UCRL-8030 Pt. I
Aug. 1968 Rev.
(Unpublished)

REVIEW OF PARTICLE PROPERTIES

Particle Data Group

Naomi BARASH-SCHMIDT, Angela BARBARO-GALTIERI,
LeRoy R. PRICE, Arthur H. ROSENFELD, Paul SODING, Charles G. WOHL

Lawrence Radiation Laboratory, University of California, Berkeley, California

Matts ROOS

CERN, Geneva, Switzerland

August 1968
(Next edition, to be published in Rev. Mod Phys., Jan 1969)

Printed in the USA at Lawrence Radiation Laboratory, Berkeley,
and in Europe at CERN, Geneva.

TENTH ANNIVERSARY EDITION

As an interesting measure of a decade's progress in particle physics, we reproduce below Side 1 of the original 1958 wallet card. Note that the relevant information really fit on a wallet card, rather than a bed sheet. Table I, entitled "Masses and Mean Lives of Elementary Particles" mentions no resonances, although 3/4 of the way down Table IV there is an entry for the (3/2, 3/2) πp resonance. Even two stable particles were missing, the η (discovered in late 1960) and the Ω^- (found in 1964).

Our Meson table now lists 26 certified isotopic multiplets, mainly unstable of course; and there are loads of other possibilities. The baryon table lists 36 states, the footnotes allude to 16 more.

Parkinson's law as usual applies: After ten years without help, we have just acquired a part-time secretary and are looking for specific funds to continue and expand this work!

DATA FOR ELEMENTARY-PARTICLE PHYSICS

Walter H. Barkas and Arthur H. Rosenfeld

Radiation Laboratory
University of California
Berkeley, California

March 20, 1958

Elementary-particle data and certain other reference information frequently are needed by research workers in high-energy physics in a compact and readily accessible form. For the use of students and staff members in the Radiation Laboratory we have attempted to meet this need. In this summary we have tried to employ units and concepts natural to this field, and to drop those that are irrelevant or obsolete. Slightly older versions of Tables I and Va have already appeared in Gell-Mann's and Rosenfeld's review of elementary particles.[1]

The tables and graphs are as follows:

Table I

Masses and mean lives of elementary particles: November, 1957

(The antiparticles are assumed to have the same spins, masses, and mean lives as the particles listed)

	Particle	Spin	Mass (Errors represent standard deviation) (Mev)	Mass difference (Mev)	Mean life (sec)	Decay rate (number per second)
Photon	γ	1	0		stable	0
Leptons	ν	$\frac{1}{2}$	0		stable	0
	e^-	$\frac{1}{2}$	0.510976 (a)		stable	0
	μ^-	$\frac{1}{2}$	105.70 ±0.06 (a)		$(2.22 \pm 0.02) \times 10^{-6}$	0.45×10^6
Mesons	π^+	0	139.63 ±0.06 (a)	4.6 (a)	$(2.56 \pm 0.05) \times 10^{-8}$ (a)	0.39×10^8
	π^0	0	135.04 ±0.16 (a)		$< 4 \times 10^{-16}$ (d)	$> 2.5 \times 10^{15}$
	K^+	0	494.0 ±0.2 ($\frac{1}{2}$)	0.4±1.8	$(1.224 \pm 0.013) \times 10^{-8}$ (h)	0.815×10^8
	K^0	0	494.4 ±1.8 (i)	K_1^0:	$(0.95 \pm 0.08) \times 10^{-10}$ (e)	1.05×10^{10}
				K_2^0:	$(4 < \tau < 13) \times 10^{-8}$ (c)	$(0.07 < \tau < 0.25) \times 10^8$
Baryons	p	$\frac{1}{2}$	938.213 ±0.01 (a)		stable	0.0
	n	$\frac{1}{2}$	939.506 ±0.01 (a)		$(1.04 \pm 0.13) \times 10^{+3}$ (a)	0.96×10^{-3}
	Λ	$\frac{1}{2}$	1115.2 ±0.14 (j)		$(2.77 \pm 0.15) \times 10^{-10}$ (k)	0.36×10^{10}
	Σ^+	$\frac{1}{2}$	1189.4 ±0.25 (l)	7.1 ± 0.4	$(0.83 \pm \frac{0.09}{0.06}) \times 10^{-10}$ (m)	1.21×10^{10}
	Σ^-	$\frac{1}{2}$	1196.5 ±0.5 (n)	$6.0^{+1.4}_{-0.5}$	$(1.67 \pm 0.17) \times 10^{-10}$ (o)	0.60×10^{10}
	Σ^0	$\frac{1}{2}$	$1190.5^{+0.9}_{-1.4}$ (p)		$(<0.1) \times 10^{-10}$ theoretically $\sim 10^{-19}$ (b)	$>10 \times 10^{10}$ theoretically $\sim 10^{19}$
	Ξ^-	?	1320.4 ±2.2 (q)		$(4.6 < \tau < 200) \times 10^{-10}$ (f)	$(>0.005, <0.2) \times 10^{10}$
	Ξ^0	?	?		?	

Table IV

Atomic and nuclear constants in units of Mev, cm, and sec[a]

GENERAL ATOMIC CONSTANTS

$N = 6.0249 \times 10^{23}$ molecules/gram

$c = 2.99793 \times 10^{10}$ cm/sec

$e = 4.80286 \times 10^{-10}$ esu $= 1.6021 \times 10^{-1'}$ coulomb.

1 Mev $= 1.6021 \times 10^{-6}$ erg [1 ev $= e(10^8/c)$]

$\hbar = 6.5817 \times 10^{-22}$ Mev sec $= 1.054 \times 10^{-27}$ erg sec.

$\hbar c = 1.9732 \times 10^{-11}$ Mev cm [$= \lambda\!\!\!^{-}$ for $p = 1$Mev/c]

$k = 8.6167 \times 10^{-11}$ Mev/°C [Boltzmann constant]

$\alpha = \frac{e^2}{\hbar c} = 1/137.037$; $e^2 = 1.44 \times 10^{-13}$ Mev cm

QUANTITIES DERIVED FROM THE ELECTRON MASS, m

Mass and Energy

$m = 0.510976$ Mev $= 1/1836.12$ m $= 1/273.26$ m_π

Rydberg, $R_\infty = \frac{mc^2}{2h} = \frac{me^4}{2\hbar^2} \times \frac{e^2}{2} = 13.605$ ev

Length (1 fermi $= 10^{-13}$ cm; 1 Å $= 10^{-8}$ cm)

$r_e = e^2/mc^2 = 2.81785$ fermi

$\lambda\!\!\!^{-}_{Compton} = \frac{\hbar}{mc} = r_e a^{-1} = 3.8612 \times 10^{-11}$ cm

a_∞ Bohr $= \frac{\hbar^2}{me^2} = r_e a^{-2} = 0.52917$ Å

Cross Section

$\sigma_{Thompson} = \frac{8}{3} \pi r_e^2 = 0.6652 \times 10^{-24} \text{cm}^2 = 0.6652$ barn

Magnetic Moment and Cyclotron Angular Frequency

$\mu_{Bohr} = \frac{e\hbar}{2mc} = 0.57883 \times 10^{-14}$ Mev/gauss

$\frac{1}{2}\omega_{cyclotron} = \frac{e}{2mc} = 8.7945 \times 10^6$ rad sec^{-1}/gauss

$\mu_{electron} = 2[1 + \frac{\alpha}{2\pi} + 0.328 (\frac{\alpha}{\pi})^2] = 2[1.001163]^b$

$\mu_{muon} = 2[1 + \frac{\alpha}{2\pi} + 0.75 (\frac{\alpha}{\pi})^2] = 2[1.001172]^b$

QUANTITIES DERIVED FROM THE PROTON MASS, m_p

Rest mass $= 938.211$ Mev/$c^2 = 1836.12$ $m_e = 6.719$ m_π

1.007593 $m_p[m_p] = 1$ amu $= \frac{1}{16} O^{16}[O^{16}]$

Magnetic Moment and Cyclotron Angular Frequency

$\mu_p = \frac{e\hbar}{2m_p c} = 3.1524 \times 10^{-18}$ Mev/gauss

$\frac{1}{2}\omega_{cyclotron} = \frac{e}{2m_p c} = 4.7896 \times 10^3$ rad sec^{-1}/gauss

$g_p \equiv \frac{\mu_p}{(\frac{e\hbar}{2m_p c})_{proton}} = 2.79275$; $g_n \equiv \frac{\mu_n}{(\frac{e\hbar}{2m_p c})_{proton}} = -1.9128$

Table IV (continued)

MISCELLANEOUS

Physical Constants

1 year $= 3.1536 \times 10^7$ sec ($\pi \times 10^7$ sec)

Density of air $= 1.205$ mg/cm^3 at 20°C

Acceleration by gravity $= 980.67$ cm/sec^2

1 calorie $= 4.184$ joules

1 atmosphere $= 1033.2$ g/cm^2

Numerical Constants

1 radian $= 57.29578$ deg; $e = 2.71828$

$\ln x = 2.3026 \log_{10} x$; $\log_{10} e = 0.43429$;

$10 = 2.30259$; $\log_{10} 2 = 0.30103$;

Stirling's approximation

$\sqrt{2\pi} (\frac{n}{e})^n < n! < \sqrt{2\pi} (\frac{n}{e})^n (1 + \frac{1}{12n-1})$

Gaussianlike Distributions

For $n > -1$ but not necessarily integral:

$\int_0^\infty x^{2n+1} \exp\left(-\frac{x^2}{2\sigma^2}\right) dx = 2^n n!\, \sigma^{2n+2}$; $(\frac{1}{2})! = \sqrt{\pi}/2$

Relation between standard deviation σ and mean deviation α:

$2\sigma^2 = \pi\alpha^2$; $\sigma = 1.4826$ probable error.

Odds against exceeding one standard deviation = 2.15:1; two, 21.1:1; three, 370:1; four, 16,000:1; five, 1,700,000:1

QUANTITIES DERIVED FROM THE MASS OF THE CHARGED PION, m_π

Rest mass $= 139.63$ Mev/$c^2 = 273.26$ $m_e = 0.14882$ m_p

Length

$\frac{\hbar}{m_\pi c} = 1.4132$ fermi $(\sim\sqrt{2}$ fermi)

Natural (= "geometrical") Nucleon Cross Section

$\pi \left(\frac{\hbar}{m_\pi c}\right)^2 = 62.7344$ mb (1 mb $= 10^{-27}$ cm^2)

$(3/2, 3/2)p\pi$ Resonance

Center-of-mass momentum: $p_\pi = 230$ Mev/c

Lab-system momentum: $P_\pi = 303$ Mev/c ($T_\pi = 194$ Mev)

RADIOACTIVITY

1 curie $= 3.7 \times 10^{10}$ disintegrations/sec

1 r $= 87.8$ ergs/g air $= 5.49 \times 10^7$ Mev/g air

Fluxes (per cm^2) to liberate 1 r in carbon:

3×10^7 minimum ionizing singly charged particles

0.9×10^9 photons of 1 Mev energy

(These fluxes are actually correct to within a factor of two for all materials.)

Natural background: 100 mr/year

"Tolerance": 100 millirem/week. [Note: 1 r may produce up to 10 rem (= 1 r equivalent for man), depending on type of radiation.]

[a] Based mainly on Cohen, Crowe, and Dumond, The Fundamental Constants of Physics (Interscience, New York, 1957).

[b] C. Sommerfield, Phys. Rev. 107, 328 (1957).

Work performed partly under the auspices of the U. S. Atomic Energy Commission.

REVIEW OF PARTICLE PROPERTIES

Particle Data Group

This review of the properties of leptons, mesons, and baryons is an updating of Rev. Mod. Phys. 40, 77 (1968). Data are evaluated, listed, averaged, and summarized in tables, wallet sheets, and a data booklet.

This review is an updating of that of January 1968,[1] with minor changes.

We have adopted the impersonal name Particle Data Group, and request that in the future our work be attributed to this group for the following reasons:

We point out in each edition that it is inappropriate to make reference to this compilation instead of to an original work (to which we even provide a handy citation) but some people still just quote us, without warning the reader that ours is a review and not an experiment. By de-emphasizing author names we hope to make it more clear, if we are quoted, that we have not done the original experiment.

In addition, when people refer to these tables as the Rosenfeld Tables, they may believe that the tables are one man's impression of the world, whereas actually we break up into small independent subgroups, and try to do an unbiased job on each table. Hence we feel that a less personal name like Particle Properties Tables is more appropriate.

We realize, however, that this new name may give the opposite impression, that the tables are the work of nameless bureaucrats, or worse, of a computer. So we want to point out that we have not changed our personalities; we are still physicists who compile data in our spare time, and we still enjoy and need your help in the form of suggestions, preprints, the verification forms that you return, and even irritated phone calls. Please keep up the necessary communication.

To avoid further impersonality we shall henceforth state who has concentrated on each major task. This edition's list is:

STABLE PARTICLES: N. Barash-Schmidt, A. Barbaro-Galtieri, LeRoy Price, and Matts Roos; with help from Hans Bichsel and Peter Schmidt (on hyperon masses), Gianni Conforto (on the neutron lifetime and on hyperon leptonic decays), and from G. H. Trilling and W. J. Willis (on K decays).

MESONS: Paul Söding, Matts Roos, and A. H. Rosenfeld, with assistance from L. Dubal.

BARYONS: A. Barbaro-Galtieri and C. G. Wohl. We thank Claiborne Johnson and Herbert Steiner for their advice on phase-shift analyses, and R. D. Tripp for general helpful discussions.

Most of what is in this unpublished summer edition will appear in the January 1969 Rev. Mod. Phys.

COMMENTS ON THE TABLES

In January 1968 we started italicising table entries if the particular quantity measured had changed by > 1 (old) standard deviation from the way it was listed in January 1967. Our motivation was twofold: 1) to call attention to poor procedures either on our part or on the part of the experimenters; 2) we suspect that quantities which have fluctuated unexpectedly in the past may continue to do so in the future. (We are not sure that this latter point is correct, but it seems reasonable. In particular we guess that there is a correlation between harder-than-average experiments and large fluctuations in the results.)

In order to preserve a reasonable number of these warning italics, we have kept our time reference back at January 1967.

COMMENTS ON THE TABLE OF STABLE PARTICLES

We have slightly modified the procedure for assigning the errors in the constrained fit of decay rates and branching ratios. Our erros are now more conservative and may appear enlarged compared with previous editions. The January 1969 text will describe in detail the changes to our procedures last described in 1967.[2]

COMMENTS ON THE MESON TABLE

The most notable recent meson experiment is that which confirms the splitting of the

---

1. Rev. Mod. Phys. 40, 77 (1968).

2. Rev. Mod. Phys. 39, 1 (1967).

A_2. Accordingly we have split it in the table, although we still give averages of unresolved experiments in a footnote. We have also deleted the H meson, believing that the "$\rho^0\pi^0$" events which seemed to make an H peak at 990 MeV are probably misidentified $\rho^0\gamma$ decays of the η' (958). For the most recent reviews of both of these questions, and many other useful reviews, we recommend the Proceedings of the April 1968 University of Pennsylvania Conference on Meson Spectroscopy, to be published by W. A. Benjamin.

We have changed the notation for the subscript which gives our guess as to whether J^P belongs to the "normal" $(0^+, 1^-, 2^+, \ldots)$ or "abnormal" $(0^-, 1^+, 2^-, \ldots)$ series. For the normal series we now use the subscript N, where we previously used V (for the series "Vacuum," "Vector,"...). Thus the old $K_V(1420)$ which decays into $K\pi$ and whose J^P is probably but not surely 2^+, is now listed as $K_N(1420)$. The reason for the change is that we have heard it called $K_{vector}(1420)$; and that certainly is confusing. For the abnormal series we still use the subscript A, as in $K_A(1320)$.

SOME STATISTICS ON CRITICAL DATA EVALUATION

We hear comments from some of our colleagues that we should be more selective in our acceptance criteria for input data, and some others feel that we should be less selective. Accordingly we have decided to give occasional statistics as to how much we "refine" the input.

At the top of each page of the listings there is a note "ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED." We now explain when we use this "ignore" feature, although a glance at the listings may be more informative.

After we have read a paper, we keypunch the results, even if we do not want to average them. Of course, if a quantity is presented without an error, our averaging programs have to ignore it. In addition, we may want to exclude it for several other reasons:

1. The result comes from a preprint or conference report, and has not yet been verified by the authors.
2. It involves some assumptions that we do not wish to incorporate.
3. It is of poor quality--e.g., bad signal to noise.

We protect the programs from such data by punching any character in column 8 of the data cards; sometimes we just punch a *, sometimes a character keyed to a note below.

For this edition we have surveyed the Meson Table. There are 550 reference cards, which generated 860 data entries. Of these, about 50% were considered useful enough to average, and another 5% were significant upper limits which also influenced the tables in some way.

WALLET SHEETS, DATA AND APPOINTMENT BOOKLETS

Extra copies of the tables from this edition are available from CERN or LRL-Berkeley, both in the form of 7- by 10-in. wallet sheets and 3- by 5-in. booklets. We can also supply 3- by 5-in. pocket diaries for physicists, which cover the academic year starting September 1968.

ACKNOWLEDGMENTS

Stanley J. Brodsky has become our consultant on fundamental constants. We want to thank Arlene Wells for her general help in handling the data.

Table S: STABLE PARTICLES. August, 1968.
(Closing date for data: July 1, 1968)

From Review of Particle Properties, UCRL-8030.

N. Barash-Schmidt, A. Barbaro-Galtieri, L. R. Price, Matts Roos, A. H. Rosenfeld, Paul Söding, C. G. Wohl

Quantities in italics have changed by more than one (old) standard deviation since January, 1967.

	$I^G(J^P)C$	Mass (MeV)	Mass difference (MeV)	Mean life (sec) $c\tau$(cm)	Mass^2 (GeV)^2	Decays: Partial mode	Fraction	Q(MeV)	‡ p or P_{max} (MeV/c)
γ	$0,1(1^-)-$	0 ($<2.\times10^{-21}$ MeV)		stable	0	stable			
ν_e ν_μ	$J=\frac{1}{2}$	0(<0.2 keV) 0(<1.6MeV)		stable	0	stable			
e	$J=\frac{1}{2}$	0.511006 ±.000002		stable ($>2\times10^{21}$y)	0.000	stable	$\mu_e = 1.001159557 \pm .000000030 \quad \frac{e\hbar}{2m_e c}$		
μ	$J=\frac{1}{2}$	105.659 ±.002		2.1983×10^{-6} ±.0008 $c\tau = 6.592\times10^{4}$	0.011	$e\nu\bar{\nu}$	100 %	105	53
						$e\gamma\gamma$	(<4.6)10^{-5}	105	53
						$3e$	(<1.3)10^{-7}	104	53
						$e\gamma$	(<6)10^{-9}	105	53
$\mu_\mu = 1.00116645 \pm .00000033 \quad \frac{e\hbar}{2m_\mu c}$			-33.949 ±.013						
$\pi^\pm$	$1(0^-)$	139.578 ±.013		2.604×10^{-8} ±.007, S=2.3* $c\tau = 781$	0.019	$\mu\nu$	100 %	34	30
						$e\nu$	(1.24±0.03)10^{-4}	139	70
						$\mu\nu\gamma$	(1.24±0.25)10^{-4}	34	30
			4.6041 ±.0037	$(\tau^+-\tau^-)/\bar{\tau}$=(.4±.2)% (test of CPT)		$\pi^0 e\nu$	(1.02±0.07)10^{-8}	4	5
						$e\nu\gamma$	(3.0 ±0.5)10^{-8}	139	70
π^0	$1^-(0^-)^+$	134.974 ±.013		c 0.89×10^{-16} ±.18, S=1.6* $c\tau = 2.67\times10^{-6}$	0.018	$\gamma\gamma$	(98.83±0.04)%	135	67
						γe^+e^-	(1.17±0.04)%	134	67
						$\gamma\gamma\gamma$	(<5)10^{-6}	135	67
						$e^+e^-e^+e^-$	b(3.47)10^{-5}	133	67
$K^\pm$	$\frac{1}{2}(0^-)$	493.82 ±0.11		1.234×10^{-8} ±.004 S=1.8* $c\tau = 370$ $(\tau^+-\tau^-)/\bar{\tau}$=(.09±.12)% (test of CPT) S=1.3*	0.244	$\mu\nu$	(63.47±0.29)% S=1.1*	388	236
						$\pi\pi^0$	(20.84±0.28)% S=1.1*	219	205
						$\pi\pi^-\pi^+$	(5.54±0.04)% S=1.1*	75	126
						$\pi\pi^0\pi^0$	(1.69±0.05)%	84	133
						$\mu\pi^0\nu$	(3.43±0.08)%	253	215
						$e\pi^0\nu$	(5.02±0.08)%	358	228
						$\pi\pi^+e^\pm\nu$	(3.8 ±0.8)10^{-5}	214	203
						$\pi\pi^\pm e^\mp\nu$	(<2)10^{-6}	214	203
						$\pi\pi^+\mu^\pm\nu$	(≤1.4)10^{-5}	109	151
			-3.94 ±0.13			$\pi\pi^\pm\mu^\mp\nu$	(<3)10^{-6}	109	151
						$e\nu$	(1.24±0.40)10^{-5}	493	247
						$\pi\pi^0\gamma$	(2.2 ±0.7)10^{-4}	219	205
						$\pi\pi^+\pi^-\gamma$	(10 ±4)10^{-5}	75	126
						$\pi e\nu\gamma$	(6 ±4)10^{-4}	354	227
						πe^+e^-	(<1.1)10^{-6}	353	227
						$\pi\mu^+\mu^-$	(<2.4)10^{-6}	143	172
						$\pi\gamma\gamma$	(<1.1)10^{-4}	354	227
K^0	$\frac{1}{2}(0^-)$	497.76 ±0.16		50%K_{short}, 50%K_{long}					
K^0_S	$\frac{1}{2}(0^-)$	S = 1.5*		0.862×10^{-10} ±.006 S=1.2* $c\tau = 2.59$	0.248	$\pi^+\pi^-$	(68.4 ±1.1)%	219	206
						$\pi^0\pi^0$	(31.6)%	228	209
K^0_L	$\frac{1}{2}(0^-)$		$-0.469\times\frac{1}{\tau_S}$ ±.015	5.29×10^{-8} ±.15 $c\tau = 1587$ S=1.3*	0.248	$\pi^0\pi^0\pi^0$	(25.5 ±2.4)% S=1.3*	93	139
						$\pi^+\pi^-\pi^0$	(13.1 ±0.5)% S=1.1*	84	133
						$\pi\mu\nu$	(27.3 ±1.4)% S=1.2*	253	216
						$\pi e\nu$	(35.9 ±1.5)% S=1.2*	358	229
						$\pi^+\pi^-$	(0.149±0.006)%	219	206
						c) $\pi^0\pi^0$	still uncertain	228	209
						$\pi^+\pi^-\gamma$	(<0.3)%	219	206
						c) $\gamma\gamma$	still uncertain	498	249
						$e\mu$	(<0.6)10^{-5}	392	238
						$\mu^+\mu^-$	(<1.5)10^{-6}	286	225
						e^+e^-	(<1.7)10^{-5}	497	249
η	$0^+(0^-)^+$	548.8 ±0.6		Γ=(2.3±0.5)keV	Neutral decays 71.0%	$\gamma\gamma$	(38.1 ±2.2)%	549	274
						$\pi^0\gamma\gamma$	(3.4 ±2.9)% S=1.3*	414	258
						$3\pi^0$	(29.4 ±2.8)% (c)	144	179
					Charged decays 29.0%	$\pi^+\pi^-\pi^0$	(23.4 ±1.1)%	135	174
						$\pi^+\pi^-\gamma$	(5.5 ±0.5)%	269	236
						$\pi^0 e^+e^-$	(< 0.01)%	413	258
						$\pi^+\pi^-e^+e^-$	(0.1 ±0.1)%	268	236
p	$\frac{1}{2}(\frac{1}{2}^+)$	938.256 ±0.005	-1.2933 ±.0001 S=3.2*	stable ($>2\times10^{28}$y)	0.880				
n	$\frac{1}{2}(\frac{1}{2}^+)$	939.550 ±0.005		(0.96 ±0.04)10^3 $c\tau = 2.87\times10^{13}$	0.882	$pe^-\nu$	100 %	1	1
Λ	$0(\frac{1}{2}^+)$	1115.57 ±0.07 S=1.4*		2.52×10^{-10} ±.03 S=1.3* $c\tau = 7.55$	1.245	$p\pi^-$	(65.3 ±1.2)%	38	100
						$n\pi^0$	(34.7 ±1.2)%	41	104
						$pe\nu$	(0.88±0.15)10^{-3}	177	163
						$p\mu\nu$	(1.35±0.60)10^{-4}	72	131
Σ^+	$1(\frac{1}{2}^+)$	1189.43 ±0.17 S=2.8*		0.810×10^{-10} ±.013 $c\tau = 2.43$	1.412	$p\pi^0$	(52.8 ±1.5)%	116	189
						$n\pi^+$	(47.2 ±1.5)%	110	185
						$p\gamma$	(1.9 ±0.5)10^{-3}	251	225
						$n\pi^+\gamma$	(≈1.)10^{-3}	110	185
						$\Lambda e^+\nu$	(2.2 ±0.7)10^{-5}	73	72
			-8.00 ±.18	$\frac{\Gamma(\Sigma^+\to \ell^+ n\nu)}{\Gamma(\Sigma^-\to \ell^- n\nu)}$ = < .05		$n\mu^+\nu$	(< 0.7)10^{-4}	144	202
						$ne^+\nu$	(< 0.2)10^{-4}	249	224
Σ^0	$1(\frac{1}{2}^+)$	1192.55 =0.11 S=1.1*		$<1.0\times10^{-14}$ $c\tau<3\times10^{-4}$	1.422	$\Lambda\gamma$	100 %	77	75
						Λe^+e^-	b(5.45)10^{-3}		
Σ^-	$1(\frac{1}{2}^+)$	1197.42 ±0.09 S=1.1*	-4.87 ±.07	1.64×10^{-10} ±.06 S=2.4* $c\tau = 4.92$	1.434	$n\pi^-$	100 %	118	193
						$ne^-\nu$	(1.14±0.08)10^{-3}	257	230
						$n\mu^-\nu$	(0.62±0.12)10^{-3}	152	210
						$\Lambda e^-\nu$	(0.66±0.11)10^{-4}	81	79
						$n\pi^-\gamma$	(≈1)10^{-3}	118	193
Ξ^0	$\frac{1}{2}(\frac{1}{2}^+)$?	1314.7 =0.7	-6.6 ±.7	3.03×10^{-10} ±.18 $c\tau = 9.10$	1.728	$\Lambda\pi^0$	100 %	64	135
						$p\pi^-$	(< 0.9)10^{-3}	237	299
						$pe^-\nu$	(< 1.3)10^{-3}	376	323
						$\Sigma^+e^-\nu$	(< 1.5)10^{-3}	125	119
						$\Sigma^-e^+\nu$	(< 1.5)10^{-3}	117	112
						$\Sigma^+\mu^-\nu$	(< 1.5)10^{-3}	20	64
						$\Sigma^-\mu^+\nu$	(< 1.5)10^{-3}	12	49
						$p\mu^-\nu$	(< 1.3)10^{-3}	271	309
Ξ^-	$\frac{1}{2}(\frac{1}{2}^+)$?	1321.25 ±0.18		1.66×10^{-10} ±.04 S=1.1* $c\tau = 4.98$	1.746	$\Lambda\pi^-$	100 %	66	139
						$\Lambda e^-\nu$	(0.9 $^{+0.7}_{-0.4}$)10^{-3}	205	190
						$n\pi^-$	(< 1.1)10^{-3}	242	303
						$\Lambda\mu^-\nu$	(< 1.3)10^{-3}	100	163
						$\Sigma^0 e^-\nu$	(< 0.5)10^{-3}	128	122
						$\Sigma^0\mu^-\nu$	(< 0.5)%	23	70
						$ne^-\nu$	(< 1.0)%	381	327
Ω^-	$0(\frac{3}{2}^+)$? ?	1672.4±.6 S=1.1*		$1.3^{+0.4}_{-0.3}\times10^{-10}$ $c\tau = 3.9$	2.797	$\Xi^0\pi^-$	8 events seen	217	293
						$\Xi^-\pi^0$	3 events seen	216	289
						ΛK^-	13 events seen	63	210

Partial Rates (sec^{-1})

$(51.42 \pm 0.29)10^6$	S = 1.2*	
$(16.89 \pm 0.24)10^6$	S = 1.1*	
$(4.49 \pm 0.03)10^6$	S = 1.1*	
$(1.37 \pm 0.04)10^6$		
$(2.78 \pm 0.06)10^6$		
$(4.07 \pm 0.07)10^6$		
$(0.794\pm0.013)10^{10}$		
$(0.367\pm0.013)10^{10}$		
$(4.81 \pm 0.49)10^6$	S=1.1*	
$(2.29 \pm 0.10)10^6$	S=1.2*	
$(5.15 \pm 0.30)10^6$	S=1.1*	
$(6.64 \pm 0.33)10^6$	S=1.2*	
$(0.028\pm0.001)10^6$		

General Atomic and Nuclear Constants [a]

N	$= 6.02252\times10^{23}$ mole^{-1} (based on $A_C{}^{12}$=12)
c	$= 2.997925\times10^{10}$ cm sec^{-1}
e	$= 4.80298\times10^{-10}$ esu $= 1.60210\times10^{-19}$ coulomb
1 MeV	$= 1.60210\times10^{-6}$ erg
$\hbar$	$= 6.5819\times10^{-22}$ MeV sec $= 1.05449\times10^{-27}$ erg sec
$\hbar c$	$= 1.9732\times10^{-11}$ MeV cm = 197.32 MeV fermi
k	$= 8.6171\times10^{-11}$ MeV deg^{-1} (Boltzmann const.)
α	$= e^2/\hbar c = 1/137.0388$
m_e	$= 0.511006$ MeV/c^2 $= 1/1836.10\ m_p$
m_p	$= 938.256$ MeV/c^2 $= 1836.10\ m_e = 6.721\ m_{\pi^\pm}$ $= 1.00727663\ m_1$ (where m_1 = 1 amu = $\frac{1}{12} m_C{}^{12}$ = 931.478 MeV/c^2)
r_e	$= e^2/m_e c^2 = 2.81777$ fermi (1 fermi = 10^{-13} cm)
λ_e	$= \hbar/m_e c = r_e \alpha^{-1} = 3.86144\times10^{-11}$ cm
a_∞ Bohr	$= \hbar^2/m_e e^2 = r_e \alpha^{-2} = 0.529167$ A(1 A=10^{-8} cm)
$\sigma_{Thomson}$	$= \frac{8}{3}\pi\ r_e{}^2 = 0.66516\times10^{-24}$ cm^2=0.66516 barn
μ_{Bohr}	$= e\hbar/2m_e c = 0.578817\times10^{-14}$ Mev gauss^{-1}
μ_{nucl}	$= e\hbar/2m_p c = 3.1524\times10^{-18}$ Mev gauss^{-1}

$\frac{1}{2}\omega_{cyclotron}$ (rad sec^{-1} gauss^{-1}) $= e/2m_e c = 8.79404\times10^6$

$= e/2m_p c = 4.7895\times10^3$

(continued on the other side)

[a] Based mainly on E. R. Cohen and J. W. M. DuMond, Rev. Mod. Phys. 37, 537 (1965). Note that recent fine structure and ac Josephson effect measurements currently indicate that α is ~20 ppm larger than the value given above. The corresponding readjustment of the fundamental constants will increase e by 60 ppm, $\hbar$ by 100 ppm, m_e by 60 ppm, and decrease N by 60 ppm. For a preliminary analysis see W. H. Parker, B. N. Taylor, and D. N. Langenberg, Phys. Rev. Lett. 18, 287 (1967).

{ CP violation parameters

$\eta_{+-} = \frac{A(K_L\to\pi^+\pi^-)}{A(K_S\to\pi^+\pi^-)} = |\eta_{+-}|e^{i\Phi_{+-}}$ $\quad (00)$

$|\eta_{+-}| = (1.89\pm0.04)\times10^{-3}$

$\Phi_{+-} = (49\pm8)^\circ$

$|\eta_{00}|$ still uncertain, see data listings for published values

Decay Parameters †

Magnetic Moment ($e\hbar/2m_p c$)	Measured: α	Φ(degree)	Derived: γ	Δ(degree)
2.792763 ±.000030				
-1.913148 ±.000066	$\frac{g_A}{g_V} = -1.198\pm.022$ †			
-0.73 ±.16 S=1.2*	0.646±0.016	(-6±7)° S=1.2*	0.75	(7±8)°
	0.71 ±0.18			
	0.06 ±0.19	For $\Lambda\to pe\nu$, $\frac{g_A}{g_V} = -1.14^{+0.23}_{-0.33}$ †		
2.4 ±.6	-.955±0.070	←S=1.1*		
	+.018±0.039	(180±30)°	-0.99	(0±85)°
-.06 ±0.05 S=1.6*		(-22±30)° For $\Sigma^-\to ne^-\nu$, $g_A/g_V = 0.05^{+.23}_{-.32}$ †	0.90	
-.37 ±0.08		(13± 15)° For $\Sigma^-\to\Lambda e\nu$, $g_V/g_A = 0.3\pm0.3$ †	0.93	(28 ± 34)°
-.42 ±.03		(0±7)° S=1.1*	0.91	(0± 15)°

† The definition of these quantities is as follows: [for more details on sign convention, see RMP 39, 1 (1967)]

$\alpha = \frac{2\,\mathrm{Re}(S^*P)}{|S|^2+|P|^2}$; $\beta = \frac{2\,\mathrm{Im}(S^*P)}{|S|^2+|P|^2}$; $\gamma = \frac{|S|^2-|P|^2}{|S|^2+|P|^2}$

$\tan\Phi = \beta/\gamma$ $\quad \tan\Delta = -\beta/\alpha$

g_A/g_V defined by $M \propto \langle B_f|\gamma_\lambda(g_V - g_A\gamma_5)|B_i\rangle$

* S = Scale factor = $\sqrt{\chi^2/(N-1)}$ where N ≈ number of experiments. S should be ≈ 1. If S > 1, we have enlarged the error of the mean, δx, i. e., $\delta x \to S\,\delta x$. This new convention is still inadequate, since if S > 1, the real uncertainty is probably even greater than $S\delta x$. See text of January 1967 edition.

‡ In decays with more than two bodies, P_{max} is the maximum momentum that any particle can have.

b. Theoretical value, see also data card listings.

c. See note in data card listings.

Change in Notation. The subscript N stands for "normal spin-parity series" ($J^P = 0^+, 1^-, 2^+, \ldots$), A for "abnormal" ($J^P = 0^-, 1^+, 2^-, \ldots$).

Quantities in italics have changed by more than one (old) standard deviation since January, 1967.

Symbol (J^P)	$I^G(J^P)C_n$ ⊢ estab. ?= guess	Mass M (MeV)	Width Γ (MeV)	$M^2_{(a)}$ ±Γ M (GeV)^2	Partial decay modes: Mode	Fraction %	Q (MeV)	p or p_{max}(b) (MeV/c)
$\pi^\pm(140)$	$\pi(0^-)$	$1^-(0^-)+$	139.58		0.019	See Table S		
$\pi^0(135)$			134.97		0.018			
$\eta(549)$	$\eta(0^-)$	$0^+(0^-)+$	548.8 ±0.6	2.3 keV ±.5 keV	0.301 ±.000	all neutral	71 } See Table S	
						$\pi^+\pi^-\pi^0 + \pi^+\pi^-\gamma$	29 }	
$\rho^\pm(765)$	$\rho(1^-)$	$1^+(1^-)-$	755-770 (c)	110-150 (c)	0.585 ±.095	$\pi\pi$	≈ 100	491 359
						$\pi^\pm\pi^+\pi^-\pi^0$	< 0.2	212 247
						$\pi^+\pi^-\pi^+\pi^-$	< 0.15	212 247
						$\pi^0\gamma$	< 0.4	630 372
$\rho^0(765)$			764±11	90-150 (c)	0.590 ±.090	$\eta\pi^\pm$	< 0.8	82 146
						e^+e^-	.0056±.0006 (d)	769 385
						$\mu^+\mu^-$	.0066±.0015 (e)	559 370
$\omega(783)$	$\phi'(1^-)$	$0^-(1^-)-$	783.4 ±0.7 S=2.0*	12.2 ±1.3	0.614 ±.009	$\pi^+\pi^-\pi^0$	≈ 90	369 328
						$\pi^+\pi^-$	seen (f)	504 366
						$\pi^0\gamma$	9.3±0.8	648 380
						η+ neutral	< 1.5	234 199
						$\pi^+\pi^-\gamma$	< 5	504 366
						$\pi^0\pi^0\gamma$	< 1	513 368
						e^+e^-	0.02±.012 (g)	782 392
						$\mu^+\mu^-$	< 0.10	572 377
						$\pi^0\mu^+\mu^-$	< 0.2	437 350
$\eta'(958)$ or X^0	$\eta'(0^-)$	$0^+(0^-)+$ (J^P=1^+, 2^- not yet excluded)	958.3 ±0.8	<4	0.918 <.004	$\eta\pi\pi$	67 ± 11	131 232
						$\pi^+\pi^-\gamma$(incl. $\rho^0\gamma$)	22 ± 3	679 458
						neutrals (excl. $\eta\pi\pi$)	11 ± 9	
See note (h), on name η'.						for upper limits see footnote (i)		
$\delta(962)$	?( )	≥1 ( )	962 ±5	<5	0.927 <.005			
Still needs confirmation								
$\pi_N(1016)$ → $K\bar{K}$	$\pi(0^+)$	$1^-(0^+)+$	1016 +25 −5 (if →, ±10 res.)		1.032 ±.025	$K^\pm K^0$	only mode seen	24 110
						$\eta\pi$	< 80	328 342
Resonance, virtual bound state, or antibound state, still not distinguished.								
$\phi(1019)$	$\phi(1^-)$	$0^-(1^-)-$	*1019.5* ±0.6 S = 1.5*	3.4 ±0.8	1.039 ±.004	K^+K^-	47.3 ± 3.2	32 126
						K_LK_S	38.9 ± 3.1	24 109
						$\pi^+\pi^-\pi^0$ (incl. $\rho\pi$)	13.8 ± 4.3	605 462
						e^+e^-	0.049±.016	1018 510
						$\mu^+\mu^-$	0.035 +.035 −.018	808 499
						for upper limits see footnote (j)		
$\eta_{0^+}(1070)$ → K_SK_S	$\eta(0^+)$	$0^+(0^+)+$	1069 ±20§ S=2.3*	~ 80 (?) see note (k)	1.14 ±.09	$\pi\pi$	< 70	793 516
(Some data still favor large scattering length)						$K\bar{K}$	>30	76 198
A1(1070)	$\pi(1^+)$	$1^-(1^+)+$	1070 ±20§	80 ±35§	1.12	3π see note (ℓ)	≈ 100	651 488
Existence still in doubt		($J^P = 2^-$ not yet excluded)				$K\bar{K}$	< 0.25, G=$(-1)^{\ell+1}$ forbids this	
B(1220)	ρ(A) ?	$1^+(1^+)-$	1221 ±16 S=1.2*	123 ±16 S=1.3*	1.46 ±.14	$\omega\pi$	≈ 100	297 339
						$\pi\pi$	< 30 } suggests	950 600
$J^P = 2^+, 3^-, \ldots$ still poss.						$K\bar{K}$	< 2 } J^P=Abnormal	240 360
						for upper limits see footnote (m)		
f(1260)	$\eta'(2^+)$	$0^+(2^+)+$	1264 ±10§	*145* § ±25 S=2.7*	1.57 ±.15	$\pi\pi$	large	984 616
						$2\pi^+2\pi^-$	< 4	705 552
						$K\bar{K}$ indic. seen,	< 2.5	267 388
D(1285)	η'(A)	0^+(A)+	1285 ±4	32 ±8	1.65 ±.04	$K\bar{K}\pi$(mainly $\pi_N(1016)\pi$) only mode seen		154 304
						$K^*\bar{K}+\bar{K}^*K$		-100
($J^P = 0^-, 1^+, 2^-$ with 1^+ favored)						$\pi\pi\rho$	not seen	256 356
$A2_L(1270)$	π(N)	1^-(N)+	1269 ±5	26 ±7	1.61 ±.03	$\rho\pi$ (and π+neutrals)	dominant	364 387
see footnote(n)						$\eta\pi$ indication seen → J^P=N		580 504
						$K\bar{K}$, $\omega\pi$ not seen → G($K\bar{K}$) = $(-1)^{\ell+1}$ sugg. ℓ odd.		
$A2_H(1315)$	$\pi(2^+)$	$1^-(2^+)+$	1315 ±3 S=1.3*	29 ±6 S=1.4*	1.73 ±.04	$\rho\pi$ (and π+neutrals)	dominant	410 420
see footnote(n)						$K\bar{K}$	seen	327 434
						$\eta\pi$	indication seen	626 532
E(1420)	η(A)	$0^+(0^-)+$	1424 ±6	71 ±10 S=1.2*	2.03 ±.10	$K^*\bar{K}+\bar{K}^*K$	50 ±10	38 157
						$\pi N(1016)\pi$	50 ±10	268 328
($J^P = 1^+$ not yet excluded)						$\pi\pi\eta$	< 88	596 569
						$\pi\pi\rho$	not seen	384 455
f'(1515)	$\eta(2^+)$	$0^+(2^+)+$	1514 ±5	73 ±23 S=1.8*	2.29 ±.11	$K\bar{K}$	72 ± 12 (o)	518 570
						$K^*\bar{K}+\bar{K}^*K$	10 ± 10 (o)	128 294
						$\pi\pi$	< 14	1235 744
						$\eta\pi\pi$	18 ± 10	686 624
						$\eta\eta$	< 40	417 522

$K^+(494)$ $K^0(498)$	$K(0^-)$	$1/2(0^-)$	493.82 497.76	0.244 0.248	See Table S						
$K^*(890)$	$K(1^-)$	$1/2(1^-)$	891.4 ±0.6	49.7 ±1.1	0.797 ±.044	$K\pi$ $K\pi\pi$	≈ 100 < 0.2	259 289 120 216			
	$m_0 - m_\pm = 6.3 \pm 4.1$		L for charged K^*								
$K_A(1230)$ or C	K(A)	$1/2(1^+)$	≈ 1240	≈ 60	1.54 ±.07	K-Region		Kππ dominant See footnote (r).			
	Still some doubt.		2- still poss.								
$K_A(1320)$	K(A)	$1/2(1^+)$	≈ 1330	≈ 70	1.77 ±.09						
	$J^P = 2^-$ not yet completely ruled out.										
$K_N(1420)$	$K(2^+)$	$1/2(2^+)$	*1422* ±4 S=1.2*	89 ±6	2.012 ±.126	$K\pi$ $K^*\pi$ $K\rho$ $K\omega$ $K\eta$	51 ± 4 33 ± 4 11 ± 3 3.4± 1 2.0± 1	787 615 388 413 S = 1.4* 156 318 143 304 378 482			
$K_A(1780)$ or L	K(A) ?	$1/2(A)$?	1775 ±12 S=1.3*	72 ±26 S=1.4*	3.17 ±.13	$K\pi$ $K^*\pi$ $K_N(1420)\pi$ $K\rho$ Remaining $K\pi\pi$ $K\omega$ $K\eta$	< 2.3 24 ± 8 16 ± 6 45 ± 15 4.8± 2 < 1	1167 825 772 670 245 317 532 632 1032 807 519 624 754 732			

$\pi_A(1640)$ [= $R_A(1630)$ see note (p)]	$1^-(A)+$?	1633 ±9 S=1.2*	93 ±24	3π $\rho\pi$ [$\pi^\pm\omega(\to\pi^+\pi^-\pi^0)$/all $\pi^\pm\pi^+\pi^-$] [$\pi^\pm\rho^0(\to\pi^+\pi^-)$/all $\pi^\pm\pi^+\pi^-$] $\eta\pi$ $K\bar{K}$ $\pi^\pm 2\pi^+ 2\pi^-$	dominant < 20 - 35± 20 < 9 < 40 < 10	1245 745 252 966 654 935	797 637 320 727 658 714				
$\rho_N(1650)$ ($J^P = 1^-, 3^-, \ldots$ with 3^- favored)	$1^+(N)-$?	1650 (q) ±20	120 (q) ±30	2π $K\bar{K}$ indication seen, (other possible modes see under $\rho(1700)$? below)	dominant < 10	1385 668	820 667				
$g \to 2\pi$ [? $R_1(1630)$ see note (p)]	Not yet a completely established resonance										
$\rho(1700)$? [? $R_1(1700)$ see note (p)]	$1^+(A)-$?	1700 (r) ±20(r)	110 (r) ±25(r)	4π [$\pi^\pm A_9(\to\pi^+\pi^-\pi^0)$/all $\pi^\pm\pi^+\pi^-\pi^0$ 40±20] [$\pi^\pm\omega(\to\pi^+\pi^-\pi^0)$/all $\pi^\pm\pi^+\pi^-\pi^0$ 25±10] [$\pi^\pm\rho^0$/all $\pi^\pm\pi^+\pi^-\pi^0$ seen] $\pi^\pm 2\pi^- 2\pi^-\pi^0$ 2π (if ≠ $\rho_N(1650)$)	dominant < 11 < 15 < 10	1144 263 777 170 540 862 1420	792 333 661 371 532 699 838				

→ The following bumps, excluded above, are listed among the data cards: σ(410); ε(730); H(990); A1.5(1170); ρρ(1410); K_SK_S(1440); η(1600)→ 4π; R_{1-4}(1630-1830); η or ρ(1830)→ 4π; φ or π(1830)→ ωππ; S(1930); T(2200); $NN_{I=0}$(2380), U(2380); κ(725); K_N(1080); K_A(I=3/2)(1175); K_A(I=3/2)(1265); K_A(I=1/2)(1280); K_N(I=1/2)(1660); K^*(2240) → $\bar{Y}N$

* Quoted error includes scale factor S = $\sqrt{\chi^2/(N-1)}$. See footnote to Table S.

† Square brackets indicate a subreaction of the previous (unbracketed) decay mode.

§ This is only an educated guess; the error given is larger than the error of the average of the published values (see listings for the latter).

(a) ΓM is the half-width of the resonance when plotted against M^2.

(b) For decay modes into ≥ 3 particles p_{max} is the maximum momentum that any of the particles in the final state can have. The momenta have been calculated using the averaged central mass values, without taking into account the widths of the resonances.

(c) Values reported for M(ρ) and Γ(ρ) fluctuate so widely that we cannot give averaged values with meaningful errors. The ranges given in the main table show where we believe the final values are most likely to fall. Contrast the results tabulated in this note.

	M	Γ	
ρ^0	764±11	93±15	from e^+e^- colliding beams
ρ^0	767± 2	151± 4	from ππ phase shift anal.
ρ^-	764± 2	147± 4	from $\pi N \to \rho N$, fits in phys. region
ρ^-	755± 5	110± 9	from $\pi N \to \rho N$, Chew-Low extrap.

(d) The quoted value of the rate $\rho^0 \to e^+e^-$ is the average from two $e^+e^- \to \pi^+\pi^-$ experiments (which alone give an average of (0.0054±0.0007)%) and one photoproduction experiment of high mass resolution. Interference effects with ω decay are hoped to be small.

(e) Warning: The values given in the literature, and in our table, for the rate $\rho^0 \to \mu^+\mu^-$ may be somewhat too high, due to possible interference with ω decay.

(f) Reported values range between 1% and 10%, and depend on assumptions on ρ-ω interference.

(g) If one includes results from experiments that do not resolve ω from ρ and therefore assume a ratio $\Gamma(\omega \to e^+e^-)/\Gamma(\rho \to e^+e^-)$ from SU(3) and ωφ mixing, the average value of the rate $\omega \to e^+e^-$ becomes (0.0069±.0013)% (where the error does not include systematic uncertainties).

(h) This 0^- meson was named η' on discovery, when it looked as if it completed the 0^- nonet. With the recent evidence that the E(1420) is probably also 0^-, it is no longer clear whether η' or E or both are mixed in with the π, η, K octet; so the name η' may be misleading.

(i) Empirical limits on fractions for other decay modes of η'(958): $\pi^+\pi^-$ < 7%, 3π < 7%, 4π < 1%, 6π < 1%, $\pi^+\pi^-e^+e^-$ < 0.6%, $\pi^0e^+e^-$ < 1.3%, ηe^+e^- < 1.1%, $\pi^0\rho^0$ < 4%, $\pi^0\omega$ < 8%.

(j) Empirical limits on fractions for other decay modes of φ(1019): $\pi^+\pi^-$ < 20%, ηγ < 8%, η + neutrals < 13%, $\pi^+\pi^-\gamma$ < 4%, ωγ < 5%, ργ < 2%.

Footnotes continued

(k) There is no well-established Y = 0 meson resonance with M > 1700 MeV. For a list of some possible states see footnote (p).

Footnotes to Meson Table (continued)

(k) Width of $\eta_{0^+}(1070) \to K_S K_S$: Average value from two bubble chamber experiments is $\Gamma = (72 \pm 13)$MeV; whereas two spark chamber experiments on $K_S K_S$ give $\Gamma \gtrsim 100$ MeV and another spark chamber experiment (observing what might be a $\pi^+\pi^-$ mode) yields $\Gamma < 25$ MeV. (For references, see data listings.)

(ℓ) $\rho\pi$ fraction of 3π mode difficult to distinguish because ρ bands cover most of the Dalitz plot.

(m) Empirical limits on fractions for decay modes of B(1220): $\pi\pi < 30\%$, $K\bar{K} < 2\%$, $4\pi < 50\%$, $\phi\pi < 1.5\%$, $\eta\pi < 25\%$, $(K\bar{K})^{\pm}\pi^0 < 8\%$, $K_S K_S \pi^{\pm} < 2\%$, $K_S K_L \pi^{\pm} < 6\%$.

(n) Although the splitting of the A2 needs further confirmation, we give the results from the two experiments that have observed a split A2; for M and Γ of $A2_H$ we have also used the values for the $K\bar{K}$ mode from other experiments. Since most experiments have only seen one rather wide, A2 enhancement, we here list its ("combined") properties: $I^G(J^P)C_n = 1^-(2^+)+$; $M = 1297 \pm 10$ MeV (S=1.9*) (§), $\Gamma = 91 \pm 10$ MeV (S=1.1*) (§); partial decay modes: $\rho\pi$ 85 ±3% , $K\bar{K}$ 2.5 ± 0.5%, $\eta\pi$ 12 ±4% , $\eta'\pi$ 0.5 ± 0.4% (S=1.9*).

(o) There is only a weak indication for a $K^*\bar{K} + \bar{K}^*K$ mode of the f' (1514). If this mode does not exist, the $K\bar{K}$ branching fraction will have to be reported as (80 ± 13)% (rather than (72 ± 12)% as given in the table).

(p) See the listings for many statistically weak Y = 0 bumps with $M \geq 1700$ MeV, seen in bubble chambers. We tabulate here 9 statistically strong bumps seen with a missing mass spectrometer ($\pi^- p \to p(MM)^-$) or seen in counter experiments on the $\bar{p}N$ total cross section.

Name	I	M (MeV)	Γ (MeV)	Decay Modes Observed	
R1(1630)	≥1	1630 ± 15	≤21	1/3/>3 charg. part. ≈.37/.59/.04	(MMS)⁻
R2(1700)	≥1	1700 ± 15	≤30	1/3/>3 charg. part. ≈.43/.56/.01	(MMS)⁻
R3(1750)	≥1	1748 ± 15	< 38	1/3/>3 charg. part. >.14/<.80/.15	(MMS)⁻
S(1930)	≥1	1929 ± 14	< 35	1/3/>3 charg. part. ≈ 0/.92/ 0	(MMS)⁻
? NN̄(2190)	1	2190 ± 10	! ≈85	structure in NN̄ total cross section	
? T(2200)	≥1	2195 ± 15	! ≤13	(MM)⁻ → 3 charged particl. ≈94%	
? NN̄(2345)	1	2345 ± 10	! ≈140	structure in NN̄ total cross section	
? U(2380)	≥1	2382 ± 24	! ≤30	(MM)⁻ → 1/3/>3 chrgd part. ≈30/45/25	
NN̄(2380)	0	2380 ± 10	≈140	structure in NN̄ total cross section	

There is no evidence on the G, J, or P quantum numbers of these bumps, nor is there satisfactory agreement between them and the bubble chamber claims. Further, the NN̄ bumps are broader than the $(MM)^-$ bumps, and there is no evidence for or against their interpretation as resonances.

(q) Taken from compilation by T. Ferbel, Proc. 1968 Philadelphia Conf. See the data listings for averages of the values given in the literature.

(r) See note in listings. Some investigators see a broad enhancement in mass ($K\pi\pi$) from 1200 - 1350 MeV, and others see structure. A further bump at 1280 MeV, $\Gamma = 80$ MeV, has been suggested. In light of this confusion, the masses, widths, quantum numbers, and branching ratios are at best tentative. For the mass region 1200 - 1350 MeV, the decay rate into $K^*(890)\,\pi$ is large, and a $K\rho$ decay is seen. The $K\eta$, $K\omega$ and $K\pi$ rates are less than a few percent (although for $K\pi$, there is some disagreement among experimenters).

Mixing angles from Quadratic SU(3) Mass Formula: 0^- nonet (π, K, η, η') $\theta = 10.4^\circ \pm 0.2^\circ$; 0^- nonet (π, K, η, E) $\theta = 6.2^\circ \pm 0.1^\circ$; 1^- nonet (ρ(m = 765±15 MeV), K^*, ϕ, ω) $\theta = 39.9 \pm 1.1^\circ$; 2^+ nonet (A2, $K_V(1420)$, f', f) $\theta = 29.9^\circ \pm 2.2^\circ$.

Particle or resonance	$I(J^P)$ —— = estab.	Beam π, K (BeV) (BeV/c)	Mass (MeV)	Γ (MeV)	$M^2 \pm \Gamma M$ (BeV^2)	Partial decay modes: Mode	Fraction (%)	p or $p^{\dagger}_{max}$ (MeV/c)	$4\pi\lambda^2$ (mb)
p	$1/2(1/2^+)$		938.3		0.880	See Table S			
n	——		939.6		0.883				
N' (1470)	$1/2(1/2^+)$ P_{11}	T=0.53πp p=0.66	1470	210	2.16 ±0.31	Nπ	65	420	27.8
	——					Nππ	35	368	
						[Nσ][a]	[domin]	283	
N(1518)	$1/2(3/2^-)$ D_{13}	T=0.62 p=0.75	1525	115	2.33 ±0.18	Nπ	55	460	23.2
	——					Nππ	45	414	
						[Δ(1236)π][a]	[domin]	229	
						Nη	~0.5	161	
N(1550)	$1/2(1/2^-)$ S_{11}	T=0.66 p=0.79	1550	130	2.40 ±0.20	Nπ	30	477	21.5
	——					Nη	70	210	
						Nππ	small	434	
N(1680)	$1/2(5/2^-)$ D_{15}	T=0.88 p=1.02	1680	170	2.82 ±0.29	Nπ	40	567	15.2
	——					Nππ	dom. inel.	533	
						[Δ(1236)π][a]	[?]	365	
						ΛK	<1.6	218	
						Nη	<2.5	379	
N(1688)	$1/2(5/2^+)$ F_{15}	T=0.90 p=1.03	1690	130	2.86 ±0.22	Nπ	65	574	14.9
	——					Nππ	dom. inel.	540	
						[Δ(1236)π][a]	[?]	374	
						ΛK	<.13	234	
						Nη	<1.5	390	
N' (1710)	$1/2(1/2^-)$ S_{11}	T=0.94 p=1.07	1710	300	2.92 ±0.51	Nπ	80	587	14.2
	——								
N(2190)	$1/2(7/2^-)$ G_{17}	T=1.96 p=2.10	2200	250	4.84 ±0.55	Nπ	30	894	6.13
	——								
N(2650)	$1/2(?^-)$ ——	T=3.12 p=3.26	2650	360	7.02 ±0.95	Nπ	(J+1/2)x=0.45[b]	1154	3.67
N(3030)	$1/2(?^?)$ ——	T=4.26 p=4.40	3030	400	9.18 ±1.21	Nπ	(J+1/2)x=0.05[b]	1377	2.62
Δ(1236)	$3/2(3/2^+)$ P_{33}	T=0.195 p=0.304	(++) 1236.0 ±0.6	120 ±2	1.53 ±0.15	Nπ	100	231	91.9
	——					$N\pi^+\pi^-$	0	89	
		$m_0 - m_{++} = 0.45 \pm 0.85$		$m_- - m_{++} = 7.9 \pm 6.8$		Nγ	~0.6	262	
Δ(1640)	$3/2(1/2^-)$ S_{31}	T=0.81 p=0.94	1640	180	2.69 ±0.30	Nπ	30	540	16.8
	——					Nππ	dom. inel.		
Δ(1950)	$3/2(7/2^+)$ F_{37}	T=1.41 p=1.54	1950	220	3.80 ±0.43	Nπ	40	741	8.91
	——					ΣK	2.4	453	
						Σ(1385)K	1.2	232	
						Δ(1236)π	>30	571	
						Δ(1236)ρ	seen		
Δ(2420)	$3/2(11/2^+)$ ——	T=2.50 p=2.64	2420	310	5.86 ±0.75	Nπ	11	1024	4.67
	——					Nππ	>20	1007	
Δ(2850)	$3/2(?^+)$ ——	T=3.71 p=3.85	2850	400	8.12 ±1.14	Nπ	(J+1/2)x=0.25[b]	1266	3.05
Δ(3230)	$3/2(?^?)$ ——	T=4.94 p=5.08	3230	440	10.4 ±1.4	Nπ	(J+1/2)x=0.05[b]	1475	2.24
Z_0(1865)	$0(?^?)$ —	p=1.15 K^+p Resonance interpretation not established.	1865	180	3.47 ±0.34	NK	(J+1/2)x=0.35[b]	579	14.6
						NK^*		179	
Λ	$0(1/2^+)$ ——		1115.6		1.24	See Table S			
Λ(1405)	$0(1/2^-)$ S_{01} ——	p<0 K^-p	1405 ±5§	40 ±10§	1.97 ±0.06	Σπ	100	140	
Λ(1520)	$0(3/2^-)$ D_{03} ——	p=0.392	1518.8 ±1.5	16 ±2	2.31 ±0.02	NK̄	45±4 } S=1.8*	235	83.6
						Σπ	45±4	258	
						Λππ	10±1	251	
Λ'(1670)	$0(1/2^-)$ S_{01} ——	p=0.74	1670	18	2.79 ±0.03	NK̄	$K^-p \to \Lambda\eta$ seen	410	28.5
						Λη		66	
Λ'(1690)	$0(3/2^-)$ D_{03} ——	p=0.79	1695	40	2.88 ±0.07	NK̄	20	434	25.6
						Σπ	58	407	
Λ(1815)	$0(5/2^+)$ F_{05} ——	p=1.05	1815 ±5§	75 ±10§	3.30 ±0.14	NK̄	70	538	16.7
						Σπ	10	500	
						Σ(1385)π	8	359	
						Λη	~1	346	
Λ(1830)	$0(5/2^-)$ D_{05} ——	p=1.08	1830	80	3.35 ±0.15	NK̄	8	550	16.0
						Σπ	42	510	
Λ(2100)	$0(7/2^-)$ G_{07} ——	p=1.68	2100	140	4.41 ±0.29	NK̄	30	748	8.68
						Σπ	4	699	
						Λη	<3	617	
						ΞK	~1	483	
						Λω	<10	443	
Λ(2350)	$0(?^?)$ —	p=2.29 Seen in total c.s.	2350	210	5.52 ±0.49	NK̄	(J+1/2)x=0.6[b]	913	5.85
Σ	$1(1/2^+)$ ——		(+)1189.4 (0)1192.6 (-)1197.4		1.41 1.42 1.43	See Table S			
Σ(1385)	$1(3/2^+)$ P_{13} ——	p<0 K^-p	(+)1382.2±0.8 S=1.4*	(+)36±3 S=2.1*	1.92 ±0.05	Λπ	91±3	208	
						Σπ	9±3	117	
		S=4.8* ! ↔ (-)	1388.0±3.0	(-)38±8, S=3.7* !			S=1.4*		
Σ(1660)	$1(3/2^-)$ D_{13} ——	p=0.72 Decay modes of these two states not separated yet.	1660	50	2.76 ±0.08	Λ(1405)π	large	197	
						NK̄	small for both	400	29.9
Σ(1700)	$1(?^?)$ —	p=0.80	1700	110	2.89 ±0.19	Λπ	large	470	
						Σπ	not disentangled	411	25.1
Σ(1770)	$1(5/2^-)$ D_{15} ——	p=0.95	1765 ±5§	100 ±15§	3.13 ±0.18	NK̄	45	497	19.4
						Λπ	15	519	
						Λ(1520)π	15	190	
						Σ(1385)π	15	317	
						Ση	~1	140	
						Σπ	~1	463	
Σ(1910)	$1(5/2^+)$ F_{15} —	p=1.25	1910	60	3.65 ±0.11	NK̄	8	612	12.9
						Λπ	8	619	
A small effect. Not established beyond all question.									
Σ(2030)	$1(7/2^+)$ F_{17} ——	p=1.52	2030	120	4.12 ±0.24	NK̄	10	700	9.92
						Λπ	35	700	
						Σπ	10	652	
						ΞK	<2	412	
Σ(2250)	$1(?^?)$ —	p=2.04 Seen in total c.s.	2250	200	5.06 ±0.45	NK̄	(J+1/2)x=0.4[b]	849	6.76
Σ(2455)	$1(?^?)$ —	p=2.57 Seen in total c.s.	2455	120	6.03 ±0.29	NK̄	(J+1/2)x=0.3[b]	979	5.08
Σ(2595)	$1(?^?)$ —	p=2.95 Seen in total c.s.	2595	~140	6.73 ±0.36	NK̄	(J+1/2)x=0.25[b]	1064	4.30

Ξ	$1/2(1/2^+)$ ——	(0)1314.7 (-)1321.3	1.73 1.75	See Table S					
Ξ(1530)	$1/2(3/2^+)$ —— p-wave	(0)1528.9±1.1 (-)1533.8±1.9	2.34 ±0.01	7.3 ±1.7	Ξπ	100	145		
Branching ratios poorly known.									
Ξ(1815)	$1/2(?^?)$ ——	1815 ±3	16 ±8 S=2.2*		ΛK̄	~65	391		
					Ξπ	~10	409		
					Ξππ	~25	351		
					[Ξ(1530)π][a]	[~20]	220		
					ΣK̄	<2	299		
Ξ(1930)	$1/2(?^?)$ ——	1915 Needs confirmation.	120		Ξπ	seen	487		
					ΛK̄	±0.23	488		
Ω⁻	$0(3/2^+)$ ——	1672.4			See Table S				

§ This is only an educated guess; the error given is larger than the error of the average of the published values (see listings for the latter).

† Table indicates a candidate that has been omitted because the evidence for the existence of the effect and/or for its interpretation as a resonance is open to considerable question. See listings for information on the following: $N\gamma$(3245), N(3690), N(3755), Z_1^*(1900), Λ(1860) F_{07}, Σ(1780), Σ(1880), Σ(3000), and Ξ(1705).

‡ Quoted error includes an S(scale) factor. See footnote to Table S.

* For decay modes into ⩾ 3 particles p_{max} is the maximum momentum that any of the particles in the final state can have. The momenta have been calculated using the averaged central mass values, without taking into account the widths of the resonances.

a. Square brackets indicate a sub-reaction of the previous unbracketed decay mode.

b. J is not known; x is Γ_{el}/Γ.

c. Several new resonances have been reported by the CERN group (Donnachie et al.) as a result of their phase-shift analysis up to M = 2100 MeV. The other two groups working on phase-shift analysis (Berkeley, Saclay) have not claimed these states at this time; therefore we have to take them with some caution. For the time being, we classify the nine new CERN resonances as follows (the numbers in parentheses are M, Γ, Γ_{el}/Γ, slightly rounded): i) Strong candidates, D_{33}(1690, 270, 0.14), F_{35}(1910, 350, 0.16); ii) less certain, P_{31}(1930, 340, 0.30), P_{33}(1690, 280, 0.10), P_{11}(1750, 330, 0.32), F_{17}(1980, 220, 0.13); iii) require some imagination, D_{35}(1950, 310, 0.15), P_{13}(1860, 300, 0.21), D_{13}(2060, 290, 0.26).

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

CODE EVENTS QUANTITY ERROR+ ERROR- REFERENCE YR TECN SIGN COMMENTS DATE PUNCHED
ABOVE BACKGROUND

N ANY SYMBOL IN COLUMN 8 INDICATES DATA IGNORED BY AVERAGING PROGRAMS

γ

0 GAMMA (0,J=1)

0 GAMMA MASS

M * 2.0 (10**-21 MEV) OR LESS PATEL 65 6/68

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES

0 GAMMA

PATEL 65 PL 14 105 V. L. PATEL ////////////////// NEW HAMPSHIRE

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

ν_e

1 E-NEUTRINO (0,J=1/2)

1 E-NEUTRINO MASS (KEV)

M * LESS THAN 0.25 LANGER 52 CNTR
M * LESS THAN 0.15 HAMILTON 53 CNTR
M * LESS THAN 0.55 +OR- 0.28 FRIEDMAN 58 CNTR

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES

1 E-NEUTRINO (0,J=1/2)

LANGER 52 PR 88 689 L M LANGER,R J D MOFFAT //////// INDIANA
HAMILTON 53 PR 92 1521 D HAMILTON,W P ALFORD,L GROSS // PRINCETON
FRIEDMAN 58 PR 109 2214 LEWIS FRIEDMAN,LINCOLN G SMITH ///// BNL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

ν_μ

2 MU-NEUTRINO (0,J=1/2)

2 MU-NEUTRINO MASS (MEV)

M * 3.5 OR LESS BARKAS 56 EMUL
M * 4.0 OR LESS DUDZIAK 59 CNTR
M * 3.6 OR LESS FEINBERG 63 RVUE
M * 3.0 OR LESS ALLCOCK 65 RVUE
M * 2.5 OR LESS BARDON 65 SPRK
M * 2.1 OR LESS SHAFER 65 CNTR CONF LEV = 68PCT
M 1.6 OR LESS BOOTH 67 CNTR 90 PERCNT C.L. 3/68
M 2.2 OR LESS,CL=0.90 HYMAN 67 HEBC 0. K- HE 11/67

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
2 MU-NEUTRINO (0,J=1/2)

BARKAS 56 PR 101 778 W H BARKAS,W BIRNBAUM,F M SMITH //// LRL
DUDZIAK 59 PR 114 336 W F DUDZIAK,R SAGANE,J VEDDER ////// LRL
FEINBERG 63 ARNS 13 431 G FEINBERG, L M LEDERMAN //////// COLUMBIA
ALLCOCK 65 PPSL 85 875 G R ALLCOCK ////////////////////// LIVERPOOL
BARDON 65 PRL 14 449 BARDON,NORTON,PEOPLES +//COLUM+STONY BROOK
SHAFER 65 PRL 14 923 R E SHAFER,CROWE,JENKINS /////////// LRL
BOOTH 67 PL 268 39 BOOTH,JOHNSON,WILLIAMS,WORMALD///LIVERPOOL
HYMAN 67 PL 25 B 376 +LOKEN,PEWITT,MCKENZIE,KEYES+/ARG+CARN+NWU

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

e

3 ELECTRON (0.5,J=1/2)

3 ELECTRON MASS (MEV)

M 0.511006 0.000002 COHEN 65 RVUE

3 ELECTRON LIFETIME (UNITS 10**21 YR)

T * OVER 2.0 MOE 65 CNTR

3 ELECTRON MAGNETIC MOMENT(E/2ME)

MM * 1.0011609 .0000024 SCHUPP 61 CNTR -
MM R 1.001159622 +-(27)*10**-9 WILKINSON 63 CNTR -
MM * 1.001168 0.000011 RICH 66 CNTR + POSITRON
MM 1.001159557 +-(30)*10**-9 RICH 68 6/68
MM R RICH 68 IS REEVALUATION OF WILKINSON 63

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
3 ELECTRON (0.5,J=1/2)

SCHUPP 61 PR 121 1 A A SCHUPP,R W PIDD,H R CRANE // MICHIGAN
WILKINSO 63 PR 130 852 D T WILKINSON,H R CRANE ///////// MICHIGAN
COHEN 65 RMP 37 537 E R COHEN, J W M DUMOND //// NAASC+CALTECH
MOE 65 PR 140 B 992 M K MOE,F REINES //// CASE INST TECHNOLOGY
RICH 66 PRL 17 271 A RICH, H R CRANE // MICHIGAN
RICH 68 PRL 20 967 A RICH ////////////////////////// MICHIGAN

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

μ

4 MUON (106,J=1/2)

4 MUON MASS (MEV)

M 105.659 0.002 FEINBERG 63 RVUE
M . . . . . .
M FIT 105.659 0.002 VALUE FROM CONSTRAINED FIT 6/68

4 MUON LIFETIME (UNITS 10**-6)

T 2.198 0.001 0.001 FARLEY 62 CNTR
T 2.203 0.004 LUNDY 62 CNTR CONLEV=.98 11/67
T 2.202 0.003 0.003 ECKHAUSE 63 CNTR
T 2.197 0.002 0.002 MEYER 63 CNTR +
T 2.198 0.002 0.002 MEYER 63 CNTR -
T . . . . . .
T AVG 2.1983 .0008 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

4 RATIO OF LIFETIME OF MU+ TO MU-

DT 1.000 0.001 MEYER 63 CNTR LIFETIME MU+/MU-

4 MUON PARTIAL DECAY MODES

P1 MUON INTO E (E-NEU) (MU-NEU) S 3S 1S 2
P2 MUON INTO E 2GAMMA S 3S 0S 0
P3 MUON INTO 3ELECTRONS S 3S 3S 3
P4 MUON INTO E GAMMA S 3S 0

4 MUON BRANCHING RATIOS

R1 * MUON INTO E+2GAMMA (IN UNITS OF 10**-5) (P2)/(P1)
R1 * LESS THAN 1.6 FRANKEL 1 63 SPRK

R2 * MUON INTO 3E (IN UNITS OF 10**-7) (P3)/(P1)
R2 * LESS THAN 5.0 PARKER 1 62 CNTR
R2 * LESS THAN 1.3 ALIKHANOV 62 SPRK
R2 * LESS THAN 1.5 FRANKEL 2 63 CNTR
R2 * LESS THAN 1.45 BABAEV 63 SPRK

R3 * MUON INTO E+GAMMA (IN UNITS OF 10**-8) (P4)/(P1)
R3 * LESS THAN 1.2 FRANKEL 1 63 SPRK
R3 * LESS THAN 0.6 PARKER 2 64 SPRK

4 MUON ANOMALOUS MAGN. MOMENT (10**-6*E/(2*MUON MASS))

MM 1162.0 5.0 CHARPAK 62 CNTR +
MM P 1165.0 3.0 FARLEY 66 CNTR - STORAGE RINGS
MM P 1166.6 0.5 BAILEY 67 CNTR - STORAGE RING 6/68
MM 1166.45 0.33 BAILEY 68 CNTR STORAGE RINGS 6/68
MM P BAILEY 68 IS AN UPDATING OF BAILEY 67 AND FARLEY 66 6/68
MM . . . . . .
MM AVG 1166.4307 .3293 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
4 MUON (106,J=1/2)

CHARPAK 61 PRL 6 128 CHARPAK,FARLEY,GARWIN,MULLER,SENS + //CERN
HUTCHINS 61 PRL 7 129 D P HUTCHINSON,J MENES + ////// COLUMBIA
ALIKHANC 62 CERN CONF 423 A I ALIKHANOV,A BABAEV + /// ITEP MOSCOW
CHARPAK 62 PL 1 16 G CHARPAK,F J M FARLEY,R L GARWIN + //CERN
FARLEY 62 CERN CONF 415 FARLEY,MASSAM,MULLER,ZICHICHI ///// CERN
LUNDY 62 PR 125 1686 RICHARD A LUNDY ////////////////////// EFINS
PARKER 62 NC 23 485 S PARKER,S PENMAN ////////////////// EFINS
SHAPIRO 62 PR 125 1022 G SHAPIRO,L M LEDERMAN ////////// COLUMBIA

BABAEV 63 JETP 16 1397 BABAEV,BALATS,KAFTANOV,LANDSBERG + // ITEP
ECKHAUSE 63 PR 132 422 M ECKHAUSE,T A FILIPPAS + /////// CARNEGIE
FEINBERG 63 ARNS 13 431 GERALD FEINBERG, L M LEDERMAN /// COLUMBIA
FRANKEL 63 NC 27 894 S FRANKEL,W FRATI,J HALPERN + ////// PENNA
FRANKEL 63 PR 130 351 S FRANKEL,W FRATI,J HALPERN + ////// PENNA
MEYER 63 PR 132 2693 S L MEYER,ANDERSON,BLESER,LEDERMAN+//COLUM
PARKER 64 PR 133B 768 S PARKER,H L ANDERSON,C REY /////// EFINS
FARLEY 66 NC 45A 281 FARLEY,BAILEY,BROWN,GIESCH + // CERN
BAILEY 67 SLAC CONF. 48 +BARTL,BROWN,PICASSO,FARLEY + /////// CERN
BAILEY 68 WASH MTNG, APS +BARTL,BROWN,PICASSO,FARLEY + /////// CERN

OLD REFERENCES NOT REFERRED TO IN DATA CARDS

FISHER 59 PRL 3 349 FISHER,LEONTIC,LUNDBY,MEUNIER,STROOT//CERN
ASTBURY 60 ROCH CONF 60 542 ASTBURY,HATTERSLEY,HUSSAIN + // LIVERPOOL
DEVONS 60 PRL 5 330 DEVONS,GIDAL,LEDERMAN,SHAPIRO // COLUMBIA
LATHROP 60 NC 17 109 J LATHROP,R A LUNDY,V L TELEGDI + // EFINS
LATHROP 60 NC 17 114 J LATHROP,R A LUNDY,S PENMAN + //// EFINS
REITER 60 PRL 5 22 REITER,ROMANOWSKI,SUTTON + ///// CARNEGIE
TELEGDI 60 ROCH CONF 60 713 V L TELEGDI ////////////////////////// CERN

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

$\pi^\pm$

8 CHARGED PION (140,JPG=0--) I=1

8 CHARGED PI MASS (MEV)

M 139.37 0.20 CROWE 54 CNTR -
M 139.68 0.15 BARKAS 56 EMUL +
M 139.577 0.013 SHAFER 67 CNTR MESONIC ATOMS 6/68
M . . . . . .
M AVG 139.5769 .0129 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
M FIT 139.578 0.013 VALUE FROM CONSTRAINED FIT 6/68

8 PI+ MU+ MASS DIFFERENCE (MEV)

D 34.00 0.076 BARKAS 56 EMUL
D 33.89 0.076 BARKAS 56 EMUL
D . . . . . .
D AVG 33.9450 .0550 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
D FIT 33.920 0.013 VALUE FROM CONSTRAINED FIT 6/68

8 CHAR.PI LIFETIME (UNITS 10**-9)

T 25.6 0.5 0.5 CROWE 57 RVUE
T 25.6 0.8 0.8 ANDERSON 60 CNTR

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
T     8000    25.46      0.32      0.32  ASHKIN     60 CNTR +
T   *                                    MERRISON   62 RVUE
T             26.02      0.04            ECKHAUSE   65 CNTR +
T             25.6       0.3             BARDON     66 CNTR
T             25.9       0.3             DUNAITSEV  66 CNTR                    6/68
T   N         26.40      0.08            KINSEY     66 CNTR +
T   N  SYSTEMATIC ERRORS IN CALIBR.IN THIS EXP. DISCUSSED BY NORDBERG 67       8/67
T             26.67      0.24            LOBKOWICZ  66 CNTR
T             26.6       0.2             AYRES      67 CNTR
T             26.04      0.05            NORDBERG   67 CNTR +                  8/67
T           . . . . . .
T   AVG       26.0404    .0688   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.3)
                  (SEE IDEOGRAM, APPENDIX I)
```

8 MEANLIFE DIFFERENCE,(+)-(-)/AVGE. (PERCENT)

```
DT  N    THIS QUANTITY IS A MEASURE OF CPT INVARIANCE IN W.I.

DT            0.23      0.40            LOBKOWICZ 66 CNTR     SEE NOTE L
DT  L    ABOVE IS THE MOST CONSERVATIVE VALUE QUOTED BY AUTHORS
DT            0.4       0.7             BARDON    66 CNTR
DT            0.56      0.28            AYRES     67 CNTR
DT          . . . . . .
DT  AVG        .4465     .2180   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

8 CHARGED PION PARTIAL DECAY MODES

```
P1     CHAR.PION INTO MU (MU-NEU)                          S 4S 2
P2     CHAR.PION INTO E (E-NEU)                            S 3S 1
P3     CHAR.PION INTO MU (MU-NEU) GAMMA                    S 4S 2S 0
P4     CHAR.PION INTO PIO E (E-NEU)                        S 9S 3S 1
P5       CHAR.PION INTO E NEU GAMMA                        S 3S 1S 0
```

8 CHARGED PION BRANCHING RATIOS

```
R1  *  CHAR.PION INTO MU NEU GAMMA  (UNITS 10**-4)      (P3)/(P1)
R1       26    1.24      0.25          CASTAGNOL 58 EMUL

R2  *  CHAR.PION INTO E NEU          (UNITS 10**-4)      (P2)/(P1)
R2            1.21      0.07            ANDERSON  60 CNTR
R2            1.247     0.028           DI CAPUA  64 CNTR
R2          . . . . . .
R2  AVG       1.2419    .0260   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R3  *  CHAR.PION INTO PIO E NEU     (UNITS 10**-8)      (P4)/(P1)
R3       36    0.97      0.20            BARTLETT  64 SPRK
R3       38    1.07      0.21            BACASTOW  65 SPRK +
R3             1.10      0.26            BERTRAM   65 SPRK
R3       43    1.1       0.2             DUNAITSEV 65 CNTR
R3      332    1.00      0.08      0.10  DEPOMMIER 68 CNTR                    3/68
R3          . . . . . .
R3  AVG       1.0228    .0689   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R4  *    CHAR.PION INTO E NEU GAMMA (UNITS 10**-8)      (P5)/(P1)
R4      143   3.0       0.5           DEPOMMIER 63 CNTR
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
8 CHARGED PION (140,JPG=0--)I=1

```
CROWE     54 PR  96  470      K M CROWE,R H PHILLIPS ///////////////// LRL
BARKAS    56 PR 101  778      W H BARKAS,W BIRNBAUM,F M SMITH ////// LRL
CROWE     57 NC   5  541      K M CROWE ////////////////// STANFORD HEPL
CASTAGNO  58 PR 112 1779      C CASTAGNOLI,M MUCHNIK ////////// ROME I F

ANDERSON  60 PR 119 2050      H L ANDERSON,T FUJII,R H MILLER + // EFINS
ASHKIN    60 NC  16  490      ASHKIN,FAZZINI,FIDECARO,LIPMAN + //// CERN
MERRISON  62 ADVP 11 1        A W MERRISON ////////////////// LIVERPOOL
SHAPIRO   62 PR 125 1022      G SHAPIRO,L M LEDERMAN ////////// COLUMBIA

CZIRR     63 PR 130  341      JOHN B CZIRR ////////////////////////// LRL
DEPOMMIE  63 PL 7 285         P DEPOMMIER,HEINTZE,RUBBIA,SOERGEL // CERN
BARTLETT  64 PR 136B 1432     BARTLETT,DEVONS,MEYER,ROSEN ///// COLUMBIA
DI CAPUA  64 PR 133B 1333     DI CAPUA,GARLAND,PONDROM,STRELZOFF //COLUM

BACASTOW  65 PR 139 B407      +GHESQUIERE,WIEGAND,LARSEN      //LRL+SLAC
BERTRAM   65 PR 139 B 617     BERTRAM,MEYER,CARRIGAN+ //// MICH+CARNEGIE
CLINE     65 PL   15  293     A CLINE,W F FRY ////////////////// WISCONSIN
DUNAITSE  65 JETP 20 58       DUNAITSEV,PETRUKHIN,PROKOSHKIN + /// DUBNA
ECKHAUSE  65 PL 19 348        ECKHAUSE,HARRIS,SHULER+// WILLIAM AND MARY

BARDON    66 PRL 16 775       BARDON,DORE,DORFAN,KRIEGER + //// COLUMBIA
DUNAITSE  66 PL 23 283        +KUTYIN,PROKOSHKIN,RASUVAEV,SIMONOV//DUBNA
KINSEY    66 PR 144   1132    KINSEY,LOBKOWICZ,NORDBERG //ROCHESTER UNIV
LOBKOWIC  66 PRL  17  548     LOBKOWICZ,MELISSINOS,NAGASHIMA+ //ROCH+BNL

AYRES     67 PL 24B  483      D S AYRES,CALDWELL,GREENBERG,KURZ+ /// LRL
 ALSO     67 PR  157  1288    AYRES,CALDWELL,GREENBERG,KENNEY,KURZ+//LRL
NORDBERG  67 PL 24B  594      NORDBERG,LOBKOWICZ,BURMAN //ROCHESTER UNIV
SHAFER    67 PR 163 1451      ROBERT E. SHAFER ////////////////////// LRL
  SEE ALSO  PRL 14 923        SHAFER,CROWE,JENKINS  ////////////////// LRL

DEPOMMIE  68 NUC PHYS B4 189  DEPOMMIER,DUCLOS,HEINTZE,KLEINKNECHT+/CERN
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

9 NEUTRAL PION (135,JPG=0--) I=1

9 PI MASS DIFFERENCE (PI+-)-(PIO)(MEV)

```
D   *          5.37      1.0             PANOFSKY  51 CNTR  -
D              4.50      0.31            CHINOWSKY 54 CNTR  -
D              4.62      0.05            HADDOCK   59 CNTR  -
D              4.60      0.04            HILLMAN   59 CNTR
D              4.55      0.07            CASSELS   59 CNTR
D              4.6056    0.0055          CZIRR     63 CNTR
D              4.59      0.03            PETRUKHIN 63 CNTR  -
D              4.6034    0.0052          VASILEVSK 66 CNTR  -
D           . . . . . .
D   AVG        4.6041    .0037   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

9 PIO LIFETIME (UNITS 10**-16)

```
T   N   76    1.9       0.5       0.5   GLASSER   61 EMUL
T   N   45    2.3       1.1       1.0   TIETGE    62 EMUL
T   N   88    2.8       0.9       0.9   KOLLER    63 EMUL    SEE STAMER 66
T             1.05      0.18      0.18  VON DARDE 63 CNTR
T   N   75    1.7       0.5             SHWE      64 EMUL
T             0.730     0.105           BELLETTIN 65 CNTR
T   N   67    1.6       0.6       0.5   EVANS     65 EMUL
```

```
T   N  OLD EMULSION MEASUREMENTS NOT USED BECAUSE OF POSSIBLE SYSTEMATIC
T   N      SHIFT TO LARGER LIFETIME VALUES
T      232    1.0       0.5             STAMER    66 EMUL    SEE NOTE K BELOW  8/67
T   K   INCLUDES EVENTS OF KOLLER 63                                           8/67
T          . . . . . .
T   AVG        .8931     .1815   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.6)
                  (SEE IDEOGRAM, APPENDIX I)
```

9 NEUTRAL PION PARTIAL DECAY MODES

```
P1     PIO INTO 2GAMMA                                    S 0S 0
P2     PIO INTO e+ e- GAMMA                               S 3S 3S 0
P3     PIO INTO 4ELECTRONS                                S 3S 3S 3S 3
P4     PIO INTO 3 GAMMA                                   S 0S 0S 0
```

9 NEUTRAL PION BRANCHING RATIOS

```
R1  *  PIO INTO (GAMMA E+ E-)/(2GAMMA)                    (P2)/(P1)
R1  *        0.01196 THEORETICAL CALC.JOSEPH    61          QUANTUM ELECT.
R1       27    0.0117    0.0015          BUDAGOV   60 HBC
R1     3071    0.01166   0.00047         SAMIOS    61 HBC     PI-P TO PIO N
R1  S       SAMIOS VALUE USES PANOFSKY RATIO = 1.62
R1          . . . . . .
R1  AVG          .0117     .0004   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R2  *    PIO INTO (3 GAMMA)/(2 GAMMA) (UNITS 10**-6)     (P4)/(P1)
R2  *    0    5.0 OR LESS             DUCLOS    65 CNTR    CL=90 PERCENT
R2             5.0   OR LESS          KUTIN     65 CNTR    90 PERCNT  C.L.   3/68

R3  *    PIO INTO (E+E+E-E-)/(2 GAMMA) (UNITS 10**-5)    (P3)/(P1)
R3  *        3.47   THEORETICAL CAL. KROLL     55          QUANTUM ELECT.

R3      146   3.18      0.30            SAMIOS    62 HBC     SEE NOTE N BELOW
R3  N       ABOVE VALUE USES PANOFSKY RATIO=1.62
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
9 NEUTRAL PION (135,JPG=0--)I=1

```
PANOFSKY  51 PR   81  565      W K H PANOFSKY,R L AAMODT,J HADLEY /// LRL
CHINOWSK  54 PR   93  586      W CHINOWSKY,J STEINBERGER /////// COLUMBIA
KROLL     55 PR 98 1355        N KROLL ,W WADA                 // COLUMBIA+NRLW
CASSELS   59 PPS  74   92      CASSELS,JONES,MURPHY,D.NEILL /// LIVERPOOL
HADDOCK   59 PRL   3  478      HADDOCK,ABASHIAN,CROWE,CZIRR ///////// LRL
HILLMAN   59 NC   14  887      HILLMAN,MIDDELKOOP,YAMAGATA,ZAVATTINI/CERN

BUDAGOV   60 JETP 11  755      BUDAGOV,VIKTOR,DZHELEPOV,ERMOLOV +  //JINR
JOSEPH    60 NC 16 997         D W JOSEPH                          // EFI
GLASSER   61 PR  123 1014      R G GLASSER,N SEEMAN,B STILLER /////// NRL
SAMIOS    61 PR  121  275      N P SAMIOS ////////////////// COLUMBIA+BNL
SAMIOS    62 PR 126 1844       SAMIOS,PLANO,PRODELL + ////// COLUMBIA+BNL
TIETGE    62 PR  127 1324      J TIETGE,W PUESCHEL ////// MAX PLANCK INST

CZIRR     63 PR  130  341      JOHN B CZIRR ////////////////////////// LRL
KOLLER    63 NC   27 1405      E L KOLLER,S TAYLOR,T HUETTER //// STEVENS
KOLLER    63   SEE ALSO STAMER 66
PETRUKHI  63 SIENA CONF 208    V I PETRUKHIN,YU D PROKOSHKIN /////// JINR
VONDARDE  63 PL    4   51      VON DARDEL,DEKKERS,MERMOD,VAN PUTTEN+/CERN

SHWE      64 PR  136B 1839     H SHWE,F M SMITH,W H BARKAS ////////// LRL
BELLETTI  65 NC 40 A 1139      BELLETTINI,BEMPORAD,BRACCINI+/PISA+FIRENZE
DUCLOS    65 PL 19 253         DUCLOS,FREYTAG,HEINTZE + //CERN+HEIDELBERG
EVANS     65 PR 139 B 982      D A EVANS ////////////////////////// OXFORD
KUTIN     65 JETP LETT 2 243   KUTIN,PETRUKHIN,PROKOSHKIN ////////// JINR

STAMER    66 PR 151  1108      STAMER,TAYLOR,KOLLER,HUETTER+ //// STEVENS
VASILEVS  66 PL  23  281       VASILEVSKY,VISHNYAKOV,DUNAITSEV + // DUBNA
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

10 CHARGED K (494,JP=0-) I=1/2

10 CHARGED K MASS (MEV)

```
M            493.9     0.2             COHEN     57 RVUE +
M            493.7     0.3             BARKAS    63 EMUL  -
M            493.78    0.17            GREINER   65 EMUL +   VIA TAU DECAY
M          . . . . . .
M   AVG      493.8099   .1189   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
M   FIT      493.82    0.11    VALUE FROM CONSTRAINED FIT                     6/68
```

10 CHAR.K LIFETIME (UNITS 10**-8)

```
T   *    CHAR. K LIFETIME
T              0.95      0.36      0.25  ILOFF     56 EMUL
T        52    1.60      0.3       0.3   EISENBERG 58 EMUL
T              1.21      0.06      0.06  BURROWES  59 CNTR
T        33    1.38      0.24      0.24  FREDEN    60 EMUL
T              1.25      0.22      0.17  BARKAS    61 EMUL
T        51    1.27      0.36      0.23  BHOWMIK   61 EMUL
T       293    1.31      0.08      0.08  NORDIN    61 HBC   -
T   *          1.24      0.07            NORDIN    61 RVUE  -
T              1.231     0.011     0.011 BOYARSKI  62 CNTR +
T              1.2443    0.0038          FITCH     65 CNTR +
T              1.2265    0.0036          LOBKOWICZ 66 CNTR +
T              1.221     0.011           FORD      67 CNTR +-                 8/67
T   G          1.244     0.005           GIACOMELL 67 CNTR +                  8/67
T   G      GIACOMELLI 67 VALUE JUST A CHECK ON APPARATUS
T          . . . . . .
T   AVG        1.2343    .0052   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.1)
T   FIT         .810     .003    VALUE FROM CONSTRAINED FIT
                  (SEE IDEOGRAM, APPENDIX I)
```

10 LIFETIME DIFFERENCE,(+)-(-)/AVGE. (PERCENT)

```
DT  N    THIS QUANTITY IS A MEASURE OF CPT INVARIANCE IN W.I.

