EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH
ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE

CERN - PS DIVISION

PS/ PA/ Note 94-10 (PPC)

MINUTES OF THE PPC MEETING
HELD ON 8.2.94

D. Manglunki

Geneva, Switzerland
16 February, 1994

PS/PA Note 94-10 (PPC)
February 17, 1994

Minutes of the PPC meeting held on February 8th, 1994

Present:

V. Agoritsas, B. Allardyce, S. Baird, J. Boillot, R. Cappi (Chairman), F. Caspers, M. Chanel, A. Chapman-Hatchett, V. Chohan, G. Cyvoct, D. Dekkers, D. Dumollard, L. Durieu, R. Garoby, J.Y. Hémery, E. Jensen, H. Koziol, P. Lefèvre, R. Ley, D. Manglunki(Secretary), M. Martini, S. Maury, C. Metzger, D. Möhl, F. Pedersen, J.P. Riunaud, K. Schindl, G. Schneider, H. Schönauer, E. Schulte, A. Terrier, G. Tranquille, H. Ullrich, E. Wildner.

Results of LEAR's electron cooling in 1993 (G.Tranquille)

- Neutralisation of the electron beam to compensate for the space-charge has been successfully demonstrated, but oscillations of the neutralisation rate have been observed in the high neutralisation regime
- A servo-system has been designed to avoid any momentum drift of the antiproton beam with the electron beam intensity. Its response time is less than 3 seconds.
- When working with protons, the H^0 beam produced by the interaction of the electrons and protons, and hitting a fluorescent screen, has shown to be a very effective diagnostic tool for emittance measurements.

(see attached copies of transparencies)

Results of AAC MD's in 1993, forecast for 1994 (C.Metzger)

- Impedance measurements in the AC gave a value of $Z/n=1.5k\Omega$, which would limit the accumulation of lead ions.
- The bad lifetime of the AA beam was due to a 11dB gain drop of a stochastic cooling amplifier.
- Some studies were devoted to the measurement of the clearing current, in view of using this technique for vacuum estimations in LHC.
- Optimisation of the cool down tunes led to the conclusion that the best values were the ones currently used.

Over the years, the vertical acceptance of the AA dropped from 25 to 15πmm.mrad. This might explain why the maximum stacked number of antiprotons dropped from 12 to 8 10^{11}. A survey will take place during the shutdown, and simulations will be made using symbolic computation.

- Measurements of the AC stochastic cooling in closed loop will take place, to optimise the gain of the system as a function of time .

(see attached copies of transparencies).

Results of LEAR MD's in 1993, forecast for 1994 (M.Chanel)

- Fast extraction at 105MeV/c showed that it is possible to extract 10^9 particles in 300ns.
- Stochastic cooling measurements were compared to theory, but the software was not quite ready to allow automatic measurements.
- Tunes, tune shifts, emittances and space-charge: a maximum tune shift of 0.1 was observed.

- $Q_H + Q_V = 5$: this resonnance is quite strong and can only be partially compensated. A strange effect was observed: getting close to this resonance induces a longitudunal instability (self-bunching of the otherwise coasting beam).

All the above studies will be continued in 1994, and in addition the following ones will be investigated :

- Trimming quadrupoles around electron cooling to compensate the tune-shift due to the solenoid.
- Extraction flux measurements at 105 and 200MeV/c.
- Transverse instabilities compensation with the damper.
- Search for "ghost": comparisons of p and pbar ultra-slow extractions at 200 MeV/c, to check if the encountered problems are due to ion trapping in the pbar beam, or to a hardware fault in the stochastic cooling system.
- Intensity limitations at 105 MeV/c
- IBS beam profile measurements in BHN20

(see attached copies of transparencies).

New studies in LEAR's experimental zones in 1994 (J.Y.Hémery)

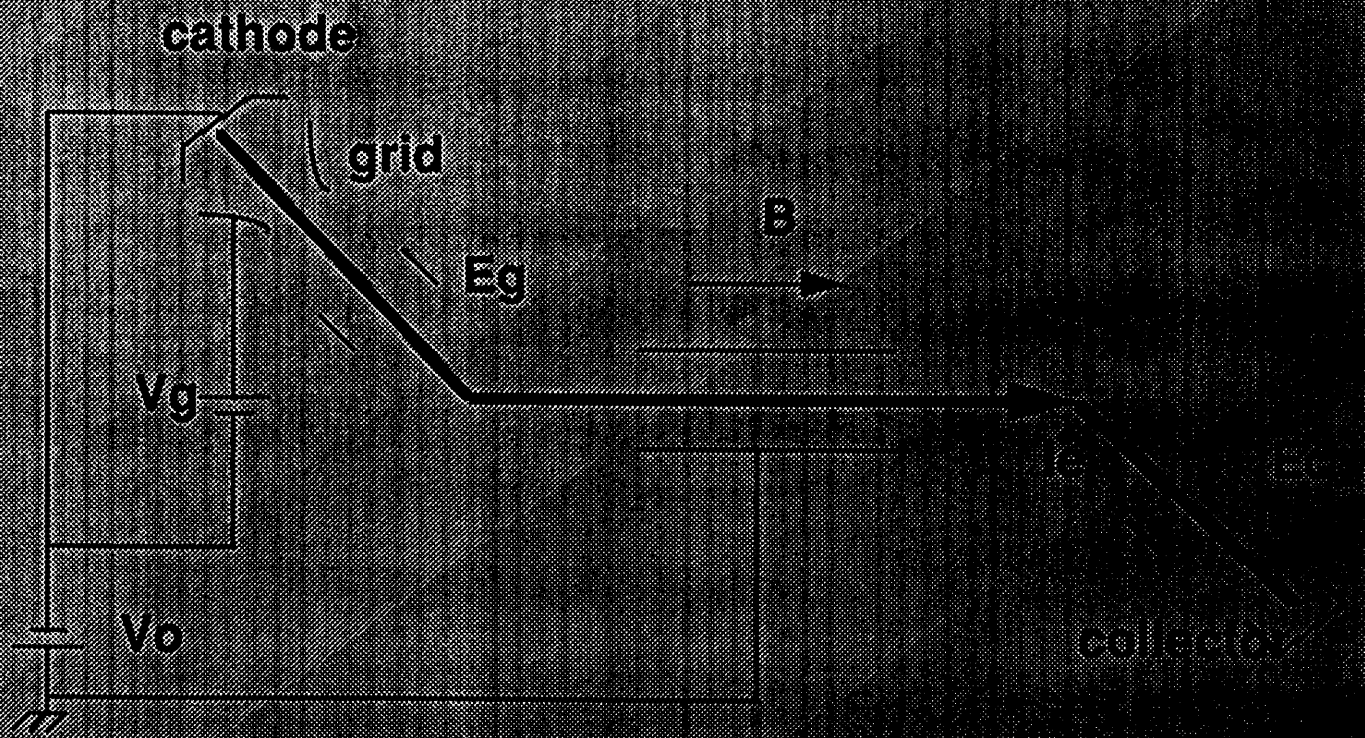
- PS195's target's diameter will be reduced from 70 to25mm
- PS197 will take some beam at 105MeV/c (instead of the routine 200MeV/c)
- PS 205 will require fast extraction
- Two new experiments come on the ground (PS207 & PS208)
- An MD time of 4 x 4 hours *with the LEAR machine previously set up with a stable extraction*, is required.

(see attached copies of transparencies)

ECOOL MD summary

- operation of the electron cooling device down to 105 MeV/c
- optimisation of the servo system
- electron beam neutralisation studies
- transverse emittance measurements using the H0 profile monitor

Experimental layout



Eg - gun neutralisation electrode
Ec - collector neutralisation electrode

Some important equations

- **electron kinetic energy**

$$E_c = -e\left[-V_0 + V_{sp}\right]$$

$$V_{sp} = \frac{91.71 \cdot I_e}{\beta}(1 - \eta)$$

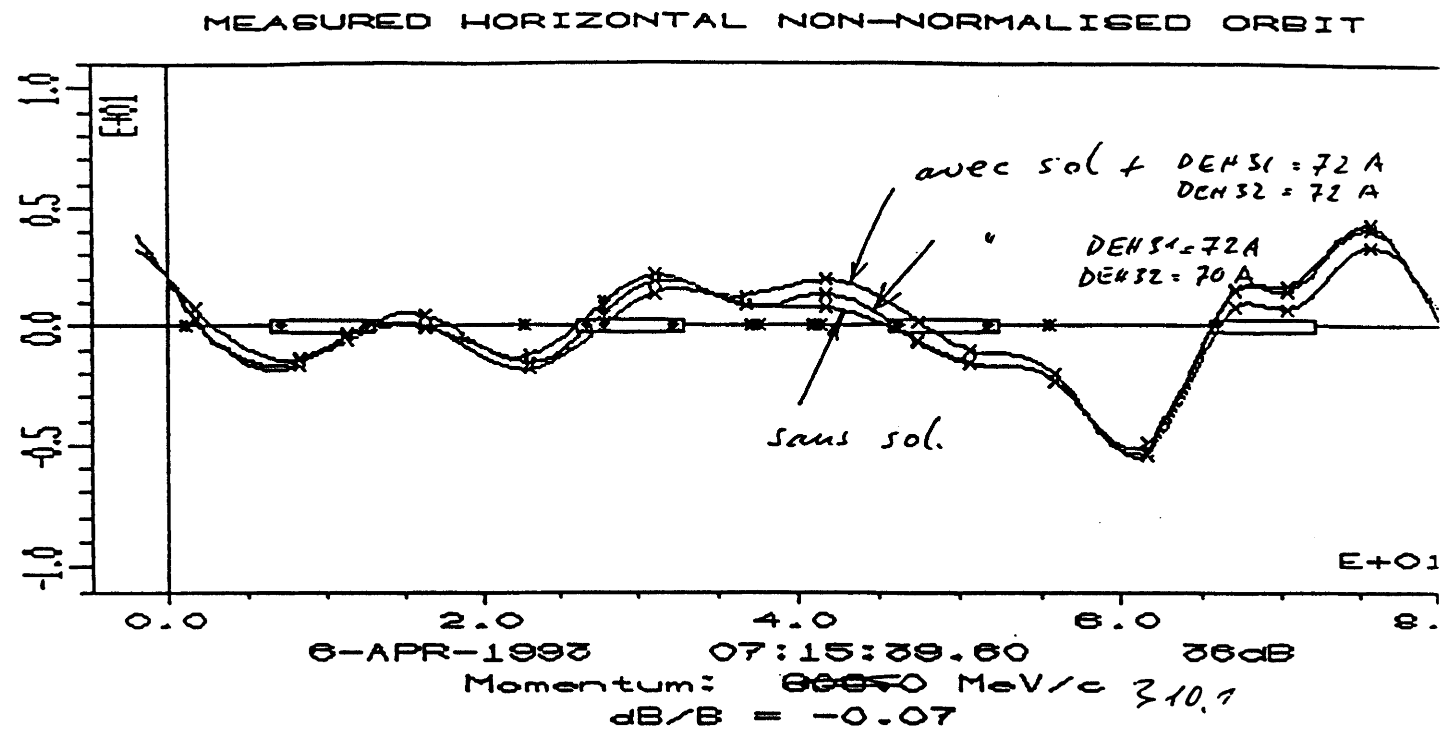
- **neutralisation factor**

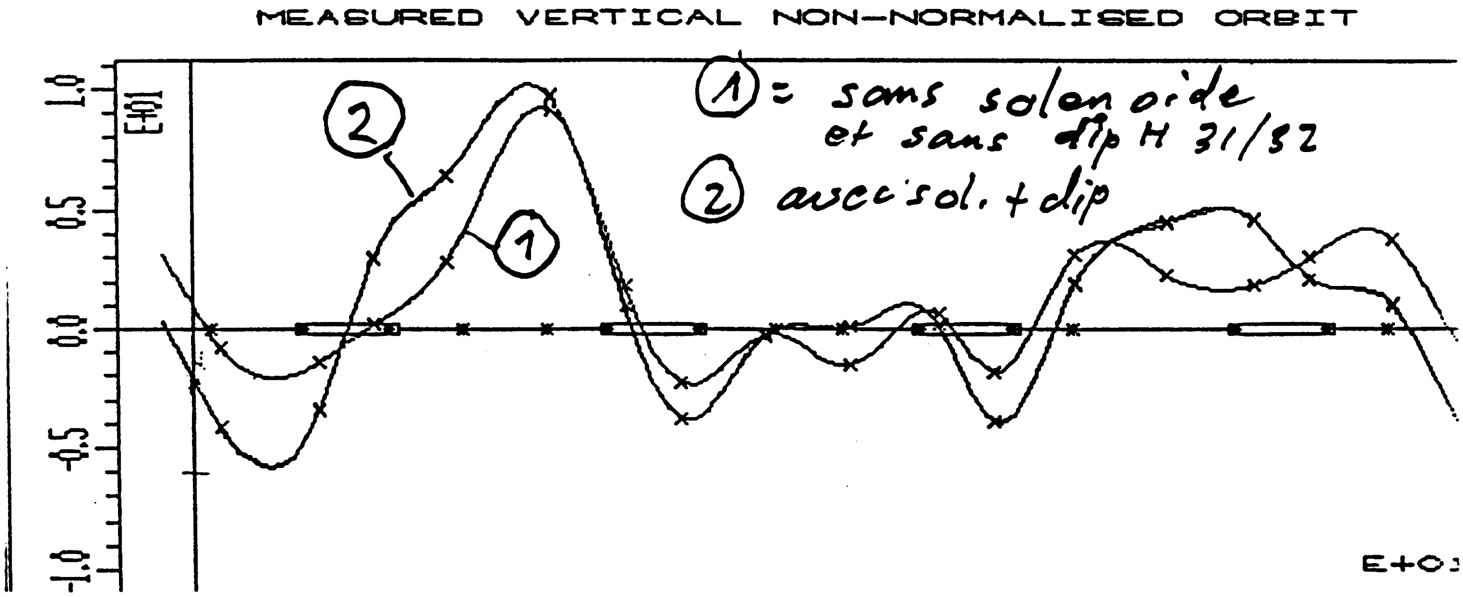
$$\eta = \frac{\text{positive ion density}}{\text{electron beam density}}$$

Operation of the electron cooling device down to 105 MeV/c

- compensation of the electron cooler solenoid at low momenta
- correction of the closed orbit distortion due to the cooler toroids
- correct alignment of the electron and ion beams for optimum cooling

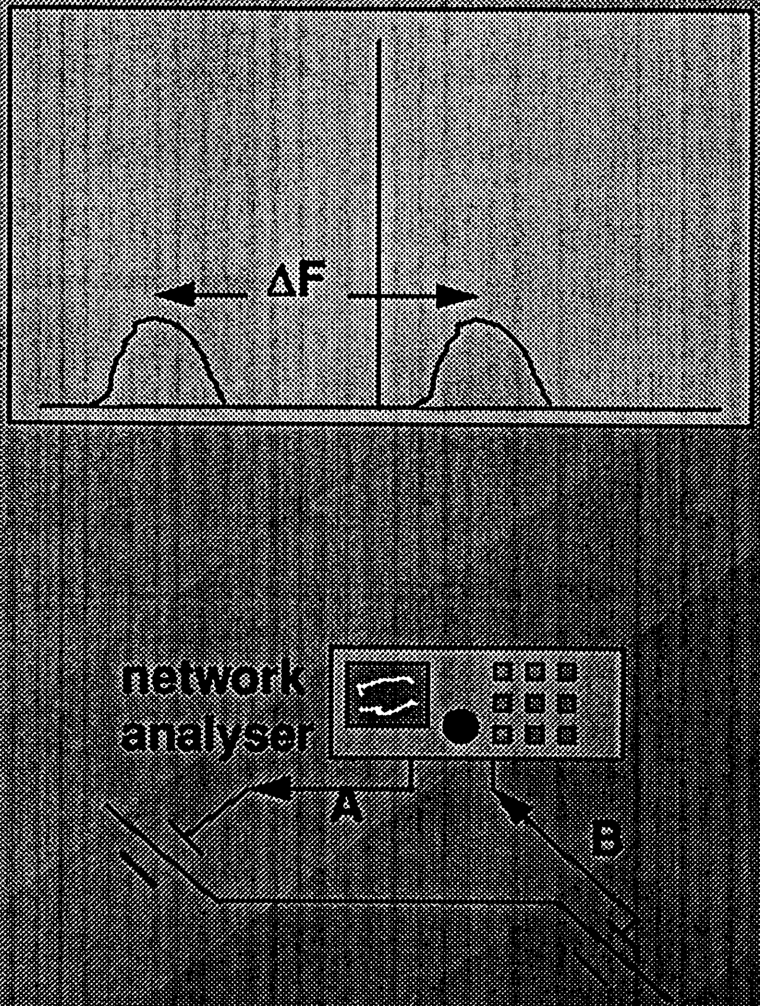
- closed orbit distortion is fully corrected [illegible] momenta
- e and ion position monitors [illegible] well, beam alignment is [illegible]


