PS/AA/BA/afm 6 September 1982

AA LONG TERM NOTE No. 17

Summary of the meeting of August 31, 1982

Present : B. Autin, R. Billinge, R. Brown, V. Chohan, W. Hardt, R. Johnson, E. Jones, H. Koziol, C. Metzger, G. Nassibian, K.H. Schindl, J.C. Schnuriger, R. Sherwood, A. Sullivan, H.H. Umstätter, S. van der Meer, E.J.N. Wilson

Topic : Lattice of the Antiproton Collector, by S.X. Fang

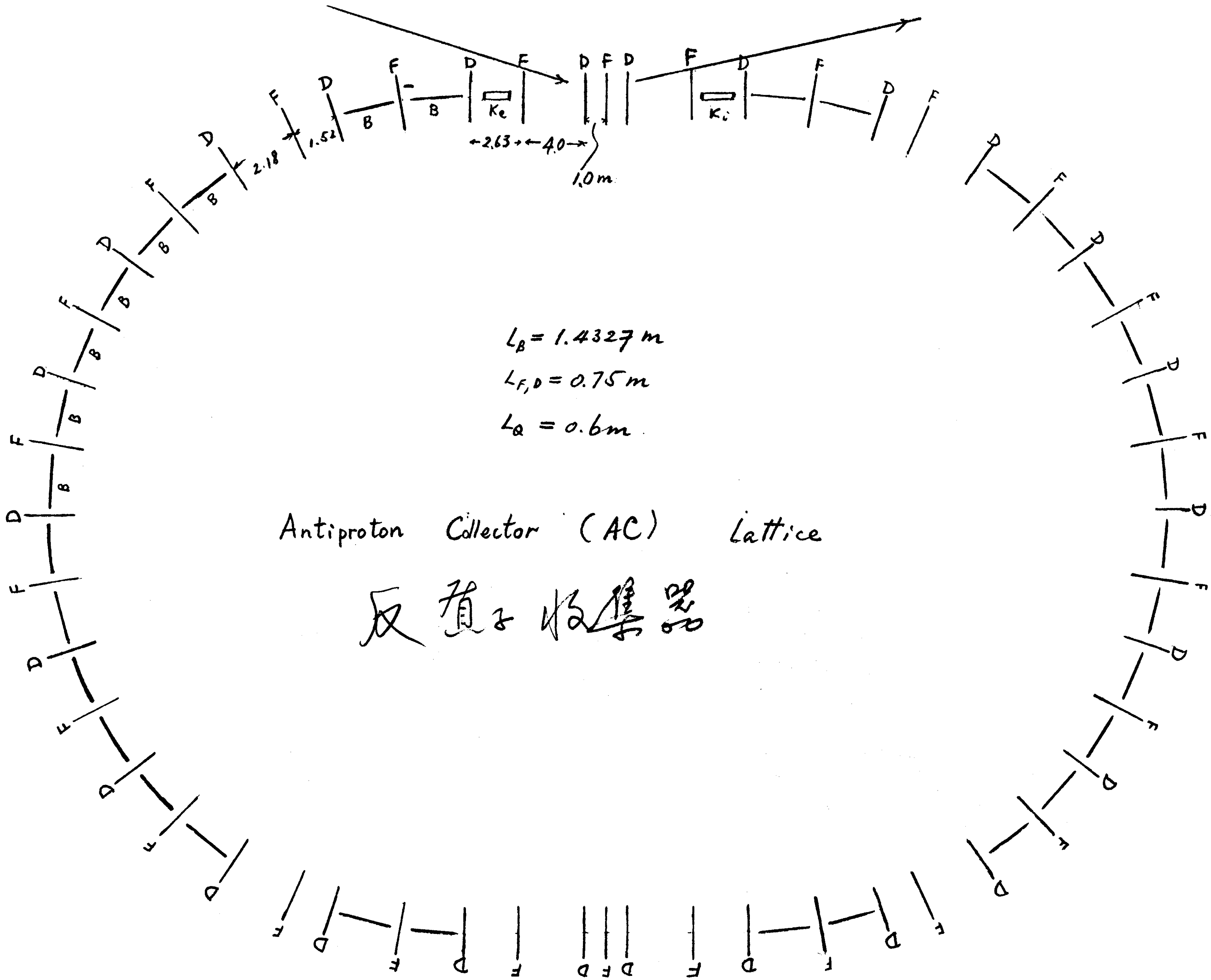
The lattice of the Antiproton Collector (AC) has a focusing structure which varies with time in order to cope with two regines of operation.