DT            0.049     0.097           LOBKOWICZ 66 CNTR     SEE NOTE L
DT  L    ABOVE IS THE MOST CONSERVATIVE VALUE QUOTED BY AUTHORS
DT            0.47      0.30            FORD      67 CNTR                    8/67
DT          . . . . . .
DT  AVG        .0888     .1232   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
D1  *  DIFFERENCE IN K MU2 RATES ((W1+)-(W1-))/W1
D1           -0.54     0.41          FORD      67 CNTR                    8/67
D2  *  DIFFERENCE IN TAU RATES   ((W2+)-(W2-))/W2
D2           -0.04     0.21          FORD      67 CNTR                    8/67
D2           -0.50     0.90          FLETCHER  67 SPRK                    8/67
D2         . . . . . . . . .
D2  AVG      -.0638    .2045   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

------ --------- --------- --------- --------- --------- --------- ---------

                        10  CHARGED K DECAY RATES

W1  *  CHAR. K INTO MU NEU (K MU)      (UN. 10**6 SEC-1) (P1)
W1           51.2      0.8           FORD      67 CNTR +-                 8/67
W1         . . . . . . . . .
W1  FIT      51.421    .293    VALUE FROM CONSTRAINED FIT

W2  *  CHARG. K INTO PI PI+ PI- (TAU) (UN. 10**6 SEC-1) (P3)
W2           4.496     0.030         FORD      67 CNTR +-                 8/67
W2         . . . . . . . . .
W2  FIT      4.491     .028    VALUE FROM CONSTRAINED FIT

------ --------- --------- --------- --------- --------- --------- ---------

                        10  CHARGED K PARTIAL DECAY MODES

P1      CHAR. K INTO MU (NEU)              K MU          S 4S 2
P2      CHAR. K INTO PI PIO                K PI          S 8S 9
P3      CHAR. K INTO PI PI+ PI-            TAU           S 8S 8S 8
P4      CHAR. K INTO PI 2PIO               TAU PRIME     S 8S 9S 9
P5      CHAR. K INTO MU PIO NEU            K MU          S 4S 9S 2
P6      CHAR. K INTO E PIO NEU             K E           S 3S 9S 1
P7      POSIT.K INTO PI+ PI- E+NEU         K E+          S 8S 8S 3S 1
P8      POSIT.K INTO PI+ PI+ E-NEU         K E-          S 8S 8S 3S 1
P9       POSIT.K INTO PI+ PI- MU+ NEU      K+MU+ 4       S 8S 8S 4S 2
P10     POSIT.K INTO PI+ PI+ MU- NEU       K+MU- 4       S 8S 8S 4S 2
P11     CHAR. K INTO E NEU                 K E 2         S 3S 1
P12     CHAR. K INTO MU NEU GAMMA          K MU RAD      S 4S 2S 0
P13     CHAR. K INTO PI PIO GAMMA          K PI RAD      S 8S 9S 0
P14     CHAR. K INTO PI PI+ PI- GAMMA      TAU RAD       S 8S 8S 8S 0
P15     CHAR. K INTO PI E+ E-              PI E E        S 8S 3S 3
P16     CHAR. K INTO PI MU+ MU-            PI MU MU      S 8S 4S 4
P17     CHAR. K INTO PI GAMMA GAMMA        PI GAM GAM    S 8S 0S 0
P18     CHAR. K INTO PI E NEUTRINO GAMMA   PI E NEU GAM  S 8S 3S 1S 0
P19     NEG.  K INTO PI+ E- E-             PI+E-E-       S 8S 3S 3

------ --------- --------- --------- --------- --------- --------- ---------

                        10  CHARGED K BRANCHING RATIOS

R   O       OLD DATA EXCLUDED

R1  *  CHAR. K INTO MU NEU (MU2)      (UNITS 10**-2)      (P1)/TOTAL
R1  O          58.5      3.0           BIRGE     56 EMUL +
R1  O          56.9      2.6           ALEXANDER 57 EMUL +
R1         . . . . . . . . .
R1  FIT      63.469    .285    VALUE FROM CONSTRAINED FIT

R2  *  CHAR. K INTO PI PIO (PI2)      (UNITS 10**-2)      (P2)/TOTAL
R2  O          27.7      2.7           BIRGE     56 EMUL +
R2  O          23.2      2.2           ALEXANDER 57 EMUL +
R2  *          21.0      0.6           CALLAHAN  65 PBC      SEE R17
R2  *          21.6      0.6           TRILLING  65 RVUE
R2         . . . . . . . . .
R2  FIT      20.842    .283    VALUE FROM CONSTRAINED FIT

R3  *  CHAR. K INTO PI PI+ PI-(TAU)   (UNITS 10**-2)      (P3)/TOTAL
R3  O          5.6       0.4           BIRGE     56 EMUL +
R3  O          6.8       0.4           ALEXANDER 57 EMUL +
R3  O          5.2       0.3           TAYLOR    59 EMUL +
R3             5.7       0.3           ROE       61 XBC  +
R3    2332     5.54      0.12          CALLAHAN  64 XBC  +
R3     540     5.1       0.2           SHAKLEE   64 XBC  +
R3             5.71      0.15          DE MARCO  65 HBC
R3      44     6.0       0.4           YOUNG     65 EMUL +
R3         . . . . . . . . .
R3  AVG        5.5477    .1112   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
R3  FIT        5.543     .038    VALUE FROM CONSTRAINED FIT
                       (SEE IDEOGRAM, APPENDIX I)

R4  *  CHAR. K INTO PI 2PIO (TAU PRIME)(UNITS 10**-2)   (P4)/TOTAL
R4  O          2.1       0.5           BIRGE     56 EMUL +
R4  O          2.2       0.4           ALEXANDER 57 EMUL +
R4  O          1.5       0.2           TAYLOR    59 EMUL +
R4             1.7       0.2           ROE       61 XBC  +                  11/67
R4     108     1.8       0.2           SHAKLEE   64 XBC  +                  11/67
R4         . . . . . . . . .
R4  AVG        1.7500    .1414   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R4  FIT        1.691     .048    VALUE FROM CONSTRAINED FIT

R5  *  CHAR. K INTO MU PIO NEU (MU3) (UNITS 10**-2)     (P5)/TOTAL
R5  O          2.8       1.0           BIRGE     56 EMUL +
R5  O          5.9       1.3           ALEXANDER 57 EMUL +
R5  O          2.8       0.4           TAYLOR    59 EMUL +
R5         . . . . . . . . .
R5  FIT        3.432     .079    VALUE FROM CONSTRAINED FIT

R6  *  CHAR. K INTO E PIO NEU (E3)    (UNITS 10**-2)      (P6)/TOTAL
R6  O          3.2       1.3           BIRGE     56 EMUL +
R6  O          5.1       1.3           ALEXANDER 57 EMUL +
R6             5.0       0.5           ROE       61 XBC  +                  11/67
R6     429     4.7       0.3           SHAKLEE   64 XBC  +                  11/67
R6         . . . . . . . . .
R6  AVG        4.7794    .2572   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R6  FIT        5.023     .078    VALUE FROM CONSTRAINED FIT

R7  *  POSIT.K INTO PI+ PI- E+ NEU    (UNITS 10**-5)      (P7)/TOTAL

R8  *  POSIT.K INTO PI+ PI+ E- NEU    (UNITS 10**-5)      (P8)/TOTAL
R8             0.2    OR LESS        BIRGE     65 FBC  +  95 PER CT CONF

R9  *   POSIT.K INTO PI+ PI- MU+ NEU (UNITS 10**-5)      (P9)/TOTAL
R9       1     0.77      0.54     0.50  CLINE     65 FBC  +

R10 *   POSIT.K INTO PI+ PI+ MU- NEU (UNITS 10**-6)      (P10)/TOTAL
R10      0     3.0 OR LESS            BIRGE     65 FBC  +  95 PER CT CONF

R11 *   CHAR. K INTO E NEU            (UNITS 10**-5)      (P11)/TOTAL
R11 *       160.0   OR LESS           BORREANI  64 HBC  +  CONLEV=0.95       11/67
R11      4     2.1       1.8      1.3  BOWEN     67 SPRK +                  8/67
R11 *   BOWEN RESULT SHOULD BE CORRECTED TO 1.9(+1.7,-1.2) BECAUSE OF
R11 *   K+ TO E+ NEU GAMMA DECAYS BEFORE COMPARING WITH BOTTERILL 67 R28

R12 *   CHAR. K INTO MU NEU GAMMA     (UNITS 10**-5)      (P12)/TOTAL

R13 *   CHAR. K INTO PI PIO GAMMA     (UNITS 10**-4)      (P13)/TOTAL
R13 *   18    2.2       0.7           CLINE     64 FBC  +  PI+ KE 55-90 MEV

R14 *   CHAR. K INTO PI PI+ PI- GAMMA(UNITS 10**-4)      (P14)/TOTAL
R14             1.0       0.4           STAMER    65 EMUL +

R15 *   CHAR. K INTO PI E+ E-          (UNITS 10**-6)      (P15)/TOTAL
R15      1      1.1    OR LESS         CAMERINI  64 FBC  +
R15 *           0.4    OR LESS         CLINE     67      +                  11/67
R15             4.4    OR LESS         BISI      67 DBC  +  90 PER CT CONF  11/67

R16 *   CHAR. K INTO PI MU+ MU-        (UNITS 10**-6)      (P16)/TOTAL
R16             3.0    OR LESS         CAMERINI  65 FBC  +  90 PER CT CONF
R16             2.4    OR LESS         BISI      67 DBC  +  90 PER CT CONF  11/67

R17 *   CHAR. K INTO (PI PIO)/TAU                          (P2)/(P3)
R17    134      3.24      0.34          YOUNG     65 EMUL +
R17   1045      3.96      0.15          CALLAHAN  66 FBC  +
R17         . . . . . . . . .
R17 AVG        3.8427    .2659   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.9)
R17 FIT        3.760     .058    VALUE FROM CONSTRAINED FIT
                       (SEE IDEOGRAM, APPENDIX I)

R18 *   CHAR. K INTO (PI 2PIO)/TAU                         (P4)/(P3)
R18   2027      0.303     0.009         BISI      65 H+HL +
R18     17      0.393     0.099         YOUNG     65 EMUL +
R18         . . . . . . . . .
R18 AVG        .3037     .0090   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R18 FIT        .305      .008    VALUE FROM CONSTRAINED FIT

R19 *   CHAR. K INTO (MU PIO NEU)/TAU                      (P5)/(P3)
R19   2175      0.632     0.035         BISI      65 H+HL +
R19     38      0.90      0.16          YOUNG     65 EMUL +
R19         . . . . . . . . .
R19 AVG        .6442     .0342   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R19 FIT        .619      .015    VALUE FROM CONSTRAINED FIT

R20 *   CHAR. K INTO (E PIO NEU)/TAU                       (P6)/(P3)
R20    230      0.90      0.06          BORREANI  64 HBC  +
R20     37      0.90      0.16          YOUNG     65 EMUL +
R20    854      0.94      0.09          BELLOTT2  67 HLBC                    11/67
R20         . . . . . . . . .
R20 AVG        .9112     .0477   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R20 FIT        .906      .015    VALUE FROM CONSTRAINED FIT

R21 *   POSIT.K INTO (PI+ PI- E+ NEU)/TAU(UNITS 10**-4)(P7)/(P3)
R21     69      6.7       1.5           BIRGE     65 FBC  +

R22 *   POSIT.K INTO (PI+ PI- MU+ NEU)/TAU(UNITS 10**-4)(P9)/(P3)
R22      1      2.5    APPROX          GREINER   64 EMUL +
R22      7      2.57      1.55          BISI      67 DBC  +                  11/67

R23 *   CHAR. K INTO (E PIO NEU)/(MU2+PI2)(UNITS 10**-2)(P6)/(P1+P2)
R23   1679      5.89      0.21          CESTER    66 SPRK +                  8/67
R23   5110      6.16      0.22          ESCHSTRUT 68 SPRK +                  3/68
R23         . . . . . . . . .
R23 AVG        6.0187    .1519   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R23 FIT        5.958     .103    VALUE FROM CONSTRAINED FIT

R24 *   CHAR. K INTO (PI PIO)/(MU NEU)                     (P2)/(P1)
R24            0.3253    0.0065        AUERBACH  67 SPRK +                  8/67
R24         . . . . . . . . .
R24 FIT        .328      .006    VALUE FROM CONSTRAINED FIT

R25 *   CHAR. K INTO (E PIO NEU)/(MU NEU)                  (P6)/(P1)
R25     472    0.0797    0.0054          AUERBACH  67 SPRK +                  8/67
R25 *   THE VALUE .0785+-.0025 GIVEN IN THE ABOVE REF IS AN AVERAGE OF
R25 *   AUERBACH 67 R25 AND CESTER 66 R23.
R25     960      .0775     .0033         BOTTERIL1 68 SPRK +                  5/68
R25     561    0.069     0.006          GARLAND   68 SPRK +                  4/68
R25         . . . . . . . . .
R25 AVG        .0765     .0026   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R25 FIT        .079      .001    VALUE FROM CONSTRAINED FIT

R26 *   CHAR. K INTO (MU PIO NEU)/(MU NEU)                 (P5)/(P1)
R26     310    0.0602    0.0046          AUERBACH  67 SPRK +                  8/67
R26     424    0.055     0.004           GARLAND   68 SPRK +                  4/68
R26         . . . . . . . . .
R26 AVG        .0572     .0030   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R26 FIT        .054      .001    VALUE FROM CONSTRAINED FIT

R27 *   CHAR. K INTO (MU NEU)/(TAU)                        (P1)/(P3)
R27 R   427   10.38      0.82          YOUNG     65 EMUL +
R27 R DELETED FROM OVERALL FIT BECAUSE YOUNG 65 CONSTRAINS HIS RESULTS TO
R27 R TO ADD UP TO 1.  ONLY YOUNG MEASURED MU2 DIRECTLY.
R27         . . . . . . . . .
R27 FIT       11.449     .100    VALUE FROM CONSTRAINED FIT

R28 *  CHAR. K INTO (E NEU)/(MU NEU) (UNITS 10**-5)     (P11)/(P1)
R28      10     1.9       0.7       0.5  BOTTERILL 67 SPRK +                  11/67

R29 *  CHAR. K INTO (MU PIO NEU)/(E PIO NEU)             (P5)/(P6)
R29   1509      0.703     0.056         CALLAHAN1 66 HLBC                    6/68
R29 *           0.65      0.05          AACHEN    67          PRELIMINARY    11/67
R29  13371      0.667     0.017         BOTTERIL2 68 SPRK +                  6/68
R29         . . . . . . . . .
R29 AVG        .6700     .0163   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R29 FIT        .683      .014    VALUE FROM CONSTRAINED FIT

R30 *   CHAR. K INTO PI GAMMA GAMMA/TOTAL(UNITS 10**-4)(P17)/TOTAL
R30             1.1    OR LESS         CHEN      68 SPRK +                  5/68

R31 *  CHAR. K INTO PI E NEU GAMMA/PI E NEU               (P18)/(P6)
R31            0.012     0.008         BELLOTT1  67      +                  11/67

R32 *   CHAR. K INTO (PI2 + MU3)/(TOTAL)                   (P2+P5)/TOTAL      11/67
R32 *  WE COMBINE THESE TWO MODES FOR EXPTS MEASURING THEM IN XENON BC
R32 *  BECAUSE OF DIFFICULTIES OF SEPARATING THEM THERE
R32            23.4      1.1           ROE       61 XBC  +                  11/67
R32     886    25.4      0.9           SHAKLEE   64 XBC  +                  11/67
R32         . . . . . . . . .
R32 AVG       24.5980    .9802   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
R32 FIT       24.274     .273    VALUE FROM CONSTRAINED FIT

R33 *  K- INTO PI+ E- E-/TOTAL (UNITS 10**-5)            (P19)/TOTAL
R33 *    TEST OF LEPTON NUMBER CONSERVATION
R33            1.5    OR LESS         CHANG     68 HBC   - 65 PCT. CL        3/68

------ --------- --------- --------- --------- --------- --------- ---------

                        10  CHARGED K FORM FACTORS                           8/67

LM+ *   LAMBDA +  (LINEAR ENERGY DEPENDENCE OF F+ IN KE3 DECAY)              8/67
LM+ *   FOR RAD. CORR. TO THE DALITZ PLOT, SEE GINSBERG 67.

LM+ *  217   +0.038     .045          BROWN     62 XEBC +  PIO SPEC,NO R.C.
LM+ *  230   -0.04      .05           BORREANI  64 HBC  +  E+ SPEC,NO R.C.   8/67
LM+ *  407   -0.010     .029          JENSEN    64 XEBC +  PIO SPEC,NO R.C.  8/67
LM+ B  457   +0.025     .018          BELLOTTI  66 FBC  +  SEE NOTE B BELOW  8/67
LM+ *  854     0.045     0.017    0.018 BELLOTT2  67 FBC  +  SEE NOTE B BELOW 11/67
LM+ B       BELLOTT2 67 REPLACES BELLOTTI 66.USES DALITZ PLOT WITH RAD. COR. 11/67
LM+ * 1393   +0.016     .016          IMLAY     67 SPRK + DLTZ PLT,NO R.C.   8/67
LM+ *  515   +0.028     .013     .014 KALMUS    67 FBC  + E,PI SPEC,NO R.C.  8/67
LM+ *  960     .08       .04           BOTTERIL1 68 SPRK + E SPEC  USES R.C.  6/68
LM+ *   90   -0.02      0.08      0.12 EISLER    68 PBC  + PIO SPEC,NO R.C.  6/68
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

XIA * XIA = F-/F+ (DETERMINED FROM SPECTRA AND KMU3/KE3)

XIA *	76	+1.8	1.6		BROWN	62 XEBC +	MU+,PIO SPECTRA	8/67
XIA *	87	+0.7	0.5		GIACOMELL	64 EMUL +	MU+ SPECTRUM	8/67
XIA *		-0.1	0.7		JENSEN	64 XEBC +	MU+,PIO SPECTRN	8/67
XIA *		-0.17	0.75	0.99	SHAKLEE	64 XEBC +	KMU3/KE3	8/67
XIA *		+0.6	0.5		BISI	65 HBC +	KMU3/KE3,MU SPEC	8/67
XIA *		BTWN +0.2 AND +1.4			CUTTS	65 SPRK +	MU+ SPECTRUM	8/67
XIA *	1509	+0.4	0.4	0.22	CALLAHAN	66 FRBC +	KMU3/KE3	8/67
XIA *	2648	0.0	1.1	0.9	CALLAHAN	66 FRBC +	MU+ SPECTRUM	8/67
XIA *	444	+0.72	0.37		CALLAHAN	66 FRBC +	PIO SPECTRUM	8/67
XIA *		-0.5	0.3		AACHEN	67 +	KMU3/KE3 PRELIM	11/67
XIA *		+0.75	0.50		AUERBACH	67 SPRK +	KMU3/KE3	8/67
XIA *	13371	-0.08	0.13		BOTTERIL2	68 SPRK +	KMU3/KE3 PRELIM	6/68
XIA *	78	-0.5	0.9		EISLER	68 PBC +	PIO SPECTRUM	6/68
XIA *	976	+1.0	0.3		GARLAND	68 SPRK +	KMU3/KE3	4/68

XIB * XIB = F-/F+ (DETERMINED FROM MU POLARIZATION IN KMU3)

XIB *	2100	+1.2	2.4	1.8	BORREANI	65 PBC +	POLARIZATION	8/67
XIB *	397	-1.4	1.8		CALLAHAN	66 FRBC +	TOTAL POLAR.	8/67
XIB *	2950	-0.7	0.9	3.3	CALLAHAN	66 FRBC +	LONG. POLAR.	8/67
XIB *	6000	-1.0	0.3		AACHEN	68 FRBC +	TOTAL POLAR.	6/68
XIB *	3133	-0.95	0.3		CUTTS	68 SPRK +	TOTAL POLAR.	6/68

XIB * MEAS OF XI USING POLARIZATION IS LESS SENSITIVE TO FORM FACTOR
XIB * VARIATIONS.

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
10 CHARGED K (494,JP=0-)I=1/2

BIRGE	56 NC 4 834	BIRGE,PERKINS,PETERSON,STORK,WHITEHEA//LRL	
ILOFF	56 PR 102 927	ILOFF,GOLDHABER,LANNUTTI,GILBERT + /// LRL	
ALEXANDE	57 NC 6 478	ALEXANDER,JOHNSTON,OCEALLAIGH//DUBLIN INST	
COHEN	57 FUND.CONS.PHYS.	E R COHEN,K M CROWE,J DUMOND // AI+LRL+CIT	
EISENBER	58 NC 8 663	EISENBERG,KOCH,LOHRMANN,NIKOLIC + /// BERN	
BURROWES	59 PRL 2 117	BURROWES,CALDWELL,FRISCH,HILL + ////// MIT	
TAYLOR	59 PR 114 359	S TAYLOR,HARRIS,OREAR,LEE,BAUMEL//COLUMBIA	
FREDEN	60 PR 118 564	S C FREDEN,F C GILBERT,R S WHITE ///// LRL	
BARKAS	61 PR 124 1209	BARKAS,DYER,MASON,NORRIS,NICKOLS,SMIT//LRL	
BHOWMIK	61 NC 20 857	B BHOWMIK,P C JAIN,P C MATHUR //DELHI UNIV	
NORDIN	61 PR 123 2166	PAUL NORDIN JR ////////////////////// LRL	
ROE	61 PRL 7 346	ROE,SINCLAIR,BROWN,GLASER + ///// MICH+LRL	
BOYARSKI	62 PR 128 2398	BOYARSKI,LOH,NIEMELA,RITSON ////////// MIT	
BROWN	62 PRL 8 450	BROWN,KADYK,TRILLING,ROE+/////////LRL,MICH	
BARKAS	63 PRL 11 26	W H BARKAS,J N DYER,H H HECKMAN ////// LRL	
BIRGE	63 PRL 11 35	BIRGE,ELY,GIDAL,CAMERINI + // LRL+WIS+BARI	
ADAIR	64 PL 12 67	ADAIR,LEIPUNER // YALE,BNL	
BORREANI	64 PL 12 123	G BORREANI,G RINAUDO,A WERBROUCK /// TURIN	
CALLAHAN	64 PR 136 B 1463	A CALLAHAN,R MARCH,R STARK ///// WISCONSIN	
CAMERINI	64 PRL 13 318	CAMERINI,CLINE,FRY,POWELL // WISCONSIN+LRL	
CLINE	64 PRL 13 101	D CLINE, W F FRY ////////////// WISCONSIN	
GIACOMEL	64 NC 34 1134	GIACOMELLI,MONTI,QUARENI+// BOLOGNA,MUNICH	
GREINER	64 PRL 13 284	D GREINER, W OSBORNE, W BARKAS /////// LRL	
JENSEN	64 PR 136 B1431	JENSEN,SHAKLEE,ROE,SINCLAIR ///// MICHIGAN	
SHAKLEE	64 PR 136 B 1423	SHAKLEE,JENSEN,ROE,SINCLAIR ///// MICHIGAN	
BIRGE	65 PR 139 B 1600	BIRGE,ELY,GIDAL,CAMERINI,CLINE + //LRL+WIS	
BISI	65 NC 35 768	BISI,BORREANI,CESTER,FERRARO + ///// TURIN	
BISI	65 PR 139 B 1068	BISI,MARZARI-CHIESA,RINAUDO // TURINO,INFN	
BORREANI	65 PR 140 B1686	BORREANI,GIDAL,RINAUDO,CAFORIO+/BARI,TURIN	
CALLAHAN	65 PRL 15 129	A CALLAHAN,D CLINE ////////////// WISCONSIN	
CAMERINI	65 NC 37 1795	CAMERINI,CLINE,GIDAL,KALMUS,KERNAN/WIS+LRL	
CLINE	65 PL 15 293	A CLINE,W F FRY ////////////////// WISCONSIN	
CUTTS	65 PR 138 B969	CUTTS,ELIOFF,STIENING // // LRL	
DEBOUARD	65 PL 15 58	DEBOUARD,DEKKERS,JORDAN+/MUNICH,CERN,ORSAY	
DE MARCO	65 PR 140 B 1430	DE MARCO,GROSSO,RINAUDO ////// TURINO+CERN	
FITCH	65 PR 140 B 1088	FITCH,QUARLES,WILKINS //PRINCETON+MT HOLYK	
GREINER	65 ARNS 15 67	QUOTED BY BARKAS // LRL	
STAMER	65 PR 138 B 440	STAMER,HUETTER,KOLLER,TAYLOR,GRAUMAN//STEV	
TRILLING	65 UCRL 16473	GEORGE H TRILLING ////////////////////// LRL	
TRILLING	65 IS UPDATED FROM	1965 ARGONNE CONF, PAGE 5	
YOUNG	65 UCRL 16362	POH-SHIEN YOUNG (THESIS,BERKELEY) //// LRL	
ALSO	67 PR 156 1464	P-S YOUNG,W.Z.OSBORNE,W.H.BARKAS ///// LRL	
BELLOTTI	66 PL 20 690	BELLOTTI,FIORINI,PULLIA+ ////////// MILAN	
CALLAHA1	66 PR 150 1153	CALLAHAN,CAMERINI+/WISC,LRL,RIVERSIDE,BARI	
CALLAHAN	66 NC 44A 90	A C CALLAHAN ////////////////////WISCONSIN	
CESTER	66 PL 21 343	CESTER,ESCHSTRUTH,ONEILL+ //PRINCETON-PENN	
CESTER	66 SEE ALSO FOOTNOTE	1 OF AUERBACH 67	
LOBKOWIC	66 PRL 17 548	LOBKOWICZ,MELISSINOS,NAGASHIMA+ //ROCH+BNL	
AACHEN	67 HEIDELBERG CONF	AACHEN,BARI,CERN,PADOVA,VALENCIA,MADRID	
AACHEN	67 CORRECTED VALUE	GIVEN AT NOV 67 PRINCETON CONF	
AUERBACH	67 PR 155 1505	AUERBACH,DOBBS,MANN+ ////// PRINCETON-PENN	
BELLOTT1	67 HEIDELBERG CONF	BELLOTTI,PULLIA ////////////////////// MILAN	
BELLOTT2	67 NC 52A 1287	BELLOTTI,FIORINI,PULLIA ////////////// MILAN	
BISI	67 PL 25B 572	BISI,CESTER,CHIESA,VIGONE ///////// TORINO	
BOTTERIL	67 PRL 19 982	BOTTERILL,BROWN,CORBETT,CULLIGAN +//OXFORD	
BOWEN	67 PR 154 1314	BOWEN,MANN,MCFARLANE,HUGHES+/PENN-PRINCETO	
CLINE	67 HEIDELBERG CONF	CLINE,HAGGERTY,SINGLETON,FRY+////WISCONSIN	
FLETCHER	67 PRL 19 98	FLETCHER,BEIER,EDWRADS,+////////////ILLINOIS	
FORD	67 PRL 18 1214	+LEMONICK,NAUENBERG,PIROUE //PRINCETON	
GIACOMEL	67 BNL 11056	GIACOMELLI,KYCIA,LI,TEIGER ////////// BNL	
GINSBERG	67 PR 162 1570	EDWARD S GINSBERG ////////// U. MASS BOSTON	
IMLAY	67 PR 160 1203	IMLAY,ESCHSTRUTH,FRANKLIN+///////PRINCETON	
KALMUS	67 PR 159 1187	KALMUS,KERNAN ////////////////////// LRL	
AACHEN	68 PREPRINT	AACHEN-BARI-BERGEN-CERN-EP-KATH-ORSAY +	
BOTTERI1	68 PREPRINT RPP/H/34	BOTTERILL,BROWN,CLEGG,CORBETT,+ /// OXFORD	
BOTTERI2	68 PREPRINT	BOTTERILL,BROWN,CLEGG,CORBETT,+ /// OXFORD	
CHANG	68 PRL 20 510	CHANG,YODH,EHRLICH,PLANO+/MARYLAND,RUTGERS	
CHEN	68 PRL 20 73	CHEN,CUTTS,KIJEWSKI,STIENING +//// LRL,MIT	
CUTTS	68 PRL 20 955	CUTTS,STIENING,WIEGAND,DEUTSCH /// LRL,MIT	
EISLER	68 PR 169 1090	EISLER,FUNG,MARATECK,MEYER,PLANO //RUTGERS	
ESCHSTRU	68 PR 165 1487	ESCHSTRUTH,FRANKLIN,HUGHES+/PRINCETON,PENN	
GARLAND	68 PR 167 1225	+TSIPIS,DEVONS,ROSEN+///COLUMBIA,RUTG,WISC	

QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN THE DATA CARDS

BLOCK	62 CERN CONF 371	BLOCK,LENDINARA,MONARI /////// NWU+BOLOGNA	

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

K^0

11 NEUTRAL K (JP=0-) I=1/2

11 KO MASS (MEV)

M		498.1	0.4	CHRISTENS 64 SPRK		
M	2223	497.44	0.33	KIM 65 HBC	KO FROM PBAR P	
M	4500	498.9	0.5	BALTAY 66 HBC	KO FROM PBAR P	
M		497.44	0.50	FITCH 67 SPRK		11/67
M		. . . . .				
M	AVG	497.8653	.3158	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)		
M	FIT	497.76	0.16	VALUE FROM CONSTRAINED FIT		6/68

(SEE IDEOGRAM, APPENDIX I)

11 KO-K CH. MASS DIFFERENCE (MEV)

D		3.9	0.6	ROSENFELD 59 HBC	-	
D		5.4	1.1	CRAWFORD 59 HBC	+	
D	9	3.90	0.25	BURNSTEIN 65 HBC	-	
D	7	3.71	0.35	KIM 65 HBC	- K- P TO KO N	6/68
D	417	3.95	0.21	HILL 68 DBC	+ K+D TO KOPP	3/68
D		. . . . .				
D	AVG	3.9163	.1408	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)		
D	FIT	3.94	0.13	VALUE FROM CONSTRAINED FIT		6/68

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
11 NEUTRAL K (JP=0-)I=1/2

CRAWFORD	59 PRL 2 112	CRAWFORD,CRESTI,GOOD,STEVENSON,TICHO //LRL	
ROSENFEL	59 PRL 2 110	A H ROSENFELD,F SOLMITZ,R D TRIPP //// LRL	
CHRISTEN	64 PRL 13 138	CHRISTENSON,CRONIN,FITCH,TURLAY//PRINCETON	
BURNSTEI	65 PR 138 B 895	R A BURNSTEIN,H A RUBIN ///////// MARYLAND	
KIM	65 PR 140 B 1334	J K KIM,L KIRSCH,D MILLER /////// COLUMBIA	
BALTAY	66 PR 142 932	BALTAY,SANDWEISS,STONEHILL + //YALE+BNL	
FITCH	67 PR 164 1711	FITCH,ROTH,RUSS,VERNON ///////// PRINCETON	
HILL	68 PR 168 1534	HILL,ROBINSON,SAKITT,CANTER / BNL,CARNEGIE	

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

K^0_1

12 SHORT-LIVED NEUTRAL K (498, JP=0-) I=1/2

12 K01 LIFETIME (UNITS 10**-10)

T	0 90	1.07	0.13	0.13	BOLDT	58 CC	
T	512	0.94	0.05	0.05	CRAWFORD	59 HBC	
T	0 63	1.09	0.18	0.15	BOWEN	60 CC	
T	0 OLD EXPTS WITH LOW STATISTICS NOT INCLUDED IN AVERAGE.						6/68
T	378	0.94	0.05	0.05	BERTANZA	62 HBC	
T	503	0.87	0.05		CHRETIEN	63 PBC	
T	545	0.86	0.04		KREISLER	64 SPRK	
T		0.866	0.016		ALFF-STEI	66 SPRK	
T	572	0.90	0.06	0.05	AUERBACH	66 SPRK	8/67
T	4500	0.92	0.04		BALTAY	66 HBC	
T	8	0.904	0.024		BOTT-BODE	66 SPRK	
T	8 K01 LIFETIME NOT THE PRIMARY QUANTITY MEASURED IN THIS EXPT.						6/68
T	5000	0.843	0.013		KIRSCH	66 HBC	
T	19994	0.856	0.008		DONALD	68 HBC	6/68
T	20000	0.865	0.009		HILL	68 DBC	6/68
T	H HILL 68 GIVES A DETAILED DISCUSSION OF SYSTEMATICS ENCOUNTERED IN						
T	H IN THIS TYPE OF EXPERIMENT.						
T	. . . . .						
T	AVG .8619 .0062 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)						

(SEE IDEOGRAM, APPENDIX I)

12 K01 PARTIAL DECAY MODES

P1	K01 INTO PI+ PI-	S 8S 8
P2	K01 INTO PIO PIO	S 9S 9
P3	K0S INTO MU+ MU-	S 4S 4

12 K01 BRANCHING RATIOS

R1	* K01 INTO (PI+ PI-)/TOTAL				(P1)/TOTAL	
R1		0.68	0.04	CRAWFORD	59 HBC	
R1		0.70	0.08	COLUMBIA	60 HBC	
R1	U	0.740	0.024	ANDERSON	62 HBC	
R1		. . . . .				
R1	AVG	.6840	.0358	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)		
R1	FIT	.684	.011	VALUE FROM CONSTRAINED FIT		
R2	* K01 INTO (PIO PIO)/TOTAL				(P2)/TOTAL	
R2		0.27	0.11	CRAWFORD	59 HBC	
R2		0.26	0.06	BAGLIN	60 PBC	
R2		0.30	0.035	BROWN	61 XBC	
R2	1066	0.335	0.014	BROWN	63 XBC	
R2	198	0.288	0.021	CHRETIEN	63 PBC	
R2		. . . . .				
R2	AVG	.3161	.0135	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)		
R2	FIT	.316	.011	VALUE FROM CONSTRAINED FIT		

(SEE IDEOGRAM, APPENDIX I)

R3	* (K01 INTO PI+ PI- PIO)/(K02 INTO PI+ PI- PIO)					
R3	0.45 OR LESS			BEHR	66 HLBC	90 PER CT CONF
R4	* K0S INTO (MU+ MU-)/CHARGED (UNITS 10**-5)				(P3)/(P1)	
R4	10.0 OR LESS			BOTT-BODE	67 SPRK	90 PER CT CONF 8/67

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
12 SHORT-LIVED NEUTRAL K (498, JP=0-) I=1/2

BOLDT	58 PRL 1 150	E BOLDT,D O CALDWELL,Y PAL ////////// MIT	
CRAWFORD	59 PRL 2 266	CRAWFORD,CRESTI,DOUGLASS,GOOD,TICHO +//LRL	
BAGLIN	60 NC 18 1043	BAGLIN,BLOCH,BRISSON,HENNESSY + //PARIS EP	
BIRGE	60 ROCH CONF 601	R W BIRGE,P P ELY + //////// LRL+WISCONSIN	
BOWEN	60 PR 119 2030	BOWEN,HARDY,REYNOLDS,SUN,MOORE+/PRINCE+BNL	
COLUMBIA	60 ROCH CONF 727	M SCHWARTZ + ////////////////////// COLUMBIA	
MULLER	60 PRL 4 418	MULLER,BIRGE,FOWLER,GOOD,PICCIOMI+/LRL+BNL	
BROWN	61 NC 19 1155	BROWN,BRYANT,BURNSTEIN,GLASER,KADYK+//MICH	
FITCH	61 NC 22 1160	V FITCH,P PIROUE,R PERKINS /// PRINCE+LASL	
GOOD	61 PR 124 1223	GOOD,MATSEN,MULLER,PICCIONI + //////// LRL	
ANDERSON	62 CERN CONF 836	J A ANDERSON,F S CRAWFORD + ////////// LRL	
BERTANZA	62 PREPRINT D105	BERTANZA,CONNOLLY,CULWICK,EISLER + /// BNL	
	(BERTANZA UNPUBLISHED,BUT RECERTIFIED BY AUTHORS,AUGUST 66)		
CRAWFORD	62 CERN CONF 827	F S CRAWFORD ////////////////////// LRL	
BROWN	63 PR 130 769	BROWN,KADYK,TRILLING,ROE + ///LRL+MICHIGAN	
CHRETIEN	63 PR 131 2208	CHRETIEN+ //// BRANDEIS+BROWN+HARVARD+ MIT	
KREISLER	64 PR 136 B 1074	M KREISLER,O OVERSETH,J CRONIN / PRINCETON	
AUERBACH	65 PRL 14 192	AUERBACH,LANDE,MANN,SCIULLI,UTO + /// PENN	
TRILLING	65 UCRL 16473	GEORGE H TRILLING ////////////////////// LRL	
TRILLING	65 IS UPDATED FROM	1965 ARGONNE CONF , PAGE 115	
ALFF-STE	66 PL 21 595	ALFF-STEINBERGER,HEUER,KLEINKNECHT +//CERN	
AUERBACH	66 PR 149 1052	AUERBACH,DOBBS,LANDE,MANN,SCIULLI+/// PENN	

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

SEE ALSO AUERBACH 65

BALTAY 66 PR 142 932 BALTAY,SANDWEISS,STONEHILL + /// YALE+BNL
BEHR 66 PL 22 540 BEHR,BRISSON,PETIAU+/EP,MILAN,PADUA,ORSAY
BOTT-BOD 66 BERKELEY CONF. BOTT-BODENHAUSEN,DE BOUARD + // CERN
KIRSCH 66 PR 147 939 L KIRSCH,P SCHMIDT ////////////// COLUMBIA
BOTT-BOD 67 PL 248 194 BOTT-BODENHAUSEN,DE BOUARD,CASSEL+ ///CERN

DONALD 68 PL 278 58 DONALD,EDWARDS,NISAR+/LIVERPOOL,CERN,PARIS
HILL 68 PR TO BE PUB HILL,ROBINSON,SAKITT+ ////// BNL,CARNEGIE

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********

K^0_2

13 LONG-LIVED NEUTRAL K (498, JP=0-) I=1/2

13 K02-K01 MASS DIFFERENCE (UNITS OF INVERSE K01 LIFE)

D	*	1.9	0.3		FITCH	61 CNTR			
D		0.84	0.29	0.21	GOOD	61 PBC			
D		0.88	0.20		CAMERINI	62 PBC	SEE NOTE C BELOW		8/67
D	C	VALUE CHANGED FROM 1.5 (SEE TABLE 1 OF CAMERINI 66)							8/67
D		0.47	0.21		AUBERT	65 PBC			
D		0.26	0.36	0.26	BALDO-CEO	65 PBC	ASS.CP CONS.		
D		0.55	0.1		CHRISTENS	65 SPRK			
D	*	0.60 OR LESS			FITCH	65 SPRK	CF. MEISNER 66		
D	V	130 0.82	0.14		VISHNEVSK	65 SPRK	CU AND AL REGEN		8/67
D	V	VISHNEVSKY 65 NOT CORRECTED FOR INTERFERENCE EFFECTS							3/68
D		0.445	0.034		ALFF-STEI	66 SPRK			
D		84 0.36	0.21	0.31	BALDO-CEO	66 HLBC	K0+N INTO HYPER.		8/67
D		0.480	0.024		BOTT-BODE	66 SPRK			
D		77 0.50	0.15		CAMERINI	66 HBC, DBC	K0+N INTO HYPER		8/67
D	N	72 + 0.54	0.15		CANTER	66 DBC	K0 SCATTER IN D2		11/66
D	N	ERROR IGNORES UNCERTAINTY OF PHASE SHIFTS							
D		95 0.54	0.09	0.14	CHANG	66 HBC	K0+P INTO HYPER.		8/67
D		0.72	0.15		FUJII	66 SPRK	IRON REGENERATOR		
D	C	89 0.62	0.16		HILL	66 DBC	K0+D INTO HYPER.		
D		59 0.65	0.30		MEISNER 1	66 HBC	SEE NOTE M1		
D	M1	+ SIGN FAVORED			MEISNER 2	66 HBC			
D	M	+ 0.44	0.06		MEHLHOP	66 SPRK	SEE NOTE M		
D	C	136 0.67	0.15		CANTER	67 DBC	K0+D INTO HYPER.		11/67
D	C	CANTER 67 IS A PRELIMINARY RESULT,INCLUDES HILL 66 EVENTS							
D		+0.35	0.15		JOVANOVIC	66 SPRK	C+URANIUM REGEN.		11/66
D		0.57	0.10		MISCHKE	67 SPRK			11/67
D		590 0.53	0.12		BALATZ	68 SPRK	AL REGENERATOR		3/68
D		0.445	0.038		CARNEGIE	68 HBC	GAP METHOD		3/68
D		+0.42	0.04		MELHOP	68 SPRK	ST.STEEL REGEN		6/68
D	M	MELHOP 68 IS A FURTHER ANALYSIS OF MELHOP 66							6/68
D		. . . . .							
D	AVG	.4691	.0149	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

13 K02 LIFETIME (MICROSEC)

T	*	ASSUMED DS=DQ AND DELTA I=1/2			CRAWFORD	59 HBC		
T		34 0.081	0.032	0.024	BARDON	58 CC		
T		15 0.051	0.024	0.013	DARMON	62 FBC		
T		0.053	0.006		FUJII	64 SPRK		8/67
T		1700 0.061	0.015	0.012	ASTBURY3	65 CC		8/67
T		0.0515	0.0014		DEVLIN	67 CNTR		8/67
T	L	0.050	0.005		LOWYS	67 HLBC	SEE NOTE L BELOW	8/67
T	L	SUM OF PARTIAL DECAY RATES						
T		. . . . .						
T	AVG	.0520	.0014	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				
T	FIT	.053	.001	VALUE FROM CONSTRAINED FIT				

13 K02 PARTIAL DECAY MODES

P1	K02 INTO 3PIO	S 9S 9S 9
P2	K02 INTO PI+ PI- PIO	S 8S 8S 9
P3	K02 INTO PI MU NEUTRINO	S 8S 4S 2
P4	K02 INTO PI E NEUTRINO	S 8S 3S 1
P5	K02 INTO PI+ PI-	S 8S 8
P6	K02 INTO MU+ MU-	S 4S 4
P7	K02 INTO E+ E-	S 3S 3
P8	K02 INTO E MU	S 3S 4
P9	K0Z INTO TWO GAMMAS	S 0S 0
P10	K02 INTO PI+ PI- GAMMA	S 8S 8S 0
P11	K02 INTO PIO PIO	S 9S 9

13 K02 DECAY RATES

W1	*	K02 INTO PIO PIO PIO			(UNITS 10**6 SEC-1)	(P1)			
W1		54 5.22	1.03	0.84	BEHR	66 HLBC	ASSUMES CP		
W1		. . . . .							
W1	FIT	4.811	.487	VALUE FROM CONSTRAINED FIT					
W2	*	K02 INTO PI+ PI- P0			(UNITS 10**6 SEC-1)	(P2)			
W2		18 3.26	0.77		ANDERSON	65 HBC			
W2		14 1.4	0.4		FRANZINI	65 HBC			
W2		136 2.62	0.28	0.27	BEHR	66 HLBC	ASSUMES CP		
W2		2.54	0.43		HILL	66 DBC			
W2		. . . . .							
W2	AVG	2.3573	.3207	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.7)					
W2	FIT	2.293	.103	VALUE FROM CONSTRAINED FIT					
		(SEE IDEOGRAM, APPENDIX I)							
W3	*	K02 INTO PI E NEUTRINO			(UNITS 10**6 SEC-1)	(P4)			
W3		7.52	0.85	0.72	AUBERT	65 HLBC	DS=DQ,CP ASSUMED		8/67
W3		. . . . .							
W3	FIT	6.642	.356	VALUE FROM CONSTRAINED FIT					
W4	*	K02 INTO CHARGED (3-BODY)			(UNITS 10**6 SEC-1)	(P2+P3+P4)			
W4		98 15.1	1.9		AUERBACH	66 SPRK			8/67
W4		. . . . .							
W4	FIT	14.085	.572	VALUE FROM CONSTRAINED FIT					
W5	*	K02 INTO LEPTONIC (KMU3+KE3)			(UNITS 10**6 SEC-1)	(P3+P4)			
W5		109 9.4	1.3		FRANZINI	65 HBC			
W5		54 11.3	1.9		GOLDEN	66 HBC			
W5		335 10.3	0.8		HILL	67 DBC	K+N TO K0 P		8/67
W5		. . . . .							
W5	AVG	10.1949	.6413	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					
W5	FIT	11.791	.493	VALUE FROM CONSTRAINED FIT					
W6	*	K02 INTO PI MU NEUTRINO			UNITS 10**6 SEC-1)	(P3)			
W6		19 4.54	1.24	1.08	LOWYS	67 HLBC			8/67
W6		. . . . .							
W6	FIT	5.149	.269	VALUE FROM CONSTRAINED FIT					

13 DECAY RATES DIFF.,(+)-(-)/(+)+(-) (PERCENT)

D1	*	K02 INTO (MU+PI-NU)-(MU-PI+NU)/(MU+PI-NU)+(MU-PI+NU)						
D1		1C**6 0.403	0.134		DORFAN	67 SPRK	DERIVED FROM R16	11/67
D2	*	K02 INTO (E+PI-NU)-(E-PI+NU)/(E+PI-NU)+(E-PI+NU)						
D2		1C**7 0.224	0.036		BENNETT	67 CNTR		11/67

13 K02 BRANCHING RATIOS

R1	*	K02 INTO (PIO PIO PIO)/CHARGED				(P1)/(P2+P3+P4)		
R1		24 0.24	0.08		ANIKINA	64 CC		
R1		0.31	0.06		KULYUKINA	66 CC		
R1	*	0.248	0.035		AUBERT	67 HLBC		11/67
R1	*	0.277	0.035		BEHR	67 HLBC		11/67
R1		. . . . .						
R1	AVG	.2848	.0480	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				
R1	FIT	.342	.043	VALUE FROM CONSTRAINED FIT				
R2	*	K02 INTO (PI+ PI- PIO)/CHARGED				(P2)/(P2+P3+P4)		
R2		59 0.185	0.038		ASTIER	61 CC		
R2		79 0.151	0.020		ADAIR	64 HBC		
R2		75 0.157	0.03	0.04	LUERS	64 HBC		
R2		66 0.15	0.03	0.04	ASTBURY 1	65 CC		
R2		326 0.159	0.015		ASTBURY 2	65 CC		
R2		566 0.178	0.017		GUIDONI	65 HBC		
R2	*	1729 0.144	0.004		HOPKINS	65 HBC	SEE HOPKINS 67	
R2		126 0.162	0.015		HAWKINS	66 HBC		
R2		180 0.17	0.03		KULYUKINA	66 CC		
R2	*	0.154	0.020		AUBERT	67 HLBC		11/67
R2		0.161	0.005		HOPKINS	67 HBC		8/67
R2		. . . . .						
R2	AVG	.1618	.0041	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				
R2	FIT	.163	.004	VALUE FROM CONSTRAINED FIT				
R3	*	K02 INTO (PI MU NEUTRINO)/CHARGED				(P3)/(P2+P3+P4)		
R3	C	251 0.356	0.07		LUERS	64 HBC		
R3	C	172 0.39	0.08	0.10	ASTBURY 1	65 CC		
R3	C	330 0.32	0.07		KULYUKINA	66 CC		
R3	C	THIS MODE NOT MEASURED INDEPENDENTLY FROM R2 AND R4						
R3		. . . . .						
R3	FIT	.366	.015	VALUE FROM CONSTRAINED FIT				
R4	*	K02 INTO (PI E NEUTRINO)/CHARGED				(P4)/(P2+P3+P4)		
R4		153 0.487	0.05		LUERS	64 HBC		
R4		202 0.46	0.08	0.10	ASTBURY 1	65 CC		
R4		500 0.51	0.06		KULYUKINA	66 CC		
R4		. . . . .						
R4	AVG	.4908	.0353	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				
R4	FIT	.472	.015	VALUE FROM CONSTRAINED FIT				
R5	*	K02 INTO (PI E NEU)/((PI E NEU)+(PI MU NEU))				(P4)/(P3+P4)		
R5		320 0.415	0.120		ASTIER	61 CC		
R5		. . . . .						
R5	FIT	.563	.018	VALUE FROM CONSTRAINED FIT				
R6	*	K02 INTO(PI+ PI- PIO)/TOTAL				(P2)/TOTAL		
R6								
R6		. . . . .						
R6	FIT	.121	.005	VALUE FROM CONSTRAINED FIT				
R7	*	K02 INTO(LEPTON PI NEUTRINO)/TOTAL				(P3+P4)/TOTAL		
R7								
R7		. . . . .						
R7	FIT	.624	.021	VALUE FROM CONSTRAINED FIT				
R8	*	K02 INTO (2 GAMMA)/TOTAL			(UN. 10**-4)	(P9)/TOTAL		
R8	*	1.3	0.6		CRIEGEE	66 SPRK		
R8	*	33 7.4	1.6		CRONIN	67 SPRK		11/67
R8	*	NOT AVERAGED BECAUSE OF LARGE DISCREPANCY BETWEEN THE TWO EXPTS						
R9	*	K02 INTO (PI+ PI-)/CHARGED			(UNIT 10**-3)	(P5)/(P2+P3+P4)		
R9		45 2.0	0.4		CHRISTENS	64 SPRK		
R9		54 2.08	0.35		GALBRAITH	65 SPRK		
R9		1.93	0.26		BASILE	66 SPRK		
R9		1.993	0.080		BOTT-BODE	66 SPRK		
R9		. . . . .						
R9	AVG	1.9920	.0734	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				
R10	*	K02 INTO (PI MU NEU)/(PI E NEU)				(P3)/(P4)		
R10		0.81	0.19		ADAIR	64 HBC		
R10	N	0.78	0.15		DE BOUARD	65 CNTR	SEE NOTE N BELOW	
R10	*	0.71	0.07		AUBERT	67 HLBC		11/67
R10	*	0.76	0.14	0.08	BASILE	67		11/67
R10		0.82	0.10		DEBOUARD	67 SPRK	SEE NOTE N BELOW	11/67
R10	N	DEBOUARD 67 REPLACES DEBOUARD 65						
R10		273 0.7	0.2		HAWKINS	67 HBC		8/67
R10		0.81	0.08		HOPKINS	67 HBC		8/67
R10		. . . . .						
R10	AVG	.8043	.0569	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				
R10	FIT	.775	.051	VALUE FROM CONSTRAINED FIT				
R11	*	K02 INTO (MU+MU-)/CHARGED			(UNITS 10**-6)	(P6)/(P2+P3+P4)		
R11		100.0 OR LESS			ANIKINA	65 CC		
R11		50.0 OR LESS			ABASHIAN	66 SPRK	90 PER CT CONF	
R11		250.0 OR LESS			ALFF	66 SPRK	0.90 CONF. LEVEL	
R11		2.0 OR LESS			BOTT-BODE	67 SPRK	90 PER CT CONF	8/67
R11		35.0 OR LESS			FITCH	67 SPRK	90 PER CT CONF	3/68
R12	*	K02 INTO (PI+ PI- GAMMA)/TOTAL (UNITS 10**-3)				(P10)/TOTAL		
R12		15.0 OR LESS			ANIKINA	65 CC		
R12		5.0 OR LESS			BELLOTTI	66 HLBC		8/67
R12		3.0 OR LESS			NEFKENS	66 SPRK		
R13	*	K02 INTO (E+ E-)/CHARGED			(UNITS 10**-6)	(P7)/(P2+P3+P4)		
R13		1000.0 OR LESS			ANIKINA	65 CC		
R13		50.0 OR LESS			ABASHIAN	66 SPRK	90 PRCT CONF	
R13		200.0 OR LESS			ALFF	66 SPRK	90 PRCT CONF	
R13		23.0 OR LESS			BOTT-BODE	67 SPRK	90 PER CT CONF	8/67
R14	*	K02 INTO (E MU)/CHARGED			(UNITS 10**-4)	(P8)/(P2+P3+P4)		
R14		10.0 OR LESS			ANIKINA	65 CC		
R14		1.0 OR LESS			CARPENTER	66 SPRK	90 PER CT CONF	
R14		0.107 OR LESS			BOTT-BODE	67 SPRK	90 PER CT CONF	8/67
R14		0.08 OR LESS			FITCH	67 SPRK	90 PER CT CONF	3/68
R15	*	K02 INTO(E+ PI- NEU)/(E- PI+ NEU)						
R15	0	97 0.90	0.18		NEAGU	61 CC		
R15	0	1.01	0.16		LUERS	64 HBC		
R15	0	894 0.99	0.023		KULYUKINA	66 CC		
R15	0	1539 1.06	0.05		VERHEY	66 SPRK		8/67
R15	0	LOW PRECISION EXPTS NOT AVERAGED. FOR MORE PRECISE VALUE,						
R15	0	SEE S13D2 (BENNETT 67)						
R16	*	K02 INTO(MU+ PI- NEU)/(MU- PI+ NEU)						
R16		3200 1.02	0.04		ABASHIAN	66 SPRK		
R16		10**6 1.0081	0.0027		DORFAN	67 SPRK		11/67
R17	*	K02 INTO (PIO PIO)/TOTAL (UNITS 10**-3)				(P11)/TOTAL		
R17	C	7 1.2	1.5	1.2	CRIEGEE	66 SPRK		
R17	C	CRIEGEE EXPT NOT DESIGNED TO MEASURE 2 PIO DECAY MODE						
R17		87 3.3	1.8	1.1	GAILLARD	67 SPRK	KS REGENER.IN CA	8/67
R17	*	GAILLARD 67 QUOTES ETA 00 = 4.3(+1.1,-0.8) UNITS 10**-3						

```
R18 *    K02 INTO (3PIO)/(PI+PI-PIO)                    (P1)/(P2)
R18     188     2.0      0.6            ALEKSANYA 64 FBC
R18 *           1.73     0.20           BUDAGOV   67                                  11/67
R18          . . . . . .
R18 FIT         2.098    .214    VALUE FROM CONSTRAINED FIT

R19 *  KOL INTO (2PIO)/(3PIO)          (UNITS 10**-2)      (P11)/(P1)
R19 C  109      1.89     0.31           CRONIN 1  67 SPRK     ETA00=4.9+-0.5     8/67
R19 C           1.36     0.18           CRONIN 2  67 SPRK     ETA00=3.92+-0.3   11/67
R19 C      CRONIN 2 IS PRELIM RESULT FROM FURTHER ANALYSIS OF CRONIN 1           11/67

R20 *  K02 INTO (PI+ PI-)/(KE3 + KMU3)  (UNITS 10**-3)  (P5)/(P3+P4)
R20     309     2.51     0.23           DEBOUARD  67 SPRK                          6/68
R20     525     2.35     0.19           FITCH     67 SPRK     ETA+-=1.91+-.06      6/68
R20          . . . . . .
R20 AVG         2.4149   .1465   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)


------ --------- --------- --------- --------- --------- --------- ---------
                        13  K02  FORM FACTORS                                     8/67

LM+ *   LAMBDA +  (LINEAR ENERGY DEPENDENCE OF F+ IN KO E3 DECAY)                 8/67

LM+ *   FOR RAD. CORR. TO THE DALITZ PLOT OF KE3, SEE GINSBERG 67.

LM+ *  153    +0.07      .06            LUERS     64 DLTZ PLT,NO RAD CORR
LM+ *         +0.15      .08            FISHER    65 SPRKDLTZ PLT,NO RAD CORR      8/67
LM+ *  762    -0.01      .02            FIRESTONE 67 HBC DLTZ PLT,NO RAD CORR      8/67
LM+ *  531    +0.01      .015           KADYK     67 HBC E,PI SPEC,NO RAD COR      8/67
LM+ *  240    +0.08      .10     .08    LOWYS     67 FBC PI  SPEC,NO RAD CORR      8/67
LM+ * 1000    +0.020     0.013          ARONSON   68 SPRK PI SPEC,NO RAD CORR      3/68
LM+ * 7233    +0.023     0.012          BASILE    68 SPRK DLTZ PLT,NO RAD COR      3/68

XIA *  XIA = F-/F+ (DETERMINED FROM SPECTRA AND KMU3/KE3)

XIA *  389    +1.1       0.9     1.3    ADAIR     64 HBC      KMU3/KE3             8/67
XIA *         +0.66      0.9     1.3    LUERS     64 HBC      KMU3/KE3             8/67
XIA * 1371    +1.2       0.8            CARPENTER 66 SPRK     MU,PI SPECTRA        8/67
XIA C 1371    -0.82      0.6            CARPENTER 66 SPRK     MU,PI SPECTRA        8/67
XIA C       2ND CARPENTER VALUE ALLOWS ENERGY DEP OF F+,F-
XIA *         -0.2       1.0     1.7    KULYUKINA 66 CC       MU,PI SPECTRA        8/67
XIA *          0.4       0.5            AUBERT    67 HLBC +   KMU3/KE3             11/67
XIA *          0.8       0.7            BASILE    67 SPRK +   KMU3/KE3             11/67

XIB *  XIB = F-/F+ (DETERMINED FROM MU POLARIZATION IN KMU3)

XIB *          -1.1      0.5            ABRAMS    66 SPRK     POLARIZATION         8/67
XIB * 2608     -1.2      0.5            AUERBACH  66 SPRK     POLARIZATION         8/67
XIB *          -1.75     0.5     0.2    HELLAND   68 CNTR +   TOTAL POLAR.         6/68

XIB *  MEAS OF XI USING POLARIZATION IS LESS SENSITIVE TO FORM FACTOR
XIB *  VARIATIONS.

------ --------- --------- --------- --------- --------- --------- ---------
                        13 X =(DS=-DQ AMPLITUDE /DS=+DQ AMPLITUDE)


REX *    REAL PART OF X

REX     152     0.06     0.18     0.44  BALDO-CE  65 HLBC     K+ CHARGE EXCHNG 11/67
REX *          BALDO-CE 65 GIVES X AND THETA.CONVERTED BY US TO REX AND IMX     11/67
REX     196     0.035    0.11     0.13  AUBERT    65 HLBC     K+ CHARGE EXCHNG 11/67
REX     109     -0.08    0.16     0.28  FRANZINI  65 HBC      PBAR P           11/67
REX *          FRANZINI 65 GIVES X AND THETA.FOR REX AND IMX SEE SCHMIDT 67    11/67
REX     335     0.17     0.10           HILL      67 DBC      K+D YIELDS KOPP  11/67
REX     116     0.17     0.16     0.35  FELDMAN   67 SPRK     PI-P TO KO LMBDA 11/67
REX             0.22     0.07     0.09  WEBBER    68 HBC                       7/68
REX             0.03     0.03           BENNETT1  68
REX          . . . . . .
REX AVG          .06      .03    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.15 )

IMX *   IMAGINARY PART OF X (ASSUMES M(KL)-M(KS) POSITIVE -- SEE S13D)

IMX     152     -0.44    0.32     0.19  BALDO-CE  65 HLBC     K+ CHARGE EXCHNG  3/68
IMX *          BALDO-CE 65 GIVES X AND THETA.CONVERTED BY US TO REX AND IMX     11/67
IMX     196     -0.21    0.11     0.15  AUBERT    65 HLBC     K+ CHARGE EXCHNG  3/68
IMX     109     +0.24    0.40     0.30  FRANZINI  65 HBC      PBAR P            3/68
IMX *          FRANZINI 65 GIVES X AND THETA.FOR REX AND IMX SEE SCHMIDT 67    11/67
IMX     116     0.0      0.25           FELDMAN   67 SPRK     PI-P TO KO LMBDA 11/67
IMX     335     -0.20    0.10           HILL      67 DBC      K+D YIELDS KOPP  11/67
IMX H  FTNOTE 10 OF HILL 67 SHOULD READ +0.58, NOT -0.58 (PRIV COMM)             3/68
IMX             -0.08    0.08           WEBBER    68 HBC                       7/68
IMX          . . . . . .
IMX AVG          -.1401   .0531   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)


------ --------- --------- --------- --------- --------- --------- ---------
                        13  CP VIOLATION PARAMETERS
     ETA+- = A(KL TO PI+PI-)/A(KS TO PI+PI-)
     ETA00 = A(KL TO PIOPIO)/A(KS TO PIOPIO)
     THE MAGNITUDES OF ETA+- AND OF ETA00 ARE DERIVED FROM BR. RATIOS.
     FOR VALUES OF MAGNITUDE(ETA+-) QUOTED BY INDIVIDUAL EXPTS, SEE
     LISTINGS OF S13R9.  FOR MAGNITUDE  OF ETA00,SEE S13R17,S13R19.

F+- *  PHASE OF ETA +-          (DEGREES)
F+- *          45.0     50.0           FITCH     65 SPRK     BE REGEN         11/67
F+- *          30.0     45.0           FIRESTONE 66 HBC                       11/67
F+-             46.0     15.0           BOHM      68 SPRK     VACUUM REGEN     11/67
F+-             70.0     21.0           BOTT-BODE 67 SPRK     C REGEN          11/67
F+- R           84.0     17.0           RUBBIA    67 SPRK     CU REGEN         11/67
F+-             25.0     35.0           MISCHKE   67 SPRK     CU REGEN         11/67
F+-             51.0     11.0           BENNETT2  68 CNTR     CU REGEN
F+- R      RUBBIA 67 REPLACED BY BENNETT2 68.
F+-          . . . . . .
F+- AVG          49.0     8.0    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

****** ******** ******** ******** ******** ******** ******** ********

                        REFERENCES
                  13   LONG-LIVED NEUTRAL K (498, JP=0-)  I=1/2


BARDON    58 ANP 5 156          M BARDON,K LANDE,L LEDERMAN //COLUMBIA+BNL
CRAWFORD 59 PRL 2 361           CRAWFORD,CRESTI,DOUGLASS,GOOD + ////// LRL
ASTIER    61 AIX CONF 1 227     ASTIER,BLASKOVIC,RIVET,SIAUD +/// PARIS+EP
FITCH     61 NC  22 1160        V FITCH,P PIROUE,R PERKINS ///// PRINCETON
GOOD      61 PR 124 1223        GOOD,MATSEN,MULLER,PICCIONI,POWELL +// LRL
NEAGU     61 PRL  6  552        NEAGU,OKONOV,PETROV,ROSANOVA,RUSAKOV//JINR

ALEXANDE 62 PRL 9 69            G ALEXANDER,S ALMEIDA,F CRAWFORD ///// LRL
CAMERINI 62 PR 128 362          CAMERINI,FRY,GAIDOS,BIRGE,ELY +///WISC+LRL
DARMON    62 PL 3 57            J DARMON,A ROUSSET,J SIX /////////PARIS+EP
JOVANOVI 63 BNL CONF 42         JOVANOVIC,FISCHER,BURRIS + // BNL+MARYLAND

ADAIR     64 PL 12 67           R K ADAIR,L B LEIPUNER /////////// YALE+BNL
ALEKSANY 64 DUBNA 2 102         ALEKSANYAN,ALIKHANYAN,VARTAZARYAN+//EREVAN
  SEE ALSO  JETP 19 1019        ALEKSANYAN+/// LEBEDEV+MOS ENG PHYS+EREVAN
ANIKINA   64 JETP 19 42         ANIKINA,ZHURAVLEVA+//GEORG ACAD SCI+ DUBNA
CHRISTEN 64 PRL 13 138          CHRISTENSON,CRONIN,FITCH,TURLAY //PRINCETN
FUJII     64 DUBNA 2 146        FUJII,JOVANOVICH,TURKOT+//BNL,MARYLAND,MIT
LUERS     64 PR 133 B 1276      LUERS,MITTRA,WILLIS,YAMAMOTO //////// BNL

STERN     64 PRL 12 459         STERN,BINFORD,LIND,ANDERSON + /// WISC+LRL

ANIKINA   65 JINR P 2488        ANIKINA,VARDENGA,ZHURAVLEVA,KOTLYA+//DUBNA
ANDERSON 65 PRL 14 475          ANDERSON,CRAWFORD,GOLDEN,STERN +//LRL+WISC
ASTBURY1 65 PL 16 80            ASTBURY,FINOCCHIARO,BEUSCH + / CERN+ZURICH
ASTBURY1 65  SEE ALSO M PEPIN   HELV.PHYS. ACTA 39 523
ASTBURY2 65 PL 18 175           ASTBURY,MICHELINI,BEUSCH + /// CERN+ZURICH
ASTBURY3 65 PL 18 178           ASTBURY,MICHELINI,BEUSCH + /// CERN+ZURICH

AUBERT    65 PL 17 59           AUBERT,BEHR,CANAVAN,CHOUNET+///PARIS+ORSAY
AUBERT    65  SEE ALSO LOWYS 67
BALDO-CE 65 NC 38 684           BALDO-CEOLIN,CALIMANI,CIAMPOLILLO + /PADVA
BEHR      65 ARGONNE CONF 59    BEHR,BRISSON,BELLOTTI+ // EP+MILANO+PADOVA
CHRISTEN 65 PR 140 B 74         CHRISTENSON,CRONIN,FITCH,TURLAY//PRINCETON
  (CHRISTENSON 65 HAS BEEN CORRECTED FOR INTERFERENCE BY FITCH 65, FOOTNOTE)

DE BOUAR 65 PL  15  58          DE BOUARD,DEKKERS,SCHARFF+//CERN+ORSAY+MPI
FISHER    65 ANL 7130 83        FISHER,ABASHIAN,ABRAMS,CARPENTER+/ILLINOIS
FITCH     65 PRL 15 73          FITCH,ROTH,RUSS,VERNON ///////// PRINCETON
FRANZINI 65 PR 140 B 127        FRANZINI,KIRSCH,PLANO + / COLUMBIA+RUTGERS
GALBRAIT 65 PRL 14 383          GALBRAITH,MANNING,JONES +//AERE+BRIST+RHEL

GUIDONI   65 ARGONNE CONF 49    +BARNES,FOELSCHE,FERBEL,FIRESTO+// BNL+YALE
HOPKINS   65 ARGONNE CONF 67    H W K HOPKINS,BACON,EISLER // YALE+RUTGERS
MESTVIRI 65 JINR P 2449         MESTVIRISHVILI,NYAGU,PETROV,RUSAKOV+//JINR
TRILLING 65 UCRL 16473          GEORGE H TRILLING ////////////////////// LRL
TRILLING 65   IS UPDATED FROM 1965 ARGONNE CONF, PAGE 115
VISHNEVS 65 PL  18   339        VISHNEVSKY,GALANINA,SEMENOV + ///// MOSCOW

ABASHIAN 66 BERKELEY 2B         ABASHIAN,ABRAMS,VERHEY+ // URBANA
ABRAMS    66 BERKELEY CONF 2B   ABRAMS ABASHIAN,CARPENTER+ ////// ILLINOIS
ALFF-STE 66 PL 21 595           ALFF-STEINBERGER,HEUER,RUBBIA +     // CERN
AUERBACH 66 PRL  17  980        AUERBACH,MANN,MCFARLANE,SCIULLI ///// PENN
AUERBACH 66 PR  149 1052        AUERBACH,DOBBS,LANDE,MANN,SCIULLI+/// PENN
AUERBACH 66   SEE ALSO PRL 14 192
BALDO-CE 66 NC  45A  733        BALDO-CEOLIN,CALIMANI,CIAMPOLILLO+///PADUA
BASILE    66  BALATON CONF      BASILE,CRONIN,THEVENET +            // SACLAY

BEHR      66 PL  22  540        BEHR,BRISSON,BALDO-CEOLIN,AUBERT+/PADUA,EP
BELLOTTI 66 NC  45A  737        BELLOTTI,PULLIA,BALDO-CEOLIN+ /MILAN,PADUA
BOTT-BOD 66 PL  23  277         BOTT-BODENHAUSEN,DE BOUARD,CASSEL+ // CERN
CAMERINI 66 PR  150 1148        CAMERINI,CLINE,ENGLISH,FISCHBEIN+WISCONSIN
CANTER    66 PRL 17 942         +CHO,ENGLER,FISK,HILL +     // CARNEGIE+BNL
CARPENTE 66 PR  142  871        CARPENTER,ABASHAN,ABRAMS,FISHER///ILLINOIS
CHANG     66 PL  23  702        CHANG,BASSANO,KIKUCHI,DODD+// SYRACUSE,BNL

CRIEGEE   66 PRL 17 150         +FOX,FRAUENFELDER,HANSON,MOSCAT+//ILLINOIS
FIRESTON 66 PRL 16 556          FIRESTONE,KIM,LACH,SANDWEISS+/////YALE,BNL
FIRESTON 66 PRL 17 116          FIRESTONE,KIM,LACH,SANDWEISS+/////YALE,BNL
FUJII     66 PRL 13 253         FUJII,JOVANOVICH,TURKOT,ZORN//BNL+MARYLAND
  (FUJII 66 IS THE CORRECTED VALUE GIVEN BY JOVANOVICH+ 66)
GOLDEN    66  BERKELEY 2B       R.GOLDEN,F.CRAWFORD,D.STERN          // LRL
HAWKINS   66 PL 21 238          C J B HAWKINS ////////////////////////// YALE
 ALSO     67 PR  156  1444      C J B HAWKINS ////////////////////////// YALE

HILL      66 BNL 10608          HILL,ROBINSON,SAKITT,CANTER+//BNL,CARNEGIE
JOVANOVI 66 PRL 17 1075         JOVANOVICH,FUJII,TURKOT,ZORN +//BNL+MD+MIT
KULYUKIN 66  BERKELEY 2B        KULYUKINA,MESTVIRISHVILI,NEAGU,PETR+//JINR
MEISNER1 66 PRL 16 278          G W MEISNER,B B CRAWFORD,F CRAWFORD // LRL
MEISNER2 66 PRL  17  492        G MEISNER,B CRAWFORD,F CRAWFORD ////// LRL
MEHLHOP   66    BERKELEY CONF. MEHLHOP,GOOD,PICCIONI +          // LA JOLLA
MELHOP    66   SEE ALSO MURTY 67
MISCHKE   66    BERKELEY CONF. + ABASHIAN,ABRAMS,CARPENTER +  // ILLINOIS
NEFKENS   66 PL 19 706          NEFKENS,ABASHIAN,ABRAMS,CARPENTER+ /// ILL
VERHEY    66 PRL 17 669         VERHEY,NEFKENS,ABASHIAN+// URBANA

AUBERT    67 HEIDELBERG CONF    AUBERT,HEUSS,LEDONG,NAGY,PASCAUD /// CRSAY
BASILE    67 HEIDELBERG CONF    BASILE,CRONIN,THEVENET,TURLAY+//////// CERN
BEHR      67 HEIDELBERG CONF    BEHR,BEILLIERE,BOUTANG,VANDERVERLDE////EP
BENNETT   67 PRL  19  993       BENNETT,NYGREN,SAAL,STEINBERGER +/COLUMBIA
BOTT-BOD 67 PL  24B  194        BOTT-BODENHAUSEN,DEBOUARD,CASSEL + ///CERN
BOTT-BOD 67 PL  24B  438        BOTT-BODENHAUSEN,DEBOUARD,DEKKERS+////CERN
   ALSO  66 PL  20  212         BOTT-BODENHAUSEN,DEBOUARD,CASSEL+/////CERN
   ALSO  66 PL  23  277         BOTT-BODENHAUSEN,DEBOUARD,CASSEL+/////CERN
BUDAGOV   67 HEIDELBERG CONF    BUDAGOV,BURMEISTER,CUNDY,KRENZ,MYATT+/CERN
CANTER    67 HEIDELBERG CONF    CANTER,CHO,DRALLE,ENGLER+ /// CARNEGIE,BNL

CRONIN 1 67 PRL 18 25           +KUNZ,RISK,WHEELER//////////PRINCETON
CRONIN 2 67 PRINC CONF(11/67)   +KUNZ,RISK,WHEELER ////////////// PRINCETON
DEBOUARD 67 NC  52A  662        DEBOUARD,DEKKERS,JORDAN,MERMOD + //// CERN
DEVLIN    67 PRL 18 54          DEVLIN,SOLOMON,SHEPARD,BEALL+//PRINC+MARY.
DORFAN    67 PRL  19  987       DORFAN,ENSTROM,RAYMOND,SCHWARTZ +/SLAC+LRL
FELDMAN   67 PR  155  1611      FELDMAN,FRANKEL,HIGHLAND,SLOAN /// OF PENN
FIRESTON 67 PRL 18  176         FIRESTONE,KIM,LACH,SANDWEISS,+////YALE,BNL
FITCH     67 PR 164  1711       FITCH,ROTH,RUSS,VERNON ///////// PRINCETON
GAILLARD 67 PRL 18 20           +KRIENEN,GALBRAITH,HUSSRI+//CERN+RUTH+AACH
GINSBERG 67 PR 162  1570        EDWARD S GINSBERG ///////// U. MASS BOSTON

HAWKINS   67 PR  156  1444      C J B HAWKINS ////////////////////////// YALE
HILL      67 PRL  19  668       HILL,LUERS,ROBINSON,CANTER+///BNL,CARNEGIE
HOPKINS   67 PRL 19  185        HOPKINS,BACON,EISLER ////////////////// BNL
KADYK     67 PRL 19  597        KADYK,CHAN,DRIJARD,OREN,SHELDON ///////LRL
LOWYS     67 PL  24B  75        LOWYS,AUBERT,CHOUNET,PASCAUD+////EP,ORSAY
MISCHKE   67 PRL 18  138        MISCHKE,ABASHIAN,ABRAMS+////////// ILLINOIS
RUBBIA    67 PL  24B  531       C.RUBBIA,J.STEINBERGER,////////// CERN+COL
  ALSO    66 PL  20  207        ALFF-STEINBERGER,HEUER,KLEINKNECHT+///CERN
  ALSO    66 PL  21  595        ALFF-STEINBERGER,HEUER,KLEINKNECHT+///CERN
  ALSO    66 PL  23  167        C.RUBBIA,J.STEINBERGER ////////////CERN+COL
SCHMIDT   67 NEVIS 160(THESIS)  P. SCHMIDT ////////////////////////// COLUMBIA

ARONSON   68 PRL 20 287         S.H.ARONSON, K.W.CHEN ////////// PRINCETON
BALATZ    68 PL 26B  320        BALATZ,BEREZIN,VISHNEVSKY,GALANINA+/MOSCOW
BASILE    68 PL 26B  542        BASILE,CRONIN,THEVENET,TURLAY+//////SACLAY
BENNETT1  68  PL 27B 24         BENNETT,NYGREN,STEINBERGER+/COLUMBIA + CERN
BENNETT2  68  PL 27B 24         BENNETT,NYGREN,STEINBERGER+/COLUMBIA + CERN
BOHM      68 PREPRINT           BOHM,DARRIULAT,GROSSO,KAFTANOV ////// CERN
CARNEGIE 68 BAPS  13  16        CARNEGIE,FITCH,KAMAE,ROTH,RUSS+//PRINCETON
HELLAND   68 PREPRINT           HELLAND,LONGO,YOUNG //////// UCLA,MICHIGAN
MELHOP    68 PREPRINT           MELHOP,MURTY,BOWLES,BURNETT+///// LA JOLLA
WEBBER    68 UCRL 18135 REV.    WEBBER,SOLMITZ,CRAWFORD,GARNJOST ///// RLR
********* ********* ********* ********* ********* ********* ********* ******
********* ********* ********* ********* ********* ********* ********* ******


                        14  ETA (549,JPG=0-+)  I=0

FOR C. BALTAYS REVIEW OF THE ETA MESON, SEE PROC. UNIV.OF PENN.
CONF. ON MESON SPECTROSCOPY, W.A. BENJAMIN, 1968.


                        14  ETA MASS  (MEV)

M        53  549.0      1.2            BASTIEN   62 HBC
M        35  546.0      4.0            PICKUP    62 HBC
M        91  548.0      1.0            ALFF      62 HBC
M            549.3      2.9            DELCOURT  63 CNTR
M       148  549.0      0.7            FOELSCHE  64 HBC
M       325  552.0      3.0            KRAEMER   64 DBC
M            548.2      0.65           FOSTER3   65 HBC
M       250  555.0      2.0            JAMES     66 HBC
M         . . . . . .
M  AVG       548.8176   .5570   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
```

```
14 ETA WIDTH (MEV)

W      91   10.0   OR LESS          ALFF       62 HBC
W     148   10.0   OR LESS          FOELSCHE   64 HBC
W      31   12.0   OR LESS          JAMES      66 HBC
W            4.0   OR LESS          BALTAY     66 DBC
W             .9   OR LESS          JONES      66 CNTR    .95 CONF.LEVEL     8/67
  ALSO SEE ETA DECAY RATES (BELOW).

14 ETA PARTIAL DECAY MODES

P1     ETA INTO 2GAMMA                                    S 0S 0
P2     ETA INTO 3PIO                                      S 9S 9S 9
P3     ETA INTO PI+ PI- PIO                               S 8S 8S 9
P4     ETA INTO PI+ PI- GAMMA                             S 8S 8S 0
P5     ETA INTO   E+E-PIO         VIOLATES C IN E.M.I.    S 9S 3S 3
P6     ETA INTO E+E-PI+PI-                                S 8S 8S 3S 3
P7     ETA INTO PIO 2GAMMA                                S 9S 0S 0
P8     ETA INTO E+E-GAMMA                                 S 3S 3S 0
P9     ETA INTO 2PIO GAMMA        VIOLATES C              S 9S 9S 0
P10    ETA INTO PI+PI-PIO GAMMA                           S 8S 8S 9S 0
P11    ETA INTO PI+PI- 2GAMMA                             S 8S 8S 0S 0
P12    ETA INTO MU+MU-                                    S 4S 4
P13    ETA INTO MU+MU-GAMMA                               S 4S 4S 0
P14    ETA INTO MU+MU-PIO                                 S 4S 4S 9

14 ETA DECAY RATES

W1  *  ETA INTO 2GAMMA (UNITS KEV)                        (P1)
W1          0.93     0.2         BEMPORAD 67 CNTR      PRIMAKOFF EFFECT 11/67
    *    ASSUMES THAT  2GAMMA/TOTAL =0.41+/- 0.02

+ + + + + + + + + + + + + + + + + + + + + + + + + + + + +
+                                                        +
+   BE SURE TO READ THE NOTE ON ETA DECAYS IN APPENDIX II.  +
+                                                        +
+ + + + + + + + + + + + + + + + + + + + + + + + + + + + +

14 ETA  BRANCHING RATIOS

(P9) IS ASSUMED = 0 IN ALL RATIOS

R1  *    ETA INTO NEUTRALS/CHARGED                        (P1+P2+P7)/(P3+P4)
R1  N  10    2.5       1.0         PICKUP     62 HBC
R1  N  53    3.20      1.26        BASTIEN    62 HBC
R1  N        2.7       0.8         SHAFER     62 HBC
R1           2.6        .9         BUSCHBECK 63 HBC
R1  N  280   4.5       1.0         JAMES      66 HBC
R1  N    THIS EXPERIMENT HAS NOT BEEN USED IN COMPUTING THE AVERAGES
R1  N  AS IT WAS UNABLE TO CLEARLY SEPARATE PARTIAL MODES (3) AND (4)
R1  N  FROM EACH OTHER.  THE REPORTED VALUE THUS PROBABLY CONTAINS
R1  N  SOME (UNKNOWN) FRACTION OF MODE (4), AS POINTED OUT BY E.C. FOWLER
R1           2.64      0.23        BALTAY2    67 DBC                          11/67
R1           . . . . . . . .
R1  AVG      2.6375     .2228   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R1  FIT      2.433      .170    VALUE FROM CONSTRAINED FIT

R2  *  ETA INTO 2GAMMA/CHARGED                            (P1)/(P3+P4)
R2           0.99      0.48        CRAWFORD   63 HBC
R2           . . . . . . . . .
R2  FIT      1.307      .114    VALUE FROM CONSTRAINED FIT

R3  *    ETA INTO PIO 2GAMMA/NEUTRALS                     (P7)/(P1+P2+P7)
R3  S        0.375     0.072       DIGIUGNO   66 CNTR    ERROR DOUBLED
R3  *    THE ERRORS OF DIGIUGNO+ 66 HAVE BEEN INCREASED BY A FACTOR
R3  *  OF TWO, TO TAKE INTO ACCOUNT POSSIBLE SYSTEMATIC ERRORS, AS
R3  *  SUGGESTED BY THE AUTHORS.
R3            .27       .10        GRUNHAUS   66 SPRK                          8/67
R3  S         .244      .05        FELDMAN    67 SPRK                          8/67
R3  S  SEE THE NOTE ON ETA DECAYS IN APPENDIX II.
R3            .028      .044       BUNIATOV   67 SPRK                         11/67
R3           . . . . . . . . .
R3  AVG       .0673     .0892   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.2)
R3  FIT       .048      .042    VALUE FROM CONSTRAINED FIT
                 (SEE IDEOGRAM, APPENDIX I)

R4  *  ETA INTO (PI+ PI- GAMMA)/(PI+ PI- PIO)             (P4)/(P3)
R4           0.14      0.08        FOELSCHE   64 HBC
R4  M  24    0.73      0.25        PAULI      64 DBC
R4  M    THIS EXPERIMENT HAS NOT BEEN INCLUDED IN THE AVERAGES SINCE
R4  M  IT IS NOT CLEAR THAT THEIR CLASS B EVENTS ARE ACTUALLY FROM ETAS.
R4           0.30      0.06        CRAWFORD   66 HBC
R4            .10       .10        KRAEMER    64 DBC
R4            .196      .041       FOSTER3    65 HBC
R4            .25       .035       LITCHFIEL  67 DBC                           8/67
R4           0.28      0.04        BALTAY2    67 DBC                          11/67
R4           . . . . . . . . .
R4  AVG       .2377     .0229   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)
R4  FIT       .234      .021    VALUE FROM CONSTRAINED FIT

R5  *    ETA INTO (3PIO + 2/3 PIO 2GAMMA)/ PI+PI-PIO      (P2+2/3P7)/P3
R5           0.83      0.32        CRAWFORD   63 HBC
R5           2.0       1.0         FOELSCHE   64 HBC
R5           0.90      0.24        FOSTER1    65 HBC
R5           . . . . . . . . .
R5  AVG       .9148     .1886   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R5  FIT      1.341      .119    VALUE FROM CONSTRAINED FIT

R6  *  ETA INTO 3PIO/2GAMMA                               (P2)/(P1)
R6            .90  OR MORE         CHRETIEN   62 PBC
R6  P        0.42  OR LESS         STRUGALSK 67 HBC  PRELIMINARY REPORT   4/67
R6           0.88      0.16        BALTAY1    67 DBC                          11/67
R6           1.1       0.2         CENCE      67 SPRK                          1/68
R6           . . . . . . . . .
R6  AVG       .9659     .1249   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R6  FIT       .771      .100    VALUE FROM CONSTRAINED FIT

R7  *  ETA INTO 2GAMMA/(PI+ PI- PO)                       (P1)/(P3)
R7           1.61      0.39        FOSTER1    65 HBC
R7           . . . . . . . . .
R7  FIT      1.613      .144    VALUE FROM CONSTRAINED FIT

R8  *    ETA INTO NEUTRAL/(PI+ PI- PIO)                   (P1+P2+P7)/(P3)
R8     280   3.6       0.8         KRAEMER    64 DBC
R8           3.8       1.1         PAULI      64 DBC
R8           2.89      0.56        ALFF-STEI 66 HBC
R8     244   3.6       0.6         FLATTE2    67 HBC                           1/68
R8           . . . . . . . . .
R8  AVG      3.3488     .3460   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R8  FIT      3.123      .189    VALUE FROM CONSTRAINED FIT

R9  *  ETA INTO  (E+E-PIO)/(PI+PI-PIO)  (UNITS 10**-2)  (P5)/(P3)
R9          1.1   OR LESS          PRICE      65 HBC
R9     0    0.77  OR LESS          FOSTER2    65 HBC
R9           .42  OR LESS          BAGLIN1    67 HLBC   .9 CONF.LEVEL      8/67
R9     0     .16  OR LESS          BILLING    67 HLBC   .9 CONF.LEVEL     11/67

R10 *    ETA INTO (E+E-PI+PI-)/TOTAL  (UNITS 10**-2)     (P6)/TOTAL
R10         0.7 OR LESS            RITTENBER 65 HBC

R11 *    ETA INTO (E+E-PI+PI-)/(PI+PI-GAMMA)              (P6)/(P4)
R11    1    0.026     0.026        GROSSMAN  66 HBC

R12 *    ETA INTO 2 GAMMA/NEUTRALS                        (P1)/(P1+P2+P7)
R12 S       0.416     0.044        DIGIUGNO  66 CNTR    ERROR DOUBLED
R12          .44       .07         GRUNHAUS  66 SPRK                           8/67
R12 S        .579      .052        FELDMAN   67 SPRK                           8/67
R12 S  SEE THE NOTE ON ETA DECAYS IN APPENDIX II.
R12 T       0.39      0.06         JONES     66 CNTR                           8/67
R12 T  THIS RESULT FROM COMBINING CROSS-SECTIONS FROM TWO DIFFERENT EXPTS.
R12          .59       .033        BUNIATOV  67 SPRK                          11/67
R12         . . . . . . . . .
R12 AVG      .5627     .0579   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.9)
R12 FIT      .537      .029    VALUE FROM CONSTRAINED FIT

R13 *    ETA INTO 3PIO/NEUTRALS                           (P2)/(P1+P2+P7)
R13 S       0.209     0.054        DIGIUGNO  66 CNTR    ERROR DOUBLED
R13 R        .29       .10         GRUNHAUS  66 SPRK                           8/67
R13 S        .177      .035        FELDMAN   67 SPRK                           8/67
R13 S  SEE THE NOTE ON ETA DECAYS IN APPENDIX II.
R13 R        .41       .033        BUNIATOV  67 SPRK                          11/67
R13 R REDUNDANT INFORMATION FROM THIS EXPERIMENT
R13         . . . . . . . . .
R13 FIT      .414      .042    VALUE FROM CONSTRAINED FIT

R14 *     ETA INTO PIO 2GAMMA/2GAMMA                      (P7)/(P1)
R14          .5   OR LESS          WAHLIG    66 SPRK     .9 CONF LEVL
R14 P       0.86      0.47         STRUGALSK 67 HBC  PRELIMINARY REPORT   4/67
R14         0.0       0.14         BALTAY1   67 DBC                           11/67
R14 N       0.05      0.04         BONAMY    67 SPRK                          11/67
R14 N  PRELIMINARY RESULT
R14         . . . . . . . . .
R14 FIT      .085      .076    VALUE FROM CONSTRAINED FIT

R15 *     ETA INTO (E+E-PIO)/TOTAL (UNITS 10**-2)        (P5)/TOTAL
R15         0.7 OR LESS            RITTENBER 65 HBC
R15         0.084 OR LESS          BAZIN     68 DBC  .9 CONF LEVL          6/68

R16 *    ETA INTO 2GAMMA/(3PIO + PIO 2GAMMA)              (P1)/(P2+P7)
R16         0.80       .25         BACCI     63 CNTR
R16         . . . . . . . . .
R16 FIT     1.137      .130    VALUE FROM CONSTRAINED FIT

R17 *    ETA INTO (PI+PI-PIO GAMMA)/(PI+PI-PIO)           (P10)/(P3)
R17          .07  OR LESS          FLATTE    67 HBC                            8/67
R17          .009 OR LESS          PRICE     67 HBC                            8/67
R17          .016 OR LESS          BALTAY2   67 DBC     .95 CONF LEVL     11/67

R18 *    ETA INTO (PI+PI- 2GAMMA)/(PI+PI-PIO)             (P11)/(P3)
R18          .009 OR LESS          PRICE     67 HBC                            8/67
R18          .016 OR LESS          BALTAY2   67 DBC     .95 CONF LEVL     11/67

R19 *  ETA INTO 3PIO/(PI+ PI- PIO)                        (P2)/(P3)
R19         1.05       .25         MICHAEL   67 HLBC                           8/67
R19         1.3        .4          BAGLIN2   67 HLBC                           8/67
R19         . . . . . . . . .
R19 AVG     1.1202     .2120   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R19 FIT     1.245      .134    VALUE FROM CONSTRAINED FIT

R20 *    ETA INTO 2GAMMA/(3PIO +2/3 PIO 2GAMMA)           (P1)/(P2+2/3P7)
R20         1.10      0.5          MULLER    63 DBC
R20         . . . . . . . . .
R20 FIT     1.203      .134    VALUE FROM CONSTRAINED FIT

R21 *  ETA INTO NEUTRALS/TOTAL                            (P1+P2+P7)/TOTAL
R21          .79       .08         BUNIATOV  67 SPRK                          11/67
R21         . . . . . . . . .
R21 FIT      .709      .014    VALUE FROM CONSTRAINED FIT

R22 *  ETA INTO PIZRO 2GAMMA/TOTAL                        (P7)/TOTAL
R22          .12  OR LESS          JACQUET   67 HLBC    .9 CONF LEVL      11/67
R22         . . . . . . . . .
R22 FIT      .034      .030    VALUE FROM CONSTRAINED FIT

R23 *  ETA INTO MU+MU-/TOTAL      (UNITS 10**-5)          (P12)/TOTAL
R23    0    2.    OR LESS          WEHMANN   68 SPRK    .95 CONF.LEVEL     4/68

R24 *  ETA INTO MU+MU-PIO/TOTAL  (UNITS 10**-4)           (P14)/TOTAL
R24         5.    OR LESS          WEHMANN   68 SPRK                           4/68

+ + + + + + + + + + + + + + + + + + + + + + + + + + + + +
+                                                        +
+   BE SURE TO READ THE NOTE ON ETA DECAYS IN APPENDIX II.  +
+                                                        +
+ + + + + + + + + + + + + + + + + + + + + + + + + + + + +

14 ETA C-NONCONSERVING DECAY PARAMETER

A   DECAY ASYMMETRY PARAMETER FOR PI+ PI- PIO   (UNITS 10**-2)
A     1351    7.2       2.8        BALTAY    66 DBC
A      355    8.7       5.3        FOWLER    66 HBC
A      705   -6.1       4.0        LARRIBE   66 HBC                            8/67
A    10665    0.3       1.0        CNOPS     66 SPRK                           8/67
A     1300    5.8       3.4        OTHERS    66 HBC
A    36800    1.5        .5        GORMLEY3  68 SPRK                           6/68
A            . . . . . . . . .
A   AVG       1.4398     .7225   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.7)
                 (SEE IDEOGRAM, APPENDIX I)

B   DECAY ASYMMETRY PARAMETER FOR PI+ PI- GAMMA (UNITS 10**-2)
B       33   -2.       17.         CRAWFORD  66 HBC                           11/66
B     1620    1.5       2.5        BOWEN     67 SPRK                           8/67
B   N ABOVE EXPERIMENT IS SENSITIVE ONLY TO UPPER .4 OF GAMMA-RAY SPECTRUM
B            -4.        8.         LITCHFIEL 67 DBC                            8/67
B     6710    2.4       1.4        GORMLEY2  68 SPRK                           6/68
B            . . . . . . . . .
B   AVG       2.0239    1.2045   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

****** ********* ********* ********* ********* ********* ********* *********
```

REFERENCES
14 ETA(549,JPG=0-+)I=0


```
PEVSNER  61 PRL 7 421        PEVSNER,KRAEMER,NUSSBAUM,RICHARDSON +//JHU

ALFF     62 PRL 9 322        ALFF,BERLEY,COLLEY,BRUGGER +///COL+RUTGERS
BASTIEN  62 PRL 8 114        BASTIEN,BERGE,DAHL,FERRO-LUZZI + ///// LRL
CHRETIEN 62 PRL 9 127        CHRETIEN+ //BRAND+BROWN+HARVARD+MIT+PADOVA
PICKUP   62 PRL 8 329        E PICKUP,ROBINSON,SALANT ///// NRC+CAN+BNL
SHAFER   62 CERN CONF 307    J SHAFER,FERRO-LUZZI,MURRAY + ///// UC+LRL
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
BACCI     63 PRL 11 37          BACCI,PENSO,SALVINI + //ROME U+CNEN FRASCA
BUSCHBEC  63 SIENA CONF 1 166   BUSCHBECK-CZAPP,COOPER + //VIENNA+CERN+AMS
CRAWFORD  63 PRL 10 546         F S CRAWFORD,LLOYD,FOWLER /////// LRL+DUKE
       AND   PRL 16 907         F S CRAWFORD,L LLOYD,E FOWLER   //LRL+DUKE
DELCOURT  63 PL 7 215           DELCOURT,LEFRANCOIS,PEREZ Y JORBA+// ORSAY
MULLER    63 SIENA CONF 99      MULLER,PAULI + //LPCHE+SACLAY IF+ROME+INFN

FOELSCHE  64 PR 134 B 1138      H W FOELSCHE,H L KRAYBILL ////////////// YALE
KRAEMER   64 PR 136 B 496       KRAEMER,MADANSKY,FIELDS + // JHU+NW U+WOOD
PAULI     64 PL 13 351          E PAULI,A MULLER ////////////// LPCHE+SACLAY

FOSTER1   65 PR 138 B 652       FOSTER,PETERS,MEER,LOEFFLER +//WISC+PURDUE
FOSTER2   65 ATHENS             FOSTER,GOOD,MEER                 //WISCONSIN
FOSTER3   65 THESIS             M.C.FOSTER                       //WISCONSIN
PRICE     65 PRL  15  123       L.R.PRICE,F.S.CRAWFORD             //LRL
RITTENBE  65 PRL 15 556         RITTENBERG,KALBFLEISCH /////////// LRL+BNL

ALFF-STE  66 PR 145 1072        ALFF-STEINBERGER,BERLEY+//COLUMBIA+RUTGERS
BALTAY    66 PRL 16 1224        +FRANZINI,KIM,KIRSCH+/COLUMBIA+STONY BROOK
CRAWFORD  66 PRL  16  333       F.S.CRAWFORD,L.R.PRICE             //LRL
DIGIUGNO  66 PRL 16 767         DIGIUGNO,GIORGI,SILVESTRI+//NAP+TRST+FRASC
GROSSMAN  66 PR 146  993        R GROSSMAN,L PRICE,F CRAWFORD ///////// LRL
GRUNHAUS  66 THESIS             J.GRUNHAUS                       //COLUMBIA
JAMES     66 PR 142   896       F E JAMES,H L KRAYBILL ////////// YALE+BNL
JONES     66 PL 23  597         JONES,BINNIE,DUANE,HORSEY,MASON,+/ICL+RUTH
WAHLIG    66 PRL  17  221       WAHLIG,SHIBATA,MANNELLI          //MIT+PISA

BAGLIN1   67 PL 24B 637         BAGLIN,BEZAGUET,DEGRANGE,+     //E.POLY+UC
BAGLIN2   67 BAPS 12 567        BAGLIN,BEZAGUET,DEGRANGE,+     //E.POLY+UC
BALTAY1   67 PRL 19 1495        BALTAY,FRANZINI,KIM,NEWMAN+   /COLUM+BRAND
BALTAY2   67 PRL 19 1498        BALTAY,FRANZINI,KIM,NEWMAN+/COLUM+STONY BK
BEMPORAD  67 PL 25B 380         BEMPORAD,BRACCINI,FOA,LUBELSMEY+/PISA,BONN
    AND       PRIVATE COMMUNICATION
BILLING   67 PL 25B 435         BILLIG,BULLOCK,ESTEN,GOVAN,+     //UCL,OXF
BONAMY    67 HEIDELBERG CONF.   BONAMY,SONDEREGGER                 //SACLAY
BUNIATOV  67 PL 25B 560         BUNIATOV,ZAVATTINI,DEINET,+     /CERN,KARLS
CENCE     67 PRL 19 1393        CENCE,PETERSON,STENGER,CHIU+    /HAWAII+LRL
FELDMAN   67 PRL 18 868         FELDMAN,FRATI,GLEESON,HALPERN,+       /PENN
FLATTE    67 PRL 18 976         S.M.FLATTE                         /LRL
FLATTE2   67 PR 163 1441        S.M.FLATTE AND C.G.WOHL            /LRL
JACQUET   67 PL 25B 574         JACQUET,NGUYEN-KHAC,BAGLIN+/EC.POLY,BERGEN
MICHAEL   67 THESIS             W.B.MICHAEL                        //UC
PRICE     67 PRL 18 1207        L.R.PRICE,F.S.CRAWFORD             /LRL
STRUGALS  67 JINR-E1-3100       STRUGALSKI,CHUVILO,IVANOVSKAJA,+    //DUBNA

BAZIN     68 PRL 20 895         BAZIN,GOSHAW,ZACHER,+     /PRINCETON,QUEENS
WEHMANN   68 PRL 20 748         WEHMANN,ENGELS,+/HARV+CASE+SLAC+COR+MCGILL

        QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN THE DATA CARDS

BASTIEN   62 PRL 8 114          BASTIEN,BERGE,DAHL,FERRO-LUZZI,MILLER+/LRL
CARMONY   62 PRL 8 117          D CARMONY,A ROSENFELD,VAN DE WALLE /// LRL
ROSENFEL  62 PRL 8 293          A ROSENFELD,D CARMONY,VAN DE WALLE /// LRL

            REFERENCES ON ETA ASYMMETRY PARAMETERS

BALTAY    66 PRL  16  1224      BALTAY,FRANZINI,KIM,KIRSCH+/COLUM+STONY BK
CNOPS     66 PL 22 546          CNOPS,FINOCCHIARS,LASSALLE,+/CERN+ZUR+SACL
CRAWFORD  66 PRL  16  333       F.S.CRAWFORD,L.R.PRICE             //LRL
FOWLER    66 BAPS 11  380       E.C.FOWLER                         //DUKE
LARRIBE   66 PL 23 600          LARRIBE,LEVEQUE,MULLER,PAULI,+  /SACL+RUTH
OTHERS    66 PR 149  1044       COLUMBIA,LRL,PURDUE,WISCONSIN,YALE

BOWEN     67 PL 24B 206         BOWEN,CNOPS ,FINOCCHIARO,+ //CERN+ZUR+SACL
LITCHFIE  67 PL 24B 486         LITCHFIELD,RANGAN,SEGAR,SMITH+/RUTH+SACLAY
GORMLEY2  68 PRL (TO BE PUB)    GORMLEY,HYMAN,LEE,NASH,PEOPLES+ //COLU+BNL
GORMLEY3  68 PRL (TO BE PUB)    GORMLEY,HYMAN,LEE,NASH,PEOPLES+ //COLU+BNL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

p

```
                    16  PROTON  (938,J=1/2)  I=1/2
                    16  PROTON  MASS (MEV)
M          938.256     0.005          COHEN     65 RVUE

------ --------- --------- --------- --------- --------- --------- ---------

                    16  PROTON LIFETIME  (UNITS 10**26 YR)

T   *      OVER  10**20  YRS          GOLDHABER 54 TH 232 FISS.MODE INDEPEN
T   *      OVER  2.0 * 10**23 YRS     FLEROV    57 TH 232 FISS.MODE INDEPEN
T   *  OVER                  1.5      BACKENSTO 60 CNTR
T   *  OVER                 60.0      KROPP     65 CNTR
T   *    KROPP AND BACKENSTOSS SENSITIVE TO PARTICULAR DECAY MODES OF PROT
T   *  OVER                200.0      GURR      67 CNTR DEP. ON DECAY MODE   6/68

------ --------- --------- --------- --------- --------- --------- ---------

                    16 PROTON MAGNET. MOMENT(E/2MP)

MM         2.792763 0.000030          COHEN     65 RVUE

****** ********* ********* ********* ********* ********* ********* *********

                    REFERENCES
                    16 PROTON (938,J=1/2) I=1/2

GOLDHABER 54 PR 96 1157 FNOTE2 M GOLDHABER,F REINES+ /////LOS ALAMOS,BNL
FLEROV    57 SOV PHYS DOK 3 78 FLEROV,KLOCHKOV,SKOBKIN,TERENTEV //// USSR
BACKENST  60 NC   16  749       BACKENSTOSS,FRAUENFELDER,HYAMS + //// CERN
COHEN     65 RMP 37 537         E R COHEN, J W M DUMOND //// NAASC+CALTECH
KROPP     65 PR 137 B 740       W R KROPP,F REINES ///CASE INST TECHNOLOGY
GURR      67 PR  158  1321      GURR,KROPP,REINES,MEYER//CASE,JOHANNESBURG

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

n

```
                    17  NEUTRON (939,J=1/2)  I=1/2
                    17  NEUTRON-PROTON MASS DIF.(MEV)
D             1.2939    0.0004          BONDELID  60 CNTR
D             1.2933    0.0001          SALGO     64 CNTR
D          . . . . . .
D   AVG       1.2933     .0001   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)

------ --------- --------- --------- --------- --------- --------- ---------

                    17  NEUTRON LIFETIME (UNITS 10**3 SEC)

T             1.012     0.021          SOSNOVSKI 59 PILE     SEE NOTE E       7/68
    E  ERROR CHANGED BECAUSE ERROR IN CROSS SECTION FOR NEUTRON ABSORPTION
    E  IN GOLD HAS BEEN REDUCED
T             0.932     0.014          CHRISTENS 67 PILE                      3/68

------ --------- --------- --------- --------- --------- --------- ---------

                    17  NEUTRON MAGNETIC MOMENT (MAGNETONS,938.2 MEV)

MM        -1.913148 0.000066          COHEN     56 RVUE

AV  *   GA/GV FOR NEUTRON BETA DECAY (SEE TEXT FOR SIGN CONVENTION)
AV  B        -1.18      0.02          BHALLA    66                          11/67
AV           -1.198     0.022         CONFORTO  67                           6/68
AV  B     CONFORTO VALUE COMBINES FREE NEUTRON DECAY WITH DATA FROM O14
AV  B     AND NEUTRON FT VALUES.                                             6/68

****** ********* ********* ********* ********* ********* ********* *********

                    REFERENCES
                    17 NEUTRON (939,J=1/2) I=1/2

COHEN     56 PR 104 283         V W COHEN, CORNGOLD, RAMSEY // BNL+HARVARD
SOSNOVSK  59 JETP  9  717       SOSNOVSKII,SPIVAK,PROKOFEV + // IAE MOSCOW
BONDELID  60 PR  120  887       BONDELID,BUTLER,KENNEDY +//USNRL+CATH UNIV
SALGO     64 NP   53  457       R SALGO, STAUB, WINKLER, ZAMBONI // ZURICH
COHEN     65 RMP 37 537         E R COHEN,DUMOND ///// NAASC+CAL INST TECH
BHALLA    66 PL 19  691         C P BHALLA ////////////////////// ALABAMA
CHRISTEN  67 PL 26B 11          +NIELSEN,BAHNSEN,BROWN,RUSTAD/RISO-DENMARK
CONFORTO  67 ACTA PHYS ACAD
          HUNGARICA 22  15 G. CONFORTO ////////////////////////// CERN

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Λ

```
                    18  LAMBDA (1115,JP=1/2+)  I=0
                    18  LAMBDA  MASS (MEV)
M   N  SINCE OUR FINAL VALUES FOR THE SIGMA AND LAMBDA MASSES COME FROM
M   N  DOING AN OVERALL FIT TO ALL MEASURED MASSES AND MASS DIFFERENCES,
M   N  WE HAVE USED THE UNCORRELATED MEASUREMENTS FROM SCHMIDT 65 RATHER
M   N  THAN THE ONES COMING FROM THE OVERALL FIT REPORTED IN THAT PAPER.
M   N  SINCE THERE SEEMS TO BE NO CONVINCING ARGUMENT AS TO WHY ONE SHOULD
M   N  IGNORE DATA USING RANGE MEASUREMENTS, WE HAVE INCLUDED HERE VALUES
M   N  DEPENDING ON PROTON AND PION RANGES.