MEASURED HORIZONTAL NON-NORMALISED ORBIT
E+01
1.0
0.5
0.0
-0.5
-1.0
avec sol + DEH31 = 72 A
DEH32 = 72 A
DEH31 = 72A
DEH32 = 70 A
sans sol.
E+01
0.0
2.0
4.0
6.0
8.
6-APR-1993 07:15:39.60 36dB
Momentum: MeV/c 310.1
dB/B = -0.07


MEASURED VERTICAL NON-NORMALISED ORBIT
E+01
1.0
0.5
0.0
-0.5
-1.0
1 = sans solenoide
et sans dip H 31/32
2 avec sol. + dip
2
1
E+01

Electron beam neutralisation studies

- the aim of neutralisation system is to reduce the electron beam space charge and hence eliminate the induced azimuthal drift velocity in order to obtain smaller equlibrium emittances
- performed by polarizing a pair of electrodes Eg and Ec in order to trap ions created by the ionisation of the residual gas
- measurement of the neutralisation factor
- direct measurement of the frequency shift of the longitudinal Schottky spectrum
- Time Of Flight measurement

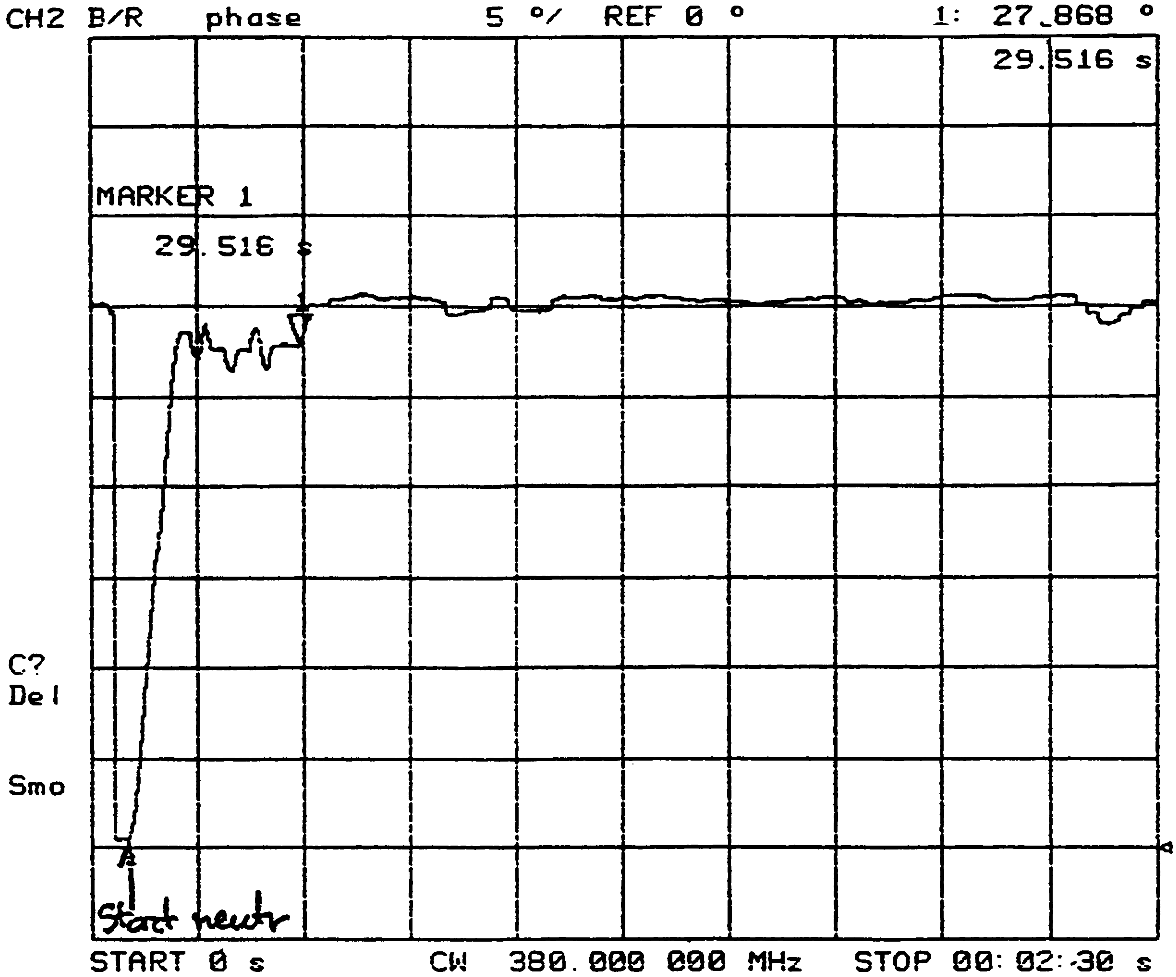


$\Delta F \rightarrow \Delta P \rightarrow \Delta E_g \rightarrow \Delta U_k \rightarrow$

$\theta = \omega L/v$

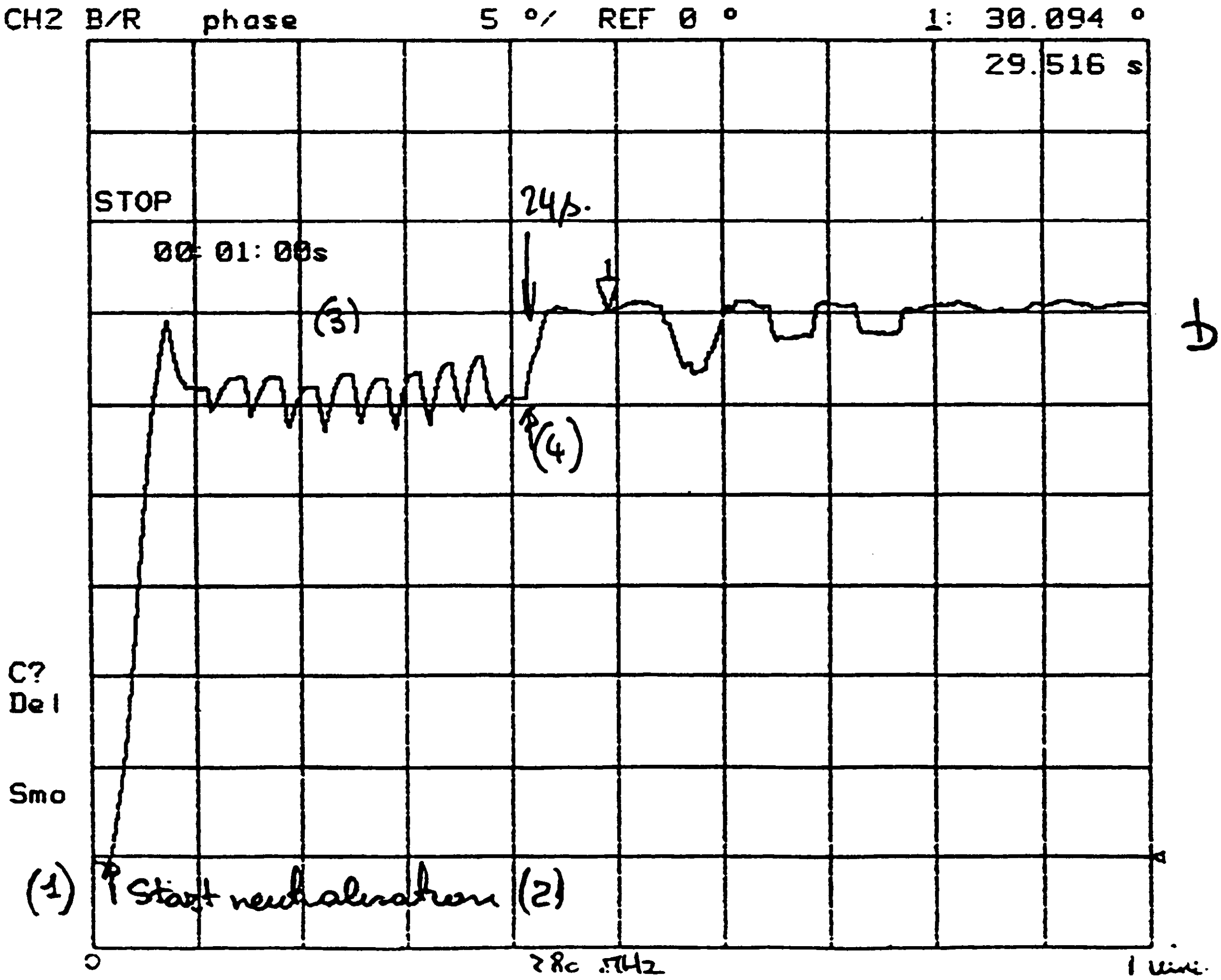
$\Delta\theta = \omega L/v$

0 6,3 0 6,3



a)

Fig 2.25



b

7) p = 510 MeV/c

$U_0 = 27.9$ kV, $\beta = 0.314$, $f_r = 1.197732$ MHz

$h = 34$, $hf_r = 40.723$ MHz

$I = 2.5$ A, $U_{sp}(0) = 730$ V $\Delta f_{max} = 532$ kHz

$I = 1.5$ A, $U_{sp}(0) = 435$ V $\Delta f_{max} = 318$ kHz

I (A)	V_{k1} kV	V_{k2} kV	V_{k3} kV	V_{k4} kV	Δf kHz	$\Delta\phi$ °	$\eta(\Delta f)$	$\eta(\Delta\phi)$ see 2.2
2.5	1	0	1	0	70	5	0.13	0,086
	2	0	2	0	105	9	0,19	0,154
	3	0	3	0	158	15	0,29	0,257
	4	0	4	0	183,5	17	0.34	0,291
	5	0	5	0	209	22	0.39	0,376
	6	0	6	0	293	30	0,55	0,513
1.5	4	0	4	0	140	15	0,44	0,427
	5	0	5	0	146	17	0,46	0,487
	6	~~1~~	6	0	157,5	19	0,49	0,541
	6	0	0	6	138	16	0,43	0,456
	6.3	0	6,3	0	160	19	0,5	0,541
	0	6.3	0	6,3	280	31	0,88	0,884 ← see remark

Remark: When looking to the phase measurement (see 2.2) we notice that with this configuration (0, 6.3, 0, 6.3)

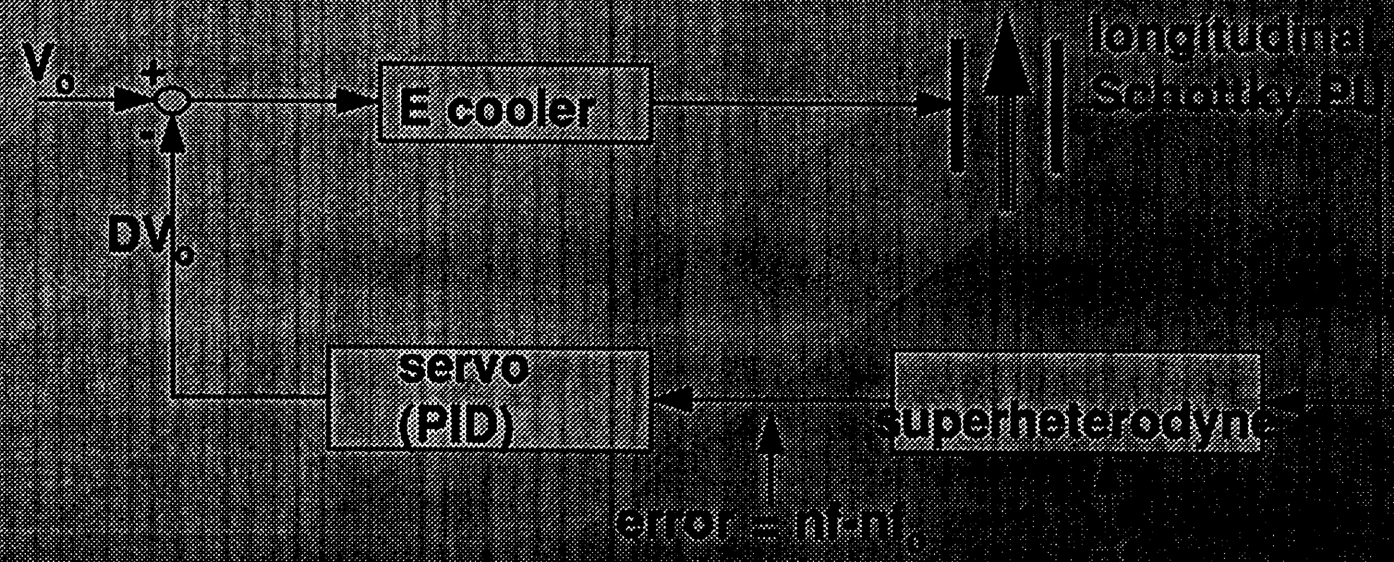
- measurements made at 310.1 and 200 MeV/c
- electron current varied at 310.1 MeV/c, fixed for 200 MeV/c

- obtained $\eta=0.5$ at 310.1 MeV/c and $\eta=0.9$ at 200 MeV/c
- TOF measurements show phase oscillations at high neutralisation factors (need higher voltages to keep the ions trapped)
- measurements have to be made with varying I_e at 200 and 105 MeV/c
- some strange phenomena related to the cathode heating power were observed and need further investigation
- phase oscillations seen during the [illegible] process

Optimisation of the servo system

- the aim of the servo system is to keep the electron beam velocity constant when the beam space charge is modified either by varying I_e or by neutralising the e-beam
- measurements on the response time of the system made at all momenta
- works very well with a response time of less than 3s for step functions of 2e[illegible]
- slight improvement to be made at [illegible] to supress the overshoot
- automatic operation still to be tested

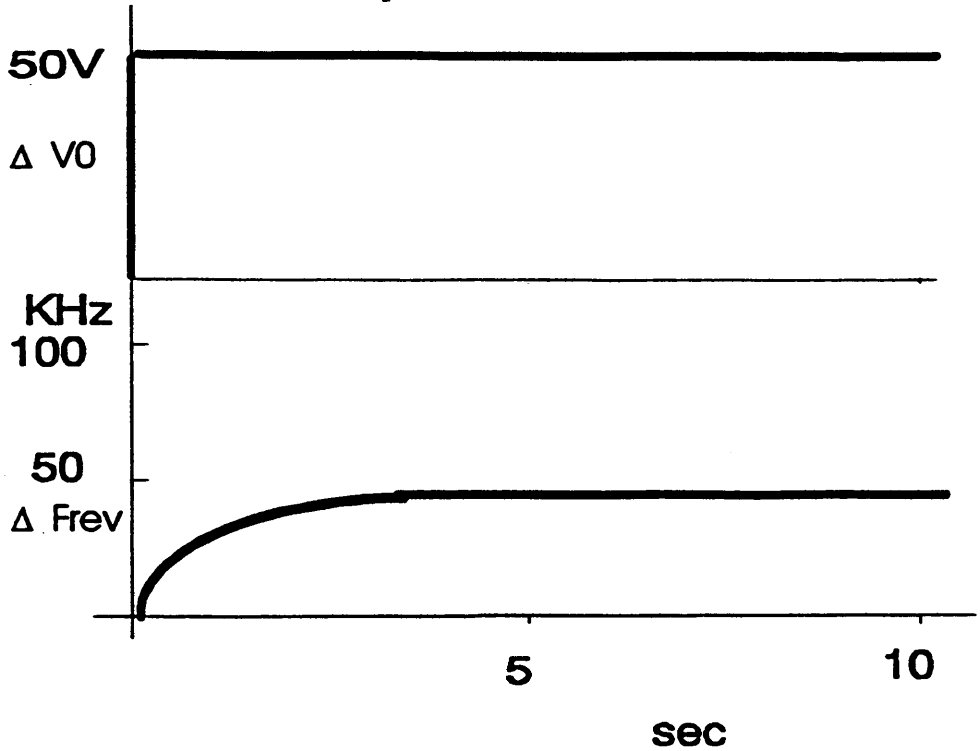
Principle of the servo system



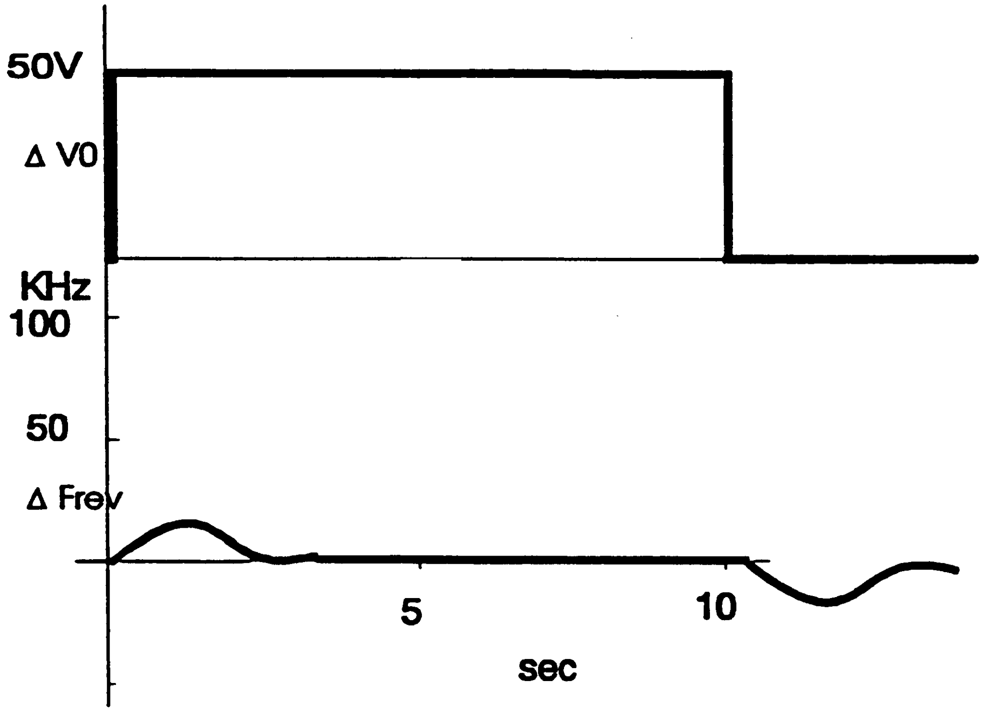
- the error in revolution frequency is fed into the servo which minimises the error and derives a correction voltage DV_o to be applied to the high voltage power supply