During the "bunch rotation" regime, the dispersion in revolution frequency η is small in order to maintain the RF voltage low. This situation is maintained during a quarter of the synchrotron period and, for simplicity, corresponds to $\eta = 0$ in the following but it is obvious that η can be adjusted to any finite value in practice.

Once the beam is debunched, the quadrupole currents are varied in one half of the ring to reach the "cooling" regime. Under these conditions, the half ring which is still in its initial state is isochronous and the signal picked-up by the cooling electrodes is transmitted without alteration to the cooling kickers. In contrast, in the other half ring the dispersion in particle time of flight is high, it corresponds to an η value of 0.1 and the population of the beam sample sensed by the pick-ups is fastly renewed at each turn.

The attached copies of transparencies describe the properties of the proposed AC ring.

B. Autin

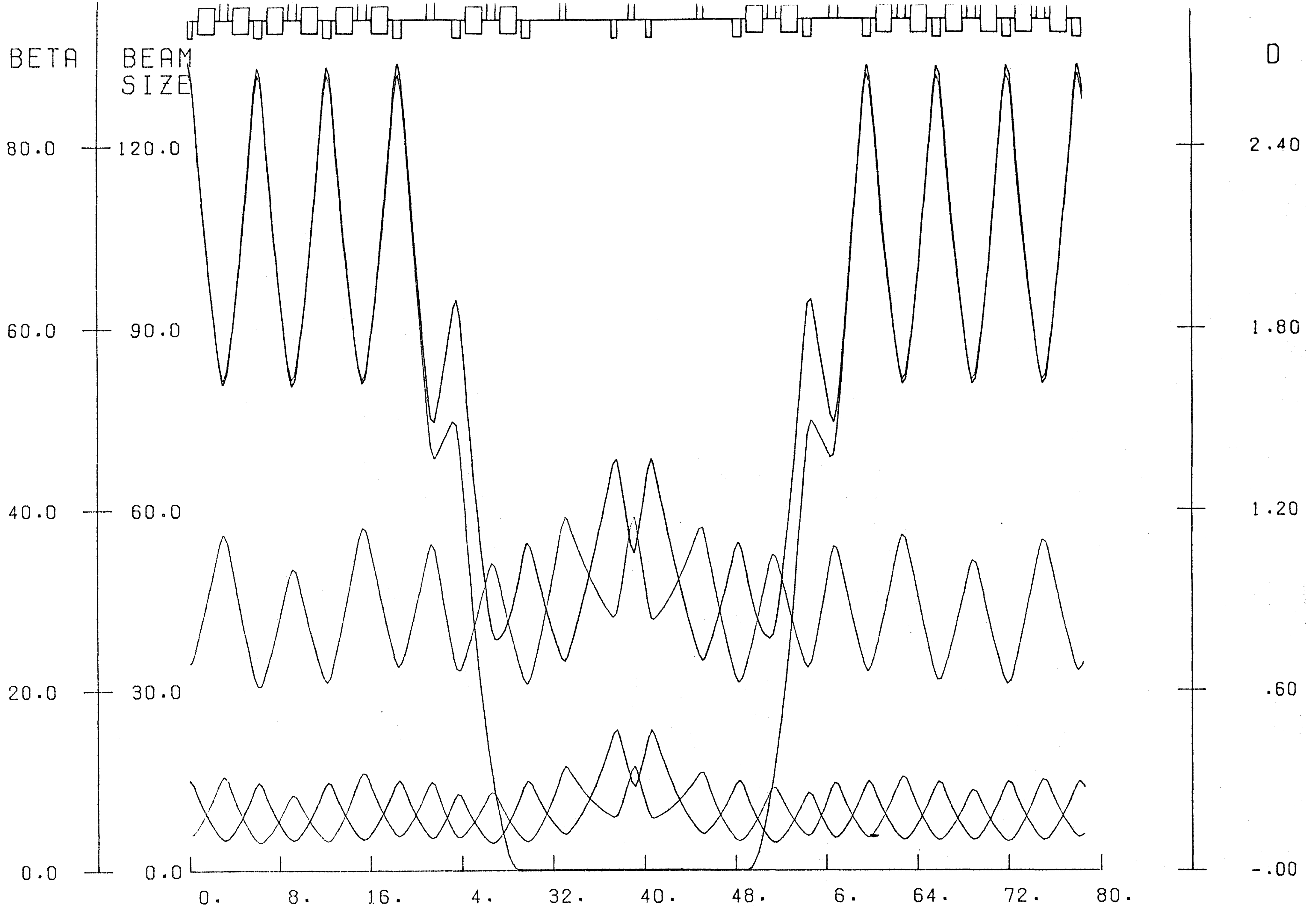


D F D
F D F
D F
B
Ke
Ki
←2.63→←4.0→
1.0m