M          1115.44     0.12          BHOWMIK   63 RVUE +  SEE NOTE L BELOW
M   L  ABOVE LAMBDA MASS HAS BEEN RAISED 35 KEV TO ACCOUNT FOR 46 KEV
M   L  INCREASE IN PROTON MASS AND 11 KEV DECREASE IN CHARGED PION MASS.
M   S  635 1115.86      0.09          BALTAY    65 HBC    ERROR IS STATIS.
M      488 1115.63      0.07          SCHMIDT   65 HBC  SEE NOTE N           6/68
M   S 1147 1115.74      0.04          CHIEN     66 HBC     6.9 PBAR P          9/67
M   S  972 1115.69      0.05          CHIEN     66 HBC     6.9 PBAR PANTIL     9/67
M          1115.6       0.4           LONDON    66 HBC
M   *      1116.0       0.2           BADIER    67 HBC     2.4 PBAR P,LLBAR    8/67
M      195 1115.39      0.12          MAYEUR    67 EMUL                       11/67
M   S     ERROR PURELY STATISTICAL
M          . . . . . .
M   AVG    1115.5440     .0748   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
M   FIT    1115.57       .07     VALUE FROM CONSTRAINED FIT                   6/68
                  (SEE IDEOGRAM, APPENDIX I)

                    18  LAMDA - ANTILAMBDA MASS DIFFERENCE (MEV)
DM            0.05      0.06          CHIEN     66 HBC     6.9 PBAR P          9/67
DM            0.29      0.15          BADIER    67 HBC     2.4 PBAR P          8/67
DM         . . . . . .
DM  AVG        .0831     .0828   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)

------ --------- --------- --------- --------- --------- --------- ---------

                    18  LAMBDA LIFETIME (UNITS 10**-10)

T      188    2.63      0.21      0.21  BOLDT     58 CC
T      825    2.72      0.16      0.16  CRAWFORD  59 HBC
T      140    2.72      0.29      0.27  BOWEN     60 CC
T      186    2.60      0.28      0.20  C-C CHANG 62 HBC
T      799    2.69      0.11      0.11  HUMPHREY  62 HBC
T     2239    2.36      0.06      0.06  BLOCK     63 HEBC
T      706    2.76      0.20            CHRETIEN  63 PBC
T      794    2.59      0.09            HUBBARD   64 HBC
T     2260    2.31      0.10            KREISLER  64 SPRK
T     1378    2.59      0.07            SCHWARTZ  64 HBC
T      635    2.51      0.16            BALTAY    65 HBC
T     2534    2.6       0.1             HILL      65 SPRK
T      916    2.35      0.09            BURAN     66 HLBC
T   S 1147    2.50      0.14            CHIEN     66 HBC     6.9 PBAR P          9/67
T   S  972    2.70      0.20            CHIEN     66 HBC     6.9 PBAR P,ANTI     9/67
T      2213   2.452     0.056     0.054 EGELMANN  66 HBC
T      585    2.68      0.13      0.11  AUERBACH  67 SPRK                       8/67
T             2.44      0.15            BADIER    67 HBC     2.4 PBAR P          6/68
T             2.55      0.15            BADIER    67 HBC     2.4 PBAR P,ANTIL    6/68
T   S 8342    2.535     0.035           GRIMM     HBC                            6/68
T   S     ERROR PURELY STATISTICAL
T          . . . . . .
T   AVG       2.5180    .0322   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)
                  (SEE IDEOGRAM, APPENDIX I)

                    18  LIFETIME DIFFERENCE,(LAMBDA-ANTILAMDA)/AVERAGE
DT            0.044     0.085          BADIER    67 HBC     2.4 PBAR P          8/67
------ --------- --------- --------- --------- --------- --------- ---------

                    18  LAMBDA MAGNETIC MOMENT (MAGNETONS,938.26 MEV)

MM          -1.5       0.5           COOL      62 SPRK
MM           0.0       0.6           KERNAN    63 CC
MM     8553 -1.39      0.72          ANDERSON  64 HBC
MM      151 -0.5       0.28          CHARRIERE 65 EMUL
MM          -0.75      0.19          HILL      66 SPRK
MM         . . . . . .
MM  AVG       -.7289    .1654   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)

------ --------- --------- --------- --------- --------- --------- ---------

                    18  LAMBDA PARTIAL DECAY MODES

P1     LAMBDA INTO PROTON PI-                                    S16S 8
P2     LAMBDA INTO NEUTRON PIO                                   S17S 9
P3     LAMBDA INTO PROTON MU- NEUTRINO                           S16S 4S 2
P4     LAMBDA INTO PROTON E- NEUTRINO                            S16S 3S 1

------ --------- --------- --------- --------- --------- --------- ---------

                    18  LAMBDA BRANCHING RATIOS

R1  *  LAMBDA INTO (P PI-)/((P PI-)+(N PIO))              (P1)/(P1+P2)
R1            0.627     0.031          CRAWFORD  59 HBC
R1            0.65      0.05           COLUMBIA  60 HBC
R1  U         0.685     0.017          ANDERSON  62 HBC
R1     903    0.643     0.016          HUMPHREY  62 HBC
R1         . . . . . .
R1  AVG        .6404     .0137   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R1  FIT        .653      .013    VALUE FROM CONSTRAINED FIT
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
R2  *  LAMBDA INTO (N PIO)/((P PI-)+(N PIO))                    (P2)/(P1+P2)
R2            0.23      0.09            EISLER    57 PBC
R2            0.43      0.14            CRAWFORD  59 HBC
R2            0.28      0.08            BAGLIN    60 PBC
R2            0.35      0.05            BROWN     63 XBC
R2      75    0.291     0.034           CHRETIEN  63 PBC
R2          . . . . . . . . .
R2  AVG        .3044     .0250   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R2  FIT        .347      .012    VALUE FROM CONSTRAINED FIT

R3  *  LAMBDA INTO (P E- NEU)/TOTAL    (UNITS  10**-3)    (P4)/(P1+P2)
R3       15    2.0       0.5             HUMPHREY  61 RVUE
R3        8    2.9       1.5       1.2   AUBERT    62 FBC
R3      150    0.82      0.12      0.13  ELY       63 FBC
R3       20    1.55      0.34            LIND      64 HBC
R3      102    0.78      0.12            BAGLIN    64 FBC
R3          . . . . . . . . .
R3  AVG        .8841     .1495   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.8)
                    (SEE IDEOGRAM, APPENDIX I)

R4  *  LAMBDA INTO (P MU- NEU)/TOTAL  (UNITS  10**-4)    (P3)/(P1+P2)
R4  *      1     0.2    OR GREATER     GOOD      62 HBC
R4  *      1     1.0    OR LESS        ALSTON    63 HBC
R4  *      2     1.0    OR LESS        KERNAN    64 FBC
R4  *   BETWEEN 1.3 AND 6.0            LIND      64 HBC
R4         3     1.3       0.7         LIND      64 RVUE
R4         2     1.5       1.2         RONNE     64 FBC
R4            . . . . . . . . .
R4  AVG        1.3508     .6046   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

18 LAMBDA DECAY PARAMETERS

```
A-  *  ALPHA LAMBDA- (LAMBDA INTO PI- PROTON)
A-     1156    0.62      0.07            CRONIN    63 CNTR    LAMBDA FROM PI-P  8/67
A-  *          0.663     0.022           BERGE     66 RVUE  INCLUDES ABOVE
A-    10130    0.645     0.017           OVERSETH  67 SPRK    LAMBDA FROM PI-P  8/67
A-     3520    0.67      0.06            DAUBER    68 HBC  FROM XI DECAY       6/68
A-  M 2529    0.747     0.086           MERRILL   68 HBC  REPL BY DAUBER 68     6/68
A-          . . . . . . . . .
A-  AVG        .6455     .0159   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

AO  *  ALPHAO /ALPHA- FOR LAMBDA (L INTO PIO N/L INTO PI- P)
AO            1.10      0.27            CORK      60 CNTR

AE  *      ALPHA LAMBDA E- (LAMBDA INTO PROTON E- NEUTRINO)
AE            0.06      0.19            BARLOW    65 SPRK

F   *   PHI ANGLE (TAN(PHI) = BETA/GAMMA)   (DEGREE)
F      1156   13.0      17.0            CRONIN    63 SPRK    LAMBDA FROM PI-P 11/67
F     10130   -8.0       6.0            OVERSETH  67 SPRK    LAMBDA FROM PI-P 11/67
F           . . . . . . . . .
F   AVG       -5.6738   6.5908   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)

AV  *   GA/GV FOR LAMBDA BETA DECAY (SEE TEXT FOR SIGN CONVENTION)
AV  C   22    -1.03                     LIND      64 HBC                        6/68
AV  C  102 ABS VALUE GREATER THAN 0.6 BAGLIN    65 HLBC                       6/68
AV  C      BETW 0. AND -1.1             BARLOW    65 SPRK                       6/68
AV  C  102 ABS VALUE GREATER THAN 0.7 ELY       65 HLBC    95 PCT CONF LEV    6/68
AV  C    ABOVE EXPTS INCLUDED IN CONFORTO 65, RVUE                             6/68
AV           -1.14     0.23      0.33  CONFORTO  65 RVUE                      11/67
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES
18 LAMBDA (1115,JP=1/2+) I=0

```
EISLER    57 NC    5 1700      EISLER,PLANO,SAMIOS,SCHWARTZ + //COLUM+BNL
BOLDT     58 PRL   1  148      E BOLDT,D O CALDWELL,Y PAL /////////// MIT
CRAWFORD 59 PRL   2  266      CRAWFORD,CRESTI,DOUGLASS,GOOD + /////  LRL

BAGLIN    60 NC   18 1043      BAGLIN,BLOCH,BRISSON,HENNESSY + //PARIS-EP
BOWEN     60 PR  119 2030      BOWEN,HARDY,REYNOLDS,SUN + ///// PRINCETON
CORK      60 PR  120 1000      CORK,KERTH,WENZEL,CRONIN,COOL //LRL+PR+BNL
COLUMBIA 60 ROCH CONF 726     M SCHWARTZ + ////////////////////// COLUMBIA
HUMPHREY 61 PRL   6  478      HUMPHREY,KIRZ,ROSENFELD,RHEE + //LRL+SYRAC

ANDERSON 62 CERN CONF 832     ANDERSON,CRAWFORD,GOLDEN,LLOYD + ///// LRL
ARMENTER 62 CERN CONF 236     ARMENTEROS+/CERN+EP+LONDON+BIRM+CEN-SACLAY
AUBERT    62 NC   25  479      AUBERT,BRISSON,HENNESSY,SIX + /// PARIS-EP
BALTAY    62 CERN CONF 233    BALTAY,FOWLER,SANDWEISS,CULWICK+//YALE+BNL
CHANG     62 THESIS DUKE      CHUEN CHUEN CHANG ////////////////// DUKE
COOL      62 PR  127 2223     COOL,HILL,MARSHALL + ///// BNL+MIT+NYU+ANL
GOOD      62 PRL   9  518     M L GOOD,V G LIND ///////////// WISCONSIN
HUMPHREY 62 PR  127 1305     W E HUMPHREY,R R ROSS ///////////////// LRL

ALSTON    63 UCRL 10926       ALSTON,KIRZ,NEUFELD,SOLMITZ,WOHLMUT // LRL
BERGE     63 THESIS (BERKELEY) J PETER BERGE ////////////////////// LRL
BHOWMIK   63 NC   28 1494     B BHOWMIK,D P GOYAL ////////////////// DELHI
BLOCK     63 PR  130  766     BLOCK,GESSAROLI,RATTI,KIKUCHI + //NW+BLGNA
BROWN     63 PR  130  769     BROWN,KADYK,TRILLING,ROE + ///LRL+MICHIGAN
CHRETIEN 63 PR  131  2208    CHRETIEN,CROUCH+///BRAND+BROWN+HARVARD+MIT
CRONIN    63 PR  129 1795     J W CRONIN,O E OVERSETH //////// PRINCETON
ELY       63 PR  131  868     ELY,GIDAL,KALMUS,OSWALD,POWELL + ///// LRL
KERNAN    63 PR  129  870     KERNAN,NOVEY,WARSHAW,WATTENBERG // ANL+ILL

ANDERSON 64 PRL  13  167      J A ANDERSON,F S CRAWFORD ////////////// LRL
BADIER    64 DUBNA CONF 1 593 BADIER,BARLOUTAUD + //////EP+SACLAY+AMSTDM
BAGLIN    64 NC   35  977     BAGLIN,BINGHAM+//EP+CERN+UC LOND+RHEL+BERG
HUBBARD   64 PR  135 B 183    HUBBARD,BERGE,KALBFLEISCH,SHAFER + /// LRL
KERNAN    64 PR  133 B 1271   KERNAN,POWELL,SANDLER + //LRL+UN-COLL-LOND
KREISLER 64 PR 136 B 1074    M N KREISLER,O OVERSETH,J CRONIN ///PRINCE
LIND      64 PR  135 B 1483   LIND,BINFORD,GOOD,STERN //////// WISCONSIN
RONNE     64 PL   11   357    RONNE+ /// CERN+EP+UCOL-LONDON+UNIV.BERGEN
SCHWARTZ 64 UCRL 11360 THESIS JOSEPH ADAM SCHWARTZ ////////////////// LRL

BAGLIN    65 NC 35 977        BAGLIN + /// EP,CERN,UC LONDON,RUTH,BERGEN
BALTAY    65 PR 140 B 1027    BALTAY,SANDWEISS,CULWICK,KOPP + //YALE+BNL
BARLOW    65 PL  18  64       J BARLOW,BLAIR,DUKE,MANN+//CERN+RUTH+PENNA
CHARRIER 65 PL   15   66      CHARRIERE,GIBSON+ //// EPUL+BRIST+CERN+MPI
   ALSO       NC  46A  205     CHARRIERE,GIBSON +/////EPUL,BRIST,CERN, MPI
CONFORTO 65 EC INT HERZEGNOVI G CONFORTO + ////////////////////// CERN
ELY       65 PR 137 B1302     ELY,GIDAL,KALMUS,POWELL + // LRL,UC LONDON
HILL      65 PRL  15   05     D A HILL,K K LI ////////////////////// MIT
SCHMIDT   65 PR 140 B 1328    P SCHMIDT ////////////////////// COLUMBIA

BERGE     66    BERKELEY CONF. BERGE,CABIBBO                    // RVUE
BURAN     66 PL 20 318        BURAN,EIVINDSON,SKJEGGESTAD,TOFTE + //OSLO
CHIEN     66 PR  152  1171    +LACH,SANDWEISS,TAFT,YEH,OREN + //YALE+BNL
ENGELMAN 66 NC 45A  1038      ENGELMANN,FILTHUTH,ALEXANDER+/HEIDBG+WEIZM
HILL      66  BERKELEY CONF   HILL,LI,JENKINS,KYCIA,RUDERMAN          // BNL
LONDON    66 PR 143 1034      LONDON,RAU,GOLDBERG,LICHTMAN+//BNL+SYRACUS

AUERBACH 67 NC  47A  19       AUERBACH,BOWEN,DOBBS,LANDE,MANN+ //U OF PA
BADIER    67 PL 25B 152       +BONNET,BRIANDET,SADOULET   // EP (PARIS)
MAYEUR    67 U.LIBR.BRUX.BUL32 C.MAYEUR,E.TOMPA,J.WICKENS//UL.BRUX+UC.LON
OVERSETH 67 PRL  19  391      O E OVERSETH, R F ROTH//MICHIGAN+PRINCETON
```

```
DAUBER    68 PREPRINT         +BERGE,HUBBARD,MERRILL,MILLER //////// LRL
GRIMM     68 NC 54A 187       H.-J.GRIMM                    //  HEIDELBERG
MERRILL   68 PR 167 1202      MERRILL,SHAFER ////////////////////////// LRL
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ^+

19 SIGMA+   (1189,JP=1/2+) I=1

19 SIGMA+ MASS (MEV)

```
M   N SEE NOTE PRECEDING LAMBDA MASS LISTINGS

M       144 1189.38     0.15            BARKAS    63 EMUL +  SEE NOTE S BELOW
M        58 1189.48     0.22            BHOWMIK   64 EMUL +  SEE NOTE S BELOW
M   S  ABOVE SIGMA+ MASSES HAVE BEEN RAISED 30  KEV TO ACCOUNT FOR 46 KEV
M   S  INCREASE IN PROTON MASS AND 21 KEV DECREASE IN PION MASS
M     4205 1189.68     0.10            SCHMIDT   65 HBC  SEE NOTE N          6/68
M          1189.16     0.12            HYMAN     67 HEBC                     6/68
M          . . . . . . . . .
M   AVG    1189.4516    .1271   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.9)
M   FIT    1189.43      0.17    VALUE FROM CONSTRAINED FIT                   6/68
                    (SEE IDEOGRAM, APPENDIX I)
```

19 SIGMA+ LIFETIME (UNITS 10**-10)

```
T   *                                       GLASER    58 RVUE
T         127    0.98      0.16      0.12  PUSCHEL   60 EMUL
T          41    0.82      0.34      0.20  EVANS     60 EMUL
T         117    0.85      0.14      0.11  FREDEN    60 EMUL
T          54    0.80      0.10      0.067 KAPLON    60 EMUL
T          23    0.76      0.22      0.14  CHIESA    61 EMUL
T          49    0.75      0.13      0.09  BERTHELOT 61 PBC
T         140    0.82      0.10      0.08  BARKAS    61 EMUL
T         192    0.749     0.056     0.052 GRARD     62 HBC
T         456    0.765     0.04      0.04  HUMPHREY  62 HBC
T         203    0.84      0.12      0.08  BHOWMIK   64 EMUL
T         181    0.84      0.09            BALTAY    65 HBC
T         900    0.76      0.03            CARAYANNO 65 HBC
T                0.83      0.018           CHANG     65 HBC
T   S  125    0.86      0.15            CHIEN     66 HBC  +   6.9 PBAR P       9/67
T   S  117    1.10      0.24            CHIEN     66 HBC  -   6.9 PBAR P,ANTI  9/67
T          381    0.80      0.07            COOK      66 SPRK
T   S      ERROR PURELY STATISTICAL
T                . . . . . . . . .
T   AVG          .8099     .0131   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

19 SIGMA+ MAGNETIC MOMENT (MAGNETONS,938.26 MEV)

```
MM      381    1.5       1.1             COOK      66 SPRK
MM  *          3.5       1.2             BRISTOL   67 EMUL    PRELIMINARY      6/68
MM        52    3.5       1.5             KOTELCHUC 67 EMUL    K-P AT 1.15BEV/C 8/67
MM        51    3.0       1.2             SULLIVAN  67 EMUL    PHOTOPRODUCTION  8/67
MM    29333    2.1       1.0             MAST      68 HBC                      6/68
MM             . . . . . . . . .
MM  AVG        2.3534    .5807   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

19 SIGMA+ PARTIAL DECAY MODES

```
P1      SIGMA + INTO PROTON PIO                                   S16S 9
P2      SIGMA + INTO NEUTRON PI+                                  S17S 8
P3      SIGMA + INTO NEUTRON PI+ GAMMA                            S17S 8S 0
P4      SIGMA + INTO LAMBDA E+ NEU                                S18S 3S 0
P5      SIGMA + INTO PROTON GAMMA                                 S16S 0
P6      SIGMA + INTO NEUTRON MU+ NEUTRINO                         S17S 4S 2
P7      SIGMA + INTO NEUTRON E+ NEUTRINO                          S17S 3S 1
```

19 SIGMA+ BRANCHING RATIOS

```
R1  *  SIGMA+  INTO (NEUTRON PI+)/(NUCLEON PI)          (P2)/(P1+P2)
R1       308    0.490     0.024           HUMPHREY  62 HBC
R1       534    0.46      0.02            CHANG     65 HBC
R1             . . . . . . . . .
R1  AVG          .4723     .0154   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R2  *  SIGMA+ INTO (NEUT PI+ GAM)/(PI+N)  (UNITS 10**-3) (P3)/(P2)
R2  *  ABOUT  1.8                        BAZIN2    65 HBC                      8/67
R2  *  FOR PI+ MOM LESS THAN 166 MEV/C

R3  *    SIGMA+ INTO (LAMBDA E+ NEU)/TOTAL (UNIT 10**-5) (P4)/TOTAL
R3         4    3.3       1.7             WILLIS    64 HBC     STOP. K-
R3         6    2.0       0.8             BARASH    67 HBC     STOP K-         8/67
R3             . . . . . . . . .
R3  AVG        2.2357    .7239   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R4  *  SIGMA+  INTO (N MU+ NEU)/(PI+N)   (UNITS 10**-4) (P6)/(P2)
R4  *      1     120 ANALYSED EVENTS     GALTIERI  62 EMUL    NO RATIO QUOTED 11/67
R4         0   10150 EFFECTIVE DENOM.    COURANT   64 HBC     SEE NOTE E      11/67
R4         0    1710 EFFECTIVE DENOM.    NAUENBERG 64 HBC     SEE NOTE E      11/67
R4         1   18750 EFFECTIVE DENOM.    EISELE    67 HBC                     11/67
R4  E                EFFECTIVE DENOM.  TAKEN FROM EISELE 67                  11/67

R5  *  SIGMA+  INTO (N E+ NEU)/(N PI+)  (UNITS 10**-4)  (P7)/(P2)
R5         0   16220 EFFECTIVE DENOM.    COURANT   64 HBC     SEE NOTE E      11/67
R5         0    2720 EFFECTIVE DENOM.    MURPHY    64 HBC     SEE NOTE E      11/67
R5         1    9690 EFFECTIVE DENOM.    NAUENBERG 64 HBC     SEE NOTE E       6/68
R5         0   25000 EFFECTIVE DENOM.    EISELE    67 HBC                      6/68
R5  E                EFFECTIVE DENOM.  TAKEN FROM EISELE 67                  11/67
R5         0   32406 EFFECTIVE DENOM.    BIERMAN   68 HBC                      6/68

R6  *  SIGMA+  INTO (P GAMMA)/(P PIO)  (UNITS 10**-2)   (P5)/(P1)
R6  *      1    0.68  OR LESS           CARRARA   64 HBC
R6        24    0.37      0.08            BAZIN     65 HBC
R6         4    0.17                      QUARENI   65 EMUL

R7  *  SIGMA+ INTO LEPTONS / SIGMA- INTO LEPTONS
R7  N      3    0.04      0.04      0.02  AVERAGE                             6/68
R7  N        AVERAGE OF ALL DATA IN R4 AND R5 UP TO BIERMAN 68.              6/68
R7         0    0.034 OR LESS           BAGGETT   67 HBC                      6/68
```

19 SIGMA+ DECAY PARAMETERS

```
A+  *   ALPHA+/ALPHAO FOR SIGMA+ (SIG+ TO PI+ N)/(SIG+ TO PIO P)
A+          +0.04     0.11            CORK      60 CNTR    SIG+ FROM PI+P
A+  *       +0.20     0.24            TRIPP     62 HBC  +  REPLAC.BY BANGER
A+    3500   -.014     0.052           BANGERTER 66 HBC  +  SIG+ FROM K-P
A+    2600   -.047     .07             BERLEY    66 HBC  +  SIG+ FROM K-P
A+           . . . . . . . . .
A+  AVG        -.0175    .0390   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
A0  *  ALPHA SIGMA0 (SIG+ INTO PIO PROTON)
A0          -0.80     0.16          BEALL     62 CNTR
A0  *       -0.90     0.25          TRIPP     62 HBC     REPLAC. BY BANGER
A0    5200  -0.986    0.072         BANGERTER 66 HBC     K-P TO SIG+ PI-
A0          . . . . . . . . .
A0  AVG      -.9547    .0696   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)

F   *      PHI ANGLE (TAN(PHI)=BETA/GAMMA)  (DEGREE)
F      370  180.       30.           BERLEY    66 HBC  +  NEUTRON RESCATT.

****** ********* ********* ********* ********* ********* ********* *********

                          REFERENCES
                  19  SIGMA + (1189,JP=1/2+)  I=1

GLASER   58 CERN CONF 270     GLASER,GOOD,MORRISON ////////////// MICH+LRL
EVANS    60 NC 15 873         BRIST+BRUSS+IAS-U.COL-DUBLIN+LON+MILAN+PAD
FREDEN   60 NC 16 611         S FREDEN,H KORNBLUM,R WHITE ////////// LRL
KAPLON   60 ANP 9 139         M KAPLON,A MELISSINOS,YAMANOUCHI // RCCHES
CORK     60 PR 120 1000       CORK,KERTH,WENZEL,CRONIN,COOL /LRL+PRI+BNL
PUSCHELL 60 NP 20 254         W PUSCHEL ////////////////// MAX PLANCK INST

BARKAS   61 PR 124 1209       BARKAS,DYER,MASON,NICHOLS,SMITH ////// LRL
BERTHELO 61 NC 21 693         BERTHELOT,DAUDIN,GOUSSU + /// SACLAY+CRSAY
CHIESA   61 NC 19 1171        CHIESA,QUASSIATI,RINAUDO ////// INFN-TURIN

BEALL    62 PRL 8 75          BEALL,CORK,KEEFE,MURPHY,WENZEL /////// LRL
GRARD    62 PR 127 607        F GRARD,G A SMITH ////////////////////// LRL
GALTIERI 62 PRL 9 26          GALTIERI,BARKAS,HECKMAN,PATRICK,SMITH//LRL
HUMPHREY 62 PR 127 1305       W E HUMPHREY,R R ROSS ////////////////// LRL
TRIPP    62 PRL 9 66          R D TRIPP,M B WATSON,M FERRO-LUZZI /// LRL

BARKAS   63 PRL 11 26         W H BARKAS,J N DYER,H H HECKMANN ///// LRL
    ALSO 61 UCRL 9450         JOHN DYER (THESIS, BERKELEY) /////// LRL

BHOWMIK  64 NP 53 22          B BHOWMIK,P JAIN,P MATHUR,LAKSHMI // DELHI
CARRARA  64 PL 12 72          CARRARA,CRESTI,GRIGOLETTO,PERUZZO+//PADOVA
COURANT  64 PR 136 B 1791     COURANT,FILTHUTH+//CERN+HEIDLB+MD+NRL +BNL
MURPHY   64 PR 134 B 188      C THORNTON MURPHY /////////////// WISCONSIN
NAUENBER 64 PRL 12 679        NAUENBERG,MARATECK,BLUMENFELD+ /COL+RUT+PR
WILLIS   64 PRL 13 291        WILLIS,COURANT,ENGELMAN+//BNL+CERN+HEID+MD

BALTAY   65 PR 140 B 1027     BALTAY,SANDWEISS,CULWICK,KOPP + //YALE+BNL
BAZIN    65 PRL 14 154        BAZIN,BLUMENFELD,NAUENBERG +///PRINCE+COLUM
BAZIN2   65 PR 140  B1358        BAZIN,PLANO,SCHMIDT+//PRINCE,RUTG,COLUM
CARAYAN  65 PR 138 B 433      CARAYANNOPOULOS,TAUTFEST,WILLMANN// PURDUE
CHANG    65 NEVIS 145  THESIS CHUNG YUN CHANG ////////////////// COLUMBIA
    ALSO 66 PR  151  1081     CHUNG YUN CHANG ////////////////// COLUMBIA
QUARENI  65 NC 40 A 928       QUARENI,CARTACCI + //////BOL+FIR+GEN+PARMA
SCHMIDT  65 PR 140 B 1328     P SCHMIDT ////////////////////////// COLUMBIA

BANGERTE 66 PRL  17  495      BANGERTER,GALTIERI,BERGE,MURRAY+   // LRL
BERLEY   66 PRL 17 1071       +HERZBACH,KOFLER,YAMAMOTO +//BNL+MASS+YALE
CHIEN    66 PR  152  1171     +LACH,SANDWEISS,TAFT,YEH,OREN + //YALE+BNL
COOK     66 PRL  17  223      V COOK,EWART,MASEK,ORR,PLATNER//WASHINGTON

BAGGETT  67 PRL 19 1458       BAGGETT,DAY,GLASSER,KEHOE,KNOP+///MARYLAND
BARASH   67 PRL 19  181       BARASH,DAY,GLASSER,KEHOE,KNOP +///MARYLAND
BRISTOL  67 HEIDELBERG CONF   BRISTOL-CERN-LAUSANNE-MUNICH-ROME COLLABOR
EISELE   67 ZEIT.PHYS.205,409 +ENGELMANN,FILTHUTH,FOLISH,HEPP+//HEIDELB.
HYMAN    67 PL 25 B 376       +LOKEN,PEWITT,MCKENZIE,KEYES+/ARG+CARN+NWU
KOTELCHU 67 PRL 18 1166       KOTELCHUCK,GOZA,SULLIVAN,ROSS//VANDERBILT
SULLIVAN 67 PRL 18 1163       SULLIVAN,MCINTURFF,KOTELCHUCH//VANDERBILT
    ALSO 64 PRL 13 246        A D MCINTURFF,C E ROOS        // VANDERBILT

BIERMAN  68 PRL 20 1459       BIERMAN,KOUNOSU,NAUENBERG + //// PRINCETON
MAST     68 PRL 20 1312       MAST,GERSHWIN,ALSTON-GARNJOST + ////// LRL

        QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN THE DATA CARDS

TRIPP    62 PRL 8 175         R TRIPP,M WATSON,M FERRO-LUZZI /////// LRL
ALFF     63 SIENA CONF 1 205  ALFF,NAUENBERG,KIRSCH,BERLEY+/COLU+RUT+BNL
    ALSO 65 PR 137 B 1105     ALFF,GELFAND,BRUGGER,BERLEY+/COLUM+RUT+BNL
COURANT  63 SIENA CONF 1 73   COURANT,FILTHUTH,BURNSTEIN,DAY+//CERN+MARY

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

```
                  20  SIGMA-  (1198,JP=1/2+)  I=1

                  20  SIGMA-   MASS (MEV)

M   N SEE NOTE PRECEDING LAMBDA MASS LISTINGS

M      3000 1197.47     0.11          SCHMIDT   65 HBC  SEE NOTE N          6/68
M           . . . . . . . . .
M   FIT    1197.42     0.09     VALUE FROM CONSTRAINED FIT                   6/68

------ --------- --------- --------- --------- --------- --------- ---------

                  20 SIGMA- MASS DIFFER.(-)-(+)(MEV)

D        87    8.25     0.40          BARKAS    63 EMUL  -
D      2500    8.25     0.25          DOSCH     65 HBC
D           . . . . . . . . .
D   AVG         8.2500   .2120   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
D   FIT         8.00     0.18    VALUE FROM CONSTRAINED FIT                   6/68

------ --------- --------- --------- --------- --------- --------- ---------

                  20  (SIGMA-) - (LAMBDA) MASS DIFFERENCE (MEV)

DL  N   SEE NOTE PRECEDING LAMBDA MASS LISTINGS.

DL           81.70     0.19          BURNSTEIN 64 HBC
DL       85  81.80     0.24          SCHMIDT   65 HBC  SEE NOTE N          6/68
DL           . . . . . . . . .
DL  AVG      81.7385   .1490   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
DL  FIT      81.85     0.10    VALUE FROM CONSTRAINED FIT                   6/68

------ --------- --------- --------- --------- --------- --------- ---------

                  20  SIGMA- LIFETIME (UNITS 10**-10)

T            1.67     0.40     0.28  BROWN     58 PBC
T            1.89     0.33     0.25  EISLER    58 PBC
T       45   1.35     0.32     0.17  CHIESA    61 EMUL
T       41   1.75     0.39     0.30  BARKAS    61 EMUL
T     1208   1.58     0.06     0.06  HUMPHREY  62 HBC
T     3267   1.666    0.026          CHANG     65 HBC
T   S   61   2.08     0.22           CHIEN     66 HBC   -  6.9 PBAR P       9/67
T   S   64   1.46     0.31           CHIEN     66 HBC   +  6.9 PBAR P,ANTI  9/67
T   S      ERROR PURELY STATISTICAL
T       506  1.38     0.07           WHITESIDE 68 HBC                       6/68
T           . . . . . . . . .
T   AVG      1.6385   .0551   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.4)
                  (SEE IDEOGRAM, APPENDIX I)
```

```
------ --------- --------- --------- --------- --------- --------- ---------

                  20  SIGMA- PARTIAL DECAY MODES

P1     SIGMA - INTO  NEUTRON PI-                          S17S 8
P2     SIGMA - INTO  NEUTRON PI- GAMMA                    S17S 8S 0
P3     SIGMA - INTO  NEUTRON MU- NEUTRINO                 S17S 4S 2
P4     SIGMA - INTO  NEUTRON E- NEUTRINO                  S17S 3S 1
P5     SIGMA - INTO  LAMBDA E- NEUTRINO                   S18S 3S 1

------ --------- --------- --------- --------- --------- --------- ---------

                  20  SIGMA-  BRANCHING RATIOS

R1  *  SIGMA - INTO (N MU- NEU)/(N PI-) (UNITS 10**-3)  (P3)/(P1)
R1       22    0.66     0.15          COURANT   64 HBC
R1       11    0.56     0.20          BAZIN     65 HBC      FROM STOP. K-
R1          . . . . . . . . .
R1  AVG       .6240    .1200   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R2  *  SIGMA - INTO (N E- NEU)/(N PI-)  (UNITS 10**-3)  (P4)/(P1)
R2        9    1.0      0.4      0.3  MURPHY    64 PBC
R2       16    1.37     0.34          NAUENBERG 64 HBC
R2       16    1.15     0.4           MILLER    64 FBC
R2       31    1.4      0.3           COURANT   64 HBC
R2      180    1.11     0.09          BIERMAN   68 HBC                       6/68
R2          . . . . . . . . .
R2  AVG       1.1406   .0796   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R3  *  SIGMA - INTO (LAMBDA E- NEU)/(N PI-) (UNITS 10**-4)(P5)/(P1)
R3       11    0.75     0.28          COURANT   64 HBC      STOP. K-
R3       35    0.64     0.12          BARASH    67 HBC      STOP K-          8/67
R3          . . . . . . . . .
R3  AVG       .6571    .1103   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R4  *  SIGMA - INTO (N PI- GAMMA)/(NPI-) (UNITS 10**-3)(P2)/(P1)
R4  *  ABOUT  1.1                         BAZIN     65 HBC                   8/67
R4  *  FOR PI- MOM LESS THAN 166 MEV/C

------ --------- --------- --------- --------- --------- --------- ---------

                  20 SIGMA- DECAY PARAMETERS

A-  *  ALPHA SIGMA-
A-  *       -0.16     0.21          TRIPP     62 HBC      REPL.BY BANGERTER
A-    6500  -0.010    0.043         BANGERTER 66 HBC      K-P TO SIG- PI+
A-    6068  -0.104    0.04          BERLEY    67 HBC      K-P TO SIG- PI+  11/67
A-          . . . . . . . . .
A-  AVG       -.0604   .0469   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.6)

F   *  PHI ANGLE (TAN(PHI)=BETA/GAMMA)  (DEGREES)
F     1006  -22.      30.           BERLEY    67 HBC      K-P TO SIG- PI+  11/67

AV  *   GV/GA FOR SIGMA TO LAMBDA BETA DECAY (SEE TEXT FOR SIGN CONVENTION)
AV  *   PREDICTED TO ZERO BY CONSERVED VECTOR CURRENT THEORY
AV       45    0.31     0.30          BARASH    67 HBC                   11/67
AV       44    0.3      0.4           EISELE    67 HBC                   11/67
AV          . . . . . . . . .
AV  AVG       .3064    .2400   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

AV1 *   GA/GV FOR SIGMA TO NEUTRON BETA DECAY (SEE TEXT FOR SIGN CONVENTION)
AV1      57    0.05     0.23     0.32 GERSHWIN  68 HBC  POLARIZED SIGMAS     6/68

****** ********* ********* ********* ********* ********* ********* *********

                          REFERENCES

                  20 SIGMA-(1198,JP=1/2+)I=1

BROWN    58 CERN CONF 270     BROWN,GLASER,GRAVES,PERL,CRONIN + /// MICH
EISLER   58 NC SER10 10 150   EISLER,BASSI,CONVERSI + / COL+BNL+BOL+PISA
BROWN    57 PR 108 1036       J BROWN, D GLASER, M PERL / MICHIGAN + BNL

BARKAS   61 PR 124 1209       BARKAS,DYER,MASON,NICKOLS,SMITH ////// LRL
CHIESA   61 NC 19 1171        A M CHIESA,B QUASSIATI,G RINAUDO /// TURIN
HUMPHREY 62 PR 127 1305       W E HUMPHREY,R R ROSS ////////////////  LRL
TRIPP    62 PRL 9 66          R D TRIPP,M WATSON,M FERRO-LUZZI ///// LRL

BARKAS   63 PRL 11 26         W H BARKAS,J N DYER,H H HECKMAN ////// LRL
BURNSTEI 64 PRL 13 66         BURNSTEIN,DAY,KEHOE,SECHI ZORN,SNOW// MARY
COURANT  64 PR 136 B 1791     COURANT,FILTHUTH+///CERN+HEIDLB+MD+NRL+BNL
MILLER   64 PL 11 262         MILLER,STANNARD,BEZAGUET+ /LOND+PARIS+BERG
MURPHY   64 PR 134 B 188      C THORNTON MURPHY /////////////// WISCONSIN
NAUENBER 64 PRL 12 679        NAUENBERG,SCHMIDT,MARATECK+ /COL+RUT+PRINC

BAZIN    65 PR 140 B 1358     BAZIN,PLANO,SCHMIDT +   //PRINC+RUTG+COLUM
CHANG    65 NEVIS 145  THESIS CHUNG YUN CHANG ////////////////  COLUMBIA
  ALSO   66 PR  151  1081     CHUNG YUN CHANG ////////////////// COLUMBIA
DOSCH    65 PL 14 239         DOSCH,ENGELMANN,FILTHUTH,HEPP,KLUGE+ /HEID
SCHMIDT  65 PR 140 B 1328     P SCHMIDT ////////////////////////// COLUMBIA
BANGERTE 66 PRL  17  495      BANGERTER,GALTIERI,BERGE,MURRAY+   // LRL
CHIEN    66 PR  152  1171     +LACH,SANDWEISS,TAFT,YEH,OREN + //YALE+BNL

BARASH   67 PRL 19  181       BARASH,DAY,GLASSER,KEHOE,KNOP +///MARYLAND
BERLEY   67 PRL  19  979      BERLEY,HERTZBACH,KOFLER +////BNL,MASS,YALE
EISELE   67 HEIDELBERG CONF   EISELE,ENGELMANN,FILTHUTH+///// HEIDELBERG

BIERMAN  68 PRL 20 1459       BIERMAN,KOUNOSU,NAUENBERG + //// PRINCETON
GERSHWIN 68 PRL 20 1270       GERSHWIN,ALSTON-GARNJOST,BANGERTER+ // LRL
WHITESID 68 NC  54A  537      H. WHITESIDE,J. GOLLUB /////////// OBERLIN

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

```
                  21  SIGMA 0  (1193,JP=1/2+)  I=1

                  21  (SIGMA-) - (SIGMA0) MASS DIFFERENCE (MEV)
D1  N   SEE NOTE PRECEDING LAMBDA MASS LISTINGS.

D1       18    4.75     0.1           BURNSTEIN 64 HBC
D1       37    4.87     0.12          DOSCH     65 HBC
D1       12    4.99     0.13          SCHMIDT   65 HBC  SEE NOTE N          6/68
D1          . . . . . . . . .
D1  AVG       4.8486   .0692   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
D1  FIT       4.87     0.07    VALUE FROM CONSTRAINED FIT                   6/68

------ --------- --------- --------- --------- --------- --------- ---------

                  21  (SIGMA 0) - (LAMBDA) MASS DIFFERENCE (MEV)

DL  N   SEE NOTE PRECEDING LAMBDA MASS LISTINGS.

DL      208   76.63     0.28          SCHMIDT   65 HBC  SEE NOTE N          6/68
DL          . . . . . . . . .
DL  FIT       76.98     0.12    VALUE FROM CONSTRAINED FIT                   6/68
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

21 SIGMAO LIFETIME (UNITS 10**-14)

```
T   *     1.0 OR LESS                  DAVIS     62 EMUL
```

21 SIGMA 0 PARTIAL DECAY MODES

```
P1        SIGMA 0 INTO LAMBDA GAMMA                          S18S 0
P2        SIGMA 0 INTO LAMBDA E+ E-                          S18S 3S 3

R1  *   SIGMA 0 INTO(LAMBDA E+ E-)/TOTAL                     (P2)/(P1+P2)

R1  *          0.00545    THEORET. CAL. FEINBERG  58          QUANTUM ELECT.
```

REFERENCES

21 SIGMA 0(1193,JP=1/2+)I=1

```
FEINBERG 58 PR 109 1019      G.FEINBERG                              // BNL
DAVIS    62 PR 127 605       D DAVIS,R SETTI,M RAYMOND,G TOMASIN ///CHI
COURANT  63 PRL 10 409       COURANT,FILTHUTH,FRANZINI+//CERN+UMD+USNRL
BURNSTEI 64 PRL 13 66        BURNSTEIN,DAY,KEHOE,SECHI ZORN,SNOW //MARY
DOSCH    65 PL 14 239        DOSCH,ENGELMANN,FILTHUTH,HEPP,KLUGE+ /HEID
SCHMIDT  65 PR 140 B 1328    P SCHMIDT ////////////////////////// COLUMBIA

        QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN THE DATA CARDS

ALFF     65 PR 137 B1105     ALFF,GELFAND,NAUENBERG+//COLUMBIA+RUTG+BNL P
```

22 XI- (1321,JP=1/2) I=1/2

22 XI- MASS (MEV)

```
M   H    11 1317.0      2.2          WANG      61 PBC
M   H    18 1317.9      1.9          FOWLER    61 PBC
M   H (OLD DATA AND LOW STATISTICS DROPPED ON SUGGESTION OF J R HUBBARD)
M   *     1 1322.0      1.3          BROWN     62 HBC     ANTI-XI-
M       517 1321.4      0.4          JAUNEAU   63 FBC
M        62 1321.1      0.65         SCHNEIDER 63 HBC
M       241 1321.1      0.3          BADIER    64 HBC
M   *  ALL MASSES ABOVE WERE RAISED 0.09 MEV BECAUSE LAMBDA MASS RAISED
M       149 1321.3      0.4          PJERROU   65 HBC                    ,1/67
M         5 1320.69     0.93         CHIEN     66 HBC   +   6.9 PBAR P,ANTI  9/67
M         6 1321.67     0.52         CHIEN     66 HBC   -   6.9 PBAR P       9/67
M       299 1321.4      1.1          LONDON    66 HBC
M   S    12 1321.7      0.6          SHEN      67 HBC     ANTI-XI-          10/67
M   S   THE ERROR IS STATISTICAL ONLY
M             . . . . . .
M   AVG    1321.2582    .1777   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
M   FIT    1321.25      0.18    VALUE FROM CONSTRAINED FIT                 6/68
```

22 MASS DIFFERENCE,(XI-)-(ANTI-XI-) IN MEV

```
DM          1.0         1.1          CHIEN     66 HBC      6.9 PBAR P       9/67
```

22 XI- LIFETIME (UNITS 10**-10)

```
T   H   11     3.5      3.4     1.23  WANG      61 PBC
T   H   18     1.28     0.41    0.25  FOWLER    61 PBC
T   H (OLD DATA AND LOW STATISTICS DROPPED ON SUGGESTION OF J R HUBBARD)
T       517    1.86     0.15    0.14  JAUNEAU   63 FBC
T        62    1.55     0.31    0.31  SCHNEIDER 63 HBC
T   *   356    1.77     0.12          CARMONY   64 HBC    REP BY PJERROU 65
T       794    1.69     0.07          HUBBARD   64 HBC
T       246    1.70     0.12          PJERROU   65 HBC                    11/67
T   S     6    1.37     0.51          CHIEN     66 HBC   -   6.9 PBAR P       9/67
T   S     5    1.51     0.55          CHIEN     66 HBC   +   6.9 PBAR P,ANTI  9/67
T       299    1.80     0.16          LONDON    66 HBC
T   S    12    1.9      0.7     0.5   SHEN      67 HBC     ANTI-XI-          10/67
T      2610    1.61     0.04          DAUBER    68 HBC                       6/68
T   S   THE ERROR IS STATISTICAL ONLY
T             . . . . . .
T   AVG        1.6603    .0366   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)
```

22 XI- PARTIAL DECAY MODES

```
P1      XI- INTO LAMBDA PI-                                   S18S 8
P2      XI- INTO LAMBDA E- NEUTRINO                           S18S 3S 1
P3      XI- INTO NEUTRON PI-                                  S17S 8
P4      XI- INTO LAMBDA MU- NEUTRINO                          S18S 4S 2
P5      XI- INTO SIGMA0 E- NEUTRINO                           S21S 3S 1
P6      XI- INTO SIGMA0 MU- NEUTRINO                          S21S 4S 2
P7      XI- INTO NEUTRON E- NEUTRINO                          S17S 3S 1
```

22 XI- BRANCHING RATIOS

```
R1  *  XI- INTO (LAMBDA E- NEU)/(LAMBDA PI-) (UNITS 10**-3) (P2)/(P1)
R1        1       155 EFFECTIVE DENOM.  CARMONY   63 HBC                  11/67
R1        0       260 EFFECTIVE DENOM.  JAUNEAU   63 HBC                  11/67
R1        0       220 EFFECTIVE DENOM.  BERGE     66 HBC                  11/67
R1        1       155 EFFECTIVE DENOM.  LONDON    66 HBC                  11/67
R1        0       717 EFFECTIVE DENOM.  TRIPPE    67 HBC                  11/67
R1        2      1976 EFFECTIVE DENOM.  HUBBARD   68 HBC                   6/68
R1        4      0.90     0.71    0.43  HUBBARD   68 RVUE                  6/68
R1  *  HUBBARD 68 (RVUE) INCLUDES ALL ABOVE EVENTS                         6/68

R2  *  XI- INTO (NEUTRON PI-)/(LAMBDA PI-) (UNITS 10**-3) (P3)/(P1)
R2          5.0   OR LESS          FERRO-LUZ 63 HBC                       6/68
R2          1.1   OR LESS          DAUBER    68 HBC                       6/68

R3  *  XI- INTO (LAMBDA MU- NEUTRINO)/TOTAL (UNITS 10**-3) (P4)/TOTAL
R3         12.0   OR LESS          BERGE     66 HBC                       6/68
R3          1.3   OR LESS          DAUBER    68 HBC                       6/68

R4  *  XI- INTO (SIGMA0 E- NEUTRINO)/TOTAL (UNITS 10**-3) (P5)/TOTAL
R4          3.0   OR LESS          BERGE     66 HBC                       6/68
R4          0.5   OR LESS          DAUBER    68 HBC                       6/68

R5  *      XI- INTO (SIGMA0 MU- NEUTRINO)/TOTAL          (P6)/TOTAL
R5  *         0.005   OR LESS       BERGE     66 HBC

R6  *      XI- INTO (N E- NEUTRINO) / (LAMBDA PI-)       (P7)/(P1)
R6  *         0.01  OR LESS          BINGHAM   65 RVUE    CONF.LIMIT 0.9
```

22 XI- DECAY PARAMETERS

```
A   *  ALPHA XI-
A   O        -0.44     0.12          JAUNEAU   63 FBC     SEE NOTE D BELOW  6/68
A   O    62  -0.73     0.23          SCHNEIDER 63 HBC     SEE NOTE D BELOW  6/68
A       240  -0.5      0.38          BADIER    64 HBC     SEE NOTE D BELOW  6/68
A       356  -0.62     0.13          CARMONY   64 HBC     SEE NOTE D BELOW  6/68
A      1004  -0.368    0.063         BERGE     66 HBC     SEE NOTE D BELOW  6/68
A       364  -0.47     0.15          LONDON    66 HBC     SEE NOTE D BELOW  6/68
A   L   LONDON 66 USES ALPHA-LAMBDA = 0.62
A   *        -0.391    0.032         BERGE 2   66 RVUE  INCLUDES ALL ABOVE
A   D   ERRORS MULTIPLIED BY 1.1 DUE TO APPROXIMATIONS USED FOR XI
A   D   POLARIZATION. (SEE DAUBER 68 FOR DETAILED DISCUSSION)                6/68
A      2781  -0.404    0.045         DAUBER    68 HBC     USED ALPHAL=.650  6/68
A   M 2529   -0.375    0.051         MERRILL   68 HBC                       6/68
A   M   DATA OF MERRILL 68 INCLUDED IN DAUBER 68.
A   O   OLD DATA NOT INCLUDED IN AVERAGE.
A             . . . . . .
A   AVG        -.4135    .0354   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

F   *  PHI ANGLE (TAN(PHI)=BETA/GAMMA)  (DEGREE)
F   O       -16.0     45.0          JAUNEAU   63 FBC     SEE NOTE D BELOW  6/68
F   O    62  45.0     36.0          SCHNEIDER 63 HBC     SEE NOTE D BELOW  6/68
F       356  54.0     30.0          CARMONY   64 HBC     SEE NOTE D BELOW  6/68
F      1004   0.45     12.9         BERGE     66 HBC     SEE NOTE D BELOW  6/68
F       364   0.0      20.4         LONDON    66 HBC     SEE NOTE D BELOW  6/68
F   L   LONDON 66 USES ALPHA-LAMBDA = 0.62
F   D   ERRORS MULTIPLIED BY 1.2 DUE TO APPROXIMATIONS USED FOR XI
F   D   POLARIZATION. (SEE DAUBER 68 FOR DETAILED DISCUSSION)
F      2781   -9.5     10.0          DAUBER    68 HBC     USED ALPHAL=.650  6/68
F   M 2529    9.8      11.6         MERRILL   68 HBC                       6/68
F   M   DATA OF MERRILL 68 INCLUDED IN DAUBER 68.
F   O   OLD DATA NOT INCLUDED IN AVERAGE.
F             . . . . . .
F   AVG       -1.6542   8.3568   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)
```

REFERENCES

22 XI - (1321,JP=1/2) I=1/2

```
FOWLER   61 PRL 6 134        FOWLER,BIRGE,EBERHARD,ELY,GOOD,POWELL+/LRL
WANG     61 JETP 13 512      K WANG,T WANG,VIRYASOV,TING,SOLOVEV+//JINR
BERTANZA 62 PRL 9 229        BERTANZA,BRISSON,GOLDBERG,GRAY+/BNL+SYRACU
BROWN    62 PRL 8 255        BROWN,CULWICK,FOWLER,GAILLOUD +///BNL+YALE

CARMONY  63 PRL  10  381     CARMONY,PJERROU                      // UCLA
FERROLUZ 63 PR 130 1568      FERRO-LUZZI,ALSTON,ROSENFELD,WOJCICKI//LRL
JAUNEAU  63 SIENA CONF 4     JAUNEAU+ ///// PARIS+CERN+LOND+RUTH+BERGEN
JAUNEAU1 63 PL  5  261       JAUNEAU,MORELLET+//EP,CERN,LON,RUTH,BERGEN
SCHNEIDE 63 PL 4 360         H SCHNEIDER ////////////////////////// CERN

CARMONY  64 PRL 12 482       CARMONY,PJERROU,SCHLEIN,SLATER,STORK+/UCLA
BADIER   64 DUBNA CONF       BADIER,DEMOULIN,BARLOUTAUD+ /PARIS+SAC+ZEE
HUBBARD  64 PR 135 B 183     HUBBARD,BERGE,KALBFLEISCH,SHAFER +////LRL
BINGHAM  65 PRSL  285  202   H H BINGHAM                          // CERN
PJERROU  65 PRL 14 275       + SCHLEIN,SLATER,SMITH,STORK,TICHO // UCLA
PJERROU  65 THESIS           G M PJERROU ////////////////////////// UCLA

BERGE    66 PR  147  945     BERGE,EBERHARD,HUBBARD,MERRILL + ///// LRL
BERGE 2  66    BERKELEY CONF. BERGE,CABIBBO                        // RVUE
CHIEN    66 PR  152  1171    +LACH,SANDWEISS,TAFT,YEH,OREN + //YALE+BNL
LONDON   66 PR 143 1034      LONDON,RAU,GOLDBERG,LICHTMAN+//BNL+SYRACUS
SHEN     67 PL 25 B 443      B.C.SHEN,A.FIRESTONE,G.GOLDHABER// UCB+LRL
TRIPPE   67 PRIV. COMM.      T. TRIPPE ////////////////////////// UCLA
DAUBER   68 PREPRINT         +BERGE,HUBBARD,MERRILL,MILLER //////// LRL J
HUBBARD  68 PRL 20 485       HUBBARD,BERGE,DAUBER ////////////////// LRL
MERRILL  68 PR 167 1202      MERRILL,SHAFER ////////////////////////// LRL J
```

QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN THE DATA CARDS

```
CARMONY  64 PRL 12 482       CARMONY,PJERROU,SCHLEIN,SLATER,STORK+/UCLA  J
```

23 XI 0 (1314,JP=1/2) I=1/2

23 XI 0 MASS (MEV)

```
M         1 1313.4      1.8          PALMER    68 HBC                     3/68
M             . . . . . .
M   FIT    1314.69      0.70    VALUE FROM CONSTRAINED FIT                 6/68
```

23 XI MASS DIFFERENCE (-)-(0)(MEV)

```
D        23    6.8      1.6          JAUNEAU   63 FBC
D   *    45    6.1      1.6          CARMONY   64 HBC    REP BY PJERROU 65
D        88    6.1      0.9          PJERROU   65 HBC                    11/67
D        29    6.9      2.2          LONDON    66 HBC
D             . . . . . .
D   AVG        6.3395    .7389   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
D   FIT        6.56      0.68    VALUE FROM CONSTRAINED FIT                 6/68
```

23 XI 0 LIFETIME (UNITS 10**-10)

```
T        24    3.9      1.4     0.80  JAUNEAU   63 FBC
T   *    45    3.5      1.0      0.8  CARMONY   64 HBC    REP BY PJERROU 65
T       101    2.5      0.4      0.3  HUBBARD   64 HBC
T        80    3.0      0.5           PJERROU   65 HBC                    11/67
T       340    3.07     0.22    0.20  DAUBER    68 HBC                     6/68
T             . . . . . .
T   AVG        3.0327    .1815   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

23 XI 0 PARTIAL DECAY MODES

```
P1      XI 0 INTO LAMBDA PIO                                  S18S 9
P2      XI 0 INTO PROTON PI-                                  S16S 8
P3      XI 0 INTO PROTON E- NEU                               S16S 3S 1
P4      XI 0 INTO SIGMA+ E- NEU                               S19S 3S 1
P5      XI 0 INTO SIGMA- E+ NEU                               S20S 3S 1
P6      XI 0 INTO SIGMA+ MU- NEUTRINO                         S19S 4S 2
P7      XI 0 INTO SIGMA- MU+ NEUTRINO                         S20S 4S 2
P8      XI 0 INTO PROTON MU- NEUTRINO                         S16S 4S 2
```

23 XI 0 BRANCHING RATIOS

```
R1  *  XIO INTO (PROTON PI-)/(LAMBDA PIO) (UNITS 10**-3) (P2)/(P1)
R1         27.0   OR LESS          TICHO     63 HBC                       6/68
R1          5.0   OR LESS          HUBBARD   66 HBC                       6/68
R1          0.9   OR LESS          DAUBER    68 HBC                       6/68
```

```
R2  *  XIO INTO (PROTON E- NEU)/(LAMBDA PIO) (UNITS 10**-3) (P3)/(P1)
R2          27.0    OR LESS             TICHO     63 HBC                      6/68
R2           6.0    OR LESS             HUBBARD   66 HBC                      6/68
R2           1.3    OR LESS             DAUBER    68 HBC                      6/68

R3  *  XIO INTO (SIGMA+ E- NEU)/(LAMBDA PIO) (UNITS 10**-3) (P4)/(P1)
R3          13.0    OR LESS             TICHO     63 HBC                      6/68
R3           7.0    OR LESS             HUBBARD   66 HBC                      6/68
R3           1.5    OR LESS             DAUBER    68 HBC                      6/68

R4  *  XIO INTO (SIGMA- E+ NEU)/(LAMBDA PIO) (UNITS 10**-3) (P5)/(P1)
R4           6.0    OR LESS             HUBBARD   66 HBC                      6/68
R4           1.5    OR LESS             DAUBER    68 HBC                      6/68

R5  *  XIO INTO (SIGMA+ MU- NEU)/TOTAL (UNITS 10**-3) (P6)/TOTAL
R5           7.0    OR LESS             HUBBARD   66 HBC                      6/68
R5           1.5    OR LESS             DAUBER    68 HBC                      6/68

R6  *  XIO INTO (SIGMA- MU+ NEU)/TOTAL (UNITS 10**-3) (P7)/TOTAL
R6           6.0    OR LESS             HUBBARD   66 HBC                      6/68
R6           1.5    OR LESS             DAUBER    68 HBC                      6/68

R7  *  XIO INTO (PROTON MU- NEU)/TOTAL  (UNITS 10**-3) (P8)/TOTAL
R7           6.0    OR LESS             HUBBARD   66 HBC                      6/68
R7           1.3    OR LESS             DAUBER    68 HBC                      6/68

-------------------------------------------------------------------------------

                    23  XI 0 DECAY PARAMETER

A   *  ALPHA XI 0
A          -0.09      0.46              PJERROU   65 HBC      SEE NOTE D BELOW  6/68
A     146  -0.149     0.170             BERGE     66 HBC      SEE NOTE D BELOW  6/68
A      46  -0.2       0.4               LONDON    66 HBC      SEE NOTE D BELOW  6/68
A   L   LONDON 66 USES ALPHA-LAMBDA = 0.62
A   M  490  -0.33      0.11              MERRILL   66 HBC      SEE NOTE D BELOW  6/68
A   M   MERRILL 66 REPLACED BY DAUBER 68
A   D   ERRORS MULTIPLIED BY 1.1 DUE TO APPROXIMATIONS USED FOR XI
A   D   POLARIZATION. (SEE DAUBER 68 FOR DETAILED DISCUSSION)
A      739  -0.45      0.09              DAUBER    68          USED ALPHAL=.650  6/68
A          . . . . . . . . .
A   AVG        -.3691    .0773   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

F   *  PHI ANGLE XIO  (TAN(PHI)=BETA/GAMMA)  (DEGREE)
F     146   -2.9      28.3              BERGE     66 HBC      SEE NOTE D BELOW  6/68
F   M 490  107.0      46.0              MERRILL   66 HBC      SEE NOTE D BELOW  6/68
F   M   MERRILL 66 REPLACED BY DAUBER 68
F   D   ERRORS MULTIPLIED BY 1.2 DUE TO APPROXIMATIONS USED FOR XI
F   D   POLARIZATION. (SEE DAUBER 68 FOR DETAILED DISCUSSION)
F      739   19.0      17.0              DAUBER    68 HBC      USED ALPHAL=.650  6/68
F          . . . . . . . . .
F   AVG       13.1929   14.5728   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES

                              23 XI 0(1314,JP=1/2)I=1/2

ALVAREZ   59 PRL 2 215          ALVAREZ,EBERHARD,GOOD,GRAZIANO,TICHO+//LRL
JAUNEAU   63 SIENA CONF 1 1     JAUNEAU+ ///// PARIS+CERN+LOND+RUTH+BERGEN
    ALSO  63 PL 4 49            JAUNEAU+ ///// PARIS+CERN+LOND+RUTH+BERGEN
TICHO     63 BNL CONF 410       HAROLD K TICHO ////////////////////////UCLA

CARMONY   64 PRL 12 482         CARMONY,PJERROU,SCHLEIN,SLATER,STORK+/UCLA
HUBBARD   64 PR 135 B 183       HUBBARD,BERGE,KALBFLEISCH,SHAFER +/////LRL
PJERROU   65 PRL 14 275         + SCHLEIN,SLATER,SMITH,STORK,TICHO // UCLA
PJERROU   65 THESIS             G M PJERROU ////////////////////////// UCLA

BERGE     66 PR  147  945       BERGE,EBERHARD,HUBBARD,MERRILL + ///// LRL
HUBBARD   66 UCRL 11510         J RICHARD HUBBARD (THESIS,BERKELEY) // LRL
LONDON    66 PR 143 1034        LONDON,RAU,GOLDBERG,LICHTMAN+//BNL+SYRACUS
MERRILL   66  BERKELEY CONF     MERRILL,SHAFER,BERGE                  // LRL
     CF.  66 UCRL 16455         DEANE MERRILL (THESIS, BERKELEY) ///// LRL

DAUBER    68 PREPRINT           +BERGE,HUBBARD,MERRILL,MILLER //////// LRL
PALMER    68 PL 26B  323        PALMER,RADOJICIC,RAU,RICHARDSON+///BNL,SYR

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

```
                    24  OMEGA- (1675,JP=3/2+)   I=0

                    QUANTUM NUMBERS ASSIGNED FROM SU3

                    24  OMEGA-  MASS (MEV)

M   *     1 1620.0     25.0       10.0  EISENBERG 54 EMUL
M         1 1673.0      8.0             ABRAMS    64 HBC      INTO XI- PIO
M         1 1669.0      4.0             ABCLV     68 HBC      INTO LAMBDA K-    3/68
M         1 1671.0      5.0             ABCLV     68 HBC      INTO LAMBDA K-    3/68
M         1 1676.0     14.0             ABCLV     68 HBC      INTO LAMBDA K-    3/68
M         1 1670.0      2.0             ABCLV     68 HBC      INTO LAMBDA K-    3/68
M   P     1 1675.6      5.4             PALMER    68 HBC      INTO XIO PI-      3/68
M   P     1 1673.6      1.2             PALMER    68 HBC      INTO LAMBDA K-    3/68
M   P     1 1672.5      1.8             PALMER    68 HBC      INTO LAMBDA K-    3/68
M   P  THE 3 ABOVE EVENTS WERE ORIGINALLY PUBLISHED WITH MASSES 1686(+-12),
M      1674(+-3) AND 1671(+-5) IN BARNES1(64),BARNES2(64),AND RICHARDSON 65
M      ALL ARE INCLUDED IN THE MASS GIVEN ON THE FOLLOWING LINE --
M         3 1673.3      1.0             PALMER    68 HBC                        3/68
M         3 1671.8      0.9             SCHULTZ   68 HBC      ALL 3 LAMBDA K-   3/68
M         1 1666.0      8.0             SCOTTER   68 HBC      INTO XIO PI-      3/68
M         1 1674.0      2.0             SCOTTER   68 HBC      INTO LAMBDA K-    3/68
M   C  THE ABOVE EVENT WAS ORIGINALLY PUBLISHED AS COLLEY 65
M         1 1662.0     15.0             SCOTTER   68 HBC      INTO XIO PI-      3/68
M         1 1667.0      6.0             SCOTTER   68 HBC      INTO XIO PI-      3/68
M         1 1678.0      3.0             SCOTTER   68 HBC      INTO LAMBDA K-    3/68
M             . . . . . . . . .
M   AVG     1672.4148    .6485   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)

------ --------- --------- --------- --------- --------- --------- ---------

                    24  OMEGA- LIFETIME  (UNITS 10**-10 SEC)

T   A     1    1.63                   ABRAMS    64 HBC
T   A     1    0.7                    BARNES 1  64 HBC
T   A     1    1.4                    BARNES 2  64 HBC
T   A     1    1.85                   COLLEY    65 HBC
T   A     1    1.5                    RICHARDSO 65 HBC
T   A     1    0.93                   ABCLV COL 68 HBC                      11/67
T   A     1    2.6                    ABCLV COL 68 HBC                      11/67
T   A     1    1.6                    ABCLV COL 68 HBC                      11/67
T   A     1    0.21                   ABCLV COL 68 HBC                      11/67
T   A     1    1.20                   SCHULTZ   68 HBC                      11/67
T   A     1    0.06                   SCHULTZ   68 HBC                      11/67
T   A     1    0.63                   SCHULTZ   68 HBC                      11/67
T   A     1    0.25                   SCOTTER   68 HBC                       6/68
T   A     1    0.30                   SCOTTER   68 HBC                       6/68
T   A     1    0.71                   SCOTTER   68 HBC                       6/68
T   A     1    0.08                   SCOTTER   68 HBC                       6/68
T   A     1    1.04                   SCOTTER   68 HBC                       6/68
T   A     1    2.38                   SCOTTER   68 HBC                       6/68
T   A  ALLISON INCLUDES ALL ABOVE + 3 MORE BNL EVENTS, UNPUBLISHED.          6/68
T        21    1.31     0.37     0.24  ALLISON   68 RVUE                      6/68

                    24 OMEGA- PARTIAL DECAY MODES

P1  OMEGA- INTO LAMBDA K-                                   S18S10
P2  OMEGA- INTO XI 0 PI-                                    S23S 8
P3  OMEGA- INTO XI- PI 0                                    S22S 9

------ --------- --------- --------- --------- --------- --------- ---------

                    24  OMEGA- BRANCHING RATIOS

    25 EXAMPLES OF OMEGA - PRODUCTION HAVE BEEN REPORTED. 13 HAVE
    DECAYED INTO LAMBDA K-, 8 INTO XIO PI-, 3 INTO XI- PIO, AND ONE IS
    AMBIGUOUS BETWEEN LAMBDA K- AND XIO PI-.

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES
                              24 OMEGA-(1675,JP=3/2+)  I=0

EISENBER 54 PR 96 541           Y EISENBERG ////////////////////////CORNELL
ABRAMS   64 PRL 13 670          + BURNSTEIN,GLASSER + ///// MARYLAND+USNRL
BARNES 1 64 PRL  12  204        V E BARNES,CONNOLLY,CRENNELL,CULWICK+//BNL
BARNES 2 64 PL 12 134           V E BARNES,CONNOLLY,CRENNELL,CULWICK+//BNL
COLLEY   65 PL 19 152           COLLEY,DODD +  //  BIR+GLA+IC+MUN+OXF+RHEL
RICHARDS 65 BAPS 10 115         RICHARDSON,BARNES,CRENNEL+ // BNL+SYRACUSE
SAMIOS   65 ARGONNE CONF 189    N P SAMIOS //////////////////// (RVUE) BNL

ABCLV    68 NUC PHYS B4 326     AACHEN+BERLIN+CERN+LONDON IMP.COLL.+VIENNA
ALLISON  68 PRIV. COMM.         JOHN ALLISON //////////////////// LANCASTER
PALMER   68 PL 26B 323          PALMER,RADOJICIC,RAU,RICHARDSON+///BNL,SYR
SCHULTZ  68 PR  168  1509       SCHULTZ+ /// ILL,ARGONNE,NORTHWESTERN,WISC
SCOTTER  68 PL 26B 474          SCOTTER+/BIRM,GLASGOW,IC LONDON,MUNICH,OXF

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

$\pi^{\pm}$

8 CHARGED PION (140, JPG=0--) I=1

SEE LISTINGS OF STABLE PARTICLES

π^{0}

9 NEUTRAL PION (135, JPG=0--) I=1

SEE LISTINGS OF STABLE PARTICLES

$\sigma(410)$

7 SIGMA MESON (410, JPG=0++) I = 0

NO EVIDENCE FOR NARROW RESONANCE.
* OMITTED FROM TABLE.
* SEE NOTE ON SIGMA(410) AND EPSILON(700) BELOW

REFERENCES ON SIGMA

SAMIOS	62 PRL 9 139	+BACHMAN,LEA+	BNL+CCNY+CO+KY
BLOKHINT	63 JETP 17 80	BLOKHINTSEVA,GREIBINNIK,ZHUKOV +	// DUBNA
BOOTH	63 PR 132 2314	+ ABASHIAN	LRL
KIRZ	63 PR 130 2481	+SCHWARTZ + TRIPP	LRL
BARISH	64 PR 135 B 416	BARISH,KURZ,PEREZ-MENDEZ,SOLOMON	// LRL
CRAWFORD	64 PRL 13 421	+GROSSMAN,LLOYD,PRICE,FOWLER	LRL
DEL FABR	64 PRL 12 674	DEL FABRO,DE PRETIS,JONES+	FRASCATI
KALMUS	64 PRL 13 99	+KERNAN,PU,POWELL,DOWD	LRL+WISCONSIN
BIRGE	65 PR 139 B 1600	+ELY+GIDAL+KALMUS+CAMERINI+	LRL+WISC
BROWN	65 CORAL GABLES 219	BROWN+FAIER	NORTHWESTERN
WOLF	65 PL 19 328	WOLF	DESY
JACOBS	66 PRL 16 669	+SELOVE	LRL
KOPELMAN	66 PL 22 118	+ALLEN,GODDEN,MARSHALL +	// COLORADO+IOWA
LOVELACE	66 PL 22 332	LOVELACE,HEINZ,DONNACHIE	// CERN
ANDERSON	67 PRL 18 89	+FUKUI+KESSLER+	// CHIC+ANL+OTT+MCGILL+QMC
CORBETT	67 PR 156 1451	+DAMERELL+MIDDLEMAS+NEWTON	OXF+RUTHERF
MALAMUD	67 PRL 19 1056	E.MALAMUD + P.E.SCHLEIN	UCLA
WALKER	67 PRL 18 630	+CARROLL,GARFINKEL,OH	WISCONSIN
BANDER	68 PR 168 1679	M. BANDER, G.L. SHAW, J.R. FULCO	/UCI+UCSB
EISENHAN	68 PRL 20 758	EISENHANDLER,MISTRY,MOSTEK +	CORNELL
FOSTER	68 CERN/PHYS. 68-4	+GAVILLET+LABROSSE+MONTANET+	// CERN+PARIS
JONES	68 PR 166 1405	+CALDWELL+ZACHAROV+HARTING+BLEULER+	/ CERN

η

14 ETA (549, JPG=0-+) I=0

SEE LISTINGS OF STABLE PARTICLES

$\epsilon(730)$

14 EPSILON (730,JPG=0++) I=0

NNNNNN NNNNNNNNN NNNNNN NNNNN NNNNNNNNN NNNNNNNNN
NNNNNN NNNNNNNNN NNNNNN -----TYPEWRITTEN NOTE----- NNNNN NNNNNNNNN NNNNNNNNN
NNNNNN NNNNNNNNN NNNNNN -----AT END OF LISTING---- NNNNN NNNNNNNNN NNNNNNNNN
NNNNNN NNNNNNNNN NNNNNN NNNNN NNNNNNNNN NNNNNNNNN

14 EPSILON MASS (MEV)

M	F		700.0		FELDMAN	65 SPRK	1.52 PI- P	
M	F		NO EPSILON SEEN BY BUHLER 67 (IN EXPERIMENT AT SAME ENERGY).					11/67
M	F		FOR ANOTHER NEGATIVE RESULT SEE BUNIATOV 67					11/67
M			600. APPROX.		CORBETT	67 SPRK	1.7-2.5 PI-P	7/67
M			730. APPROX.		MALAMUD	67 RVUE	(PREFERRED SOLUT.)	7/67
M	P	20	709. 18.		STRUGALSK	67 HLBC	2.3 PI+ N	7/67
M	P		PRELIMINARY RESULT					

14 EPSILON WIDTH (MEV)

W	F		50.0		FELDMAN	65 SPRK	(SEE NOTE F ABOVE)	
W			400. APPROX.		CORBETT	67 SPRK	1.7-2.5 PI- P	7/67
W			150. APPROX.		MALAMUD	67 RVUE	(PREFERRED SOLUT.)	7/67

REFERENCES ON EPSILON

CLARK	65 PR 139 B1556	+CHRISTENSON+CRONIN+TURLAY	PRINCETON
COHN	65 PRL 15 906	H O COHN,BUGG+//ORNL+TENN+UNCAR+COLU+EFINS	
DURAND	65 PRL 14 329	L. DURAND AND Y.T. CHIU	YALE
FELDMAN	65 PRL 14 869	FELDMAN,FRATI,HALPERN,CHOUDRY+/PENNA+COLUM	
FORINO	65 PL 19 65	+GESSAROLI,LENDINARA+	BOL+ORSAY+SACLAY
HAGOPIAN	65 PRL 14 1077	HAGOPIAN,SELOVE,ALIT+/PENNA+SACLAY+BOLOGNA	
WOLF	65 PL 19 328	G WOLF	DESY
GOLDHABE	66 BERKELEY CONF 102	G.GOLDHABER, MESON REVIEW	LRL
JABIOL	66 PRL 17 1065	+JAMES+NGUYEN HUU KHANH /SACLAY+YALE+ORSAY	
JACOBS	66 UCRL-16877	L.D.JACOBS	LRL
LOVELACE	66 PL 22 332	LOVELACE,HEINZ,DONNACHIE	// CERN
BANDER	67 PR 155 1675	M.BANDER + G.L.SHAW	UCI
BUHLER	67 NC 49A 183	+DALPIAZ,MASSAM,ZICHICHI+	// CERN+BOLOGNA
BUNIATOV	67 HEIDELB.CONF.P.61	+ZAVATTINI,DEINET,MULLER+	CERN+KARLSR
CLEGG	67 PR 163 1664	A.B.CLEGG	LANCASTER
CORBETT	67 PR 156 1451	+DAMERELL+MIDDLEMAS+NEWTON	OXF+RUTHERF
GUTAY	67 PRL 18 142	+JOHNSON+LOEFFLER+MCILWAIN+	// PURDUE+UCRL
JOHNSON	67 PR 163 1497	+EISNER+GUTAY+KLEIN+PETERS+SAHNI+	/ PURDUE
MALAMUD	67 PRL 19 1056	E.MALAMUD + P.E.SCHLEIN	UCLA
STRUGALS	67 JINR E1-3100	STRUGALSKI+CHUVILO+IVANOVSKAJA+	DUBNA
(SEE ALSO	G. GOLDHABER, MESON REVIEW, PROC. 1966 BERKELEY CONF.)		
WALKER	67 PRL 18 630	+CARROLL,GARFINKEL,OH	WISCONSIN
WALKER	67 RMP 39 695	W.D.WALKER	WISCONSIN
ARMENISE	68 NC 54 A 999	+FORINO+CARTACCI+/BARI+BOLOG+FIRENZE+ORSAY	
DUTTA-RO	68 PR 169 1357	B. DUTTA-ROY, I.R. LAPIDUS	HOBOKEN,NJ
FOSTER	68 CERN/PHYS. 68-4	+GAVILLET+LABROSSE+MONTANET+	// CERN+PARIS
JONES	68 PR 166 1405	+CALDWELL+ZACHAROV+HARTING+BLEULER+	/ CERN
SMITH	68 UCRL-17917 - PR	GERALD A. SMITH AND ROBERT J. MANNING	/LRL

$\rho(765)$

9 RHO (765, JPG = 1-+) I=1

9 RHO MASS (MEV)

THERE ARE WIDE FLUCTUATIONS IN THE MEASURED VALUES FOR MASS AND WIDTH OF THE RHO DUE TO DIFFERENCES IN PRODUCTION MECHANISM, BACKGROUND, METHOD OF ANALYSIS AND PARAMETRIZATION. UNCERTAINTIES IN THEORY GIVE RISE TO SYSTEMATIC ERRORS OF ABOUT 20 MEV IN MASS AND 40 MEV IN WIDTH.

THE FOLLOWING FOUR ENTRIES ARE THE MOST SIGNIFICANT ONES. THEY ILLUSTRATE THE DISCREPANCIES, AND ARE ALSO REPEATED IN FOOTNOTE (H) OF THE MESON TABLE.