$$DV_o = error \cdot (P + I \int dt + D$$

Same measurement with a step of 50V



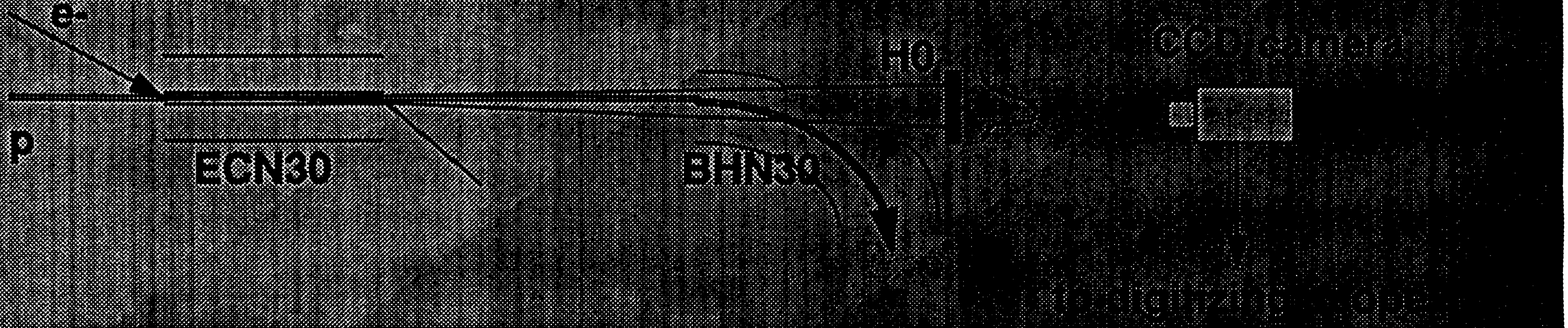
3.2.2) Servo system ON

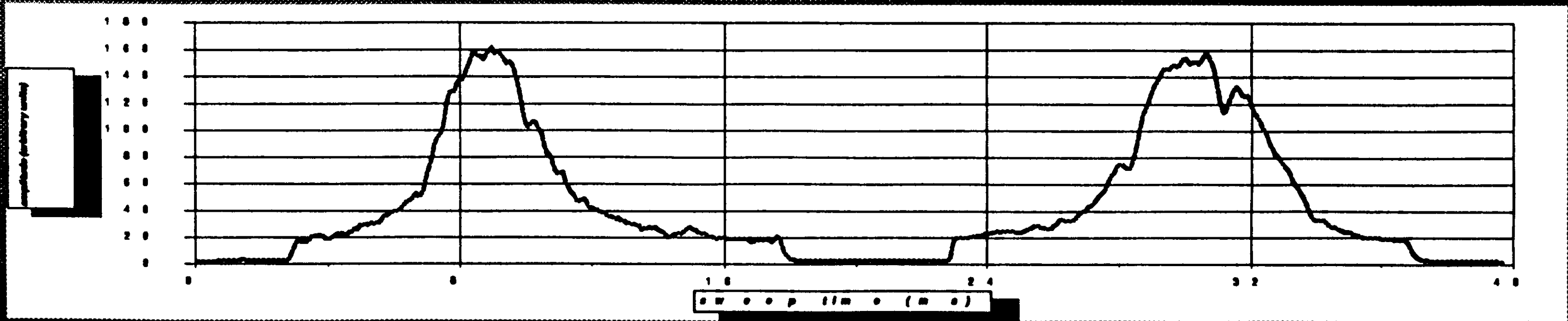


V0=27744 (+50V) ; Vs= 20 KV.; KP= 2500; KI= 35; KD=8000; KDV0=511

Transverse emittance measurements using the H0 profile monitor

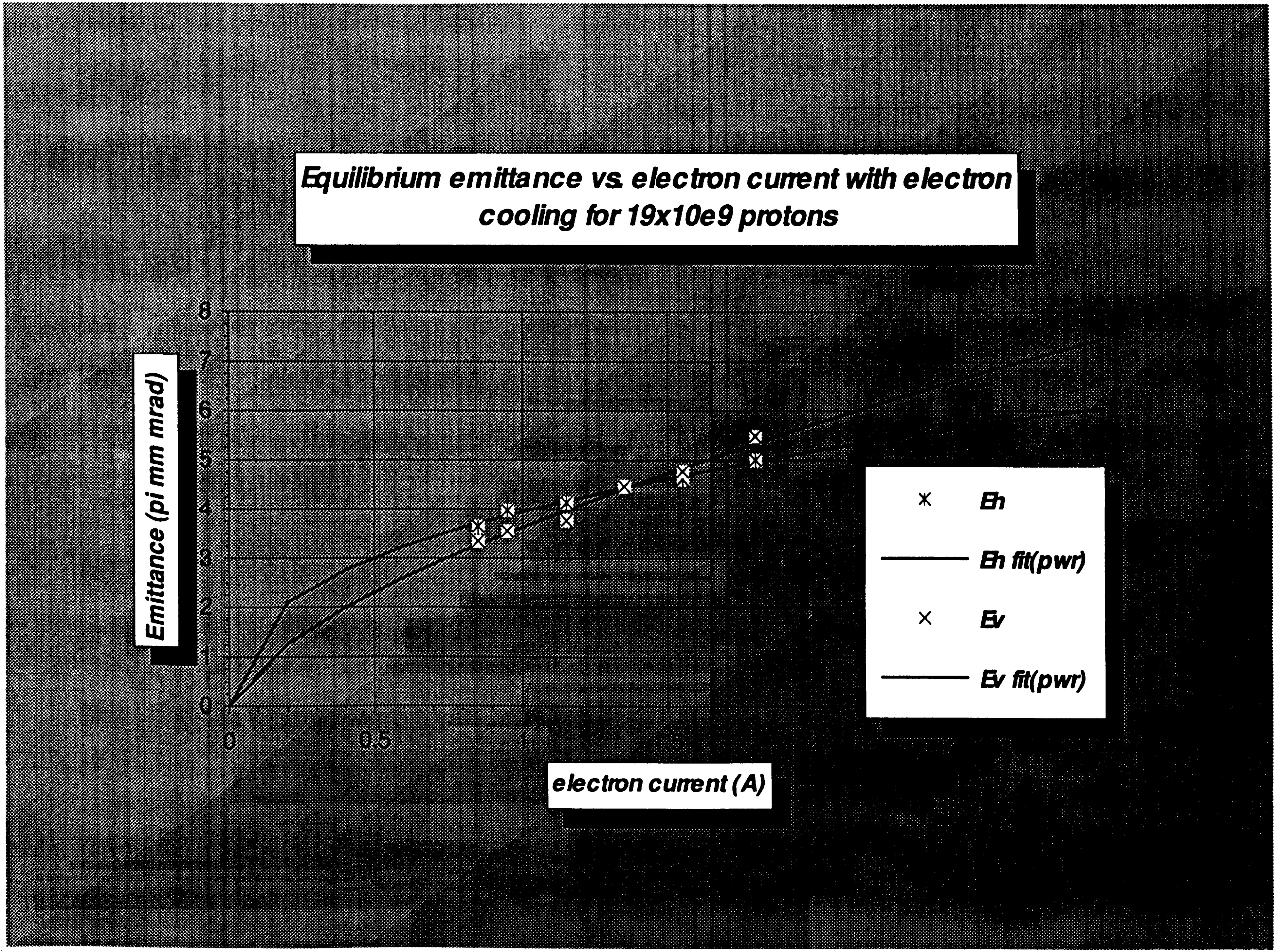
- use the recombination channel, e-+p -> H0, to observe the beam profile on a CsI screen





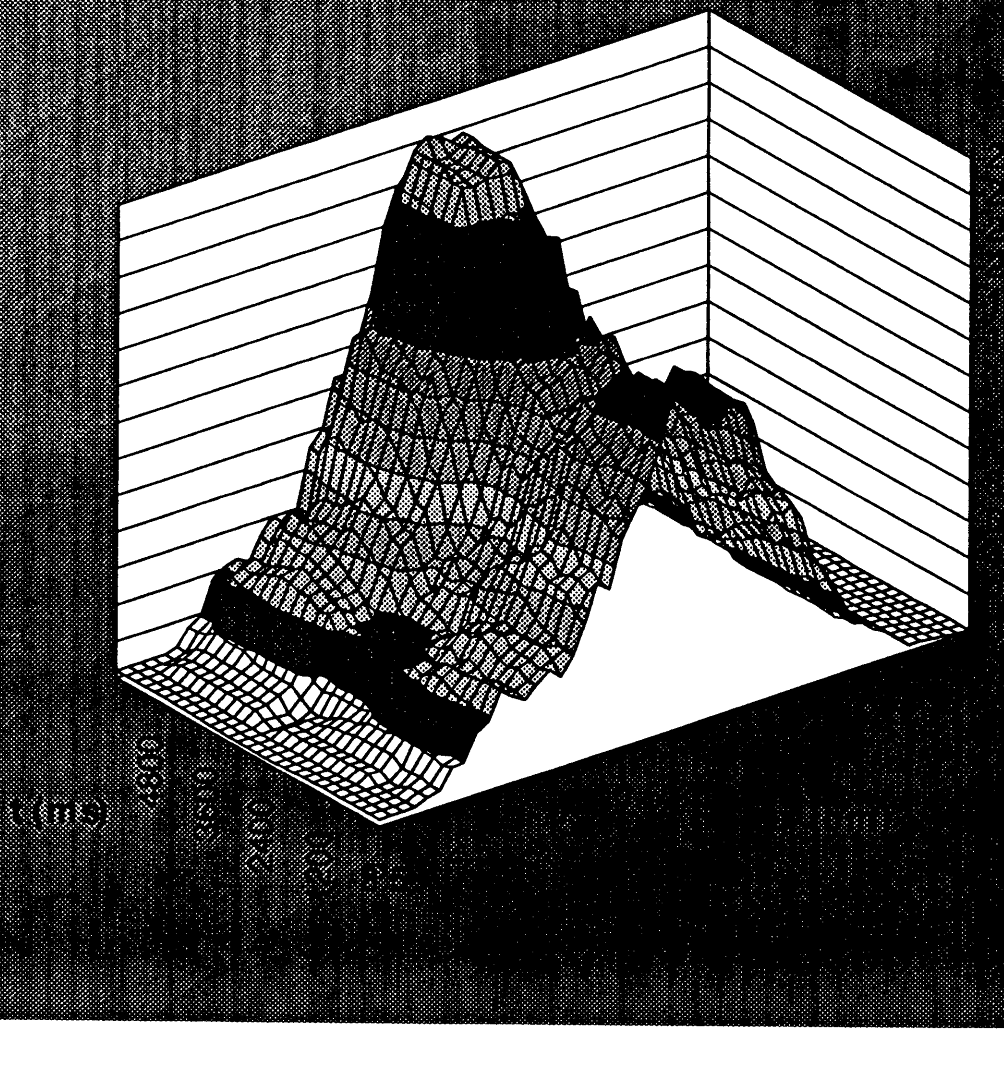
- measured equilibrium emittances as a function of particle number and electron beam intensity
- gives a good indication on the alignment of the e and p beams

- the signal at 105 MeV/c is very small
- there seems to be some signal saturation at high recombination rates
- more measurements need to be made on the equilibrium emittances
- might be possible to measure the emittance evolution during the cooling process



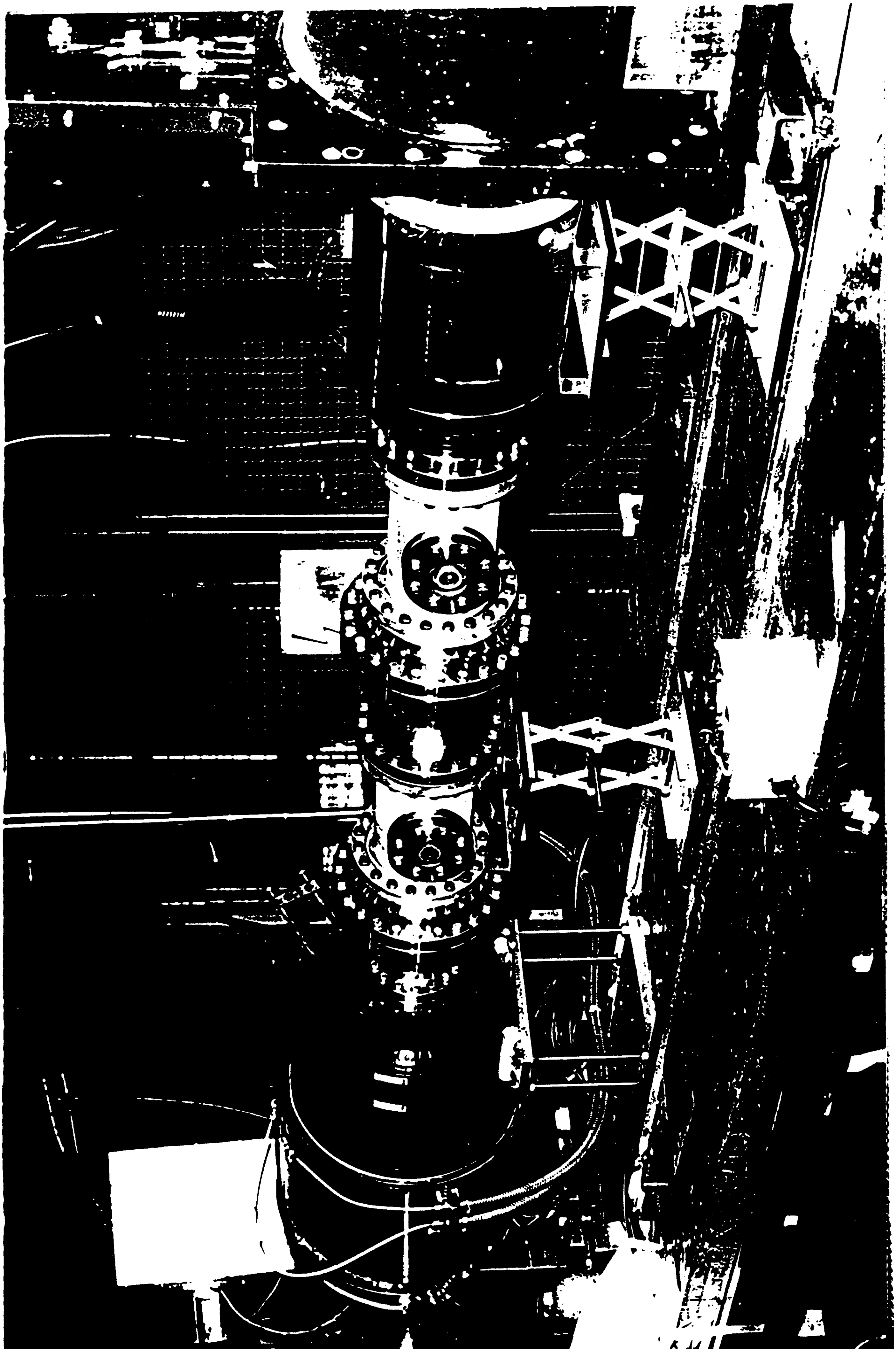
Equilibrium emittance vs. electron current with electron cooling for 19x10e9 protons
Emittance (pi mm mrad)
0
1
2
3
4
5
6
7
8
0
0.5
electron current (A)
Eh
Eh fit(pwr)
Ev
Ev fit(pwr)

horizontal emittance evolution seen on the H0 profile monito



And for 1994 ?