2.18
1.52
$L_B = 1.4327\ m$
$L_{F,D} = 0.75\ m$
$L_Q = 0.6m$
Antiproton Collector (AC) lattice
反质子收集器

Main Lattice parameters of AC ring

T	3.5 GeV (γ = 3.862)
$B\rho$	11.675 Tm
$C = 2\pi R$	156.49 (PS/4)
Acceptance	
$\Delta p/p$	±3% (initial), ±0.75% (Final)
ε_x	~ 300 π mm. mrad
ε_z	
number of nor. cell	20
length of nor. cell	6.1665 m
number of bending M.	32
length of B's	1.4327 m
number of quad's	52
length of Q's	0.75 m (nor. cell), 0.60 m (straight section)
bending angle	0.19635 rad
field strength	1.6 T
½ gap height of B	~6.5 cm (see beam size)
½ good field width	~12 cm. (see beam size)
μ_x, μ_z	~60°

	Initial	Final
eta η	0.0	0.1 (left) 0.0 (right)
Q_x	4.31	4.30
Q_z	4.28	4.33
D_{max}	2.64 m.	9.454 m
$\beta_{H\,max}$	15.23 m	25.04 m
$\beta_{V\,max}$	11.34 m	14.14 m
ξ_H (natural)	−1.168	−1.41
ξ_V (")	−0.96	−1.068



BETA
BEAM SIZE
D
80.0
60.0
40.0
20.0
0.0
120.0
90.0
60.0
30.0
0.0
2.40
1.80
1.20
.60
-.00
0.
8.
16.
4.
32.
40.
48.
6.
64.
72.
80.

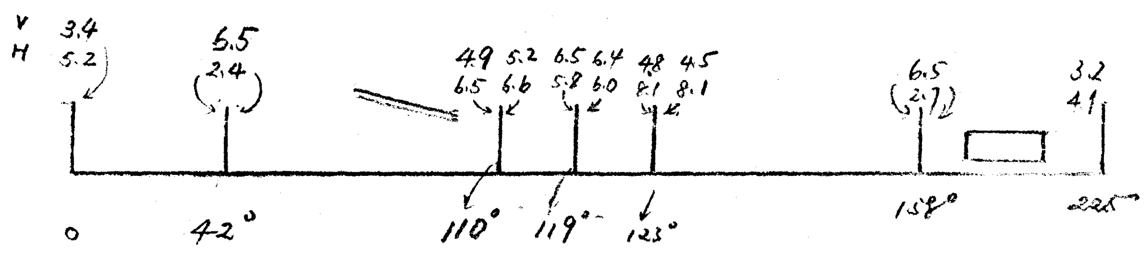
Beam size in differents elements & gradient in Q's