BATON 67 (RHO - IN CHEW-LOW EXTRAPOLATION)
MALAMUD 67 (RHO 0 FROM PION-PION PHASE SHIFT ANALYSIS)
PISUT 68 (COMPILATION AND DISCUSSION OF RHO+-0 IN PI N COLLISIONS AND DISCUSSION OF RHO 0 IN E+ E- COLLIDING BEAMS)
SIDOROV 68 (RHO 0 FROM E- E+ COLLIDING BEAMS)

M+	R		760.0	9.0		CARMONY	64	HBC	+	3.5 PI+P,TCUT 4
M+			760.	10.		ARMENISE	65	HBC	+	2.8 PI+P
M+	R		765.0	5.0		ALFF-STEI	66	HBC	+	2-3 PI+ P
M+	R		783.0	6.0		JAMES	66	HBC	+	2.1 PI+ P
M+	R		758.0	10.0		JAMES	66	HBC	+	2.1 PI+,TCUT2.5
M+			777.0	7.0		ABC COLL.	68	HBC	+	8 PI+P TO P+3PI 5/68
M+			. . . . .							
M+	AVG		771.4094	7.9866	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)					
M+	S		750.0	3.0		BALTAY	66	HBC	+-	0.0 PBAR P
M+			755.	10.		ALLES-BOR	67	HBC	+-	5.7 PBAR P 12/66
M+			730.	11.		BARLOW	67	HBC	+-	1.2 PBAR P 11/66
M+			782.	5.		FOSTER	68	HBC	+-	PBAR P AT REST 6/68
M+			. . . . .							
M+	AVG		769.9901	13.4986	AVERAGE (ERROR INCLUDES SCALE FACTOR = 3.3)					
M-	*		748.0			KENNEY	62	HBC	-	1.2 PI-P
M-	*	130	775.0			GUIRAGOSS	63	HBC	-	3.3 PI-P
M-	R		768.0	5.0		BLIEDEN	65	MMSP	-	3-5 PI- P
M-			772.0	19.0		FIDECARO	66	SPRK	-	2.5 PI-,T CUT18 11/66
M-	R		760.0	5.0		HAGOPIAN1	66	HBC	-	3.0 PI- P
M-	R		770.0	5.0		HAGOPIAN2	66	HBC	-	2.14 PI-P 9/67
M-	R		765.0	5.0		HAGOPIAN2	66	HBC	-	2.14 PI-,TCUT12 9/67
M-	R	6014	757.6	6.6		JACOBS	66	HBC	-	2-3PI- 6/68
M-	R	2775	753.5	10.5		JACOBS	66	HBC	-	2-3PI-,T CUT 20 6/68
M-	R		749.0	3.0		WEST	66	HBC	-	2.1 PI- P
M-			752.0	14.0		BANNER	67	MMS	-	1.8 PI-P, P+MM 9/67
M-	C		755.0	5.0		BATON	67	HBC	-	2.8 PI- P 10/67
M-			751.	5.		CLEAR	67	HBC	-	3 PI- P 7/67
M-			764.	4.		EISNER	67	HBC	-	4.2 PI-P 9/67
M-	R		777.0	6.0		MILLER	67	HBC	-	2.7 PI-,T CUT 5
M-	R		775.0	5.0		MILLER	67	HBC	-	2.7 PI-,T CUT10
M-	R		768.0	5.0		MILLER	67	HBC	-	2.7 PI-,T CUT20
M-	R		781.0	2.0		BATON	68	HBC	-	2.8 PI-,T CUT13 4/68
M-		12773	764.3	1.9	1.8	PISUT	68	RVUE	-	1.7-3.2PI-,CT10 6/68
M-	A	12773	764.3	19.2	3.3	PISUT	68	RVUE	-	1.7-3.2PI-,CT10 6/68
M-	A	ERRORS ARE 2 STD AND INCLUDE SYSTEMATIC UNCERTAINTIES FROM THEORY								
M-			. . . . .							
M-	AVG		762.8290	2.8006	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.8)					
MO	*	190	750.0	20.0		SAMIOS	62	HBC	0	4.7 PI-P
MO	R	300	760.0	10.0		ABOLINS	63	HBC	0	3.5 PI+P
MO	*	160	775.0			GUIRAGOSS	63	HBC	0	3.3 PI-P
MO	R	500	770.0	10.0		GOLDHABER	64	HBC	0	3.7 PI+P
MO	*		735.0	10.0		ALYEA	65	DBC	0	2.2 K- P
MO			750.0			CLARK	65	SPRK	0	1.5 PI-P
MO	N		736.0			CLARK	65	SPRK	0	1.5 PI- P
MO	N	AT PI PI SCATT.ANGLE OF 90 DEG.WITHOUT INTERFERENCE WITH NONRES.BACKGD								
MO	M		753.0			CLARK	65	SPRK	0	1.5 PI- P
MO	M	AT PI PI SCATT.ANGLE OF 90 DEG. ALLOWING FOR INTERF.WITH NONRES.BACKGD								
MO			763.0			DERADO	65	DBC	0	4.0 PI- P
MO	S		750.0	15.0		GUTAY	65	HBC	0	2.0 PI- P
MO			768.0	14.0		ACCENSI	66	HBC	0	5.7 PBARP
MO	R		750.0	5.0		ALFF-STEI	66	HBC	0	2-3 PI+ P
MO	S		751.	6.		BALTAY	66	HBC	0	0.0 PBARP
MO	P		728.0	8.0		CAMBRIDGE	66	HBC	0	1.0-6.0 GAMMA P
MO	S		773.0	12.0		CASON	66	HBC	0	7.0 PI- P
MO	R		775.0	5.0		HAGOPIAN1	66	HBC	0	3.0 PI- P
MO	R		770.0	5.0		HAGOPIAN2	66	HBC	0	2.14 PI-P 9/67
MO	R		770.	5.		HAGOPIAN2	66	HBC	0	2.1 PI-,TCUT 12 2/67
MO	R	7760	763.3	6.0		JACOBS	66	HBC	0	2-3PI- 6/68
MO	R	4207	758.0	7.5		JACOBS	66	HBC	0	2-3PI-,T CUT 20 6/68
MO	R		765.0	8.0		JAMES	66	HBC	0	2.1 PI+ P
MO	R		760.0	3.0		WEST	66	HBC	0	2.1 PI- P
MO			765.	5.		ASBURY 2	67	CNTR	0	GAMMA + PB 8/67
MO	S		764.0	11.0		AUSLANDER	67	SPRK	0	E+E- COLL.BEAMS 10/67
MO	*		SUPERSEDED BY SIDOROV 68 BELOW.							
MO	R		768.0	2.0		BACON	67	HBC	0	1.7 PI-P 9/67
MO			745.	9.		BARLOW	67	HBC	0	1.2 PBAR P 11/66
MO		327	750.	10.		DANYSZ	67	HBC	0	3,3.6PBAR P,6PI 7/67
MO	W	184	755.	5.		DANYSZ	67	HBC	0	3,3.6 PBAR P 7/67
MO	W	WIDTH UNUSUALLY SMALL, SEE BELOW UNDER WIDTH								
MO	O	240	752.	10.		DANYSZ	67	HBC	0	3,3.6PBAR P,7PI 6/68
MO	O	SELECTION ON OMEGA.								
MO			781.	3.		EISNER	67	HBC	0	4.2 PI-P 9/67
MO	P		728.0	6.0		ERBE	67	HBC	0	3.5-5.8 GAMMA P
MO		1500	774.	3.		ERBE	67	HBC	0	1.4-5.8 GAMMA P 7/67
MO	R		761.	3.		HUWE	67	HBC	0	2.4 PI- P 7/67
MO	Q		765.0	4.0		MALAMUD	67	RVUE	0	PI+P,SEE NOTE Q 7/67
MO	Q		767.0	2.0		MALAMUD	67	RVUE	0	PI-P,SEE NOTE Q 7/67
MO	R		770.0	4.0		MILLER	67	HBC	0	2.7 PI-,T CUT20
MO	*		777.0	5.0		POIRIER	67	HBC	0	8.0 PI- P 11/67
MO			770.0	3.0		ABC COLL.	68	HBC	0	8 PI+P TO P+3PI 5/68
MO	R		775.0	2.0		ARMENISE	68	DBC	0	5.1 PI+D 6/68
MO			763.	15.		BLECHSCHM	68	HBC	0	GAMMA P (BREMS) 6/68
MO			776.	5.		FOSTER	68	HBC	0	PBAR P AT REST 6/68
MO	S		765.0	6.0		JONES	68	SPRK	0	12PI-, T LT 2.5 5/68
MO	S		745.0	13.0		JONES	68	SPRK	0	18PI-, T LT 2.5 5/68
MO	S		760.0	9.0		JONES	68	SPRK	0	18PI-,T2.5 TO 5 5/68
MO	S		749.0	5.0		JONES	68	SPRK	0	12PI-,T 5 TO 10 5/68
MO	S		761.0	6.0		JONES	68	SPRK	0	18PI-,T 5 TO 10 5/68
MO	S		750.0	8.0		JONES	68	SPRK	0	12PI-,T10 TO 15 5/68
MO	S		780.0	10.0		JONES	68	SPRK	0	18PI-,T10 TO 15 5/68
MO	S		760.0	5.0		KEY	68	HBC	0	3.0 PI- P 5/68
MO			766.	4.		LAMSA	68	HBC	0	8.0 PI-P 11/67
MO	P		740.0	10.0		LANZEROTT	68	CNTR	0	GAMMA P(BREMS)
MO	S		754.0	9.0		SIDOROV	68	SPRK	0	E+E- COLL.BEAMS 6/68
MO			. . . . .							
MO	AVG		771.7858	2.8358	AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.0)					
M		240	752.0			ALITTI	63	HBC	-0	1.6 PI-P
M		290	755.0			CHADWICK	63	HBC	+-0	0.0 PBAR P
M			744.	9.		FRENCH	67	HBC	+-0	3-4 PBAR P 6/67

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
M   *   ----------NOTES----------

M   C   FROM CHEW-LOW EXTRAPOLATION
M   P   PHOTOPRODUCTION,UNCORRECTED FOR PRODUCTION E-DEPENDENCE
                                        OR BACKGROUND INTERFERENCE
M   Q   FROM PHASE SHIFT ANALYSIS
M   R   INCLUDED IN PISUT 68 RVUE
M   S   S-WAVE BREIT-WIGNER FIT, CANNOT BE COMBINED WITH OTHER VALUES

------ --------- --------- --------- --------- --------- --------- ---------

                    9  RHO(0) - RHO(+-) MASS DIFFERENCE (MEV)

D             2.4       2.1             PISUT     68 RVUE      PI N TO RHO N     6/68

------ --------- --------- --------- --------- --------- --------- ---------

                    9  RHO  WIDTH (MEV)

W   *   SEE NOTE ON RHO MASS ABOVE

W+            90.0      10.0            SACLAY    63 HBC   +   2.8 PI+P
W+  R         77.0      20.0            CARMONY   64 HBC   +   3.5 PI+P,TCUT 4
W+           160.       10.             ARMENISE  65 HBC   +   2.8 PI+P
W+  R        100.0                      ALFF-STEI 66 HBC   +   2-3 PI+ P
W+  R        177.0      15.0            JAMES     66 HBC   +   2.1 PI+ P
W+  R        147.0      19.0            JAMES     66 HBC   +   2.1 PI+,TCUT2.5
W+           149.0      22.0            ABC COLL. 68 HBC   +   8 PI+P TO P+3PI   5/68
W+          . . . . . . . . .
W+  AVG      127.2472  24.0747   AVERAGE (ERROR INCLUDES SCALE FACTOR = 3.6)

W+  S        150.0      30.0            BALTAY    66 HBC   +-  0.0 PBARP
W+           146.       31.             ALLES-BOR 67 HBC   +-  5.7 PBAR P       12/66
W+           130.       25.             BARLOW    67 HBC   +-  1.2 PBAR P       11/66
W+           145.       10.             FOSTER    68 HBC   +-  PBAR P AT REST    6/68
W+          . . . . . . . . .
W+  AVG      143.1837   8.8944   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

W-  *  130   125.0                      GUIRAGOSS 63 HBC   -   3.3 PI-P
W-     98    180.0                      BONDAR    64 HBC   -   4.1 PI-P
W-  R        127.0       5.0           BLIEDEN   66 MMSP  -   3-5 PI- P
W-  R        150.0      20.0           HAGOPIAN1 66 HBC   -   3.0 PI- P
W-  R        130.0      20.0           HAGOPIAN2 66 HBC   -   2.14 PI-P         9/67
W-  R        135.0      20.0           HAGOPIAN2 66 HBC   -   2.14 PI-,TCUT12   9/67
W-  R 6014   139.5      15.0           JACOBS    66 HBC   -   2-3PI-            6/68
W-  R 2775   137.1      20.0           JACOBS    66 HBC   -   2-3PI-,T CUT 20   6/68
W-  R        149.0       13.0          WEST      66 HBC   -   2.1 PI- P
W-           100.0      30.0           BANNER    67 MMS   -   1.8 PI-P,  P+MM   9/67
W-  C        110.0       9.0           BATON     67 HBC   -   2.8 PI- P         10/67
W-           133.       11.             EISNER    67 HBC   -   4.2 PI-P          9/67
W-  R        137.0      17.0           MILLER    67 HBC   -   2.7 PI-,T CUT 5
W-  R        145.0      12.0           MILLER    67 HBC   -   2.7 PI-,T CUT10
W-  R        153.0      13.0           MILLER    67 HBC   -   2.7 PI-,T CUT20
W-  R        132.0       3.0           BATON     68 HBC   -   2.8 PI- P         4/68
W-  12773    147.3       4.0     3.9   PISUT     68 RVUE  -   1.7-3.2PI-,CT10   6/68
W-          . . . . . . . . .
W-  AVG      144.9760   4.5657   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)

WO  *  190   150.0      20.0            SAMIOS    62 HBC     0 4.7 PI-P
WO  R  300    90.0      10.0            ABOLINS   63 HBC     0 3.5 PI+P
WO  *  160   175.0                      GUIRAGOSS 63 HBC     0 3.3 PI-P
WO  R   96   210.0                      BONDAR    64 HBC     0 4.1 PI-P
WO  R  500   130.0                      GOLDHABER 64 HBC     0 3.7 PI+P
WO           110.0      20.0            ALYEA     65 DBC     0 2.2 K- P
WO           130.0                      CLARK     65 SPRK    0 1.5 PI-P
WO           150.0                      DERADO    65 HBC     0 4.0 PI- P
WO  S         80.0      15.0            GUTAY     65 HBC     0 2.0 PI- P
WO            72.0      30.0            ACCENSI   66 HBC     0 5.7 PBARP
WO  R        100.0                      ALFF-STEI 66 HBC     0 2-3 PI+ P
WO  S        174.       31.             BALTAY    66 HBC     0 0.0 PBARP
WO  P        175.0                      CAMBRIDGE 66 HBC     0 5-6 GAM P
WO  S         57.0      25.0     15.0   CASON     66 HBC     0 7.0 PI- P
WO  R        120.0      10.0            HAGOPIAN1 66 HBC     0 3.0 PI- P
WO  R        130.0      20.0            HAGOPIAN2 66 HBC     0 2.14 PI-P       9/67
WO  R        135.0      20.0            HAGOPIAN2 66 HBC     0 2.14 PI-P,LOW T 9/67
WO  R 7760   136.4      12.0            JACOBS    66 HBC     0 2-3PI-          6/68
WO  R 4207   122.2      15.0            JACOBS    66 HBC     0 2-3PI-,T CUT 20 6/68
WO  R        103.0      13.0            JAMES     66 HBC     0 2.1 PI+ P
WO  R        173.0      13.0            WEST      66 HBC     0 2.1 PI- P
WO           130.        5.             ASBURY 2  67 CNTR    0 GAMMA + PB      8/67
WO  S         93.0      15.0            AUSLANDER 67 SPRK    0 E+ E- COLLID.BM 10/67
WO  *       SUPERSEDED BY SIDOROV BELOW.
WO  *       SEE ALSO DISCUSSION BY GOUNARIS 68 AND BY PISUT 68                  6/68
WO  R        148.0       8.0            BACON     67 HBC     0 1.7 PI-P        9/67
WO            92.       42.             BARLOW    67 HBC     0 1.2 PBAR P      11/66
WO      327  135.       25.             DANYSZ    67 HBC     0 3,3.6PBAR P,6PI 7/67
WO  W   184   28.       15.             DANYSZ    67 HBC     0 3,3.6 PBAR P    7/67
WO  W     WIDTH UNUSUALLY SMALL
WO  O   240   80.       30.             DANYSZ    67 HBC     0 3,3.6PBAR P,7PI 6/68
WO  O     SELECTION ON OMEGA.
WO           166.       11.             EISNER    67 HBC     0 4.2 PI-P        9/67
WO  R        152.       15.             HUWE      67 HBC     0 2.4 PI- P       7/67
WO  Q        149.0       5.0            MALAMUD   67 RVUE    0 PI-P,SEE NOTE Q 7/67
WO  Q        154.0       8.0            MALAMUD   67 RVUE    0 PI+P,SEE NOTE Q 7/67
WO  R        160.0      15.0            MILLER    67 HBC     0 2.7 PI-,T CUT20
WO  *        135.0      10.0            POIRIER   67 HBC     0 8.0 PI- P       11/67
WO           165.0      10.0            ABC COLL. 68 HBC     0 8 PI+P TO P+3PI 5/68
WO  R        167.0       6.0            ARMENISE  68 DBC     0 5.1 PI+D        6/68
WO           126.       20.             BLECHSCHM 68 HBC     0 GAMMA P (BREMS) 6/68
WO           132.       10.             FOSTER    68 HBC     0 PBAR P AT REST  6/68
WO  S        129.0      19.0            JONES     68 SPRK    0 12PI-, T LT 2.5 5/68
WO  S        169.0      41.0            JONES     68 SPRK    0 18PI-, T LT 2.5 5/68
WO  S        175.0      30.0            JONES     68 SPRK    0 18PI-,T2.5 TO 5 5/68
WO  S        157.0      16.0            JONES     68 SPRK    0 12PI-,T 5 TO 10 5/68
WO  S        157.0      19.0            JONES     68 SPRK    0 18PI-,T 5 TO 10 5/68
WO  S        102.0      25.0            JONES     68 SPRK    0 12PI-,T10 TO 15 5/68
WO  S        157.0      31.0            JONES     68 SPRK    0 18PI-,T10 TO 15 5/68
WO  S        113.0      16.0            KEY       68 HBC     0 3.0 PI- P       5/68
WO           111.        8.             LAMSA     68 HBC     0 8.0 PI-P        11/67
WO  S        160.0      10.0            LANZEROTT 68 CNTR    0 GAMMA P         5/68
WO  S        105.0      21.0            SIDOROV   68 SPRK    0 E+E- COLL.BEAMS 6/68
WO          . . . . . . . . .
WO  AVG      132.5243   6.6655   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.0)

W       290  110.0                      CHADWICK  63 HBC   +-0 0.0 PBAR P
W            98.       30.             FRENCH    67 HBC   +-0 3-4 PBAR P      6/67

W   *   ----------NOTES----------

W   C   FROM CHEW-LOW EXTRAPOLATION
W   P   PHOTOPRODUCTION, UNCORRECTED (SEE NOTE P UNDER RHO MASS)
W   Q   FROM PHASE SHIFT ANALYSIS
W   R   INCLUDED IN PISUT 68 RVUE
W   S   S-WAVE BREIT-WIGNER FIT, CANNOT BE COMBINED WITH OTHER VALUES

------ --------- --------- --------- --------- --------- --------- ---------

                    9  RHO PARTIAL DECAY MODES

P1    RHO INTO 2PI                                                  S 8S 8
P2    RHO INTO 4PI                                                  S 8S 8S 8S 8
P3    RHO INTO PI GAMMA                                             S 8S 0
P4    RHO INTO E+ E-                                                S 3S 3
P5    RHO INTO PI ETA (VIOLATES G)                                  S 8S14
P6    RHO INTO MU+ MU-                                              S 4S 4

------ --------- --------- --------- --------- --------- --------- ---------

                    9  RHO BRANCHING RATIOS

R1  *  RHO INTO 4PI/2PI                                          (P2)/(P1)

R1  *  RHO+- INTO (PI+- PI+ PI- PIO) / (PI+- PIO)
R1            0.026 OR LESS            BLIEDEN   66 MMSP  -   3-5 PI- P
R1            0.01 OR LESS             DEUTSCHMA 66 HBC   +   8.0 PI+ P
R1            0.002 OR LESS            FERBEL    66 HBC   +- PI+- P ABOVE 2.5
R1            0.0035   0.004           JAMES     66 HBC   +   2.1 PI+P        11/66

R1  *  RHO 0 INTO  (PI+ PI- PI+ PI-) / (PI+ PI-)
R1            0.008 OR LESS            JAMES     66 HBC     0 2.1 PI+P
R1            0.0015  OR LESS,CL=0.90  HILPERT   67 HBC     0 2.5-5.8 GAMMA P 10/67
R1            0.002 OR LESS            CHUNG     68 HBC     0 3.2,4.2 PI-P    7/67

R2  *  RHO INTO PI GAMMA/2PI                                    (P3/P1)
R2  M         0.02 OR LESS             LANZEROTT 65 CNTR      GAMMA P(BREMS)  11/66
R2            0.005 OR LESS            FIDECARO  66 SPRK    -  0.97 CONF LEV
R2            0.007 OR LESS            HUSON     66 HLBC    -  15 PI-PB
R2  M         0.004 OR LESS            ERBE      67 HBC     0 3.5-5.5 GAMMA P
R2  M      ONE PION EXCHANGE MODEL USED IN THIS ESTIMATION

R3  *  RHO INTO(E+ E-)/(PI+PI-)    (UNITS 10**-4)          (P4)/(P1)
R3  P         SEE NOTE P ON LEPTONIC DECAY MODES BELOW
R3     94     0.65      0.14           ASBURY 1  67 CNTR      PHOTOPRODUCTION  9/67
R3  T         ASBURY 1 HAS MASS RESOLUTION OF 15 MEV.
R3            0.49      0.08           AUSLANDER 67 SPRK    E+E- COLLID.BEAM 10/67
R3  B         FROM SIGMA(RHO)=1.2+-0.2 MICROBARNS. SEE HEIDELB.CONF. P.353
R3  H         0.65      1.1      0.5   HERTZBACH 67 SPRK ASSUME SU(3)+MIXING
R3  H         NOT SEPARATED FROM OMEGA DECAY.
R3  K  13     0.39      0.12     0.39  KHACHATUR 67 SPRK ASSUME SU(3)+MIXING  5/67
R3  K         SUPERSEDED BY ASTVACATUROV 68 BELOW
R3     99     0.62      0.11           AUGUSTIN  68 SPRK    E+E- COLLID.BEAM 11/67
R3  A  33     0.53      0.11           ASTVACATU 68 SPRK ASSUME SU(3)+MIXING  6/68
R3  A         NOT SEPARATED FROM OMEGA DECAY. ERROR STATISTICAL ONLY.
R3          . . . . . . . . .
R3  AVG        .5552     .0587   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R4  *    RHO INTO (PI ETA)/(2PI)                                (P5)/(P1)
R4            0.03 OR LESS             DEUTSCHMA 66 HBC   +    8.0 PI+ P
R4            0.008  OR LESS           FERBEL    66 HBC   +- PI+- P ABOVE 2.5 11/66

R5  *    RHO INTO (MU+ MU-)/(PI+ PI-) (UN 10**-4)               (P6)/(P1)
R5  P         SEE NOTE P ON LEPTONIC DECAY MODES BELOW
R5  D         0.33      0.16     0.07  DE PAGTER 66 CNTR    0 5.2 GAM P
R5  D         DE PAGTER 66 SUPERSEDED BY WEINSTEIN 67 BELOW
R5           14.0 OR LESS              HERTZBACH 67 SPRK      3.0 PI-P
R5            0.97      0.31     0.33  HYAMS     67 SPRK    11 PI- LI H       6/67
R5  H         HYAMS MASS RESOL. IS 20 MEV. THE OMEGA REGION WAS EXCLUDED.
R5  W         0.51      0.12           WEHMANN   67 SPRK    0 12 PI- ON C,FE  6/67
R5  W         NOT SEPARATED FROM OMEGA DECAY. CORRECTION ASSUMING SU(3).
R5            0.59      0.15           WEINSTEIN 67 CNTR      PHOTOPRODUCTION  10/67
R5  C         DE PAGTER 66 GIVES MASS RESOL.OF THIS EXPT.AS 35 MEV.
R5          . . . . . . . . .
R5  AVG        .6585     .1460   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)

R   P   ---------- NOTE P ON LEPTONIC DECAY MODES ----------
R   P   IN EXTRACTING THE BRANCHING RATIOS, THE POSSIBILITY OF INTERFERENCE
R   P   WITH LEPTONIC DECAYS OF THE OMEGA HAS TO BE TAKEN INTO ACCOUNT.
R   P   SEE, IN PARTICULAR FOR DATA FROM PHOTOPRODUCED RHOS, DAVIER 68 AND
R   P   PARSONS 68 WHERE CORRECTIONS POSSIBLY AS HIGH AS 60 PERCENT ARE
R   P   SUGGESTED.

****** ********* ********* ********* ********* ********* ********* *********

                                REFERENCES FOR RHO

ANDERSON 61 PRL 6 365           ANDERSON,BANG,BURKE,CARMONY,SCHMITZ // LRL
KENNEY   62 PR 126 736          V P KENNEY,W D SHEPHARD,C D GALL /KENTUCKY
SAMIOS   62 PRL 9 139           SAMIOS,BACHMAN,LEA+ // BNL+CCNY+COLUM+KENT
XUONG    62 PR 128 1849         NGUYEN HUU XUONG,GERALD R LYNCH ////// LRL

ABOLINS  63 PRL 11 381          ABOLINS,LANDER,MEHLHOP,NGUYEN,YAGER / UCSD
ALITTI   63 NC 29 515           ALITTI,BATON,ARMENISE+/SAC+ORSAY+BARI+BOLO
CHADWICK 63 PRL 10 62           CHADWICK,DAVIES,DERRICK,CRESTI + / OXF+PAD
GUIRAGOS 63 PRL 11 85           ZAVEN GUIRAGOSSIAN ////////////////// LRL
SACLAY   63 SIENA CONF 1 239    SACLAY+ORSAY+BARI + BOLOGNA(COLLABORATION)

BATON    64 NC 35 713           BATON,BERTHELOT,ALLES,BORELLI + /CEN+BOLOG
BONDAR   64 NC 31 729           BONDAR+//AACHEN+BIRM+BONN+DESY+IMP-COL+MPI
CARMONY  64 DUBNA CONF 1 486    CARMONY,HOA,LANDER,NG H XUONG,YAGER //UCSD
GOLDHABE 64 PRL 12 336          GOLDHABER,BROWN,KADYK,SHEN,TRILLING/LRL+UC

ALYEA    65 PL 15 82            ALYEA,CRITTENDEN,MARTIN,RHODE + // INDIANA
ARMENISE 65 NC 37 361           SACLAY+ORSAY+BARI+BOLOGNA (COLLABORATION )
BLIEDEN  65 PL 19 444           CERN MISSING MASS SPECTROMETER GROUP//CERN
CLARK    65 PR 139 B 1556       A CLARK,CHRISTENSON,CRONIN,TURLAY/PRINCETO
DERADO   65 PRL 14 872          DERADO,KENNEY,POIRIER,SHEPHARD//NOTRE DAME
GUTAY    65 NC 39 381           GUTAY,LANNUTTI,TULI ////////////// FLORIDA
LANZEROT 65 PRL 15 210          LANZEROTTI,BLUMENTHAL,EHN,FAISSLER +/HARVD
WOLF     65 PL 19 328           G WOLF ////////////////////////////  DESY
ZDANIS   65 PRL 14 721          ZDANIS,MADANSKY,KRAEMER + //////// JHU+BNL

ACCENSI  66 PL 20 557           ACCENSI,ALLES-BORELLI,FRENCH,FRISK+// CERN
ALFF-STE 66 PR 145 1072         ALFF-STEINBERGER,BERLEY,BRUGGER+//COL+RUTG
BALTAY   66 PR 145 1103         +FRANZINI,LUTJENS,SEVERINS,TYCKO+/COLUMBIA
BLIEDEN  66 NC 43 71            CERN MISSING MASS SPECTROMETER GROUP//CERN
CAMBRIDG 66 PR  146  994        CAMBRIDGE BUBBLE CHAMBER GROUP //MIT+HARV+
CASON    66 PR  148  1282       N M CASON                    // WISCONSIN
DE PAGTE 66 PRL 16 35           DE PAGTER+//CAM EL ACC+MIT+NORTHEAST+ SLAC
DEUTSCHM 66 PL 20 82            DEUTSCHMANN,STEINBERG +//AACH+BERLIN+ CERN
FERBEL   66 PL 21 111           FERBEL ////////////////////////// ROCHESTER
FIDECARO 66 PL  23  163         G+M FIDECARO,J POIRIER,P SCHIAVON  // CERN
HAGOPIA1 66 PR 145 1128         HAGOPIAN,SELOVE,ALITTI,BATON+//PENN+SACLAY
HAGOPIA2 66 PR  152  1183       HAGOPIAN,PAN  // PENNSYLVANIA,LRL-BERKELEY
HUSON .  66 PL 20 91            HUSON,ALLARD,DRIJARD,HENNESSY + //ORSAY+EP
JACOBS   66 UCRL-16877          L.D.JACOBS ////////////////////////// LRL
JAMES    66 PR 142 896          F E JAMES,KRAYBILL /////// YALE+BROOKHAVEN
WEST     66 PR 149 1089         WEST,BOYD,ERWIN,WALKER ////////// WISCONSIN

ALLES-BO 67 NC 50 A 776         ALLES-BORELLI,FRENCH,FRISK,+ /// CERN+BONN
ASBURY 1 67 PRL 19 869          +BECKER+BERTRAM+JOOS+JORDAN+TING+/DESY+COL
ASBURY 2 67 PRL 19 865          +BECKER+BERTRAM+JOOS+JORDAN+TING+/DESY+COL
AUSLANDE 67 PL 25 B 433         AUSLANDER,BUDKER,PESTOV,SIDOROV+/NOVOSIBIR
BACON    67 PR 157 1263         +FICKINGER,HILL,HOPKINS,ROBINSON+    // BNL
BANNER   67 PL  25 B  300       +FAYOUX,HAMEL,ZSEMBERY,CHEZE+//SACLAY+CAEN
BARLOW   67 NC 50A 701          +LILLESTOL+MONTANET+/CERN+CDF+IR+LIVERPOOL
BATON    67 PL 25 B 419         J.BATON,G.LAURENS,J.REIGNIER    //  SACLAY
    ALSO 67 NP B 3  349
CLEAR    67 NC 49A 399          +JOHNSTON+COOPER+MANNER+WALKER+/TO+ANL+WIS
DANYSZ   67 NC TO BE PUBL.      DANYSZ+FRENCH+SIMAK ////////////////// CERN
EISNER   67 PR 164 1699         +JOHNSON+KLEIN+PETERS+SAHNI+YEN+ // PURDUE
ERBE     67 NC 48A 262          +BOTTCHER+MOEBES+HARIGEL+LUKE+ /// ABBDHHM
FRENCH   67 NC 52A 442          +KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM
HERTZBAC 67 PR 155  1461        HERTZBACH,KRAEMER,MADANSKI,ZDANIS+/JHU+BNL
   (SEE ALSO ZDANIS 65)
HILPERT  67  PRIV.COMM.         HILPERT+// AACH+BERL+BONN+HAMB+HEID+MUNICH
HUWE     67 PL 24B 252          +MARQUIT+OPPENHEIMER+SCHULTZ+WILSON // COL
HYAMS    67 PL 24B 634          +KOCH+PELLETT+POTTER+VONLINDERN+ /CERN+MUN
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
KHACHATU 67 PL 24B 349          KHACHATURYAN+AZIMOV+BALDIN+BELOUSOV+/DUBNA
MALAMUD  67 PRL 19 1056         E.MALAMUD+P.E.SCHLEIN//////////////////UCLA
MILLER   67 PR 153 1423         MILLER,GUTAY,JOHNSON,LOEFFLER +  // PURDUE
POIRIER  67 PR 163 1462         +BISWAS,CASON,DERADO,KENNEY+//NOTRDAM+PENN
ROOS     67 NP B 2  615         M. ROOS                          // CERN
WEHMANN  67 PRL 18 929          +ENGELS+ /// HARVARD+CWRU+SLAC+CORN+MCGILL
WEINSTEI 67 SLAC SYMPOS.P.424 R.WEINSTEIN,RAP.TALK //// CEA+NORTHEASTERN

ABC COLL 68 NP B4 501           //////////AACHEN+BERLIN+CERN COLLABORATION
ARMENISE 68 NC 54A 999          +GHIDINI,FORINO+//BARI+BOLOGN+FIRENZ+ORSAY
ASTVACAT 68 PL 27 B  45         ASTVACATUROV,AZIMOV,BALDIN+ // JINR+MOSCOW
AUGUSTIN 68 PRL 20 126          +BIZOT+BUON+HAISSINSKI+LALANNE+  /// ORSAY
BATON    68 PL  26B  471        J.P. BATON, G. LAURENS ////////////  SACLAY
BLECHSCH 68 NC  53 A  1045      BLECHSCHMIDT,DOWD,ELSNER,+ //// DESY+MANCH
  (SEE ALSO NC  52 A  1348 )
CHUNG    68 PR 165 1491         S.U.CHUNG,O.I.DAHL,J.KIRZ,D.H.MILLER / LRL
DAVIER   68 PL  27 B  27        M. DAVIER ////////////////////////// SLAC
FOSTER   68  CERN/PHYS. 68-4    +GAVILLET+LABROSSE+MONTANET+ // CERN+PARIS
GOUNARIS 68  COO-432,EFI68-34 G.J.GOUNARIS, J.J. SAKURAI /// EFI,CHICAGO
JONES    68 PR 166 1405         +BLEULER,CALDWELL,ELSNER,HARTING+   //CERN
KEY      68 PR 166 1430         +PRENTICE+COOPER+MANNER+WALKER+/TO+ANL+WIS
LAMSA    68 PR 166 1395         +CASON+BISWAS+DERADO+GROVES+ /// NOTREDAME
LANZEROT 68 PR 166 1365         LANZEROTTI,BLUMENTHAL,EHN,FAISSLER +/HARVD
PARSONS  68 PRL  20  1314       RONALD E. PARSONS, ROY WEINSTEIN/NORTHEAST
PISUT    68 NP B (TO BE PUBL) J.PISUT,M.ROOS                   // CERN
SIDOROV  68  PRIV.COMM.         V.A.SIDOROV+                 //  NOVOSIBIRSK
   (SEE ALSO AUSLANDER 67)

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

ω(783)

```
                1  OMEGA (783,JPG=1--)  I=0
------ --------- --------- --------- --------- --------- --------- ---------

                1  OMEGA  MASS (MEV)

M      400  782.0       1.0            ALFF      62 HBC      2.3-2.9 PI+P
M       64  779.4       1.4            ARMENTERO 62 HBC      0.0 PBAR P
M      650  782.0                      MURRAY    63 HBC      1.5 K-P
M       34  784.0       1.0            ARMENTERO 63 HBC      0.0 PBAR P
M      220  781.0       2.0            KRAEMER   64 DBC      1.2 PI+D
M           785.6       1.2            MILLER D  65 HBC     SEEN WITH K+K-
M    M      780.8       2.0            MILLER D  65 HBC     SEEN WITH K1 K1
M    M      DATA INCLUDED IN BARASH 67 BELOW
M      333  786.0       1.0            JAMES     66 HBC      2.1 PI+P
M     2198  783.4       0.7            BALTAY    67 HBC      0.0 PBAR P
M      155  779.5       1.5            BARASH    67 HBC      0 PBAR TO K1K1OM 11/66
M    *      785.5       3.3            GOSHAW    67 HBC      3.5 K+ P          7/67
M           784.8       1.1            KEY       68 HBC       3 PI-P          11/67
M          . . . . . .
M    AVG    783.4142    .6998   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.0)
                  (SEE IDEOGRAM, APPENDIX I)

------ --------- --------- --------- --------- --------- --------- ---------

                1  OMEGA FULL WIDTH (MEV)

W       34    9.0       3.0            ARMENTERO 63 HBC      0.0 PBAR P
W            13.4       2.0            MILLER D  65 HBC     SEEN WITH K+ K-
W    M       11.6       3.0            MILLER D  65 HBC     SEEN WITH K1 K1
W    M       DATA INCLUDED IN BARASH 67 BELOW
W      333   20.0    OR LESS           JAMES     66 HBC      2.1 PI+P
W      155   12.3       2.0            BARASH    67 HBC      SEEN WITH K1 K1
W          . . . . . .
W    AVG     12.1500    1.2792   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

------ --------- --------- --------- --------- --------- --------- ---------

                1  OMEGA PARTIAL DECAY MODES

P1     OMEGA INTO PI+ PI- PIO                                  S 8S 8S 9
P2     OMEGA INTO PI+ PI- (VIOLATES G)                         S 8S 8
P3     OMEGA INTO PI+ PI- GAMMA                                S 8S 8S 0
P4     OMEGA INTO PIO GAMMA                                    S 9S 0
P5     OMEGA INTO 2PIO GAMMA                                   S 9S 9S 0
P6     OMEGA INTO MU+ MU-                                      S 4S 4
P7     OMEGA INTO E+ E-                                        S 3S 3
P8     OMEGA INTO ETA GAMMA                                    S14S 0
P9     OMEGA INTO ETA PIO (VIOLATES C)                         S14S 9
P10    OMEGA INTO 3 GAMMA                                      S 0S 0S 0
P11    OMEGA INTO PIO MU+ MU-                                  S 9S 4S 4

------ --------- --------- --------- --------- --------- --------- ---------

                1  OMEGA  BRANCHING RATIOS

R1   *  OMEGA INTO NEUTRAL/(PI+ PI- PIO)                    (P4+P5)/(P1)
R1           0.17      0.04           ARMENTERO 63 HBC      0.0 PBAR P
R1     20    0.11      0.02           BUSCHBECK 63 HBC      1.5 K-P
R1     35    0.08      0.03           KRAEMER   64 DBC      1.2 PI+D
R1   *       0.13      0.035          MILLER D  65 HBC
R1     65    0.10      0.04           ALFF-STEI 66 HBC CORR.BY SCHULTZ(COL)
R1    850    0.134     0.026          DIGIUGNO  66 CNTR     1.4 PI-P
R1    348    0.097     0.016          FLATTE    66 HBC      1.8 K-P
R1           0.06      0.05     0.02  JAMES     66 HBC      2.1 PI+P
R1     19    0.10      0.03           BARASH    67 HBC      0.0 PBAR P        7/67
R1          . . . . . .
R1   AVG       .1043     .0091   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R2   *  OMEGA INTO (PI+ PI-)/(PI+ PI- PIO)                   (P2)/(P1)
R2           0.010 OR LESS          BUTTON    62 HBC      1.6 PBAR P
R2           0.07                   ALITTI    63 HBC      1.6 PI-P
R2           0.05 OR LESS           ARMENTERO 63 HBC      0.0 PBAR P
R2     100   0.05 OR GREATER        FICKINGER 63 HBC      1.7 PI-P
R2           0.05 OR LESS           KRAEMER   64 DBC      1.2 PI+D
R2   *       0.005 OR LESS          LUTJENS   64 RVUE NO INTERFERENCE
R2           0.018     0.012  0.006 WALKER    64 RVUE     2.1 PI-P
R2           0.04 OR GREATER        BATON     65 HBC      2.8 PI-P
R2           0.010 OR LESS          CLARK     65 SPRK     1.5 PI-P
R2           0.035 OR LESS          MILLER D  65 HBC
R2           0.02 OR LESS           ALFF-STEI 66 HBC      2.9 PI+P          11/66
R2   *       0.082     0.020        FLATTE    66 HBC  NO INTERFERENCE
R2           0.029     0.011  0.009 FLATTE    66 HBC  INTERFERENCE
R2   *   NOT ESTABLISHED WHETHER ANY PI+PI- SIGNAL HAS I=0,SEE PISUT 68.
R2          . . . . . .
R2   AVG       .0229     .0067   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R3   *  OMEGA INTO (PIO GAMMA) / (PI+ PI- PIO)              (P4)/(P1)
R3   *       0.125     0.025 OR GRTR. BARMIN    64 PXBC     2.8 PI-P
R3   N   13  0.15      0.06           BAGLIN    66 HLBC     2.1 PI+P
R3   N       BAGLIN 66 SUPERSEDED BY JACQUET 67 BELOW                      10/67
R3           0.13      0.04           JACQUET   67 HLBC                   10/67

R4   *  OMEGA INTO (PI+ PI- GAMMA)/(PI+ PI- PIO)          (P3)/(P1)
R4           0.05   OR LESS          FLATTE    66 HBC      1.8 K-P

R5   *  OMEGA INTO(E+ E-)/(PI+ PI- PIO)  (UNITS 10**-3)  (P7)/(P1)
R5   *       3.9       1.5    OR LESS BARMIN    63 PBC      1.3-2.8 PI-P
R5         1 2.8    OR LESS           BEZAGUET  64 FBC      1.5 K-P
R5           1.4    OR LESS           GALTIERI  65 HBC      2.7 K-P
R5           0.3 OR LESS              FLATTE    66 HBC      1.8 K-P

R6   *  OMEGA INTO (MU+ MU-)/(PI+ PI- PIO)(UNITS 10**-3) (P6)/(P1)
R6           1.2    OR LESS          GALTIERI  65 HBC      2.7 K-P
R6           1.7 OR LESS             FLATTE    66 HBC      1.8 K-P

R7   *  OMEGA INTO (2PIO GAMM)/(PIO GAMMA)                 (P5)/(P4)
R7           0.1    OR LESS          BARMIN    64 PXBC     1.3-2.8 PI-P

R8   *  OMEGA INTO(ETA PIO +ETA GAM)/(PI+PI-PIO)          (P8+P9)/(P1)
R8           0.017  OR LESS          FLATTE    66 HBC      1.8 K-P
R8           0.026 OR LESS           JACQUET   67 HLBC    CL=0.90            10/67

R9   *  OMEGA INTO (NEUTRALS) / (CHARGED)
R9           0.124     0.021        FELDMAN   67 SPRK     1.2 PI- P          3/67

R10  *  OMEGA INTO (2PIO GAMMA)/(PI+PI-PIO)                 (P5)/(P1)
R10  *       0.1    OR LESS          JACQUET   67 HLBC    CL=0.90            10/67

R11  *  OMEGA INTO (3 GAMMA)/(PIO GAMMA)                   (P10)/(P4)
R11  *       0.35   OR LESS          KANAREK   66 XEBC     2.34 PI+N          11/67

R12  *  OMEGA INTO (PIO MU+ MU-) / TOTAL  (UNITS 10**-3)
R12          2.     OR LESS          WEHMANN   68 SPRK     12 PI- FE          6/68

R13  *  OMEGA INTO (E+ E-)/TOTAL   (UNITS 10**-4)
R13        3    2.       1.2        BINNIE    65 SPRK     PI-P NEAR THLD.
R13  B      MASS RESOLUTION OF BINNIE 65 IS ABOUT 15 MEV.
R13  H      1.0      1.7      0.75  HERTZBACH 67 SPRK ASSUME SU(3)+MIXING
R13  H      NOT RESOLVED  FROM RHO DECAY.
R13  K   13 0.48     0.15     0.48  KHACHATUR 67 SPRK ASSUME SU(3)+MIXING  5/67
R13  K      SUPERSEDED BY ASTVACATUROV 68 BELOW
R13  A   33 0.65     0.13           ASTVACATU 68 SPRK ASSUME SU(3)+MIXING  6/68
R13  A      NOT RESOLVED  FROM  RHO  DECAY. ERROR STATISTICAL ONLY.

R14  *  OMEGA INTO NEUTRALS / TOTAL
R14          0.084     0.015        BOLLINI   68 CNTR     2.1 PI- P          6/68

****** ********* ********* ********* ********* ********* ********* *********
```

REFERENCES FOR OMEGA

```
MAGLIC   61 PRL 7 178           B MAGLIC,ALVAREZ,ROSENFELD,STEVENSON //LRL
PEVSNER  61 PRL 7 421           PEVSNER,KRAEMER,NUSSBAUM,RICHARD+///JHU+NW
XUONG    61 PRL 7 327           NGUYEN HUU XUONG,GERALD R LYNCH /////  LRL

ALFF     62 PRL 9 325           ALFF,BERLEY,COLLEY,GELFAND +//COLU+RUTGERS
ARMENTER 62 CERN CONF 90        R ARMENTEROS,R BUDDE + // CERN+COLL+FRANCE
BUTTON   62 PR 126 1858         BUTTON,KALBFLEISCH,LYNCH,MAGLIC + ///  LRL
STEVENSO 62 PR 125 687          STEVENSON,ALVAREZ,MAGLIC,ROSENFELD /// LRL

ALITTI   63 NC 29 515           ALITTI,BATON,BERTHELOT+//LPCHE+PAR+BARI+BO
ARMENTER 63 SIENA CONF 1 296    ARMENTEROS,EDWARDS,JACOBSEN+ // CERN+PARIS
BARMIN   63 SIENA CONF 1 207    BARMIN,DOLGOLENKO,KRESTNIKOV+ ///////  ITEP
BERTHELO 63 SIENA CONF 2 60     A BERTHELOT ////////////////// CEN-SACLAY
BUSCHBEC 63 SIENA CONF 1 166    BUSCHBECK,CZAPP+ /// VIENNA+CERN+AMSTERDAM
FICKINGE 63 PRL 10 457          W J FICKINGER,D K ROBINSON,E SALANT // BNL
GELFAND  63 PRL 11 436          GELFAND,MILLER,NUSSBAUM,RATAU+ /COLUM+RUTG
MURRAY   63 PL 7 358            MURRAY,FERROLUZZI,HUWE,SHAFER,SOLMITZ+/LRL

BARMIN   64 JETP 18 1289        BARMIN,DOLGOLENKO,KRESTNIKOV + /////  ITEP
BEZAGUET 64 PL 12 70            BEZAGUET,NGUYEN KHAC,ROUSSET+//PAR+BERG+LO
KRAEMER  64 PR 136 B 496        KRAEMER,MADANSKY,MEER,FIELDS+//JHU+NW+WOOD
LUTJENS  64 PRL 12 517          G LUTJENS,J STEINBERGER  ///////  COLUMBIA
WALKER   64 PL 8 208            WALKER,BOYD,ERWIN,SATTERBLOM +// WISCONSIN

BATON    65 NC 35 713           BATON,BERTHELOT,DELER,BENEDETTI+/SAC+BOLOG
BINNIE   65 PL 18 348           BINNIE,DUANE,JANE,W JONES+//IC-LOND+MANCHS
CLARK    65 PR 139 B 1556       CLARK,CHRISTENSON,CRONIN,TURLAY//PRINCETON
GALTIERI 65 PRL 14 279          A BARBARO GALTIERI,R D TRIPP /////////  LRL
MILLER D 65 CU-237(NEVIS 131) DAVID C MILLER  (THESIS) ////////  COLUMBIA
   MILLER 65 INCLUDES DATA OF GELFAND 63 ABOVE
ZDANIS   65 PRL 14 721          ZDANIS,MADANSKY,KRAEMER,HERTZBACH+/JHU+BNL

ALFF-STE 66 PR 145 1072         ALFF-STEINBERGER,BERLEY,BRUGGER+//COL+RUTG
BAGLIN   66 PL  23  286         +BEZAGUET,DEGRANGE,HAATUFT +  // EP+BERGEN
DIGIUGNO 66 NC 44A 1272         DI GIUGNO,PERUZZI,TROISE+ //NAPL+FRAS+TRST
FLATTE   66 PR  145  1050       +HUWE,MURRAY,BUTTON-SHAFER,SOLMITZ+ // LRL
JAMES    66 PR 142 896          F E JAMES,KRAYBILL //////  YALE+BROOKHAVEN
KANAREK  66  PREPRINT P1-2948 +LOSKEVICH,MARTYNOV,NICHIPORUK+  //  DUBNA

BALTAY   67 PRL  18  93         +FRANZINI,SEVERIENS,YEH,ZANELLO //COLUMBIA
BARASH   67 PR  156  1399       BARASH,KIRSCH,MILLER,TAN /////////COLUMBIA
FELDMAN  67 PR 159 1219         +FRATI,GLEESON,HALPERN,NUSSBAUM+ /// PENNA
GOSHAW   67  PREPRINT           +ERWIN+WALKER+WEINBERG ///////////// WISC
HERTZBAC 67 PR 155, 1461        HERTZBACH,KRAEMER,MADANSKI,ZDANIS+/JHU+BNL
   (SEE ALSO ZDANIS 65)
JACQUE1  67 HEIDBG CONF P.364 +NGUYEN-KHAC,BAGLIN,HAATUFT+ // EPP+BERGEN
KHACHATU 67 PL 24B 349          KHACHATURYAN+AZIMOV+BALDIN+BELOUSOV+/DUBNA

ASTVACAT 68 PL 27 B  45         ASTVACATUROV,AZIMOV,BALDIN+ // JINR+MOSCOW
BOLLINI  68  PREPRINT - NC      +BUHLER-BROGLIN,+ //// CERN+BOLOGNA+STRASB
KEY      68 PR 166 1430         +PRENTICE+COOPER+MANNER+WALKER+/TO+ANL+WIS
PISUT    68 NP B (TO BE PUBL) J.PISUT,M.ROOS                   // CERN
WEHMANN  68 PRL 20 748          +ENGELS+ /HARVARD+CASE+SLAC+CORNELL+MCGILL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

η′(958)

```
                2  ETA PRIME (958,JPG=0-+)  I=0

                KNOWN ALSO AS X0
                (JP = 1+, 2- NOT YET EXCLUDED,)
                (SEE  NOTE AT END OF LISTINGS.)
------ --------- --------- --------- --------- --------- --------- ---------

                2  ETA PRIME MASS (MEV)

M       85  957.0                      DAUBER    64 HBC      1.95 K-P
M           958.0       1.0            KALBFLEIS 64 HBC      2.7 K-P
M           957.0       3.0            BADIER    65 HBC      3.0 K-P
M        8  960.0       2.0            TRILLING  65 HBC      3.65 PI+ P
M        7  955.0      10.0            COHN      66 DBC      3.3 PI+Γ
M           959.0       3.0            LONDON    66 HBC      2.2 K-P
M          . . . . . .
M    AVG    958.3171    .8214   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

------ --------- --------- --------- --------- --------- --------- ---------

                2  ETA PRIME WIDTH (MEV)

W       85   4.0 OR LESS               DAUBER    64 HBC      1.95 K-P
W            7.0 OR LESS               KALBFLEIS 64 HBC      2.7 K-P
W           30.0 OR LESS               BADIER    65 HBC      3.0 K-P
W           15.0 OR LESS               LONDON    66 HBC      2.2 K-P

------ --------- --------- --------- --------- --------- --------- ---------
```

Note: There is no page 23

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

2 ETA PRIME PARTIAL DECAY MODES

P1	ETA PRIME INTO	PI+ PI- ETA(NEUTRAL DECAY)	S 8S 8S14
P2	ETA PRIME INTO	PI+ PI- ETA(CHARGED DECAY)	S 8S 8S14
P3	ETA PRIME INTO	PI+ PI- NEUTRALS (EXCLUDING PI+ PI- ETA(NEUTRAL DECAY))	
P4	ETA PRIME INTO	NEUTRALS	
P5	ETA PRIME INTO	PI+ PI- GAMMA (INCL. RHO GAM)	S 8S 8S 0
P6	ETA PRIME INTO	PIO E+ E- (VIOLATES C IN BORN APPROX.)	S 9S 3S 3
P7	ETA PRIME INTO	ETA E+ E- (VIOLATES C IN BORN APPROX.)	S14S 3S 3
P8	ETA PRIME INTO	PIO RHO 0 (VIOLATES C)	S 9U 9
P9	ETA PRIME INTO	PIO OMEGA (VIOLATES C)	S 9U 1
P10	ETA PRIME INTO	PI+ PI- E+ E-	S 8S 8S 3S 3
P11	ETA PRIME INTO	2 PI	S 8S 8
P12	ETA PRIME INTO	3 PI	S 8S 8S 9
P13	ETA PRIME INTO	4 PI	S 8S 8S 8S 8
P14	ETA PRIME INTO	6 PI	S 8S 8S 8S 8S 8S 8
P15	ETA PRIME INTO	PIO GAMMA GAMMA	S 9S 0S 0

2 ETA PRIME BRANCHING RATIOS

R1	*	ETA PRIME INTO (PI+ PI- ETA (NEUTRAL DEC.)) / TOTAL				NUM 1 DEN 12345	
R1	68	0.36	0.05	KALBFLEIS 64 HBC		2.7 K-P	
R1	FIT	.329	.027	VALUE FROM CONSTRAINED FIT			
R2	*	ETA PRIME INTO (PI+ PI- NEUTRALS) / TOTAL				NUM 1 3 DEN 12345	
R2	33	0.35	0.06	BADIER	65 HBC	3.0 K-P	
R2	39	0.4	0.1	LONDON	66 HBC	2.2 K-P	
R2	AVG	.3632	.0514	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			
R2	FIT	.388	.027	VALUE FROM CONSTRAINED FIT			
R3	*	ETA PRIME INTO (PI+ PI- ETA (CHRGD.DECAY)) / TOTAL				NUM 2 DEN 12345	
R3	44	0.12	0.02	KALBFLEIS 64 HBC		2.7 K-P	
R3	7	0.07	0.04	BADIER	65 HBC	3.0 K-P	
R3	10	0.1	0.04	LONDON	66 HBC	2.2 K-P	
R3	AVG	.1083	.0163	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			
R3	FIT	.120	.010	VALUE FROM CONSTRAINED FIT			
R4	*	ETA PRIME INTO (PI+ PI- NEUTRALS (EXCLUDING PI+ PI- ETA (NEUTR.DEC.))) / TOTAL				NUM 3 DEN 12345	
R4	10	0.05	0.04	KALBFLEIS 64 HBC		2.7 K-P	
R4	FIT	.059	.029	VALUE FROM CONSTRAINED FIT			
R5	*	ETA PRIME INTO (NEUTRALS) / TOTAL				NUM 4 DEN 12345	
R5	54	0.25	0.05	KALBFLEIS 64 HBC		2.7 K-P	
R5	16	0.24	0.17	BADIER	65 HBC	3.0 K-P	
R5	32	0.3	0.1	LONDON	66 HBC	2.2 K-P	
R5	AVG	.2587	.0432	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			
R5	FIT	.273	.034	VALUE FROM CONSTRAINED FIT			
R6	*	ETA PRIME INTO (PI+ PI- GAMMA (INCLUDING RHO GAMMA)) / TOTAL				NUM 5 DEN 12345	
R6	*	THIS MODE SEEMS TO BE CONSISTENT WITH BEING ENTIRELY RHO GAMMA					
R6	42	0.22	0.04	KALBFLEIS 64 HBC		2.7 K-P	
R6	B 35	0.34	0.09	BADIER	65 HBC	3.0 K-P	
R6	B	CONTROVERSIAL BACKGROUND SUBTRACTION					
R6	20	0.2	0.1	LONDON	66 HBC	2.2 K-P	
R6	AVG	.2172	.0371	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			
R6	FIT	.219	.029	VALUE FROM CONSTRAINED FIT			
R7	*	ETA PRIME INTO (PI+ PI- GAMMA (INCLUDING RHO GAMMA)) /(PI PI ETA)				NUM 5 DEN 1234	
R7		0.25	0.14	DAUBER	64 HBC	1.95 K-P	
R7	FIT	.328	.068	VALUE FROM CONSTRAINED FIT			
R8	*	ETA PRIME INTO (PIO E+ E-)/TOTAL				NUM 6 DEN 12345	
R8		0.013 OR LESS		RITTENBER 65 HBC		2.7 K-P	
R9	*	ETA PRIME INTO (ETA E+ E-)/TOTAL				NUM 7 DEN 12345	
R9		0.011 OR LESS		RITTENBER 65 HBC		2.7 K-P	
R10	*	ETA PRIME INTO (PIO RHOO)/TOTAL				NUM 8 DEN 12345	
R10		0.04 OR LESS		RITTENBER 65 HBC		2.7 K-P	
R11	*	ETA PRIME INTO (PIO OMEGA) /TOTAL				NUM 9 DEN 12345	
R11		0.08 OR LESS		RITTENBER 65 HBC		2.7 K-P	
R12	*	ETA PRIME INTO (PI+ PI- E+ E-)/TOTAL				NUM 0 DEN 12345	
R12		0.006 OR LESS		RITTENBER 65 HBC		2.7 K-P	
R13	*	ETA PRIME INTO (2 PI)/TOTAL				NUM 1 DEN 12345	
R13		0.07 OR LESS	COMP.BY LONDON	66 HBC			
R14	*	ETA PRIME INTO (3 PI)/TOTAL				NUM 2 DEN 12345	
R14		0.07 OR LESS	COMP.BY LONDON	66 HBC			
R15	*	ETA PRIME INTO (4 PI)/TOTAL				NUM 3 DEN 12345	
R15		0.01 OR LESS	COMP.BY LONDON	66 HBC			
R16	*	ETA PRIME INTO (6 PI)/TOTAL				NUM 4 DEN 12345	
R16		0.01 OR LESS	COMP.BY LONDON	66 HBC			
R17	*	ETA PRIME INTO (PIO GAMMA GAMMA) / TOTAL				NUM 5 DEN 12345	
R17	*	21 (POSSIBLY SEEN (PRELIM.))	STRUGALSK 67 HLBC		2.3 PI+ N		7/67

NNNNNN NNNNNNNNN NNNNNN NNNNN NNNNNNNNN NNNNNNNN
NNNNNN NNNNNNNNN NNNNNN -----TYPEWRITTEN NOTE----- NNNNN NNNNNNNNN NNNNNNNN
NNNNNN NNNNNNNNN NNNNNN -----AT END OF LISTING---- NNNNN NNNNNNNNN NNNNNNNN
NNNNNN NNNNNNNNN NNNNNN NNNNN NNNNNNNNN NNNNNNNN

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES FOR ETA PRIME

DAUBER 64 PRL 13 449		DAUBER,SLATER,SMITH,STORK,TICHO ///// UCLA
ALSO 64 DUBNA CONF 1 418		DAUBER,SLATER,L T SMITH,STORK,TICHO //UCLA
KALBFLEI 64 PRL 13 349		G.R.KALBFLEISCH,O.DAHL,A.RITTENBERG // LRL
BADIER 65 PL 17 337		BADIER,DEMOULIN,BARLOUTAUD +/PAR+SAC+ZEEMA
KIENZLE 65 PL 19 438		KIENZLE,MAGLIC,LEVRAT,LEFEBVRES + /// CERN
RITTENBE 65 PRL 15 556		RITTENBERG,KALBFLEISCH ////////// LRL+BNL
TRILLING 65 PL 19 427		+BROWN,GOLDHABERS,KADYK,SCANIO // LRL
COHN 66 PL 21 347		COHN,MCCULLOCH,BUGG,CONDO//ORNL+TENN+UNCAR
LONDON 66 PR 143 1034		LONDON,RAU,SAMIOS,GOLDBERG +//BNL+SYRACUSE
STRUGALS 67 JINR E1-3100		STRUGALSKI+CHUVILO+IVANOVSKAJA+ //// DUBNA

QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN THE DATA CARDS

MARTIN 66 PL 22,352		MARTIN,CRITTENDEN,SCHROEDER // INDIANA U I
BARBARO- 68 PRL 20 349		BARBARO-GALTIERI,MATTISON,RITTENBERG+/ LRL I=0
BARLOUTA 68 PL 26 B 674		BARLOUTAUD+ /SACLAY+AMSTD+BOLOG+WEIZM+E.P. I=0

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

δ (963)

36 DELTA MESON (962,JPG=) I = 1,2

STILL NEEDS CONFIRMATION.

36 DELTA (962) MASS (MEV)

M	N	910.		TURKOT	63 MMS	+ 3.3 PP TC D + MM	
M	N	AT EDGE OF PHASE SPACE. AUTHORS DID NOT CLAIM A RESONANCE.					
M	262	962.0	5.0	KIENZLE	65 MMS	- 3-5 PI- P	
M	B	NOTE THAT BANNER 1 AT 1.8 PI-P DOES NOT SEE IT.					
M	A 36	965.0		ALLEN	66 HBC	- 1.7 PI- P	
M	A 106	965.0	COMPILATION BY	ALLEN	66 HBC	+-0 1-8 PI P	
M	A	FOR RESULTS WHICH CONTRADICT ALLEN 66,					
M	A	SEE JACOBS 66, WEST 66, BANNER1 67, CLEAR 67, AND ROOS 67.					
M	O	966.0	8.0	OOSTENS	66 MMS	+ 3.8 PP TC D + MM	
M	O	FOR A CONTRADICTORY RESULT SEE BANNER2 67				3.8 PP TO D + MM	11/67
M		939.	15.	ALLISON	67 HBC	+ 6 K-P,(3PI)+...	1/68
M		913.	25.	ALLISON	67 HBC	- 6 K-P,(3PI)+...	1/68
M	*						
M	V	NOTE THAT THE PI(1016) AS SEEN BY ASTIER 67, IF INTERPRETED AS A					11/67
M	V	VIRTUAL BOUND STATE RESONANCE, WOULD CORRESPOND TO A NARROW RESO-					11/67
M	V	NANCE OF M = 975 (+15/-10) MEV.					11/67
M							
M	AVG	958.0772	6.9640	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)			

36 DELTA (962) WIDTH (MEV)

W	N	50.		TURKOT	63 MMS	+ SEE NOTE N ABOVE
W	262	5.0	OR LESS	KIENZLE	65 MMS	- 3-5 PI- P
W	A 36	25.	OR LESS	ALLEN	66 HBC	- SEE NOTE A ABOVE
W	O	10.0	OR LESS	OOSTENS	66 MMS	+ SEE NOTE O ABOVE
W		25.	OR LESS	ALLISON	67 HBC	+ 6 K-P,(3PI)+... 1/68
W		30.	OR LESS	ALLISON	67 HBC	- 6 K-P,(3PI)+... 1/68

W NOTES, SEE UNDER MASS LISTING

36 DELTA MESON PARTIAL DECAY MODES

P1	DELTA MESON INTO 2 PI	S 8S 8
P2	DELTA MESON INTO 3 PI	S 9S 9S 9
P3	DELTA MESON INTO 4 PI	S 9S 9S 9S 9
P4	DELTA MESON INTO 5 PI	
P5	DELTA MESON INTO ETA PI	S14S 9
P6	DELTA MESON INTO RHO PI	U 9S 9

36 DELTA MESON BRANCHING RATIOS

R1		CHARGED DELTA INTO (1 CHARGED) / (3 OR MORE CHARGED)					
R1		1.3	0.9	0.7	KIENZLE	65 MMS - 3-5 PI- P	

36 SIGMA(MICROB.) FOR PI- P -- P X-

CS	*	15 +- 5 BRANCH.RATIO ABOVE.KIENZLE		65	MMS	- 3-5 PI-	7/67
CS	*	KIENZLE 15. REVISED TO A FEW...FOCACCI		66	MMS	- 3-5 PI-	7/67
CS		17 OR LESS (2 PRONGS)	JACOBS	66	HBC	3.2 PI-	7/67
CS		3.0 OR LESS /(GEV/C)**2 BANNER 1		67	MMS	- 1.8 PI-P, P+MM	9/67
CS		3.3 +- 1.7 PI- PI+ PI- ETA CHUNG		68	HBC		5/68
CS		.2 OR LESS PI- PI+ PI- MM CHUNG		68	HBC	3.2-4.2 PI-	5/68
CS		1.5OR LESS PI- PI+ PI- PIO CHUNG		68	HBC	3.2 PI-	5/68

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES FOR DELTA(962)

TURKOT 63 SIENNA CONF 1 661		+COLLINS,FUJII,KEMP+ ////// BNL+PITTSBURGH
KIENZLE 65 PL 19 438		+ MAGLIC,LEVRAT,LEFEBVRES + // CERN
ALLEN D 66 PL 22 543		+GP FISHER,G GODDEN,L MARSHALL,SEARS//COLO G=+
FOCACCI 66 PL 17 890		+ KIENZLE,LEVRAT,MAGLIC,MARTIN // CERN
OOSTENS 66 PL 22 708		+CHAVANON,CROZON,TOCQUEVILLE // SACLAY,CF I=1
ALLISON 67 PL 25B 619		+CRUZ+ /// OXF+MUN+BIRM+RUTH+GLASG+LON(IC)
ASTIER 67 PL 25 B 294		+MONTANET,BAUBILLIER,DUBOC+ //CDF+CERN+IDR

REFERENCES AGAINST 2PI DECAYS OF DELTA(963)

JACOBS 66 UCRL 16877-THESIS		+O.DAHL, J. KIRZ, D.H.MILLER //////// LRL
WEST 66 PR 149 1089		WEST,BOYD,ERWIN,WALKER ////////// WISCONSIN
CLEAR 67 NC 49A 399		+JOHNSTON+PILCHER+COOPER+/TORONTO+ANL+WISC
ROOS 67 NP B 2 615		M. ROOS // CERN

REFERENCES AGAINST DELTA(963)

BANNER 1 67 PL 25 B 300		+FAYOUX,HAMEL,ZSEMBERY,CHEZE+//SACLAY+CAEN
BANNER 2 67 PL 25 B 569		+CHEZE,HAMEL,MAREL,TEIGER,CROZON+/CDF+SACL
CHUNG S 68 PR 165 1491		+O.DAHL, J. KIRZ, D.H.MILLER //////// LRL
GALTIERI 68 PRL 20 349		BARBARO-GALTIERI,MATISON,RITTENBERG+ //LRL
SABRE CO 68 PL 26B 674		SACL+AMSTDAM+BOLOGNA+REHOVOTH+ECOLE POLYT.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

H (990)

35 H (990, JPG=A -) I=0

IT IS SHOWN BY BARBARO-GALTIERI 68 THAT THE OBSERVED H ENHANCEMENT IS COMPATIBLE WITH BEING ENTIRELY DUE TO MISIDENTIFIED RHOO-GAMMA DECAYS OF ETA PRIME(958).

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

35 H MASS (MEV)

M	C	50	975.0	15.0		BARTSCH	64	HBC	4.0 PI+ P	
M	C	30	975.0	APPROX		GOLDHABER	65	HBC	3.65 PI+P	
M	C	30	998.	10.		BENSON	66	DBC	3.65 PI+D	
M	C	EXPERIMENTS ABOVE COMPILED IN JAN 67 EDITION (RMP 39,1)								
M			980.	APPROX.		COHN	67	DBC	3.3 PI+ D	1/67

35 H WIDTH (MEV)

W	C	90	120.0			BARTSCH	64	HBC	4.0 PI+ P	
W	C	30	45.0	30.0		BENSON	66	DBC	3.65 PI+ D	
W	C	EXPERIMENTS ABOVE COMPILED IN JAN 67 EDITION (RMP 39,1)								
W			60.	OR LESS		COHN	67	DBC	3.3 PI+ D	1/67

35 H PARTIAL DECAY MODES

P1	H INTO 3 PI	S 8S 8S 9
P2	H INTO RHO PI	U 9S 8

H MESON CROSS SECTION (MICROBARNS)

CS		75.0	15.0			BENSON	66	DBC	3.65 PI+D TO HPP	
CS		50.				COHN	67	DBC	3.3 PI+D TO HPP	1/67
CS		100.	OR LESS			KIRZ	67		THRESHOLD TO 2.3 PI	

REFERENCES FOR H MESON

BARTSCH 64 PL 11 167 AACHEN-ZEUTHEN-BIRM-BONN-HAMB-MUNCHEN COLL
GOLDHABE 65 CORAL GABLES P 76 G. GOLDHABER // LRL
BENSON 66 PRL 17 1234 +MARQUIT,ROE,SINCLAIR,VANDER VELDE / MICH. IJP
BENSON 66 ANALYSIS FAVORS JP=1+
GOLDHABE 66 BERKELEY CONF G.GOLDHABER,SAMIOS,ASTIER,SHEN,LAI.MESON REVIEW
COHN 67 NP B1 57 +MC CULLOCH,BUGG,CONDO // OAK R.+UNIV.TENN
ROSENFEL 67 RMP 39 1,APPENDIX ROSENFELD,BARBARO-GALTIERI+/LRL+CERN+YALE
ARMENISE 68 PL 26B 336 +GHIDINI,FORINO+//BARI+BOLOGN+FIRENZ+ORSAY
BARBARO- 68 UCRL-18271 A.BARBARO-GALTIERI,P.SODING //////// LRL
AND 68 PROC.1968 UNIV.OF PENN.CONF. ON MESON SPECTROSCOPY
FUNG 68 PRL 21 47 +JACKSON+PU+BROWN+GIDAL /// U.C.RIVERS+LRL

π_N (1016)

16 PI(1016,JPG=0+-) I=1

STILL NOT DECIDED WHETHER (K KBAR) RESONANCE, VIRTUAL BOUND STATE OR ANTIBOUND STATE.

16 PI(1016) MASS (MEV)

M	*	143	1003.3	7.0+SYSTEMATIC	ROSENFELD	65	RVUE	+-		
M			SCAT. LENGTH 2 TO 6 FERMIS.	BALTAY		66	HBC		3.7 PBAR P	
M	A	100	1016.	10.	ASTIER	67	HBC	+-	0 PBAR P	7/67
M	A	SCATT.LENGTH ALSO FITS, SEE BELOW								
M		SCATT.LENGTH +2.5 +-1. FERMI			ASTIER	67	HBC	+-	0-1.2 PBAR P	7/67
M		OR CMPLX; RE PART=-2.3 F			.....	..	...	..	....	7/67
M		IM PART=.5F OR LESS			.....	..	...	..	....	7/67

16 PI(1016) WIDTH (MEV)

W	*	143	57.0	13.0+SYSTEMATIC	ROSENFELD	65	RVUE	+-		
W	A	100	25.	5.0	ASTIER	67	HBC	+-	SEE NOTE A ABOVE	9/67

16 PI(1016) PARTIAL DECAY MODES

P1	PI(1016) INTO K KBAR	S10S11
P2	PI(1016) INTO ETA PI	S14S 8

16 PI(1016) BRANCHING RATIOS

R1	*	PI(1016) INTO (ETA PI) / (K KBAR)					NUM	2		
R1	*						DEN	1		
R1		5.0	OR LESS		ASTIER	67	HBC		0. PBAR P	9/67

REFERENCES FOR PI(1016)

ARMENTER 65 PL 17 344 ARMENTEROS,EDWARDS,JACOBSEN +///CERN+PARIS
BARASH 65 PR 139 B 1659 +FRANZINI,KIRSCH,MILLER,STEINBERGER+/COLUM
ROSENFEL 65 OXFORD CONF 58 A H ROSENFELD ////////////////// LRL--RVUE
BALTAY 66 PR 142 B 932 +LACH,SANDWEISS,TAFT,YEH,STONEHILL+ //YALE
ASTIER 67 PL 25 B 294 +MONTANET,BAUBILLIER,DUBOC+ //CDF+CERN+IDR
ASTIER 67 INCLUDES INFORMATION FROM BARLOW 67, CONFORTO 67 , ARMENTEROS 65.
BAILLON 67 NC 50A 393 +EDWARDS+D.ANDLAU+ASTIER+ /// CERN+CDF +IR
BARLOW 67 NC 50 A 701 +MONTANET,D-ANDLAU+/CERN+CDF+IDR+LIVERPOOL
CONFORTO 67 NP B3 469 CONFORTO,MARECHAL,MONTANET+/CERN+PARIS+LIV

ϕ (1019)

4 PHI (1019,JPG=1--) I=0

4 PHI MASS (MEV)

M			1017.0	2.0		ARMENTERO	63	HBC	0.0 PBAR P	
M			1019.0	2.0		SCHLEIN	63	HBC	2.0 K- P	
M			1018.6	0.5		MILLER D	65	HBC	0.0 PBAR P	
M			1020.0	2.0		LONDON	66	HBC	2.2 K-P	
M			1021.5	0.8		ABRAMS	67	HBC	4.2 K- P	11/67
M			1019.	3.		BARLOW	67	HBC	1.2 PBAR P	11/66
M			1021.0	4.0		DAHL	67	HBC	1-4 PI- P	
M		165	1022.	1.5		MOSTEK	68	SPRK	1.8 GAMMA + C	6/68
M			. . . . .							
M	AVG		1019.5071	.5799	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)					

(SEE IDEOGRAM, APPENDIX I)

4 PHI WIDTH (MEV)

W			3.4	1.7		ARMENTERO	63	HBC	0.0 PBAR P	
W		34	5.0	OR LESS		SCHLEIN	63	HBC	2.0 K-P	
W			3.5	1.0		MILLER D	65	HBC	0.0 PBAR P	
W			6.0	4.0		LONDON	66	HBC	2.2 K-P	
W			1.8	3.0	1.5	ABRAMS	67	HBC	4.2 K- P	11/67
W			10.	OR LESS		BARLOW	67	HBC	1.2 PBAR P	11/66
W	*	165	4.5	3.0	2.0	MOSTEK	68	SPRK	1.8 GAMMA + C	6/68
W			. . . . .							
W	AVG		3.3667	.7891	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

4 PHI PARTIAL DECAY MODES

P1	PHI INTO K+ K-	S10S10
P2	PHI INTO K01 K02	S11S11
P3	PHI INTO PI+ PI- PI0 (INCLUDING RHO PI)	S 8S 8S 9
P4	PHI INTO PI+ PI- (VIOLATES G)	S 8S 8
P5	PHI INTO E+ E-	S 3S 3
P6	PHI INTO MU+ MU-	S 4S 4
P7	PHI INTO PI0 GAMMA	S 9S 0
P8	PHI INTO ETA GAMMA	S14S 0
P9	PHI INTO PI+PI-GAMMA	S 8S 8S 0
P10	PHI INTO OMEGA GAMMA (VIOLATES C)	U 1S 0
P11	PHI INTO ETA PI0 (VIOLATES C)	S14S 9
P12	PHI INTO RHO GAMMA (VIOLATES C)	U 9S 0

4 PHI BRANCHING RATIOS

R1	*	PHI INTO (K+ K-)/TOTAL					NUM	1		
R1	*						DEN	123		
R1	B	27	0.26	0.06		BADIER	65	HBC	(SEE NOTE B BELOW)	
R1		252	0.48	0.04		LINDSEY	66	HBC	2.7 K-P	
R1		. . . . .								
R1	FIT		.473	.032	VALUE FROM CONSTRAINED FIT					

R2	*	PHI INTO (K1 K2)/TOTAL					NUM	2		
R2	*						DEN	123		
R2	B	25	0.23	0.06		BADIER	65	HBC	(SEE NOTE B BELOW)	
R2		167	0.40	0.04		LINDSEY	66	HBC	2.7 K-P	
R2		. . . . .								
R2	FIT		.389	.031	VALUE FROM CONSTRAINED FIT					

R3	*	PHI INTO (PI+ PI- PI0 (INCL.RHO PI))/TOTAL					NUM	3		
R3	*						DEN	123		
R3	B	57	0.51	0.09		BADIER	65	HBC	3.0 K-P	
R3	B	CONTROVERSIAL BACKGROUND SUBTRACTION								
R3		30	0.12	0.08		LINDSEY	66	HBC	2.7 K-P	
R3		. . . . .								
R3	FIT		.138	.043	VALUE FROM CONSTRAINED FIT					

R5	*	PHI INTO (K1 K2)/(K KBAR)					NUM	2		
R5	*						DEN	12		
R5		10	0.40	0.10		SCHLEIN	63	HBC	2.0 K-P	
R5		52	0.48	0.07		BADIER	65	HBC	3.0 K-P	11/67
R5			0.44	0.07		LONDON	66	HBC	2.2 K-P	
R5		. . . . .								
R5	AVG		.4482	.0444	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					
R5	FIT		.452	.026	VALUE FROM CONSTRAINED FIT					

R6	*	PHI INTO (PI+ PI- PI0 (INCL.RHO PI))/(K KBAR)					NUM	3		
R6	*						DEN	12		
R6			0.30	0.15		LONDON	66	HBC	2.2 K-P	
R6		. . . . .								
R6	FIT		.160	.058	VALUE FROM CONSTRAINED FIT					

R7	*	PHI INTO (PI+ PI- PI0 (INCL.RHO PI))/(K1 K2)					NUM	3		
R7	*						DEN	2		
R7			0.3	OR LESS		BERLEY	65	HBC	2.9 PI+P	

R8	*	PHI INTO (PI+ PI-)/(K KBAR)					NUM	4		
R8	*						DEN	12		
R8			0.2	OR LESS		LONDON	66	HBC	2.2 K-P	

R9	*	PHI INTO (E+ E-)/(K KBAR)					NUM	5		
R9	*						DEN	12		
R9			0.0036 OR LESS			GALTIERI	65	HBC	2.7 K-P	
R9		INDICATION SEEN				HERTZBACH	67	SPRK	3.0 PI-P	7/67
R9		SEEN				ASBURY	67	CNTR	PHOTOPRODUCTION	6/68

R10	*	PHI INTO (MU+ MU-)/TOTAL (UNITS 10**-4)					NUM	6		
R10	*						DEN	123		
R10		53.	OR LESS			GALTIERI	65	HBC	2.7 K- P	
R10			7.4	OR LESS		CHASE	68	CNTR	PHOTOPROD.	6/68
R10			3.5	3.5	1.8	WEHMANN	68	SPRK	12 K- C	6/68

R11	*	PHI INTO (ETA GAMMA)/TOTAL					NUM	8		
R11	*						DEN	123		
R11			0.2	OR LESS		BADIER	65	HBC	3.0 K-P	
R11			0.08	OR LESS		LINDSEY	66	HBC	2.7 K-P	

R12	*	PHI INTO (PI+ PI- GAMMA)/(K KBAR)					NUM	9		
R12	*						DEN	12		
R12			0.05	OR LESS		LINDSEY	65	HBC	2.7 K-P	

R13	*	.. INTO (ETA NEUTRALS)/(K KBAR)					NUM	8 1		
R13	*						DEN	12		
R13			0.15	OR LESS		LINDSEY	66	HBC	2.7 K-P	

R14	*	PHI INTO (OMEGA GAMMA) / TOTAL					NUM	0		
R14	*						DEN	123		
R14			0.05	OR LESS		LINDSEY	66	HBC	2.7 K-P	

R15	*	PHI INTO (RHO GAMMA) / TOTAL					NUM	2		
R15	*						DEN	123		
R15			0.02	OR LESS		LINDSEY	66	HBC	2.7 K-P	

R16	*	PHI INTO (E+ E-)/TOTAL				(UNITS 10**-4)	NUM	5		
R16	*						DEN	123		
R16	A	5	6.6	4.4	2.8	ASTVACATU 68	SPRK		4 PI- P	6/68
R16	A	ERROR OF ASTVACATUROV 68 DOES NOT INCLUDE SIGMA(PHI) UNCERTAINTY.								6/68
R16		27	7.2	3.9		BINNIE	68	SPRK	1.6 PI- P	6/68
R16		9	4.5	1.7		BOLLINI	68	CNTR	1.9 PI- P	6/68
R16		. . . . .								
R16	AVG		4.9311	1.5584	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

REFERENCES FOR PHI

BERTANZA 62 PRL 9 180 BERTANZA,BRISSON,CONNOLLY,HART + //BNL+SYR
ARMENTER 63 SIENA CONF 2 70 ARMENTEROS,EDWARDS,ASTIER+//CERN+CDF-PARIS
GELFAND 63 PRL 11 438 GELFAND,MILLER,NUSSBAUM,KIRSCH+//COLU+RUTG
GELFAND 63 DATA INCLUDED IN MILLER 65 BELOW
SCHLEIN 63 PRL 10 368 SCHLEIN,SLATER,SMITH,STORK,TICHO //// UCLA

BADIER 65 PL 17 337 BADIER,DEMOULIN,BARLOUTAUD+//PAR+LPCHE+ZEE
BERLEY 65 PR 139 B 1097 D BERLEY,N GELFAND /////////// BNL+COLUMBIA
GALTIERI 65 PRL 14 279 A BARBARO GALTIERI,R D TRIPP ///////// LRL
LINDSEY 65 PRL 15 221 JAMES S LINDSEY,GERALD A SMITH /////// LRL
LINDSEY 65 DATA INCLUDED IN LINDSEY 66 BELOW
MILLER D 65 CU-237(NEVIS 131) DAVID C MILLER (THESIS) //////// COLUMBIA

GRAY, L 66 PRL 17 501 +HAGERTY,BIZZARRI,CIAPETTI + // SYR+ROME JPG
LINDSEY 66 PR 147 913 JAMES S LINDSEY, GERALD A SMITH //// LRL

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
LINDSEY1 66 PL 20 93            J.S.LINDSEY, G.A.SMITH ////////////////// LRL
  LINDSEY I 66 DATA INCLUDED   IN LINDSEY 66 ABOVE
LONDON   66 PR 143 1034         LONDON,RAU,SAMIOS,GOLDBERG +//BNL+SYRACUSE

ABRAMS   67 MD TECH REP 720     GERALD ABRAMS , THESIS ////////// MARYLAND
ASBURY   67 PRL 19 869          +BECKER+BERTRAM+JORDAN+YING+/DESY+COLUMBIA
BARLOW   67 NC 50A 701          +LILLESTOL+MONTANET+/CERN+CDF+IR+LIVERPOOL
CHASE    67 PRL 18 710          R.C.CHASE,P.ROTHWELL,R.WEINSTEIN/CEA+NEAST
DAHL     67 PR 163 1377         +HARDY+HESS+KIRZ+MILLER ////////////////// LRL
HERTZBAC 67 PR 155  1461        HERTZBACH,KRAEMER,MADANSKI,ZDANIS+/JHU+BNL
KHACHATU 67 PL 24B 349          KHACHATURYAN+AZIMOV+BALDIN+BELOUSOV+/DUBNA

ASTVACAT 68 PL 27 B  45         ASTVACATUROV,AZIMOV,BALDIN+ // JINR+MOSCOW
BINNIE   68 PL 27B 106          +DUANE+FABUQI+HORSEY+ //// I.C.LON+RUTHERF
BOLLINI  68  PREPRINT - NC      +BUHLER-BROGLIN,+ //// CERN+BOLOGNA+STRASB
MOSTEK   68 PRL 20 1097         +EISENHANDLER,MCCLELLAN,MISTRY+ // CORNELL
WEHMANN  68 PRL 20 748          +ENGELS+ /HARVARD+CASE+SLAC+CORNELL+MCGILL

********** ********** ********** ********** ********** ********** ********** **********
********** ********** ********** ********** ********** ********** ********** **********
```

$\eta_{0^+}(1070)$

3 ETA (1070,JPG=0++)I=0

NAMED S* BY CRENNELL ET AL.
SOME DATA STILL FAVOR LARGE S-WAVE K KBAR SCATTERING LENGTH.

3 ETA (1070) MASS (MEV)

```
M   *      1000.0    APPROX          BINGHAM   62 PBC      6-18 PI-N
M   *      1000.0    APPROX          BIGI      62 HBC      10.0 PI-P
M   *      1000.0                    ERWIN     62 HBC      2.10 PI-P
M   *   30 1036.0    APPROX.         BALTAY    64 HBC      3.7 PBAR P
M   *      1025.0    APPROX.         BARMIN    64 HLBC     2.8 PI-P
M      20  1068.0      10.0          CRENNELL  66 HBC        6.0 PI- P
M   H  120  SCATT.LENGTH FITS BETTER. HESS      66 HBC      1.6-4.2 PI- P
M      35  1045.        9.           BARLOW    67 HBC      1.2 PBAR P       11/66
M     730  1079.0       6.0      5.0 BEUSCH    67 SPRK     5,7,12 PI-P       9/67
M   A      1065.       10.           PHELAN    68 SPRK     4 PI-P - KS KS N  6/68
M   A      1045.       10.           PHELAN    68 SPRK     4 PI-P - KS KS N  6/68
M   A      1035.       10.           PHELAN    68 SPRK     4 PI-P - KS KS N  6/68
M   A      ABOVE 3 VALUES ASSUMING  NO 2PI DECAY, 2PI/KKBAR =1, 2PI/KKBAR=2
M   A      RESPECTIVELY.  SCATTERING LENGTH  (+-1.1 + 0.2*I) F  ALSO FITS.
M   P   70 1085.0       10.0          WHITEHEAD 68 SPRK     3.1-3.6 PI-P      10/67
M   P      PI+PI- MODE (NOT CLEAR IF THIS IS THE S*. J=0 IS NOT FAVORED.)
M          * . * . * . * . * .
M   AVG    1069.4383   9.6955   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.3)
                (SEE IDEOGRAM, APPENDIX I)
```

3 ETA (1070) WIDTH (MEV)

```
W       20   80.0      15.0           CRENNELL  66 HBC      6.0 PI-P
W       35   50.       24.            BARLOW    67 HBC      1.2 PBAR P       11/66
W   S      168.0       21.0     19.0  BEUSCH    67 SPRK     5,7,12 PI-P       9/67
W   S  ASSUME NO S WAVE SCATTERING LENGTH.WITH S WAVE THE WIDTH IS NARROWER
W   A      170.        40.           PHELAN    68 SPRK     4 PI-P - KS KS N  6/68
W   A      140.        50.       30. PHELAN    68 SPRK     4 PI-P - KS KS N  6/68
W   A      140.        40.           PHELAN    68 SPRK     4 PI-P - KS KS N  6/68
W   A      SEE NOTE A UNDER MASS ABOVE.
W   P       25.0   OR LESS           WHITEHEAD 68 SPRK     3.1-3.6 PI-P      10/67
W   P       PI+PI- MODE (NOT CLEAR IF THIS IS THE S*. J=0 IS NOT FAVORED.)
W          * . * . * . * . * .
W   AVG     71.5730  13.4831   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)
```

3 ETA (1070) PARTIAL DECAY MODES

```
P1        ETA (1070) INTO KKBAR                          $10S11
P2        ETA (1070) INTO PIPI                           S 8S 9
```

3 ETA (1070) BRANCHING RATIOS

```
R1  *     ETA (1070) INTO (PI PI)/(K KBAR)          (P1)/(P2)
R1           2.5   OR LESS          CRENNELL  66 HBC      90 PCT CONF LEV
R1  I        0.92     0.57     0.34 WHITEHEAD 68 RVUE                      6/68
R1  I        NOT CLEAR IF THE OBSERVED PI+PI- PEAK IS A MODE OF THE        6/68
R1  I        ETA(1070). NOTE THE SMALL WIDTH AND THE PREFERENCE OF J.GT.0  6/68

********** ********** ********** ********** ********** ********** ********** **********
```

REFERENCES FOR ETA(1070)

```
BIGI     62 CERN CONF 247      A BIGI,S BRANDT, R CARRARA + ///////  CERN
BINGHAM  62 CERN CONF 240      H H BINGHAM,M BLOCH + //PARIS+EC POLY+CERN
ERWIN    62 PRL 9 34           ERWIN,HOYER,MARCH,WALKER,WANGLER //WIS+BNL

BALTAY   64 DUBNA CONF 1 409   BALTAY,LACH,CRENNELL,OREN,STUMP +/YALE+BNL
BARMIN   64 DUBNA CONF 1 433   BARMIN,DOLGOLENKO,YEROFEEV,KRESTNI+// ITEP

CRENNELL 66 PRL 16 1025        CRENNELL,KALBFLEISCH,LAI,SCARR,SCHU+ //BNL
HESS     66 PRL 17 1109        +DAHL+HARDY+KIRZ+MILLER ////////////////// LRL
  HESS REPLACES  PRL 9 460     ALEXANDER,DAHL,JACOBS,KALBFLEISCH + // LRL

BARLOW   67 NC 50A 701         +LILLESTOL+MONTANET+/CERN+CDF+IR+LIVERPOOL
BEUSCH   67 PL 25 B 357        +FISCHER,GOBBI,ASTBURY,MICHELINI+/ETH+CERN
DAHL     67 PR 163 1377        +HARDY+HESS+KIRZ+MILLER ////////////////// LRL

PHELAN   68  THESIS            JAMES J. PHELAN  //////  ANL+ST.LOUIS UNIV
WHITEHEA 68 NC 53 A 817        C.WHITEHEAD + //// HARWELL+STHAMPT+U.C.LON

********** ********** ********** ********** ********** ********** ********** **********
********** ********** ********** ********** ********** ********** ********** **********
```

$A_1(1080)$

10 A1 MESON (1070, JPG=1+-) I=1

10 A1 MESON MASS (MEV)

```
M   *   MASS AND WIDTH MIGHT HAVE LARGE SYSTEMATIC
M   *   ERRORS DUE TO COMPLICATED BEHAVIOR OF BACKGROUND.

M         1080.0                    ADERHOLZ  64 HBC      4.0 PI+P
M         1117.       30.           ALLISON   67 HBC  +   6 K-P,LAM +4 PI  1/68
M         1111.       10.           ALLISON   67 HBC  +   6 K-P,LAM +5 PI  1/68
M         1054.        7.           DANYSZ    67 HBC  +-  3,3.6 PBAR P      7/67
M         1060.       15.           JUHALA    67 HBC    0 4.6-5 K-P,5BODY  1/68
M         1060.                     ASCOLI    68 HBC  -0 5 PI-P             6/68
M         1080.    APPROX.          BOESEBECK 68 HBC  +   8 PI+ P           6/68
M         1080.    APPROX.          CASO      68 HBC  -  11 PI- P           6/68
M         1090.    APPROX.          CHUNG     68 HBC  -  3.2,4.2 PI-P       2/67
M         1042.       21.           FRIDMAN   68 HBC  +-  5.7 PBAR P        6/68
M   K     1119.       30.           KEY       68 HBC  -  3 PI-P          *2/67
M   K     SHOULDER ON A2 ONLY
M         * . * . * . * . * .
M   AVG   1070.7260  13.2112   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.6)
```

10 A1 MESON WIDTH (MEV)

```
W   *   SEE NOTE UNDER A1 MESON MASS.

W          80.0                     ADERHOLZ  64 HBC      4.0 PI+P
W          50.       50.            ALLISON   67 HBC  +   6 K-P,LAM +4 PI  1/68
W          50.       25.            ALLISON   67 HBC  +   6 K-P,LAM +5 PI  1/68
W          33.       19.            DANYSZ    67 HBC  +-  3,3.6 PBAR P      7/67
W         120.       15.            JUHALA    67 HBC    0 4.6-5 K-P,5BODY  1/68
W         130.    APPROX.           BOESEBECK 68 HBC  +   8 PI+ P           6/68
W         100.    APPROX.           CASO      68 HBC  -  11 PI- P           6/68
W         125.    APPROX.           CHUNG     68 HBC  -  3.2,4.2 PI-P       2/67
W         130.    APPROX.           FRIDMAN   68 HBC  +-  5.7 PBAR P        6/68
W   K      76.       46.            KEY       68 HBC  -  SEE NOTE K ABOVE 11/67
W   K     SHOULDER ON A2 ONLY
W         * . * . * . * . * .
W   AVG    78.6525  23.3047   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.2)
```

10 A1 PARTIAL DECAY MODES

```
P1       A1 INTO RHO PI                                  U 9S 8
P2       A1 INTO KBAR K                                  S10S11
P3       A1 INTO ETA PI                                  S14S 8
P4       A1 INTO ETA PRIME PI                            U 2S 8
P5       A1 INTO 3 PI                                    S 8S 8S 8
```

10 A1 BRANCHING RATIOS

```
R1  *    A1 INTO (KBAR K)/(RHO PI)                       (P2)/(P1)
R1            0.0025 OR LESS          DAHL      67 HBC   -  4.0 PI- P

R   *FOR I+ NONET SU3 RATES SEE E.G. GOLDHABER, REVIEW BERKELEY CONF.1966

********** ********** ********** ********** ********** ********** ********** **********
```

REFERENCES FOR A1

```
ADERHOLZ 64 PL 10 226          AACH+BERL+BIRM+BONN+DESY+HAMB+IMP.COL+ MPI
GOLDHABE 66 BERKELEY CONF.     G. GOLDHABER, MESON REVIEW ////////////// LRL

ALLISON  67 PL 25B 619         +CRUZ+ /// OXF+MUN+BIRM+RUTH+GLASG+LON(IC)
DAHL     67 PR 163 1377        +HARDY+HESS+KIRZ+MILLER ////////////////// LRL
DANYSZ   67 NC 51 A 801        DANYSZ+FRENCH+SIMAK ////////////////////// CERN
JUHALA   67 PRL 19 1355        +LEACOCK+RHODE+KOPELMAN+ /////// IOWA+COLO

ASCOLI   68  COO-1195-121      +CRAWLEY,KRUSE,MORTARA,SCHAFER,+/ ILLINOIS
BOESEBEC 68 NP B 4 501         BOESEBECK,DEUTSCHMANN,+/AACHEN+BERLIN+CERN
CASO     68 NC 54 A 983        +CONTE+CORDS+DIAZ+ // GENOVA+HAMB+MIL+SACL
CHUNG    68 PR 165 1491        S.U.CHUNG,G.DAHL,J.KIRZ,D.H.MILLER /// LRL
FRIDMAN  68 PR 167 1268        +MAURER,MICHALON,OUDET+/HEIDELB+STRASBOURG
KEY      68 PR 166 1430        +PRENTICE+COOPER+MANNER+WALKER+/TO+ANL+WIS
```

PAPERS NOT REFERRED TO IN DATA CARDS

```
BELLINI  63 NC 29 896          BELLINI,FIORINI,HERZ,NEGRI,RATTI /// MILAN
GOLDHABE 64 PRL 12 336         GOLDHABER,BROWN,KADYK,SHEN,TRILLING/LRL+UC
LANDER   64 PRL 13 346 A       LANDER,ABOLINS,CARMONY,HENDRICKS +/// UCSD  JP
ABOLINS  65 ATHENS(OHIO)CONF.  +CARMONY,LANDER,XUONG,YAGER ///// LA JOLLA I=1
ALITTI   65 PL 15 69           ALITTI,BATON,DELER,CRUSSARD+ ///// SAC+BOL
ALLARD   66 NC 46A 737         +DRIJARD+HENNESSY+ // ORSAY+MILAN+SAC+BERK
   ALLARD+ 66 GET GOOD FIT TO M(PI RHO) ONLY WHEN ASSUMING ADDITIONAL RESO-
   NANCES BETWEEN 940 AND 1315 MEV
HESS     66 UCRL-16832         R I HESS (THESIS, BERKELEY)          // LRL
SLATTERY 67 NC 50A 377         +KRAYBILL+FORMAN+FERBEL ///////// YALE+ROCH   JP
ARMENISE 68 PL 26 B  336       +FORINO+CARTACCI+ ///// BARI+BOL+FIR+ORSAY

********** ********** ********** ********** ********** ********** ********** **********
********** ********** ********** ********** ********** ********** ********** **********
```

$A_{1.5}(1170)$

44 A 1.5 (1170, JPG= -) I=1

BUMP IN 3 PI AND RHO PI MASS SPECTRA BETWEEN A1 AND A2.
EVIDENCE FOR RESONANCE NOT COMPELLING. OMITTED FROM TABLE

44 MASS (MEV)

```
M   *      1190.       4.           CASON     67 HBC   -  8 PI-P           6/68
M             1170                  ASCOLI    68 HBC   -0 5 PI-P           6/68
```

44 WIDTH (MEV)

```
W   *        17.       12.      6.  CASON     67 HBC   -  8 PI-P           6/68
W             45.       15.          ASCOLI    68 HBC   -0 5 PI-P           6/68

********** ********** ********** ********** ********** ********** ********** **********
```

REFERENCES ON A 1.5 (1170)

```
BUTTERWO 67 HEIDELB.CONF.P.28 REVIEW TALK ON MESONS  AT HEIDELBERG CONF.
CASON    67 PRL 18  880        +LAMSA,BISWAS,DERADO,GROVES,+ // NOTREDAME
ASCOLI   68  COO-1195-121      +CRAWLEY,KRUSE,MORTARA,SCHAFER,+/ ILLINOIS
DONALD   68 PL 26 B  327       +FRODESEN,BETTINI,+ / LIVERPOOL,OSLO,PADUA

********** ********** ********** ********** ********** ********** ********** **********
********** ********** ********** ********** ********** ********** ********** **********
```

$B(1210)$

11 B MESON (1220,JPG=1++) I=1

ASCOLI 68 FIND JP EITHER =1+, OR = 2+,3-,...
JP = 2+,3-,... SEEMS UNLIKELY BECAUSE 2 PI AND K KBAR
DECAYS ARE NOT OBSERVED.