- routine operation of the cooler down to 105 MeV/c - including the feedback system
- investigation into the effect of the cathode temperature on the cooling characteristics
- electron beam neutralisation at all momenta
- generation of high intensity low ener[illegible] electron beam (0.5A at 2.6keV)
- emittance evolution measurements [illegible] ionisation monitor, Schottky noise [illegible]
- measure the cooling times
- test bench



1993 AAC Tests, Settings-up and Machine Developments.

Run 01

Ckecking-up of all cooling systems in AC.
Longitudinal Instability threshold in AC.

Run 02

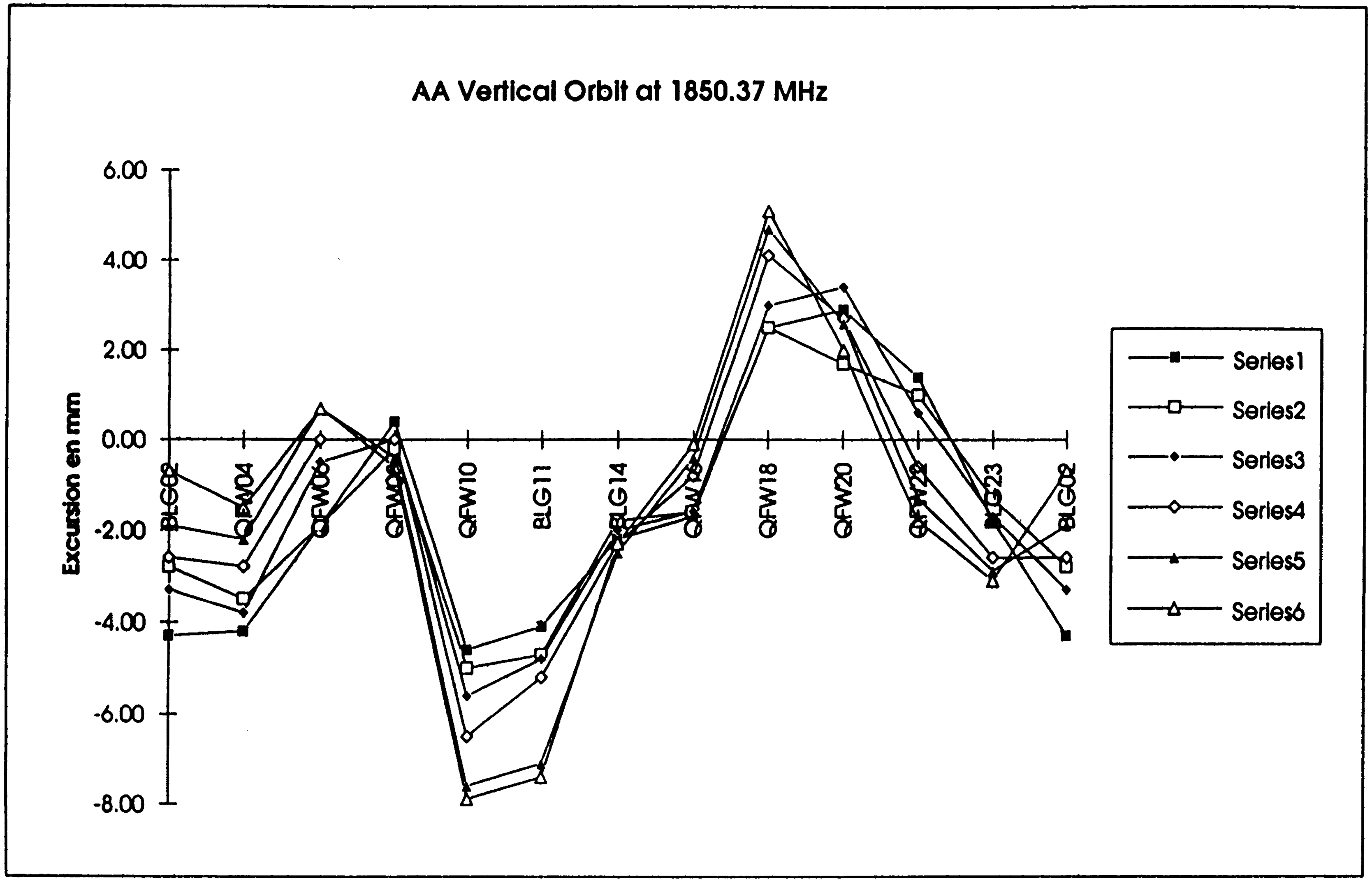
Investigation on bad Lifetime in AA.

Run 03

Blow-up investigation in AC and AA.
Ion Clearing Currents measurement in AA (LHC).
Investigation on a new Cooldown Tune for a better Lifetime in AA.

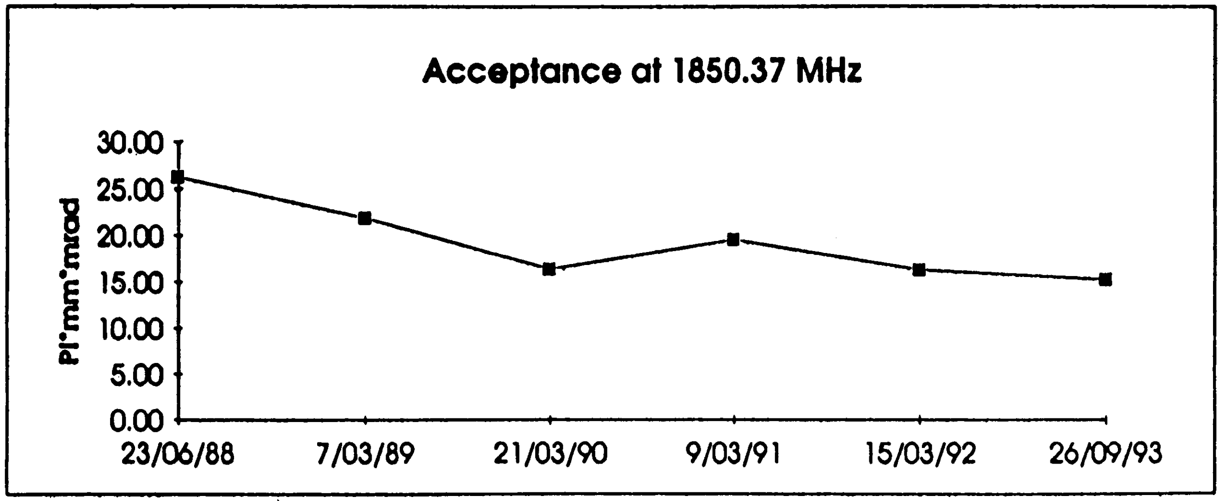
Run 04

Vertical Acceptance investigation in AA.
Influence of ionic-pumps sublimation on stack.


AA Vertical Orbit at 1850.37 MHz
Excursion en mm
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
-8.00
QFW10
BLG11
QFW18
QFW20
Series1
Series2
Series3
Series4
Series5
Series6

Vertical Orbit at 1850.37 MHz

	23/06/88	7/03/89	21/03/90	9/03/91	15/03/92	26/09/93
BLG02	-4.30	-2.80	-3.30	-2.60	-1.90	-0.70
QFW04	-4.20	-3.50	-3.80	-2.80	-2.20	-1.50
QFW06	-1.90	-1.90	-0.50	0.00	0.70	0.70
QFW08	0.40	-0.20	0.00	0.00	-0.40	-0.60
QFW10	-4.60	-5.00	-5.60	-6.50	-7.60	-7.90
BLG11	-4.10	-4.70	-4.80	-5.20	-7.10	-7.40
BLG14	-2.20	-1.80	-2.00	-2.30	-2.50	-2.30
QFW16	-1.70	-1.60	-1.60	-0.80	-0.40	-0.10
QFW18	2.50	2.50	3.00	4.10	4.70	5.10
QFW20	2.90	1.70	3.40	2.70	2.60	2.00
QFW22	1.40	1.00	0.60	-0.60	-1.30	-1.80
BLG23	-1.80	-1.30	-1.70	-2.60	-2.90	-3.10
BLG02	-4.30	-2.80	-3.30	-2.60	-1.90	-0.70
Acceptance	26.20	21.90	16.40	19.60	16.30	15.30



Week 15: AAC Machine Development Proposal (2nd draft)

Target Area:

Check of performances (after repositionning of the LI lens and target)	protons (np)

AC. Ring:

All cooling systems (Bands I, II and III):	antiprotons
Check of performances.	
Measurement of the coupling factor as a fonction of the emittance.	
Schottky pickup calibration.	protons (rp)
Acceptance measurements.	protons (rp)
Blowup investigations.	antiprotons

AA. Ring:

Acceptance investigations to find the obstruction limiting the vertical emittace at 15 π.	protons (rp)
All Cooling systems (4-8 Ghz, 2-4 Ghz, 1-2 Ghz, pre-cooling, stack-tail):	antiprotons
Adjustement of phase and amplitude after the replacement of some amplifiers.	
Check of performances.	
Blowup investigations.	antiprotons
Shaking efficiency.	
Clearing electron current measurements - LI lens and target out - (LHC)	protons (rp)

np = normal polarity
rp = reverse polarity

--

LEAR ... MD 7. 15/12/1993.

1 [illegible]

But: Extraire 10^9 à 105 MeV/c en $\Delta t < 200$ ns

Résultats

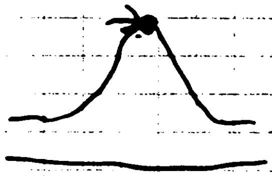
- coasting beam (st cooled) 100ns Transf 40% eff.
- faisceau groupé (st cooled) Δt 380ns 4σ eff. 25%
- faisceau groupé (e-cooled) 300ns 4σ $> 90\%$ eff.
  - $10^9 p$.
  - $h = 2$, dimension plus petite en HWPCØL
  - $B_f = 200 \times 2 / 2400 = 1/6$

> 10^9 en 300ns (4σ) est possible pour
> [illegible] extractions à 105 MeV/c avec e-cool

2 [illegible]

buts: logiciel ajustement st cool / mesures. et comparaison [illegible].

$1{,}2\,10^{10} p$. fait à 609 MeV/c



a) - signal/sur bruit. ($H_p \sim 20$, $V_p \sim 6$)

b) - Atténuation du signal lorsque boucle on

c) - BTF (analyseur réseau digital)

→ 401 pts = 401 sdb.

Résults : + logiciels pas encore au point
+ ? b HpIB.

$A_H = \frac{1}{1+Btf}$ + AH / Btf trop forte à h≈100 (200 MHz)
manque à h>200, rien h>300

+ S/bruit ok m̂ si cooling s'arrête
⇒ de la réserve pour ↗ vit. cooling

+ Gain shaping.

3. ΔQ

but: Mesurer $\varepsilon_{H,V}$, $\Delta Q_{H,V}$ en fonction de Q

moyens: • $\varepsilon_{H,V}$ par Ho
• $\Delta Q_{H,V}$ → calc. par $\varepsilon_{H,V}$
→ mesuré par Schottky.

Résultats

• Avec $2\,10^{10}$ p $\varepsilon^{90\%}_{H,V} \sim (2, 1.3\ \pi$ mm mrad)
si $Q_H+Q_V-5 < 0$ ou si $Q_H+Q_V-5 > 0.16$.

• $Q_H+Q_V=5$ semble un mur qu'il est difficile de franchir.

Amélioration mesures à plus basse fréquence.

Nota: Avec $2\,10^{10}$, couplage complet, prog IBS donne $\varepsilon^{95\%}_H = \varepsilon^{95\%}_V =$ π mm mrad, $\tau_{\parallel}^{x} = 20$ sec

4. ΔQ - 1

4 Q+ [illegible]

- but : Compenser $Q_H + Q_V = 5$ ecool ON
- moyen skew quad. + Couplage Q_H/Q_V
- Provenance excitation.
  - skew random
  - orbite V ou X pôles
  - Solénoïdes ecool.

Résultats + Résonance forte :
e ~ 6 10^{-3}

+ Compensation possible. mais pas parfaite.

+ continuer.

résiduel résonance. P^t de fonctionnement sur le bord de la résonance. faisceau stable, grandes émittances. Un petit changement de compensation et le faisceau est instable en longitudinal sur le pic f^+, et c'est réversible. De même avec un changement de Q.

5 - Bunching

but : groupé un faisceau avec ecool
- peu de tension sur cavité RF, boucle de phase, observation instabilités, ΔQ.

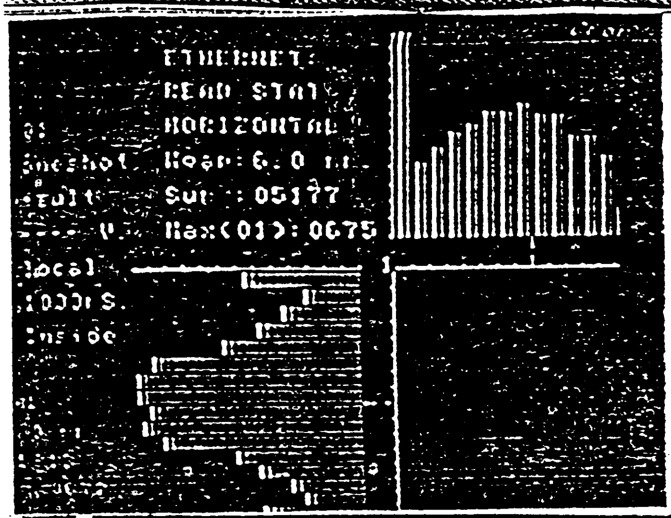
<u>Results</u> - boucle de phase ok, $V_{RF} = 200\,V$ même avec pulse de mesure.

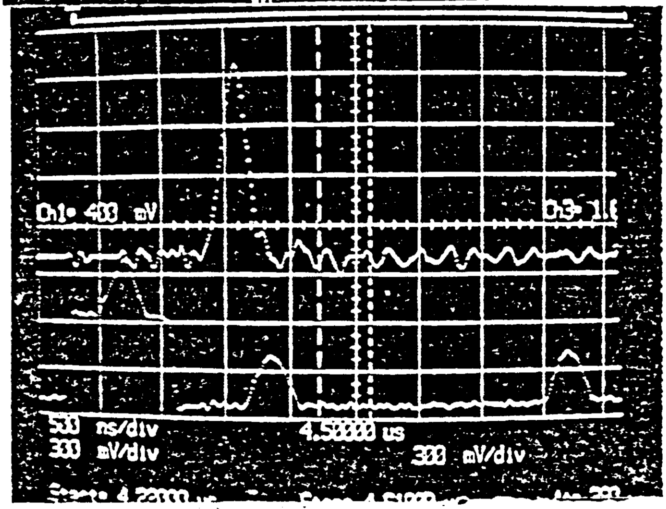
attention : $f_{RF} = f_{rev}$ ⇒ <u>Servo ecool</u>

- bunching factor 1/8 $N = 2.6\ 10^9$.
- bunching factor 1/4 $N = 1.4\ 10^{10}$

6 - T[illegible]

Non analysé.

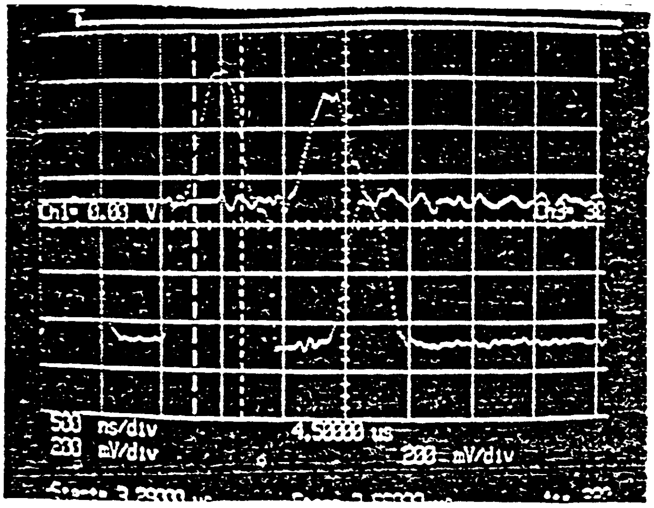


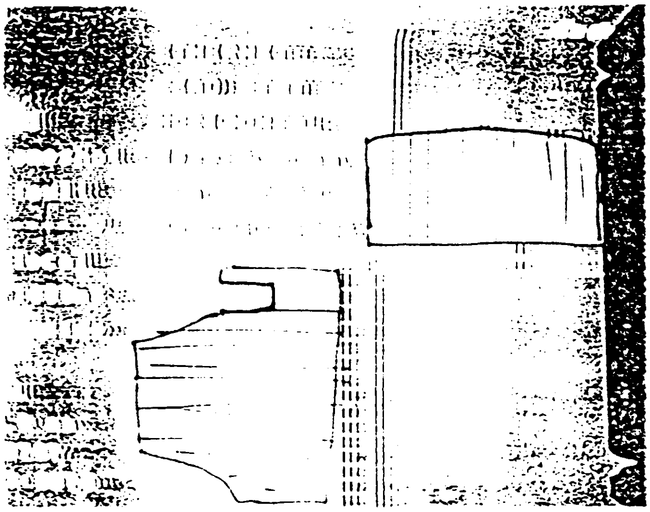


e- cooling   H=2.