	Initial	Final		Gradient Initial	Gradient Final
B_1	11.9 x 5.2 cm²	10.7 x 4.6			
B_2	11.9 x 5.2	10.9 x 5.4			
B_3	11.9 x 4.5	11.3 x 6.2	12 x 6.5		
B_4	11.9 x 4.5	12.0 x 5.7			
B_5	11.9 x 5.2	8.7 x 3.8			
B_6	11.9 x 5.2	8.5 x 3.5			
B_7	8.0 x 4.7	6.0 x 4.8	8 x 5		
B_8	5.2 x 4.6	2.4 x 3.3			
D_1	13.5 x 3.6	12.0 x 2.0		−5.66 T/m	−5.25
D_2	12.9 x 3.3	11.9 x 4.5	~14 x 4.8	−5.66 T/m	−4.55
D_3	12.9 x 3.4	12.5 x 2.8		−5.66	−4.82
D_4	13.6 x 3.6	8.8 x 3.6		−5.7	−3.97
D_5	9.8 x 3.6	6.9 x 3.9		−6.1	−6.0
F_1	8.4 x 5.6	7.5 x 5.7		5.25	6.04
F	8.4 x 4.9	8.9 x 6.3	9 x 6.5	5.25	5.21
F_3	8.4 x 5.6	8.1 x 3.7		5.25	5.14
F_4	8.0 x 5.3	5.4 x 6.2		6.1	6.5
F_5	3.3 x 5.0	2.8 x 4.5	3.5 x 5	5.0	4.55
D_{10}	5.5 x 3.3	4.4 x 3.2		−5.4	−6.9
D_{20}	6.8 x 4.5	8.1 x 4.8	8.5 x 7.0	−7.53	−9.8
D_{30}	6.8 x 4.5	2.4 x 6.5		−7.47	−7.36
F_{10}	3.6 x 5.9	3.6 x 6.5		6.4	6.9
F_{20}	5.8 x 5.5	6.3 x 6.5		10.5	10.7
F_{30}	3.6 x 5.9	5.4 x 3.3		5.35	6.23

Beam size in differents elements & gradient in Q's

D → vertical
F.

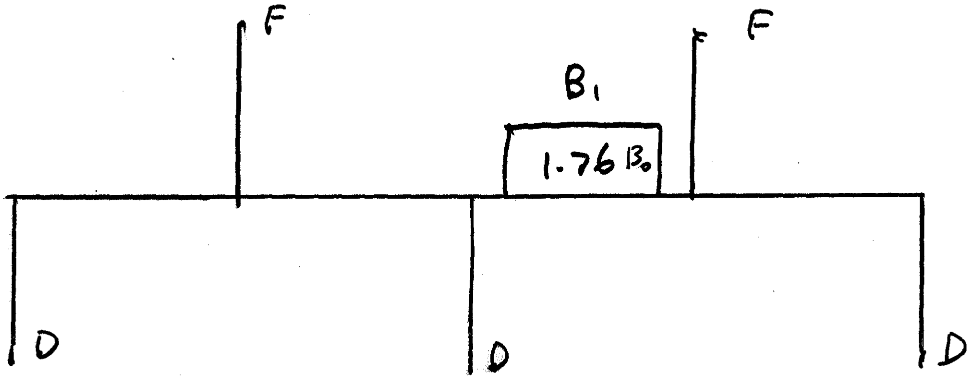
	Initial	Final		Gradient Initial	Gradient Final	
B_1	11.9×5.2 cm²	10.7×4.6				
B_2	11.9×5.2	10.9×5.4				
B_3	11.9×4.5	11.3×6.2	12×6.5			
B_4	11.9×4.5	12.0×5.7				
B_5	11.9×5.2	8.7×3.8				
B_6	11.9×5.2	8.5×3.5				
B_7	8.0×4.7	6.0×4.8	8×5			
B_8	5.2×4.6	2.4×3.3				
D_1	13.5×3.6	12.0×2.0		-5.66 T/m	-5.25	✓
D_2	12.9×3.3	11.9×4.5	~14×4.8	-5.66 T/m	-4.55	
D_3	12.9×3.4	12.5×2.8		-5.66	-4.82	
D_4	13.6×3.6	8.8×3.6		-5.7	-3.97	
D_5	9.8×3.6	6.9×3.9		-6.1	-6.0	✓
F_1	8.4×5.6	7.5×5.7		5.25	6.04	
F_2	8.4×4.9	8.9×6.3	9×6.5	5.25	5.21	✓
F_3	8.4×5.6	8.1×3.7		5.25	5.14	✓
F_4	8.0×5.3	5.4×6.2		6.1	6.5	
F_5	3.3×5.0	2.8×4.5	3.5×5	5.0	4.55	
D_{10}	5.5×3.3	4.4×3.2		-5.4	-6.9	
D_{20}	6.8×4.5	8.1×4.8	8.5×7.0	-7.53	-9.8	
D_{30}	6.8×4.5	2.4×6.5		-7.47	-7.36	
F_{10}	3.6×5.9	3.6×6.5		6.4	6.9	
F_{20}	5.8×5.5	6.3×6.5		10.5	10.7	✓
F_{30}	3.6×5.9	5.4×3.3		5.35	6.23	