11 B MESON MASS (MEV)

```
M         60 1220.0                 ABOLINS   63 HBC   +   3.5 PI+P
M            1220.0                 GOLDHABER 65 HBC       3.7 PI+,PI-P
M   *        1320.                  BALLAM    67 HBC       16 PI- P          11/67
M        376 1200.      20.         BALTAY    67 HBC   +- 0.0 PBAR P         2/67
M   *        1270.                  BISWAS    67 HBC       8. PI- P          11/67
M        25  1250.    ESTIMATED     LEE       67 HBC   -  3.6 PI- P          1/68
M            1259.9       27.0      BOESEBECK 68 HBC   +  8.0 PI+ P          10/67
M            1250.    APPROX.       CASO      68 HBC   -  11 PI- P           6/68
M            1220.       20.        CHUNG     68 HBC   -  3.2,4.2 PI- P      9/67
M   *  IN THE 3-4 PI-P DATA,THE B ENHANCEMENT MAY BE DECK EFFECT (CHUNG 68)
M        150 1230.    APPROX.       GIDAL     68 HBC   +  3-4 PI+ P          6/68
M            * . * . * . * . * .
M   AVG      1220.5490 15.5578   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)
                (SEE IDEOGRAM, APPENDIX I)
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

11 B MESON WIDTH (MEV)

W		60	100.0	20.0	ABOLINS	63	HBC	+	3.5 PI+P	
W			80.0		GOLDHABER	65	HBC		3.7 PI+,PI-P	
W		376	100.	30.	BALTAY	67	HBC	+-	0.0 PBAR P	2/67
W	*		250.		BISWAS	67	HBC		8. PI- P	11/67
W		25	100.	ESTIMATED	LEE	67	HBC	-	3.6 PI- P	1/68
W			203.	75.	BOESEBECK	68	HBC	+	8. PI+ P	11/67
W			150.	20.	CHUNG	68	HBC	-	3.2,4.2 PI- P	9/67
W			. . . . .							
W	AVG		122.7880	16.0668	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)					

(SEE IDEOGRAM, APPENDIX I)

11 B MESON PARTIAL DECAY MODES

P1	B MESON INTO OMEGA+PI	U 1S 8
P2	B MESON INTO 2PI+ 2PI-	S 8S 8S 8S 8
P3	B MESON INTO K KBAR	S10S10
P4	B MESON INTO PI PI	S 8S 8
P5	B MESON INTO PI PHI	S 9U 4
P6	B MESON INTO ETA PI (FORBIDDEN BY G)	S14S 8
P7	B MESON INTO K KBAR PI	S10S10S 8

11 B MESON BRANCHING RATIOS

R1	*	B INTO 4PI/(OMEGA PI)					(P2)/(P1)			
R1		0.5 OR LESS		ABOLINS	63	HBC	+	3.5 PI+P		
R2	*	B MESON INTO (K KBAR)/(OMEGA PI)					(P3)/(P1)			
R2		0.02 OR LESS		DAHL	67	HBC	-	1.6-4.2 PI- P		
R2		0.10 OR LESS (CL 90)		BALTAY	67	HBC	+-	0.0 PBAR P	2/67	
R3	*	B MESON INTO (PI PI)/(PI OMEGA)					(P4)/(P1)			
R3		0.3 OR LESS		ADERHOLZ	64	HBC		4.0 PI+P		
R4	*	B MESON INTO (PI PHI) / (PI OMEGA)					(P5)/(P1)			
R4		0.015 OR LESS		DAHL	67	HBC		1.6-4.2 PI- P		
R5	*	B MESON INTO (ETA PI) / (PI OMEGA)					(P6)/(P1)			
R5		0.25 OR LESS (CL 90)		BALTAY	67	HBC	+-	0.0 PBAR P	2/67	
R6	*	B+- INTO ((K KBAR)+- PIO) / (PI OMEGA)								
R6		0.08 OR LESS (CL 90)		BALTAY	67	HBC	+-	0.0 PBAR P	2/67	
R6	*	B+- INTO (KS KS PI+-) / (PI OMEGA)								
R6		0.02 OR LESS (CL 90)		BALTAY	67	HBC	+-	0.0 PBAR P	2/67	
R6	*	B+- INTO (KS KL PI+-) / (PI OMEGA)								
R6		0.06 OR LESS (CL 90)		BALTAY	67	HBC	+-	0.0 PBAR P	2/67	

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES FOR B MESON

ABOLINS	63 PRL 11 381	ABOLINS,LANDER,MEHLHOP,XUONG,YAGER // UCSD	
ADERHOLZ	64 PL 10 240	AACHEN+BERLIN+BIRM+BONN+HAMBUR+IC-LOND+MPI	
GOLDHABE	65 PRL 15 118	G GOLDHABER,S GOLDHABER,KADYK,SHEN /// LRL	
BALLAM	67 HEIDBG CONF P.33	+BRODY,CHADWICK,FRIES,GUIRAGOSSIAN+// SLAC	
BALTAY	67 PRL 18 93	+SEVERIENS+YEH+ZANELLO /////////// COL+BNL	
BISWAS	67 HEIDBG CONF P.33	+GROVES,CASON,KENNEY,POIRIER+// NOTRE DAME	
DAHL	67 PR 163 1377	+HARDY+HESS+KIRZ+MILLER ///////////// LRL	
FOSTER	67 HEIDELB.CONF.P 33	+GAVILLET,LABROSSE,MONTANET+// CERN+C.DE F	
LEE	67 PR 159 1156	+MOEBS,ROE,SINCLAIR,VANDERVELDE / MICHIGAN	
ASCOLI	68 PRL 20 1411	+CRAWLEY,MORTARA,SHAPIRO ////////// URBANA JP	
BOESEBEC	68 NP B 4 501	BOESEBECK,DEUTSCHMANN,+/AACHEN+BERLIN+CERN	
CASO	68 NC 54 A 983	+CONTE+CORDS+DIAZ+ // GENOVA+HAMB+MIL+SACL	
CHUNG	68 PR 165 1491	S.U.CHUNG,G.DAHL,J.KIRZ,D.H.MILLER /// LRL	
GIDAL	68 UCRL-17984	+BROWN,BIRGE,BACASTOW,FUNG+/LRL+U.C.RIVERS	

PAPERS NOT REFERRED TO IN DATA CARDS

BONDAR	63 PL 5 209	BONDAR,DODD+//AACHEN+BIRM+HAMB+IC-LOND+MPI
CARMONY	64 PRL 12 254	CARMONY,LANDER,RINDFLEISCH,XUONG,YAGER//UC JP
SLATTERY	67 NC 50A 377	+KRAYBILL+FORMAN+FERBEL //////// YALE+ROCH

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

f(1260)

S F (1260,JPG=2++) I=0

5 F MASS (MEV)

M			1250.0	25.0	SELOVE	62	HBC		3.0 PI-P	
M	*	5	1260.0		BONDAR	63	HBC		4.0 PI-P	
M			1260.0	35.0	VEILLET	63	FBC		6.1 PI-P	
M		5	1250.0		GUIRAGOSS	63	HBC		3.3 PI-P	
M			1250.0		LEE	64	HBC		3.7 PI-P	
M			1270.0		DERADO	65	HBC		4.0 PI- P	
M			1240.0	20.0	ACCENSI	66	HBC		5.7 PBAR P	
M		1416	1267.0	10.0	JACOBS	66	HBC		2-3 PI-P,T CUT20	10/67
M			1275.0	25.0	WAHLIG	66	SPRK		10.0 PI-P	
M	*		1295.	13.	BARLOW	67	HBC		(K0I K0I MODE)	11/66
M	*		1271.	9.	EISNER	67	HBC		4.2 PI-P (ALL T)	9/67
M			1264.	7.	EISNER	67	HBC		4.2 PI-P (T CUT 20)	9/67
M	*		1262.0	7.0	POIRIER	67	HBC		8.0 PI- P	11/67
M	S		1276.	11.	RABIN	67	HBC		8.5 PI+ P	9/67
M	S		S-WAVE BREIT-WIGNER FIT							
M			1261.	4.	ARMENISE	68	OBC		5.1 PI+N,P PI+ -	6/68
M			1270.	5.	ARMENISE	68	OBC		5.1 PI+N,P PIO 0	6/68
M			1265.	8.	BOESEBECK	68	HBC		8 PI+ P	6/68
M			1241.	38.	FOSTER	68	HBC		PBAR P AT REST	6/68
M			1267.	15.	LAMSA	68	HBC		8 PI-P	10/67
M	*		1270.0	15.0	WHITEHEAD	68	SPRK		3.2 PI-P,PI+PI-N	6/68
M			. . . . .							
M	AVG		1264.1715	2.4985	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

5 F WIDTH (MEV)

W			100.0	25.0	SELOVE	62	HBC		3.0 PI-P	
W	*	85	160.0		BONDAR	63	HBC		4.0 PI-P	
W			200.0	OR LESS	VEILLET	63	FBC		6.1 PI-P	
W			130.0	20.0	LEE	64	HBC		3.7 PI-P	
W			150.0		DERADO	65	HBC		4.0 PI- P	
W			102.0	46.0	ACCENSI	66	HBC		5.7 PBAR P	
W		1416	99.0	10.0	JACOBS	66	HBC		2-3 PI-P,T CUT20	10/67
W			100.		WAHLIG	66	SPRK		10.0 PI-P	11/66
W	*		82.	34.	BARLOW	67	HBC		(K0I K0I MODE)	11/66
W	*		219.	39.	EISNER	67	HBC		4.2 PI-P (ALL T)	9/67
W			173.	25.	EISNER	67	HBC		4.2 PI-P (T CUT 20)	9/67
W	*		163.0	16.0	POIRIER	67	HBC		8.0 PI- P	11/67
W	S		155.	17.	RABIN	67	HBC		8.5 PI+ P	9/67
W	S		S-WAVE BREIT-WIGNER FIT							
W			216.	13.	ARMENISE	68	OBC		5.1 PI+N,P PI+ -	6/68
W			188.	15.	ARMENISE	68	OBC		5.1 PI+N,P PIO 0	6/68
W			128.	23.	BOESEBECK	68	HBC		8 PI+ P	6/68
W			172.	49.	FOSTER	68	HBC		PBAR P AT REST	6/68
W			113.	30.	LAMSA	68	HBC		8 PI-P	10/67
W	*		160.0	20.0	WHITEHEAD	68	SPRK		3.2 PI-P,PI+PI-N	6/68
W			. . . . .							
W	AVG		145.3259	15.7796	AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.7)					

(SEE IDEOGRAM, APPENDIX I)

5 F PARTIAL DECAY MODES

P1	F INTO PI+ PI-	S 8S 8
P2	F INTO 2PI+ 2PI-	S 8S 8S 8S 8
P3	F INTO K KBAR	S12S12

5 F BRANCHING RATIOS

R1	*	F INTO (2PI+ 2PI-) / TOTAL								
R1		0.08	0.06		BONDAR	63	HBC	4.0 PI-P		
R1		0.04 OR LESS			CHUNG	65	HBC	3.2 PI-P		
R1	*	0.01 APPROX.			FERBEL	68	HBC	5 PI- P		6/68
R2	*	F INTO (K KBAR)/(PI PI)					(P3)/(P1)			
R2	*	DETERMINATION DIFFICULT BECAUSE PROXIMITY OF A2 WHICH HAS SAME								
R2	*	NEUTRAL (K KBAR) MODES								
R2		0.09 OR LESS			BARMIN	65	HLBC	2.8 PI-		
R2		0.16 OR LESS			WANGLER	65	HBC	3.0 PI-P		
R2		0.05 OR LESS			DEUTSCHMA	66	HBC			
R2	B	PROBABLY SEEN			BARLOW	67	HBC	1.2 PBAR P--KIKI		11/66
R2	N	0.047	0.012 + SYST.		BEUSCH	67	SPRK	5,7,12 PI-P		9/67
R2	N	PEAK UNRESOLVED FROM A2								
R2		0.025 OR LESS			DAHL	67	HBC	1.6-4.2 PI- P		

R *FOR 2+ NONET SU3 RATES SEE E.G. GLASHOW,SCCOLOW, PRL 15,329(65)

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES FOR F

SELOVE	62 PRL 9 272	SELOVE,HAGOPIAN,BRODY,BAKER,LEBOY // PENNA	
BONDAR	63 PL 5 153	BONDAR+//AACHEN+BIRM+BONN+DESY+IC-LOND+MPI	
GUIRAGOS	63 PRL 11 85	Z.G.T. GUIRAGOSSIAN ////////////////////// LRL	
VEILLET	63 PRL 10 29	VEILLET,HENNESSY,BINGHAM,BLOCH+//PAR+MILAN	
LEE	64 PRL 12 342	LEE,ROE,SINCLAIR,VANDERVELDE //// MICHIGAN	
BARMIN	65 SJNP 1 623	+DOLGOLENKO+EROFEEV+KRESTNIKOV+/ ITEP MOSC	
CHUNG	65 PRL 15 325	CHUNG,DAHL,HARDY,HESS,JACOBS,KIRZ //// LRL	
DERADO	65 PRL 14 872	DERADO,KENNEY,POIRIER,SHEPHARD//NOTRE DAME	
GUIRAGOS	65 PRL 11 85	Z G T GUIRAGOSSIAN ////////////////////// LRL	
WANGLER	65 PR 137 B 414	T P WANGLER,A R ERWIN,W WALKER //WISCONSIN	
ACCENSI	66 PL 20 557	ACCENSI,ALLES-BORELLI,FRENCH,FRISK+ //CERN	
DEUTSCHM	66 PL 20 82	DEUTSCHMANN,STEINBERG + //AACH+BERLIN+CERN	
JACOBS	66 UCRL-16877	L.D.JACOBS,THESIS////////////////////// LRL	
WAHLIG	66 PR 147 941	+SHIBATA,GORDON,FRISCH,MANNELLI //MIT+PISA J	
BARLOW	67 NC 50A 701	+LILLESTOL+MONTANET+/CERN+COF+IR+LIVERPOOL	
BEUSCH	67 PL 25 B 357	+FISCHER,GOBBI,ASTBURY,MICHELINI+/ETH+CERN	
DAHL	67 PR 163 1377	+HARDY+HESS+KIRZ+MILLER ////////////// LRL	
EISNER	67 PR 164 1699	+JOHNSON+KLEIN+PETERS+SAHNI+YEN+ // PURDUE	
POIRIER	67 PR 163 1462	+BISWAS,CASON,DERADO,KENNEY+//NOTRDAM+PENN	
RABIN	67 THESIS	M. RABIN ////////////////////////////// RUTGERS	
ARMENISE	68 NC 54 A 999	+FORINO+CARTACCI+/BARI+BOLOG+FIRENZE+ORSAY	
BOESEBEC	68 NP B 4 501	BOESEBECK,DEUTSCHMANN,+/AACHEN+BERLIN+CERN	
FERBEL	68 PREP.-PHILA.CONF	T.FERBEL,QUOT.RES.OF MORTARA+(ILL.) / ROCH	
FOSTER	68 CERN/PHYS. 68-4	+GAVILLET+LABROSSE+MONTANET+ // CERN+PARIS	
LAMSA	68 PR 166 1395	+CASON+BISWAS+DERADO+GROVES+ /// NOTREDAME	
WHITEHEA	68 NC 53A 817	+MCEWEN,OTT,AITKEN+ // AERE+SHAMPT+UC.LONG	

PAPERS NOT REFERRED TO IN DATA CARDS

HAGOPIAN	63 PRL 10 533	V HAGOPIAN,W SELOVE ////////////////// PENNA
ADERHOLZ	64 PL 10 240	AACHEN+BERLIN+BIRM+BONN+HAMBUR+IC-LOND+MPI IJ
BRUYANT	64 PL 10 232	BRUYANT,GOLDBERG,HOLDER,FLEURY,HUC/CERN+PA I
SODICKSO	64 PRL 12 485	SODICKSON,WAHLIG,MANNELLI,FRISCH+ //// MIT I
BARMIN	65 SJNP 1 230	+DOLGOLENKO,ELENSKY,EROFEEV+ / ITEP M(SCOW JP
STRUGALS	67 JINR E1-3100	STRUGALSKI+CHUVILO+IVANOVSKAJA+ //// DUBNA

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

D(1285)

8 D MESON (1285,JPG= +) I=0

(JP=0-,1+,2- WITH 1+ FAVORED.)

8 D MESON MASS (MEV)

M			1290.	APPROX.	BARLOW	67	HBC		1.2 PBAR P, 4PFS	5/67
M			1283.0	5.0	DAHL	67	HBC		1.6-4.2 PI- P	
M			1290.	7.	D.ANDLAU	68	HBC		1.2 PBAR P, 5-6 PFS	6/68
M			. . . . .							
M	AVG		1285.3649	4.0687	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

8 D MESON WIDTH (MEV)

W			35.0	10.0	DAHL	67	HBC		1.6-4.2 PI- P	
W			30.	5.	D.ANDLAU	68	HBC		1.2 PBAR P, 5-6 PFS	6/68
W			. . . . .							
W	AVG		31.0000	4.4721	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

8 D MESON PARTIAL DECAY MODES

P1	D MESON INTO K KBAR PI	S11S11S 9
P2	D MESON INTO PI PI RHO	S 9S 9U 9

8 D MESON BRANCHING RATIOS

R1	*	D MESON INTO (PI PI RHO) / (K KBAR PI)						NUM 2		
R1	*							DEN 1		
R1	*	2.0	OR LESS		DAHL	67	HBC	CHARGED PI ONLY		

R *FOR 1+ NONET SU3 RATES SEE E.G. GOLDHABER, REVIEW BERKELEY CONF.1966

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

****** ********** ********** ********** ********** ********** ********** **********

REFERENCES FOR D MESON

```
BARLOW   67 NC  50 A  701      +MONTANET,D-ANDLAU+/CERN+CDF+IOR+LIVERPOOL
DAHL     67 PR 163 1377        +HARDY+HESS+KIRZ+MILLER ////////////// LRL I JP
   SEE ALSO 65 PRL 14 1074     MILLER,CHUNG,DAHL,HESS,HARDY,KIRZ+/LRL+UC
D.ANDLAU 68 NP  8 5  693       +ASTIER,BARLOW,MONTANET+/ CDF+CERN+RAD+LIV I JP
```

****** ********** ********** ********** ********** ********** ********** **********
****** ********** ********** ********** ********** ********** ********** **********

A2(1300)

12 A2 MESON (1300,JPG=2+-) I=1

THE MASS AND WIDTH DATA ARE SEPARATED INTO 3 GROUPS
A2L CONTAINS INFORMATION ON THE LOWER PEAK
A2H CONTAINS INFORMATION ON THE HIGHER PEAK AND KBAR K
A2 CONTAINS THE REMAINING INFORMATION (NO SEPARATION)

12 A2L MESON MASS (MEV)

```
ML          1274.       16.              CHIKOVANI 67 MMS    -  6.7 PI- P        6/68
ML          1269.0       5.0             CRENNELL  68 HBC    -  6.0 PI-P,X-      6/68
ML  *       1266.        8.              KIENZLE   68 MMS    -  2.65 PI- P       6/68
ML
ML  AVG     1269.4448    4.7724   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

12 A2H MESON MASS (MEV)

```
MH       80 1317.0       3.0             BARLOW    67 HBC   +-  1.2 PBAR P, KK    9/67
MH       60 1333.0      13.0             BARLOW    67 HBC   +-  1.2 PBAR P, KK    9/67
MH  N       1344.0       7.       6.     BEUSCH    67 SPRK    0 5-12 PI- P        7/67
MH  N      K01 K01 MODE. PEAK UNRESOLVED FROM F.
MH          1320.       16.              CHIKOVANI 67 MMS    -  6.7 PI- P        6/68
MH     130 1280.0       12.0             CONFORTO  67 HBC   +-  0. PBAR P IN KK   9/67
MH          1317.2       4.0             DAHL      67 HBC    -  2.7-4.5 PI- P    8/67
MH          1315.7      10.8             DAHL      67 HBC     0 2.7-4.5 PI- P    8/67
MH          1315.0       5.0             CRENNELL  68 HBC    -  6.0 PI-P,X-      6/68
MH          1311.0       5.0             CRENNELL  68 HBC    -  6.0 PI-P,K1K1    6/68
MH  *       1319.        8.              KIENZLE   68 MMS    -  2.65 PI- P       6/68
MH
MH  AVG     1315.3180    2.4671   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)
```

(SEE IDEOGRAM, APPENDIX I)

12 A2 MESON MASS (MEV)

```
M           1320.0                       ADERHOLZ  64 HBC       4.0 PI+P
M           1338.0      10.0             GOLDHABER 64 HBC   +-  3.7 PI+- P
M     130 1310.0                         FORINO    65 DBC   + 0 4.5 PI+ D
M    1425 1290.0        5.0             LEFEBVRES 65 MMSP    -  5.6,6.0 PI-P
M           1300.0                       SEIDLITZ  65 DBC    -  3.2 PI-D
M           1290.0      10.0             BARNES    66 HBC    -  6.0 PI-P
M           1310.0      10.0             BENSON    66 DBC     0 3.65 PI+D
M   * 1800 1310.0       10.0    COMP.BY FERBEL    66        +-  PI+- P
M     1060 1286.        8.               LEVRAT    66 MMS    -   6-7 PI- P        2/67
M      137 1285.       20.               BALTAY    67 HBC     0 8.5 PI+ P        7/67
M   A       1288.       14.              CASON     67 HBC    -  8 PI- P          5/67
M   A      ANALYSIS COMPLICATED BY NEARBY PEAK (A1.5) AT 1190 MEV
M      4000 1307.       16.              CHIKOVANI 67 MMS    -  7 PI- P          8/67
M           1269.        9.              DANYSZ    67 HBC   +-  3,3.6 PBAR P     7/67
M           1311.0       6.0             ARMENISE  68 DBC     0 5.1 PI+D         9/67
M           1320.       10.              BOESEBECK 68 HBC     0 8 PI+ P          6/68
M   B       1280.       10.              BOESEBECK 68 HBC   *  8 PI+ P          6/68
M   B      ASSUMING A1 AND A1.5 MESONS OF FIXED MASS AND WIDTH
M           1300.      APPROX.           CASO      68 HBC    - 11 PI- P          6/68
M           1310.       20.              CHUNG     68 HBC    -  2.7-4.5 PI- P    5/68
M           1287.0      10.0             CRENNELL  68 HBC    -  6.0 PI-P,X-      6/68
M           1275.       17.              FRIDMAN   68 HBC   +-  5.7 PBAR P       6/68
M           1280.       12.              KEY       68 HBC    -  3 PI-P          11/67
M
M   AVG     1297.0528    4.6671   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.9)
```

12 A2L MESON WIDTH (MEV)

```
WL          29.         10.              CHIKOVANI 67 MMS    -  6.7 PI- P        6/68
WL          24.0        10.0             CRENNELL  68 HBC    -  6.0 PI-P,X-      6/68
WL  *       28.          5.              KIENZLE   68 MMS    -  2.65 PI- P       6/68
WL
WL  AVG     26.5000      7.0711   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

12 A2H MESON WIDTH (MEV)

```
WH       60   56.0       28.0             BARLOW    67 HBC   +-  1.2 PBAR P, KK   9/67
WH       80   56.0       15.0             BARLOW    67 HBC   +-  1.2 PBAR P, KK   9/67
WH  N        88.        23.      22.     BEUSCH    67 SPRK    0 5-12 PI- P        7/67
WH  N      K01 K01 MODE. PEAK UNRESOLVED FROM F.
WH          35.         10.              CHIKOVANI 67 MMS    -  6.7 PI- P        6/68
WH     130  90.0                         CONFORTO  67 HBC   +-  0. PBAR P IN KK   9/67
WH          47.         18.              DAHL      67 HBC    -  2.7-4.5 PI- P    8/67
WH          80.5        36.5             DAHL      67 HBC     0 2.7-4.5 PI- P    8/67
WH          12.0        10.0             CRENNELL  68 HBC    -  6.0 PI-P,X-      6/68
WH          21.0        10.0      6.0    CRENNELL  68 HBC    -  6.0 PI-P,K1K1    6/68
WH  *       28.          5.              KIENZLE   68 MMS    -  2.65 PI- P       6/68
WH
WH  AVG     29.3021      6.4866   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
```

(SEE IDEOGRAM, APPENDIX I)

12 A2 MESON WIDTH (MEV)

```
W           100.0                        ADERHOLZ  64 HBC       4.0 PI+P
W            90.0       10.0             GOLDHABER 64 HBC   +-  3.7 PI+- P
W    1425    99.0       15.0             LEFEBVRES 65 MMSP    -  6.0 PI-P
W           140.0                        SEIDLITZ  65 DBC    -  3.2 PI-D
W            70.0       10.0             BARNES    66 HBC    -  6.0 PI-P
W   N       110.0       45.0             BENSON    66 DBC     0 3.65 PI+D
W   N      SUPERSEDED BY BENSON 1 66
W           100.       15.               BENSON 1  66 DBC     0 3.65 PI+D        1/67
W   * 1800   80.0       10.0    COMP.BY FERBEL    66        +-  PI+- P
W     1060   98.         5.              LEVRAT    66 MMS    -  6.7 PI- P        2/67
W      137  100.        25.              BALTAY    67 HBC     0 8.5 PI+ P        7/67
W   A       84.        30.       20.    CASON     67 HBC    -  8 PI- P          5/67
W   A      ANALYSIS COMPLICATED BY NEARBY PEAK (A1.5) AT 1190 MEV
W      4000   90.       15.              CHIKOVANI 67 MMS    -  7 PI- P          8/67
W             45.       22.              DANYSZ    67 HBC   +-  3,3.6 PBAR P     7/67
W             96.0      16.0             ARMENISE  68 DBC     0 5.1 PI+D         9/67
W            90.     APPROX.             BOESEBECK 68 HBC   *  8 PI+ P          6/68
W            96.       21.               BOESEBECK 68 HBC     0 8 PI+ P          6/68
W            80.     APPROX.             CASO      68 HBC    - 11 PI- P          6/68
W            80.       20.               CHUNG     68 HBC    -  2.7-4.5 PI- P    5/68
W            94.0      30.0      20.0    CRENNELL  68 HBC    -  6.0 PI-P,X-      6/68
W            80.     APPROX.             FRIDMAN   68 HBC   +-  5.7 PBAR P       6/68
W            91.       18.               KEY       68 HBC    -  3 PI-P          11/67
W
W   AVG     90.6452    3.6834   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)
```

(SEE IDEOGRAM, APPENDIX I)

12 A2 MESON PARTIAL DECAY MODES

```
P1      A2 MESON INTO RHO PI                                  U 9S 8
P2      A2 MESON INTO KBAR K                                  S10S12
P3      A2 MESON INTO ETA PI                                  S14S 8
P4      A2 MESON INTO ETA PRIME PI                            U 2S 8
P5      A2 MESON INTO PI+ PI- PI0                             S 8S 8S 9
```

12 A2 MESON BRANCHING RATIOS

```
R1  *   A2 MESON  INTO (K KBAR) / (RHO PI)                    (P2)/(P1)
R1  *          0.08  OR LESS              LANDER    64 HBC   +   3.5 PI+P
R1  A          0.02  OR LESS              ARMENTERO 65 HBC    -  0.0 PBAR P
R1  A         SUPERSEDED BY GAVILLET 67 BELOW
R1  N          0.13       0.03           BEUSCH    67 SPRK    0 5,7,12 PI-+       9/67
R1  N         K01 K01 MODE. UNRESOLVED FROM F.
R1  *          0.15       0.05           BOCKMANN  67 HBC     0 5.0 PI+P         9/67
R1  *          0.09       0.05           BOCKMANN  67 HBC   +   5.0 PI+P         9/67
R1      130    0.042      0.016          GAVILLET  67 HBC   +-  0. PBAR P        9/67
R1       11    0.09       0.06      0.09 ASCOLI    68 HBC    -  5 PI-P           6/68
R1             0.022      0.008          BOESEBECK 68 HBC   +   8 PI+ P          6/68
R1             0.054      0.022          CHUNG     68 HBC    -  3.2 PI-P         1/67
R1             0.03       0.012          DONALD    68 HBC   +-  1.2 PBAR P       6/68
R1
R1  AVG         .0294      .0059   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R1  FIT         .030       .006    VALUE FROM CONSTRAINED FIT

R2  *   A2 MESON INTO (ETA PI)/TOTAL                          (P3)/TOTAL
R2             0.084      0.023          BOESEBECK 68 HBC   *   8 PI+ P          6/68
R2
R2  FIT         .116       .035    VALUE FROM CONSTRAINED FIT

R3  *   A2 MESON INTO (ETA PI) / (RHO PI)                     (P3)/(P1)
R3             0.3        0.2            ADERHOLZ  64 HBC       4.0 PI+P
R3             0.24       0.08           DUBOVIKOV 66 HBC    -  3.3 PI-P         11/66
R3  *   15     0.24       0.08           BOCKMANN  67 HBC   +   5.0 PI+P         9/67
R3             0.22       0.09           CONTE     67 HBC    -  11.0 PI-P        8/67
R3         22  0.23       0.08           ASCOLI    68 HBC    -  5 PI-P           6/68
R3             0.12       0.06           CHUNG     68 HBC    -  3.2 PI-P         12/66
R3  *          0.072 OR LESS             DONALD    68 HBC   +-  1.2 PBAR P       6/68
R3             0.16       0.10           KEY       68 HBC    -  3 PI-P          11/67
R3
R3  AVG         .1992      .0373   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R3  FIT         .136       .046    VALUE FROM CONSTRAINED FIT

R4  *   A2 MESON INTO (ETA PRIME PI) / TOTAL                  (P4)/TOTAL
R4             0.1    OR LESS             CHUNG     69 HBC    -  3.2 PI-P
R4             0.004      0.004          BOESEBECK 68 HBC   *   8 PI+ P          6/68
R4
R4  FIT         .005       .006    VALUE FROM CONSTRAINED FIT

R5  *   A2 MESON INTO (ETA PRIME PI)/(RHO PI)                 NUM    4
R5  *                                                          DEN  1
R5         14     0.07       0.03           ASCOLI    68 HBC    -  5.0 PI-P        6/68
R5
R5  FIT         .006       .005    VALUE FROM CONSTRAINED FIT

R6  *   A2 MESON INTO (PI+ PI- PI0) / (RHO PI)                (P5)/(P1)
R6             0.17  OR LESS              BENSON    66 DBC     0 3.7 PI+D

R   *FOR 2+ NONET SU3 RATES SEE E.G. GLASHOW,SOCOLOW, PRL 15,329(65)
```

12 QUANTUM NUMBER DETERMINATIONS

```
Q1  *       IJP FOR NEUTRAL A2
Q1  *       I = 1                        ABOLINS   65          3.7 PI-D
Q1  *       I = 1     JP = 2+            BENSON    66 HBC      3.65 PI+ D       11/67
Q1  *       I = 1     JP = 2+            ARMENISE2 67 DBC    0 5.1 PI+D         9/67
Q1  *       I = 1     JP = 2+            BALTAY    67          8.5 PI+P
Q1  *       I = 1     JP = 2+            BARTSCH   67          8.0 PI+P
```

****** ********** ********** ********** ********** ********** ********** **********

REFERENCES FOR A2

```
ADERHOLZ 64 PL 10 248          AACHEN+BERLIN+BIRM+BONN+HAMB+IC-LONDON+MPI
GOLDHABER 64 DUBNA CONF  1 480 G GOLDHABER,S GOLDHABER,OHALLORAN,SHEN/LRL
LANDER   64 PRL 13 346         +ABOLINS,CARMONY,HENDRIKS,XUONG+/ LA JOLLA

ABOLINS  65 ATHENS(OH10)CONF. +CARMONY,LANDER,XUONG,YAGER ///// LA JOLLA I=1
CHUNG    65 PRL  15  325       +DAHL,HARDY,HESS,JACOBS,KIRZ,MILLER // LRL
FORINO   65 PL 19 68           +GESSAROLI+LENDINARA+/BOL+BARI+FIR+ORS+SAC
LEFEBVRE 65 PRL 14 434         CERN MISSING MASS SPECTROMETER GROUP /CERN
SEIDLITZ 65 PRL 15 217         L SEIDLITZ,D I DAHL,D H MILLER //////// LRL

BARNES   66 PRL 16 41          BARNES,FOWLER,LAI,ORENSTEIN + /// BNL+CCNY
BENSON   66 PRL 16 1177        G BENSON,LOVELL,MARQUIT,ROE  + // MICHIGAN
BENSON 1 66 MICH COO-1112-4    G.C.BENSON, THESIS////////////////// MICHIGAN
DUBOVIKC 66 PL 23 716+PRIV.C.  DUBOVIKOV,GRIGORIEV,VLADIMIRSKY +  // ITEP
EHRLICH  66 PR 152 1194        R. EHRLICH,W.SELOVE,H.YUTA // PENNSYLVANIA
FERBEL   66 PL 21 111                                     // ROCHESTER
LEVRAT   66 PL  22  714        CERN MISSING MASS SPECTROMETER GROUP /CERN

ARMENISE 67 PL 25B 53          ARMENISE,FORINO,+ ///// BARI+BOL+FIR+ORSAY
BALTAY   67 PL 25B 160         +KIRSCH+KUNG+YEH+RABIN / COLUM+BNL+RUTGERS
BARLOW   67 NC 50A 701         +LILLESTOL+MONTANET+/CERN+CDF+IR+LIVERPOOL
BARTSCH  67 PL 25B 48          +DEUTSCHMANN+GROTE+COCCONI+/AACH+BERL+CERN
BEUSCH   67 PL 25 B 357        +FISCHER,GOBBI,ASTBURY,MICHELINI+/ETH+CERN
BOCKMANN 67 HEIDBG CONF P.20   +KOBE,KOST,POLS+//BONN+DURH+NIJM+EPP+TURIN
CASON    67 PRL 18 880         +LAMSA,BISWAS,DERADO,GROVES,+ // NOTREDAME
CHIKOVAN 67 PL 25B 44          CERN MISSING MASS SPECTROMETER GROUP//CERN
CHUNG    67 PRL 18 100         +DAHL,HARDY,HESS,KIRZ,MILLER ////////// LRL
   ALSO  66 UCRL-16832         RICHARD I HESS--THESIS,BERKELEY     // LRL
CONN     67 NP B1 57           +MCCULLOCH+BUGG+CONDO //// CRNL+UNIV.TENN.
CONFORTO 67 NP B3 469          +MARECHAL,MONTANET+//CERN+CF+IPN+LIVERPOOL
CONTE    67 NC  51 A  175      +TOMASINI,CORDS+//GENOVA+HAM+MILANO+SACLAY
DAHL     67 PR 163 1377        +HARDY+HESS+KIRZ+MILLER ////////////// LRL
DANYSZ   67 NC 51 A 801        DANYSZ+FRENCH+SIMAK ////////////////// CERN
GAVILLET 67 PRIVATE COMM.      +VILLEMOES,FOSTER,MONTANET,BLOCH+/CERN+CDF

ARMENISE 68 PL 26B 336         ARMENISE,FORINO,+ ///// BARI+BOL+FIR+ORSAY
ASCOLI   68 PRL 20  1321       +CRAWLEY,MORTARA,SHAPIRO,BRIDGES+/ILLINOIS   JP
BOESEBEC 68 NP B 4 501         BOESEBECK,DEUTSCHMANN,+/AACHEN+BERLIN+CERN
CASO     68 NC 54 A 983        +CONTE+CORDS+DIAZ+ // GENOVA+HAMB+MIL+SACL
CHUNG    68 PR 165 1491        S.U.CHUNG,O.DAHL,J.KIRZ,D.H.MILLER /// LRL
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
CRENNELL  68 PRL 20 1318          +KARSHON+KWAN LAI,SCARR,SKILLICORN  // BNL
DONALD    68 PL 26 B  327         +FRODESEN+BETTINI+ // LIVERPOOL+OSLO+PADUA
FRIDMAN   68 PR 167 1268          +MAURER,MICHALON,OUDET+/HEIDELB+STRASBOURG
KEY       68 PR 166 1430          +PRENTICE+COOPER+MANNER+WALKER+/TD+ANL+WIS
KIENZLE   68  PHILADELPH.CONF. REVIEW GIVEN AT PH.C. ON MESON SPECT./CERN

                    PAPERS NOT REFERRED TO IN DATA CARDS

LANDER    64 PRL 13 346 A         LANDER,ABOLINS,CARMONY,HENDRICKS +/// UCSD    JP
ADERHOLZ 65 PR 138 B 897          AACHEN+BERLIN+BIRM+BONN+HAMB+LOND+MUENCHEN
ALITTI    65 PL 15 69             ALITTI,BATON,DELER,CRUSSARD+/ SACLAY+BOLOG    JP
GOLDHABE 66 BERKELEY CONF.        G. GOLDHABER, MESON REVIEW ////////////LRL
SLATTERY 67 NC 50A 377            +KRAYBILL+FORMAN+FERBEL //////// YALE+ROCH    JP
LAMSA     68 PR 166 1395          +CASON+BISWAS+DERADO+GROVES+ /// NOTREDAME
```

A2 I=2 (1320)

A2,2 (1320) I=2 OR GREATER

SEEN AS A BUMP IN RHO- PI- MASS SPECTRUM.
EVIDENCE NOT COMPELLING. OMITTED FROM TABLE.
FOR A DISCUSSION SEE ROSENFELD 68

90 MASS (MEV)

M	34	1320.	25.	VANDERHAG 67 OBC	-- 5 PI-0	5/67

90 WIDTH (MEV)

W	34	150.	APPROX.	VANDERHAG 67 OBC	-- 5 PI-0	5/67

90 CROSS SECTION (MICROBARNS)

CS	34	15.	5.	VANDERHAG 67 OBC	-- 5 PI-0	5/67

REFERENCES FOR A2,2

```
VANDERHA 67 PL 24B 493          VANDERHAGEN+MUC+FLEURY+ /EP+IPN+BARI+BOLOG
ROSENFEL 68 UCRL-18266          A.H.ROSENFELD (PHILAD.CONF. MESON SP.)/LRL
```

E (1420)

6 E MESON (1420,JPG=A +) I=0

BAILLON 67 FAVOR JP=0-, DAHL 67 FAVOR 1+ BUT DO NOT
EXCLUDE 2-, 0-.

6 E MESON MASS (MEV)

M		1425.	7.	BAILLON 67 HBC	0. PBAR P	11/66
M		1420.0	20.0	DAHL 67 HBC	1.6-4.2 PI- P	
M		1423.	10.	FRENCH 67 HBC	3-4 PBAR P	6/67
M		* * * * * * * * *				
M	AVG	1424.0124	5.5125	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)		

6 E MESON WIDTH (MEV)

W		80.	10.	BAILLON 67 HBC	0. PBAR P	11/66
W		60.0	20.0	DAHL 67 HBC	1.6-4.2 PI- P	
W		45.	20.	FRENCH 67 HBC	3-4 PBAR P	6/67
W		* * * * * * * * *				
W	AVG	70.8333	9.6665	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)		

(SEE IDEOGRAM, APPENDIX I)

6 E MESON PARTIAL DECAY MODES

P1	E INTO K K*(890)	S10U18
P2	E INTO K KBAR PI	S12S12S 8
P3	E MESON INTO PI PI RHO	S 9S 9U 9
P4	E INTO PI((1016) PI	U16S 8
P5	E INTO ETA PI PI	S14S 8S 8

6 E MESON BRANCHING RATIOS

R1	*	E INTO K K*(890)/((K K*)+(PI((1016) PI))		NUM 1		
R1	*			DEN 1 4		
R1		.30 .10	BAILLON 67 HBC	0.0 PBAR P		11/66
R2	*	E MESON INTO (PI PI RHO) / (K KBAR PI)		NUM 3		
R2	*			DEN 2		
R2	*	2.0 OR LESS	DAHL 67 HBC	0 CHARGED PI ONLY		

R *FOR 1+ NONET SU3 RATES SEE E.G. GOLDHABER, REVIEW BERKELEY CONF.1966

REFERENCES FOR E MESON

```
BAILLON   67 NC 50A  393        +EDWARDS+D.ANDLAU+ASTIER+ //// CERN+CDF+IR
BARASH    67 PR 156  1399       BARASH,KIRSCH,MILLER,TAN ////////////COLUMBIA
DAHL      67 PR 163 1377        +HARDY+HESS+KIRZ+MILLER ////////////// LRL I JP
   SEE ALSO 65 PRL 14 1074      MILLER,CHUNG,DAHL,HESS,HARDY,KIRZ+ /LRL+UC
FRENCH    67 NC 52A 442         +KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM
```

$K_S K_S$ (1440) / $\rho\rho$ (1410)

29 KSKS(1440) AND RHORHO(1410) (JPG=V +) I GTE 0

EVIDENCE NOT YET COMPELLING, OMITTED FROM TABLE
IF RHOO RHOO AND KS KS ARE MODES OF THE SAME RESONANCE
THEN I=0.

29 KSKS AND RHORHO MASS (MEV)

M	----------RHOO RHOO MODE----------					
M		1410.0		BETTINI 66 OBC	0 0. PBARP TO 5PR	
M	----------KS KS MODE ----------					
M	8	POSSIBLY SEEN		ABRAMS 67 HBC	4.25 K- P	5/67
M	8	THE AUTHORS ASSOCIATE THE PEAK WITH THE F PRIME, BUT BACKGROUND				
M	8	ESTIMATION IS DIFFICULT				
M		1412. 23.		BARLOW 67 HBC	1.2 PBAR P	5/67
M		1439.0 5.0 6.0		BEUSCH 67 SPRK	5,7,12 PI-P	9/67
M		* * * * * * * * *				
M	AVG	1437.5396 5.3492	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			

29 KSKS AND RHORHO WIDTH (MEV)

W	----------RHOO RHOO MODE----------					
W		90.0		BETTINI 66 OBC	0 0. PBAR P TO 5PR	
W	----------KS KS MODE ----------					
W		100. 70.		BARLOW 67 HBC	1.2 PBAR P	5/67
W		43.0 17.0 18.0		BEUSCH 67 SPRK	5,7,12 PI-P	9/67
W		* * * * * * * * *				
W	AVG	46.3529 16.9775	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			

REFERENCES FOR KSKS(1440) AND RHO RHO(1410)

```
BETTINI   66 NC 42A 695         +CRESTI,LIMENTANI,LORIA,PERUZZO+//PAD+PISA
ABRAMS    67 PRL 18 620         +KENDE,GLASSER,SECHI-ZORN,WOLSKY /MARYLAND
BARLOW    67 NC  50 A  701      +MONTANET,D-ANDLAU+/CERN+CDF+IDR+LIVERPOOL
BEUSCH    67 PL 25 B 357        +FISCHER,GOBBI,ASTBURY,MICHELINI+/ETH+CERN
```

f' (1515)

13 F PRIME (1515,JPG=2++) I=0

13 F PRIME(1515) MASS (MEV)

M		14 1480.0		GRENNELL 66 HBC	6.0 PI- P	
M	8	5 1460. 10.		ABRAMS 67 HBC	4.25 K- P	5/67
M	8	BACKGROUND ESTIMATION DIFFICULT.				5/67
M		1515.0 7.0		AMMAR 67 HBC	5.5 K-P	9/67
M		70 1513.0 7.0		BARNES 67 HBC	4.6, 5. K- P	10/67
M		* * * * * * * * *				
M	AVG	1514.0000 4.9497	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)			

13 F PRIME(1515) WIDTH (MEV)

W	8	5 53. 18.		ABRAMS 67 HBC	4.25 K- P	5/67
W	8	BACKGROUND ESTIMATION DIFFICULT.				5/67
W		35.0 25.0		AMMAR 67 HBC	5.5 K-P	9/67
W		70 87.0 15.0		BARNES 67 HBC	4.6, 5. K- P	10/67
W		* * * * * * * * *				
W	AVG	73.2353 22.9412	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.8)			

13 F PRIME PARTIAL DECAY MODES

P1	F PRIME INTO PI+ PI-	S08S08
P2	F PRIME INTO K KBAR	S12S12
P3	F PRIME INTO K K*(890)	S10U18
P4	F PRIME INTO ETA ETA	S14S14
P5	F PRIME INTO PI PI ETA	S 8S 8S14
P6	F PRIME INTO PI K KBAR	S 8S12S12

13 F PRIME BRANCHING RATIOS

R1	*	F PRIME INTO (PI+ PI-)/(K KBAR)		(P1)/(P2)		
R1		0.2 OR LESS	AMMAR 67 HBC	5.5 K-P ,CL=.67		9/67
R1		0.18 OR LESS	BARNES 67 HBC	4.6, 5.0 K- P		10/67
R1	N	.03 ESTIMATE FROM SU3 GLASHOW 65 SU3				
R3	*	F PRIME INTO (ETA ETA)/(K KBAR)		(P4)/(P2)		
R3		0.50 OR LESS	BARNES 67 HBC	4.6, 5.0 K- P		10/67
R4	*	F PRIME INTO (PI PI ETA)/(K KBAR)		(P5)/(P2)		
R4		0.3 OR LESS	AMMAR 67 HBC	CL=0.67		10/67
R4		0.25 0.13	BARNES 67 HBC	4.6, 5.0 K- P		10/67
R5	*	F PRIME INTO (PI K KBAR + K K*(890))/(K KBAR) (P3+P6)/(P2)				
R5		0.4 OR LESS	AMMAR 67 HBC	CL=0.67		10/67
R5		0.14 OR LESS	BARNES 67 HBC	4.6, 5.0 K- P		10/67
R5	8	OR AS 0.14 0.14	BARNES 67 HBC	4.6, 5.0 K- P		10/67

R N FOR 2+ NONET SU3 RATES SEE GLASHOW 65

REFERENCES FOR F PRIME

```
GLASHOW   65 PRL 15 329         S L GLASHOW, R H SOCOLOW    //SU3 BERKELEY
CRENNELL  66 PRL  16  1025      + KALBFLEISCH,LAI,SCARR,SCHUMANN +  // BNL I
ABRAMS    67 PRL 18 620         +KENDE,GLASSER,SECHI-ZORN,WOLSKY /MARYLAND
AMMAR     67 PRL  19  1071      +DAVIS,HWANG,DAGAN,DERRICK +    // NWU+ANL    JP
BARNES    67 PRL  19  964       +DORNAN,GOLDBERG,LEITNER + // BNL+SYRACUSE (CJP
```

η (1600) — 4π

30 ETA (1600,JPG= +) I = 0

THIS ENTRY CONTAINS 4PI,RHO PI PI , RHO RHO PEAKS
EVIDENCE NOT COMPELLING, OMITTED FROM TABLE

30 ETA (1600) MASS (MEV)

M	*	23 1610.0	40.	KERNAN 65 HBC	0 2.7 PBAR P	
M		1592.0	9.0	CLAYTON 67 HBC	0 2.5 PBAR P	6/68

30 ETA (1600) WIDTH (MEV)

W	*	155.	85.	KERNAN 65 HBC	0 2.7 PBAR P	
W		48.0	20.0	CLAYTON 67 HBC	0 2.5 PBAR P	6/68

30 ETA (1600) PARTIAL DECAY MODES

P1	ETA (1600) INTO 4PI	S 8S 8S 8S 8

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

REFERENCES FOR ETA(1600)

```
KERNAN   65 PRL 15 803          +LYON+CRAWLEY ////////////////////////// IOWA
CLAYTON  67 HEIDBG.CONF.P.52    +MASON,MUIRHEAD,FILIPPAS+// LIVPOOL+ATHENS
```

$\pi_A(1640)$ $\rightarrow 3\pi, 5\pi$

34 PI (1640, JPG= -) I = 1

(ALSO CALLED A3.)

THIS ENTRY CONTAINS G=-1 PEAKS AND THE R1 PEAK

34 PI (1640) MASS (MEV)

```
M       30 1600.0                      FORINO    65 DBC    04.5 PI+ D
M       20 1630.0      30.0            VETLITSKY 66 HBC    -  4.7 PI- P
M   G      1689.       10.             DANYSZ    67 HBC     0 3,3.6 PBAR P      7/67
M   G   OBSERVED IN (OMEGA PI+ PI-) (AND POSSIBLY (OMEGA RHO(0))) MODE
M   C   NOTE THAT THE WIDTH OF THIS PEAK IS SMALL
M   R      1630.       15.             DUBAL     67 MMS    -  7,11.5,12PI- P    7/67
M   R   R1 PEAK FROM CERN MMS EXPT. DECAY MODES AND G PARITY UNKNOWN.
M   R   NOTE THAT THE R1 HAS SMALLER WIDTH THAN THE OTHER ENTRIES.
M   I      1636.0      20.0            ARMENISE  68 DBC     0 9.1 PI+D          9/67
M   I   THIS PERHAPS NOT PI(1640) SINCE SOME INDICATIONS OF (RHOD PID)DECAY     6/68
M       1630.       10.             BALTAY    68 HBC   +   7, 8.5 PI+ P         6/68
M   *   1708.       10.             BISWAS    68 HBC     0 8 PI- P             6/68
M       1660.       16.             BOESEBECK 68 HBC   +   8 PI+ P             6/68
M   *   1700.0      16.0            BOESEBECK 68 HBC   +   8.0 PI+ P,PI+F     10/67
M       1660.                       CASO      68 HBC   -  11 PI- P             6/68
M   *   1680.0                      CASO      68 HBC   -  11 PI-P, PI-P        6/68
M   F   1640.       15.             FERBEL    68 RVUE +-  5-20 PI+- P          6/68
M   F   COMPIL.OF BALTAY 68,BISWAS 68,BOESEB,68,CASO 68,+HARVARD+ILL. DATA     6/68
M       1610.       19.             LAMSA     68 HBC   -  8.0 PI-P, PI-F     11/67
M
M   AVG    1633.4736   9.0898   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)
                  (SEE IDEOGRAM, APPENDIX I)
```

34 PI (1640) WIDTH (MEV)

```
W   R       21.     OR LESS            LEVRAT    66 MMS    -  7,12 PI- P       7/67
W   R   R1 PEAK FROM CERN MMS EXPT. DECAY MODES AND G PARITY UNKNOWN.
W       20  100.                      VETLITSKY 66 HBC    -  4.7 PI-P
W   G       38.     18.                DANYSZ    67 HBC     0 3,3.6 PBAR P      7/67
W   G   OBSERVED IN (OMEGA PI+ PI-) (AND POSSIBLY (OMEGA RHO(0))) MODE
W   I      112.0      60.0            ARMENISE  68 DBC     0 9.1 PI+D          9/67
W   I      SEE NOTE UNDER PI(1640) MASS ABOVE                                   6/68
W       70.         40.             BALTAY    68 HBC   +   7, 8.5 PI+ P         6/68
W   *   116.        30.       23.   BISWAS    68 HBC     0 8 PI- P             6/68
W       115.        45.             BOESEBECK 68 HBC   +   8 PI+ P             6/68
W   *   152.0       51.0            BOESEBECK 68 HBC   +   8.0 PI+ P,PI+F     5/68
W       130.                        CASO      68 HBC   -  11 PI- P             6/68
W   *   150.0                       CASO      68 HBC   - 11.0 PI-P,PI- P       6/68
W   F      90.      25.             FERBEL    68 RVUE +-  5-20 PI+- P          6/68
W   F   COMPIL.OF BALTAY 68,BISWAS 68,BOESEB.68,CASO 68,+HARVARD+ILL. DATA     6/68
W       100.        30.       30.   LAMSA     68 HBC   -  8.0 PI-P  PI-F     11/67
W
W   AVG     93.4956  23.9468   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

34 PI (1640) PARTIAL DECAY MODES

```
P1          PI(1640) INTO 3 PI                                  S 95 95 9
P2          PI(1640) INTO RHO PI                                S 9U 9
P3          PI(1640) INTO ETA PI                                S 9S14
P4          PI(1640) INTO 5 PI
P5          PI(1640) INTO K K*(890)                             S11U18
P6          PI(1640) INTO K KBAR PI                             S11S11S 9
P7          PI(1640) INTO K KBAR                                S11S11
P8          PI(1640) INTO F PI                                  U 55 9
```

34 PI (1640) BRANCHING RATIOS

```
R1  *    PI(1640) INTO (K KBAR) / (ALL 3 PI)
R1           .40  OR LESS (ESTIMATED FROM DATA OF DEUTSCHMANN 66)          11/66

R2  *    PI(1640)+- INTO (PI+- RHO0)/(ALL PI+- PI+ PI-)
R2          0.2  OR LESS              BALTAY    68 HBC   +  7-8.5 PI+P        5/68
R2          0.35 OR LESS              CASO      68 HBC   - 11.0 PI-P          6/68

R3  *    PI(1640)+- INTO (PI+- F)/(ALL PI+- PI+ PI-)
R3  *                 (WITH F INTO PI+ PI-)
R3          INDICATION SEEN           LUBATTI   66 HLBC     16 PI-            11/66
R3          0.35     0.20             BALTAY    68 HBC   +  7-8.5 PI+P        5/68
R3          SEEN                      BOESEBECK 68 HBC   +   8 PI+ P          6/68
R3          CONSISTENT WITH 1.0       CASO      68 HBC   -  11 PI- P          6/68

R4  *    R1 MESON FRACTION INTO ONE / THREE / FIVE OR MORE CHARGED TRACKS
R4  *       0.37 /   0.59 /   0.04  FOCACCI   66 MMS    -  3-12 PI-P

R5  *    PI(1640) +- INTO (PI+- ETA)/(ALL PI+- PI+ PI-)
R5  *                 (ALL ETA DECAYS)
R5          0.09 OR LESS              BALTAY    68 HBC   +  7-8.5 PI+P        5/68

R6  *    PI(1640)+- INTO (PI+- 2PI+ 2PI-)/(ALL PI+- PI+ PI-)
R6          0.1  OR LESS              BALTAY    68 HBC   +  7,8.5 PI+ P       6/68
```

REFERENCES FOR PI(1640)

```
FORINO   65 PL 19 68            +G=S,SAROLI+LENDINARA+/BOL+BARI+FIR+ORS+SAC
DEUTSCHM 66 PL 20 82            DEUTSCHMANN,STEINBERG + / AACH+BERLIN+CERN
   ALSO CERN/PH.67-4            D.R.O.MORRISON ////////////////////// CERN
FERBEL   66 BERK.CONF.P 131     SEE G. GOLDHABER, REVIEW ON MESONS /// LRL
FOCACCI  66 PRL  17  890        CERN MISSING MASS SPECTROMETER GROUP//CERN
LEVRAT   66 PL  22  714         CERN MISSING MASS SPECTROMETER GROUP//CERN
LUBATTI  66 THESIS BERKELEY     H.J.LUBATTI ////////////////////// LRL 1-2-
VETLITSK 66 PL  21  579         VETLITSKY,GUSZAVIN,KLIGER,ZOLGANOV+ //ITEP

DANYSZ   67 NC 51 A 801         DANYSZ+FRENCH+SIMAK ////////////////// CERN
DUBAL    67 NP B3 435           CERN MISSING MASS SPECTROMETER GROUP//CERN
   ALSO  68 THESIS 1456         L.DUBAL                          // GENEVE

ARMENISE 68 PL 28B 336          +GHIDINI,FORINO+//BARI+BOLOGN+FIRENZ+ORSAY
BALTAY   68 PRL 20 887          +KUNG+YEH+FERBEL+ /// COLMB+ROCH+RUTG+YALE I=1
BISWAS   68  PREPRINT -ATHENS   +CASON,GROVES,KENNEY,POIRIER+ //// NTRDAME
BOESEBEC 68 NP B 4 501          BOESEBECK,DEUTSCHMANN,+/AACHEN+BERLIN+CERN
CASO     68 NC 54 A 983         +CONTE+CORDS+DIAZ+ // GENOVA+HAMB+MIL+SACL
FERBEL   68  PREP.-PHILA.CONF   T.FERBEL ////////////////////// ROCHESTER
LAMSA    68 PR 166 1395         +CASON+BISWAS+DERADO+GROVES+ /// NOTREDAME
```

$\rho_x(1650)$, $\eta' \rightarrow 2\pi$

15 RHO (1650, JPG= N+) I=1

THIS ENTRY CONTAINS THE G (DIPION) AND R1 PEAKS
FOR POSSIBLE 4 PI MODES SEE ETA(1600) AND RHO(1700)

CRENNELL 67 SUGGEST JP=3- FROM THE PI PI SCATTERING ANGLE DISTR.

15 RHO (1650) MASS (MEV)

```
M          1700.(    100.0            BELLINI   65 HLBC    0 6.1 PI-P
M          1640.0                     FORINO    65 DBC     0 4.5 PI+D
M          1670.0     30.0            GOLDBERG  65 HBC     0 6 PI+D, 8 PI-P
M       70 1790.                      CRENNELL  67 HBC     0 6.0 PI-P          3/67
M       50 1630.                      CRENNELL  67 HBC     - 6.0 PI-P          3/67
M   R      1630.       15.            DUBAL     67 MMS     -  7,11.5,12PI- P   7/67
M   R   R1 PEAK FROM CERN MMS EXPT. DECAY MODES AND G PARITY UNKNOWN.
M   R   NOTE THAT THE R1 HAS MUCH SMALLER WIDTH THAN THE OTHER ENTRIES.
M   *      1680.0      20.0           POIRIER   67 HBC     0 8.0 PI- P         11/67
M          1683.       13.            ARMENISE  68 DBC     0 5.1 PI+ D         6/68
M          1620.       20.            BOESEBECK 68 HBC   +   8 PI+ P           6/68
M   F      1650.       20.            FERBEL    68 RVUE +-0 5-8 PI+- P          6/68
M   F   COMPIL.OF POIRIER 67,JOHNSTON 68,+NEW PURDUE AND BNL DATA.              6/68
M          1655.0      10.0           JOHNSTON  68 HBC     0 7.0 PI- P          6/68
M
M   AVG    1660.0614  11.2795   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.6)
                  (SEE IDEOGRAM, APPENDIX I)
```

15 RHO (1650) WIDTH (MEV)

```
W          40.0                       FORINO    65 DBC     0 4.5 PI+D
W          180.0      40.0            GOLDBERG  65 HBC     0 6 PI+D, 8 PI-P
W   R      21.     OR LESS            LEVRAT    66 MMS     -  7,12 PI- P       7/67
W   R   R1 PEAK FROM CERN MMS EXPT. DECAY MODES AND G PARITY UNKNOWN.
W       70 200.                       CRENNELL  67 HBC     0 6.0 PI-P          3/67
W       50 100.                       CRENNELL  67 HBC     - 6.0 PI-P          3/67
W   *      226.0       68.0     46.0  POIRIER   67 HBC     0 8.0 PI- P         11/67
W          188.        49.           ARMENISE  68 DBC     0 5.1 PI+ D         6/68
W          108.        40.           BOESEBECK 68 HBC   +   8 PI+ P           6/68
W   F      120.        30.           FERBEL    68 RVUE +-0 5-8 PI+- P          6/68
W   F   COMPIL.OF POIRIER 67, JOHNSTON 68,+NEW PURDUE AND BNL DATA.            6/68
W          80.0        20.0          JOHNSTON  68 HBC     0 7.0 PI- P          6/68
W
W   AVG    109.9968  25.0588   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.6)
                  (SEE IDEOGRAM, APPENDIX I)
```

15 RHO (1650) PARTIAL DECAY MODES

```
P1          RHO (1650) INTO PI PI                               S 8S 8
P5          RHO (1650) INTO K KBAR                              S11S11
```

15 RHO (1650) BRANCHING RATIOS

```
R1  *    R1 MESON FRACTION INTO ONE / THREE / FIVE OR MORE CHARGED TRACKS
R1          0.37 /   0.59 /   0.04  FOCACCI   66 MMS    -

R3  *    RHO(1650) INTO (K KBAR) / (2 PI)                    NUM    5
R3  *                                                        DEN 1
R3          INDICATION SEEN           EHRLICH   66 HBC   +-0 7.9 PI- P        3/67
R3          PROBABLY SEEN             ABRAMS    67 HBC     0 4.25 K- P        6/67
R3          0.10  OR LESS             CRENNEL   67 HBC       6.0 PI-P         4/67
```

REFERENCES FOR RHO(1650)

```
BELLINI  65 NC 40 A 948         BELLINI,DI CORATO,DUIMIND,FIORINI //MILANO
FORINO   65 PL 19 65            FORINO,GESSAROLI +  //BOLOGNA+ORSAY+SACLAY
GOLDBERG 65 PL 17 354           GOLDBERG+/CERN+PARIS+ORSAY+MILANO+CEA-SACL
EHRLICH  66 PR 152 1194         R. EHRLICH,W.SELOVE,H.YUTA // PENNSYLVANIA
FOCACCI  66 PRL  17  890        CERN MISSING MASS SPECTROMETER GROUP//CERN
ABRAMS   67 PRL 18 620          +KEHOE+GLASSER+SECHI-ZORN+WOLSKY/ MARYLAND
CRENNELL 67 PRL 18 323          +HOUGH,KALBFLEISCH,LAI,BACHMAN+// BNL,CCNY I JP
DUBAL    67 NP B3 435           CERN MISSING MASS SPECTROMETER GROUP//CERN
   ALSO  68 THESIS 1456         L.DUBAL                          // GENEVE
POIRIER  67 PR 163 1462         +BISWAS,CASON,DERADO,KENNEY+//NOTRDAM+PENN
ARMENISE 68 NC 54 A 999         +FORINO+CARTACCI+/BARI+BOLOG+FIRENZE+ORSAY I
BOESEBEC 68 NP B 4 501          BOESEBECK,DEUTSCHMANN,+/AACHEN+BERLIN+CERN
FERBEL   68  PREP.-PHILA.CONF T.FERBEL ////////////////////// ROCHESTER
JOHNSTON 68 PRL 20 1414         +PRENTICE,STEENBERG,YOON  //  TORONTO+WISC
```

R(1700)

92 RHO(1700,JPG= A+) I = 1 OR 2

THIS ENTRY CONTAINS 4PI, RHO 2PI, 2RHO, OMEGA PI, AND K*KBAR
ENHANCEMENTS, AND THE R2. IT SEEMS TO BE DIFFERENT IN MASS FROM
THE RHO(1650), THEREFORE WE LIST IT TENTATIVELY AS A NEW ENTRY,
ASSUMING THAT IT HAS JP=A (ABNORMAL SERIES, 0-, 1+, 2-...).
IF (2RHO 0) MODE IS TRUE, AN I=0 RESONANCE EXISTS AS WELL.
~~~~~ SEE SKETCH AT END OF LISTING ~~~~~

92 MASS (MEV)

```
M       80 1717.        7.            DANYSZ    67 HBC    (SEE NOTE R BELOW  5/67
M   R   SEEN IN 2.5-3 PBAR P. 2PI+2PI-,WITH 0,1,2 PI+PI- PAIRS IN RHOO BAND
M   M      1700.       15.            DUBAL     67 MMS    -  7,11.5,12PI- P   7/67
M   M   R2 PEAK FROM CERN MMS EXPT. DECAY MODES AND G PARITY UNKNOWN.
M   K      1700.                      FRENCH    67 HBC     0 3,3.6 PBAR P      7/67
M   K   OBSERVED IN NEUTRAL(K* KBAR) MODE  (G-PARITY UNKNOWN)
M          1720.       15.            BALTAY    68 HBC   +   7, 8.5 PI+ P       6/68
M   *      1710.       23.            BISWAS    68 HBC   -  8 PI- P            6/68
M   *      1720.0                     CASO      68 HBC   - 11.0PI-P,RHO 2PI    6/68
M   *      1670.0                     CASO      68 HBC   - 11.0 PI-P, 4PI      6/68
M   F      1700.       20.            FERBEL    68 RVUE +-  7-11 PI+- P         6/68
M   F   COMPIL.OF BALTAY 68,BISWAS 68,CASO 68,JOHNSTON 68 DATA                 6/68
M   J      1675.0      10.0           JOHNSTON  68 HBC   -  7.0 PI- P          6/68
M   J   NOT SEPARATED FROM 2 PI DECAY
M
M   AVG    1717.5365   6.3433   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```
~~~~~

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

92 WIDTH (MEV)

```
W   M        30.     OR LESS            LEVRAT    66 MMS    -  7-12 PI- P       7/67
W   M   R2 PEAK FROM CERN MMS EXPT. DECAY MODES AND G PARITY UNKNOWN.
W       80    40.       12.             DANYSZ    67 HBC    OSEE NOTE R BELOW  5/67
W   R   SEEN IN 2.5-3 PBAR P. 2PI+2PI-,WITH 0,1,2 PI+PI- PAIRS IN RHOO BAND
W       100.      35.             BALTAY    68 HBC   +   7, 8.5 PI+ P        6/68
W   *   162.      58.      40.    BISWAS    68 HBC    -  8 PI- P             6/68
W   *   120.0                     CASO      68 HBC    - 11.0 PI-P, 4PI       6/68
W   *   100.0                     CASO      68 HBC    - 11.0PI-P,RHO 2PI     6/68
W   F   110.      25.             FERBEL    68 RVUE +-  7-11 PI+- P          6/68
W   F   COMPIL.OF BALTAY 68, BISWAS 68, CASO 68,JOHNSTON 68 DATA             6/68
W   J     90.0     20.0           JOHNSTON  68 HBC    -  7.0 PI- P           6/68
W   J   NOT SEPARATED FROM 2 PI DECAY
W       * . * . * . * . * .
W   AVG     46.3112  18.4076   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.6)
```

92 RHO (1700) PARTIAL DECAY MODES

```
P1        RHO(1700) INTO 4 PI                                  S 8S 8S 8S 8
P2        RHO(1700) INTO A2 PI                                 S 8U12
P3        RHO(1700) INTO OMEGA PI                              S 8U 1
P4        RHO(1700) INTO PHI PI                                U 4S 8
P5        RHO(1700) INTO 2 RHO                                 U 9U 9
```

92 RHO(1700) BRANCHING RATIOS

```
R1  *     R2 MESON FRACTION INTO ONE / THREE / FIVE OR MORE CHARGED TRACKS
R1          0.42 /   0.56 /   0.01  FOCACCI   66 MMS    -

R2  *     RHO(1720)+- INTO (PI+- A2O)/(ALL PI+- PI+ PI- PIO)
R2  *                 (WITH A2O INTO (PI+ PI- PIO))
R2          0.40      0.20            BALTAY    68 HBC   +   7,8.5 PI+P        6/68
R2          NOT SEEN                  JOHNSTON  68 HBC    -  7 PI- P          6/68

R3  *     RHO(1720)+- INTO (PI OMEGA)/(ALL PI+- PI+ PI- PIO)
R3  *                 (WITH OMEGA INTO(PI+ PI- PIO))
R3          0.25      0.10            BALTAY    68 HBC   +   7-8.5 PI+P       5/68
R3           .25      0.10            JOHNSTON  68 HBC    -  7.0 PI- P        6/68
R3        * . * . * . * . * .
R3  AVG       .2500     .0707   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R4  *     RHO(1720)+- INTO (PI PHI)/(ALL PI+- PI+ PI- PIO)
R4  *       0.11  OR LESS           EHRLICH   68 HBC   +   7,8.5 PI+P        6/68

R5  *     RHO(1720)+- INTO (RHO 2PI)/(ALL 4PI)
R5  *       CONSISTENT WITH 1.      CASO      68 HBC    -  11 PI- P          6/68

R6  *     RHO(1720)+- INTO (RHO+- RHOO)/(ALL RHO 2PI)
R6  *       0.48      0.16          CASO      68 HBC    -  11 PI- P          6/68

R7  *     RHO(1720)   INTO (2 RHO) / (ALL 4PI)
R7  *       SEEN                    DANYSZ    67 HBC     0 3-4 PBAR P        5/68
R7  *       SEEN                    BALTAY    68 HBC   +   7,8.5 PI+ P       6/68
R7  *       SEEN                    JOHNSTON  68 HBC    -  7 PI-P            6/68

R8  *     RHO(1720)+- INTO (PI+- 2PI+ 2PI- PIO)/(ALL PI+- PI+ PI- PIO)
R8          0.15  OR LESS           BALTAY    68 HBC   +   7,8.5 PI+ P       6/68

R9  *     RHO(1720)+- INTO (PI+- PIO) / (ALL PI+- PI+ PI- PIO)
R9  D       0.08  OR LESS           BALTAY    68 HBC   +   7-8.5 PI+ P       6/68
R9  D       USING DATA OF DEUTSCHMANN 65 ON PI+P TO PI+ PIO P                 6/68
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES FOR RHO(1700)

```
DEUTSCHM 65 PL 18 351        M.DEUTSCHMANN ET AL /// AACHEN+BERLIN+CERN
FOCACCI  66 PRL  17  890     CERN MISSING MASS SPECTROMETER GROUP//CERN
LEVRAT   66 PL   22  714     CERN MISSING MASS SPECTROMETER GROUP//CERN
DANYSZ   67 PL 24B 349       +FRENCH+KINSON+SIMAK+ ///// CERN+LIVERPOOL
DUBAL    67 NP B3 435        +FOCACCI+KIENZLE+LECHANGINE+LEVRAT+ / CERN
   ALSO  68 THESIS 1456      L.DUBAL                          // GENEVE
FRENCH   67  CERN/TC/PH.66-31 +KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM

BALTAY   68 PRL 20 887       +KUNG+YEH+FERBEL+ /// COLMB+ROCH+RUTG+YALE I=1
BISWAS   68  PREPRINT        +CASON,GROVES,KENNEY,POIRIER+ //// NTRDAME
CASO     68 NC 54 A 983      +CONTE+CORDS+DIAZ+ // GENOVA+HAMB+MIL+SACL
EHRLICH  68  QUT.BY BALTAY 68 R.EHRLICH ////////////////////////// RUTGERS
FERBEL   68  PREP.-PHILA.CONF T.FERBEL ////////////////////////// ROCHESTER
JOHNSTON 68 PRL 20 1414      +PRENTICE,STEENBERG,YOON  //  TORONTO+WISC IJP
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

R(1750)

93 R(1750) I=1

THIS ENTRY CONTAINS I=1 PEAKS AND THE R3 PEAK
~~~~~ SEE SKETCH AT END OF LISTING ~~~~~

NOT A FIRMLY ESTABLISHED RESONANCE - OMITTED FROM TABLE

93 R(1750) MASS(MEV)

```
M         1748.      16.            DUBAL     67 MMS    -  7,11.5,12 PI- P  7/67
M   F     1740.                     FRENCH    67 HBC   (KO K+-) 3-4 PBAR P  7/67
M   F     SEE FIG. 9 OF FRENCH 67
```

93 R(1750) WIDTH (MEV)

```
W           38.     OR LESS          LEVRAT    66 MMS    -  7,12 PI- P        7/67
```

93 R(1750) BRANCHING RATIOS

```
R3  *     R3 MESON FRACTION INTO ONE / THREE / FIVE OR MORE CHARGED TRACKS
R3  C       0.14 /   0.80 /   0.05  FOCACCI   66 MMS    -
R3  C   FRACTION INTO ONE CHARGED PROB.LARGER THAN GIVEN ABOVE. CF.DUBAL+67
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES FOR R (1750)

```
FOCACCI  66 PRL  17  890     CERN MISSING MASS SPECTROMETER GROUP//CERN
LEVRAT   66 PL   22  714     CERN MISSING MASS SPECTROMETER GROUP//CERN
DUBAL    67 NP B3 435        CERN MISSING MASS SPECTROMETER GROUP//CERN
FRENCH   67 NC 52A 442       +KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

$\eta_{A,I=0}(1830)$ — $4\pi,K^*K$

ETA OR RHO (1830) G=+1 (JPG=A +) I=0 OR GREATER

THIS ENTRY CONTAINS 4 PI AND K PI KBAR AND THE R4 MMS PEAK.
~~~~~ SEE SKETCH AT END OF LISTING ~~~~~
R4 IS ONLY A 3 STANDARD DEVIATIONS EFFECT.
OMITTED FROM TABLE.

94 MASS (MEV)

```
M       110 1832.       6.            DANYSZ    67 HBC    OSEE NOTE R BELOW  5/67
M   R   SEEN IN 2.5-3 PBAR P. 2PI+2PI-,WITH 0,1,2 PI+PI- PAIRS IN RHOO BAND
M   M     1830.       15.            DUBAL     67 MMS    -  7,11.5,12.PI- P  6/68
M   M     MISSING MASS R4 PEAK,FINAL STATE UNKNOWN
M         1820.       12.            FRENCH    67 HBC    OSEE NOTE K BELOW  7/67
M   K   SEEN IN 3.-3.6 PBAR P TO (KS KO PIO...). G PARITY UNKNOWN
M       * . * . * . * . * .
M   AVG   1829.6000   5.3666   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

94 WIDTH (MEV)

```
W       110   42.       11.            DANYSZ    67 HBC    OSEE NOTE R BELOW  5/67
W   R   SEEN IN 2.5-3 PBAR P. 2PI+2PI-,WITH 0,1,2 PI+PI- PAIRS IN RHOO BAND
W   M     30.0  OR LESS              DUBAL     67 MMS    - 7,11.5,12 PI-P    6/68
W   M     MISSING MASS R4 PEAK,FINAL STATE UNKNOWN
W         50.       23.            FRENCH    67 HBC    OSEE NOTE K BELOW  7/67
W   K   SEEN IN 3.-3.6 PBAR P TO (KS KO PIO...). G PARITY UNKNOWN
W       * . * . * . * . * .
W   AVG     43.4892   9.9235   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

94 PARTIAL DECAY MODES

```
P1        ETA OR RHO (1830) INTO 4 PI                          S 8S 8S 8S 8
P2        ETA OR RHO (1830) INTO RHO PI PI                     S 8S 8U 9
P3        ETA OR RHO (1830) INTO RHO RHO                       U 9U 9
P4        ETA OR RHO (1830) INTO K KBAR PI                     S 9S11S11
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES

```
DANYSZ   67 PL 248 309       +FRENCH+KINSON+SIMAK+ ///// CERN+LIVERPOOL
DUBAL    67 NP B3 435        CERN MISSING MASS SPECTROMETER GROUP//CERN
   ALSO  68 THESIS 1456      L.DUBAL                          // GENEVE
FRENCH   67 NC 52A 442       +KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

$\phi_{A,I=0}(1830)$ — $5\pi,K^*K$

PHI OR PI (1830) G=-1 (JPG=A -) I=0 OR GREATER

THIS ENTRY CONTAINS OMEGA PI PI AND K PI KBAR AND THE R4 PEAK.
~~~~~ SEE SKETCH AT END OF LISTING ~~~~~
R4 IS ONLY A 3 STANDARD DEVIATIONS EFFECT.
* I=1 IF (OMEGA RHO) MODE EXISTS.
OMITTED FROM TABLE.

95 MASS (MEV)

```
M   O     1848.       11.            DANYSZ    67 HBC     0 3,3.6 PBAR P     7/67
M   O   OBSERVED IN (OMEGA PI+ PI-) (AND POSSIBLY (OMEGA RHO(O))) MODE
M   K     1820.       12.            FRENCH    67 HBC     0 3,3.6 PBAR P     7/67
M   K   OBSERVED IN (KS KO PIO...) MODE  (G-PARITY UNKNOWN)
M   M     1830.       15.            DUBAL     67 MMS    -  7,11.5,12.PI- P  6/68
M   M     MISSING MASS R4 PEAK,FINAL STATE UNKNOWN
```

95 WIDTH (MEV)

```
W   O       67.       27.            DANYSZ    67 HBC     0 3,3.6 PBAR P     7/67
W   O   OBSERVED IN (OMEGA PI+ PI-) (AND POSSIBLY (OMEGA RHO(O))) MODE
W   K       50.       20.            FRENCH    67 HBC     0 3-4 PBAR P       7/67
W   K   OBSERVED IN (KS KO PIO...) MODE (G PARITY UNKNOWN)
W   M     30.0  OR LESS              DUBAL     67 MMS    - 7,11.5,12 PI-P    6/68
W   M     MISSING MASS R4 PEAK,FINAL STATE UNKNOWN
```

95 PARTIAL DECAY MODES

```
P1        PHI (1830) INTO 5 PI                                 S 6S 8S 8S 8S 9
P2        PHI (1830) INTO OMEGA PI PI                          S 8S 8U 1
P3        PHI (1830) INTO OMEGA RHO                            U 1U 9
P4        PHI (1830) INTO K KBAR PI                            S 9S11S11
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES

```
DANYSZ   67 NC 51A 801       DANYSZ+FRENCH+SIMAK ////////////////// CERN
DUBAL    67 NP B3 435        CERN MISSING MASS SPECTROMETER GROUP//CERN
   ALSO  68 THESIS 1456      L.DUBAL                          // GENEVE
FRENCH   67 NC 52A 442       +KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

S(1930)

31 S(1930, JP= , I GTE 1) 3 CHARGED DECAY TRACKS

31 S (1930) MASS (MEV)

```
M         1929.0      14.0           CHIKOVANI 66 MMSP   -  12.0 PI-P
M         1900.       40.            BOESEBECK 68 HBC   +   8 PI+ P          6/68
M       * . * . * . * . * .
M   AVG   1928.8352  13.2140   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

M   *  THESE TWO MAY NOT BE THE SAME RESONANCE SINCE (A) MMS HAS LESS
M   *  THAN 30 PERCENT OF DECAYS WITH 1 CHARGED TRACK, WHEREAS HBC SEES 0E-
M   *  CAY INTO (PI+ PIO), (B) THE WIDTHS DO NOT AGREE TOO WELL.
```

31 S (1930) WIDTH (MEV)

```
W           35.0   OR LESS          CHIKOVANI 66 MMSP   -  12.0 PI-P
W          216.     105.            BOESEBECK 68 HBC   +   8 PI+ P          6/68
```