~14 10^9 in Ext. beam

90 % efficiency





St cooling

0,5 10^9 in Ext. beam

25 % efficiency

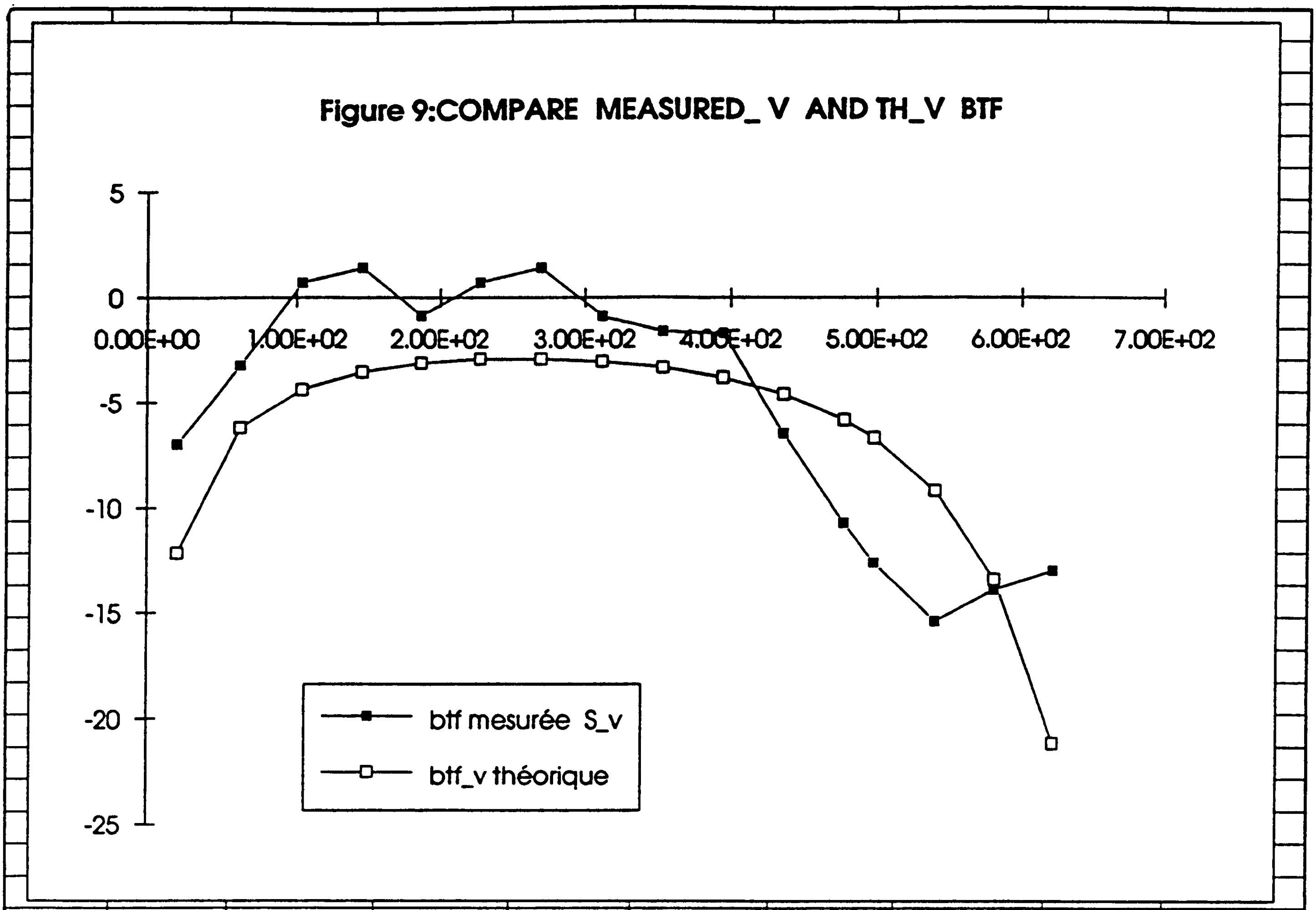


Figure 9:COMPARE MEASURED_ V AND TH_V BTF
5
0
-5
-10
-15
-20
-25
0.00E+00
1.00E+02
2.00E+02
3.00E+02
4.00E+02
5.00E+02
6.00E+02
7.00E+02
btf mesurée S_v
btf_v théorique

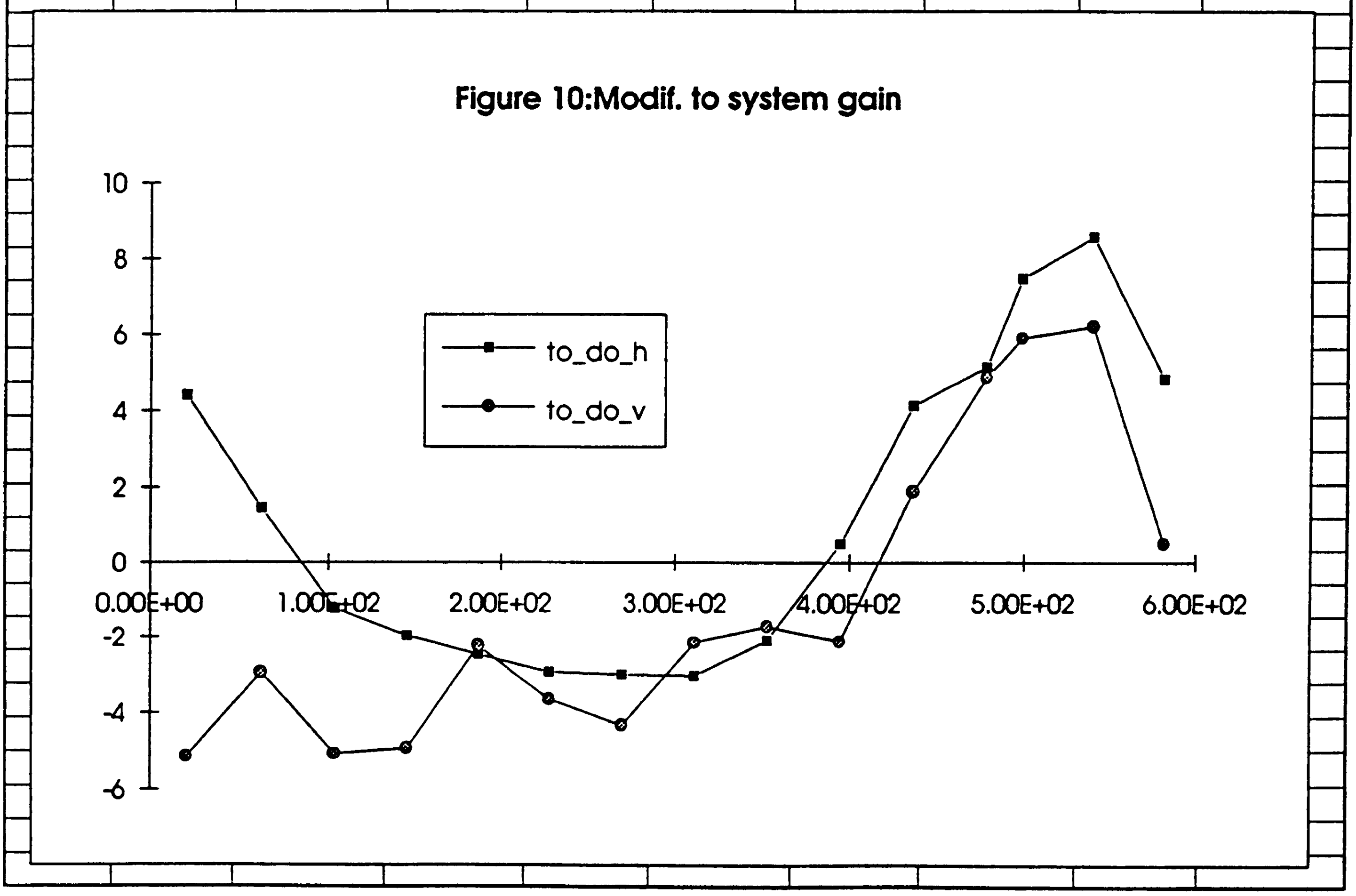


Figure 10:Modif. to system gain
10
8
6
4
2
0
-2
-4
-6
0.00E+00
1.00E+02
2.00E+02
3.00E+02
4.00E+02
5.00E+02
6.00E+02
to_do_h
to_do_v

Figure 3:Schottky signal attenuation when Cooling ON (VERT.,609MeV/c)

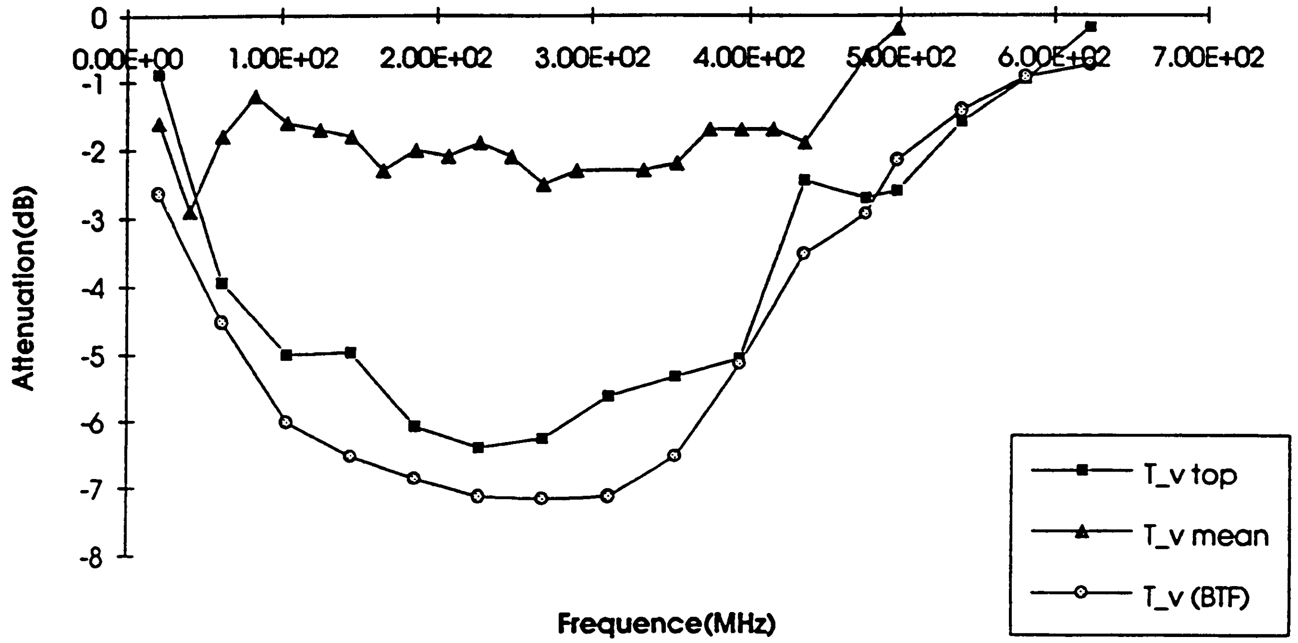
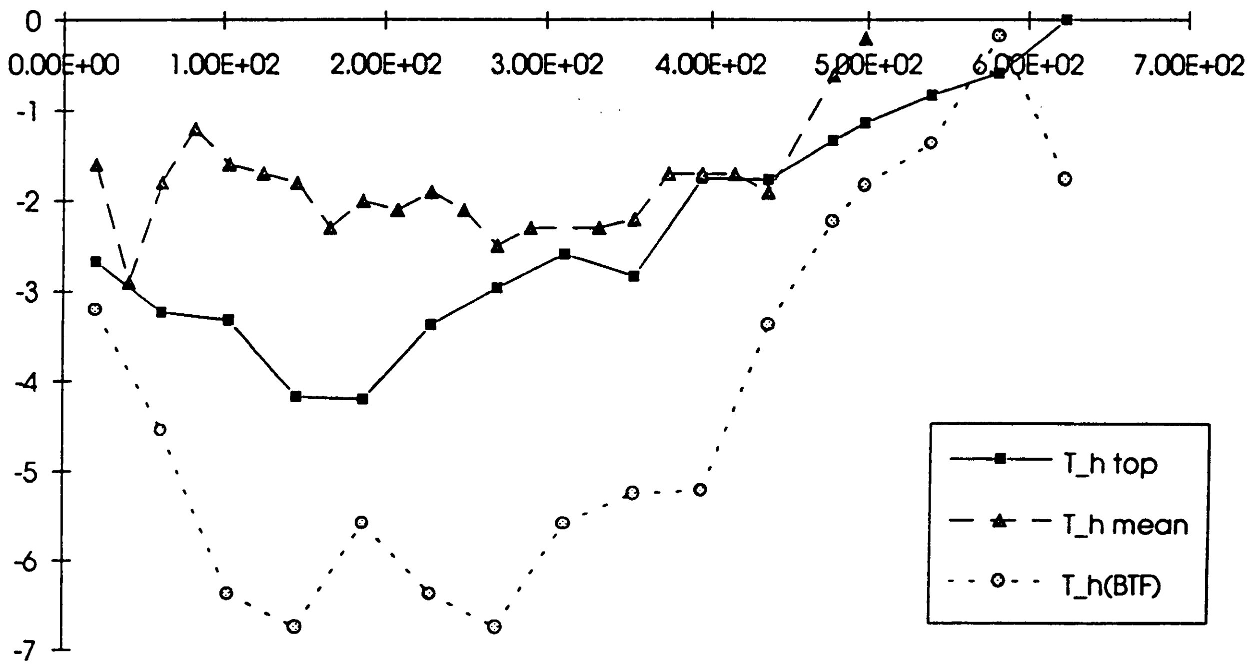
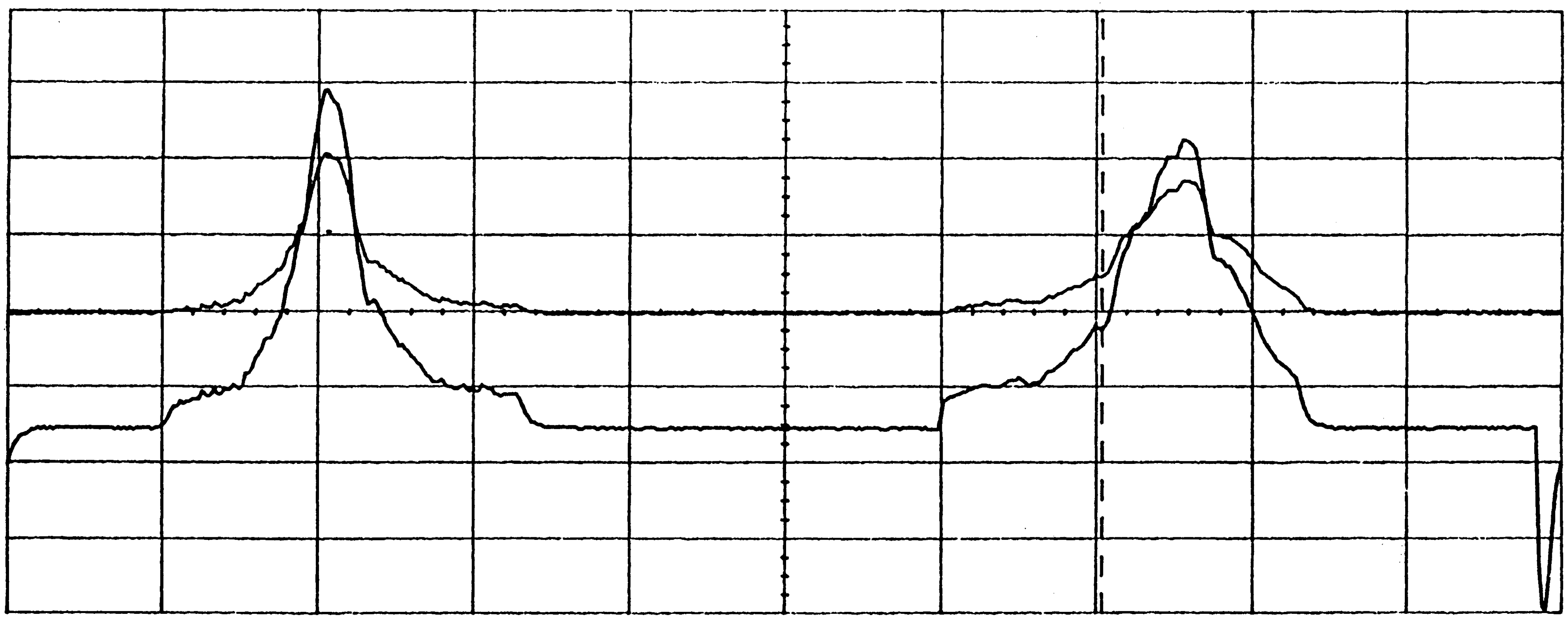