Beam size in the injection and ejection region

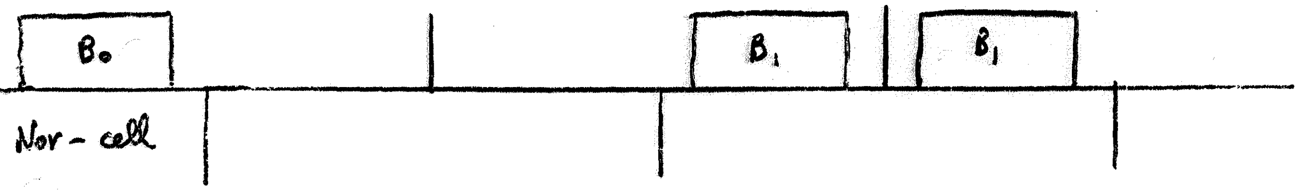
1. What is the AC Ring like?

2. Which lattice pattern is most suitable for us?



AA ring — As many straight as possible

AC Dynamical lattice. large acceptance in both direction.



to divide B_1 by two part in order to decrease the edd effect of B_1, meanwhile, decrease β_v modulation.

Three advantage for $\mu_x = 60°$

1) $B_1 = B_0$

2) The smallest β_v modulation [for large machine modulation = 0]

3) If one introduces some perturbation, it can easily limited in certain region.

If we introduce some pertubation ΔK

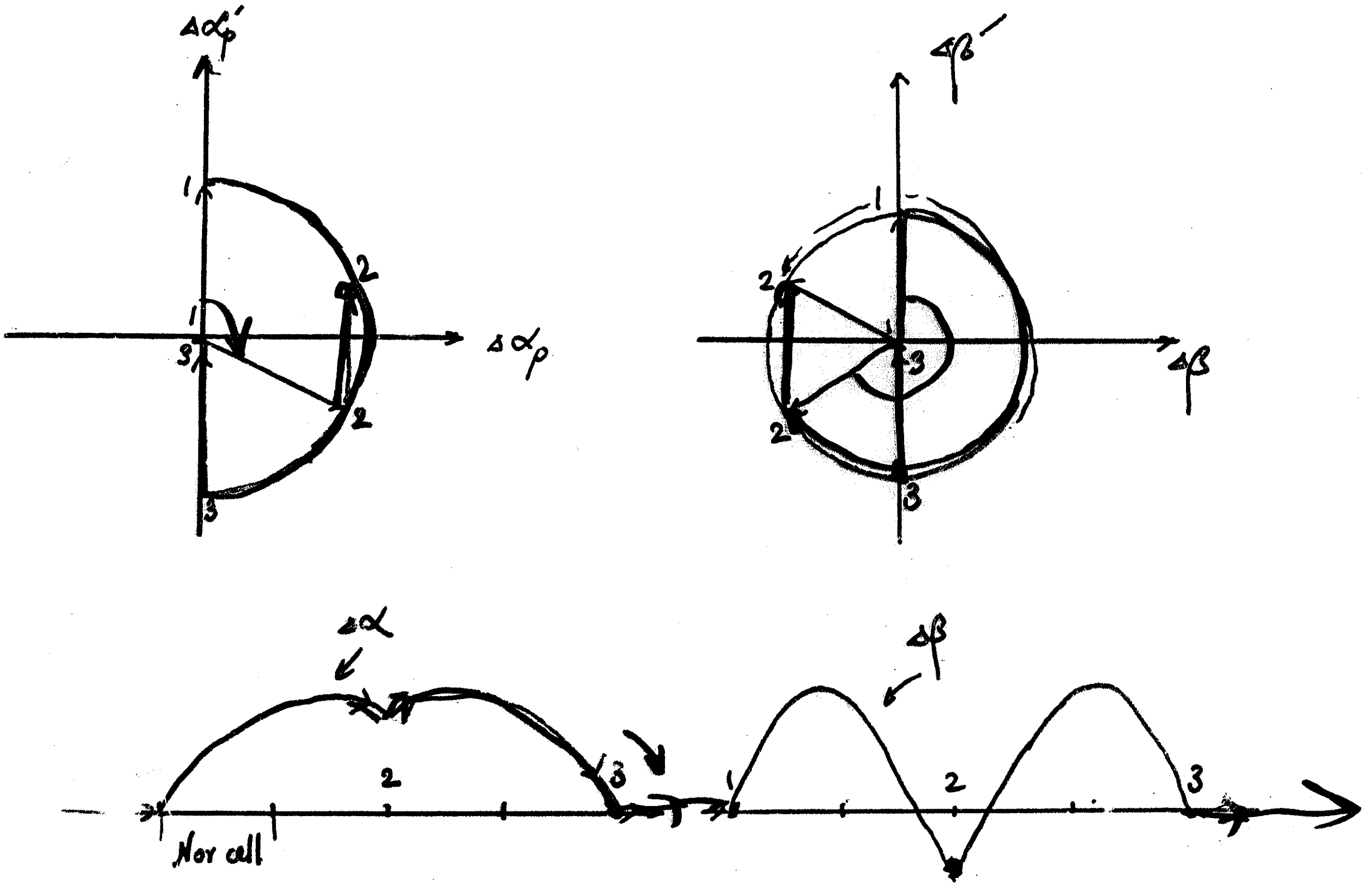
$\beta \to \beta_0 + \Delta\beta$ $\qquad\qquad$ $\alpha_p \to \alpha_{p0} + \Delta\alpha_p$