31 D(SIGMA)/D(T) (MICROBARNS/(GEV/C)**2).

```
CS          35.0      12.0          FOCACCI   66 MMS   .22 LTE Y LTE .36
```
~~~~~

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

T(2195)

32 T(2200, JP= , I GTE 1) 3 CHARGED DECAY TRACKS

THIS ENTRY CONTAINS, BESIDES THE T(2200) SEEN BY CHIKOVANI 66 WITH A MMS, VARIOUS OTHER PEAKS NEAR 2200 MEV.

32 T(2200) MASS (MEV)

M		2195.0	15.0	CHIKOVANI 66 MMSP ~ 12.0 PI-P			
M	B	2190.	5.	ABRAMS 67 CNTR S CHANNEL NBAR N			7/67
M	B	SEEN AS BUMP IN I=1 STATE. WIDTH MUCH LARGER THAN IN THE MMSP EXPT.					
M	B	SEE ALSO COOPER 68.					
M		2207.	13.	ALLES-BOR 67 HBC 0 5.7 PBAR P			12/66
M	A	ALLES-BORELLI 67 SEE NEUTRAL MODE ONLY (PI+PI-PIO)					
M		2190.0	10.0	CLAYTON 67 HBC +- 2.5PBAR,A2+OMEGA			10/67
M		* * * * * * * * *					
M	AVG	2196.0316	7.0080 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

32 T(2200) WIDTH (MEV)

W		13.0	OR LESS	CHIKOVANI 66 MMSP ~ 12.0 PI-P			
W	B	85.		ABRAMS 67 CNTR S CHANNEL NBAR N			7/67
W	B	SEE NOTE B UNDER T(2200) MASS ABOVE.					
W		62.	52.	ALLES-BOR 67 HBC 0 5.7 PBAR P			12/66

32 D(SIGMA)/D(T) (MICROBARNS/(GEV/C)**2)

CS		29.0	10.0	FOCACCI 66 MMS .22 LTE T LTE .36			

32 SIGMA (MB) FOR FORMATION BY NUCLEON ANTINUCLEON

CS		6.		ABRAMS 67 CNTR S CHANNEL NBAR N			7/67

REFERENCES FOR T(2200)

CHIKOVAN 66 PL 22 233 CERN MISSING MASS SPECTROMETER GROUP//CERN
FOCACCI 66 PRL 17 890 CERN MISSING MASS SPECTROMETER GROUP//CERN
ABRAMS 67 PRL 18 1209 +COOL+GIACOMELLI+KYCIA+LEONTIC+LI+ /// BNL
ALLES-BO 67 NC 50 A 776 ALLES-BORELLI,FRENCH,FRISK,+ /// CERN+BONN G+-
CLAYTON 67 HEIDBG.CONF.P.57 +MASON,MUIRHEAD,FILIPPAS+// LIVPOOL+ATHENS
COOPER 68 PRL 20 1059 +HYMAN,MANNER,MUSGRAVE,VOYVODIC ////// ANL

$N\bar{N}_{I=0}(2380)$

N NBAR (2380) (I=0)

EVIDENCE FOR RESONANT STATE NOT YET COMPELLING. OMITTED FROM TABLE.

99 MASS

M		2380.	10.	ABRAMS 67 CNTR S CHANNEL NBAR N			7/67

99 WIDTH

W		140.		ABRAMS 67 CNTR S CHANNEL NBAR N			7/67

99 SIGMA (MB) FOR FORMATION BY NUCLEON ANTINUCLEON

CS	*	2.		ABRAMS 67 CNTR			7/67

REFERENCES FOR N NBAR (2380)

ABRAMS 67 PRL 18 1209 +COOL+GIACOMELLI+KYCIA+LEONTIC+LI+ /// BNL

U(2380)

33 U(2380,JP= ,I=1)

THIS ENTRY CONTAINS (A2 OMEGA), N NBAR (I=1), AND THE U (MMS) PEAK.

33 U(2380) MASS (MEV)

M		2382.0	24.0	CHIKOVANI 66 MMSP ~ 12.0 PI-P			
M	B	2345.	10.	ABRAMS 67 CNTR S CHANNEL NBAR N			7/67
M	B	SEEN AS BUMP IN I=1 STATE. WIDTH MUCH LARGER THAN IN THE MMSP EXPT.					
M		2380.0	10.0	CLAYTON 67 HBC +- 2.5PBAR,A2+OMEGA			10/67
M		* * * * * * * * *					
M	AVG	2380.2959	9.2308 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

33 U(2380) WIDTH (MEV)

W		30.0	OR LESS	CHIKOVANI 66 MMSP ~ 12.0 PI-P			
W	B	140.		ABRAMS 67 CNTR S CHANNEL PBAR N			7/67
W	B	SEEN AS BUMP IN I=1 STATE. WIDTH MUCH LARGER THAN IN THE MMSP EXPT.					

33 D(SIGMA)/D(T) (MICROBARNS/(GEV/C)**2)

CS		42.0	14.0	FOCACCI 66 MMS .28 LTE T LTE .36			

33 SIGMA (MB) FOR FORMATION BY NUCLEON ANTINUCLEON

CS	*	3.		ABRAMS 67 CNTR S CHANNEL NBAR N			7/67

33 U MESON BRANCHING RATIOS

RI * U- MESON FRACTION INTO ONE / THREE / FIVE OR MORE CHARGED TRACKS
RI 0.30 / 0.45 / 0.25 FOCACCI 66 MMS -

REFERENCES FOR U(2380)

CHIKOVAN 66 PL 22 233 CERN MISSING MASS SPECTROMETER GROUP//CERN
FOCACCI 66 PRL 17 890 CERN MISSING MASS SPECTROMETER GROUP//CERN
ABRAMS 67 PRL 18 1209 +COOL+GIACOMELLI+KYCIA+LEONTIC+LI+ /// BNL
CLAYTON 67 HEIDBG.CONF.P.57 +MASON,MUIRHEAD,FILIPPAS+// LIVPOOL+ATHENS

$K^{\pm}$

10 CHARGED K (494, JP=0-) I=1/2

SEE LISTINGS OF STABLE PARTICLES

K^{0}

11 NEUTRAL K (498,JP=0-) I=1/2

SEE LISTINGS OF STABLE PARTICLES

K(725)

17 KAPPA (725,JP=) I=1/2

EVIDENCE NOT COMPELLING. OMITTED FROM TABLE.
FOR A COMPILATION, SEE APPENDIX A OF JAN 67 EDITION (RMP 39, 1) OF THIS DATA SUMMARY.
SEE ALSO ROSENFELD, PROC.1968 UNIV.OF PENN.CONF.ON MESON SPECTROSCOPY

$K^{*}(892)$

18 K* (890,JP =1-) I=1/2

18 K* (890) MASS (MEV)

M		898.0	5.0	CHADWICK 63 HBC + 1.5 K+P			
M		891.0	3.0	FERRO-LUZ 65 HBC + 3.0 K+P			
M		895.	3.	BOMSE 67 HBC + 2.3 K+P			7/67
M		891.	2.	DE BAERE 67 HBC + 3.5 K+P (KO PI+)			7/67
M		892.5	2.5	DE BAERE 67 HBC + 3.5 K+P (K+ PIO)			7/67
M		898.	4.	SALLSTROM 67 HBC + 3. K+ P (KO PI+)			7/67
M		883.	5.	SALLSTROM 67 HBC + 3. K+ P (K+ PIO)			7/67
M		890.	2.	BARLOW 67 HBC +- 1.2 PBAR P			11/66
M		889.	3.	BARLOW 67 HBC +- 1.2 PBAR P			11/66
M		896.0	9.0	CONFORTO 67 HBC +- 0. PBAR P			9/67
M	3870	891.0	1.0	WOJCICKI1 64 HBC ~ 1.7 K-P			
M		889.5	2.5	ADELMAN 65 HBC ~ 1.5 K-P			
M		895.0	3.0	GELSEMA 65 HBC ~ 1.5 K-P			
M		893.	4.	ADERHOLZ 68 HBC ~ 10 K- P			6/68
M		891.	4.	FICENEC 68 HBC ~ 1.3 K-P (K-PIO)			9/67
M		887.	3.	FICENEC 68 HBC ~ 1.3 K-P (KOPI-)			9/67
M		896.0	4.0	SCHWEINGR 68 HBC ~ 4.1 K-P			9/67
M		892.0	2.0	SCHWEINGR 68 HBC ~ 5.5 K-P			9/67
M		* * * * * * * * *					
M	AVG	891.4197	.5778 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

(SEE IDEOGRAM, APPENDIX I)

M	200	880.0		ALEXANDER 62 HBC + 0 2.2 PI-P			
M		895.0	2.0	FERRO-LUZ 65 HBC + 0 3.0 K+P			
M		895.0		WANGLER 65 HBC + 0 3.0 PI- P			
M		894.	5.	FRENCH 67 HBC +-0 3-4 PBAR P			6/67
M		* * * * * * * * *					
M	AVG	894.8621	1.8570 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

M	70	897.0	10.0	COLLEY 62 HBC 0 2.0 PI-P			
M	200	892.0	2.0	KRAEMER 63 HBC 0 2.3 K+P			
M	150	885.0		SMITH 63 HBC 0 2.3 PI-P			
M		899.	4.	BARLOW 67 HBC 0 1.2 PBAR P			11/66
M		897.	4.	BARLOW 67 HBC 0 1.2 PBAR P			11/66
M		889.0	5.0	CONFORTO 67 HBC 0 0. PBAR P			9/67
M		894.7	1.3	DAUBER 67 HBC 0 2.0 K- P			12/66
M		892.0	4.0	GEORGE 67 HBC 0 5.0 K+ P			11/67
M		895.	2.	FICENEC 68 HBC 0 1.3 K-P (K-PI+)			9/67
M		896.0	4.0	SCHWEINGR 68 HBC 0 4.1 K-P			9/67
M		903.0	4.0	SCHWEINGR 68 HBC 0 5.5 K-P			9/67
M		* * * * * * * * *					
M	AVG	894.7266	.9036 AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)				

(SEE IDEOGRAM, APPENDIX I)

18 K*(0) - K*(+) MASS DIFF. (MEV)

D		6.3	4.1	BARASH 67 HBC 0 PBAR P			8/67

18 K* (890) WIDTH (MEV)

W		46.0	8.0	CHADWICK 63 HBC + 1.9 K+P			
W		47.0	4.0	FERRO-LUZ 65 HBC + 3.0 K+P			
W		50.	5.	BOMSE 67 HBC + 2.3 K+P			7/67
W		56.	4.5	DE BAERE 67 HBC + 3.5 K+P (KO PI+)			7/67
W		53.	8.	DE BAERE 67 HBC + 3.5 K+P (K+ PIO)			7/67
W		68.	10.	SALLSTROM 67 HBC + 3. K+ P (KO PI+)			7/67
W		47.	10.	SALLSTROM 67 HBC + 3. K+ P (K+ PIO)			7/67
W		44.	7.	BARLOW 67 HBC +- 1.2 PBAR P			11/66
W		43.	9.	BARLOW 67 HBC +- 1.2 PBAR P			11/66
W		55.	7.	BARLOW 67 HBC +- 1.2 PBAR P			11/66
W		43.		CONFORTO 67 HBC +- 0. PBAR P			9/67
W	3870	46.0	3.0	WOJCICKI1 64 HBC ~ 1.7 K-P			
W		51.0	3.0	ADELMAN 65 HBC ~ 1.5 K-P			
W		50.0	15.0	GELSEMA 65 HBC ~ 1.5 K-P			
W		58.	7.	ADERHOLZ 68 HBC ~ 10 K- P			6/68
W		58.	16.	FICENEC 68 HBC ~ 1.3 K-P (K-PIO)			9/67
W		44.	13.	FICENEC 68 HBC ~ 1.3 K-P (KOPI-)			9/67
W		41.0	8.0	SCHWEINGR 68 HBC ~ 4.1 K-P			9/67
W		47.0	4.0	SCHWEINGR 68 HBC ~ 5.5 K-P			9/67

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

W										
W	200	60.0	5.0		ALEXANDER	62 HBC	+ 0 2.2 PI-P			
W		51.8	3.5		FERRO-LUZ	65 HBC	+ 0 3.6 K+P			
W		40.0			WANGLER	65 HBC	+ 0 3.0 PI- P			
W		60.	10.		FRENCH	67 HBC	+-0 3-4 PBAR P		6/67	
W										
W	70	60.0	10.0		COLLEY	62 HBC	0 2.0 PI-P			
W	200	50.0	5.0		KRAEMER	63 HBC	0 2.3 K+P			
W	150	50.0			SMITH	63 HBC	0 2.3 PI-P			
W		53.	13.		BARLOW	67 HBC	0 1.2 PBAR P		11/66	
W		34.	8.		BARLOW	67 HBC	0 1.2 PBAR P		11/66	
W		43.			CONFORTO	67 HBC	0 0. PBAR P		9/67	
W		44.	4.		DAUBER	67 HBC	0 2.0 K- P		12/66	
W		52.	12.		PICENEC	68 HBC	0 1.3 K-P (K-PI+)		9/67	
W		51.0	11.0		SCHWEINGR	68 HBC	0 5.5 K-P		9/67	
W		53.0	11.0		SCHWEINGR	68 HBC	0 4.1 K-P		9/67	
W		* * * * * * * * *								
W AVG		49.7498	1.0657	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)						

18 K* (890) PARTIAL DECAY MODES

P1	K* INTO K PI	S105 8
P2	K*(890) INTO (K PI PI)	S105 85 6

18 K* (890) BRANCHING RATIOS

R1 *	K*(890) INTO (K PI PI)/(K PI)			(P2)/(P1)	
R1	0 0.002 OR LESS		WOJCICKI2	64 HBC ~ 1.7 K-P	

REFERENCES FOR K*

ALSTON 61 PRL 6 300	ALSTON,ALVAREZ,EBERHARD,GOOD,GRAZIANO+/LRL	
ALEXANDE 62 PRL 8 447	ALEXANDER,KALBFLEISCH,MILLER,G SMITH //LRL	
COLLEY 62 CERN CONF 315	D COLLEY,N GELFAND + //// COLUMBIA+RUTGERS	
CHADWICK 63 PL 6 309	CHADWICK,CRENNELL,DAVIES,BETTINI+/OXF+PADU	
GOLDHABE 63 ATHENS CONF 92	SULAMITH GOLDHABER ////////////////////// LRL	
KRAEMER 63 ATHENS CONF 130	M KRAEMER L MADANSKY + //// JOHNS HOPKINS	
SMITH 63 PRL 10 138	SMITH,SCHWARTZ,MILLER,KALBFLEISCH,HUF+/LRL	
WOJCICK1 64 PR 135 B 484	STANLEY G WOJCICKI ////////////////////// LRL	
WOJCICK2 64 PR 135 B 495	S WOJCICKI,M ALSTON,G KALBFLEISCH //// LRL	
ADELMAN 69 ATHENS 527	STUART LEE ADELMAN // CAVENDISH	
FERRO-LU 65 NC 36 1101	FERRO-LUZZI,GEORGE,HENRI,JONGEJANS // CERN	
FERRO-LU 65 NC 39 417	FERRO-LUZZI,GEORGE,GOLDSCHMIDT-CLER+//CERN	
GELSEMA 65 THESIS	E.S.GELSEMA (SEE ALSO PL 10 341) / AMSTERD	
WANGLER 65 PR 137 B 414	WANGLER,ERWIN,WALKER //////////// WISCONSIN	
BARASH 67 PR 156 1399	BARASH,KIRSCH,MILLER,YAN //////// COLUMBIA	
BARLOW 67 NC 50 A 701	+MONTANET,D-ANGLAU+/CERN+GDF+IGR+LIVERPOOL	
BOMSE 67 PR 158 1298	+BORENSTEIN+COLE+GILLESPIE+ / JOHN HOPKINS	
CONFORTO 67 NP B3 469	+MARECHAL,MONTANET+//CERN+CF+IPN+LIVERPOOL	
DAUBER 67 PR 153 1403	+SCHLEIN,SLATER,TICHO ////////////////// UCLA	
DE BAERE 67 NC 51 A 401	+GOLDSCHMIDT-CLERMONT,HENRI+ /// BRUX+CERN	
FRENCH 67 NC 42A 442	+KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM	
GEORGE 67 NC 49A 9	+GOLDSCHMIDT-CLERMONT+HENRI+ /// CERN+BRUX	
SALLSTRO 67 NC 49A 346	SALLSTROM+OTTER+EKSPONG //////// STOCKHOLM	
ADEMOLZ 68 NP B 5 567	+DEUTSCHMANN+ / AACH+BERL+CERN+I.C.+VIENNA	
PICENEC 68 PR 169 1034	+HULSIZER+SWANSON+TROWER //////////// URBANA	
SCHWEING 68 PR 166 1317	SCHWEINGRUBER,GEBRICK,FIELDS,AMMAR+/ANL+NW	

$K_N(1100-1200)$

19 K*(1100-1200)

From a recent study of the Kπ interaction in $K^+p \to K^0\pi^-\pi^+p$ it is suggested that the s-wave, I = 3/2 phase shift increases smoothly from threshold, reaching 90° in the 1.1 to 1.2 GeV region, thus pointing to the existence of a broad s-wave resonance. See Peter H. Schlein, UCLA-1089 (March 1968), to be published in Proceedings of the University of Pennsylvania Conference on Meson Spectroscopy, April 1968.

$K_{3/2}(1175)$

24 KA 3/2 (1175,JP=) I = 3/2

EVIDENCE NOT COMPELLING, OMITTED FROM TABLE.
FOR A DISCUSSION SEE ROSENFELD 68

24 KA 3/2 (1175) MASS (MEV)

M *	23	1175.0		WANGLER	64 HBC	3.0 PI-P	
M *	15	1160.0	10.0	MILLER	65 HBC	2.7 PI-P	

24 KA 3/2 (1175) WIDTH (MEV)

W *	23	25.0	OR LESS	WANGLER	64 HBC	3.0 PI-P	
W *	15	35.0	10.0	MILLER	65 HBC	2.7 PI-P	

REFERENCES FOR KA3/2(1175)

WANGLER 64 PL 9 71	T P WANGLER,A R ERWIN,W D WALKER //WISCONS
MILLER 65 PL 15 74	MILLER,KOVACS,MCILWAIN,PALFREY +/// PURDUE
ROSENFEL 65 OXFORD CONF 58	A H ROSENFELD ////////////////// LRL--RVUE
ROSENFEL 68 UCRL-18266	A.H.ROSENFELD (PHILAD.CONF. MESON SP.)/LRL

$K_{3/2}(1270)$

25 KA3/2(1265,JP=) I=3/2

EVIDENCE NOT YET COMPELLING, OMITTED FROM TABLE
FOR A DISCUSSION SEE ROSENFELD 68

KA3/2 (1265) MASS (MEV)

M	1265.	10.		FRENCH	67 HBC	I=3/2 3-4 PBAR P	6/67

KA3/2 (1265) WIDTH (MEV)

W	50.	20.		FRENCH	67 HBC	I=3/2 3-4 PBAR P	6/67

KA3/2 (1265) PARTIAL DECAY MODES

P1	KA(1270) INTO K PI	S115 9	
P2	KA(1270) INTO K*(890) PI	U185 9	
P3	KA(1270) INTO K RHO	S110 9	

REFERENCES FOR K*3/2 (1265)

FRENCH 67 NC 52A 442	+KINSON+MCDONALD+RIDDIFORD+ //// CERN+BIRM
ROSENFEL 68 UCRL-18266	A.H.ROSENFELD (PHILAD.CONF. MESON SP.)/LRL

THERE EXIST MANY PAPERS REPORTING A BROAD I=1/2 (K PI PI) ENHANCEMENT IN THE MASS REGION 1.2-1.5 GEV. THE BUMP NEAR 1.4 GEV IS USUALLY ASSOCIATED WITH THE WELL-ESTABLISHED KN(1420), WHICH IS CLEARLY SEEN IN (K PI) DECAY. THE 1.2-1.4 GEV ENHANCEMENT IS PROBABLY DUE TO SOME COMBINATION OF DECK EFFECT AND ONE, TWO, OR THREE REAL RESONANCES. FOR CONVENIENCE OF PRESENTATION, WE HAVE GROUPED THE DATA UNDER THE NAMES OF THREE PARTICLES AND ONE PSEUDO-PARTICLE, RESPECTIVELY KA(1230), KA(1280), KA(1320), AND KA(1200-1350). UNDER THE LAST CATEGORY WE HAVE LISTED ALL EXPERIMENTS THAT REPORT A BROAD PEAK, WITH A WIDTH GREATER THAN 100 MEV. THE FOLLOWING FIGURE SHOWS THE MASSES AND WIDTHS OF REPORTED PEAKS.

SEE ALSO SKETCH AT END OF LISTING ~~~~

$K_A(1200-1350)$

KA(1200-1350) I=1/2

SEE NOTE ABOVE

28 KA(1200-1350) MASS (MEV)

M	200	1280.	20.		BERLINGHI	67 HBC	+ 12.7 K+ P		7/67
M	BERLINGHIERI VALUE IS FROM (K* PI) MODE. THE (K RHO) MASS PEAKS AT 1320,								
M	AN EFFECT THAT THEY ATTRIBUTE TO KINEMATICS NEAR (K RHO) THRESHOLD.								
M		1270.	APPROX.		DE BAERE	67 NBC	+ 3.5 K+ P		7/67

28 KA(1200-1350) WIDTH (MEV)

W	200	130.	15.		BERLINGHI	67 HBC	+ 12.7 K+ P		7/67
W		200.	APPROX.		DE BAERE	67 HBC	+ 3.5 K+ P		7/67

28 KA(1200-1350) PARTIAL DECAY MODES

P1 *	KA(1200-1350) INTO K*(890) PI	U18508	
P2 *	KA(1200-1350) INTO K RHO	S11U09	
P3 *	KA(1200-1350) INTO K PI	S11508	
P4 *	KA(1200-1350) INTO K ETA	S11514	
P5 *	KA(1200-1350) INTO K OMEGA	S11U01	

28 KA(1200-1350) BRANCHING RATIOS

R1	KA(1200-1350) INTO K*(890) PI AND K RHO (OVERLAPPING BANDS)						
R1	200 1.0			BERLINGHI	67 HBC	+	7/67
R2	KA(1200-1350) INTO (K PI) / TOTAL						
R2	0.02 OR LESS			BERLINGHI	67 HBC	+ 12.7 K+ P	11/67
R3	KA(1200-1350) INTO (K ETA) / TOTAL						
R3	0.02 OR LESS			BERLINGHI	67 HBC	+ 12.7 K+ P	11/67
R4	KA(1200-1350) INTO (K OMEGA) / TOTAL						
R4	0.02 OR LESS			BERLINGHI	67 HBC	+ 12.7 K+ P	11/67
R5	KA(1200-1350) INTO (K RHO) / (K*(890) PI)						
R5	0.91 0.29			BERLINGHI	67 HBC	+ 12.7 K+ P	11/67
R6	KA(1200-1350) INTO (K PI) / (K*(890) PI)						
R6	0.21 OR LESS			DE BAERE	67 HBC		11/66

REFERENCES FOR KA (1200-1350)

BERLINGH 67 PRL 18 1087	BERLINGHIERI+FARBER+FERBEL+FORMAN+ // ROCH IJP
DE BAERE 67 NC 49A 374	+DEBAISIEUX+FAST+PIL|PPAS+ ///// CERN+BRUX
	AND PRIVATE COMMUNICATION BY B. JONGEJANS
BOMSE 68 PRL 20 1519	+BORENSTEIN,CALLAHAN,COLE,COX,+ / JOHNHOPK 1+
GENEGRI 68 PRL 20 1194	+CALLAHAN+ETTLINGER+GILLESPIE+ // JOHNHOPK 1+

$K_A(1230)$

20 KA (1230,JP=) I=1/2

FORMERLY CALLED C MESON
(JP = 1+ FAVORED)

SEE NOTE PRECEDING KA(1200-1350)

20 KA (1230) MASS (MEV)

M		1230.0	15.0		BASSOMPIE	67 HBC	+ 5. K+ P		11/67
M		1250.0	10.0		GOLDHABER	67 HBC	9.0 K+ P		10/67
M	M	1242.	9.	10.	MARECHAL	68 HBC	+-0 0 PBAR P		6/68
M	M	1277.	9.	10.	MARECHAL	68 HBC	+-0 0 PBAR P		6/68
M	M	FITS1 FROM FIT WITHOUT KA(1320), SECOND WITH KA(1320).							
M		* * * * * * * * *							
M	AVG	1243.8462	9.2308	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)					

20 KA (1230) WIDTH (MEV)

W		60.0	20.0		BASSOMPIE	67 HBC	+ 5. K+ P		11/67
W		50.0	20.0		GOLDHABER	67 HBC	9.0 K+ P		10/67

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
W   M       127.       7.      25.     MARECHAL  68 HBC  +-0 0 PBAR P          6/68
W   M        83.      20.              MARECHAL  68 HBC  +-0 0 PBAR P          6/68
W   M      SEE NOTE M UNDER MASS ABOVE.
W          * * * * * * * * *
W   AVG     99.0000  14.1421   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

20 KA (1230) PARTIAL DECAY MODES

```
P1      KC INTO K RHO                                       S10U 9
P2      KC INTO K* PI                                       U18S 8
P3      KC INTO K PI PI                                     S11S 8S 8
```

20 KA (1230) BRANCHING RATIOS

```
R1  *   KA(1230) INTO (K RHO)/TOTAL  (UNITS OF 10**-2)  (P1)/TOTAL
R1          75.0     10.0            ARMENTERO 64 HBC       0.0 PBAR P

R2  *   KA(1230) INTO (K* PI)/TOTAL  (UNITS OF 10**-2)  (P2)/TOTAL
R2          25.0     10.0            ARMENTERO 64 HBC       0.0 PBAR P
```

REFERENCES FOR KA (1230)

```
ARMENTER 64 DUBNA CONF 1 577  ARMENTEROS,EDWARDS,D ANDLAU +//// CERN+CDF
                    SEE ALSO PL 9, 207
    ALSO    DUBNA CONF 1 617  R ARMENTEROS (RAPPORTEUR)
SEE ALSO 66 PR  145  1095     BARASH,KIRSCH,MILLER,YAN        // COLUMBIA

BASSOMPI 67 PL 268 30         BASSOMPIERRE,GOLDSCHMIDT+ //CERN+BRUX+BIRM IJP
GOLDHABER67 PRL 19  972       G.GOLDHABER,FIRESTONE,SHEN              // LRL
MARECHAL 68  PRIV. COMM.      +BARLOW, JAMES,+ /CERN+CDF+IPN.PARIS+LPOOL
```

$K_A(1280)$

26 KA(1280,JP=) I=1/2

SEE NOTE PRECEDING KA(1200-1350)

26 KA(1280) MASS (MEV)

```
M   S      1280.0                  SHEN      66 HBC  + 0 4.6 K+P          11/67
M   S   SEEN IN FIVE-BODY FINAL STATE. MAY BE ASSOCIATED WITH KA(1320).
M       35 1280.0      10.0        BASSOMPIE 67 HBC  +   5. K+ P          11/67
M   N   45 1300.                   CRENNELL  67 HBC    0 6 PI- P           7/67
M   N   THESE PEAKS MAY BETTER BE ASSOCIATED WITH THE KA(1320).
M   G      1250.0      10.0        GOLDHABER 67 HBC      9.0 K+ P          10/67
M   G   THIS PEAK MAY BETTER BE ASSOCIATED WITH THE KA(1230).
```

26 KA(1280) WIDTH (MEV)

```
W   S       100.0      20.0        SHEN      66 HBC  + 0 4.6 K+ P          11/67
W   S   SEEN IN FIVE-BODY FINAL STATE. MAY BE ASSOCIATED WITH KA(1320).
W       39   80.0      20.0        BASSOMPIE 67 HBC  +   5. K+ P          11/67
W   N   45   60.                   CRENNELL  67 HBC    0 6 PI- P           7/67
W   N   THESE PEAKS MAY BETTER BE ASSOCIATED WITH THE KA(1320).
W   G      150.0      20.0        GOLDHABER 67 HBC      9.0 K+ P          10/67
W   G   THIS PEAK MAY BETTER BE ASSOCIATED WITH THE KA(1230).
```

26 KA (1280) PARTIAL DECAY MODES

```
P1        KA INTO K*(890) PI                                U18S08
P2        KA INTO K RHO                                     S11U09
P3        KA INTO K OMEGA                                   S11U01
P4        KA INTO K PI                                      S10S 8
P5        KA INTO K ETA                                     S10S14
```

26 KA (1280) BRANCHING RATIOS

```
R1  *      KA(1280) INTO (K PI) / (K*(890) PI)
R1  S         0.8   OR LESS          SHEN      66 HBC     4.6 K+P          11/67
R1  S   SEEN IN FIVE-BODY FINAL STATE. MAY BE ASSOCIATED WITH KA(1320).
```

REFERENCES FOR KA(1280)

```
SHEN     66 PRL  17  726      *BUTTERWORTH,FU,GOLDHABER,TRILLING // LRL
BASSOMPI 67 PL 268 30         BASSOMPIERRE,GOLDSCHMIDT+ //CERN+BRUX+BIRM IJP
CRENNELL 67 PRL 19  44        *KALBFLEISCH,LAI,SCARR,SCHUMANN ////// BNL I
GOLDHABER67 PRL 19  972       G.GOLDHABER,FIRESTONE,SHEN              // LRL
```

$K_A(1320)$

21 KA (1320,JP=) I=1/2

(JP = 1+ FAVORED)
SEE NOTE PRECEDING KA(1200-1350)

21 KA (1320) MASS (MEV)

```
M       12 1320.0      25.0        ALMEIDA   65 HBC  +   3-5 K+  P
M       70 1320.0      10.0        SHEN      66 HBC  +   4.6 K+  P
M   S      1280.0                  SHEN      66 HBC  + 0 4.6 K+P          11/67
M   S   SEEN IN FIVE-BODY FINAL STATE. MAY BE ASSOCIATED WITH KA(1280).
M       35 1320.0      15.0        BASSOMPIE 67 HBC  +   5. K+ P          11/67
M   N   45 1300.                   CRENNELL  67 HBC    0 6 PI- P           7/67
M   N   THESE PEAKS MAY POSSIBLY BE ASSOCIATED WITH THE KA(1280).
M       1360.0      10.0        GOLDHABER 67 HBC      9.0 K+ P          10/67
M   *   1330.       12.         MARECHAL  68 HBC  +-0 0 PBAR P           6/68
M          * * * * * * * * *
M   AVG  1335.3584  11.2317   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.8)
                  (SEE IDEOGRAM, APPENDIX I)
```

21 KA (1320) WIDTH (MEV)

```
W       12   60.0      20.0        ALMEIDA   65 HBC  +   3-5 K+P
W       70   80.0      20.0        SHEN      66 HBC  +   4.6 K+P
W   S      100.0      20.0        SHEN      66 HBC  + 0 4.6 K+ P          11/67
W   S   SEEN IN FIVE-BODY FINAL STATE. MAY BE ASSOCIATED WITH KA(1280).
W       1          60.0      20.0        BASSOMPIE 67 HBC  +   5. K+ P          11/67
W   N   45   60.                   CRENNELL  67 HBC    0 6 PI- P           7/67
W   N   THESE PEAKS MAY POSSIBLY BE ASSOCIATED WITH THE KA(1280).
W          80.0      20.0            GOLDHABER 67 HBC      9.0 K+ P          10/67
W   *      120.      20.       30.   MARECHAL  68 HBC  +-0 0 PBAR P           6/68
W          * * * * * * * * *
W   AVG     70.0000  10.0000   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

21 KA (1320) PARTIAL DECAY MODES

```
P2        KA INTO K RHO                                     S11U09
P3        KA INTO K OMEGA                                   S11U01
P4        KA INTO K PI                                      S10S 8
P5        KA INTO K ETA                                     S10S14
P1        KA INTO K*(890) PI                                U18S08
```

21 KA (1320) BRANCHING RATIOS

```
R1  *      KA INTO K*(890) PI AND K RHO (OVERLAPPING BANDS)
R1      70    1.0                 SHEN      66 HBC  +   4.6 K+P

R2  *      KA INTO(K OMEGA)/(K*(890) PI)                    (P3)/(P1)
R2            0.1   OR LESS       SHEN      66 HBC  +   4.6 K+P

R8  *      KA (1320) INTO (K PI) / (K*(890) PI)             (P4)/(P1)
R8            0.30  OR LESS       SHEN      66 HBC  +   4.6 K+P

R9  *      KA (1320) INTO (K+ PI-) / (K+0 PI0+ PI-)
R9            0.2   OR LESS (CL=.90)  CRENNELL  67 HBC    0 6.0 PI-P          7/67

R10 *      KA (1320) INTO (K0 PI+ PI- PI0) / (K+0 PI0+ PI-)
R10           0.1   OR LESS (CL=.90)  CRENNELL  67 HBC    0 6.0 PI-P          7/67

R   *FOR I+ MONET SU3 RATES SEE E.G. GOLDHABER, REVIEW BERKELEY CONF.1966
```

REFERENCES FOR KA(1320)

```
ALMEIDA  65 PL 16 184         ALMEIDA,ATHERTON,BYER,DORNAN,PORSON+/CAMBR
SHEN     66 PRL  17  726      +BUTTERWORTH,FU,GOLDHABERS,TRILLING // LRL
  ALSO SHEN  BERKELEY CONF    +BUTTERWORTH,FU,GOLDHABERS,TRILLING // LRL

BASSOMPI 67 PL 268 30         BASSOMPIERRE,GOLDSCHMIDT+ //CERN+BRUX+BIRM IJP
CRENNELL 67 PRL 19  44        +KALBFLEISCH,LAI,SCARR,SCHUMANN ////// BNL I
GOLDHABER67 PRL 19  972       G.GOLDHABER,FIRESTONE,SHEN              // LRL
MARECHAL 68  PRIV. COMM.      +BARLOW, JAMES,+ /CERN+CDF+IPN.PARIS+LPOOL
```

$K_N(1420)$

22 KN (1420,JP=2+) I=1/2

JP = 3- IS UNLIKELY BUT NOT YET COMPLETELY RULED OUT.

22 KN(1420) MASS (MEV)

```
M          1404.0      15.0            FOCARDI   65 HBC   -0 3.  K- P (K PI)
M          1390.0      30.0            SHEN      66 HBC  + 0 4.6 K+ P (K PI)
M          1446.0       7.9            DAHL      67 HBC    0 4.PI- P (KPI)
M          1427.       15.0            DE BAERE  67 HBC  +  3.5 K+P (KO PI+)
M          1440.       24.0      40.   DE BAERE  67 HBC  +  3.5 K+P (K* PIO)
M          1430.0      20.0            GEORGE    67 HBC    0 5.  K+ P (K PI)
M          1423.       21.             ADERHOLZ  68 HBC   -  10 K- P (K PI)   6/68
M          1405.0      18.0            SCHWEINGR 68 HBC    0 4.1 K- P (K PI)  9/67
M          1401.0       8.0            SCHWEINGR 68 HBC   -  4.1 K- P (K PI)  9/67
M          1397.0      19.0            SCHWEINGR 68 HBC    0 5.5 K- P (K PI)  9/67
M          1427.0       9.0            SCHWEINGR 68 HBC   -  5.5 K- P (K PI)  9/67
M
M          1400.0      20.0            BADIER    65 HBC   -  3.  K- P (K*PI)
M          1430.0      10.0            SHEN      66 HBC  + 0 4.6 K+ P (K*PI)
M          1420.0      10.0            BASSOMPIE 67 HBC  +   5. K+ P (K 2PI) 11/67
M          1440.                       CRENNELL  67 HBC    0 6 PI- P (K 2PI)  7/67
M          1420.0      10.0            GOLDHABER 67 HBC      9.0 K+ P(K 2PI) 10/67
M
M   *     THE FOLLOWING VALUES ARE FROM BOTH (K PI) AND (K 2PI) MODES
M          1425.0      10.0            BISHOP    66 HBC  +   3.5 K+ P
M          1423.0       7.0            BASSANO   67 HBC   -0 4.6, 5.0 K- P   10/67
M       20 1440.0      20.0            DUBAL     68 MMS   -  11.5 K- P        6/68
M          * * * * * * * * *
M   AVG    1422.1783   3.3549   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)
                  (SEE IDEOGRAM, APPENDIX I)
```

22 KN(1420) WIDTH (MEV)

```
W           92.0      14.0            FOCARDI   65 HBC   -0 3.0 K- P (K PI)
W           75.0      25.0            SHEN      66 HBC     4.6 K+ P
W           61.0      24.0            DAHL      67 HBC    0 3.8-4.2 PI- P
W           90.0      28.0            DE BAERE  67 HBC  +   3.5 K+ P
W          110.0      40.0            GEORGE    67 HBC    0 5.0 K+ P
W          175.       57.             ADERHOLZ  68 HBC   -  10 K- P (K PI)   6/68
W          107.0      20.0            SCHWEINGR 68 HBC   -0 4.1+5.5 K-P       9/67
W
W          105.0      30.0            BADIER    65 HBC   -  3.0 K-P
W           80.0      20.0            BASSOMPIE 67 HBC  +   5. K+ P (K* PI) 11/67
W           80.0      20.0            GOLDHABER 67 HBC      9.0 K+ P(K 2PI) 10/67
W
W           96.0      10.0            BISHOP    66 HBC  +   3.5 K+ P
W           65.0      20.0            BASSANO   67 HBC   -0 4.6, 5.0 K- P   10/67
W          * * * * * * * * *
W   AVG     89.4076   5.6115   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
                  (SEE IDEOGRAM, APPENDIX I)
```

22 KN (1420) PARTIAL DECAY MODES

```
P1        KN(1420) INTO K PI                                S10S 8
P2        KN(1420) INTO K*(890) PI                          U18S 8
P3        KN(1420) INTO K RHO                               S10U 9
P4        KN(1420) INTO K OMEGA                             S10U 1
P5        KN(1420) INTO K ETA                               S10S14
```

22 KN(1420) BRANCHING RATIOS

```
R1  *    KN(1420) INTO (K PI)/TOTAL                        (P1)/TOTAL
R1  R          . 0.37      0.19            BADIER    65 HBC      3.0 K-P
R1  R            0.33      0.07            BISHOP    66 HBC      3.5 K+P
R1  R            0.30      0.11            BASSANO   67 HBC   -  4.6, 5.0 K- P   10/67
R1  R   THIS BRANCHING RATIO CONTAINS REDUNDANT INFORMATION, SINCE WE
R1  R   CONSTRAIN THE SUM OF ALL BRANCHING RATIOS TO BE 1.0
R1         * * * * * * * * *
R1  FIT        .808       .039    VALUE FROM CONSTRAINED FIT
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

```
R2  *    KN(1420) INTO (K*(890) PI) / TOTAL                (P2)/TOTAL
              .41      0.14          BADIER    65 HBC       3.0 K-P
R2            0.56     0.10          BISHOP    66 HBC       3.5 K+P
R2            0.47     0.10          BASSANO   67 HBC   ~  4.6, 9.0 K- P    10/67
R2          * * * * * * * * *
R2  AVG        .5150    .0707   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R2  FIT        .327     .037    VALUE FROM CONSTRAINED FIT

R3  *    KN(1420) INTO (K RHO)/TOTAL                       (P3)/TOTAL
R3            0.14     0.05          BADIER    65 HBC       3.0 K-P
R3            0.10     0.05          BISHOP    66 HBC       3.5 K+P
R3            0.14     0.10          BASSANO   67 HBC    O 4.6, 9.0 K- P    10/67
R3          * * * * * * * * *
R3  AVG        .1222    .0333   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R3  FIT        .110     .032    VALUE FROM CONSTRAINED FIT

R4  *    KN(1420) INTO (K OMEGA)/TOTAL                     (P4)/TOTAL
R4            0.07     0.04          BADIER    65 HBC       3.0 K-P
R4          * * * * * * * * *
R4  FIT        .034     .012    VALUE FROM CONSTRAINED FIT

R5  *    KN(1420) INTO (K ETA)/TOTAL                       (P5)/TOTAL
R5            0.02     0.02          BADIER    65 HBC       3.0 K-P
R5          * * * * * * * * *
R5  FIT        .020     .013    VALUE FROM CONSTRAINED FIT

R6  *    KN(1420) INTO (K*(890) PI) / (K PI)               (P2)/(P1)
R6          6    0.33     0.33          CHUNG     65 HBC   + O  3.9-4.2 PI- P
R6            0.65     0.20          SHEN      66 HBC     O  N* PRODUCED
R6            0.63     0.20          SHEN      66 HBC     NO N* PRODUCED
R6            0.52     0.12          SCHWEINGR 68 HBC     O 4.1+5.5 K- P     10/67
R6          * * * * * * * * *
R6  AVG        .5531    .0882   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
R6  FIT        .645     .108    VALUE FROM CONSTRAINED FIT

R7  *    KN(1420) INTO (K OMEGA) / K PI                    (P4)/(P1)
R7  *         0.08  OR LESS          SHEN      66 HBC       4.6 K+P
R7          * * * * * * * * *
R7  FIT        .067     .025    VALUE FROM CONSTRAINED FIT

R8  *    KN(1420) INTO (K RHO) / (K PI)                    (P3)/(P1)
R8  *         0.09  OR LESS          CHUNG     65 HBC   + O  3.9-4.2 PI- P
R8            0.26     0.16          SCHWEINGR 68 HBC     O 4.1+5.5 K- P     10/67
R8          * * * * * * * * *
R8  FIT        .217     .067    VALUE FROM CONSTRAINED FIT

R9  *    KN(1420) INTO (K RHO) / (K*(890) PI)               (P3)/(P2)
R9  *         0.39  OR LESS          BASSOMPIE 67 HBC   +   5. K+ P          9/67
R9  *         0.40  OR LESS  (CL=.90) FIELD     67 HBC   ~ 3.8 K- P          6/67

R10 *    KN(1420) INTO (K OMEGA) / (K*(890) PI)             (P4)/(P2)
R10           0.10     0.04          FIELD     67 HBC   ~ 3.8 K- P          6/67
R10         * * * * * * * * *
R10 FIT        .104     .038    VALUE FROM CONSTRAINED FIT

R11 *    KN(1420) INTO (K ETA) / (K*(890) PI)               (P5)/(P2)
R11           0.07     0.04          FIELD     67 HBC   ~ 3.8 K- P          6/67
R11         * * * * * * * * *
R11 FIT        .062     .043    VALUE FROM CONSTRAINED FIT

R12 *    KN(1420) INTO (K ETA) / (K PI)                     (P5)/(P1)
R12         * * * * * * * * *
R12 FIT        .040     .025    VALUE FROM CONSTRAINED FIT
R12 FIT        .040     .025    VALUE FROM CONSTRAINED FIT

R   *FOR 2+ NONET SU3 RATES SEE E.G. GLASHOW,SOCOLOW, PRL 15,329(65)

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES FOR KN(1420)

BADIER   65 PL 19 612          BADIER,DEMOULIN,GOLDBERG+//EP+SACLY+ZEEMAN
CHUNG    65 PRL  15  325       +DAHL,HARDY,HESS,JACOBS,KIRZ,MILLER // LRL
FOCARDI  65 PL 16 351          FOCARDI,MINGUZZI RANZI,SERRA+ /BOLOGNA+CERN

BISHOP   66 PRL 16 1069        BISHOP,GOSHAW,ERWIN,THOMPSON+ // WISCONSIN
SHEN     66  BERKELEY CONF     +BUTTERWORTH,FU,GOLDHABERS,TRILLING // LRL
ALSO SHEN66 PRL  17  726       +BUTTERWORTH,FU,GOLDHABERS,TRILLING // LRL
   ALSO 66  (PRIVATE COMM.)    GERSON GOLDHABER                    /// LRL

BASSANO  67 PRL  19  968       +GOLDBERG,GOZ,BARNES,LEITNER+/BNL+SYRACUSE
BASSOMPI 67 PL 268 30          BASSOMPIERRE,GOLDSCHMIDT+ //CERN+BRUX+BIRM IJP
CRENNELL 67 PRL 19  44         +KALBFLEISCH,LAI,SCARR,SCHUMANN ////// BNL
DAHL     67 PR 163 1377        +HARDY+HESS+KIRZ+MILLER ////////////// LRL
SEE ALSO 65 PRL 14 401         HARDY,CHUNG,DAHL,HESS,KIRZ,MILLER //// LRL
DE BAERE 67 NC 51 A 401        +GOLDSCHMIDT-CLERMONT,HENRI+ /// BRUX+CERN
FIELD    67 PL 248 638         +HENDRICKS+PICCIONI+YAGER ////// LAJOLLA
GEORGE   67 NC 49A 9           +GOLDSCHMIDT-CLERMONT+HENRI+ /// CERN+BRUX
GOLDHABER67 PRL 19  972        G.GOLDHABER,FIRESTONE,SHEN          // LRL

ADERHOLZ 68 NP B 5  567        +DEUTSCHMANN+ / AACH+BERL+CERN+I.C.+VIENNA
SEE ALSO 66 PL 22 357          BARTSCH,DEUTSCHMANN,MORRISON+ // ABCL(IC)V
DUBAL    68 THESIS   1456      L.DUBAL                          // GENEVE
SCHWEING 68 PR 166 1317        SCHWEINGRUBER,DERRICK,FIELDS,AMMAR+/ANL+NW
   ALSO  67  THESIS            F.L.SCHWEINGRUBER  / NORTHWESTERN,EVANSTON

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

$K_N(1660)$

```
                27  KN (1660, JP=  ?  I = 1/2

          EVIDENCE NOT COMPELLING, OMITTED FROM TABLE

_____ _____ _____ _____ _____ _____ _____ _____ _____

                27  KN (1660) MASS  (MEV)

M          1660.0                    CARMONY   67 HBC   ~  3.8 K-P,OMEGA K 11/67
M          1660.0      10.0          JOBES     67 HBC   +   5. K+ P          11/67
M   J  CLAIMED BY JOBES IN (K PI), (K*(890) PI), AND (K*(1420) PI) MODES.  11/67
M   J  JOBES 67 SEES THE K PI BUMP MOSTLY IN INTERFERENCE WITH N*(1236).   11/67

_____ _____ _____ _____ _____ _____ _____ _____ _____

                27  KN (1660) WIDTH (MEV)

W            40.0     20.0          JOBES     67 HBC   +   5. K+ P          11/67

_____ _____ _____ _____ _____ _____ _____ _____ _____
```

```
                27  KN (1660) PARTIAL DECAY MODES

P1      KN*(1660) INTO K PI                                    S10S 8
P2      KN*(1660) INTO K PI PI                                 S10S 8S 8
P3      KN*(1660) INTO K*(890) PI                              U18S 8
P4      KN*(1660) INTO KN*(1430) PI                            U22S 8

****** ********* ********* ********* ********* ********* ********* ********* *********

                              REFERENCES FOR KN(1660)

CARMONY  67 PRL  18  615       D.CARMONY,T.HENDRICKS,L.LANDER // LA JOLLA
JOBES    67 PL 268 49          +BASSOMPIERRE,DE BAERE + // BIRM+CERN+BRUX

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********
```

$K_A(1780)$

```
                23    KA (1780, JP=  1  I = 1/2

                (ALSO CALLED L MESON)
                (JP = 1+, 2- SEEM MOST LIKELY)

_____ _____ _____ _____ _____ _____ _____ _____ _____

                23   KA (1780) MASS (MEV)

M          1785.0      12.0          ABCLV COL 67 HBC   ~ 10.0 K- P          6/68
M       20 1780.                     BERLINGHI 67 HBC   +   12.7 K+P          7/67
M          1760.0      15.0          JOBES     67 HBC   +   5. K+ P          11/67
M                 * * * * * * * * *
M   AVG    1779.2439   12.1951   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)

_____ _____ _____ _____ _____ _____ _____ _____ _____

                23   KA (1780) WIDTH (MEV)

W           127.0      43.0          ABCLV COL 67 HBC   ~ 10.0 K- P          6/68
W       20   80.                     BERLINGHI 67 HBC   +   12.7 K+P          7/67
W            60.0      20.0          JOBES     67 HBC   +   5. K+ P          11/67
W                 * * * * * * * * *
W   AVG     71.9164   25.6203   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)

_____ _____ _____ _____ _____ _____ _____ _____ _____

                23   KA (1780) PARTIAL DECAY MODES

P1      KA   INTO K PI                                         S11S 9
P2      KA   INTO K RHO                                        S11U 9
P3      KA   INTO K*(890) PI                                   S 9U18
P4      KA   INTO K OMEGA                                      S11U 1
P5      KA   INTO K PI PI                                      S11S 9S 9
P6      KA   INTO K*(1420) PI                                  S 9U22
P7      KA   INTO K ETA                                        S11S14

_____ _____ _____ _____ _____ _____ _____ _____ _____

                23   KA (1780) BRANCHING RATIOS

R1  *   KA   INTO (K PI)/TOTAL                                 (P1)/TOTAL
R1              0.023 OR LESS          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

R2  *   KA   INTO (K RHO)/TOTAL
R2              0.099    0.06          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

R3  *   KA   INTO (K*(890) PI)/TOTAL
R3              0.244    0.08          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

R4  *   KA   INTO (K OMEGA)/TOTAL
R4              0.048    0.02          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

R6  *   KA   INTO (K PI PI)/(TOTAL)                           (P5)/TOTAL
R6              0.445    0.15          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

R7  *   KA   INTO (K*(1420) PI) / TOTAL                       (P6)/TOTAL
R7              0.164    0.08          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

R8  *   KA   INTO (K ETA)/TOTAL                               (P7)/TOTAL
R8              0.01  OR LESS          ABCLV COL 67 HBC   ~ 10.0 K- P          10/67

****** ********* ********* ********* ********* ********* ********* ********* *********

                              REFERENCES FOR KA(1780)

ABCLV CO 67 HEIDBG CONF P.43   AACHEN+BERLIN+CERN+LONDON IC+VIENNA COLLAB
SEE ALSO 66 PL 22 357          BARTSCH,DEUTSCHMANN,MORRISON+ // ABCL(IC)V
BERLINGH 67 PRL 18 1087        BERLINGHIERI+FARBER+FERBEL+FORMAN+ // ROCH I
JOBES    67 PL 268 49          +BASSOMPIERRE,DE BAERE + // BIRM+CERN+BRUX
DENEGRI  68 PRL 20 1194        +CALLAHAN+ETTLINGER+GILLESPIE+ // JOHNHOPK   2-

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********
```

$K^*(2240)$

```
                89    K* (2240, JP=  ?  I=1/2

          ENHANCEMENT SEEN IN (ANTIHYPERON+NUCLEON) MASS.
          EVIDENCE NOT COMPELLING, OMITTED FROM TABLE.

_____ _____ _____ _____ _____ _____ _____ _____ _____

                89   K* (2240)  MASS (MEV)

M       15 2240.       20.           ALEXANDER 68 HBC  + 0 9 K+P,YBAR+N*..  6/68

_____ _____ _____ _____ _____ _____ _____ _____ _____

                89   K* (2240)  WIDTH (MEV)

W       15   70.       20.           ALEXANDER 68 HBC  + 0 9 K+P,YBAR+N*..  6/68

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES FOR K*(2240)

ALEXANDE 68 PRL 20 755         ALEXANDER,FIRESTONE,GOLDHABER,SHEN /// LRL

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

CODE EVENTS QUANTITY ERROR+ ERROR- REFERENCE YR TECN SIGN COMMENTS DATE PUNCHED
ABOVE BACKGROUND

p

16 PROTON (938, J=1/2) I=1/2

SEE LISTINGS OF STABLE PARTICLES

n

17 NEUTRON (939, J=1/2) I=1/2

SEE LISTINGS OF STABLE PARTICLES

Δ(1236)

81 N*3/2(1236, JP=3/2+) I=3/2 P33

81 N*3/2(1236) MASS (MEV)

M	*	1234.0		ROPER	65	RVUE	0++	PHASE-SHIFT ANAL	
M	*	1235.8		DONNACHIE	68	RVUE		PHASE-SHIFT ANAL	6/68
M	+	1236.0	0.55	OLSSON	65	RVUE	++	TOTAL-SIGMA DATA	
M	+	1232.0	6.0	FERRO-LUZ	65	HBC	++	K+P TO KO P PI+	
M	*	1233.4	4.4	GIDAL	66	DBC	++	D D TO NN(NN) PI	7/66
M	+	1236.0		DEANS	66	RVUE	++	PI+P TOTAL	7/66
M	0	1236.45	0.65	OLSSON	65	RVUE	0		
M	- *	1241.3	5.1	GIDAL	66	DBC	-		7/66

81 N*(0) - N*(++) MASS DIFFERENCE (MEV)

D	R	0.45	0.85	OLSSON	65	RVUE
D	R	REDUNDANT WITH DATA IN MASS LISTING.				

81 N*(-) - N*(++) MASS DIFFERENCE (MEV)

D	7.9	6.8	GIDAL	66	DBC

81 N*3/2(1236) WIDTH (MEV)

W	*	125.1		DONNACHIE	68	RVUE			6/68
W	+	120.0	2.0	OLSSON	65	RVUE	++		
W	+ *	125.0	30.0	FERRO-LUZ	65	HBC	++		
W	+ *	124.0	14.0	GIDAL	66	DBC	++		7/66
W	+	121.0		DEANS	66	RVUE	++		7/66
W	0	119.6	2.4	OLSSON	65	RVUE	0		
W	- *	149.0	18.0	GIDAL	66	DBC	-		7/66

81 N*3/2(1236) PARTIAL DECAY MODES

P1	N*3/2(1236) INTO PI N	S 8S16	
P2	N*3/2(1236) INTO N GAMMA	S 0S16	

81 N*3/2(1236) BRANCHING RATIOS

R1	N*3/2(1236) INTO (N GAMMA)/TOTAL	(PERCENT)		(P2)/(P1)		
R1	0.55	0.02	DALITZ	66	RVUE	7/68

REFERENCES --- N*3/2(1236)

OLSSON	65 PRL 14 118	M G OLSSON	//WISC
FERRO-LU	65 NC 36 1101	FERRO-LUZZI,GEORGE, +	//CERN
ROPER	65 PR 138 B190	L D ROPER, R M WRIGHT, B T FELD	//LRL,MIT JP
DALITZ	66 PR 146 1180	DALITZ,SUTHERLAND //	OXFORD
DEANS	66 PREPRINT	S R DEANS, W G HOLLADAY	//VANDERBILT
GIDAL	66 PR 141 1261	G GIDAL, A KERNAN, S KIM	//LRL
DONNACHI	68 PL 268 161	A DONNACHIE, R G KIRSOPP, C LOVELACE	//CERN IJP

FOR EXTENSIVE REFERENCES TO DATA AND PHASE-SHIFT ANALYSES TILL 1965, SEE ROPER 65, ESPECIALLY APPENDIX II.

N(1470)

61 N*1/2(1470, JP=1/2+) I=1/2 P11

THE LEAST DISPUTABLE EVIDENCE FOR A P11 RESONANCE COMES FROM PHASE-SHIFT ANALYSES, AND IT IS FROM THESE THAT WE TAKE THE RESONANCE PARAMETERS. WHETHER THE BUMP NEAR 1400 MEV SEEN IN THE RECOIL INVARIANT MASS IN INELASTIC-SCATTERING EXPERIMENTS IS A RESONANCE OR A KINEMATIC EFFECT IS A SUBJECT OF DEBATE. BOTH EFFECTS MAY IN FACT BE PRESENT. WE CONTINUE TO LIST (BUT NOT AVERAGE) THE MASS OF A BUMP BELIEVED BY ITS OBSERVERS TO BE THE N*(1470), AND REFER TO GELLERT 66, WALKER 68, AND THE LITERATURE FOR NEGATIVE VIEWPOINTS. EVIDENCE FOR A RESONANCE IN PRODUCTION EXPERIMENTS GIVEN BY BELL 68

SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

61 N*1/2(1470) MASS (MEV)

M	*	1400.0	APPROX	COCCONI	64	CNTR	+	PP 3.6-12 BEV/C	
M	*	1425.0	APPROX	ADELMAN	64	HBC	+	K-P 1.45 BEV/C	7/66
M	*	1430.0	APPROX	ANKENBRAN	65	CNTR	+	PP 7.1 BEV/C	7/66
M	*	1400.0	APPROX	BELLETTIN	65	SPRK	+	PP,0 10-26 BEV/C	7/66
M	*	1405.0	15.0	ANDERSON	66	SPRK	+	PP 6-30 BEV/C	9/66
M	*	1410.0	15.0	BLAIR	66	CNTR	+	PP 2.8-7.9 BEV/C	9/66
M	*	1450.0	15.0	ALMEIDA	67	HBC	+	PP 2PI 10 BEV/C	9/66
M	*	1400.0	30.0	FOLEY	67	CNTR		PI+- P AND PP	11/67
M	*	1420.0		BELL	68	HBC		PI+- P, 6 BEV/C	6/68
M	*	1400.0	APPROX	LAMSA	68	HBC		P- P 8 BEV/C	6/68
M	*	1380.0		ROPER	65	RVUE		PHASE-SHIFT ANAL	9/66
M	*	1370.0		BRANDSEN	65	RVUE		PHASE-SHIFT ANAL	9/66
M	1	1470.0		BAREYRE	68	RVUE		PHASE-SHIFT ANAL	11/67
	1	WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.							
M	2	1505.0		BAREYRE	68	RVUE		PHASE-SHIFT ANAL	11/67
	2	WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM							
	2	IS GREATEST.							
M	3	1466.0		DONNACHIE	68	RVUE		PHASE-SHIFT ANAL	6/68
	3	WHERE THE ABSORPTION IS GREATEST.							

61 N*1/2(1470) WIDTH (MEV)

W	1	255.0		BAREYRE	68	RVUE			11/67
W	2	205.0		BAREYRE	68	RVUE			11/67
W	3	211.0		DONNACHIE	68	RVUE			6/68
	SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.								
W		100.0		BELL	68	HBC		PI+- P, 6 BEV/C	6/68

61 N*1/2(1470) PARTIAL DECAY MODES

P1	N*1/2(1470) INTO PI N	S 8S16	
P2	N*1/2(1470) INTO N SIGMA (SIGMA MESON)	S16U 7	
P3	N*1/2(1470) INTO N*3/2(1236) PI	U8lS 8	

61 N*1/2(1470) BRANCHING RATIOS

R1	N*1/2(1470) INTO (PI N)/TOTAL			(P1)/TOTAL		
R1	1	0.68		BAREYRE	68	RVUE	11/67
R1	3	0.658		DONNACHIE	68	RVUE	6/68
	SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.						
R2	N*1/2(1470) INTO (N SIGMA)/TOTAL			(P2)/TOTAL		
R2	DOMINANT INELASTIC DECAY		THURNAUER	69	RVUE	~	11/67
R2	DOMINANT INELASTIC DECAY		NAMYSLOWS	66	RVUE	~	11/67
R2	DOMINANT INELASTIC DECAY		ROSENFELD	67	RVUE	~	11/67
R2	DOMINANT INELASTIC DECAY		MORGAN	68	RVUE	ISOBAR MODEL	6/68

REFERENCES --- N*1/2(1470)

COCCONI	64 PL 8 134	+LILLETHUN,SCANLON,STAHLBRANDT, +	//CERN
ADELMAN	64 PRL 13 555	S L ADELMAN	//CAMBRIDGE(CERN)
ANKENBRA	65 NC 35 1052	ANKENBRANDT,CLYDE,CORK,KEEFE,KERTH,+	//LRL
BELLETTI	65 PL 18 167	BELLETTINI,COCCONI,DIDDENS, +	//CERN
BRANDSEN	65 PR 139 B1566	+ODONNELL, MOORHOUSE	//DURHAM,RTHPD IJP
ROPER	65 PR 138 B190	LD ROPER,RM WRIGHT,BT FELD	//LRL-LVMR,MIT IJP
THURNAUE	65 PRL 14 985	P G THURNAUER	//ROCH
ANDERSON	66 PRL 16 855	+BLESER,COLLINS,FUJII, +	//BNL,CARNEGIE
BLAIR	66 PRL 17 789	+TAYLOR,CHAPMAN,+//HARWELL,QUEENMARY,RTHPD	
GELLERT	66 PRL 17 884	+SMITH,WOJCICKI,COLTON,SCHLEIN,+//LRL,UCLA	
NAMYSLOW	66 PR 157 1328	NAMYSLOWSKI,RAZMI,ROBERTS	//STAN,EDIN8,IC
ALMEIDA	67 NC 50A 1000	+RUSHBROOKE, +	//CAVNDSH,HAMBURG
FOLEY	67 PRL 19 397	+JONES,LINDENBAUM,LOVE,OZAKI, +	//BNL
ROSENFEL	67 IRVINE CONF	A H ROSENFELD, P SODING	//LRL
BAREYRE	68 PR 165 1731	P BAREYRE, C BRICMAN, G VILLET	//SACLAY IJP
BELL	68 PRL 20 164	+CRENNELL,HOUGH,KARSHON,LAI, +	//BNL,CCNY
DONNACHI	68 PL 268 161	A DONNACHIE, R G KIRSOPP, C LOVELACE	//CERN IJP
LAMSA	68 PR 166 1395	+CASON,BISWAS,DERADO,GROVES,+	//NOTRE DAME
MORGAN	68 PR 166 1731	D MORGAN	//RTHPD
WALKER	68 PRL 20 133	+THOMPSON,ROBERTSON,OH,LEE,HARTUNG,+	//WISC

PAPERS NOT REFERRED TO IN DATA CARDS.

BAREYRE	64 PL 8 137	+BRICMAN,VALLADAS,VILLET, +	//SACLAY,CAEN IJ
ADELMAN	65 PRL 14 1043	S L ADELMAN	//CAMBRIDGE(CERN)
DALITZ	65 PL 14 159	R H DALITZ, R G MOORHOUSE	//OXF,RTHPD
	--- DALITZ 65 REVIEWS EARLY PHASE-SHIFT-ANALYSIS RESULTS (AND DISCUSSES WHETHER THEY IN FACT REQUIRE THE EXISTENCE OF A RESONANCE).		
BAREYRE	65 PL 18 342	+BRICMAN, STIRLING, VILLET	//SACLAY IJP
FRIDMAN	66 PL 23 386	+MAURER,MICHALON, +	//STRASBOURG,HEIDEL
LOVELACE	67 HEIDELBERG C. 79	C LOVELACE	//CERN IJP
JOHNSON	67 UCRL-17683 THESIS	C H JOHNSON	//LRL
	THE FOLLOWING ARE THEORETICAL PAPERS CONCERNING THE N*1/2(1470) ---		
RESNICK	66 PR 150 1292	L RESNICK	//NIELS BOHR
SCHWARZ	66 PR 152 1325	J H SCHWARZ	//LRL
GOLDBERG	67 PR 154 1558	H GOLDBERG	//CORNELL
BALL	67 PR 155 1725	JS BALL, GL SHAW, DY WONG	//UCLA,UCI,UCSD

N(1518)

62 N*1/2(1518, JP=3/2-) I=1/2 D13

SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

62 N*1/2(1518) MASS (MEV)

M	*	1536.0		ROPER	65	RVUE		PHASE-SHIFT ANAL	9/66
M	*	1530.0		BRANDSEN	65	RVUE		PHASE-SHIFT ANAL	9/66
M	1	1510.0		BAREYRE	68	RVUE		PHASE-SHIFT ANAL	11/67
	1	WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.							
M	2	1515.0		BAREYRE	68	RVUE		PHASE-SHIFT ANAL	11/67
	2	WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM							
	2	IS GREATEST.							
M	3	1541.0		DONNACHIE	68	RVUE		PHASE-SHIFT ANAL	6/68
	3	WHERE THE ABSORPTION IS GREATEST.							

62 N*1/2(1518) WIDTH (MEV)

W	1	125.0		BAREYRE	68	RVUE			11/67
W	2	110.0		BAREYRE	68	RVUE			11/67
W	3	149.0		DONNACHIE	68	RVUE			6/68
	SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.								

62 N*1/2(1518) PARTIAL DECAY MODES

P1	N*1/2(1518) INTO PI N	S 8S16	
P2	N*1/2(1518) INTO N*3/2(1236) PI	U8lS 8	
P3	N*1/2(1518) INTO N PI PI	S16S 8S 8	
P4	N*1/2(1518)+ INTO NEUTRON PI+	S17S 8	
P5	N*1/2(1518)+ INTO PROTON PI+ PI-	S16S 8S 8	
P6	N*1/2(1518) INTO N ETA	S17S14	
P7	N*1/2(1518) INTO N SIGMA (SIGMA MESON)	S17U 7	

62 N*1/2(1518) BRANCHING RATIOS

R1	N*1/2(1518) INTO (PI N)/TOTAL			(P1)/TOTAL		
R1	1	0.54		BAREYRE	68	RVUE	11/67
R1	3	0.509		DONNACHIE	68	RVUE	6/68
	SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.						
	ALMOST THE ENTIRE INELASTICITY IS IN N PI PI (ONLY N ETA COULD COMPETE, AND IT DOESN'T). THE N PI PI SEEMS TO BE MAINLY N*3/2(1236) PI, IN BOTH S AND D WAVES.						
R2	N*1/2(1518) INTO (N*3/2(1236) PI)/TOTAL			(P4)/TOTAL		
R2	DOMINANT INEL DECAY		OLSSON	66	RVUE	PI P TO PI PI N	9/66
R2	0.20	0.05	KIRZ	66	HBC	0 ASSUMING R1=0.72	9/66
R3	N*1/2(1518) INTO (N PI)/(N PI PI)			(P1)/(P3)		
R3	1.25	0.44	0.71	A-BORELLI	67	HBC	0 PBAR P 5.7 BEV/C	9/66
R4	N*1/2(1518) INTO (N*3/2(1236) PI)/(N PI PI)			(P2)/(P3)		
R4	0.00	0.09		A-BORELLI	67	HBC		9/66
R4	LARGE			THURNAUER	69	RVUE	~	11/67
R4	LARGE			NAMYSLOWS	66	RVUE	~	11/67
R4	LARGE			ROBERTS	67	RVUE	~	11/67
R4	LARGE			ROSENFELD	67	RVUE	~	11/67
R2	LARGE			MORGAN	68	RVUE	ISOBAR MODEL	6/68
R5	N*1/2(1518) INTO (NEUTRON PI+)/(P PI+ PI-)			(P4)/(P5)		
R5	0.77	0.45		ALEXANDER	67	HBC	* PP 5.5 BEV/C	9/66

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
R6          N*1/2(1518) INTO (PI N)/(PI N*3/2(1236))          (P1)/(P2)
R6            0.42    OR LESS          LEE       67 HBC                    11/67

R7          N*1/2(1518) INTO (N ETA)/TOTAL                    (P6)/TOTAL
R7            0.006     APPROX          DAVIES    67 RVUE                   11/67
     DAVIES 67 GIVES SEVERAL VALUES DEPENDING ON INPUT DATA.  ALL ARE SMALL.

R8          N*1/2(1518) INTO (N SIGMA)/TOTAL                  (P7)/TOTAL
R8            PROBABLY PRESENT          MORGAN    68 RVUE     ISOBAR MODEL      6/68

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES -- N*1/2(1518)

          SEE A PREVIOUS EDITION (RMP 37, 633, 1965) FOR EARLIER REFERENCES.

ROPER     65 PR 138 B190        LD ROPER,RM WRIGHT,BT FELD   //LRL-LVMR,MIT IJP
BRANDSEN  65 PR 139 B1566       +ODONNELL, MOORHOUSE         //DURHAM,RTHFD IJP
THURNAUE  65 PRL 14 985         P G THURNAUER                //ROCH
NAMYSLOW  66 PR 147 1328        NAMYSLOWSKI,RAZMI,ROBERTS  //STAN,EDINB,IC
KIRZ      66 PRIVATE COMM       J KIRZ                       //LRL
    ---  NUMBER EXTRACTED FROM DATA DISCUSSED IN KIRZ 63.
OLSSON    66 PR 145 1309        M G OLSSON, G B YODH          //WISC,MD
A-BORREL  67 NC 47 232          ALLES-BORELLI,FRENCH,FRISK,MICHEJDA //CERN
ALEXANDE  67 PR 154 1284        ALEXANDER,BENARY,CZAPEK,+ //WEIZMANN(CERN)
LEE       67 PR 159 1156        +MOEBS,ROE,SINCLAIR,VANDER VELDE    //MICH
ROBERTS   67 PREPRINT           R G ROBERTS                  //DURHAM
ROSENFEL  67 IRVINE CONF        A H ROSENFELD, P SODING        //LRL
DAVIES    67 NC 52A 1112        A T DAVIES, R G MOORHOUSE  //GLASGOW,RTHFD

MORGAN    68 PR 166 1731        D MORGAN                     //RTHFD
BAREYRE   68 PR 165 1731        P BAREYRE, C BRICMAN, G VILLET   //SACLAY IJP
DONNACHI  68 PL 268 161         A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

                          PAPERS NOT REFERRED TO IN DATA CARDS.

KIRZ      63 PR 130 2481        J KIRZ, J SCHWARTZ, R D TRIPP      //LRL
CROUCH    69 DESY CONF II 21    +  //BROWN,CEA,HARVARD,MIT,PADOVA,WEIZMANN
DERADO    65 ATHENS CONF 264    +KENNEY,LAMSA, +      //NOTRE DAME,KENTUCKY
BAREYRE   69 PL 28 342          + BRICMAN, STIRLING, VILLET       //SACLAY IJP
MERLO     66 P ROY SOC 289 489  J P MERLO, G VALLADAS              //SACLAY
    --- THE ABOVE PAPERS DISCUSS INELASTIC CHANNELS NEAR THE RESONANCE.
LOVELACE  67 HEIDELBERG C. 79   C LOVELACE                      //CERN IJP
JOHNSON   67 UCRL-17683 THESIS  C H JOHNSON                      //LRL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(1550)

```
                63  N*1/2(1550, JP=1/2-) I=1/2     S11

                 SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

                63  N*1/2(1550) MASS (MEV)    ------------------------------

M   *      1519.0                       HENDRY    65 RVUE    ETA N + S11 PI N  9/66
M          1570.0                       MICHAEL   66 RVUE    FITS BAREYRE S11  7/66
M   N      1597.0  OR  1565.0           UCHIYAMA- 66 RVUE    FITS N ETA DATA   9/66
M   N      FITTING GIVES TWO SOLUTIONS.  PROBLEMS MATCHING PI P PHASE SHIFTS.
M   1      1535.0                       BAREYRE   68 RVUE    PHASE-SHIFT ANAL 11/67
    1      WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.
M   2      1515.0                       BAREYRE   68 RVUE    PHASE-SHIFT ANAL 11/67
    2      WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM
    2      IS GREATEST.
M   3      1591.0                       DONNACHIE 68 RVUE    PHASE-SHIFT ANAL  6/68
    3      WHERE THE ABSORPTION IS GREATEST.

-----------------   63  N*1/2(1550) WIDTH (MEV)    ------------------------------

W   *       130.0                       HENDRY    65 RVUE                     9/66
W           130.0                       MICHAEL   66 RVUE                     7/66
W   N       156.0  OR  144.0           UCHIYAMA- 66 RVUE    SEE NOTE ON MASS  9/66
W   1       155.0                       BAREYRE   68 RVUE                    11/67
W   2       105.0                       BAREYRE   68 RVUE                    11/67
W   3       268.0     APPROX            DONNACHIE 68 RVUE                     6/68
       SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

-----------------   63  N*1/2(1550) PARTIAL DECAY MODES    ------------------------

P1          N*1/2(1550) INTO PI N                          $ 8S16
P2          N*1/2(1550) INTO N ETA                         S17S14
P3          N*1/2(1550) INTO N PI PI                       S16S 8S 8

-----------------   63  N*1/2(1550) BRANCHING RATIOS    ------------------------

R1          N*1/2(1550) INTO (PI N)/TOTAL                  (P1)/TOTAL
R1  *         0.69                       HENDRY    65 RVUE                     9/66
R1  *         0.32                       MICHAEL   66 RVUE                     9/66
R1  N         0.71  OR  0.28            UCHIYAMA- 66 RVUE    SEE NOTE ON MASS  9/66
R1            0.31   OR   0.43          DAVIES    67 RVUE    SOLUT. B OR C    11/67
R1  3         0.696                     DONNACHIE 68 RVUE                     6/68

R2          N*1/2(1550) INTO (N ETA)/TOTAL                 (P2)/TOTAL
R2            DOMINANT INEL DECAY       HENDRY    65 RVUE                     9/66
R2            0.68                      MICHAEL   66 RVUE                     9/66
R2  N         0.29  OR  0.71            UCHIYAMA- 66 RVUE    SEE NOTE ON MASS  9/66
R2            0.69   OR   0.45          DAVIES    67 RVUE    SOLUT. B OR C    11/67

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES -- N*1/2(1550)

HENDRY    65 PL 18 171          A W HENDRY, R G MOORHOUSE          //RTHFD
    ---  REVIEWS EARLY PHASE-SHIFT-ANALYSIS RESULTS AND PI- P TO ETA N
         EXPERIMENTS.  WE TAKE NUMBERS FROM THE SOLUTION USING BRANDSEN 65.
BAREYRE   65 PL 18 342          + BRICMAN, STIRLING, VILLET       //SACLAY IJP
MICHAEL   66 PL 21 93           C MICHAEL                         //OXF
UCHIYAMA  66 PR 149 1220        F UCHIYAMA-CAMPBELL, R K LOGAN       //ILL IJP
DAVIES    67 NC 52A 1112        A T DAVIES, R G MOORHOUSE  //GLASGOW,RTHFD
BAREYRE   68 PR 165 1731        P BAREYRE, C BRICMAN, G VILLET   //SACLAY IJP
DONNACHI  68 PL 268 161         A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

                          PAPERS NOT REFERRED TO IN DATA CARDS.

BRANDSEN  65 PR 139 B1566       +ODONNELL, MOORHOUSE          //DURHAM,RTHFD IJP
    ---  BASIS OF NUMBERS WE QUOTE FROM HENDRY 65.
LOVELACE  67 HEIDELBERG C. 79   C LOVELACE                       //CERN IJP
JOHNSON   67 UCRL-17683 THESIS  C H JOHNSON                      //LRL

          THERE IS GETTING TO BE A WHOLE LITERATURE ON THE REACTIONS PI- P TO
          ETA N AND GAMMA P TO ETA P NEAR THRESHOLD AND THEIR CONNECTION WITH
          THE BEHAVIOR OF THE S11 AMPLITUDE AS DETERMINED IN PI P PHASE-SHIFT
          ANALYSIS.  THE READER IS INVITED TO PERUSE THE FOLLOWING RATHER IN-
          DIGESTIBLE COLLECTION.  FURTHER REFERENCES MAY BE FOUND IN THESE.

           MAINLY EXPERIMENTAL ---
BULOS     66 PRL 13 486         +      //BROWN,BRANDEIS,HARVARD,MIT,PADOVA  I
RICHARDS  66 PRL 16 1221        +CHIU,EANDI,HELMHOLZ,KENNEY,+ //LRL,HAWAII  IJ
JONES     66 PL 23 597          +BINNIE,DUANE,HORSEY,MASON,+//IMPCOL,RTHFD
BACCI     66 NC 45A 983         +PENSO,SALVINI,MENCUCCINI,+//ROME,FRASCATI IJP
PREPOST   67 PRL 18 82          R PREPOST, D LUNDQUIST, D QUINN //STANFORD
           MAINLY THEORETICAL ---
DOBSON    66 PR 146 1022        P N DOBSON                       //HAWAII
MINAMI    66 PR 147 1123        S MINAMI                          //OSAKA

BALL      66 PR 149 1191        J S BALL                           //UCLA

LOGAN     67 PR 153 1634        R K LOGAN, F UCHIYAMA-CAMPBELL       //ILL
MENCUCCI  67 NC 48A 579         C MENCUCCINI, A REALE          //FRASCATI
DEANS     67 PR 161 1466        S R DEANS, W G HOLLADAY      //VANDERBILT
MINAMI    67 PR 162 1619        S MINAMI                          //OSAKA
MOSS      67 PR 163 1785        T A MOSS                            //LSU
DEANS     68 PR 165 1886        S R DEANS, W G HOLLADAY      //VANDERBILT
PAL       68 PR 167 1350        B K PAL                     //NPL NEW DELHI

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Δ(1640)

```
                82  N*3/2(1640, JP=1/2-) I=3/2     S31

                 SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

                82  N*3/2(1640) MASS (MEV)    ------------------------------

M   *      1648.0      12.0             DEVLIN    65 CNTR    PI+- P TOTAL
M   1      1695.0                       BAREYRE   68 RVUE    PHASE-SHIFT ANAL 11/67
    1      WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.
M   2      1650.0                       BAREYRE   68 RVUE    PHASE-SHIFT ANAL 11/67
    2      WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM
    2      IS GREATEST.
M   3      1635.0                       DONNACHIE 68 RVUE    PHASE-SHIFT ANAL  6/68
    3      WHERE THE ABSORPTION IS GREATEST.

-----------------   82  N*3/2(1640) WIDTH (MEV)    ------------------------------

W   1       250.0                       BAREYRE   68 RVUE                    11/67
W   2       130.0                       BAREYRE   68 RVUE                    11/67
W   3       177.0                       DONNACHIE 68 RVUE                     6/68
       SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

-----------------   82  N*3/2(1640) PARTIAL DECAY MODES    ------------------------

P1          N*3/2(1640) INTO PI N                          $ 8S16

-----------------   82  N*3/2(1640) BRANCHING RATIOS    ------------------------

R1          N*3/2(1640) INTO (PI N)/TOTAL                  (P1)/TOTAL
R1  3         0.284                     DONNACHIE 68 RVUE                     6/68

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES -- N*3/2(1640)

DEVLIN    65 PRL 14 1031        T J DEVLIN,J SOLOMON,G BERTSCH //PRINCETON  I
BAREYRE   68 PR 165 1731        P BAREYRE, C BRICMAN, G VILLET     //SACLAY IJP
DONNACHI  68 PL 268 161         A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

                          PAPERS NOT REFERRED TO IN DATA CARDS.

CARRUTHE  60 PRL 4 303          P CARRUTHERS                      //CORNELL  I
DEVLIN    62 PR 125 690         T J DEVLIN, B J MOYER, V PEREZ-MENDEZ//LRL  I
HELLAND   64 PR 134 B1062       +DEVLIN,HAGGE,LONGO,MOYER,WOOD       //LRL  I
BAREYRE   65 PL 18 342          + BRICMAN, STIRLING, VILLET       //SACLAY IJP
LOVELACE  67 HEIDELBERG C. 79   C LOVELACE                       //CERN IJP
JOHNSON   67 UCRL-17683 THESIS  C H JOHNSON                      //LRL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(1680)

```
                64  N*1/2(1680, JP=5/2-) I=1/2     D13

                 SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

                64  N*1/2(1680) MASS (MEV)    ------------------------------

M   *      1650.0          APPROX       BRANDSEN  65 RVUE    PHASE-SHIFT ANAL  7/66
M   *      1674.0                       DUKE      68 CNTR    PI-P EL + POL     6/68
M   1      1680.0                       BAREYRE   68 RVUE    PHASE-SHIFT ANAL 11/67
    1      WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.
M   2      1655.0                       BAREYRE   68 RVUE    PHASE-SHIFT ANAL 11/67
    2      WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM
    2      IS GREATEST.
M   3      1678.0                       DONNACHIE 68 RVUE    PHASE-SHIFT ANAL  6/68
    3      WHERE THE ABSORPTION IS GREATEST.

-----------------   64  N*1/2(1680) WIDTH (MEV)    ------------------------------

W   1       135.0                       BAREYRE   68 RVUE                    11/67
W   2       105.0                       BAREYRE   68 RVUE                    11/67
W   3       173.0                       DONNACHIE 68 RVUE                     6/68
       SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

-----------------   64  N*1/2(1680) PARTIAL DECAY MODES    ------------------------

P1          N*1/2(1680) INTO  PI N                         $ 8S16
P2          N*1/2(1680) INTO  N ETA                        S17S14
P3          N*1/2(1680) INTO  LAMBDA K                     S18S11
P4          N*1/2(1680) INTO N*3/2(1236) PI                U8S 8

-----------------   64  N*1/2(1680) BRANCHING RATIOS    ------------------------

R1          N*1/2(1680) INTO (PI N)/TOTAL                  (P1)/TOTAL
R1  1         0.41                      BAREYRE   68 RVUE                    11/67
R1  3         0.391                     DONNACHIE 68 RVUE                     6/68
       SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

R2          N*1/2(1680) INTO (N ETA)/TOTAL                 (P2)/TOTAL
R2            0.025     OR LESS         TRIPP     67 RVUE                     8/67

R3          N*1/2(1680) INTO (LAMBDA K)/TOTAL              (P3)/TOTAL
R3            0.016     OR LESS         TRIPP     67 RVUE                     8/67

   SEE NOTE PRECEDING THE N*1/2(1688) INELASTIC DECAY MODE MEASUREMENTS.

****** ********* ********* ********* ********* ********* *********** *********

                              REFERENCES -- N*1/2(1680)

DUKE      65 PRL 19 468         +JONES,KEMP,MURPHY,PRENTICE, + //RTHFD,OXF IJP
BRANDSEN  65 PL 19 420          +ODONNELL, MOORHOUSE          //DURHAM,RTHFD IJP
TRIPP     67 NP B3 10           + LEITH, +    //LRL,SLAC,CERN,HEIDEL,SACLAY
DUKE      68 PR 166 1448        +JONES,KEMP,MURPHY,THRESHER, + //RTHFD,OXF IJP
    ---  INSIGHTFUL QUALITATIVE ARGUMENTS CONCERNING EXISTENCE AND IJP.
BAREYRE   68 PR 165 1731        P BAREYRE, C BRICMAN, G VILLET     //SACLAY IJP
DONNACHI  68 PL 268 161         A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

                          PAPER NOT REFERRED TO IN DATA CARDS.

BAREYRE   65 PL 18 342          + BRICMAN, STIRLING, VILLET       //SACLAY IJP
LOVELACE  67 HEIDELBERG C. 79   C LOVELACE                       //CERN IJP
JOHNSON   67 UCRL-17683 THESIS  C H JOHNSON                      //LRL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

N(1688)

65 N*1/2(1688, JP=5/2+) I=1/2 F15

SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

65 N*1/2(1688) MASS (MEV)

M	*	1680.0	BRANDSEN	65 RVUE	PHASE SHIFT ANAL	7/66
M	*	1682.0	DUKE	68 CNTR	PI-P EL + POL	6/68
M	1	1690.0	BAREYRE	68 RVUE	PHASE-SHIFT ANAL	11/67
	1	WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.				
M	2	1680.0	BAREYRE	68 RVUE	PHASE-SHIFT ANAL	11/67
	2	WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM				
	2	IS GREATEST.				
M	3	1687.0	DONNACHIE	68 RVUE	PHASE-SHIFT ANAL	6/68
	3	WHERE THE ABSORPTION IS GREATEST.				

65 N*1/2(1688) WIDTH (MEV)

W	1	110.0	BAREYRE	68 RVUE	11/67
W	2	105.0	BAREYRE	68 RVUE	11/67
W	3	177.0	DONNACHIE	68 RVUE	6/68

SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

65 N*1/2(1688) PARTIAL DECAY MODES

P1	N*1/2(1688) INTO PI N	$ 8516	
P2	N*1/2(1688) INTO N ETA	S17S14	
P3	N*1/2(1688) INTO LAMBDA K	S18S11	
P4	N*1/2(1688) INTO N*3/2(1236) PI	U81S 8	
P5	N*1/2(1688) INTO N PI	S16S 8S 8	
P6	N*1/2(1688)+ INTO NEUTRON PI+	S17S 8	
P7	N*1/2(1688)+ INTO PROTON PI+ PI-	S16S 8S 8	
P8	N*1/2(1688)+ INTO N*3/2(1236)++ PI-	U81S 8	

65 N*1/2(1688) BRANCHING RATIOS

R1	N*1/2(1688) INTO (PI N)/TOTAL				(P1)/TOTAL	
R1	1	0.64		BAREYRE	68 RVUE	11/67
R1	3	0.360		DONNACHIE	68 RVUE	6/68

SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

WE LIST MEASUREMENTS OF THE INELASTIC DECAY MODES OF THE 1688 MEV BUMP. SUCH MEASUREMENTS HAVE NOT UNTANGLED THE D15 AND F15 (AND POSSIBLE S11) COMPONENTS. IT IS CLEAR THAT BOTH D15 AND F15 DECAY ALOT INTO N PI PI. MERLO 66 FINDS SOME N*3/2(1236) PI (SLIGHTLY MORE THAN PHASE SPACE). ROBERTS 67 SUGGESTS THAT THE DOMINANT MODE IS N*1/2(1918).

R2	N*1/2(1688) INTO (N ETA)/TOTAL					(P2)/TOTAL		
R2	0.025	OR LESS		KRAEMER	64 DBC	+ PI+D 1.23 BEV/C		9/66
R2	0.042 OR LESS (95PC CL)			A-BORELLI	67 HBC	+ PBAR P 9.7 BEV/C		8/67
R2	0.015			TRIPP	67 RVUE			8/67
R3	N*1/2(1688) INTO (N ETA)/(PI N)					(P2)/(P1)		
R3	0.027	OR LESS		HEUSCH	66 RVUE	+ PI0, ETA PHOTO		9/66
R4	N*1/2(1688) INTO (LAMBDA K)/TOTAL					(P3)/TOTAL		
R4	0.013 OR LESS (95PC CL)			A-BORELLI	67 HBC	+		8/67
R4	0.0013			TRIPP	67 RVUE			8/67
R4	SEEN			CHINOWSKY	68 HBC	PP TO K+ Y N		6/68
R5	N*1/2(1688) INTO (N PI)/(N PI PI)					(P1)/(P5)		
R5	1.26 OR LESS (95PC CL)			A-BORELLI	67 HBC	+		8/67
R6	N*1/2(1688) INTO (N*3/2(1236) PI)/(N PI PI)					(P4)/(P5)		
R6	NO EVIDENCE			A-BORELLI	67 HBC	+		8/67
R6	SEE MERLO 66 FOR A REVIEW.							
R7	N*1/2(1688) INTO (NEUTRON PI+)/(P PI+ PI-)					(P6)/(P7)		
R7	0.67	0.40		ALEXANDER	67 HBC	+ PP 5.5 BEV/C		11/67
R8	N*1/2(1688) INTO (N*(1236)++ PI-)/(P PI+ PI-)					(P8)/(P7)		
R8	0.74	0.14		ALEXANDER	67 HBC	+ PP 5.5 BEV/C		11/67
R8	1.0		0.3	ALMEIDA	66 HBC	+ PP 10 BEV/C		9/66
R9	N*1/2(1688) INTO (LAMBDA K)/(P PI+ PI-)					(P3)/(P7)		
R9	0.034	OR LESS		ALEXANDER	67 HBC	+ PP 5.5 BEV/C		11/67
R10	N*1/2(1688) INTO (PI N)/(PI N*3/2(1236))					(P1)/(P4)		
R10	0.77	OR LESS		LEE	67 HBC			11/67

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES --- N*1/2(1688)

SEE A PREVIOUS EDITION (RMP 37, 633, 1965) FOR EARLIER REFERENCES.

KRAEMER 64 PR 136 B496 +MADANSKY,+ //J HOPKINS,NWESTERN,WOODSTOCK I
DUKE 65 PRL 15 468 +JONES,KEMP,MURPHY,PRENTICE, + //RTHFD,OXF IJP
BRANDSEN 65 PL 19 420 +ODONNELL, MOORHOUSE //DURHAM,RTHFD IJP
HEUSCH 66 PRL 17 1019 C A HEUSCH, C Y PRESCOTT, R F DASHEN //CIT
ALMEIDA 66 BERKELEY CONF +RUSHBROOKE, + //CAVNDSH,DESY(CERN)
MERLO 66 P ROY SOC 289 489 J P MERLO, G VALLADAS //SACLAY
ALEXANDE 67 PR 154 1284 ALEXANDER,BENARY,CZAPEK,+ //WEIZMANN(CERN)
A-BORREL 67 NC 47 232 ALLES-BORELLI,PRENCH,FRISK,MICHEJDA //CERN
LEE 67 PR 159 1156 +MOEBS,ROE,SINCLAIR,VANDER VELDE //MICH
TRIPP 67 NP B3 10 + LEITH, + //LRL,SLAC,CERN,HEIDEL,SACLAY
CHINOWSK 68 PR 165 1466 CHINOWSKY,KINSEY,KLEIN, + //LRL,SLAC
DUKE 68 PR 166 1448 +JONES,KEMP,MURPHY,THRESHER, + //RTHFD,OXF IJP
BAREYRE 68 PR 165 1731 P BAREYRE, C BRICMAN, G VILLET //SACLAY IJP
DONNACHI 68 PL 26B 161 A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

PAPERS NOT REFERRED TO IN DATA CARDS.

CROUCH 65 DESY CONF 11 21 + //BROWN,CEA,HARVARD,MIT,PADOVA,WEIZMANN
DERADO 65 ATHENS CONF 244 +KENNEY,LAMSA, + //NOTRE DAME,KENTUCKY
ROBERTS 67 PREPRINT R G ROBERTS //DURHAM
BANNER 68 PR 166 1347 +DETOEUF,FAYOUX,HAMEL, + //SACLAY,CAEN
--- THE ABOVE PAPERS DISCUSS INELASTIC CHANNELS NEAR THE BUMP.
BAREYRE 65 PL 18 342 + BRICMAN, STIRLING, VILLET //SACLAY IJP
LOVELACE 67 HEIDELBERG C. 79 C LOVELACE //CERN IJP
JOHNSON 67 UCRL-17683 THESIS C H JOHNSON //LRL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

N(1710)

66 N*1/2(1710, JP=1/2-) I=1/2 S11

SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

66 N*1/2(1710) MASS (MEV)

M	*	1698.0	BRANDSEN	65 RVUE	PHASE-SHIFT ANAL	9/66
M	*	1700.0	MICHAEL	66 RVUE	FITS BAREYRE S11	7/66
M	1	1710.0	BAREYRE	68 RVUE	PHASE-SHIFT ANAL	11/67
	1	WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.				
M	2	1665.0	BAREYRE	68 RVUE	PHASE-SHIFT ANAL	11/67
	2	WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM				
	2	IS GREATEST.				
M	3	1709.0	LOVELACE	67 RVUE	PHASE-SHIFT ANAL	11/67
	3	WHERE THE ABSORPTION IS GREATEST.				

66 N*1/2(1710) WIDTH (MEV)

W	*	240.0	MICHAEL	66 RVUE	7/66
W	1	260.0	BAREYRE	68 RVUE	11/67
W	2	110.0	BAREYRE	68 RVUE	11/67
W	3	300.0	LOVELACE	67 RVUE	PHASE-SHIFT ANAL 11/67

SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

66 N*1/2(1710) PARTIAL DECAY MODES

P1	N*1/2(1710) INTO PI N	$ 8516	
P2	N*1/2(1710) INTO N ETA	S17S14	
P3	N*1/2(1710) INTO LAMBDA K	S18S11	

66 N*1/2(1710) BRANCHING RATIOS

R1	N*1/2(1710) INTO (PI N)/TOTAL				(P1)/TOTAL	
R1	*	1.0	APPROX	MICHAEL	66 RVUE	7/66
R1	3	0.786		LOVELACE	67 RVUE	PHASE-SHIFT ANAL 11/67

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES --- N*1/2(1710)

BAREYRE 65 PL 18 342 + BRICMAN, STIRLING, VILLET //SACLAY IJP
BRANDSEN 65 PL 19 420 +ODONNELL, MOORHOUSE //DURHAM,RTHFD IJP
MICHAEL 66 PL 21 93 C MICHAEL //CXF
LOVELACE 67 HEIDELBERG C. 79 C LOVELACE //CERN IJP
JOHNSON 67 UCRL-17683 THESIS C H JOHNSON //LRL
BAREYRE 68 PR 165 1731 P BAREYRE, C BRICMAN, G VILLET //SACLAY IJP

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Δ(1920)

83 N*3/2(1920, JP=3/2+) I=3/2

SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

83 N*3/2(1920) MASS (MEV)

M	*	1922.0	APPROX	COOL	56 CNTR	PI+ P TOTAL 7/66
M	*	1912.0	15.0	BRISSON	61 CNTR	PI+ P TOTAL 7/66
M	N	1956.0		LAYSON	63 RVUE	PI P TOTAL, EL 7/66
M	N	ASSUMES AN N*3/2(1855).				
M	*	1920.0		HOHLER	64 RVUE	DATA + DISP REL 7/66
M	*	1900.0	9.0	DEVLIN	65 CNTR	PI+ P TOTAL
M	*	1950.0	APPROX	YOKOSAWA	66 CNTR	PI- P DSIG + POL 7/66
M	*	1920.0		DUKE	68 CNTR	PI-P EL + POL 6/68
M	1	1975.0		BAREYRE	68 RVUE	PHASE-SHIFT ANAL 11/67
	1	WHERE THE PARTIAL-WAVE TOTAL CROSS SECTION IS GREATEST.				
M	2	1980.0		BAREYRE	68 RVUE	PHASE-SHIFT ANAL 11/67
	2	WHERE THE VELOCITY OF THE AMPLITUDE ACROSS THE ARGAND DIAGRAM				
	2	IS GREATEST.				
M	3	1946.0		DONNACHIE	68 RVUE	PHASE-SHIFT ANAL 6/68
	3	WHERE THE ABSORPTION IS GREATEST.				

83 N*3/2(1920) WIDTH (MEV)

W	*	170.0	HOHLER	64 RVUE	7/66
W	*	256.0 39.0	DEVLIN	65 CNTR	
W	*	170.0	DUKE	65 CNTR	7/66
W	*	200.0 APPROX	YOKOSAWA	66 CNTR	7/66
W	1	180.0	BAREYRE	68 RVUE	11/67
W	2	140.0	BAREYRE	68 RVUE	11/67
W	3	221.0	DONNACHIE	68 RVUE	6/68

SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

83 N*3/2(1920) PARTIAL DECAY MODES

P1	N*3/2(1920) INTO PI N	$ 8516	
P2	N*3/2(1920) INTO SIGMA K	S20S10	
P3	N*3/2(1920) INTO N*3/2(1236) PI	U81S 8	
P4	N*3/2(1920) INTO N*3/2(1236)++ RHO.0	U81U 9	
P5	N*3/2(1920) INTO N*3/2(1236)++ PI+ PI-	U81S 8S 8	
P6	N*3/2(1920) INTO Y*1(1385)+ K+	U43S10	
P7	N*3/2(1920) INTO NEUTRON PI+ PI+	S17S 8S 8	

83 N*3/2(1920) BRANCHING RATIOS

R1	N*3/2(1920) INTO (PI N)/TOTAL				(P1)/TOTAL	
R1	N	0.33		LAYSON	63 RVUE	7/66
R1	N	ASSUMES AN N*3/2(1855).				
R1	*	0.73	OR LESS	HOHLER	63 RVUE	DATA + DISP REL 7/66
R1	*	0.57	0.12	DEVLIN	65 CNTR	
R1	*	0.41		DUKE	65 CNTR	VERY ENERGY DEP 7/66
R1	*	0.4	APPROX	YOKOSAWA	66 CNTR	7/66
R1	1	0.57		BAREYRE	68 RVUE	11/67
R1	3	0.386		DONNACHIE	68 RVUE	6/68

SEE THE NOTES ACCOMPANYING THE MASSES QUOTED.

R2	N*3/2(1920) INTO (SIGMA+ K+)/(PROTON PI+)				(P2)/(P1)	
R2	SEEN			HOLLADAY	65 RVUE	PI+P DATA 11/66
R2	N	0.059	0.024	CHINOWSK1	68 HBC	PP TO K+ Y N 6/68
R2	N	ASSUMING SIGMA(PROT. PI+)= 375+-135 MICROB. FROM CHINOWSKY2 68 AND				
R2	N	ALEXANDER 67				
R3	N*3/2(1920) INTO (PI N)/(PI N*3/2(1236))				(P1)/(P3)	
R3		0.55	OR LESS	LEE	67 HBC	11/67
R4	N*3/2(1920) INTO N*3/2(1236)++ RHO.0/(PROTON PI+)				(P4)/(P1)	
R4	N	0.84	OR LESS	CHINOWSK2	68 HBC	PP 6 BEV/C 6/68
R4	N	SEE NOTE N IN R2				
R5	N*3/2(1920) INTO N*3/2(1236)++ PI+ PI-				P5	
R5	SEEN			CHINOWSK2	68 HBC	PP 6 BEV/C 6/68
R6	N*3/2(1920) INTO Y*1(1385)+ K+				P6	
R6	N	0.035	0.015	CHINOWSK2	68 HBC	PP 6 BEV/C 6/68
R6	N	SEE NOTE N IN R2				
R7	N*3/2(1920) INTO (PI N)*(NEUTRON PI+ PI+)/(TOTAL**2) (P1*P4)/TOTAL**2					
R7		0.05	0.013	GALLOWAY	68 RVUE	PI+P TO PI+PI+N 6/68

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES --- N*3/2(1920)

COOL 56 PR 103 1082 R COOL, O PICCIONI, D CLARK //BNL I
BRISSON 61 NC 19 210 +DETOEUF,FALK-VAIRANT,VAN ROSSUM,+//SACLAY I
LAYSON 63 NC 27 726 W M LAYSON //CERN IJ
HOHLER 63 NP 48 470 G HOHLER, G EBEL //KARLSRUHE I
HOHLER 64 PL 12 149 G HOHLER, J GIESECKE //KARLSRUHE I
DEVLIN 65 PRL 14 1031 T J DEVLIN,J SOLOMON,G BERTSCH //PRINCETON I
DUKE 65 PRL 15 468 +JONES,KEMP,MURPHY,PRENTICE, + //RTHFD,OXF IJP
HOLLADAY 65 PR 139 B1348 W G HOLLADAY //VANDERBILT
YOKOSAWA 66 PRL 16 714 +SUWA, HILL, ESTERLING, BOOTH //ARG,CHI IJP
ALEXANDE 67 PR 154 1284 ALEXANDER,BENARY,CZAPEK,+ //WEIZMANN(CERN)
LEE 67 PR 159 1156 +MOEBS,ROE,SINCLAIR,VANDER VELDE //MICH
DUKE 68 PR 166 1448 +JONES,KEMP,MURPHY,THRESHER, + //RTHFD,OXF IJP
CHINOWSK1 68 PR 165 1466 CHINOWSKY,KINSEY,KLEIN, + //LRL,SLAC
CHINOWSK2 68 PR (SUBMITTED) CHINOWSKY,CONDON,KINSEY,KLEIN, //LRL

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

```
GALLOWAY 68 PL 268 334          K F GALLOWAY                        //INDIANA  I
BAREYRE  68 PR 165 1731         P BAREYRE, C BRICMAN, G VILLET      //SACLAY IJP
DONNACH1 68 PL 268 161          A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

                    PAPERS NOT REFERRED TO IN DATA CARDS.

HELLAND  64 PR 134 B1062        +DEVLIN,HAGGE,LONGO,MOYER,WOOD        //LRL  IJ
AUVIL    64 NC 33 473           P AUVIL, C LOVELACE                 //IMPCOL IJP
LOVELACE 67 HEIDELBERG C. 79    C LOVELACE                           //CERN IJP
JOHNSON  67 UCRL-17683 THESIS C H JOHNSON                            //LRL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(2080)

```
                    70  N*   (2080, JP=    ) I=
```

YOON 67 SEE A NARROW BUMP IN THE INVARIANT MASS OF (P PI+ PI- PI0) FROM 3 BEV/C PI- P TO (PI- P PI+ PI- RHO-). AT 3.2 BEV/C, WITH APPROXIMATELY FOUR TIMES THE NUMBER OF EVENTS, THE EFFECT IS NOT SEEN (CHUNG 68). OMITTED FROM TABLE.