Figure 4:Schottky signal attenuation when Cooling ON (HOR.,609MeV/c)



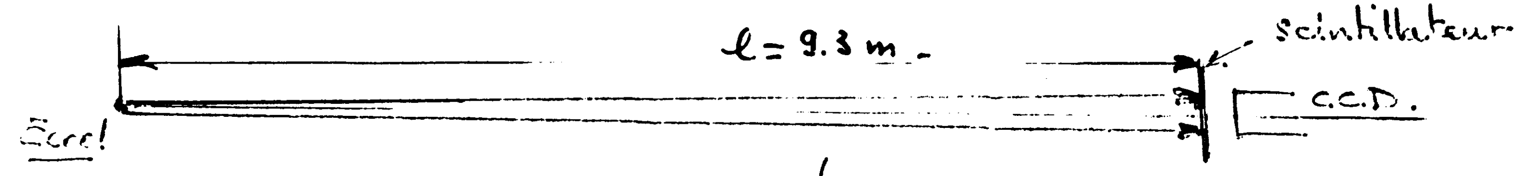


$\varrho_H = 2.281$
$\varrho_V = 2.685$
$N = 2 \cdot 10^{10}$

4,966

9,5 → 1,5 ms

16 mm → 2,56 ms

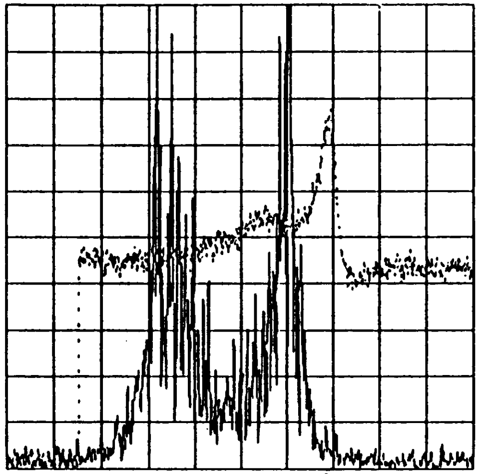


$\beta + e^- \rightarrow H_2$

$X'_{écran}$ '' x_{sc}/ℓ

DATE	:	12-DEC-1993
TIME	:	21:03:05.02
MOMENTUM	:	310.1 MeV/C
STACK	:	1992.5 10^7

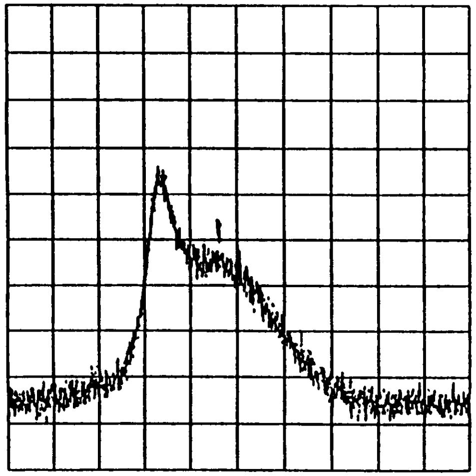
LONGITUDINAL SPECTRUM



RES BW 300 Hz REF 397.6 mV
VBW 300 Hz LINEAR
SWP 1.0 sec CENTER 41.95340 MHz
ATTEN 0 dB SPAN 50.00 kHz

$n - q_H$

HORIZONTAL SPECTRUM

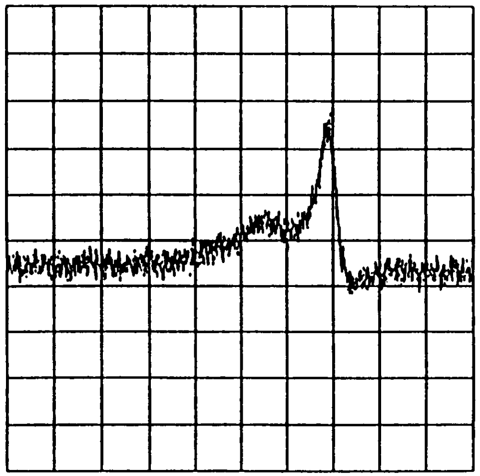


RES BW 3 kHz REF -58.5 dBm
VBW 100 Hz 2 dB/
SWP 1.5 sec CENTER 203.4530 MHz
ATTEN 0 dB SPAN 200.0 kHz

−7.5

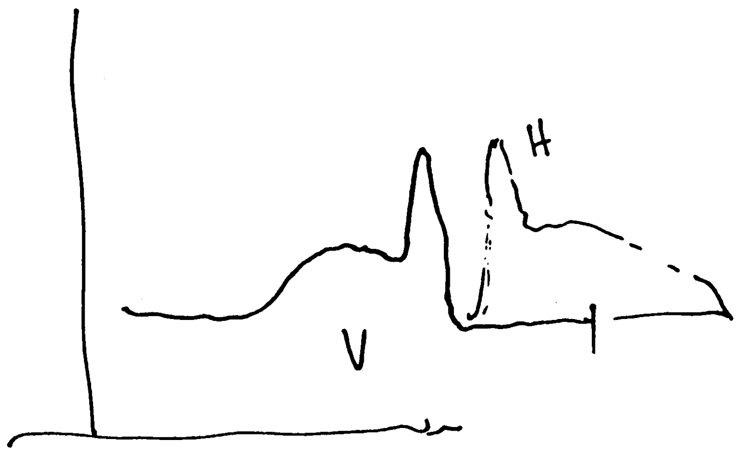
$n + q_V$

VERTICAL SPECTRUM

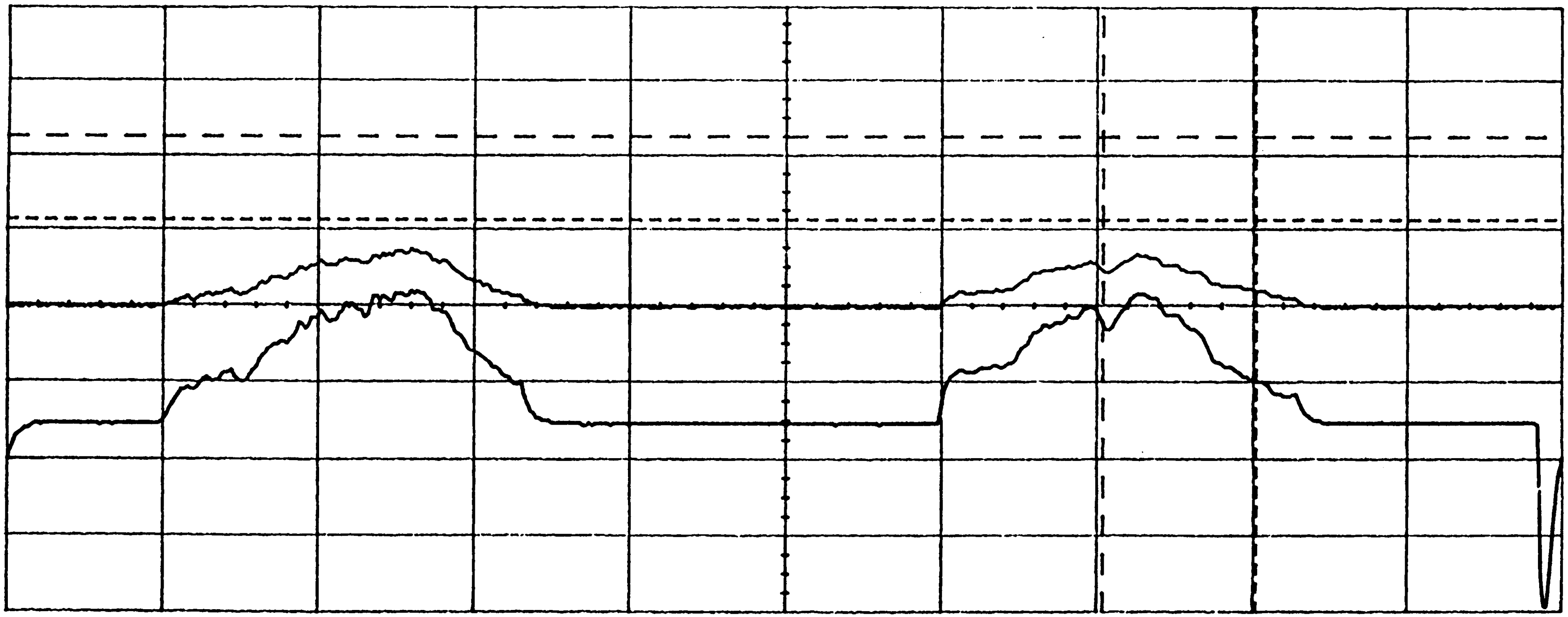


RES BW 3 kHz REF -64.0 dBm
VBW 30 Hz 2 dB/
SWP 5.0 sec START 203.2530 MHz
ATTEN 10 dB STOP 203.4530 MHz

−9 mm



6/mm | $2.7 \cdot 10^{-3}$/mm
200k



$Q_H = 2{,}306$
$Q_V = 2{,}706$
$N = 2\,10^{10}$

[illegible],012

$Q_H + Q_V - 5 = 12\ 10^{-3}$

$2\ell \to 4{,}448\,ms$

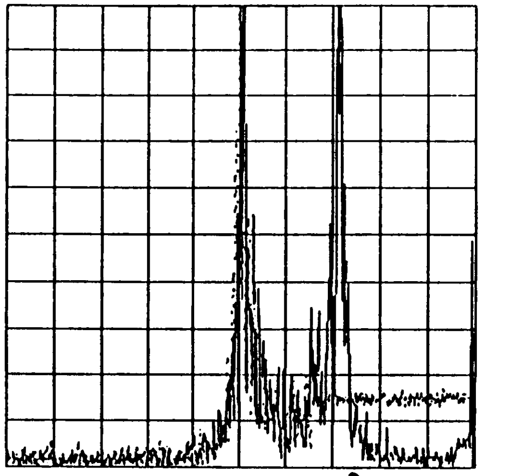
$V \to 4{,}44\,ms$

$\varepsilon_V \sim 10\pi$ mmrad

$\varepsilon_H \sim 8\pi$ mmrad.

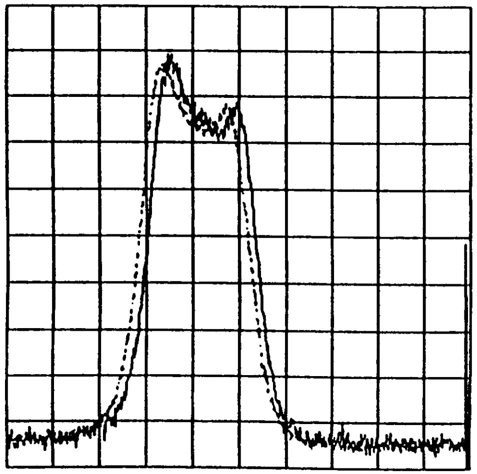
DATE : 12-DEC-1993
TIME : 21:18:33.57
MOMENTUM : 310.1 MeV/C
STACK :2062.5 10^7

LONGITUDINAL SPECTRUM



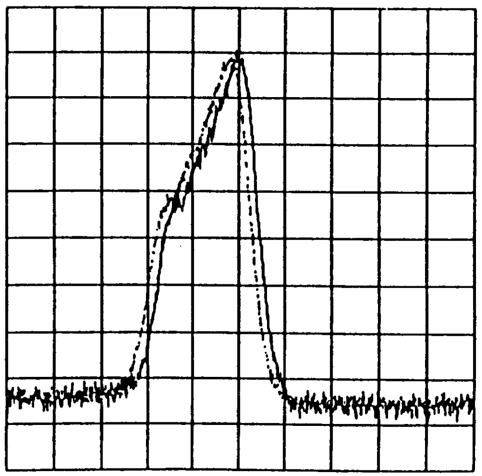
RES BW 300 Hz REF 397.6 mV
VBW 300 Hz LINEAR
SWP 1.0 sec CENTER 41.95340 MHz
ATTEN 0 dB SPAN 50.00 kHz

HORIZONTAL SPECTRUM



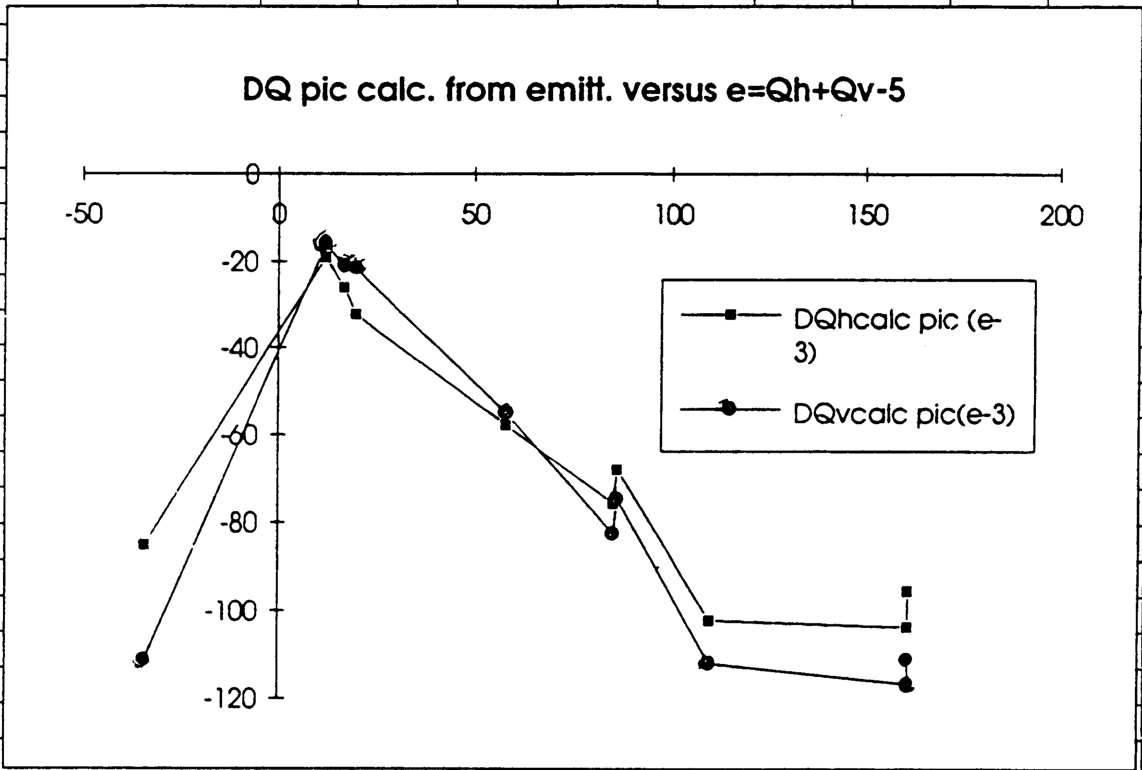
RES BW 3 kHz REF -56.5 dBm
VBW 100 Hz 2 dB/
SWP 1.5 sec CENTER 203.4530 MHz
ATTEN 0 dB SPAN 200.0 kHz