If $\Delta\beta \ll \beta_0$ $\qquad\qquad$ $\Delta\alpha_p \ll \alpha_{p0}$

Then
$$\frac{d^2}{d\phi^2}\left(\frac{\Delta\beta}{\beta_0}\right) + 4Q_0^2\left(\frac{\Delta\beta}{\beta_0}\right) = -2\Delta K\,(Q_0\beta_0)^2 \quad \text{——} ①$$
$$\frac{d^2}{d\phi^2}\left(\frac{\Delta\alpha_p}{\sqrt{\beta_0}}\right) + Q_0^2\left(\frac{\Delta\alpha_p}{\sqrt{\beta_0}}\right) = -\Delta K\,\alpha_{p0}\,Q_0^2\beta_0^{3/2} \quad \text{——} ②$$

Here $\phi = \int \frac{ds}{Q_0\beta_0}$

This means $\Delta\beta$, $\Delta\alpha_p$ will be a harmonic oscillation with frequency $2Q_0$ & Q_0.



Ouside 1 & 3 $\quad \frac{\Delta\alpha_p}{\Delta\beta} \equiv 0$

3. How to decide the parameters of a normal cell. 9

$\mu_H = 60°$ is more favorable, but we can not keep this value

$\because$ $\eta = 0 \rightarrow \overline{\alpha_p} = \frac{\bar{R}}{\gamma_T^2} = \frac{24.9}{(3.86)^2} = 1.67$

FODO lattice $\alpha_p \propto L_{cell} F_1(\mu)$

$\beta_H^V \propto L_{cell} F_H^V(\mu)$

μ between $60° \sim 90°$.