```
                    70  N*   (2080) MASS (MEV)

M          2080.0     12.0            YOON      67 HBC  +  3 BEV/C PI-P      8/67

                    70  N*   (2080) WIDTH (MEV)

W            40.0     20.0            YOON      67 HBC  +                    8/67

                    70  N*   (2080) PARTIAL DECAY MODES

P1         N*   (2080) INTO PI N
P2         N*   (2080) INTO N*3/2(1236) RHO

                    70  N*   (2080) BRANCHING RATIOS

R1         N*   (2080) INTO (N*3/2(1236) RHO)/TOTAL      (P2)/TOTAL
R1               SEEN              YOON      67 HBC  +                    8/67

****** ********* ********* ********* ********* ********* ********* *********

                    REFERENCES -- N*   (2080)

YOON     67 PL 24B 307          +BERENYI,KEY,PRENTICE, +    //TORONTO,WISC
CHUNG    68 PR 169 1491         S U CHUNG,DAHL,KIRZ,MILLER           //LRL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(2190)

```
                    71  N*1/2(2190, JP=7/2-) I=1/2
```

SEE NOTE ON PHASE-SHIFT ANALYSES IN APPENDIX II.

```
                    71  N*1/2(2190) MASS (MEV)

M          2190.0                    DIDDENS   63 CNTR    PI+- P TOTAL
M          2210.0                    HOHLER    64 RVUE    DATA + DISP REL
M          2190.0         APPROX     YOKOSAWA  66 CNTR    PI- P DSIG + POL   7/66
M          2265.0                    DONNACHIE 68 RVUE    PHASE-SHIFT ANAL   6/68

                    71  N*1/2(2190) WIDTH (MEV)

W           200.0                    DIDDENS   63 CNTR
W           200.0                    HOHLER    64 RVUE                      7/66
W           220.0         APPROX     YOKOSAWA  66 CNTR                      7/66
W           298.0                    DONNACHIE 68 RVUE                      6/68

                    71  N*1/2(2190) PARTIAL DECAY MODES

P1         N*1/2(2190) INTO PI N                          $ 8S16
P2         N*1/2(2190) INTO LAMBDA K                      S18S11

                    71  N*1/2(2190) BRANCHING RATIOS

R1         N*1/2(2190) INTO (PI N)/TOTAL                 (P1)/TOTAL
R1             0.3          APPROX     DIDDENS   63 CNTR                      7/66
R1             0.3          APPROX     YOKOSAWA  66 CNTR                      7/66
R1             0.349                   DONNACHIE 68 RVUE                      6/68

****** ********* ********* ********* ********* ********* ********* *********

                    REFERENCES -- N*1/2(2190)

DIDDENS  63 PRL 10 262          +JENKINS, KYCIA, RILEY                //BNL  I
HOHLER   64 PL 12 149           G HOHLER, J GIESECKE                //KARLSRUHE  I
YOKOSAWA 66 PRL 16 714          +SUWA,HILL,ESTERLING,BOOTH           //ARG,CHI  JP
DONNACH1 68 PL 26B 161          A DONNACHIE, R G KIRSOPP, C LOVELACE//CERN IJP

          QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN DATA CARDS.

CARROLL  66 PRL 16 288          +CORBETT,DAMERELL,MIDDLEMAS, + //RTHFO,GXF J-L
CARROLL  66 PRL 17 1274         +CORBETT,DAMERELL,MIDDLEMAS, + //RTHFO,GXF J-L
     --  ERRATUM CHANGING THE RATHER WEAK DETERMINATION OF J-L TO +1/2.
KORMANYO 66 PRL 16 709          KORMANYOS,KRISCH,OFALLON, +     //MICH,ARG  P
BARGER   66 PRL 16 913          V BARGER, D CLINE                    //WISC  P
BUSZA    67 NC 52A 331          +DAVIS,DUFF,HEYMANN, +  //UNICOL,WESTFIELD

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Δ(2420)

```
                    84  N*3/2(2420, JP=11/2+) I=3/2
```

PARTIAL WAVE ANALYSIS OF BELLAMY 67 SUGGESTS J=11/2

```
                    84  N*3/2(2420) MASS (MEV)

M   *      2360.0                    DIDDENS   63 CNTR    PI+ P TOTAL
M   *      2520.0          40.0      ALVAREZ   64 CNTR    PI PHOTOPROD       7/66
M   *      2400.0              APPROX WAHLIG    64 SPRK D  PI-P CH EX
M   *      2440.0                    HOHLER    64 RVUE    DATA + DISP REL
M          2423.0          10.0      CITRON    66 CNTR    PI+ P TOTAL        7/66
M   B      2452.0                    BARGER    66 RVUE    TOTAL + CH EX     11/67

                    84  N*3/2(2420) WIDTH (MEV)

W   *       200.0                    DIDDENS   63 CNTR
W   *       245.0                    HOHLER    64 RVUE                      7/66
W               310.0          20.0  CITRON    66 CNTR                      7/66
W   B       275.0                    BARGER    66 RVUE    TOTAL + CH EX     11/67

                    84  N*3/2(2420) PARTIAL DECAY MODES

P1         N*3/2(2420) INTO PI N                          $ 8S16
P2         N*3/2(2420) INTO SIGMA K                       S20S10
P3         N*3/2(2420) INTO N*3/2(1236) PI                U01S B
P4         N*3/2(2420) INTO NEUTRON PI+ PI+               S17S 8S 8

                    84  N*3/2(2420) BRANCHING RATIOS

R1         N*3/2(2420) INTO (PI N)/TOTAL                 (P1)/TOTAL
R1   *         0.067          APPROX     DIDDENS   63 CNTR    ASSUMING J=11/2   7/66
R1             0.113    0.0036           CITRON    66 CNTR    ASSUMING J=11/2   7/66
R1   B         0.12                      BARGER    67 FIT     ASSUMING J=11/2  11/67
     B  USES REGGE AMP.+RESON. TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGRE
     B  FOR CRITICISM OF THIS METHOD, SEE DOLEN 68.
R1   D         0.163                     DIKMEN    67 FIT     ASSUMING J=11/2  11/67
     D  USES ONLY RESONANCES TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGREES
R1             0.06                      KORMANYOS 67 CNTR    ASSUMING J=11/2  11/67

R2  N*3/2(2420) INTO (PI N)*(NEUTRON PI+ PI+)/(TOTAL**2) (P1*P4)/TOTAL**2
R2             0.0195   0.0048           GALLOWAY  68 RVUE                    6/68

****** ********* ********* ********* ********* ********* ********* *********

                    REFERENCES -- N*3/2(2420)

DIDDENS  63 PRL 10 262          +JENKINS, KYCIA, RILEY                //BNL  I
ALVAREZ  64 PRL 12 710          +BAR-YAM,KERN,LUCKEY,OSBORNE, +  //MIT,CEA
WAHLIG   64 PRL 13 103          +MANNELLI,SODICKSON,FACKLER,WARD, +  //MIT
HOHLER   64 PL 12 149           G HOHLER, J GIESECKE                //KARLSRUHE  I
CITRON   66 PR 144 1101         +GALBRAITH,KYCIA,LEONTIC,PHILLIPS, + //BNL  I
BARGER   66 PR 151 1123         V BARGER, M OLSSON                   //WISC

BARGER   67 PR 155 1792         V BARGER, D CLINE                    //WISC  P
DIKMEN   67 PRL 18 798          F N DIKMEN                           //MICH
KORMANYO 67 PR 164 1661         KORMANYOS, KRISCH, OFALLON, +    //MICH,ARG  P
DOLEN    68 PR 166 1768         R DOLEN, D HORN, C SCHMID           //CAL TECH
GALLOWAY 68 PL 26B 334          K F GALLOWAY                        //INDIANA  I

          PAPERS NOT REFERRED TO IN DATA CARDS.

DOBROWOL 67 PL 24B 203          DOBROWOLSKI,GUSKOV,LIKHACHEV, +     //DUBNA  P
BELLAMY  67 PRL 19 476          +BUCKLEY,DOBINSON, +     //WESTFIELD,UNICOL  JP
BAACKE   67 NC 51A 761          J BAACKE, M YVERT              //KARLSRUHE,ORSAY J-L
WAHLIG   68 PR 168 1515         M A WAHLIG, I MANNELLI              //MIT,PISA
     --  FINAL VERSION OF DATA USED IN WAHLIG 64.  IN CONJUNCTION WITH
         CITRON 66 TOTAL CROSS SECTIONS, THIS CHARGE EXCHANGE DATA GIVES
         COMPLEX ELASTIC SCATTERING AMPLITUDE AT 0 DEGREES.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(2650)

```
                    72  N*1/2(2650, JP=    -) I=1/2

                    72  N*1/2(2650) MASS (MEV)

M   *      2700.0                    ALVAREZ   64 CNTR    PI PHOTOPROD
M   *      2600.0              APPROX WAHLIG    64 SPRK D  PI-P CH EX
M   *      2660.0                    HOHLER    64 RVUE    DATA + DISP REL
M          2649.0          10.0      CITRON    66 CNTR    PI+- P TOTAL       7/66
M   *      2633.0                    BARGER    66 PIT     TOTAL + CH EX     11/67

                    72  N*1/2(2650) WIDTH (MEV)

W   *       100.0                    ALVAREZ   64 CNTR
W   *       200.0                    HOHLER    64 RVUE                      7/66
W               360.0          20.0  CITRON    66 CNTR                      7/66
W   *       425.0                    BARGER    66 PIT     TOTAL + CH EX     11/67

                    72  N*1/2(2650) PARTIAL DECAY MODES

P1         N*1/2(2650) INTO PI N                          $ 8S16
P2         N*1/2(2650) INTO LAMBDA K                      S18S11

                    72  N*1/2(2650) BRANCHING RATIOS

R1         N*1/2(2650) INTO (PI N)/TOTAL                 (P1)/TOTAL
R1     ONLY (J+1/2)*( PI N/TOTAL) MEASURED FOR THIS STATE
R1             0.436    0.028           CITRON    66 CNTR    TOTAL CROSS-SEC. 11/67
R1   B         0.456    0.018           BARGER    66 RVUE    TOTAL + CH EXC.  11/67
R1   B         0.30                     BARGER    67 RVUE    USES KORMANYOS67 11/67
     B  USES REGGE AMP.+RESON. TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGRE
     B  FOR CRITICISM OF THIS METHOD, SEE DOLEN 68.
R1   D         0.24                     DIKMEN    67 RVUE    USES KORMANYOS66 11/67
     D  USES ONLY RESONANCES TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGREES
R1             0.06                     KORMANYOS 67 CNTR    PI-P AT 180 DEG. 11/67

****** ********* ********* ********* ********* ********* ********* *********

                    REFERENCES -- N*1/2(2650)

ALVAREZ  64 PRL 12 710          +BAR-YAM,KERN,LUCKEY,OSBORNE, +  //MIT,CEA
WAHLIG   64 PRL 13 103          +MANNELLI,SODICKSON,FACKLER,WARD, +  //MIT
HOHLER   64 PL 12 149           G HOHLER, J GIESECKE                //KARLSRUHE  I
CITRON   66 PR 144 1101         +GALBRAITH,KYCIA,LEONTIC,PHILLIPS, + //BNL  I
BARGER   66 PR 151 1123         V BARGER, M OLSSON                   //WISC
BARGER   67 PR 155 1792         V BARGER, D CLINE                    //WISC  P
DIKMEN   67 PRL 18 798          F N DIKMEN                           //MICH
KORMANYO 67 PR 164 1661         KORMANYOS, KRISCH, OFALLON, +    //MICH,ARG  P
DOLEN    68 PR 166 1768         R DOLEN, D HORN, C SCHMID           //CAL TECH

          PAPER NOT REFERRED TO IN DATA CARDS.

BAACKE   67 NC 51A 761          J BAACKE, M YVERT              //KARLSRUHE,ORSAY J-L
WAHLIG   68 PR 168 1515         M A WAHLIG, I MANNELLI              //MIT,PISA
     --  FINAL VERSION OF DATA USED IN WAHLIG 64.  IN CONJUNCTION WITH
         CITRON 66 TOTAL CROSS SECTIONS, THIS CHARGE EXCHANGE DATA GIVES
         COMPLEX ELASTIC SCATTERING AMPLITUDE AT 0 DEGREES.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Δ(2850)

```
                    85  N*3/2(2850, JP=    +) I=3/2

                    85  N*3/2(2850) MASS (MEV)

M   *      2700.0              APPROX WAHLIG    64 SPRK D  PI-P CH EX
M   *      2870.0                    HOHLER    64 RVUE    DATA + DISP REL
M          2850.0          12.0      CITRON    66 CNTR    PI+ P TOTAL        7/66
M   *      2850.0                    BARDADIN  66 HBC  ++ N* TO P + 3 PIS   7/66

                    85  N*3/2(2850) WIDTH (MEV)

W           400.0          40.0      CITRON    66 CNTR                      7/66
W   *       150.0                    BARDADIN  66 HBC  ++                   7/66

                    85  N*3/2(2850) PARTIAL DECAY MODES

P1         N*3/2(2850) INTO PI N                          $ 8S16
P2         N*3/2(2850) INTO P PI PI PI                    S16S 8S 8S 8

                    85  N*3/2(2850) BRANCHING RATIOS

R1         N*3/2(2850) INTO (PI N)/TOTAL                 (P1)/TOTAL
R1     ONLY (J+1/2)*( PI N/TOTAL) MEASURED FOR THIS STATE
R1             0.261    0.048           CITRON    66 CNTR    TOTAL CROSS.SEC. 11/67
R1   B         0.224    0.016           BARGER    66 RVUE    TOTAL + CH EXC.  11/67
R1   B         0.40                     BARGER    67 RVUE    USES KORMANYOS66 11/67
     B  USES REGGE AMP.+RESON. TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGRE
     B  FOR CRITICISM OF THIS METHOD, SEE DOLEN 68.
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
    D  USES ONLY RESONANCES TO CALCULATE DIF. CROSS SECTIONS A= 180 DEGREES
R1            0.10                    KORMANYOS 67 CNTR    PI-P AT 180 DEG. 11/67
R1            0.39                    DOBROWOLS 67 CNTR    PI+P AT 180 DEG

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N*3/2(2850)

WAHLIG   64 PRL 13 103        +WANNELLI,SODICKSON,FACKLER,WARD, +  //MIT
HOHLER   64 PL 12 149         G HOHLER, J GIESECKE                 //KARLSRUHE  I
CITRON   66 PR 144 1101       +GALBRAITH,KYCIA,LEONTIC,PHILLIPS, + //BNL  I
BARDADIN 66 PL 21 357         BARDADIN-OTWINOWSKA,DANYSZ, +      //WARSAW
BARGER   66 PR 151 1123       V BARGER, M OLSSON                   //WISC
BARGER   67 PR 155 1792       V BARGER, D CLINE                    //WISC  P
DIKMEN   67 PRL 18 798        F N DIKMEN                           //MICH
DOBROWOL 67 PL 24B 203        DOBROWOLSKI,GUSKOV,LIKHACHEV, +    //DUBNA  P
KORMANYO 67 PR 164 1661       KORMANYOS, KRISCH, OFALLON, +    //MICH,ARG  P
DOLEN    68 PR 166 1768       R DOLEN, D HORN, C SCHMID          //CAL TECH

                        PAPERS NOT REFERRED TO IN DATA CARDS.

BAACKE   67 NC 51A 761        J BAACKE, M YVERT          //KARLSRUHE,ORSAY J-L
WAHLIG   68 PR 168 1515       M A WAHLIG, I MANNELLI               //MIT,PISA
      --  FINAL VERSION OF DATA USED IN WAHLIG 64.  IN CONJUNCTION WITH
          CITRON 66 TOTAL CROSS SECTIONS, THIS CHARGE EXCHANGE DATA GIVES
          COMPLEX ELASTIC SCATTERING AMPLITUDE AT 0 DEGREES.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(3030)

```
                  73  N*1/2(3030, JP=     ) I=1/2

-------------------  73  N*1/2(3030) MASS (MEV)  ------------------------------

M   *      3080.0                    HOHLER    64 RVUE    DATA + DISP REL   7/66
M          3030.0                    CITRON    66 CNTR    PI+- P TOTAL      7/66

-------------------  73  N*1/2(3030) WIDTH (MEV)  ------------------------------

W           400.0                    CITRON    66 CNTR                      7/66

-------------------  73  N*1/2(3030) PARTIAL DECAY MODES  ----------------------

PI         N*1/2(3030) INTO PI N                          S 8S16

-------------------  73  N*1/2(3030) BRANCHING RATIOS  -------------------------

R1         N*1/2(3030) INTO (PI N)/TOTAL                 (PI)/TOTAL
R1    ONLY (J+1/2)*( PI N/TOTAL) MEASURED FOR THIS STATE
R1            0.048                 CITRON    66 CNTR    TOTAL CROS.SEC.  11/67
R1  B         0.088    0.016        BARGER    66 RVUE    TOTAL + CH EXC.  11/67
R1  B         0.12                  BARGER    67 CNTR    USES KORMANYOS66 11/67
    B  USES REGGE AMP.+RESON. TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGRE
    B  FOR CRITICISM OF THIS METHOD, SEE DOLEN 68.
R1  D         0.016                 DIKMEN    67  RVUE   USES KORMANYOS67 11/67
    D  USES ONLY RESONANCES TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGREES

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N*1/2(3030)

HOHLER   64 PL 12 149         G HOHLER, J GIESECKE           //KARLSRUHE  I
CITRON   66 PR 144 1101       +GALBRAITH,KYCIA,LEONTIC,PHILLIPS, + //BNL  I
BARGER   66 PR 151 1123       V BARGER, M OLSSON                   //WISC
KORMANYO 67 PR 164 1661       KORMANYOS, KRISCH, OFALLON, +    //MICH,ARG  P
BARGER   67 PR 155 1792       V BARGER, D CLINE                    //WISC  P
DIKMEN   67 PRL 18 798        F N DIKMEN                           //MICH
DOLEN    68 PR 166 1768       R DOLEN, D HORN, C SCHMID        //CAL TECH

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Δ(3230)

```
                  86  N*3/2(3230, JP=     ) I=3/2

-------------------  86  N*3/2(3230) MASS (MEV)  ------------------------------

M          3230.0                    CITRON    66 CNTR    PI+ P TOTAL       7/66

-------------------  86  N*3/2(3230) WIDTH (MEV)  ------------------------------

W           440.0                    CITRON    66 CNTR                      7/66

-------------------  86  N*3/2(3230) PARTIAL DECAY MODES  ----------------------

PI         N*3/2(3230) INTO PI N                          S 8S16

-------------------  86  N*3/2(3230) BRANCHING RATIOS  -------------------------

R1    ONLY (J+1/2)*( PI N/TOTAL) MEASURED FOR THIS STATE
R1            0.06                  CITRON    66 CNTR    TOTAL CROS. SEC. 11/67
R1  B         0.03     0.01         BARGER    66 RVUE    TOTAL + CH EXC.  11/67
R1  B         0.03    TO  0.1       BARGER    67 CNTR    USES KORMANYOS66 11/67
    B  USES REGGE AMP.+RESON. TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGRE
    B  FOR CRITICISM OF THIS METHOD, SEE DOLEN 68.
R1  D         0.29                  DIKMEN    67 RVUE    USES KORMANYOS67 11/67
    D  USES ONLY RESONANCES TO CALCULATE DIF. CROSS SECTIONS AT 180 DEGREES

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N*3/2(3230)

CITRON   66 PR 144 1101       +GALBRAITH,KYCIA,LEONTIC,PHILLIPS, + //BNL  I
BARGER   66 PR 151 1123       V BARGER, M OLSSON                   //WISC
KORMANYO 67 PR 164 1661       KORMANYOS, KRISCH, OFALLON, +    //MICH,ARG  P
BARGER   67 PR 155 1792       V BARGER, D CLINE                    //WISC  P
DIKMEN   67 PRL 18 798        F N DIKMEN                           //MICH
DOLEN    68 PR 166 1768       R DOLEN, D HORN, C SCHMID        //CAL TECH

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N₂(3245)

```
                  74  N*   (3245, JP=    +)

                  EXISTENCE NOT CONCLUSIVELY ESTABLISHED.  I-SPIN
                  NOT DETERMINED, BUT THE NARROW WIDTH PRECLUDES
                  IDENTIFICATION WITH THE N*3/2(3230).  OMITTED
                  FROM TABLE.

-------------------  74  N* /2(3245) MASS (MEV)  ------------------------------

M          3245.0     10.0           KORMANYOS 67 CNTR    PI-P 180 DEG EL   6/68

-------------------  74  N* /2(3245) WIDTH (MEV)  ------------------------------

W            35.0     OR LESS        KORMANYOS 67 CNTR                      6/68

-------------------  74  N* /2(3245) PARTIAL DECAY MODES  ----------------------

PI         N* /2(3245) INTO PI N                          S 8S16
      J IS NOT KNOWN.  FOLLOWING IS (J+1/2)*(PI N)/TOTAL
R1            0.37                  KORMANYOS 67 CNTR                      6/68

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N* /2(3245)

KORMANYO 67 PR 164 1661       KORMANYOS, KRISCH, OFALLON, +    //MICH,ARG  P

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N(3695)

```
                  79  N*1/2(3690, JP=     ) I=1/2

                  A BUMP SEEN IN THE INVARIANT MASS OF A VERY COMPLI-
                  CATED STATE (N + SEVEN PIS), SO AS EVIDENCE FOR
                  A NEW RESONANCE IT IS NOT CONCLUSIVE.  NOT INCLUDED
                  IN TABLE.

-------------------  75  N*1/2(3690) MASS (MEV)  ------------------------------

M          3690.0     10.0           BARTKE    67 HBC   + PI+P 8 PRONGS     8/67

-------------------  75  N*1/2(3690) WIDTH (MEV)  ------------------------------

W            50.0     30.0           BARTKE    67 HBC   +                   8/67

-------------------  75  N*1/2(3690) PARTIAL DECAY MODES  ----------------------

PI         N*1/2(3690) INTO N + 7 PIS                     +

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N*1/2(3690)

BARTKE   67 PL 24B 118        +CZYZEWSKI,DANYSZ, +  //CRACOW,ORSAY(CERN)  I

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N_P(3755)

```
                  76  N* /2(3755, JP=     )

                  A SMALL PEAK IN THE (P P PBAR) INVARIANT MASS FROM
                  8.4 BEV/C PI+ P TO PI+ P P PBAR EVENTS.  AS EVIDENCE
                  FOR A NEW RESONANCE IT IS NOT CONCLUSIVE.  OMITTED
                  FROM TABLE.

-------------------  76  N* /2(3755) MASS (MEV)  ------------------------------

M          3755.0      8.0           EHRLICH   68 HBC   +  PI+ P P PBAR      6/68

-------------------  76  N* /2(3755) WIDTH (MEV)  ------------------------------

W            40.0     20.0           EHRLICH   68 HBC   +                   6/68

-------------------  76  N* /2(3755) PARTIAL DECAY MODES  ----------------------

PI         N* /2(3755) INTO PI+ P P PBAR

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N* /2(3755)

EHRLICH  68 PRL 20 686        R EHRLICH,R J PLANO,J B WHITTAKER//RUTGERS

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

N*5/2(1560)

```
                  91  N*5/2(1560, JP=     ) I=5/2

                  IT HAS BEEN SUSPECTED ALMOST FROM THE BEGINNING THAT
                  THIS IS A KINEMATIC EFFECT AND NOT A RESONANCE.  RE-
                  CENT EVIDENCE STRONGLY SUPPORTING THIS INTERPRETATION
    IS GIVEN BY GOLDHABER 67.  A THEORETICAL APPROACH TO KINEMATIC PEAKS
    IS GIVEN BY KRAMER 67.  OMITTED FROM TABLE.

-------------------  91  N*5/2(1560) MASS (MEV)  ------------------------------

M          1560.0     20.0           GOLDHABER 64 HBC  +++3.65 BEV/C PI+ P  7/66
M          1570.0                    ALEXANDER 67 HBC  +++PP 4PI 5.5 BEV/C  9/66
M          1562.0     18.0           CAMBRIDGE 68 HBC  +++GAMMA P TO 6 BEV  6/68
M                  * * * * * * * * *
M   AVG    1561.1050  13.3793   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

-------------------  91  N*5/2(1560) WIDTH (MEV)  ------------------------------

W           220.0     20.0           GOLDHABER 64 HBC  +++                  7/66
W           140.0                    ALEXANDER 67 HBC  +++                  9/66
W           200.0     54.0           CAMBRIDGE 68 HBC  +++GAMMA P TO 6 BEV  6/68
W                  * * * * * * * * *
W   AVG     217.5875  18.7550   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

-------------------  91  N*5/2(1560) PARTIAL DECAY MODES  ----------------------

PI         N*5/2(1560) INTO N PI PI                       S16S 8S 8
P2         N*5/2(1560) INTO N*3/2(1236) PI                U81S 8

****** ********* ********* ********* ********* ********* ********* *********

                                  REFERENCES -- N*5/2(1560)

GOLDHABE 64 DUBNA CONF 1 480  G+S GOLDHABER,GHALLORAN,SHEN    //LRL(BNL)  I
DASH     65 LRL UCID-2752     J DASH, G GOLDHABER, J SWIHART        //LRL
CONTE    66 BERKELEY CONF     +DAMERI,RATTI,RUSSO, + //GENOVA,MILANO,CXF
ALEXANDE 67 PR 154 1284       ALEXANDER,BENARY,CZAPEK,+ //WEIZMANN(CERN)
GOLDHABE 67 CORAL GABLES 190  G GOLDHABER                           //LRL
KRAMER   67 PR 164 1887       I KRAMER                              //LRL
CAMBRIDG 68 PR 169 1081       BROWN, CEA, HARVARD, MIT, PADOVA, WEIZMANN  I

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Z₀(1865)

```
                  96  Z*0(1865, JP=     ) I=0

                  THE SIZE AND NARROWNESS OF THE I=0 PEAK MAKE IT DIFFI-
                  CULT TO INTERPRET IT AS OTHER THAN RESONANT.  THE DIS-
                  PERSION-RELATION ANALYSIS BY CARTER 67 SUPPORTS
    A RESONANCE INTERPRETATION.  BUT IN VIEW OF THE IMPLICATIONS OF THE
    EXISTENCE OF S=+1 BARYONS, IT MUST BE STRESSED THAT THE RESONANCE
    INTERPRETATION IS NOT CONCLUSIVELY ESTABLISHED.

-------------------  96  Z*0(1865) MASS (MEV)  ------------------------------

M          1868.0     10.0           KYCIA     67 CNTR    K+P, D TOTAL      8/67
M          1860.0     15.0           CARTER    67 THEO    DISPERSION REL.   8/67
M                  * * * * * * * * *
M   AVG    1865.5385   8.3205   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

-------------------  96  Z*0(1865) WIDTH (MEV)  ------------------------------

W           160.0     30.0           KYCIA     67 CNTR                      8/67
W           200.0     50.0           CARTER    67 THEO                      8/67
W                  * * * * * * * * *
W   AVG     170.5882  25.7248   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

---

96 Z*0(1865) PARTIAL DECAY MODES

P1 Z*0(1865) INTO K N S10S17

---

96 Z*0(1865) BRANCHING RATIOS

R1	Z*0(1865) INTO (K N)/TOTAL				(P1)/TOTAL			
R1	0.40	0.05	KYCIA	67 CNTR	IF J=1/2			8/67
R1	0.31	0.05	CARTER	67 THEO	IF J=1/2			8/67
R1	* * * * * * * * *							
R1 AVG	.3550	.0450	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)					

****** ********* ********* ********* ********* ********* ********* ********* *********

REFERENCES --- Z*0(1865)

KYCIA 67	PRIVATE COMM.	T F KYCIA	//BNL I
CARTER 67	PRL 18 801	A A CARTER	//CAVENDISH

PAPER NOT REFERRED TO IN DATA CARDS.

COOL 66	PRL 17 102	+GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL I	
---	REPLACED BY KYCIA 67.		
BUGG 68	PR 168 1466	+GILMORE,KNIGHT, + //RTHFD,BRMGHM,CVNDSH I	
---	TOTAL CROSS SECTION MEASUREMENTS IN AGREEMENT WITH RESULTS OF KYCIA 67 AND EXTENDING TO LOWER ENERGIES. THESE EXPERIMENTS ARE THE BASIS FOR THE DISPERSION-RELATION ANALYSIS OF CARTER 67.		

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********

$Z_1(1910)$

97 Z*1(1900, JP=) I=1

MOST OF THE BUMP IN THE CROSS SECTION IS DUE TO A BUMP IN THE KN* CHANNEL NEAR ITS THRESHOLD. ANALYSIS OF THIS CHANNEL (BLAND 67) NEITHER REQUIRES NOR SUGGESTS THAT ANY OF THE MAIN AMPLITUDES PRESENT BE RESONATING. NEITHER DOES A DISPERSION RELATION ANALYSIS OF THE TOTAL CROSS-SECTION DATA (CARTER 67) SUGGEST THE EXISTENCE OF A RESONANCE. AN ANALYSIS USING THE K-MATRIX FORMALISM (HITE 67) REPRODUCES THE MAIN FEATURES OF THE DATA WITHOUT INVOKING A RESONANCE. OMITTED FROM TABLE.

THERE IS EVIDENCE FOR OTHER STRUCTURE IN K+ NUCLEON INTERACTIONS. SEE THE SUPPLEMENTARY REFERENCES FOR SOURCES AND COMMENTS. A CONSERVATIVE INTERPRETION, ADVISABLE IN THE LIGHT OF THE IMPLICATIONS OF S=+1 BARYONS, IS THAT THE EFFECTS CAN EVENTUALLY BE EXPLAINED AS THRESHOLD EFFECTS OR, IN THE CASE OF PRODUCTION EXPERIMENTS, AS REFLECTIONS AND KINEMATIC EFFECTS. TUNE IN NEXT ISSUE.

---

97 Z*1(1900) MASS (MEV)

M	1900.0	10.0	KYCIA	67 CNTR	++ K+P TOTAL		8/67

---

97 Z*1(1900) WIDTH (MEV)

W	260.0	50.0	KYCIA	67 CNTR	++		8/67

---

97 Z*1(1900) PARTIAL DECAY MODES

P1 Z*1(1900) INTO K N S10S16
P2 Z*1(1900) INTO N*3/2(1236) K U01S10

---

97 Z*1(1900) BRANCHING RATIOS

R1	Z*1(1900) INTO (K N)/TOTAL				(P1)/TOTAL			
R1	0.25	0.06	KYCIA	67 CNTR	++ IF J=1/2			8/67
R1	0.10	OR LESS	CARTER	67 THEO	DISPERSION REL.			8/67
R2	Z*1(1900) INTO (N*3/2(1236) K)/TOTAL				(P2)/TOTAL			
R2	DOMINANT CONTR TO PEAK		BLAND	67 HBC	++			8/67

****** ********* ********* ********* ********* ********* ********* ********* *********

REFERENCES --- Z*1(1900)

KYCIA 67	PRIVATE COMM.	T F KYCIA	//BNL I
CARTER 67	PRL 18 801	A A CARTER	//CAVENDISH
BLAND 67	PRL 18 1077	+BOWLER,BROWN,G+S GOLDHABER,SEEGER,+ //LRL	
HITE 67	THESIS	G E HITE	//ILLINOIS

PAPERS NOT REFERRED TO IN DATA CARDS.

COOL 66	PRL 17 102	+GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL I	
---	REPLACED BY KYCIA 67.		
ABRAMS 67	PRL 19 259	+COOL,GIACOMELLI,KYCIA,LEONTIC,LI, + //BNL	
---	NEW TOTAL CROSS-SECTION DATA SHOWING SMALL I=1 BUMPS AT 2190 AND 2505 AND BORDERLINE INDICATIONS OF I=0 STRUCTURE.		
TYSON 67	PRL 19 255	+GREENBERG,HUGHES,LU,MINEHART,MORI, //YALE	
---	GAMMA + P TO K- + MISSING MASS. ARE THE BUMPS IN THE MISSING-MASS DISTRIBUTION DUE TO S=+1 BARYONS ...		
BIRNBAUM 67	HEIDELBERG CONF.	+EDELSTEIN,HEIN,MCMAHON, + //CARNEGIE,BNL	
---	PI- + P TO K- + MISSING MASS. SAME QUESTION AS FOR TYSON 67.		
MEYER 67	HEIDELBERG C. 117 J MEYER	//SACLAY	
---	A SUMMARY BY THE RAPPORTEUR ON BARYONS WITH S NOT ZERO.		
LEA 68	PR 165 1770	LEA, MARTIN, OADES //RTHFD,BNL,CERN	
---	A PHASE-SHIFT ANALYSIS OF AVAILABLE DATA. LACK OF POLARIZATION DATA FORCES THE INTRODUCTION OF ARTIFICIAL CONSTRAINTS ON THE PHASE-SHIFT PARAMETERS. SEVERAL SOLUTIONS ARE FOUND. THE ONLY WAVE AT ALL LIKELY TO BE RESONANT IS THE P1.		
BUGG 68	PR 168 1466	+GILMORE,KNIGHT, + //RTHFD,BRMGHM,CVNDSH I	
---	TOTAL CROSS SECTION MEASUREMENTS IN AGREEMENT WITH RESULTS OF KYCIA 67 AND EXTENDING TO LOWER ENERGIES. THESE EXPERIMENTS ARE THE BASIS FOR THE DISPERSION-RELATION ANALYSIS OF CARTER 67.		

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********

Λ

18 LAMBDA (1115,JP=1/2+) I=0

SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********

$\Lambda(1405)$

37 Y*0(1405, JP=1/2-) I=0 S01

THIS RESONANCE CAN BE IDENTIFIED WITH THE VIRTUAL BOUND STATE IN THE KBAR-N SYSTEM DEDUCED FROM THE I=0 SCATTERING LENGTH DETERMINED FROM LOW ENERGY K-P INTERACTIONS. THE DIFFICULTIES IN EXTRAPOLATING FROM THE PHYSICAL REGION TO THE RESONANCE LOCATION ARE DISCUSSED BY DALITZ 67. PARAMETERS USED IN AVERAGING ARE FROM PRODUCTION EXPERIMENTS ONLY.

---

37 Y*0(1405) MASS (MEV)

M	1405.0		ALSTON	61 HBC	K-P 1.15 BEV/C		
M	1410.0		ALEXANDER	62 HBC	PI-P 2.1 BEV/C		
M	1405.0		ALSTON	62 HBC	K-P 1.2-.5 BEV/C		
M	1400.0	24.0	MUSGRAVE	65 HBC	PBAR P 3-4 BEV/C		7/66
M *	1382.0	8.0	ENGLER	65 HDBC	PI-P, PI+D 1.68		7/66
M *	1410.7	1.0	KIM	65 HBC	O-EFF-RANGE FIT		7/66
M N	1409.6	1.7	SAKITT	65 HBC	O-EFF-RANGE FIT		7/66
M N	DATA OF SAKITT ARE USED IN FIT BY KITTEL.						
M *	1407.5	1.2	KITTEL	66 HBC	O-EFF-RANGE FIT		7/66
M	67 1400.0	5.0	BIRMINGHA	66 HBC	3.5 K- P		9/67
M *	1403.0	3.0	KIM	67 HBC	K MATRIX PIY(KP)		8/67
M	1405.0	5.0	GALTIERI	68 DBC	K-D 2.1-2.78EV/C		6/68
M	* * * * * * * * *						
M AVG	1402.4469	3.4978	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

---

37 Y*0(1405) WIDTH (MEV)

W	20.0		ALSTON	61 HBC			7/66
W	35.0	5.0	ALEXANDER	62 HBC			
W	50.0		ALSTON	62 HBC			
W	60.0	20.0	MUSGRAVE	65 HBC			7/66
W *	89.0	20.0	ENGLER	65 HDBC			7/66
W *	37.0	3.2	KIM	65 HBC			7/66
W N	28.2	4.1	SAKITT	65 HBC			7/66
W N	DATA OF SAKITT ARE USED IN FIT BY KITTEL.						
W *	34.1	4.1	KITTEL	66 HBC			7/66
W	67 50.0	10.0	BIRMINGHA	66 HBC	3.5 K- P		9/67
W *	50.0	5.0	KIM	67 HBC	K MATRIX FIT(KP)		8/67
W	35.0	8.0	GALTIERI	68 DBC	K-D 2.1-2.78EV/C		6/68
W	* * * * * * * * *						
W AVG	38.1193	3.9257	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

---

37 Y*0(1405) PARTIAL DECAY MODES

P1 Y*0(1405) INTO SIGMA PI S20S 8

****** ********* ********* ********* ********* ********* ********* ********* *********

REFERENCES --- Y*0(1405)

ALSTON 61	PRL 6 698	+ALVAREZ,EBERHARD,GOOD,GRAZIANO, + //LRL I	
ALEXANDE 62	PRL 8 447	ALEXANDER,KALBFLEISCH,MILLER,SMITH //LRL I	
ALSTON 62	CERN CONF 311	+ALVAREZ,FERRO-LUZZI,ROSENFELD, + //LRL I	
MUSGRAVE 65	NC 35 735	+PETMEZAS,+//BIRMGHM,CERN,EP,IMPCOL,SACLAY	
ENGLER 65	PRL 19 224	+FISK,KRAEMER,MELTZER,WESTGARD,+//CRNG,BNL IJ	
KIM 65	PRL 14 29	J K KIM //COLUMBIA IJP	
SAKITT 65	PR 139 B719	+DAY,GLASSER,SEEMAN,FRIEDMAN, + //MD,LRL IJP	
KITTEL 66	PL 21 349	W KITTEL, G OTTER, I WACEK //VIENNA IJP	
BIRMINGH 66	PR 152 1148	BIRMINGHAM,GLASGOW,I.C., OXFORD,RUTHERFORD	
DALITZ 67	PR 153 1617	DALITZ, WONG, RAJASEKARAN //OXFORD,BOMBAY	
KIM 67	PRL 19 1074	J KIM ////////////////////////////////YALE JP	
GALTIERI 68	UCRL 18237	BARBARO-GALTIERI,CHADWICK + //////LRL,SLAC	

PAPERS NOT REFERRED TO IN DATA CARDS.

ABRAMS 65	PR 139 B454	G S ABRAMS, B SECHI-ZORN //MD IJP	
KADYK 66	PRL 17 599	+OREN, G+S GOLDHABER, TRILLING //LRL IJP	
DONALD 66	PL 22 711	+ EDWARDS, LYS, NISAR, MOORE //LIVERPOOL	
---	ABRAMS 65, KADYK 66, AND DONALD 66 SUPPORT THOSE EFFECTIVE-RANGE-FIT SOLUTIONS GIVING AN I=0 S1/2 RESONANCE.		

****** ********* ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* ********* *********

$\Lambda(1520)$

38 Y*0(1520, JP=3/2-) I=0 D03

---

38 Y*0(1520) MASS (MEV)

M	1519.4	2.0	WATSON	63 HBC	K-P ALL CHANNELS		
M	145 1517.2	3.0	GALTIERI	63 DBC	K-D 1.51 BEV/C		
M	29 1520.0	4.0	ALMEIDA	64 HBC	K-P 1.45 BEV/C		
M	1511.0	15.0	MUSGRAVE	65 HBC	PBAR P 3-4 BEV/C		7/66
M *	30 1510.0	2.0	BIRMINGHA	66 HBC	3.5 K- P		9/67
M	* * * * * * * * *						
M AVG	1518.8293	1.5284	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

---

38 Y*0(1520) WIDTH (MEV)

W	16.4	2.0	WATSON	63 HBC			
W *	19.0	19.0	MUSGRAVE	65 HBC			7/66
W * 30	50.0	10.0	BIRMINGHA	66 HBC	3.5 K- P		9/67
W	18.0	OR LESS	DAHL	68 HBC			9/66

---

38 Y*0(1520) PARTIAL DECAY MODES

P1 Y*0(1520) INTO KBAR N S11S17
P2 Y*0(1520) INTO SIGMA PI S20S 8
P3 Y*0(1520) INTO LAMBDA PI PI S10S 8S 8

---

38 Y*0(1520) PARTIAL WIDTHS (MEV)

W	Y*0(1520) INTO KBAR N				(P1)
W1	4.8	0.5	WATSON	63 HBC	
W2	Y*0(1520) INTO SIGMA PI				(P2)
W2	9.0	1.0	WATSON	63 HBC	

---

38 Y*0(1520) BRANCHING RATIOS

R1	Y*0(1520) INTO (SIGMA PI)/(KBAR N)					(P2)/(P1)		
R1	1.72	.78	MUSGRAVE	65 HBC				8/67
R1	0.73	0.11	DAUBER	67 HBC	K-P AT 2.GEV/C			8/67
R1	0.96	0.20	DAHL	68 HBC	PI-P 1.6-4 GEV/C			9/66
R1	* * * * * * * * *							
R1 AVG	.7975	.0974	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					
R2	Y*0(1520) INTO (LAMBDA PI PI)/(KBAR N)					(P3)/(P1)		
R2	0.21	0.18	DAUBER	67 HBC	K-P AT 2.GEV/C			8/67
R2	0.17	0.05	DAHL	68 HBC	PI-P 1.6-4 GEV/C			9/66
R2	* * * * * * * * *							
R2 AVG	.1729	.0482	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					
R3	Y*0(1520) INTO (SIGMA PI)/(LAMBDA PI PI)					(P3)/(P3)		
R3	4.5	1.0	ARMENTERO	65 HBC				7/66
R3	3.3	1.1	BIRMINGHA	66 HBC	3.5 K- P			9/67
R3	4.8	1.2	UHLIG	67 HBC	K-P .9-1.0 BEV/C			9/66
R3	* * * * * * * * *							
R3 AVG	4.1892	.6298	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)					

****** ********* ********* ********* ********* ********* ********* ********* *********

REFERENCES --- Y*0(1520)

WATSON 63	PR 131 2248	M B WATSON, M FERRO-LUZZI, R D TRIPP //LRL IJP	
GALTIERI 63	PL 6 296	A BARBARO-GALTIERI,A HUSSAIN,RD TRIPP//LRL	
ALMEIDA 64	PL 9 204	S P ALMEIDA, G R LYNCH //CERN	
MUSGRAVE 65	NC 35 735	+PETMEZAS,+//BIRMGHM,CERN,EP,IMPCOL,SACLAY	
ARMENTER 65	PL 19 338	ARMENTEROS,F-LUZZI, + //CERN,HEIDEL,SACLAY	
BIRMINGH 66	PR 152 1148	BIRMINGHAM,GLASGOW,I.C., OXFORD,RUTHERFORD	
DAUBER 67	PL 24B 525	+MALAMUD,SCHLEIN,SLATER,STORK//////UCLA	
UHLIG 67	PR 155 1448	+CHARLTON,CONDON,GLASSER,YODH,+///MD,USNRL	
DAHL 68	PR 163 1377	DAHL,HARDY,HESS,KIRZ,MILLER // LRL	

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

Λ(1670)

40 Y*0(1670, JP=1/2-) I=0 $01

40 Y*0(1670) MASS (MEV)

FIT TO LAMBDA ETA CROSS SECTIONS NEAR THRESHOLD SUGGESTS RESONANCE HERE-- HOWEVER,DATA CAN ALSO BE FITTED WITH LARGE SCATTERING LENGTH OF EITHER SIGN ------

M		1680.0			Y-CHANG	64 PBC	PI-PRP 7-8 BEV/C	7/66
M		1670.0			BERLEY	65 HBC	K-P TO LAM ETA	7/66
M	N	50 1645.0	6.0		BIRMINGHA	66 HBC +	K-P AT 3.5 GEV/C	11/67
M	N	AUTHORS SEE A SIGNAL IN NEUTRAL (SIG PI) BUT NOT IN CHARGED. IT IS NOT CLEAR THAT IT CORRESPONDS TO THIS STATE						
M		1680.			BUBELEV	67 PBC	PI-PRP AT 46EV/C	8/67

40 Y*0(1670) WIDTH (MEV)

W		20.0	OR LESS		Y-CHANG	64 PBC		7/66
W		18.0			BERLEY	65 HBC		7/66
W	N	50 40.0	10.0		BIRMINGHA	66 HBC +	K-P AT 3.5 GEV/C	11/67
W	N	AUTHORS SEE A SIGNAL IN NEUTRAL (SIG PI) BUT NOT IN CHARGED. IT IS NOT CLEAR THAT IT CORRESPONDS TO THIS STATE						
W		20.	OR LESS		BUBELEV	67 PBC	PI-PRP AT 46EV/C	8/67

40 Y*0(1670) PARTIAL DECAY MODES

P1	Y*0(1670) INTO KBAR N	$11$17
P2	Y*0(1670) INTO LAMBDA ETA	$18$14
P3	Y*0(1670) INTO SIGMA PI	20 8

40 Y*0(1670) BRANCHING RATIOS

R1	*	Y*0(1670) INTO ((KBAR N)(LAM ETA))/TOTAL**2			(P1*P2)/TOTAL**2	
R1		0.046		BERLEY	65 HBC	7/66

REFERENCES --- Y*0(1670)

Y-CHANG 64 DUBNA CONF I 615	YUNG-CHANG, IN, KLADNITSKAYA, +	//DUBNA I
BERLEY 65 PRL 15 641	+CONNOLLY,HART,RAHM,STONEHILL, +	//BNL IJP
BIRMINGH 66 PR 152 1148	BIRMINGHAM,GLASGOW,I.C., OXFORD,RUTHERFORD	
BUBELEV 67 PL 248 246	+CHADRAA,CHUVILO,HI IN+//////JINR,BUC,CERN	

Λ(1700)

55 Y*0(1690, JP=3/2-) I=0 D03

SPIN-PARITY DETERMINATION TENTATIVE.

55 Y*0(1690) MASS (MEV)

M	*	1698.0			DAVIES	67 CNTR	K-P, D TOTAL	11/66
M	S	1682.0	2.0		ARMENTERO	67 HBC	0 KP TO SIGMA PI	8/67
M	S	1699.0	2.0		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX	8/67
M		1695.0	4.0		BUGG	68 CNTR	K-P,D TOTAL	7/68
M	S	SYSTEMATIC ERRORS NOT INCLUDED. ONLY INDETERM. IN FIT QUOTED						11/67

55 Y*0(1690) WIDTH (MEV)

W	S	55.0	4.0		ARMENTERO	67 HBC	0 KP TO SIGMA PI	8/67
W	S	33.0	15.0		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX	8/67
W	S	SYSTEMATIC ERRORS NOT INCLUDED. ONLY INDETERM. IN FIT QUOTED						11/67
W		40.0	10.0		BUGG	68 CNTR		11/66

55 Y*0(1690) PARTIAL DECAY MODES

P1	Y*0(1690) INTO KBAR N	$11$17
P2	Y*0(1690) INTO SIGMA PI	20 8
P3	Y*0(1690) INTO SIGMA PI PI	20 8$

55 Y*0(1690) BRANCHING RATIOS

R1	Y*0(1690) INTO (KBAR N)/TOTAL			(P1)/TOTAL		
R1	0.19	0.07		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX 8/67
R1	0.24			DAVIES	67 CNTR	ASSUMING J=3/2 11/66
R2	Y*0(1690) INTO (SIGMA PI)*(KBAR N)/TOTAL**2			(P2*P1)/TOTAL**2		
R2	0.116	0.014		ARMENTERO	67 HBC	0 8/67

REFERENCES --- Y*0(1690)

ARMENTER 67 PL 248 198	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAYIJP	
ARMENTE1 67 NP B3 592	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY IJP	
DAVIES 67 PRL 18 62	+DOWELL,HATTERSLEY,HOMER+//BIRMI,CAMB,RUTH I	
BUGG 68 PR 168 1466	+GILMORE,KNIGHT,DAVIES+ // BIRMI,CAMB,RUTH I	

Λ(1815)

39 Y*0(1815, JP=5/2+) I=0 F05

39 Y*0(1815) MASS (MEV)

M	*	1815.0			GALTIERI	63	K-P RVUE	7/66
M		1815.0			BIRGE	65 HBC	KBAR N,LAM PI PI	7/66
M		50 1810.0	20.0		BIRMINGHA	66 HBC	3.5 K- P	9/67
M	N	1811.0	4.0		GELFAND	66 HBC	0 K-P ELASTIC	8/67
M	N	RES + DIFFRACTIVE BGD FOR K-P EL-- DATA ARE IN ARMENT 67 FITS TOO.						
M	S	1813.0	2.0		ARMENTERO	67 HBC	0 K-P TO SIGMA PI	8/67
M	S	1819.0	2.0		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX	8/67
M	S	1816.0	4.0		BELL	67 HDBC	OKP,KD TO SIG PI	11/67
M		1819.0	4.0		BUGG	68 CNTR	K-P, D TOTAL	6/68
M	S	SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED						6/68
M		* * * * * * * * *						
M	AVG	1818.6538	3.9223	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

39 Y*0(1815) WIDTH (MEV)

W	*	70.0			GALTIERI	63		
W		60.0			BIRGE	65 HBC		7/66
W		50 110.0	50.0		BIRMINGHA	66 HBC	3.5 K- P	9/67
W	N	73.0	10.0		GELFAND	66 HBC	0 K-P ELASTIC	8/67
W	N	RES + DIFFRACTIVE BGD FOR K-P EL-- DATA ARE IN ARMENT 67 FITS TOO.						
W		87.0	15.0		ARMENTERO	67 HBC	0 K-P TO SIGMA PI	8/67
W	S	70.0	7.0		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX	8/67
W	S	SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED						6/68
W		64.0	12.0		BELL	67 HDBC	OKP,KD TO SIG PI	11/67
W		75.0	7.0		BUGG	68 CNTR	K-P, D TOTAL	6/68
W		* * * * * * * * *						
W	AVG	74.7187	5.5730	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

39 Y*0(1815) PARTIAL DECAY MODES

P1	Y*0(1815) INTO KBAR N	$11$17
P2	Y*0(1815) INTO SIGMA PI	20 8
P3	Y*0(1815) INTO Y*1(1385) PI	U43$ 8
P4	Y*0(1815) INTO LAMBDA ETA	$18$14

39 Y*0(1815) BRANCHING RATIOS

R1	Y*0(1815) INTO (KBAR N)/TOTAL			(P1)/TOTAL		
R1	* 0.8			GALTIERI	63	K-P RVUE
R1	N 0.67	0.08		GELFAND	66 HBC	0 K-P ELASTIC 8/67
R1	0.80			KYCIA	67 CNTR	TOTAL CROSS-SEC. 8/67
R1	0.63	0.01		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX 8/67
R1	0.72			BUGG	68 CNTR	6/68
R1	N RES + DIFFRACTIVE BGD FOR K-P EL-- DATA ARE IN ARMENT 67 FITS TOO.					
R2	Y*0(1815) INTO (SIGMA PI)*(KBAR N)/TOTAL**2			(P2*P1)/TOTAL**2		
R2	0.073	0.005		ARMENTERO	67 HBC	0 8/67
R2	0.054	0.012		BELL	67 HDBC	OKP,KD TO SIG PI 11/67
R2	* * * * * * * * *					
R2	AVG .0702	.0067	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)			
R3	Y*0(1820) INTO (Y*1(1385) PI)*(KBAR N)/TOTAL**2			(P3*P1)/TOTAL**2		
R3	0.057	0.013		ARMENTER2	67 HBC	0 K-P TO LAM.PI PI 8/67
R4	Y*0(1815) INTO (Y*1(1385) PI)/TOTAL			(P3)/TOTAL		
R4	0.20	0.05		BIRGE	65 HBC	7/66

REFERENCES --- Y*0(1815)

GALTIERI 63 PL 6 296	A BARBARO-GALTIERI,A HUSSAIN,RD TRIPP//LRL IJ	
BIRGE 65 ATHENS CONF 296	+ELY,KALMUS,KERNAN,LOUIE,SAHOURIA, + //LRL IJP	
BIRMINGH 66 PR 152 1148	BIRMINGHAM,GLASGOW,I.C., OXFORD,RUTHERFORD	
GELFAND 66 PRL 17 1224	+HARMSEN,LEVI-SETTI,PREDAZZI+//EFINS,ARGON	
ALSO 68 PR 163 1792	LASINSKI,LEVI-SETTI,PREDAZZI // EFINS JP	
ARMENTER 67 PL 248 198	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY IJP	
ARMENTE1 67 NP B3 592	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAYIJP	
ARMENTE2 67 ZEIT.PHYS.202,486	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY	
BELL 67 PRL 19 936	R B BELL ////////////////////////////L R L	
KYCIA 67 PRIVATE COMM.	T F KYCIA //BNL I	
BUGG 68 PR 168 1466	+GILMORE,KNIGHT,DAVIES+ // BIRMI,CAMB,RUTH I	

PAPERS NOT REFERRED TO IN DATA CARDS.

CHAMBERL 62 PR 125 1696	CHAMBERLAIN,CROWE,KEEFE,KERTH, + //LRL I
--- FIRST SEEN IN CHAMBERLAIN 62 TOTAL CROSS SECTION MEASUREMENTS.	
SODICKSO 64 PR 133 B757	SODICKSON,MANNELLI,FRISCH,WAHLIG//MIT(BNL) J
HOLLEY 65 UCRL-16274 THESIS W R HOLLEY	//LRL J
--- SODICKSON 64 AND HOLLEY 65 ELASTIC SCATTERING WORK INDICATED J=5/2.	

Λ(1830)

56 Y*0(1830, JP=5/2-) I=0 D05

56 Y*0(1830) MASS (MEV)

M	S	1827.0	3.0		ARMENTERO	67 HBC	0 K-P TO SIGMA PI	8/67
M	S	SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED						6/68
M		1817.0	20.		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX	8/67
M		1837.	11.		BELL	67 HDBC	OKP,KD TO SIG PI	11/67
M		* * * * * * * * *						
M	AVG	1832.3551	9.6384	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

56 Y*0(1830) WIDTH (MEV)

W	S	75.0	9.0		ARMENTERO	67 HBC	0 K-P TO SIGMA PI	8/67
W	S	SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED						6/68
W		97.0	30.		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX	8/67
W		76.0	18.0		BELL	67 HDBC	OKP,KD TO SIG PI	11/67
W		* * * * * * * * *						
W	AVG	80.0882	15.4349	AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)				

56 Y*0(1830) PARTIAL DECAY MODES

P1	Y*0(1830) INTO KBAR N	$11$17
P2	Y*0(1830) INTO SIGMA PI	20 8

56 Y*0(1830) BRANCHING RATIOS

R1	Y*0(1830) INTO (KBAR N)/TOTAL			(P1)/TOTAL		
R1	0.08	0.01		ARMENTER1	67 HBC	0 K-P ELAST+CH.EX 8/67
R2	Y*0(1830) INTO (SIGMA PI)*(KBAR N)/TOTAL**2			(P2*P1)/TOTAL**2		
R2	0.0225	0.006		ARMENTERO	67 HBC	0 K-P TO SIG PI 8/67
R2	0.037	0.003		BELL	67 HDBC	0 KP,KD TO SIG PI 11/67
R2	* * * * * * * * *					
R2	AVG .0341	.0058	AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.2)			

REFERENCES --- Y*0(1830)

ARMENTER 67 PL 248 198	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAYIJP	
ARMENTE1 67 NP B3 592	ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY IJP	
BELL 67 PRL 19 936	R B BELL ////////////////////////////L R L	

Λ(1860)

60 Y*0(1860, JP=7/2+) I=0 F07

PARTIAL WAVE ANALYSIS OF ELASTIC AND CHARGE EXCHANGE DATA REQUIRE A RESONANT F07 AMPLITUDE. EXISTENCE NOT CONCLUSIVELY ESTABLISHED. SEEN ALSO IN FORMATION EXPERIMENT. FIT TO TOTAL CROSS SECTION DATA IMPROVES IF THIS STATE IS ACCEPTED.

Y*0(1860) MASS (MEV)

M	S	1864.0	2.0		ARMENTERO	67 HBC	0 K-P EL. +CH.EXC.	11/67
M	S	SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED						6/68
M		1870.0	5.0		BUGG	68 CNTR	K-P,D TOTAL	7/68
M	N	1840.0	10.0		GALTIERI	68 DBC	K-D 2.1-2.7BEV/C	6/68
M	N	SIGNAL SEEN ONLY IN NEUTRAL STATE--NARROW WIDTH SUGGESTS THIS ASSIG.						

Y*0(1860) WIDTH (MEV)

W	S	34.0	9.0		ARMENTERO	67 HBC	0 K-P EL. +CH.EXC.	11/67
W	S	SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED						6/68
W		40.	10.		BUGG	68 CNTR	K-P,D TOTAL	7/68
W	N	35.0	10.0		GALTIERI	68 DBC	K-D 2.1-2.7BEV/C	6/68
W	N	SIGNAL SEEN ONLY IN NEUTRAL STATE--NARROW WIDTH SUGGESTS THIS ASSIG.						

Y*0(1860) PARTIAL DECAY MODES

P1	Y*0(1860) INTO KBAR N	$11$17
P2	Y*0(1860) INTO SIGMA PI	20 8

Y*0(1860) BRANCHING RATIOS

R1	Y*0(1860) INTO (KBAR N)/TOTAL			(P1)/TOTAL		
R1	0.13	0.02		ARMENTERO	67 HBC	0 K-P EL. +CH.EXC. 11/67
R1	0.10			BUGG	68 CNTR	K-P,D TOTAL 7/68
R2	Y*0(1860) INTO SIGMA PI/ TOTAL			(P2)/TOTAL		
R2	* SEEN - NO RATIO GIVEN			GALTIERI	68 DBC	6/68

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

```
****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES -- Y*0(1860)

ARMENTER 67 NP B3 592          ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY IJP
BUGG     68 PR 168 1466        +GILMORE,KNIGHT,DAVIES+ // BIRMI,CAMB,RUTH I
GALTIERI 68  UCRL 18237        BARBARO-GALTIERI,CHADWICK + //////LRL,SLAC

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Λ(2100)

```
                    41  Y*0(2100, JP=7/2-) I=0

                    41  Y*0(2100) MASS (MEV)    ------------------------------

M   *      2097.0       6.0          BOCK      65 HBC     PBAR P 5.7 BEV/C  7/66
M   *      2120.0                    WOHL      66 HBC     K-P CH EX         7/66
M          2103.0      10.0          KYCIA     67 CNTR    K-P, D TOTAL      8/67
M          2100.0       7.0          BUGG      68 CNTR    K-P, D TOTAL      6/68
M          * * * * * * * * *
M   AVG    2100.9866    5.7346   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

------------------    41  Y*0(2100) WIDTH (MEV)    ------------------------------

M   *        24.0      14.0      24.0   BOCK      65 HBC     INTO KBAR N (PI)  7/66
M   *       145.0                      WOHL      66 HBC                       7/66
M           143.0      10.0          KYCIA     67 CNTR                      8/67
M           140.0      15.0          BUGG      68 CNTR                      6/68
M           * * * * * * * * *
M   AVG     142.0769    8.3205   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

------------------    41  Y*0(2100) PARTIAL DECAY MODES   ------------------------

P1          Y*0(2100) INTO KBAR N                          S11S17
P2          Y*0(2100) INTO SIGMA PI                        S20S 8
P3          Y*0(2100) INTO LAMBDA ETA                      S10S14
P4          Y*0(2100) INTO XI K                            S22S11
P5          Y*0(2100) INTO LAMBDA OMEGA                    S10U 1
P6          Y*0(2100) INTO KBAR N PI                       S11S17S 8

------------------    41  Y*0(2100) BRANCHING RATIOS      ------------------------

R1          Y*0(2100) INTO (KBAR N)/TOTAL                  (P1)/TOTAL
R1  *         0.25                    WOHL      66 HBC                       7/66
R1            0.333      0.013        KYCIA     67 CNTR                      8/67
R1            0.305                   BUGG      68 CNTR                      6/68

R2    Y*0(2100) INTO (SIGMA PI)*(KBAR N)/TOTAL**2          (P2)*(P1)/TOTAL**2
R2            0.0145                  GALTIERI  67 HBC     K-P TO SIG PI     8/67

R3    Y*0(2100) INTO (LAMBDA ETA)*(KBAR N)/TOTAL**2        (P3)*(P1)/TOTAL**2
R3            0.0087  OR LESS         FLATTE 2  67 HBC     K-P TO LAM ETA    6/68

R4    Y*0(2100) INTO (XI K)*(KBAR N)/TOTAL**2              (P4)*(P1)/TOTAL**2
R4            0.0029                  TRIPP     67 RVUE                      8/67

R5          Y*0(2100) INTO (LAMBDA OMEGA)/TOTAL            (P5)/TOTAL
R5            0.1         OR LESS     FLATTE 1  67 HBC                       8/67

R6          Y*0(2100) INTO (KBAR N PI)/TOTAL               (P6)/TOTAL
R6              SEEN                  BOCK      65 HBC

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES -- Y*0(2100)

BOCK      65 PL 17 166         +COOPER,FRENCH,KINSON, +     //CERN,SACLAY
WOHL      66 PRL 17 107        C G WOHL, F T SOLMITZ, M L STEVENSON //LRL IJP
KYCIA     67 PRIVATE COMM.     T F KYCIA                    //BNL  I
FLATTE 1  67 PR 155 1517       S M FLATTE                   //LRL
TRIPP     67 NP B3 10          + LEITH, +   //LRL,SLAC,CERN,HEIDEL,SACLAY
FLATTE 2  67 PR 163 1441       S M FLATTE, C G WOHL         //LRL
GALTIERI  67 PRIVATE COMM      L BARBARO-GALTIERI           //LRL
BUGG      68 PR 168 1466       +GILMORE,KNIGHT, +   //RTHFD,BRMGHM,CVNOSH  I

                    PAPER NOT REFERRED TO IN DATA CARDS.

COOL      66 PRL 16 1228       +GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL  I
     --- REPLACED BY KYCIA 67.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Λ(2340)

```
                    42  Y*0(2350, JP=    ) I=0

                    42  Y*0(2350) MASS (MEV)    ------------------------------

M          2352.0      11.0          KYCIA     67 CNTR    K-P, D TOTAL      8/67
M          2340.0       7.0          BUGG      68 CNTR    K-P, D TOTAL      6/68
M          * * * * * * * * *
M   AVG    2343.4588    5.9056   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

------------------    42  Y*0(2350) WIDTH (MEV)    ------------------------------

W           210.0      50.0          KYCIA     67 CNTR                      8/67
W           140.0      20.0          BUGG      68 CNTR                      6/68
W           * * * * * * * * *
W   AVG     149.6552   24.1379   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)

------------------    42  Y*0(2350) PARTIAL DECAY MODES   ------------------------

P1          Y*0(2350) INTO KBAR N                          S11S17

------------------    42  Y*0(2350) BRANCHING RATIOS     ------------------------

R1          Y*0(2350) INTO (KBAR N)/TOTAL                  (P1)/TOTAL
     J IS NOT KNOWN.  FOLLOWING IS (J+1/2)*(KBAR N)/TOTAL
R1            0.68      0.10          KYCIA     67 CNTR                      8/67
R1            0.57                    BUGG      68 CNTR                      6/68

                              REFERENCES -- Y*0(2350)

KYCIA     67 PRIVATE COMM.     T F KYCIA                    //BNL  I
BUGG      68 PR 168 1466       +GILMORE,KNIGHT, +   //RTHFD,BRMGHM,CVNOSH  I

                    PAPER NOT REFERRED TO IN DATA CARDS.

COOL      66 PRL 16 1228       +GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL  I
     -- .REPLACED BY KYCIA 67.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ+

```
                    19  SIGMA +   (1189,JP=1/2+)  I=1

                    SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ-

```
                    20  SIGMA -   (1198,JP=1/2+)  I=1

                    SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ0

```
                    21  SIGMA 0   (1193,JP=1/2+)  I=1

                    SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ(1385)

```
                    43  Y*1(1385, JP=3/2+) I=1

                     FOR THE TABLES WE USE ONLY THE UNSTARRED DATA, WHICH ARE
                     ATTEMPTS TO OBTAIN THE SEPARATE CHARGE-STATE MASSES AND
                     WIDTHS.  SEE HOWEVER THE IDEOGRAMS INSERTED IN LISTINGS.
    THESE INDICATE SERIOUS SYSTEMATICS, PERHAPS ARISING FROM INTERFERENCE EF-
    FECTS THAT CHANGE WITH PRODUCTION MECHANISM AND BEAM MOMENTUM.

------------------    43  Y*1(1385) MASS (MEV)    ------------------------------

M   *  141 1384.0                    ALSTON    60 HBC  +- K-P 1.15 BEV/C
M   *   38 1384.0                    MARTIN    61 HBC  0+ K20 P .98 BEV/C
M   *      1385.0                    BERGE     61 HBC  +- K-P .4-.85 BEV/C
M   *      1392.0      7.0           COLLEY    62 PBC  0- PI- PRP 2. BEV/C
M0  *  106 1381.0      4.0           CURTIS    63 SPRK 0   PI-P 1.5 BEV/C
M   *      1392.0     10.0           MUSGRAVE  65 HBC  +-OPBAR P 3-4 BEV/C  7/66
M   *      1389.0      3.0           BALTAY    65 HBC  +- PBAR P 3.7 BEV/C  7/66
M+        154 1376.0      3.0           ELY       61 PBC  +  K-P 1.11 BEV/C
M+        170 1375.0      3.9           COOPER    64 HBC  +  K-P 1.45 BEV/C
M+        859 1381.0      1.6           HUWE      64 HBC  +  K-P 1.22 BEV/C
M+            1382.0      1.0           ARMENTERO 65 HBC  +  K-P .9-1.2 BEV/C
M+            1382.6      1.4           SMITH     65 HBC  +  K-P 1.95 BEV/C     9/66
M+            1384.3      1.1           SMITH     65 HBC  +  K-P 1.8 BEV/C      9/66
M+         40 1383.0      2.0           BIRMINGHA 66 HBC   +  3.5 K- P          9/67
M+            1378.0      5.0           LONDON    66 HBC  +  K-P 2.24 BEV/C     7/66
M+            * * * * * * * * *
M+  AVG     1382.2440    .7961   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
                    (SEE IDEOGRAM, APPENDIX I)
M-         93 1382.0      3.0           DAHL      61 DBC  -  K-0 0.45 BEV/C
M-        224 1376.0      3.0           ELY       61 PBC  -
M-        200 1392.0      6.2           COOPER    64 HBC  -
M-       1086 1385.3      1.5           HUWE      64 HBC  -
M-            1384.0      1.0           ARMENTERO 65 HBC  -
M-            1391.5      1.8           SMITH     65 HBC  -  K-P 1.8 BEV/C      9/66
M-            1389.8      1.4           SMITH     65 HBC  -  K-P 1.95 BEV/C     9/66
M-            1389.0      9.0           LONDON    66 HBC  -                     7/66
M-            * * * * * * * * *
M-  AVG     1388.0068    3.0064   AVERAGE (ERROR INCLUDES SCALE FACTOR = 4.8)
                    (SEE IDEOGRAM, APPENDIX I)

------------------    43  Y*(-) - Y*(+) MASS DIFFERENCE (MEV)   ------------------

D   R          0.0       4.2           ELY       61 PBC  +- K-P 1.11 BEV/C     8/66
D   R          4.3       2.2           HUWE      64 HBC  +- K-P 1.22 BEV/C     8/66
D   R          2.0       1.5           ARMENTERO 65 HBC  +- K-P .9-1.2 BEV/C   8/66
D   R          7.2       2.1           SMITH     65 HBC  +- K-P 1.8 BEV/C      9/66
D   R         17.2       2.0           SMITH     65 HBC  +- K-P 1.95 BEV/C     9/66
    R       REDUNDANT WITH DATA IN MASS LISTING.
D   R         11.0       9.0           LONDON    66 HBC  +- K-P 2.24 BEV/C     8/66
D             9.0       6.0           LONDON    66 HBC  +- LAMBDA 3 PI EVTS   7/66

------------------    43  Y*1(1385) WIDTH (MEV)    ------------------------------

W   *         64.0                    ALSTON    60 HBC  +-
W   *         20.0         OR LESS    MARTIN    61 HBC  0+
W   *         40.0                    BERGE     61 HBC  +-
W   *         80.0      10.0          COLLEY    62 PBC  0-
W   *         30.0       9.0          CURTIS    63 SPRK 0
W   *         38.0       9.0          MUSGRAVE  65 HBC  +-0                   7/66
W   *         26.0       5.0          BALTAY    65 HBC  +-                    7/66

W+            48.0       8.0          ELY       61 PBC  +
W+           *51.0      10.0          COOPER    64 HBC  +
W+            46.5       3.0          HUWE      64 HBC  +
W+            32.0       3.0          ARMENTERO 65 HBC  +
W+            30.3       3.1          SMITH     65 HBC  +  K-P 1.8 BEV/C      9/66
W+            33.1       3.8          SMITH     65 HBC  +  K-P 1.95 BEV/C     9/66
W+         40 25.0       6.0          BIRMINGHA 66 HBC   +  3.5 K- P          9/67
W+            * * * * * * * * *
W+  AVG      35.9114    3.0978   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.1)
                    (SEE IDEOGRAM, APPENDIX I)
W             40.0                    DAHL      61 DBC  -
W-            66.0      10.0          ELY       61 PBC  -
W-            88.0      10.0          COOPER    64 HBC  -
W-            62.0       7.0          HUWE      64 HBC  -
W-            38.0       3.0          ARMENTERO 65 HBC  -
W-            29.2       5.7          SMITH     65 HBC  -  K-P 1.80 BEV/C     9/66
W-            17.1       4.4          SMITH     65 HBC  -  K-P 1.95 BEV/C     9/66
W-            * * * * * * * * *
W-  AVG      37.6559    7.7088   AVERAGE (ERROR INCLUDES SCALE FACTOR = 3.7)
                    (SEE IDEOGRAM, APPENDIX I)

------------------    43  Y*1(1385) PARTIAL DECAY MODES    ------------------------

P1          Y*1(1385) INTO LAMBDA PI                       S10S 8
P2          Y*1(1385) INTO SIGMA PI                        S20S 8

------------------    43  Y*1(1385) BRANCHING RATIOS     ------------------------

R1          Y*1(1385) INTO (SIGMA PI)/(LAMBDA PI)          (P2)/(P1)
R1            0.04      0.04          BASTIEN   61 HBC  +-
R1  *         0.04       OR LESS      ALSTON    62 HBC  +-0
R1            0.09      0.04          HUWE      64 HBC  +-
R1  .         0.163     0.035         ARMENTERO 65 HBC  +-                    7/66
R1            0.08      0.06          LONDON    66 HBC  +                     7/66
R1            * * * * * * * * *
R1  AVG        .1009     .0284   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
                    (SEE IDEOGRAM, APPENDIX I)

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES -- Y*1(1385)

ALSTON    60 PRL 5 520         +ALVAREZ,EBERHARD,GOOD,GRAZIANO, +   //LRL  I
DAHL      61 PRL 6 142         +HORWITZ,MILLER,MURRAY,WHITE         //LRL
MARTIN    61 PRL 6 283         +LEIPUNER,CHINOWSKY,SHIVELY, +  //BNL,YALE
BERGE     61 PRL 6 557         +BASTIEN,DAHL,FERRO-LUZZI,KIRZ, +    //LRL
BASTIEN   61 PRL 6 702         P BASTIEN,M FERRO-LUZZI,A H ROSENFELD//LRL
ELY       61 PRL 7 461         +FUNG,GIDAL,PAN,POWELL,WHITE         //LRL  J

ALSTON    62 CERN CONF 311     +ALVAREZ,FERRO-LUZZI,ROSENFELD, +    //LRL
COLLEY    62 PR 128 1930       +GELFAND,NAUENBERG, +   //COLUMBIA,RUTGERS  JP
CURTIS    63 PR 132 1771       +COFFIN,MEYER,TERWILLIGER            //MICH  J
COOPER    64 PL 8 365          +FILTHUTH,FRIDMAN,MALAMUD, +  //CERN,AMSTR
HUWE      64 UCRL-11291 THESIS D O HUWE                  //         //LRL  JP

MUSGRAVE  65 NC 35 735         +PETMEZAS,+//BIRMGHM,CERN,EP,IMPCOL,SACLAY
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED.

```
ARMENTER 65 PL 19 75          ARMENTEROS, +          //CERN,HEIDEL,SACLAY
BALTAY   65 PR 140 B1027      +SANDWEISS,TAFT,CULWICK,KOPP, + //YALE,BNL
SMITH    65 THESIS (UCLA)     L T SMITH              //          UCLA

BIRMINGH 66 PR  152  1148     BIRMINGHAM,GLASGOW,I.C., OXFORDYRUTHERFORD
LONDON   66 PR 143 1034       +RAU,SAMIOS,YAMAMOTO,GOLDBERG,+ //BNL,SYCR  J

          QUANTUM NUMBER DETERMINATIONS NOT REFERRED TO IN DATA CARDS.

SHAFER   64 PR 134 B1372      J B SHAFER, D O HUWE                  //LRL   JP
MALAMUD  64 PL 10 145         E MALAMUD, P E SCHLEIN          //CERN,UCLA  JP

****** ********* ********* ********* *****.*** ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ(1660)

44 Y*1(1660, JP=3/2-) I=1 D13

THE Y*1(1660) HAS APPEARED IN BOTH FORMATION AND PRODUCTION EXPERIMENTS. THE PRESENT DATA ON FORMATION EXPERIMENTS IS NOT SUFFICENT TO CLARIFY THE SITUATION OF THE I=1 STATE. PRODUCTION EXPERIMENTS HAVE SHOWN LARGE INCONSISTENCIES IN THE BRANCHING RATIOS (CHANGING WITH INCIDENT ENERGY). THE Y*(1690) MIGHT BE A SECOND I=1 STATE IN THIS ENERGY REGION. BRANCHING RATIOS HOWEVER ARE NOT YET DISENTANGLED.

AS FOR THE QUANTUM NUMBERS, THE ANALYSES OF LAMBDA PI CHANNEL (IN FORMATION EXP.) AND Y*0(1405)+PI CHANNEL (IN PROD. EXP.) ARE CONSISTENT WITH JP=3/2-. JP OF Y*1(1690) NOT YET KNOWN.

44 Y*1(1660) MASS (MEV)

```
M          1685.0                    ALEXANDER 62 HBC  0- PI-P 2-2.2 BEV/C
M          1660.0      10.0          ALVAREZ   63 HBC  +  K-P 1.51 BEV/C
M          1660.0                    BERLEY    64 HBC  0  K-P TO LAM PIO     7/66
M          1649.0       7.0          LEVEQUE   65 HBC  +  K-P TO Y*1660 PI   7/66
M  S       1665.0       3.0          ARMENTERO 67 HBC   0 K-P TO SIGMA PI    8/67
M  S  SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED            6/68
M          1665.0       5.0          BUGG      68 CNTR     K-P, D TOTAL C.S
M       70 1661.        9.           PRIMER    68 HBC  +  K-P 4.6-5. GEV/C   7/68
M                 * . * . * . * . * .
M  AVG    1658.8668    4.7059    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.4)
```

44 Y*1(1660) WIDTH (MEV)

```
W            45.0                   ALEXANDER 62 HBC  0-
W            40.0      10.0         ALVAREZ   63 HBC  +
W            60.0                   BERLEY    64 HBC  0                    7/66
W            55.0      10.0         LEVEQUE   65 HBC  +                    7/66
W  S         32.0       4.0         ARMENTERO 67 HBC   0 K-P TO SIGMA PI    8/67
W  S  SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED           6/68
W  C         46.0       7.          ARMENTER1 67 HBC    0K-P EL. +CH.EXC.  11/67
W  C LACK OF DATA PREVENTS AUTHORS FROM DETERMINING UNAMBIG  THIS AMPLITU. 11/67
W            30.0      15.0         BUGG      68 CNTR                      11/66
W       70   60.       20.          PRIMER    68 HBC  +  K-P 4.6-5. GEV/C   7/68
W                 * . * . * . * . * .
W  AVG      45.7732    6.0921    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

44 Y*1(1660) PARTIAL DECAY MODES

```
P1         Y*1(1660) INTO KBAR N                              S11S17
P2         Y*1(1660) INTO LAMBDA PI                           S18S 8
P3         Y*1(1660) INTO SIGMA PI                            S20S 8
P4         Y*1(1660) INTO LAMBDA PI PI                        S18S 8S 8
P5         Y*1(1660) INTO SIGMA PI PI                         S20S 8S 8
P6         Y*1(1660) INTO Y*1(1385) PI                        U43S 8
P7         Y*1(1660) INTO Y*0(1405) PI                        U37S 8
```

44 Y*1(1660) BRANCHING RATIOS

```
R1         Y*1(1660) INTO (KBAR N)/TOTAL                      (P1)/TOTAL
R1            0.05       OR LESS       ALVAREZ   63 HBC  + K-P AT 1.15 BEV/C
R1  B         0.16       OR MORE       BASTIEN 2 63 HBC  0                  11/67
R1  B  ANALYSIS DID NOT INCLUDE I=0 RESONANT STATE Y*0(1690)
R1            0.2        OR LESS       LONDON    66 HBC  + K-P AT 2.25 BEV/C  7/66
R1  C         0.06       0.03          ARMENTER1 67 HBC  0 K-P EL. +CH.EXC.  11/67
R1  C LACK OF DATA PREVENTS AUTHORS FROM DETERMINING UNAMBIG  THIS AMPLITU. 11/67
R1            0.025                    BUGG      68 CNTR 0  ASSUMING J=3/2   11/66
R1            0.15   OR  LESS          PRIMER    68 HBC  +  K-P 4.6-5. GEV/C  7/68

R2         Y*1(1660) INTO (LAMBDA PI)/TOTAL                   (P2)/TOTAL
R2            0.32                     ALVAREZ   63 HBC  + K-P AT 1.15 BEV/C
R2  B         0.09       OR LESS       BASTIEN 2 63 HBC  0 K-P TO LAM. PI
R2  B  ANALYSIS DID NOT INCLUDE I=0 RESONANT STATE Y*0(1690)                 11/67
R2            0.2        OR LESS       LONDON    66 HBC  + K-P AT 2.25 BEV/C  7/66
R2            0.06       0.06          SMART     66 DBC  ~  ASSUMING R1=0.15  7/68
R2            0.45                     FERRO-LUZ 66 HBC  0  ASSUMING R1=0.15  9/66

R3         Y*1(1660) INTO (SIGMA PI)/TOTAL                    (P3)/TOTAL
R3            0.27                     ALVAREZ   63 HBC  + K-P AT 1.15 BEV/C
R3  B         0.22       0.06          BASTIEN 2 63 HBC  0 K-P TO SIGMA PI
R3  B  ANALYSIS DID NOT INCLUDE I=0 RESONANT STATE Y*0(1690)                 11/67
R3            0.25       0.15          LONDON    66 HBC  + K-P AT 2.25 BEV/C  7/66
R3            0.67       0.10          ARMENTERO 67 HBC   0 ASSUMING R1=0.10  8/67
R3  A   53    0.63       0.20          PRIMER    68 HBC  +  K-P 4.6-5. GEV/C  7/68
R3  A     ASSUMING THAT P3 AND P7 ARE THE ONLY DECAY MODES OF Y*1(1660)        7/68
R3                * . * . * . * . * .
R3  AVG          .5408      .1938   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.3)

R4         Y*1(1660) INTO (LAMBDA PI PI)/TOTAL                (P4)/TOTAL
R4            0.18                     ALVAREZ   63 HBC  + K-P AT 1.15 BEV/C
R4  B         0.16       0.05          BASTIEN 2 63 HBC  0
R4  B  ANALYSIS DID NOT INCLUDE I=0 RESONANT STATE Y*0(1690)                 11/67
R4            0.2        OR LESS       LONDON    66 HBC  + K-P AT 2.25 BEV/C  7/66

R5         Y*1(1660) INTO (SIGMA PI PI)/TOTAL                 (P5)/TOTAL
R5            0.18                     ALVAREZ   63 HBC  + K-P AT 1.15 BEV/C
R5  B         0.25       0.06          BASTIEN 2 63 HBC  0 K-P TO SIG PI PI
R5  B  ANALYSIS DID NOT INCLUDE I=0 RESONANT STATE Y*0(1690)                 11/67

R6         Y*1(1660) INTO (Y*0(1405) PI)/TOTAL                (P7)/TOTAL
R6            0.75       0.25          LONDON    66 HBC  + K-P AT 2.25 BEV/C  7/66
R6  A   17    0.37       0.15          PRIMER    68 HBC  +  K-P AT 2.45 BEV/C  7/68
R6  A     ASSUMING THAT P3 AND P7 ARE THE ONLY DECAY MODES OF Y*1(1660)        7/68

R7         Y*1(1660) INTO (KBAR N)/(LAMBDA PI)                (P1)/(P2)
R7            0.43       OR MORE       SMITH     63 HBC  0-

R8         Y*1(1660) INTO (SIGMA PI)/(LAMBDA PI)              (P3)/(P2)
R8            0.86                     SMITH     63 HBC  0-
R8            6.8        3.0           HUWE      64 HBC  +

R9         Y*1(1660) INTO (LAMBDA PI PI)/(LAMBDA PI)          (P4)/(P2)
R9            0.14                     SMITH     63 HBC  0-

R10        Y*1(1660) INTO (Y*0(1405) PI)/(SIGMA PI PI)        (P7)/(P5)
R10           0.90       0.10     0.16 EBERHARD  65       + K-P AT 2.45 BEV/C  7/66

R11        Y*1(1660) INTO (Y*0(1405) PI)/(Y*1(1385) PI)       (P7)/(P6)
R11           0.8        OR MORE       EBERHARD  65       + K-P AT 2.45 BEV/C  7/66

R12    Y*1(1660) IN  (LAMBDA PI PI)/(SIGMA PI PI)             (P4)/(P5)
R12           0.35       0.2           BIRMINGHA 66 HBC  +  K-P AT 3.5 GEV/C 11/67

R13    Y*1(1660) INTO (LAMBDA PI)/(SIGMA PI PI)               (P2)/(P5)
R13           .2    OR LESS             BIRMINGHA 66 HBC  +  K-P AT 3.5 GEV/C 11/67

R14    Y*1(1660) INTO (SIGMA PI)/(SIGMA PI PI)                (P3)/(P5)
R14           .4    OR LESS             BIRMINGHA 66 HBC  +  K-P AT 3.5 GEV/C 11/67

****** ********* ********* ********* ********* ********* ********* *********
```

REFERENCES --- Y*1(1660)

```
ALEXANDE 62 CERN CONF 320     ALEXANDER,JACOBS,KALBFLEISCH,MILLER,+//LRL  I
ALVAREZ  63 PRL 10 184        +ALSTON,FERRO-LUZZI,HUWE, +           //LRL  I
BASTIEN2 63 UCRL-10779 THESIS P L BASTIEN                           //LRL  IJ
SMITH    63 ATHENS CONF 67    G A SMITH                             //LRL
HUWE     64 UCRL-11291 THESIS D O HUWE                             //LRL
BERLEY   64 DUBNA CONF I 565  +CONNOLLY,HART,RAHM,STONEHILL, +      //BNL IJP

EBERHARD 65 PRL 14 466        +SHIVELY,ROSS,SIEGAL,FICENEC, +  //LRL,ILL  I
LEVEQUE  65 PL 18 69           +     //SACLAY,EP,GLASGOW,IMPCOL,OXF,RTHFD  JP
BIRMINGH 66 PR  152  1148     BIRMINGHAM,GLASGOW,I.C.Y OXFORDYRUOHERFORD
FERRO-LU 66 BERKELEY CONF 193 ARMENTEROS,P-LUZZI, + //CERN,HEIDEL,SACLAY IJP
LONDON   66 PR 143 1034       +RAU,SAMIOS,YAMAMOTO,GOLDBERG,+ //BNL,SYCR  IJ
SMART    66 PRL 17 556        W M SMART,A KERNAN,G E KALMUS,R P ELY//LRL IJP

ARMENTER 67 PL 248 198        ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY JP
ARMENTE1 67 NP 83 592         ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY
BUGG     68 PR 168 1466       +GILMORE,KNIGHT,DAVIES+ // BIRMI,CAMB,RUTH I
PRIMER   68 PRL 20 610        +GOLDBERG,JAEGER,BARNES,DORNAN + / SYR,BNL
```

PAPERS NOT REFERRED TO IN DATA CARDS.

```
BASTIEN1 63 PRL 10 188        P L BASTIEN, J P BERGE                //LRL  IJ
   ---  REPLACED BY BASTIEN 2, BUT SIMILAR AND MORE READILY AVAILABLE.
T-ZADEH  63 PRL 11 470        TAHER-ZADEH,PROWSE,SCHLEIN,SLATER,+ //UCLA  JP
   ---  SEE NOTE FOLLOWING SCHLEIN 66.
LEE      66 PRL 17 45         Y Y LEE, D O REEDER, R W HARTUNG     //WISC  JP
SCHLEIN  66 UCLA-1016         P E SCHLEIN, T G TRIPPE              //UCLA  JP
   ---  REANALYZES DATA OF TAHER-ZADEH 63 AND BASTIEN 63 AND ALL PUBLISHED
        LAMBDA PI CROSS SECTION DATA IN THE LIGHT OF THE NOW KNOWN
        Y*1(1765) AND REVERSES THE MODEL-DEPENDENT CONCLUSION OF TAHER-
        ZADEH ON THE PREFERRED JP ASSIGNMENT (FROM 3/2+ TO 3/2-).
EBERHARD 67 PR 163 1446       +PRIPSTEIN,SHIVELY,KRUSE,SWANSON //LRL,ILL IJP

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ(1690)

```
       USB  Y*1(1690, JP=   ) I=1
       SEE NOTE PRECEDING Y*1(1660) LISTINGS
```

USB Y*1(1690) MASS (MEV)

```
M         30 1718.0      12.0          COLLEY    67 HBC  +  K-P AT 6.0 GEV/C  8/67
M         53 1683.0      15.0          DERRICK   67 HBC  +  K-P AT 5.5 GEV/C  8/67
M         60 1694.       24.           PRIMER    68 HBC  +  K-P 4.6-5. GEV/C  7/68
M                * . * . * . * . * .
M  AVG    1701.3862   10.4021    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)
```

USB Y*1(1690) WIDTH (MEV)

```
W         30  100.0      35.0          COLLEY    67 HBC  +  K-P AT 6.0 GEV/C  8/67
W         53  120.       30.           DERRICK   67 HBC  +  K-P AT 5.5 GEV/C  8/67
W         60  105.       35.           PRIMER    68 HBC  +  K-P 4.6-5. GEV/C  7/68
W                * . * . * . * . * .
W  AVG     109.5868   19.0909    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

USB Y*1(1690) PARTIAL DECAY MODES

```
P1    Y*1(1690) INTO KBAR N                                  S11S17
P2    Y*1(1690) INTO LAMBDA PI                               S18S 9
P3    Y*1(1690) INTO SIGMA  PI                               S20S 8
P4    Y*1(1690) INTO Y*1(1385) PI                            U43S 8
```

USB Y*1(1690) BRANCHING RATIOS

```
R1    Y*1(1690) INTO (LAMBDA PI)/(KBAR N)                    (P2)/(P1)
R1       18      0.80          0.50      COLLEY    67 HBC  +  KO BAR FIN.STATE  8/67
R1       15      0.6           0.40      DERRICK   67 HBC  +  KO BAR FIN.STATE  8/67
R1  *     MAIN  DECAY  MODE               PRIMER    68 HBC  +  K-P 4.6-5. GEV/C  7/68
R1                * . * . * . * . * .
R1  AVG          .6780      .3123    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R2    Y*1(1690) INTO (SIGMA PI)/(LAMBDA PI)                  (P3)/(P2)
R2           0.3           0.3       COLLEY    67 HBC  +  CHARG.SIGMA F.S.  8/67
R2           0.25   OR  LESS          DERRICK   67 HBC  +  NEUTR. SIGMA F.S  8/67

R3    Y*1(1690) INTO (Y*1(1385) PI)/(LAMBDA PI)              (P4)/(P2)
R3       14      1.0           0.3       DERRICK   67 HBC  +  LAMBDA 2PI F.S.   8/67
R3               0.49          0.29      COLLEY    67 HBC  +  LAMBDA 2PI F.S.   8/67
R3                * . * . * . * . * .
R3  AVG          .7364      .2549    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.2)

****** ********* ********* ********* ********* ********* ********* *********
```

REFERENCES --- Y*1(1690)

```
COLLEY   67 PL 248 489        +MACDONALD,MUSGRAVE+/BI,UG,IC,MPI,OXF,RUTH
DERRICK  67 PRL 18 266        +FIELDS,LOKEN,AMMAR,DAVIS//ARGONNE,NORTHWE
PRIMER   68 PRL 20 610        +GOLDBERG,JAEGER,BARNES,DORNAN + / SYR,BNL
```

PAPERS NOT REFERRED TO IN DATA CARDS

```
MEYER    67 HEIDELBERG CONF.  J MEYER - RAPPORTEUR ON BARYON RES./SACLAY

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Σ(1765)

```
       45  Y*1(1765, JP=5/2-) I=1   D15
```

45 Y*1(1765) MASS (MEV)

```
M          1769.0      10.0          GALTIERI  63 DBC  0  K-D 1.51 BEV/C
M          1755.0      10.0          ARMENTERO 65 HBC  0  K-P TO Y*1520 PI  7/66
M          1760.0      10.0          BELL 1,2  66 DBC  ~  K-N TO Y*1520 PI  7/66
M          1746.0       6.0          FENSTER   66 HBC  0  K-P TO Y*1520 PI  9/66
M  N       1758.0      11.0          GELFAND   66 HBC   0 K-P ELASTIC        8/67
M  S       1766.0       4.0          ARMENTER1 67 HBC   0 K-P ELAST+CH.EX    8/67
M          1768.0       4.0          BUGG      68 CNTR    K-P, D TOTAL      11/66
M  S       1775.0       7.0          SMART     68 DBC   ~ K-N TO LAM.PI~     7/68
M  N     RES + DIFFRACTIVE BGD FOR K-P EL-- DATA ARE IN ARMENT 67 FITS TOO.
M  S  SYSTEMATIC ERROR NOT INCLUDED -ONLY INDETERMINATION OF FIT INCLUDED   7/68
M                * . * . * . * . * .
M  AVG    1762.6012    3.9742    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)
```

45 Y*1(1765) WIDTH (MEV)

```
W            60.0      10.0          GALTIERI  63 DBC  0
W            70.0      20.0          BELL 2    66 DBC  ~                    7/66
W            70.0      20.0          FENSTER   66 HBC  0                    9/66
W  N        113.0      25.0          GELFAND   66 HBC   0 K-P ELASTIC        8/67
W  S        114.0       8.0          ARMENTER1 67 HBC   0 K-P ELAST+CH.EX    8/67
W           110.0       7.0          BUGG      68 CNTR    K-P,D TOTAL        7/68
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

```
W   S       146.0       9.0              SMART     68 OBC   - K-N TO LAM.PI-    7/68
W   S  SYSTEMATIC ERROR NOT INCLUDED . ONLY INDETERM. IN FIT QUOTED             6/68
W   N       RES + DIFFRACTIVE BGD FOR K-P EL-- DATA ARE IN ARMENT 67 FITS TOO.
W                 * * * * * * * * *
W   AVG       90.2305  13.4308   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.5)
                  (SEE IDEOGRAM, APPENDIX I)
```

45 Y*1(1765) PARTIAL DECAY MODES

```
P1          Y*1(1765) INTO KBAR N                              S11S17
P2          Y*1(1765) INTO LAMBDA PI                           S18S 9
P3          Y*1(1765) INTO SIGMA PI                            S20S 8
P4          Y*1(1765) INTO SIGMA ETA                           S21S14
P5          Y*1(1765) INTO Y*1(1385) PI                        U43S 8
P6          Y*1(1765) INTO Y*0(1520) PI                        U38S 8
```

45 Y*1(1765) BRANCHING RATIOS

```
R1    Y*1(1765) INTO (KBAR N)/TOTAL                            (P1)/TOTAL
R1  *         0.6                    GALTIERI  63 HBC   0  K-P RVUE
R1  N         0.46      0.05         GELFAND   66 HBC   0 K-P ELASTIC        8/67
R1            0.34                   KYCIA     67 CNTR     TOTAL CROSS-SEC.  8/67
R1            0.53      0.09         UHLIG     67 HBC   0                    9/66
R1            0.45      0.02         ARMENTER1 67 HBC   0 K-P ELAST+CH.EX    8/67
R1            0.37                   BUGG      68 CNTR                      11/66
R1  N       RES + DIFFRACTIVE BGD FOR K-P EL-- DATA ARE IN ARMENT 67 FITS TOO.
R1                * * * * * * * * *
R1  AVG          .4538     .0199    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R2    Y*1(1765) INTO (LAMBDA PI)*(KBAR N)/TOTAL**2             (P2*P1)/TOTAL**2
R2            0.090     0.025        ARMENTER0 66 HBC    0
R2            0.07      0.01         SMART     68 OBC    -                    7/68
R2                * * * * * * * * *
R2  AVG          .0728     .0093    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

R3    Y*1(1765) INTO (Y*0(1520) PI)*(KBAR N)/TOTAL**2          (P3*P1)/TOTAL**2
R3            0.075     0.015        ARMENTER0 66 HBC    CHYPERONS FIN.ST.  9/66
R3            0.12      0.03         FENSTER   66 HBC    OKBAR N  FIN. ST.  9/66
R3                * * * * * * * * *
R3  AVG          .0840     .0180    AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.3)

R4    Y*1(1765) INTO (Y*1(1385) PI)*(KBAR N)/TOTAL**2          (P4*P1)/TOTAL**2
R4            0.09      0.03         ARMENTER2 67 HBC   0 K-P TO LAM.PI PI   8/67

R5    Y*1(1765) INTO (SIGMA PI)*(KBAR N)/TOTAL **2             (P5*P1)/TOTAL**2
R5            0.005     0.003        ARMENTER0 67 HBC   0 K-P TO SIGMA PI    8/67


R6    Y*1(1765) INTO (LAMBDA PI)/(KBAR N)                      (P2)/(P1)
R6            0.33      0.05         UHLIG     67 HBC   0 K-P,.9 GEV/C       9/66

R7    Y*1(1765) INTO (Y*0(1520)/(KBAR N)                       (P3)/(P1)
R7            0.28      0.05         UHLIG     67 HBC   0 K-P,.9 GEV/C       9/66

R8    Y*1(1765) INTO (Y*1(1385)/(KBAR N)                       (P4)/(P1)
R8            0.25      0.09         UHLIG     67 HBC   0 K-P,.9 GEV/C       9/66

R9    Y*1(1765) INTO(SIGMA ETA)/TOTAL                          (P6)/TOTAL
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES -- Y*1(1765)

```
GALTIERI 63 PL 6 296          A BARBARO-GALTIERI,A HUSSAIN,RD TRIPP//LRL IJ
ARMENTER 65 PL 19 338         ARMENTEROS, +      //CERN,HEIDELBERG,SACLAY IJP
BELL 1   66 PRL 16 203        R B BELL, R W BIRGE, Y-L PAN, R T PU //LRL IJP
BELL 2   66 UCRL-16936 THESIS R B BELL                             //LRL IJP
FENSTER  66 PRL 17 841        +GELFAND,HARMSEN,L-SETTI,+ //CHI,ARG(CERN) IJP
GELFAND  66 PRL 17 1224       +HARMSEN,LEVI-SETTI,PREDAZZI+//EPINS,ARGON
ALSO     68 PR 163 1792       LASINSKI,LEVI-SETTI,PREDAZZI    //    8FINS JP

ARMENTER 67 PL 248 198        ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAYIJP
ARMENTE1 67 NP B3 592         ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY IJP
ARMENTE2 67 ZEIT.PHYS.202,486 ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY
KYCIA    67 PRIVATE COMM.     T F KYCIA                            //BNL  I
UHLIG    67 PR 155 1448       +CHARLTON,LONDON,GLASSER,YODH,+///MD,USNRL
BUGG     68 PR 168 1466       +GILMORE,KNIGHT,DAVIES* // BIRMI,CAMB,RUTH I
SMART    68 PR 169 1330       W M SMART                  //          LRL IJP
   ALSO  66 PRL 17 556        W M SMART,A KERNAN,G E KALMUS,B P ELY//LRL IJP
```

PAPERS NOT REFERRED TO IN DATA CARDS.