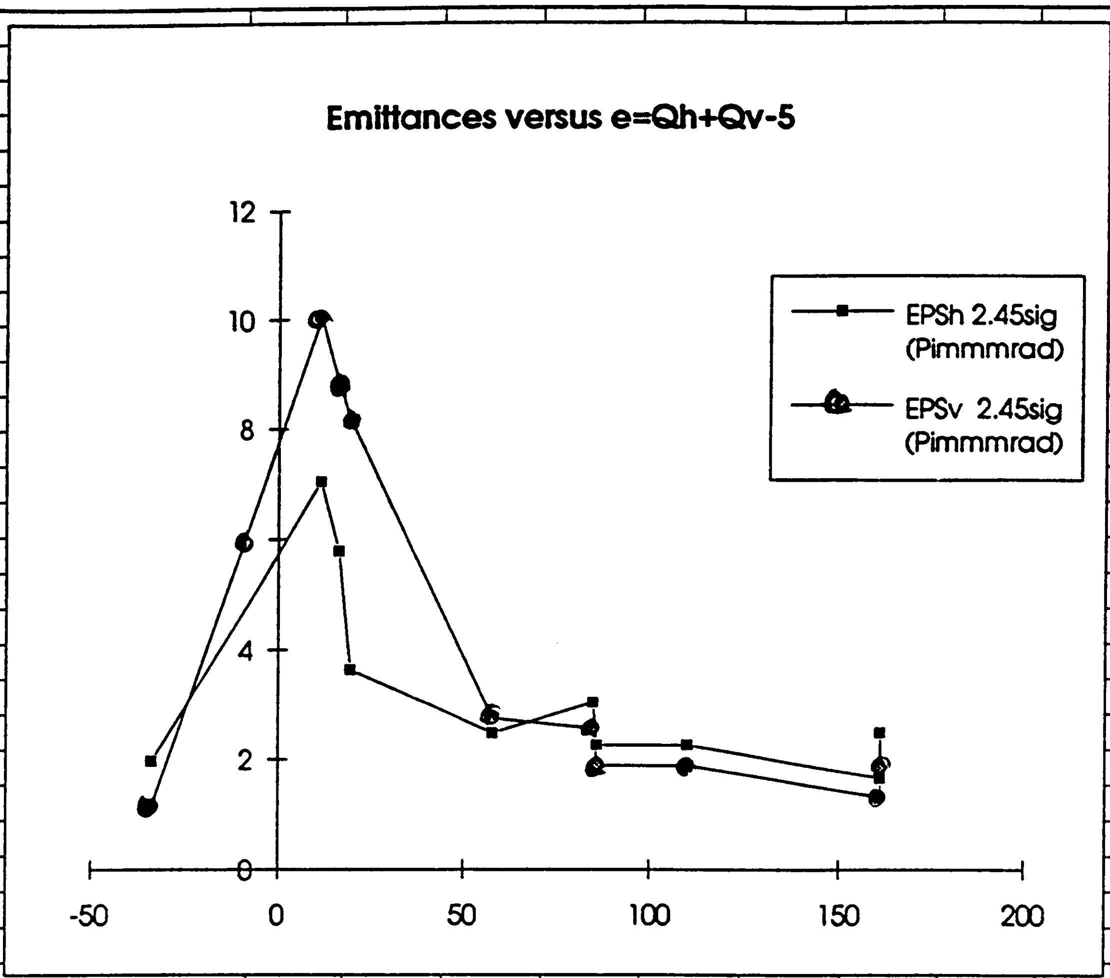
VERTICAL SPECTRUM

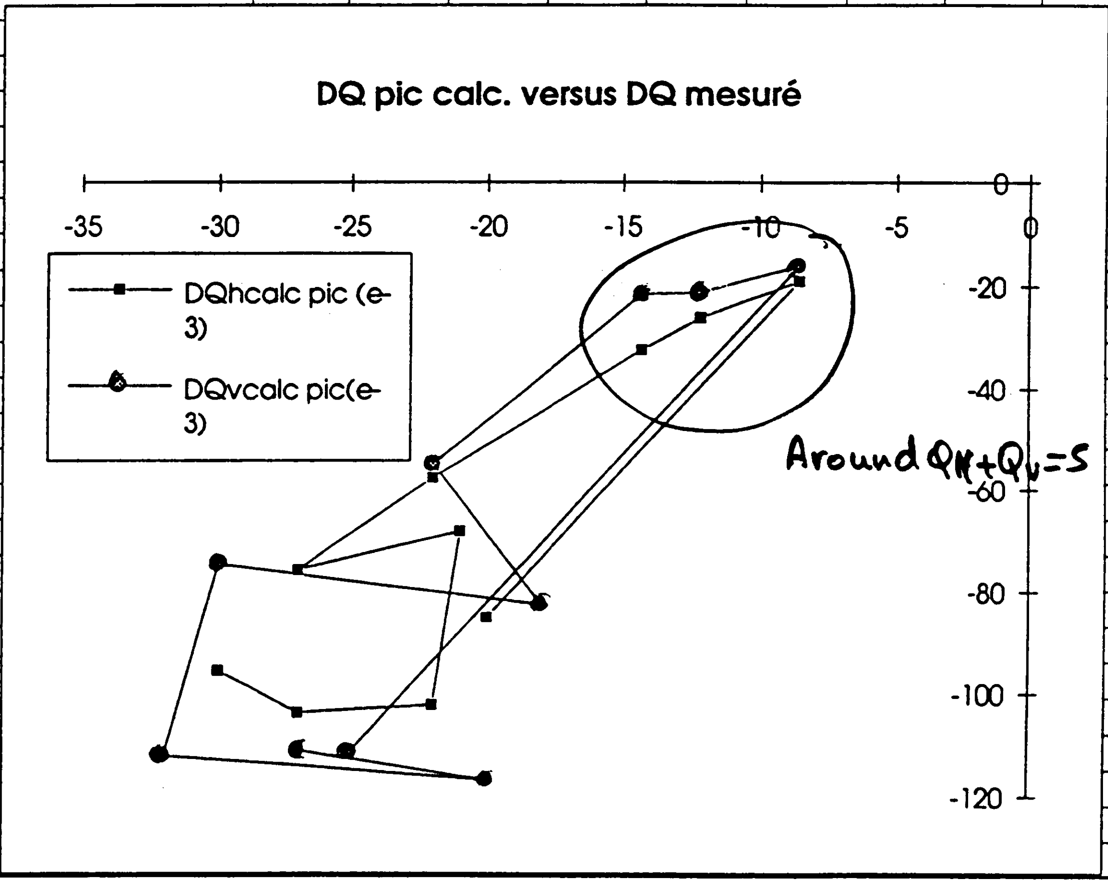


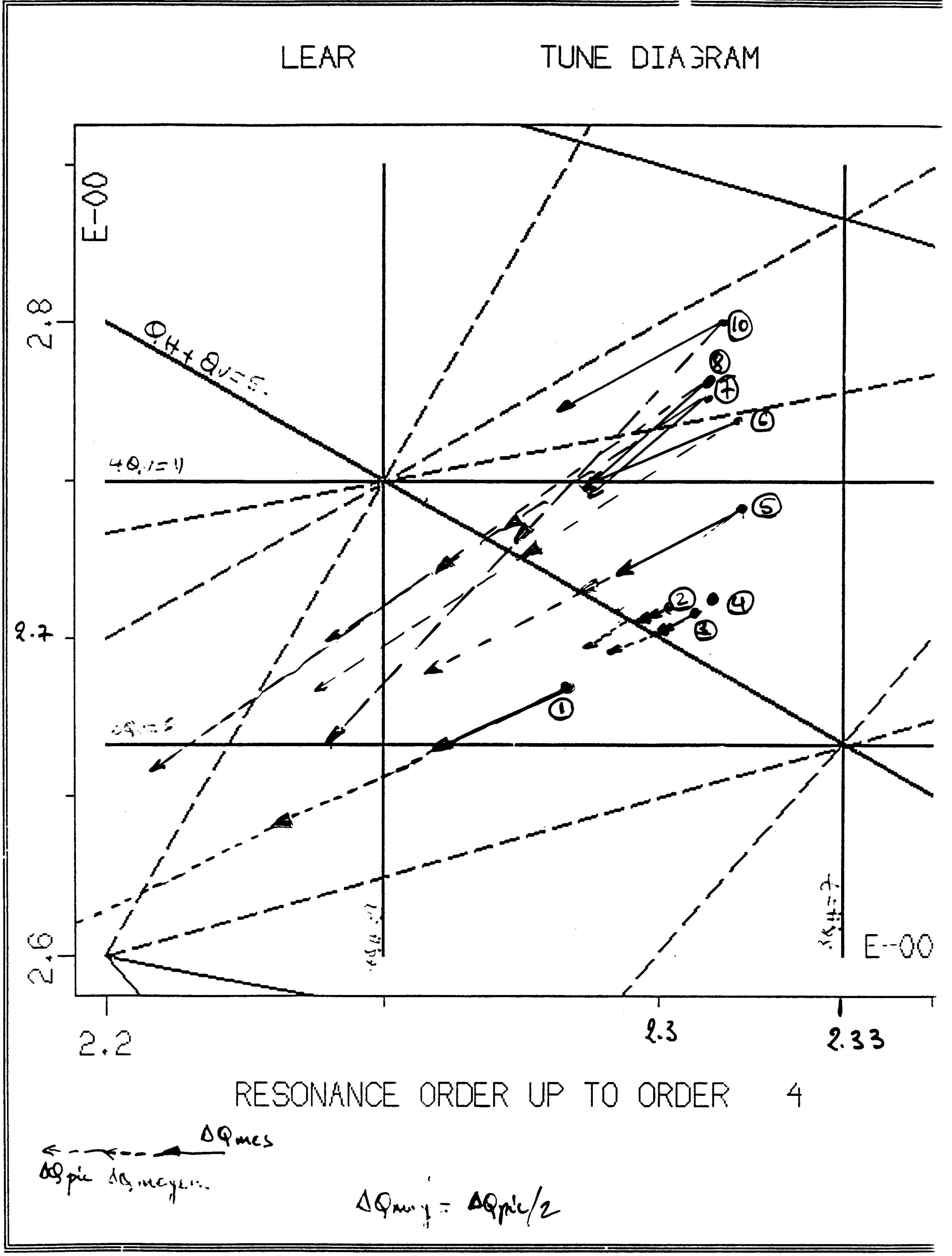
RES BW 3 kHz REF -58.0 dBm
VBW 30 Hz 2 dB/
SWP 5.0 sec CENTER 203.4530 MHz
ATTEN 10 dB SPAN 200.0 kHz

	1	2	3	4	5	6	7	8	9	10
N(10^10)	2	2	2.3	2	2	3	2	3	2.2	3
Qh	2.281	2.306	2.311	2.31	2.316	2.315	2.31	2.31	2.311	2.311
Qv	2.685	2.706	2.706	2.71	2.742	2.77	2.776	2.8	2.85	2.85
Qh+Qv-5 (e-3)	-34	12	17	20	58	85	86	110	161	161
DQhm(e-3)	-20	-8.571	-12.14	-14.29	-22	-27	-21	-22	-27	-30
DQvm(e-3)	-25	-8.571	-12.14	-14.29	-22	-18	-30	-32	-20	-27
Xfwmh (ms)	2.7	5.12	4.64	3.68	3.04	3.36	2.9	2.9	2.48	3.04
Yfwmh (ms)	1.5	4.44	4.16	4	2.32	2.24	1.92	1.92	1.6	1.9
EPSh 2.45sig (Pimmmrad)	1.9576	7.0393	5.7813	3.6365	2.4816	3.0316	2.2583	2.2583	1.6516	2.4816
EPSv 2.45sig (Pimmmrad)	1.1468	10.048	8.8204	8.1549	2.7433	2.5574	1.8789	1.8789	1.3048	1.84
DQhcalc pic (e-3)	-85.11	-19.04	-26.18	-32.38	-57.77	-75.86	-68.11	-102.2	-103.7	-95.53
DQvcalc pic(e-3)	-111.2	-15.93	-21.19	-21.63	-54.95	-82.59	-74.67	-112	-116.7	-110.9
DQhcalc mean (e-3)	-42.55	-9.519	-13.09	-16.19	-28.89	-37.93	-34.06	-51.08	-51.86	-47.76
DQvcalc mean (e-3)	-55.6	-7.967	-10.6	-10.81	-27.48	-41.3	-37.34	-56	-58.34	-55.47
	4.2554	2.2211	2.1556	2.2669	2.6261	2.8095	3.2434	4.644	3.8412	3.1842
	4.4478	1.8591	1.7452	1.5138	2.4977	4.5884	2.4891	3.5003	5.8342	4.1089

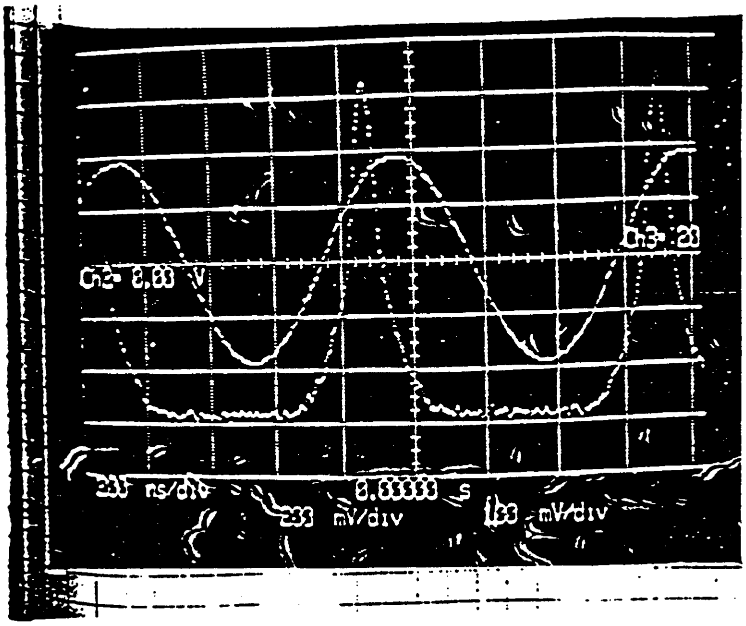



Emittances versus e=Qh+Qv-5
12
10
8
6
4
2
0
-50
0
50
100
150
200
EPSh 2.45sig (Pimmmrad)
EPSv 2.45sig (Pimmmrad)


DQ pic calc. versus DQ mesuré
-35
-30
-25
-20
-15
-10
-5
0
-20
-40
-60
-80
-100
-120
DQhcalc pic (e-3)
DQvcalc pic(e-3)
Around QH+QV=5

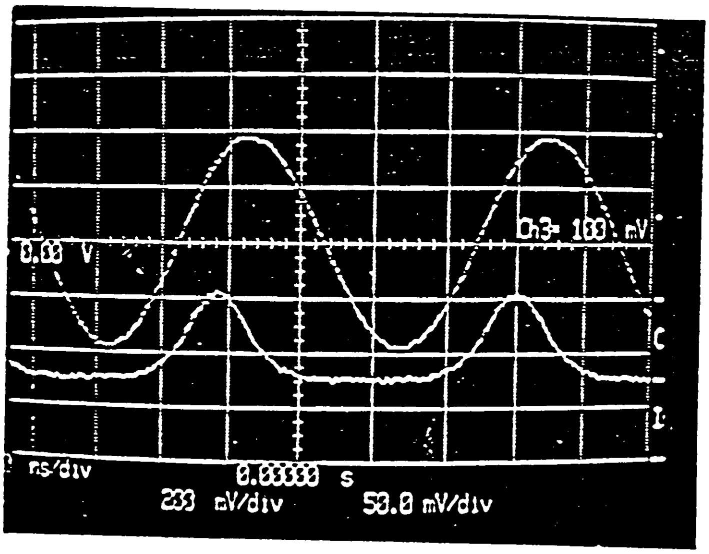

LEAR TUNE DIAGRAM
E-00
2.8
2.7
2.6
2.2
2.3
2.33
E-00
RESONANCE ORDER UP TO ORDER 4
ΔQmes
ΔQpic
ΔQmoyen
ΔQmoy = ΔQpic/2

310 MeV/c



- $2{,}6\ 10^9$ dans LEAR

VRF2 avec (40+5,7) db soit 200 V en commande :



- PU 14 db gain
- (40+5,7) en Volt (~200V)
- $1{,}8\ 10^{10}$ -

calib kick H21 Δ = (4.88 + 87.0) = 245 mV ||
Σ = (0,73 + 0,45) V = 1180 mV ||

kick 20 kV (lect · 18,6) soit 23 mm pp.

1,7 mrad.