$L_{cell} = \frac{2\pi\bar{R} - L_{in}}{N}$ ← discrete number

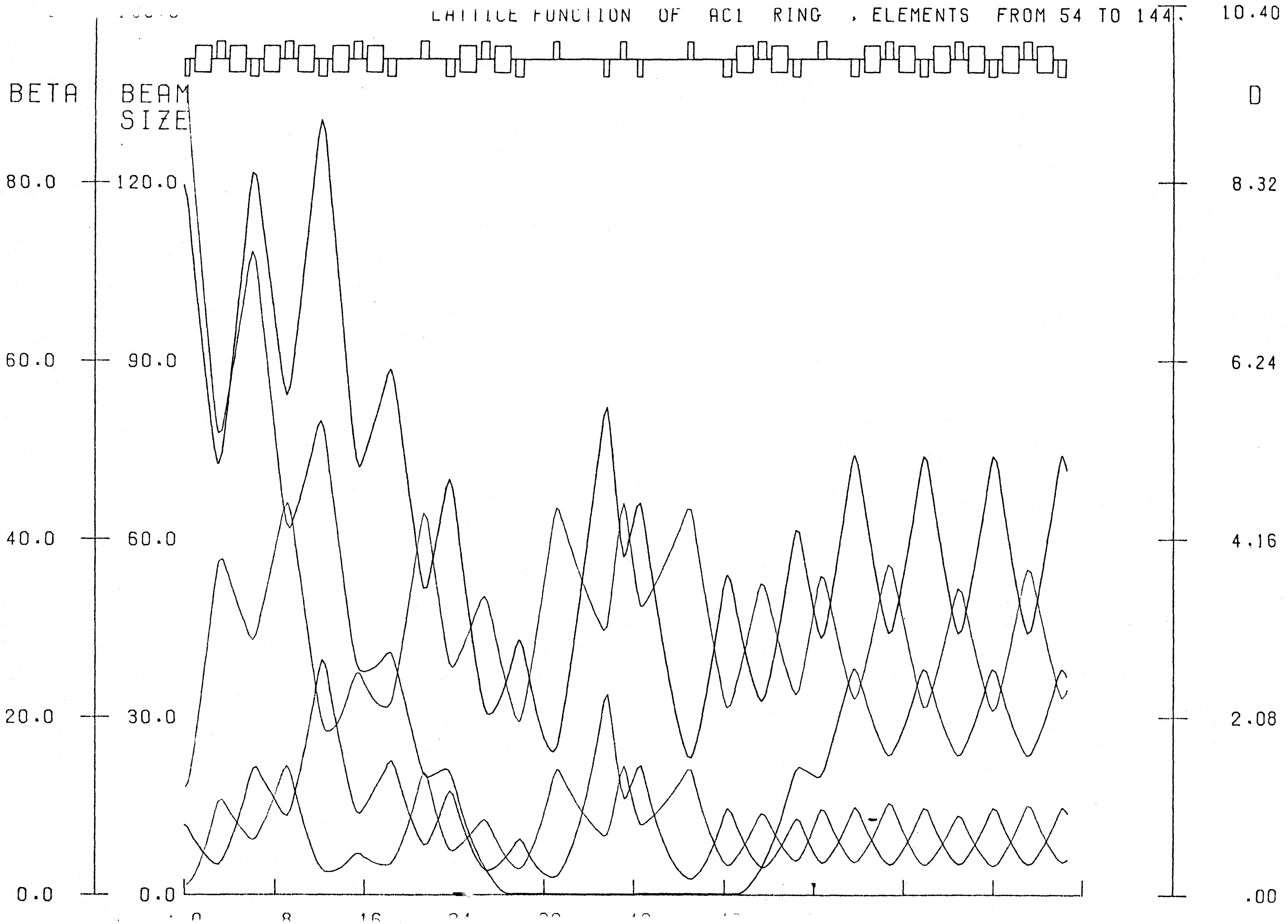
L_{in} ~ special, insertion for Q_H, Q_V match and for injection & ejection

$\therefore$ L_{cell} only can take some discreted value

$\therefore$ Once N is decided only way is to adjust μ. so as the $\overline{\alpha_p} = 1.67$.

$\therefore$ N must be choose in order to make μ as closed as possible to $60°$.

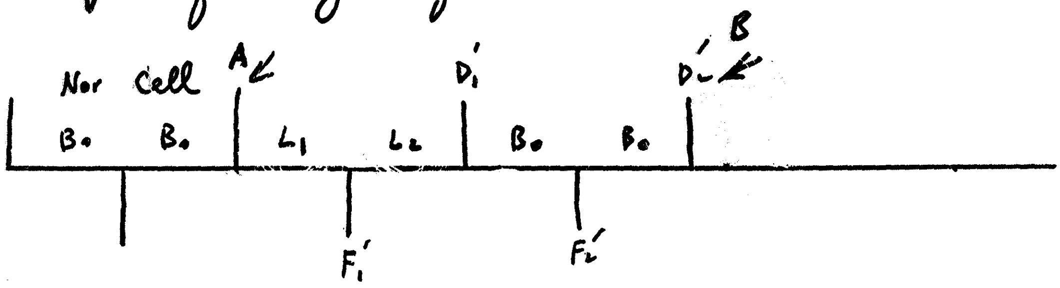
$N = \begin{matrix} 22 \\ 20 \\ 18 \end{matrix}$ ✓ $L_{cell} = 6.1654$ $\mu_H = 58.97°$ (0.1638)


LATTICE FUNCTION OF AC1 RING , ELEMENTS FROM 54 TO 144.
BETA
BEAM SIZE
D
80.0
60.0
40.0
20.0
0.0
120.0
90.0
60.0
30.0
0.0
10.40
8.32
6.24
4.16
2.08
.00

4. How to make dispersion suppressors

1) μ_H is little different from 60°

2) to decrease the β_V modulation caused by edge focusing further.