```
YODH     65 ATHENS CONF 269   G B YODH                          //MARYLAND IJ
BIRGE    65 ATHENS CONF 296   +ELY,KALMUS,KERNAN,LOUIE,SANDURIA, + //LRL IJP
    --  YODH 65 AND BIRGE 65 ARE PRECURSORS OF UHLIG 66 AND BELL 66.
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(1780)

57 Y*1(1780, JP=) I=1

SIGMA ETA THRESHOLD EFFECT. INTERPRETATION AS RESONANCE NOT CONCLUSIVE. SEE FERRO-LUZZI 66. OMITTED FROM TABLE

57 Y*1(1780) MASS (MEV)

```
M          1780.0                    CLINE     66 OBC   -  K-N TO SIG- ETA   9/66
```

57 Y*1(1780) WIDTH (MEV)

```
W           100.0                    CLINE     66 OBC   -                    9/66
```

57 Y*1(1780) PARTIAL DECAY MODES

```
P1          Y*1(1780) INTO KBAR N                              S11S17
P2          Y*1(1780) INTO SIGMA ETA                           S20S14
```

REFERENCES -- Y*1(1780)

```
FERRO-LU 66 BERKELEY 183      ARMENTEROS+FERRO-LUZZI+//CERN,HEIDE,SACLAY
CLINE    67 PL 25B 41         CLINE,OLSSON//////////////////////WISCONSIN
```

PAPERS NOT REFERRED TO IN DATA CARDS

```
MEYER    67 HEIDELBERG C. 117 J MEYER - RAPPORTEUR ON BARYON RES./SACLAY
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

67 Y*1(1880,JP=1/2+) I=1 P11

PARTIAL WAVE ANALYSIS OF K-P TO LAMBDA PI DATA REQUIRE A P11 AMPLITUDE AT THIS MASS. EXISTENCE NOT CONCLUSIVELY ESTABLISHED.

Y*1(1880) MASS (MEV)

```
M          1882.      40.            SMART     68 RVUE  -0 K-N TO LAM.PI    7/68
```

Y*1(1880) WIDTH (MEV)

```
W           222.     150.            SMART     68 RVUE  -0 K-N TO LAM.PI    7/68
```

Y*1(1880) PARTIAL DECAY MODES

```
P1    Y*1(1880) INTO KBAR N                                   S11S17
P2    Y*1(1880) INTO LAMBDA PI                                S20S 8
```

Y*1(1880) BRANCHING RATIOS

```
R1    Y*1(1880) INTO (LAMBDA PI)*(KBAR N)/ TOTAL**2      (P2)*(P1)/TOTAL**2
R1            0.012     0.007          SMART     68 RVUE  -0 K-N TO LAM.PI    7/68
```

****** ********* ********* ********* ********* ********* ********* *********
RT   68 PR 169 1330   W M SMART   ////////////////////////////////LRLIJP U 7/66
****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(1915)

46 Y*1(1915, JP=5/2+) I=1 F15

SOME RESERVATION SHOULD BE HELD AGAINST COMPLETE ACCEPTANCE OF THE INTERPRETATION OF THIS EFFECT AS (1) BEING A RESONANCE (2) HAVING JP = 5/2+.

46 Y*1(1915) MASS (MEV)

```
M   *      1942.0      9.0            BOCK      65 HBC     PBAR P 5.7 BEV/C
M          1915.0     20.0            COOL      66 CNTR  0- K-P, D TOTAL       7/66
M          1905.0      5.0            BUGG      68 CNTR     K-P, D TOTAL      11/66
M          1902.0     11.0            SMART     68 RVUE  -0 K-N TO LAM.PI    7/68
M                * * * * * * * * *
M   AVG    1905.0041   4.4383   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

46 Y*1(1915) WIDTH (MEV)

```
W   *        36.0     20.0     36.0   BOCK      65 HBC
W            65.0                     COOL      66 CNTR  0-                  7/66
W            60.0     10.0            BUGG      68 CNTR                     11/66
W   C        50.0     20.0            ARMENTER1 67 HBC     OK-P EL. +CH.EXC. 11/67
W   C LACK OF DATA PREVENTS AUTHORS FROM DETERMINING UNAMBIG  THIS AMPLITU. 11/67
W            52.0     25.0            SMART     68 RVUE  -0 K-N TO LAM.PI    7/68
W                * * * * * * * * *
W   AVG      58.8966   9.2848   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

46 Y*1(1915) PARTIAL DECAY MODES

```
P1          Y*1(1915) INTO KBAR N                              S11S17
P2          Y*1(1915) INTO LAMBDA PI                           S18S 8
P3          Y*1(1915) INTO SIGMA PI                            S20S 8
```

46 Y*1(1915) BRANCHING RATIOS

```
R1          Y*1(1915) INTO (KBAR N)/TOTAL                      (P1)/TOTAL
R1  *         0.103                  COOL      66 CNTR     ASSUMING J=5/2    7/66
R1            0.09                   KYCIA     67 CNTR     TOTAL CROSS-SEC.  8/67
R1            0.06                   BUGG      68 CNTR     ASSUMING J=5/2    6/68
R1  C         0.12      .01          ARMENTER1 67 HBC   0  K-P EL. +CH.EXC. 11/67
R1  C LACK OF DATA PREVENTS AUTHORS FROM DETERMINING UNAMBIG  THIS AMPLITU. 11/67


R2     Y*1(1915) INTO (LAMBDA PI)*(KBAR N)/TOTAL**2      (P1*P2)/TOTAL**2
R2  C         0.006                  ARMENTER1 67 HBC     OK-P TO LAM.PI    11/67
R2  C LACK OF DATA PREVENTS AUTHORS FROM DETERMINING UNAMBIG  THIS AMPLITU. 11/67
R2            0.006     0.003        SMART     68 RVUE  -0 K-N TO LAM.PI    7/68

R3     Y*1(1915) INTO (SIGMA PI)*(KBAR N)/TOTAL**2       (P1*P3)/TOTAL**2
R3  C         0.00      0.01         ARMENTER0 67 HBC     K-P TO SIG+-PI-+ 11/67
R3  C LACK OF DATA PREVENTS AUTHORS FROM DETERMINING UNAMBIG  THIS AMPLITU. 11/67

R4     Y*1(1915)  INTO (LAMBDA PI)/TOTAL                      (P2)/TOTAL
R4  *   50    SEEN                   PRIMER    68 HBC  *  K-P 4.6-5. GEV/C  7/68
```

****** ********* ********* ********* ********* ********* ********* *********

REFERENCES -- Y*1(1915)

```
BOCK     65 PL 17 166         +COOPER,FRENCH,KINSON, +      //CERN,SACLAY  I
COOL     66 PRL 16 1228       +GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL  I
SMART    66 PRL 17 556        W M SMART,A KERNAN,G E KALMUS,R P ELY//LRL IJP
ARMENTER 67 PL 24B 198        ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY
ARMENTE1 67 NP B3 592         ARMENTEROS,FERRO-LUZZI+///CERN,HEID,SACLAY
KYCIA    67 PRIVATE COMM.     T F KYCIA                            //BNL  I

BUGG     68 PR 168 1466       +GILMORE,KNIGHT,DAVIES+ // BIRMI,CAMB,RUTH I
PRIMER   68 PRL 20 610        +GOLDBERG,JAEGER,BARNES,DORNAN + / SYR,BNL
SMART    68 PR 169 1330       W M SMART                  //          LRL
```

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(2035)

47 Y*1(2030, JP=7/2+) I=1

47 Y*1(2030) MASS (MEV)

```
M   *      2022.0     20.0            BLANPIED  65 CNTR  0  GAMMA P TO K+ Y*
M   *      2030.0     20.0            WOHL      66 HBC   0  K-P TO LAM PIO     7/66
M          2026.0     19.0            KYCIA     67 CNTR     K-P, D TOTAL      8/67
M          2020.0      7.0            BUGG      68 CNTR     K-P, D TOTAL      6/68
M   S      2032.0      6.0            SMART     68 RVUE     K-N TO LAM PI     6/68
M   S  SYSTEMATIC ERROR NOT INCLUDED -ONLY INDETERMINATION OF FIT INCLUDED    7/68
M                * * * * * * * * *
M   AVG    2020.7171   6.5684   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)
```

47 Y*1(2030) WIDTH (MEV)

```
W   *       120.0     20.0            BLANPIED  65 CNTR  0
W   *       170.0                     WOHL      66 HBC   0                   7/66
W           120.0     10.0            KYCIA     67 CNTR                     8/67
W           130.0     10.0            BUGG      68 CNTR                     6/68
W           160.0     16.0            SMART     68 RVUE     INCLUDES WOHL 66  6/68
W                * * * * * * * * *
W   AVG     130.7190   9.7049   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.5)
```

47 Y*1(2030) PARTIAL DECAY MODES

```
P1          Y*1(2030) INTO KBAR N                              S11S17
P2          Y*1(2030) INTO LAMBDA PI                           S18S 9
P3          Y*1(2030) INTO SIGMA PI                            S20S 8
P4          Y*1(2030) INTO XI K                                S22S11
```

47 Y*1(2030) BRANCHING RATIOS

```
R1          Y*1(2030) INTO (KBAR N)/TOTAL                      (P1)/TOTAL
R1  *         0.25                   WOHL      66 HBC   0  K-P CH EX          7/66
R1            0.105     0.005        KYCIA     67 CNTR                      8/67
R1            0.131                  BUGG      68 CNTR                      6/68

R2    Y*1(2030) INTO (LAMBDA PI)*(KBAR N)/TOTAL**2       (P2)*(P1)/TOTAL**2
R2  *         0.040                  WOHL      66 HBC     K-P TO LAM PIO    7/66
R2            0.045     0.004        SMART     68 RVUE    INCLUDES WOHL     6/68
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

```
R3    Y*1(2030) INTO (SIGMA PI)*(KBAR N)/TOTAL**2          (P3)*(P1)/TOTAL**2
R3          0.0096                  GALTIERI  67 HBC     K-P TO SIG PI      8/67

R4    Y*1(2030) INTO (XI K)*(KBAR N)/TOTAL**2              (P4)*(P1)/TOTAL**2
R4          0.00256   OR LESS       TRIPP     67 RVUE                        8/67

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- Y*1(2030)

BLANPIED 65 PRL 14 741        +GREENBERG,HUGHES,KITCHING,LU,+//YALE(CEA)
WOHL     66 PRL 17 107        C G WOHL, F T SOLMITZ, M L STEVENSON //LRL  IJP
KYCIA    67 PRIVATE COMM.     T F KYCIA                           //BNL   I
TRIPP    67 NP B3 10          + LEITH, +   //LRL,SLAC,CERN,HEIDEL,SACLAY
GALTIERI 67 PRIVATE COMM      L BARBARO-GALTIERI                  //LRL
BUGG     68 PR 168 1466       +GILMORE,KNIGHT, +   //RTHFD,BRMGHM,CVNDSH   I
SMART    68 PR 169 1336       W M SMART                           //LRL  IJP

                        PAPERS NOT REFERRED TO IN DATA CARDS.

COOL     66 PRL 16 1228       +GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL   I
    ---  REPLACED BY KYCIA 67.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(2260)        48  Y*1(2250, JP=    ) I=1

----------------   48  Y*1(2250) MASS (MEV)   ----------------------------------

M   *       2245.0                    BLANPIED  65 CNTR     GAMMA P TO K+ Y*
M   *       2299.0       6.0          BOCK      65 HBC      PBAR P 5.7 BEV/C
M           2252.0      10.0          KYCIA     67 CNTR     K-P, D TOTAL       8/67
M           2250.0       7.0          BUGG      68 CNTR     K-P, D TOTAL       6/68
M           . . . . . . . . .
M   AVG     2250.6577    5.7346   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

----------------   48  Y*1(2250) WIDTH (MEV)   ----------------------------------

W   *        150.0                    BLANPIED  65 CNTR
W   *         21.0      17.0    21.0  BOCK      65 HBC
W            200.0      20.0          KYCIA     67 CNTR                      8/67
W            230.0      20.0          BUGG      68 CNTR                      6/68
W           . . . . . . . . .
W   AVG      215.0000   15.0000   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.1)

----------------   48  Y*1(2250) PARTIAL DECAY MODES   ----------------------------

P1          Y*1(2250) INTO KBAR N                          S11S17
P2          Y*1(2250) INTO KBAR N PI                       S11S17S 8

----------------   48  Y*1(2250) BRANCHING RATIOS   ----------------------------

R1          Y*1(2250) INTO (KBAR N)/TOTAL                  (P1)/TOTAL
     J IS NOT KNOWN.  FOLLOWING IS (J+1/2)*(KBAR N)/TOTAL
R1           0.31      0.02          KYCIA     67 CNTR                      8/67
R1           0.47                    BUGG      68 CNTR                      6/68

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- Y*1(2250)

BLANPIED 65 PRL 14 741        +GREENBERG,HUGHES,KITCHING, +  //YALE(CEA)
BOCK     65 PL 17 166         +COOPER,FRENCH,KINSON, +      //CERN,SACLAY
KYCIA    67 PRIVATE COMM.     T F KYCIA                           //BNL   I
BUGG     68 PR 168 1466       +GILMORE,KNIGHT, +   //RTHFD,BRMGHM,CVNDSH   I

                        PAPERS NOT REFERRED TO IN DATA CARDS.

DAUBER   66 PL 23 154         +SCHLEIN, SLATER, STORK, TICHO //UCLA(LRL)  J
    ---  SUGGESTS J=9/2 RESONANT BEHAVIOR IN SIGMA- PI+, BUT APPEARS
         INCONSISTENT WITH PARAMETERS OF ABRAMS 67.
COOL     66 PRL 16 1228       +GIACOMELLI,KYCIA,LEONTIC,LI,LUNDBY,+//BNL   I
    ---  REPLACED BY KYCIA 67.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(2455)        53  Y*1(2455, JP=     ) I=1

                    ONE OF TWO NEW SMALL BUMPS IN THE I=1 TOTAL CROSS
                    SECTION (SEE THE Y*1(2595)). IT IS REASONABLE TO
                    INTERPRET THEM AS RESONANCES, THOUGH THAT IS NOT
    CERTAIN.  THERE IS ALSO LESSER EVIDENCE FOR NEW STRUCTURE IN THE I=0
    CROSS SECTION --- SEE ABRAMS 67.
                    THERE IS ALSO SOME SLIGHT EVIDENCE FOR Y* STATES IN
    THIS MASS REGION FROM THE REACTION GAMMA + P TO K+ + MISSING MASS ---
    SEE GREENBERG 68.

----------------   53  Y*1(2455) MASS (MEV)   ----------------------------------

M           2455.0      10.0          ABRAMS    67 CNTR     K-P, D TOTAL      11/67
M           2455.0       7.0          BUGG      68 CNTR     K-P, D TOTAL       6/68
M           . . . . . . . . .
M   AVG     2455.0000    5.7346   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

----------------   53  Y*1(2455) WIDTH (MEV)   ----------------------------------

W            140.0   APPROXIMATELY     ABRAMS    67 CNTR                     11/67
W            100.0       20.0          BUGG      68 CNTR                      6/68

----------------   53  Y*1(2455) PARTIAL DECAY MODES   ----------------------------

P1          Y*1(2455) INTO KBAR N                          S11S17

----------------   53  Y*1(2455) BRANCHING RATIOS   ----------------------------

R1          Y*1(2455) INTO (KBAR N)/TOTAL                  (P1)/TOTAL
     J IS NOT KNOWN.  FOLLOWING IS (J+1/2)*(KBAR N)/TOTAL
R1           0.26                    ABRAMS    67 CNTR                     11/67
R1           0.3                     BUGG      68 CNTR                      6/68

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- Y*1(2455)

ABRAMS   67 PRL 19 678        +COOL,GIACOMELLI,KYCIA,LEONTIC,LI, + //BNL
BUGG     68 PR 168 1466       +GILMORE,KNIGHT, +   //RTHFD,BRMGHM,CVNDSH   I
GREENBER 68 PRL 20 221        GREENBERG, HUGHES, LU, MINEHART, +  //YALE

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(2595)        54  Y*1(2595, JP=     ) I=1

                    SEE NOTE UNDER THE Y*1(2455).

----------------   54  Y*1(2595) MASS (MEV)   ----------------------------------

M           2595.0      10.0          ABRAMS    67 CNTR     K-P, D TOTAL      11/67

----------------   54  Y*1(2595) WIDTH (MEV)   ----------------------------------

W            140.0   APPROXIMATELY     ABRAMS    67 CNTR                     11/67

----------------   54  Y*1(2595) PARTIAL DECAY MODES   ----------------------------

P1          Y*1(2595) INTO KBAR N                          S11S17

----------------   54  Y*1(2595) BRANCHING RATIOS   ----------------------------

R1          Y*1(2595) INTO (KBAR N)/TOTAL                  (P1)/TOTAL
     J IS NOT KNOWN.  FOLLOWING IS (J+1/2)*(KBAR N)/TOTAL
R1           0.26                    ABRAMS    67 CNTR                     11/67

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- Y*1(2595)

ABRAMS   67 PRL 19 678        +COOL,GIACOMELLI,KYCIA,LEONTIC,LI, + //BNL

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Σ(3000)        59  Y*1(3000, JP=    ) I=1

                    ENHANCEMENT IN LAMBDA PI AND KBAR N INVARIANT MASS
                    SPECTRA AND IN MISSING MASS OF NEUTRALS RECOILING
                    AGAINST K0.  EVIDENCE NOT CONCLUSIVE.  OMITTED FROM
                    TABLE.

----------------   59  Y*1(3000) MASS (MEV)   ----------------------------------

M           3000.0                  EHRLICH   66 HBC  0  PI-P 7.91 BEV/C    9/66

----------------   59  Y*1(3000) PARTIAL DECAY MODES   ----------------------------

P1          Y*1(3000) INTO KBAR N                          S11S17
P2          Y*1(3000) INTO LAMBDA PI                       S18S 8

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- Y*1(3000)

EHRLICH  66 PR 152 1194       R EHRLICH, W SELOVE, H YUTA    //PENN(BNL)  I

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Ξ⁻             22  XI -    (1321,JP=1/2 )  I=1/2

                    SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Ξ⁰             23  XI 0    (1314, JP=1/2 )  I=1/2

                    SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Ξ(1530)        49  XI*1/2(1530, JP=3/2+) I=1/2

----------------   49  XI*1/2(1530) MASS (MEV)   ----------------------------------

M   *       1529.0       5.0          PJERROU   62 HBC  0- K-P 1.8 BEV/C
M   *       1532.0       2.0          BADIER    64 HBC  0- K-P 3 BEV/C
M-          1535.7       3.2          LONDON    66 HBC  -  K-P 2.24 BEV/C    7/66
M0          1528.7       1.1          LONDON    66 HBC  0                    7/66

----------------   49  XI*(-)-XI*(0) MASS DIFFERENCE (MEV)   ----------------------

D             5.7       3.0          PJERROU   65 HBC  0- K-P 1.8-1.95 B/C  7/66
D   R         7.0       4.0          LONDON    66 HBC  0                    7/66
D   R    REDUNDANT WITH DATA IN MASS LISTING.
D             2.0       3.2          MERRILL   66 HBC  0- K-P 1.7-2.7 BE/C  7/66
D           . . . . . . . . .
D   AVG       3.9692    2.1886   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

----------------   49  XI*1/2(1530) WIDTH (MEV)   ----------------------------------

W             7.0       2.0          SCHLEIN   63 HBC  0  K-P 1.8-1.95 B/C
W             8.5       3.5          LONDON    66 HBC  0                    7/66
W             7.0       7.0          BERGE     66 HBC  0  K-P 1.5-1.7 BE/C  7/66
W           . . . . . . . . .
W   AVG       7.3478    1.6854   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

----------------   49  XI*1/2(1530) PARTIAL DECAY MODES   ----------------------------

P1          XI*1/2(1530) INTO XI PI                        S22S 8

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- XI*1/2(1530)

PJERROU  62 PRL 9 114         +PROWSE,SCHLEIN,SLATER,STORK,TICHO  //UCLA  I
SCHLEIN  63 PRL 11 167        +CARMONY,PJERROU,SLATER,STORK,TICHO //UCLA IJP
BADIER   64 DUBNA I 593       +DEMOULIN,GOLDBERG, +    //EP,SACLAY,AMSTR   I
PJERROU  65 PRL 14 275        +SCHLEIN,SLATER,SMITH,STORK,TICHO   //UCLA
LONDON   66 PR 143 1034       +RAU,SAMIOS,YAMAMOTO,GOLDBERG,+ //BNL,SYCR  IJ
BERGE    66 PR 147 945        +EBERHARD,HUBBARD,MERRILL,B-SHAFER,+ //LRL  I
MERRILL  66 UCRL-16455 THESIS D W MERRILL                          //LRL  JP

        QUANTUM NUMBER DETERMINATION NOT REFERRED TO IN DATA CARDS.

SHAFER   66 PR 142 883        BUTTON-SHAFER,LINDSEY,MURRAY,SMITH   //LRL  JP

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********

Ξ(1705)        51  XI*1/2(1705, JP=    ) I=1/2

                    EVIDENCE NOT COMPELLING.  OMITTED FROM TABLE.

----------------   51  XI*1/2(1705) MASS (MEV)   ----------------------------------

M           1705.0        APPROX       SMITH     65 HBC  0- K-P 2.1-.7 BEV/C

----------------   51  XI*1/2(1705) WIDTH (MEV)   ----------------------------------

W             20.0        APPROX       SMITH     65 HBC  0-

----------------   51  XI*1/2(1705) PARTIAL DECAY MODES   ----------------------------

P1          XI*1/2(1705) INTO XI PI                        S22S 8
P2          XI*1/2(1705) INTO LAMBDA KBAR                  S18S11

****** ********* ********* ********* ********* ********* ********* *********

                              REFERENCES --- XI*1/2(1705)

SMITH    65 ATHENS CONF 251   G A SMITH, J S LINDSEY              //LRL  I

****** ********* ********* ********* ********* ********* ********* *********
```

ANY CHARACTER IN THESE COLUMNS MEANS THAT THE DATA HAS NOT BEEN AVERAGED

Ξ(1815)

```
                    50  XI*1/2(1815, JP=   ) I=1/2
                    50  XI*1/2(1815) MASS (MEV)
M   *      1770.0                    HALSTEINS 63 FBC  0- K-PR 3.5 BEV/C
M          1817.0      7.0           SMITH 1   65 HBC  0- K-P 2.4-.7 BEV/C
M          1814.0      4.0           BADIER    65 HBC  0  K-P 3 BEV/C
M          * * * * * * * * *
M   AVG    1814.7385   3.4730   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

                    50  XI*1/2(1815) WIDTH (MEV)
W   *        80.0          OR LESS    HALSTEINS 63 FBC  0-
W            12.0      4.0            BADIER    65 HBC  0
W            30.0      7.0            SMITH 2   65 HBC  0-
W            * * * * * * * * *
W   AVG      16.4308   7.7538   AVERAGE (ERROR INCLUDES SCALE FACTOR = 2.2)

                    50  XI*1/2(1815) PARTIAL DECAY MODES

P1          XI*1/2(1815) INTO LAMBDA K0AR                 S18S11
P2          XI*1/2(1815) INTO XI PI                       S22S 8
P3          XI*1/2(1815) INTO SIGMA K0AR                  S20S11
P4          XI*1/2(1815) INTO XI*1/2(1530) PI             U49S 8
P5          XI*(1815) INTO XI PI PI (XI PI NOT XI*(1530)) S22S 8S 8

                    50  XI*1/2(1815) BRANCHING RATIOS

R1          XI*1/2(1815) INTO (LAMBDA K0AR)/TOTAL         (P1)/TOTAL
R1  *         LARGE                   BADIER    65 HBC                        7/66
R1  *         LARGE                   SMITH 2   65 HBC                        7/66

R2          XI*1/2(1815) INTO (XI PI)/(LAMBDA K0AR)       (P2)/(P1)
R2            0.20      0.20          BADIER    65 HBC                        7/66
R2  *         SMALL                   SMITH 2   65 HBC    IF XI*1933 EXIST   7/66

R3          XI*1/2(1815) INTO (SIGMA K0AR)/TOTAL          (P3)/TOTAL
R3            0.02       OR LESS      TRIPP     67 RVUE                       3/67

R4          XI*1/2(1815) INTO (XI*(1530) PI)/(LAM K0AR)   (P4)/(P1)
R4            0.26      0.13          SMITH 1   65 HBC
R4  *         SMALL                   BADIER    65 HBC                        7/66

R5          XI*1/2(1815) INTO (XI PI PI)/(LAMBDA K0AR)    (P5)/(P1)
R5            0.1        OR MORE      SMITH 1   65 HBC
R5  *         SMALL                   BADIER    65 HBC                        7/66

****** ********* ********* ********* ********* ********* ********* *********

                            REFERENCES --- XI*1/2(1815)

HALSTEIN 63 SIENA CONF 173    HALSTEINSLID,+//BERGEN,CERN,EP,RTHF,UNICOL  I
SMITH 1  65 PRL 14 29         +LINDSEY,BUTTON-SHAFER,MURRAY          //LRL IJP
BADIER   65 PL 16 171         +DEMOULIN,GOLDBERG, +     //EP,SACLAY,AMSTR  I
SMITH 2  65 ATHENS CONF 251   G A SMITH, J S LINDSEY                  //LRL
TRIPP    67 NP B3 10          + LEITH, +    //LRL,SLAC,CERN,HEIDEL,SACLAY
      --- USES DATA OF SMITH 1.
MERRILL  68 PR 167 1202       D W MERRILL, J BUTTON-SHAFER           //LRL
      --- WEAK EVIDENCE CONCERNING JP.

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

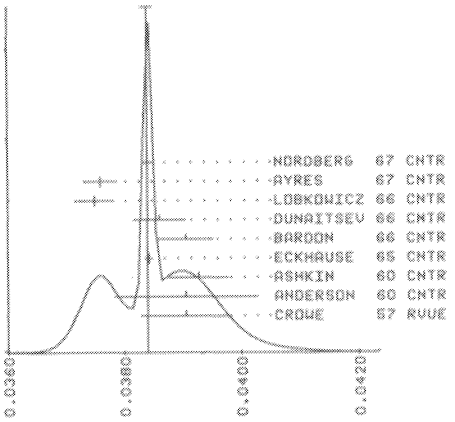
Ξ(1935)

```
                    52  XI*1/2(1935, JP=    ) I=1/2

                     SEEN AS AN ENHANCEMENT IN THE XI PI INVARIANT MASS
                     SPECTRUM.  THE I-SPIN DETERMINATION IS WEAK, AND
                     NOTHING IS KNOWN ABOUT SPIN, PARITY, OR BRANCHING
                     RATIOS.

                    52  XI*1/2(1935) MASS (MEV)

M        35 1933.0     16.0           BADIER    69 HBC  0  K-P 3 BEV/C
M        66 1894.0     18.0           DAUBER    68 HBC  -  K-P 2.7 BEV/C     6/68
M           * * * * * * * * *
M   AVG    1915.7862  19.3655   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.6)

                    52  XI*1/2(1935) WIDTH (MEV)

W        35  140.0     35.0           BADIER    65 HBC  0
W        66   98.0     23.0           DAUBER    68 HBC  -                     6/68
W           * * * * * * * * *
W   AVG     110.6670  19.2759   AVERAGE (ERROR INCLUDES SCALE FACTOR = 1.0)

                    52  XI*1/2(1935) PARTIAL DECAY MODES

P1          XI*1/2(1935) INTO XI PI                       S22S 8

****** ********* ********* ********* ********* ********* ********* *********

                            REFERENCES --- XI*1/2(1935)

BADIER   65 PL 16 171         +DEMOULIN,GOLDBERG, +     //EP,SACLAY,AMST  I
DAUBER   68 PR (TO BE SUB.)   +BERGE, HUBBARD, MERRILL, MULLER      //LRL  I

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

Ω^-

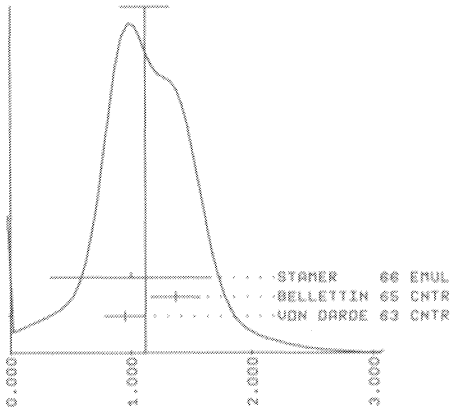
```
                    24  OMEGA -  (1675, JP=3/2+)  I=0

                     SEE LISTINGS OF STABLE PARTICLES

****** ********* ********* ********* ********* ********* ********* *********
****** ********* ********* ********* ********* ********* ********* *********
```

WEIGHTED AVERAGE = 0.038402 ± 0.000101
SCALE = 2.28 CHISQ = 15.6 CONLEV = 0.001



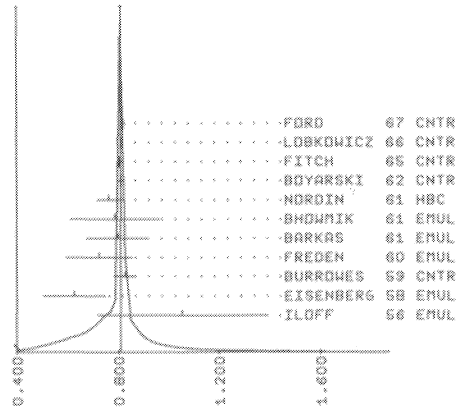
CHARG PI DECAY RATE (UNITS 10**9 SEC-1)

WEIGHTED AVERAGE = 1.120 ± 0.202
SCALE = 1.59 CHISQ = 2.5 CONLEV = 0.111



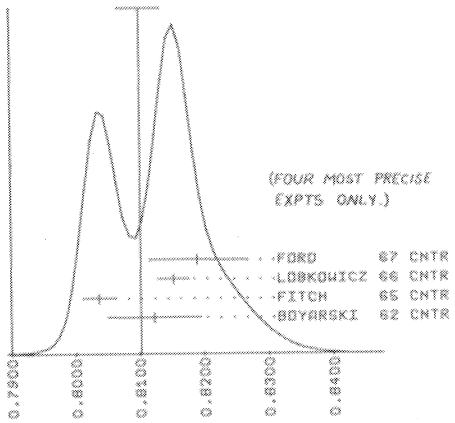
NEUTRAL_PI DECAY RATE(UNITS 10**16SEC-1)

WEIGHTED AVERAGE = 0.81016 ± 0.00341
SCALE = 2.10 CHISQ = 13.2 CONLEV = 0.004



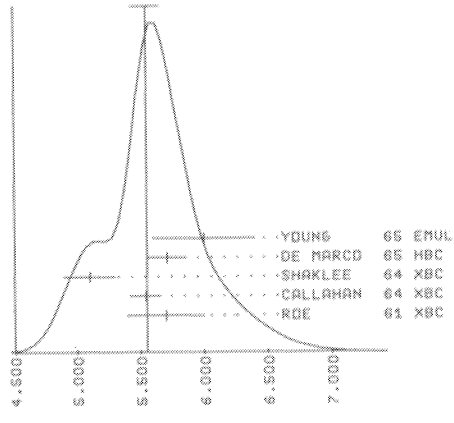
CHARGED K DECAY RATE (UNITS 10**8 SEC-1)

WEIGHTED AVERAGE = 0.81023 ± 0.00341
SCALE = 2.10 CHISQ = 13.2 CONLEV = 0.004



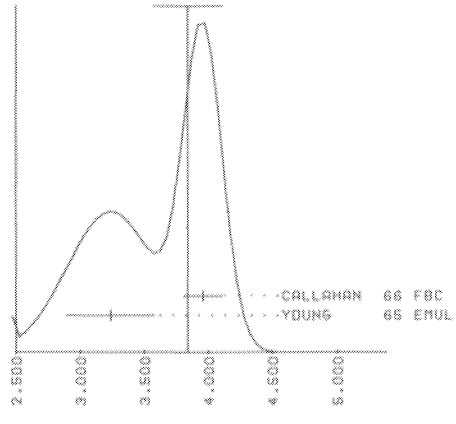
CHARGED K DECAY RATE (UNITS 10**8 SEC-1)

WEIGHTED AVERAGE = 5.548 ± 0.111
SCALE = 1.39 CHISQ = 7.7 CONLEV = 0.102



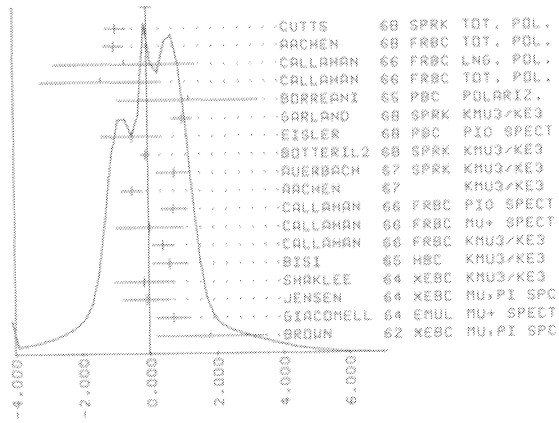
CHARGED K TAU B.F. PI+PI-PIO (UN 10**-2)

WEIGHTED AVERAGE = 3.843 ± 0.266
SCALE = 1.94 CHISQ = 3.8 CONLEV = 0.053



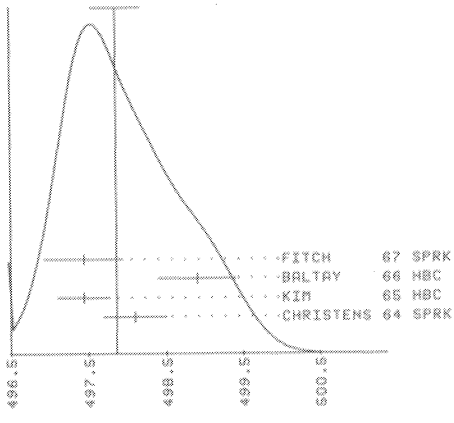
CHARGED K B.R. (2PI)/(TAU)

WEIGHTED AVERAGE = -0.028 ± 0.160
SCALE = 1.90 CHISQ = 46.7 CONLEV = 0.000



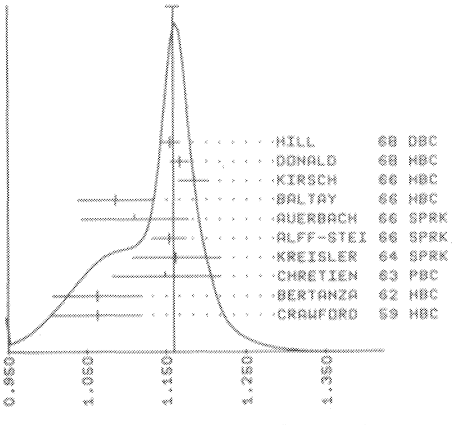
F-/F+ FOR K+ DECAY (BOTH X1A AND X1B)

WEIGHTED AVERAGE = 497.865 ± 0.316
SCALE = 1.53 CHISQ = 7.0 CONLEV = 0.072



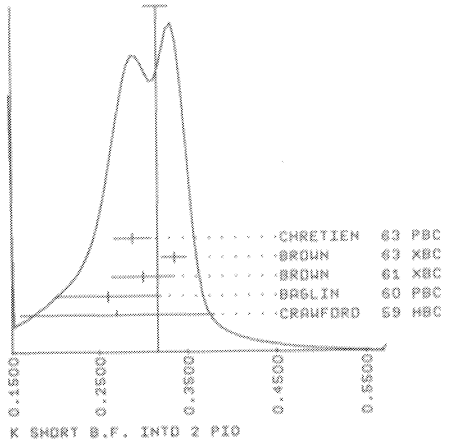
NEUTRAL K MASS (MEV)

WEIGHTED AVERAGE = 1.16018 ± 0.00835
SCALE = 1.25 CHISQ = 10.9 CONLEV = 0.142



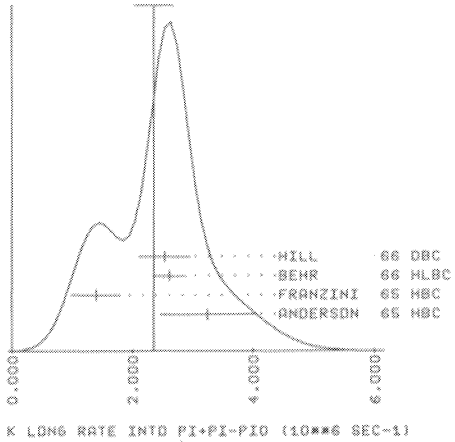
K SHORT DECAY RATE (UNITS 10**10 SEC-1)

WEIGHTED AVERAGE = 0.3161 ± 0.0136
SCALE = 1.25 CHISQ = 4.7 CONLEV = 0.195



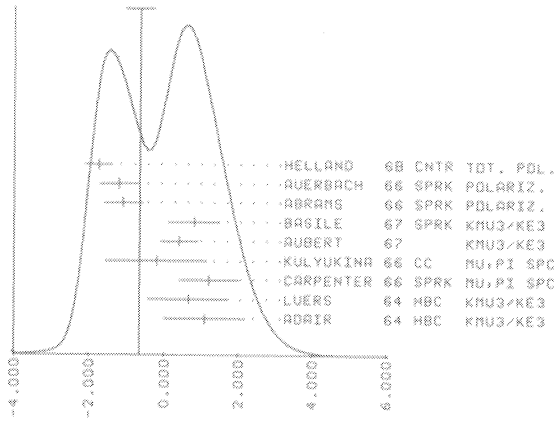
K SHORT B.F. INTO 2 PIO

WEIGHTED AVERAGE = 2.357 ± 0.321
SCALE = 1.65 CHISQ = 8.2 CONLEV = 0.042



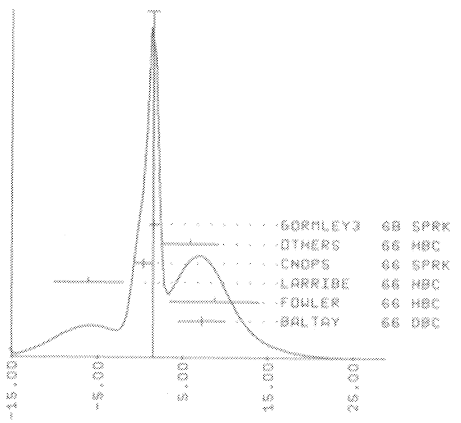
K LONG RATE INTO PI+PI-PIO (10**6 SEC-1)

WEIGHTED AVERAGE = -0.656 ± 0.380
SCALE = 1.94 CHISQ = 30.0 CONLEV = 0.000



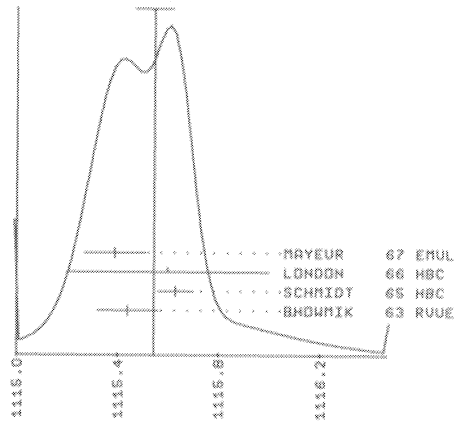
F-/F+ FOR KO DECAY (BOTH XIA AND XI0)

WEIGHTED AVERAGE = 1.440 ± 0.722
SCALE = 1.67 CHISQ = 5.5 CONLEV = 0.062



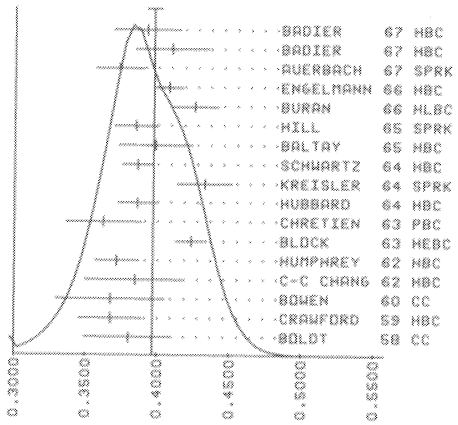
ETA INTO PI+PI-PIO ASYMMETRY PARAMETER

WEIGHTED AVERAGE = 1115.6440 ± 0.0748
SCALE = 1.40 CHISQ = 3.9 CONLEV = 0.142



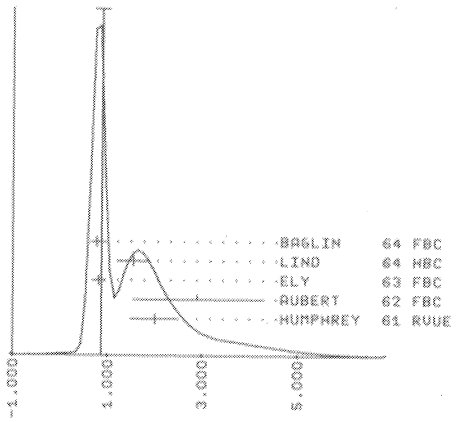
LAMBDA MASS (MEV)

WEIGHTED AVERAGE = 0.39713 ± 0.00502
SCALE = 1.28 CHISQ = 26.4 CONLEV = 0.049



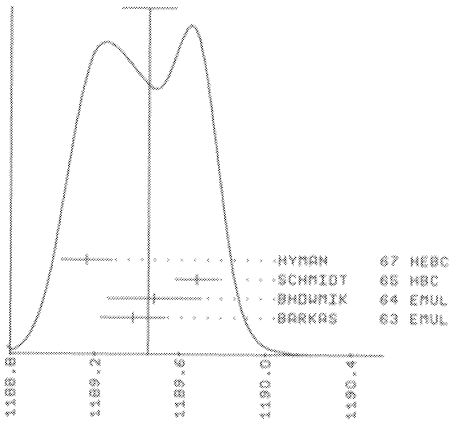
LAMBDA DECAY RATE (UNITS 10**10 SEC -1)

WEIGHTED AVERAGE = 0.884 ± 0.149
SCALE = 1.81 CHISQ = 9.8 CONLEV = 0.020



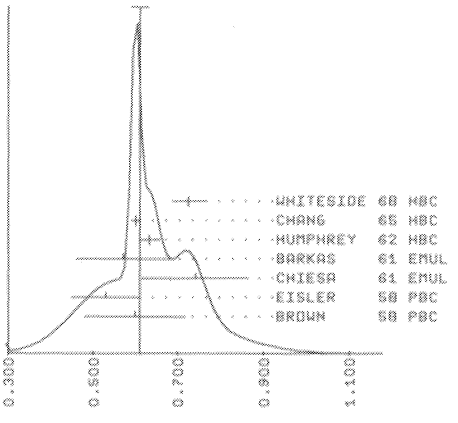
LAMBDA B.F. INTO P E- NEUTRINO

WEIGHTED AVERAGE = 1189.452 ± 0.127
SCALE = 1.96 CHISQ = 11.4 CONLEV = 0.010



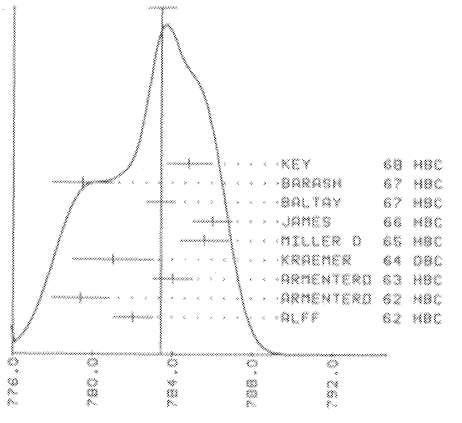
SIGMA + MASS (MEV)

WEIGHTED AVERAGE = 0.6103 ± 0.0202
SCALE = 2.41 CHISQ = 11.7 CONLEV = 0.003



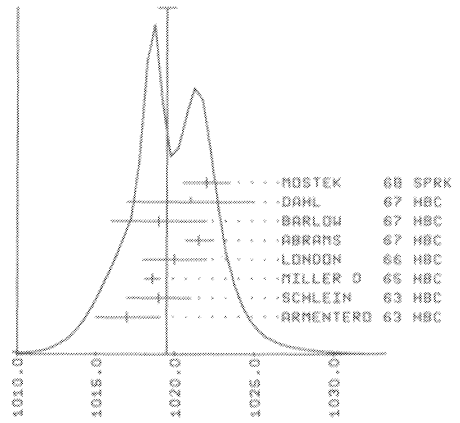
SIGMA - DECAY RATE (UNITS 10**10 SEC -1)

WEIGHTED AVERAGE = 783.414 ± 0.700
SCALE = 1.95 CHISQ = 30.4 CONLEV = 0.000



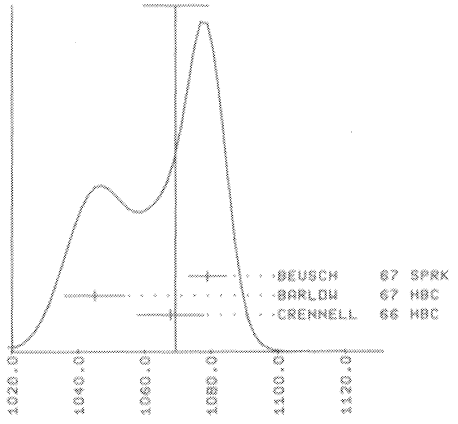
OMEGA MESON MASS (MEV)

WEIGHTED AVERAGE = 1019.507 ± 0.580
SCALE = 1.53 CHISQ = 14.0 CONLEV = 0.030



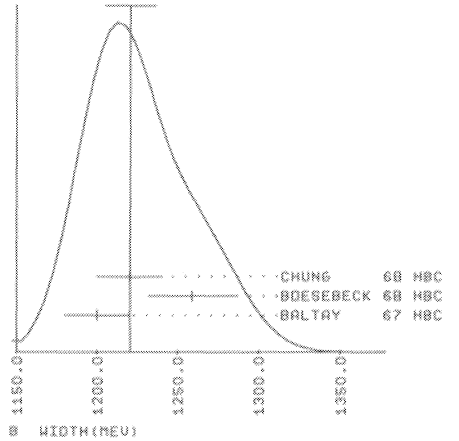
PHI MASS (MEV)

WEIGHTED AVERAGE = 1069.44 ± 9.70
SCALE = 2.28 CHISQ = 10.4 CONLEV = 0.005



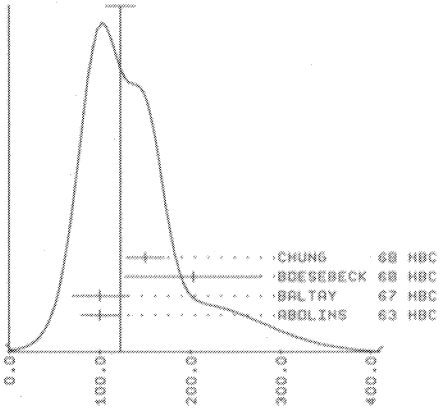
ETA(1070) MASS (MEV)

WEIGHTED AVERAGE = 1220.5 ± 15.6
SCALE = 1.24 CHISQ = 3.1 CONLEV = 0.214



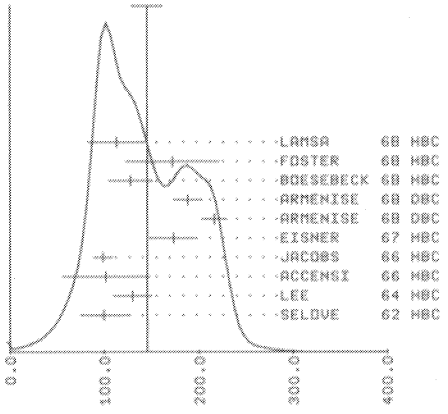
B WIDTH(MEV)

WEIGHTED AVERAGE = 122.8 ± 16.1
SCALE = 1.27 CHISQ = 4.9 CONLEV = 0.182



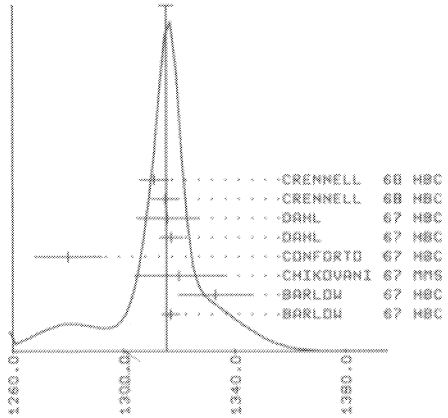
0 WIDTH(MEV)

WEIGHTED AVERAGE = 145.3 ± 15.8
SCALE = 2.73 CHISQ = 67.1 CONLEV = 0.000



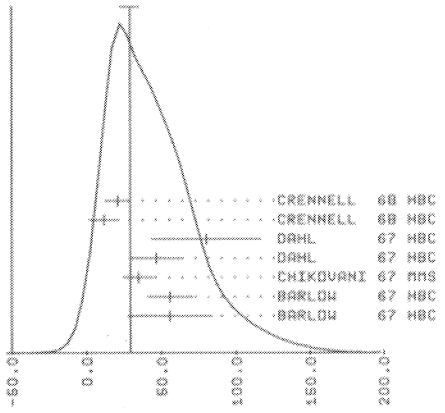
F WIDTH (MEV)

WEIGHTED AVERAGE = 1315.32 ± 2.47
SCALE = 1.30 CHISQ = 11.9 CONLEV = 0.104



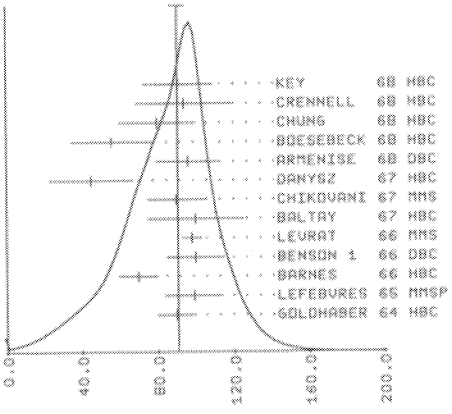
A2M MASS (MEV)

WEIGHTED AVERAGE = 29.30 ± 6.49
SCALE = 1.38 CHISQ = 11.4 CONLEV = 0.077



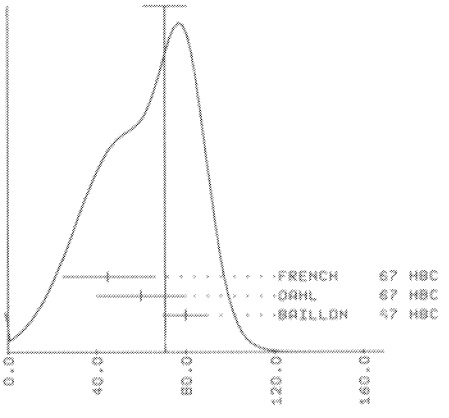
A2M WIDTH (MEV)

WEIGHTED AVERAGE = 90.65 ± 3.68
SCALE = 1.11 CHISQ = 14.7 CONLEV = 0.258



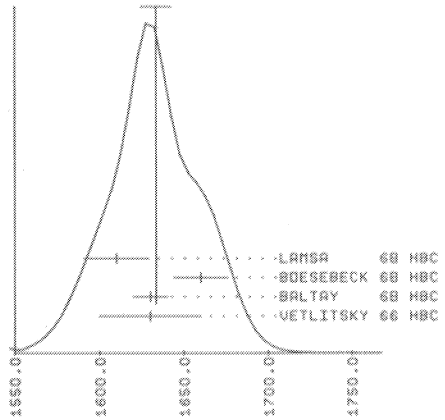
A2 WIDTH (MEV)

WEIGHTED AVERAGE = 70.83 ± 9.66
SCALE = 1.18 CHISQ = 2.8 CONLEV = 0.246



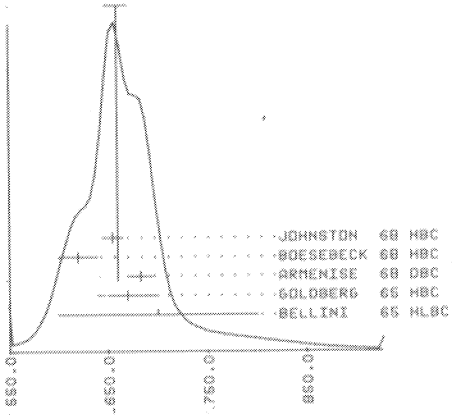
E WIDTH (MEV)

WEIGHTED AVERAGE = 1633.47 ± 9.09
SCALE = 1.21 CHISQ = 4.4 CONLEV = 0.221



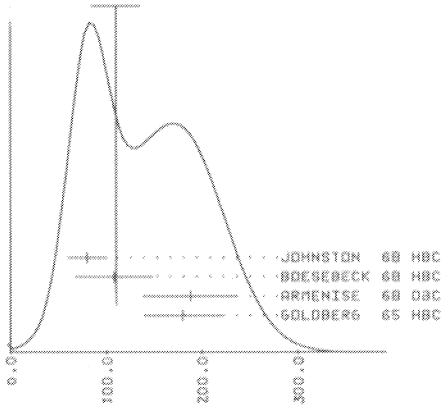
PI(1640) MASS (MEV)

WEIGHTED AVERAGE = 1660.1 ± 11.2
SCALE = 1.58 CHISQ = 7.5 CONLEV = 0.058



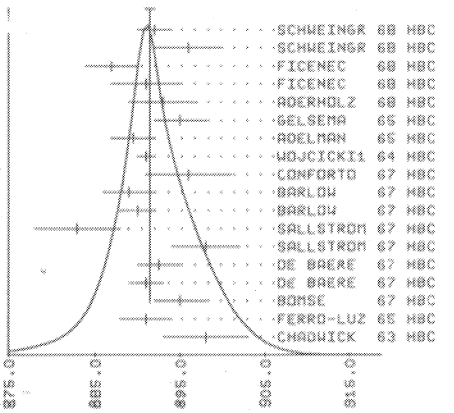
RHO (1650) MASS (MEV)

WEIGHTED AVERAGE = 110.0 ± 25.1
SCALE = 1.62 CHISQ = 7.8 CONLEV = 0.049



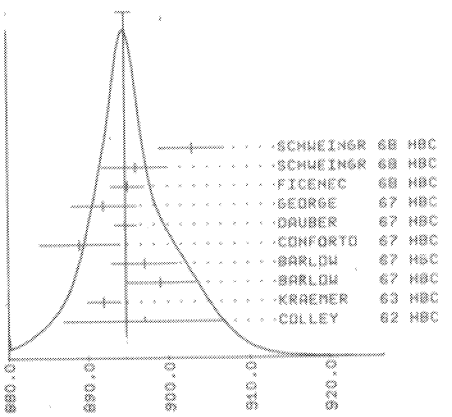
RHO (1650) WIDTH (MEV)

WEIGHTED AVERAGE = 891.420 ± 0.578
SCALE = 1.00 CHISQ = 16.9 CONLEV = 0.484



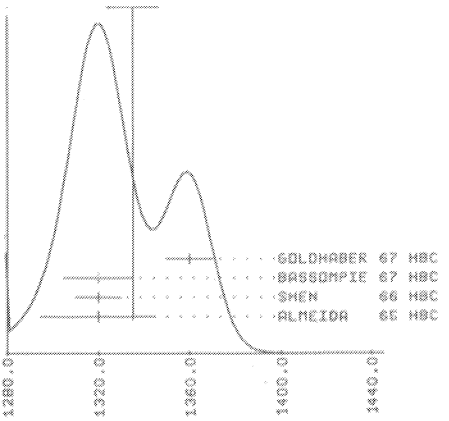
CHARGED K*(890) MASS (MEV)

WEIGHTED AVERAGE = 894.727 ± 0.904
SCALE = 1.09 CHISQ = 9.5 CONLEV = 0.302



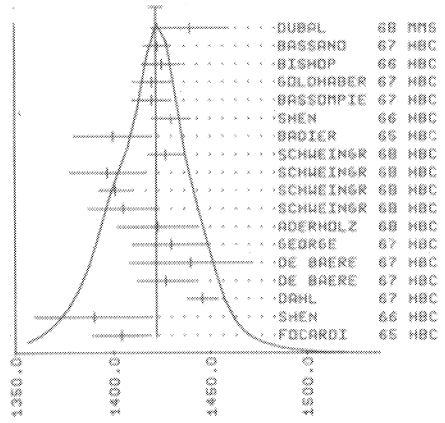
NEUTRAL K*(890) MASS (MEV)

WEIGHTED AVERAGE = 1335.4 ± 11.2
SCALE = 1.81 CHISQ = 9.0 CONLEV = 0.020



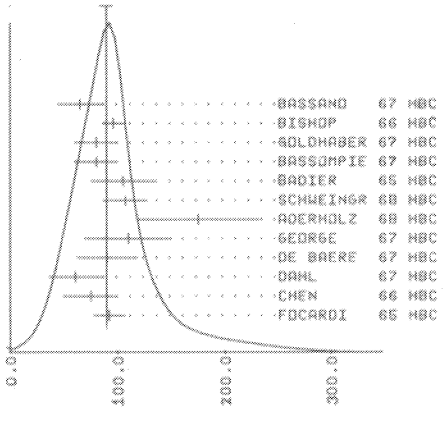
KA (1320) MASS (MEV)

WEIGHTED AVERAGE = 1422.18 ± 3.35
SCALE = 1.21 CHISQ = 25.1 CONLEV = 0.093



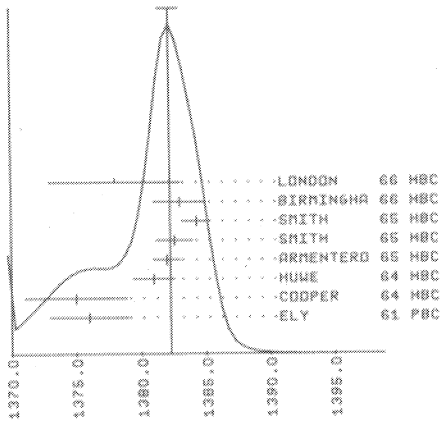
KN(1420) MASS (MEV)

WEIGHTED AVERAGE = 89.41 ± 5.61
SCALE = 0.84 CHISQ = 7.7 CONLEV = 0.740



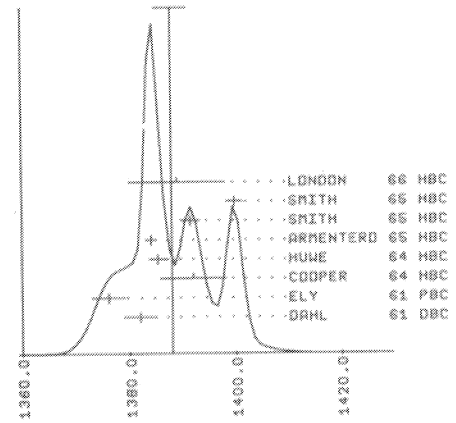
KN(1420) WIDTH (MEV)

WEIGHTED AVERAGE = 1382.244 ± 0.798
SCALE = 1.42 CHISQ = 12.1 CONLEV = 0.059



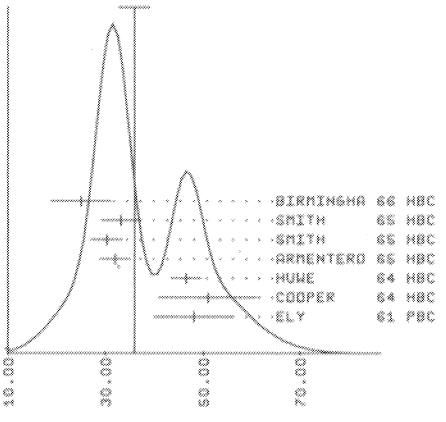
Y*1(1386)+ MASS (MEV)

WEIGHTED AVERAGE = 1388.01 ± 3.01
SCALE = 4.78 CHISQ = *4.1 CONLEV = 0.000



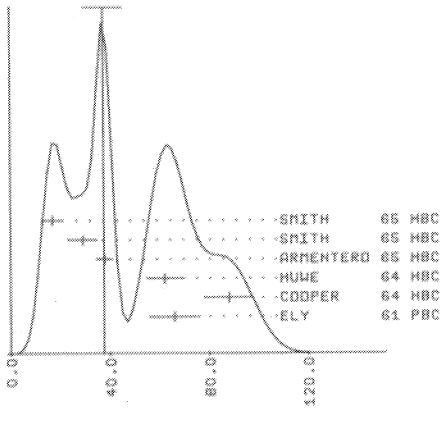
Y*1(1386)- MASS (MEV)

WEIGHTED AVERAGE = 35.91 ± 3.10
SCALE = 2.08 CHISQ = 26.8 CONLEV = 0.000



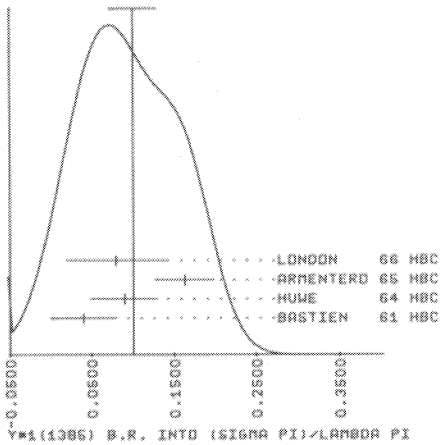
Y*1(1386)+ WIDTH (MEV)

WEIGHTED AVERAGE = 37.66 ± 7.71
SCALE = 3.73 CHISQ = 69.5 CONLEV = 0.000



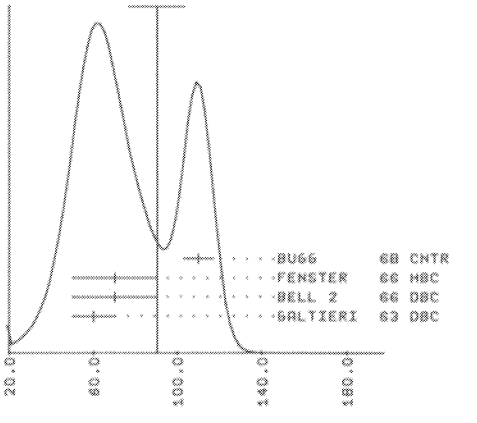
Y*1(1386)- WIDTH (MEV)

WEIGHTED AVERAGE = 0.1009 ± 0.0284
SCALE = 1.37 CHISQ = 5.7 CONLEV = 0.129



Y*1(1386) B.R. INTO (SIGMA PI)/LAMBDA PI

WEIGHTED AVERAGE = 90.2 ± 13.4
SCALE = 2.63 CHISQ = 19.2 CONLEV = 0.000



Y*1(1765) WIDTH (MEV)

APPENDIX II: NOTES

NOTE ON K^+ DECAYS

In the previous edition the $K_{\mu 3}$ and K_{e3} branching ratios were tabulated with large scale factors (S = 1.6 and S = 1.4 respectively). The introduction of this scale factor was due essentially to one experiment, CALLAHAN 66. This experiment reported the branching ratio of these two leptonic decays with respect to τ decay. The contribution to χ^2 for the overall fit from these two ratios was very large (χ^2 was 71 for 37 degrees of freedom including the two ratios of CALLAHAN 66; χ^2 was 41 for 35 degrees of freedom removing CALLAHAN 66 from the fit). We notice however that the main purpose of the CALLAHAN 66 experiment was to measure the branching ratio $K_{\mu 3}/K_{e3}$ which is in agreement with most other experiments. Assuming then, that the discrepancy is in the way the normalization to τ was done, we have now decided to use as input only the $K_{\mu 3}/K_{e3}$ branching ratio from CALLAHAN 66. This leads to a considerable improvement of the fit.

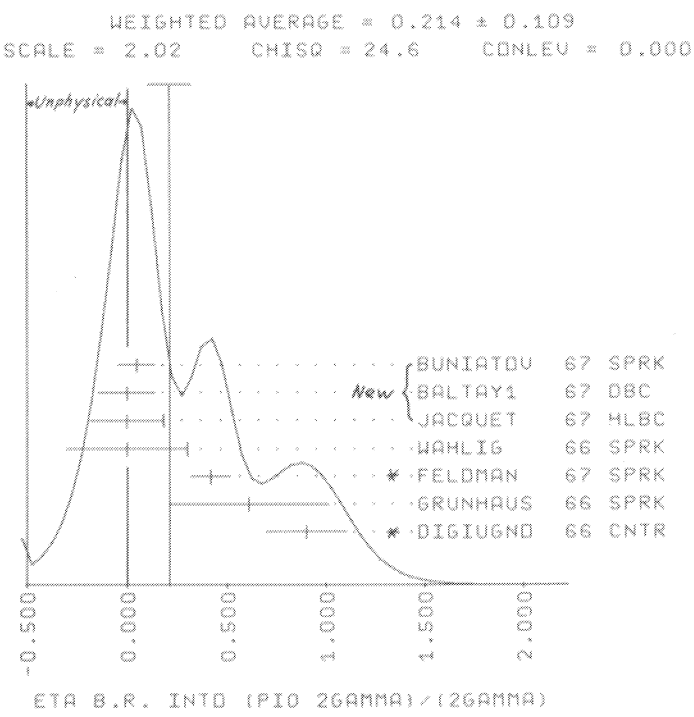
ETA DECAY INTO NEUTRALS

As is well known, there are great inconsistencies among the various experiments which report etas decaying into neutrals. The controversy is over whether the mode $\eta \to \pi^0\gamma\gamma$ is ≈ 0 (as the newer experiments indicate) or $\gtrsim 20\%$ (as the older experiments indicated).

The discrepancies are displayed in the ideogram below, in which all seven relevant experiments have been converted to a common ratio, $\pi^0\gamma\gamma/\gamma\gamma$. Also upper limits, <x, have been converted to 0 ± x. The confidence level for consistency of all seven is 4×10^{-4}!

At the time of our last edition, the top three experiments (Buniatov, Baltay, and Jacquet) were new and had not borne the tests of time. Hence we were reluctant to discard older experiments, even though the new were inconsistent with the old. We merely warned that the truth must lie somewhere in between.

But by now, and after fruitful discussion with Charles Baltay,* we feel that we should consider all seven experiments on an a priori equal basis, and then follow the prescription



of deleting large χ^2 experiments until the confidence level rises to some reasonable value. If we remove the Feldman and DiGiugno experiments, χ^2 decreases from 25 (for all seven) to nearly zero (for the remaining five). Accordingly we have removed these experiments and used the remaining five experiments in our overall fit.

$\sigma(410)$ and $\epsilon(730)$

Narrow $J^P = 0^+$ pion pion resonances have been claimed at each of these energies, but the evidence is controversial. It is, however, suggested from several recent studies of

$$\pi^- p \to n\pi^+\pi^-,\ n\pi^0\pi^0,\ p\pi^-\pi^0$$
$$\pi^+ p \to \Delta^{++}\pi^+\pi^-$$

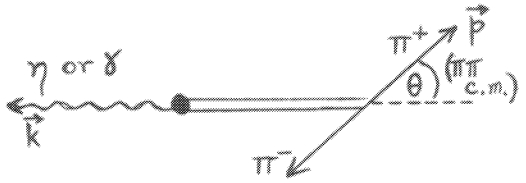
that δ_{00} (the I=0, s-wave, $\pi\pi$ phase shift) is large around 700 MeV, and passes through 90° somewhere between 700 and 850 MeV.

From the small rate of rise of $\delta_{00}(m_{\pi\pi})$ it appears that this possible 0^+ resonance may be several hundred MeV wide. (See CLEGG 67, MALAMUD 67, JONES 68.)

*See C. Baltay, Proc. of the 1968 Univ. of Penn. Conf. on Meson Spectroscopy (W. A. Benjamin, to be published).

UNCERTAINTY IN THE J^P ASSIGNMENT $\eta'(958)$

The dominant (70%) decay of η' is to $\eta\pi\pi$, but because the Dalitz-plot population is rather flat, exhibiting no significant zeroes, analyses of this mode have not permitted a unique J^P assignment (GOLDBERG 66, DAUBER 64, KALBFLEISCH 64). The flat



Dalitz plot distribution does rule out the J^P = normal series. Thus, using the notation of the sketch, any normal matrix element M needs a factor $\sin\theta$ so as to go to zero at the edge of the Dalitz plot [A. C. Zemach, Phys. Rev. 133, B1201 (1964)].

We must still try to distinguish between $0^-, 1^+, 2^-, \cdots$. In the discussion below, the confidence levels are preliminary values from Alan Rittenberg (LRL) based on fits of 314 $\pi^+\pi^-\eta_{neut}$ decays (see ~100 more in the compilation of LONDON 66) and 184 $\pi^+\pi^-\gamma$ decays (including the 40 in the Letter of KALBFLEISCH 64).

$J = 0^-$: The simplest M is constant. Conf. level = 15%.

1^+ M = k. This simply does not fit. Of course a strong $\pi\pi$ final-state interaction could help; it seems unlikely but further work is needed.

2^- M = akk + bpp, where a and b are arbitrary. Here according to London et al., $|M|^2$ gives a good fit to the data with b ~ 3a. According to Rittenberg, it gives a poor fit.

Hence, to rule out $J^P = 2^-$, one turns to the 25% mode $\eta' \to \pi^-\pi^+\gamma$, and the usual $J^P = 0^-$ assignment is based primarily on this Dalitz plot (KALBFLEISCH 64). It shows that the decay is mainly $\rho^0\gamma$, and the θ distribution shows a preference for equatorial decays (again, all the figures quoted are from Alan Rittenberg):

$$\frac{d\sigma}{d(\cos\theta)} = (0.5^{+3.0}_{-0.5}) + \sin^2\theta.$$

$J^P = 0^-$ fits well. The only matrix element is magnetic dipole, M_1. $|M_1|^2$ predicts $d\sigma/d\omega \propto \sin^2\theta$, and the confidence level is ≈80%, BUT

$J^P = 2^-$ also fits well. Again the simplest transition is M_1, and this time the predicted distribution is $6 + \sin^2\theta$, with a confidence level of ~40%!

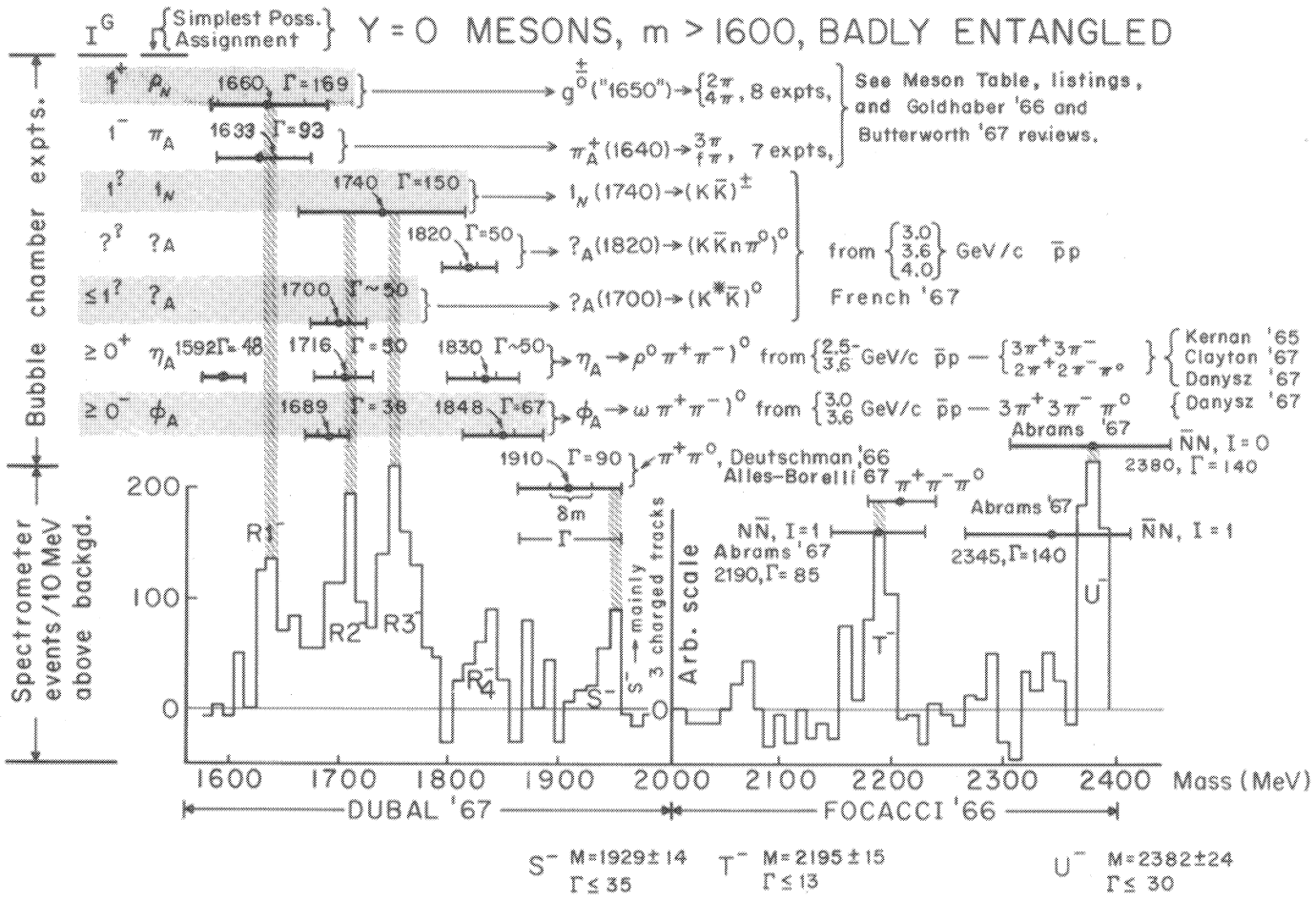
So all available Dalitz-plot data for both modes seem to permit $J^P = 2^-$! London et al. have a qualitative remark that the 2^- hypothesis is inconsistent with the observed 3:1 ratio of $\pi\pi\eta : \pi\pi\gamma$, but if all the evidence against 2^- is to be based on this consideration, it should be checked carefully.

One can return to the $\pi\pi\gamma$ Dalitz plot and ask if it confirms the "ruling out" of $J^P = 1^+$. Rittenberg assumes an E1 matrix element and finds a confidence level of 8%, which on its own would not be enough to rule out 1^+. Further, we should warn that the $\pi\pi\gamma$ decay has a very high Q value ($0 < k < 460$ MeV) with the average experimental value of k about 250 MeV. Hence we must not be too quick to consider only the smallest powers of k/M in matrix elements. Specifically this warning means the following. KALBFLEISCH 64, and we in this note, have considered only the lowest possible electric or magnetic multipole transition. Thus the 8% confidence level just mentioned for the 1^+ hypothesis was based on an E1 matrix element, which has a leading term $\propto (k/M)$. But of course M_2 is also possible, and has an independent coupling which could be large. It has $M \propto (k/M)^2$, and can interfere with E1 to give almost any angular distribution. So the $\pi\pi\gamma$ mode is likely to be unreliable. We want to thank V. I. Ogievetsky and W. Tybor for pointing this out to us.

Finally we should point out that since a spin-1 particle cannot decay into two photons, a single certified decay $\eta' \to \gamma\gamma$ would rule out $J^P = 1^+$. Unfortunately the $\gamma\gamma$ mode has not been reported; it has been estimated at a few percent [R. H. Dalitz and D. G. Sutherland, Nuovo Cimento 37, 1777(L) (1965)].

η' BRANCHING RATIOS

Only two partial decay modes of the η' have been established, namely, $\eta' \to \eta\pi\pi$ and $\eta' \to \pi^+\pi^-\gamma$. (This electromagnetic mode may be mainly $\rho^0\gamma$.) In addition a recent experiment indicates a possible $\eta' \to \pi^0\gamma\gamma$ decay. In calculating the constrained branching fractions, in a previous edition of this data summary (RMP 39, 1(1967); see note on η' branching ratios on p. 23) we assumed that only the $\eta\pi\pi$ and $\pi^+\pi^-\gamma$ decay modes are present, and therefore that $\eta' \to$ (all neutrals) is entirely due to $\eta' \to \pi^0\pi^0\eta$, with $\eta \to$ (neutrals). We now feel, however, compelled to determine the branching fractions without this assumption. This results in the values given in the Meson Table. In the fit we have not used the constraint $\Gamma(\eta' \to \eta\pi^+\pi^-)/\Gamma(\eta' \to \eta\pi^0\pi^0) = 2$ from I-spin conservation, although the results of the fit are in perfect agreement with it (the ratio actually being 2.0 ± 0.2).



Reported Masses and Widths of
$K\pi\pi$ Resonances, 1230-1360 MeV

(prepared by W. J. Podolsky and Larry Miller)

Nπ PHASE SHIFT ANALYSIS

The phase-shift analyses of current relevance are JOHNSON 67, BAREYRE 68, and DONNACHIE 68. These are in qualitative agreement on properties of the dominant partial waves, but differ in detail in many respects. JOHNSON 67, in particular, stresses the non-uniqueness of the solutions. BAREYRE 68 and DONNACHIE 68 estimate parameters of the well-established resonances. As noted in the data listings, they use different criteria in doing this. Numbers in the baryon-resonance table are most influenced by DONNACHIE 68. All groups find indications of additional possible very inelastic resonances. DONNACHIE 68 provide a list of their candidates, given in the table below, with estimates of their likelihoods of survival. Our estimates of these likelihoods are given in a footnote of the baryon-resonance table.

Argand diagrams from BAREYRE 68 and DONNACHIE 68 follow. The next edition will include those of JOHNSON 67.

Of some relevance to the interpretation of circles (or parts thereof) in Argand diagrams are the papers of Schmid [PRL 20, 689 (1968)] and Collins, Johnson, and Squires [PL 27B, 23 (1968)].

Other possible N^* resonances, as reported by DONNACHIE 68. The values are certainly not significant to the number of places given.

	Wave	Mass (MeV)	Γ_{tot} (MeV)	Γ_{el}/Γ_{tot}
	P_{33}	1688	281	0.098
Probable	F_{35}	1913	350	0.163
resonances.[a]	P_{31}	1934	339	0.299
	D_{13}	2057	293	0.260
Resonance	D_{33}	1691	269	0.137
interpretation	P_{13}	~1863	~296	~0.207
in doubt.[b]	D_{35}	~1954	~311	~0.154
Unconfirmed	P_{11}	~1751	327	0.320
resonances.[c]	F_{17}	1983	225	0.128

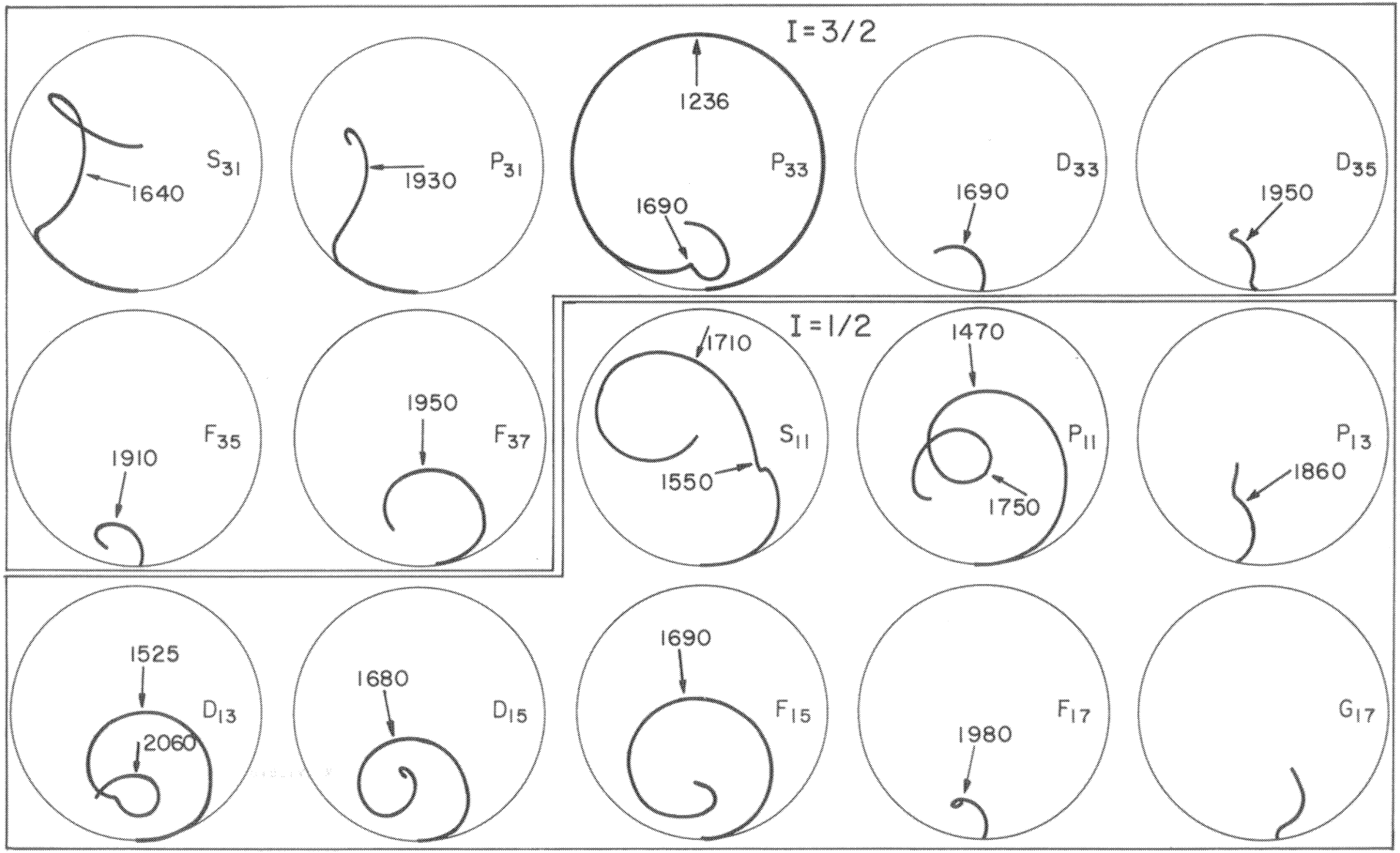
[a] There is some evidence for these in at least two of the three phase-shift analyses (CERN, LRL, Saclay).

[b] All analyses see something, but a resonance interpretation is in doubt. Possible threshold effects.

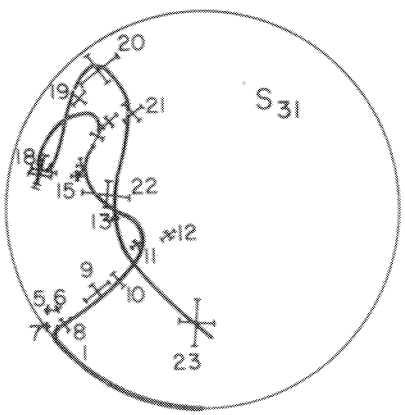
[c] Seen in only one analysis. Doubtful.

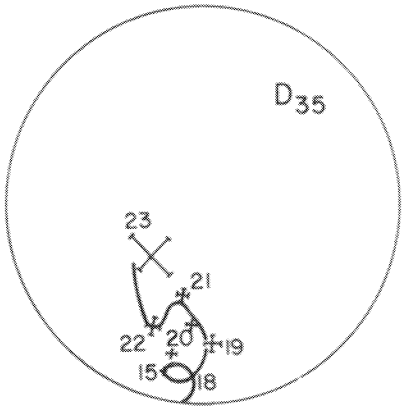
PARTIAL WAVE AMPLITUDES OBTAINED FROM THE DISPERSION RELATION RESULTS OF THE CERN GROUP

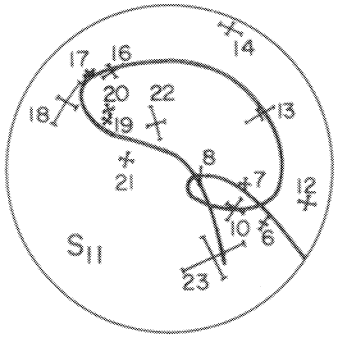
(Arrows point to approximate resonance positions.)

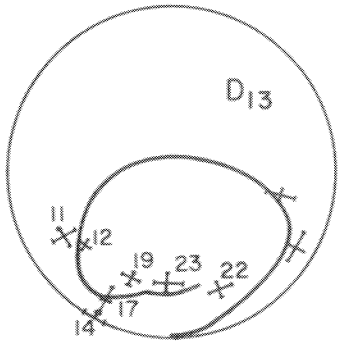


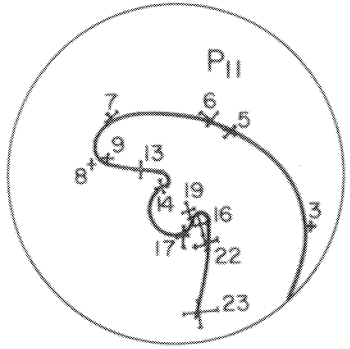
PARTIAL WAVE AMPLITUDES OBTAINED BY THE SACLAY PHASE SHIFT ANALYSIS (BAREYRE et al)

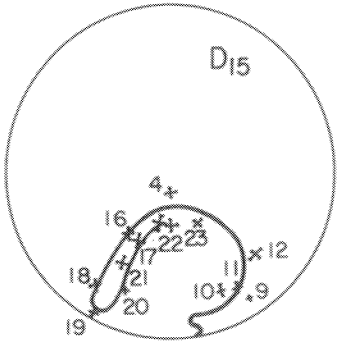


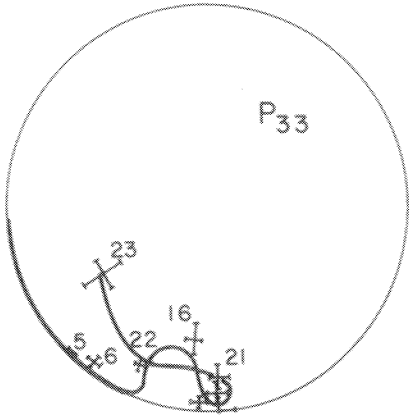


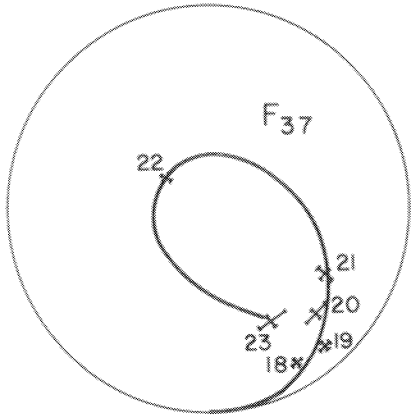


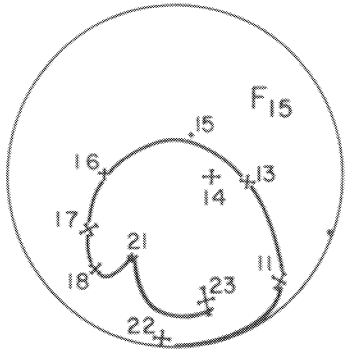












	E_{cm}
1.	1320
2.	1362
3.	1390
4.	1443
5.	1470
6.	1501
7.	1524
8.	1543
9.	1573
10.	1603
11.	1617
12.	1629
13.	1658
14.	1673
15.	1688
16.	1716
17.	1738
18.	1769
19.	1822
20.	1862
21.	1896
22.	1968
23.	2021