Les plus importans sujets à traiter lors des séances de MD protons en mars/avril 94

Focalisation machine:

Mise en route et programmation du trimming dans le secteur 3(e-cool) permet de compenser le tune-shift du aux solénoides

Décélération à 105 MeV/c

Objectif, après optimisation de la compensation des solénoides,décélérer le maximum possible à 105 MeV/c([illegible]) pour pouvoir étudier les limites d'intensité à basse energie

Electron-cooling:

Mise en opération définitve du servo système de l'electron-cooling
Neutralisation du faisceau
Mesure des temps de cooling(si possible les faire à 105MeV/c)
Mesure avec un courant d'electron et un champ du solenoide fort (en vue du plomb)
Test e-cool avec solénoide en continu

Stochastic-cooling:

Réglages et mesures à toutes energies
Investigation fantôme

Damper:

Amélioration de la compensation des instabilités
Investigation pour un développement d'un damper à large bande

Résonance QH +QV = 5

sans solenoide
avec solenoide
effet sur Qshift et emittances
self-bunching par QH+QV =5

Qshift , emittances limites:

mesures
effet du point de fonctionnement

Extraction:

Fantôme,faire une extraction à 200 MeV/c avec p et pbar et investigation.
Amélioration du programme d'extraction

Mesure du profil du faisceau en BHN 20

Mesure de la force du cooling

Ligne de mesure E5

Mesures du flux à 200 et 105 MeV/c
Test focalisation

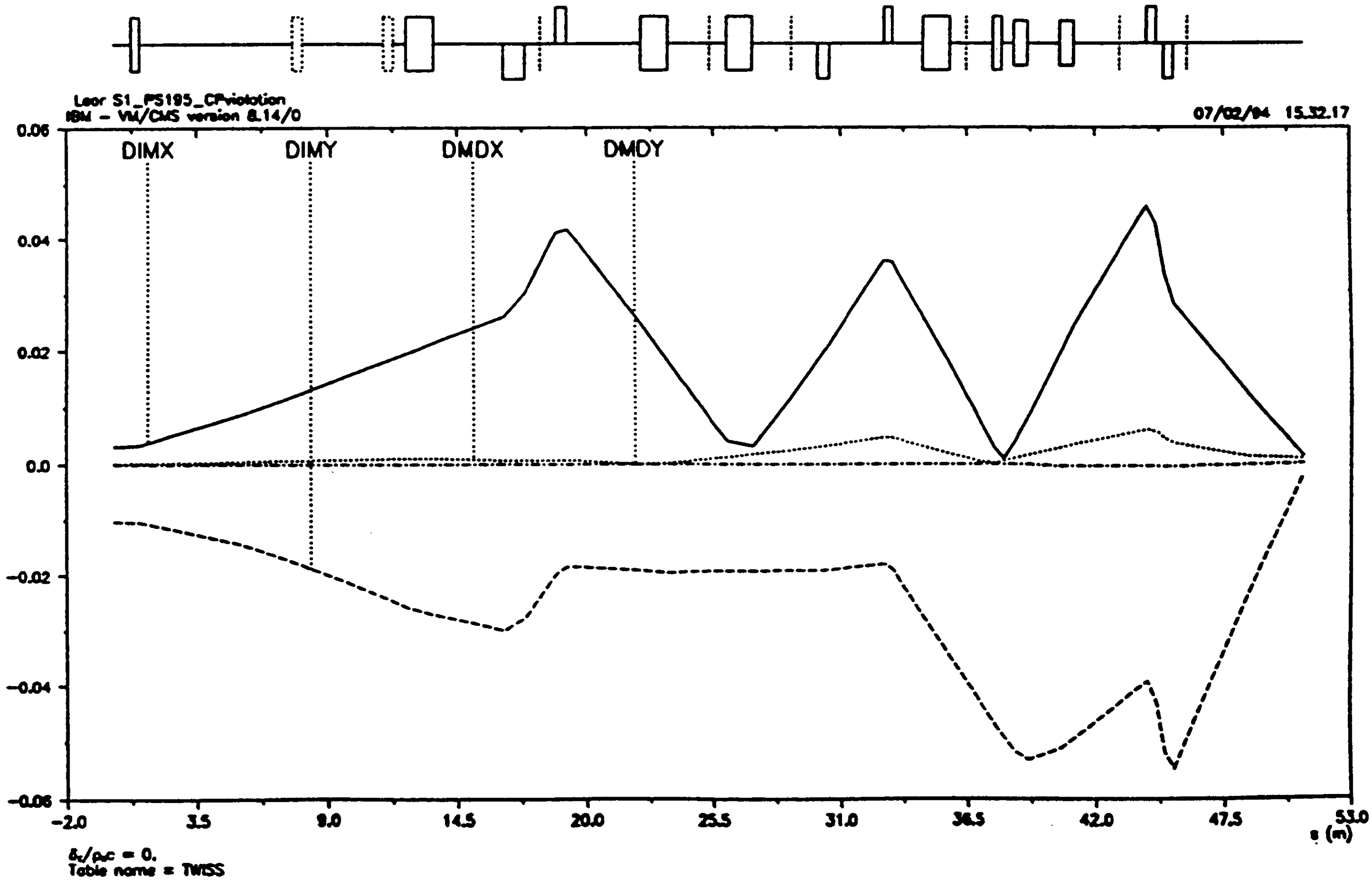
BTF mesures

S1 PS195 - CP violation

200 MeV/c 1E6 c/s

cible ∅ 70 → 25 mm

Solenoide ± ⇒ < 1 mrad



PS197

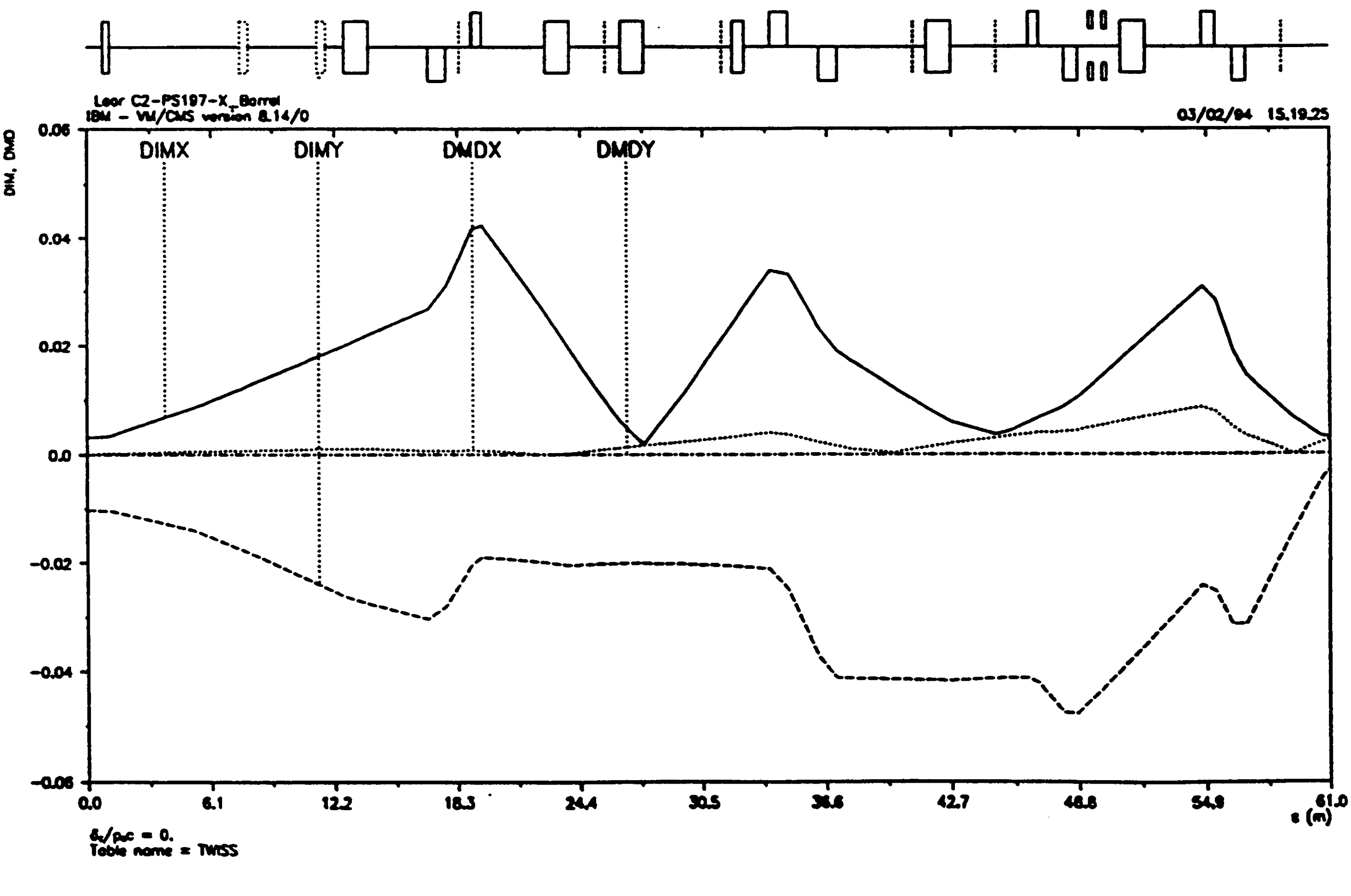
C2 PS197 - XBarrel

200 MeV/c ~ 1E5 c/s

105 MeV/c 5E4 c/s

cible Ø $16_{200} \rightarrow 20_{105}$ mm

fin de vide (1m) Ø 50 → 25 mm



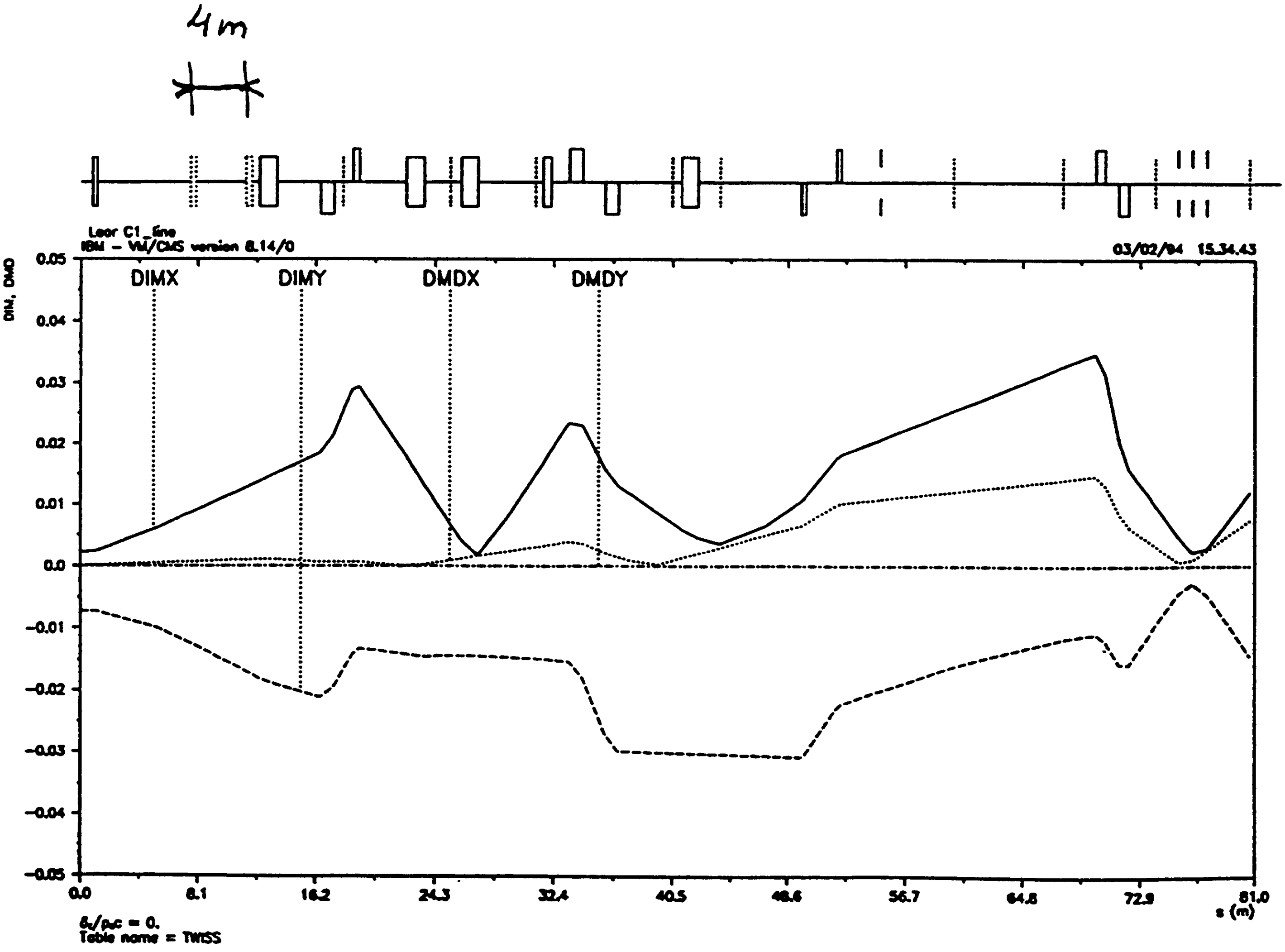
PS205

C1 PS205 Helium Trap

200 MeV/c

Slow 1E5 C/s

Fast 1E7 C/100ns

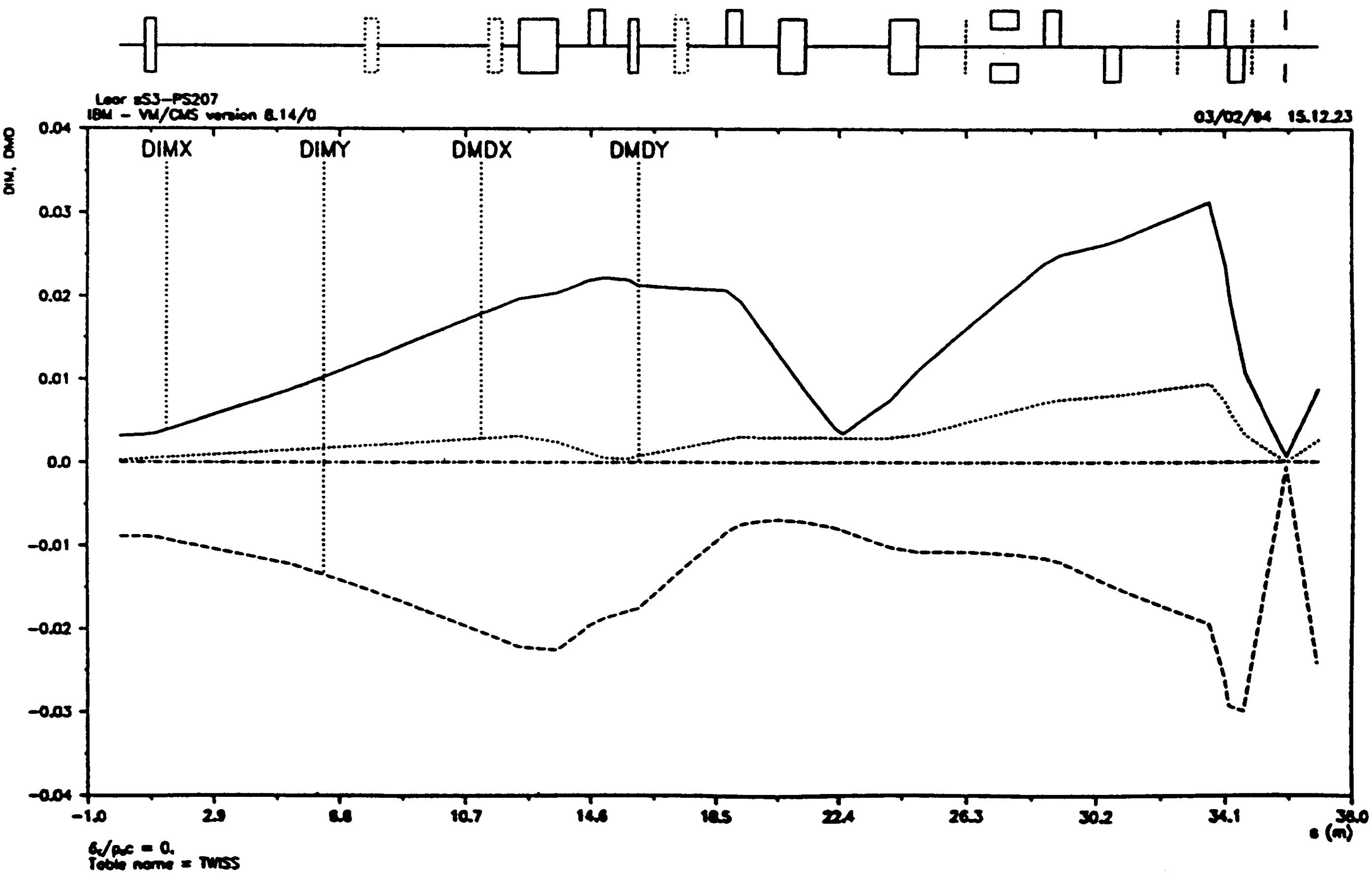


PS207

S3 PS207 - Lyman & Balmer transitions

105 MeV/c 1E9 c/25mn

fenêtre ø4mm ⇒ β_H = 80mm
β_V = 30 mm



PS208

C1 PS208 - Decay of hot nucleï

200 MeV/c < 5E3 c/s
(V collimateurs)

1945 MeV/c ≃ 5E5 c/s
(faisceau à (0,0) sur 20m)