Using six variable $F_1' F_2' D_1' D_2' L_1, L_2$ to match six condition (From A → B)

$$\beta_{\substack{H\\V}B} = \beta_{\substack{H\\V}A}$$
$$\beta'_{\substack{H\\V}B} = \beta'_{\substack{H\\V}A}$$
$$\alpha_{p_B} = 0$$
$$\alpha'_{p_B} = 0$$

Fortunately $B_1 \equiv B_0$ (If μ is not far from 60°)

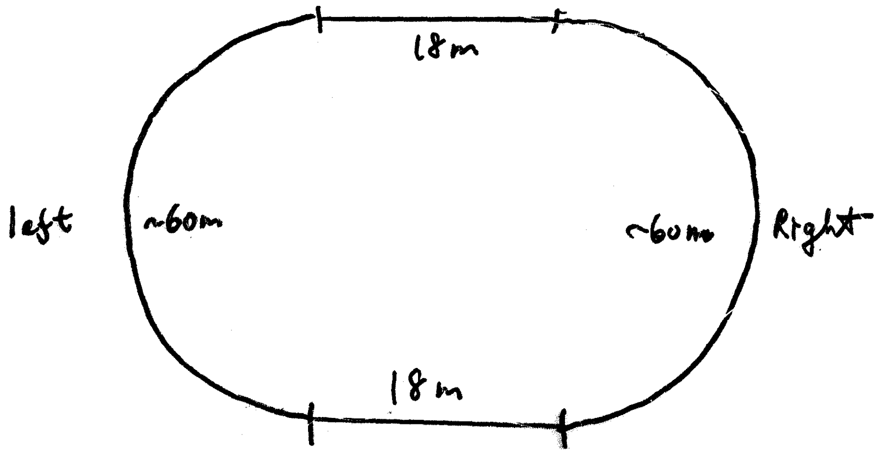
$L_2 = 2.18$ m $\quad F_1' = 0.524 \quad D_1' = -0.528 \quad$ (Nor cell

$L_1 = 1.52 \quad F_2' = 0.429 \quad D_2' = -0.462 \quad$ $F = 0.45$ $D = -0.485$)

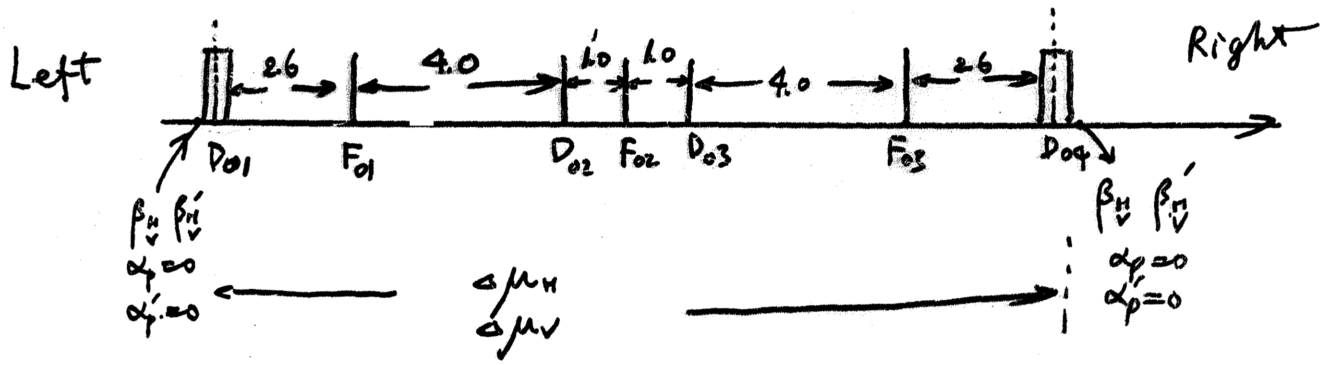
$\mu_V = 63.29°$ (0.1758)

$\Delta\beta_V \doteqdot 1$ m.

5. How to adjust the Q's value of whole ring.



Q_H, $Q_V \approx 4.30$



$\Delta\mu_H \approx 4.30 - 20 \times 0.1638 \approx 1.024$

$\Delta\mu_V \approx 4.30 - 20 \times 0.17$

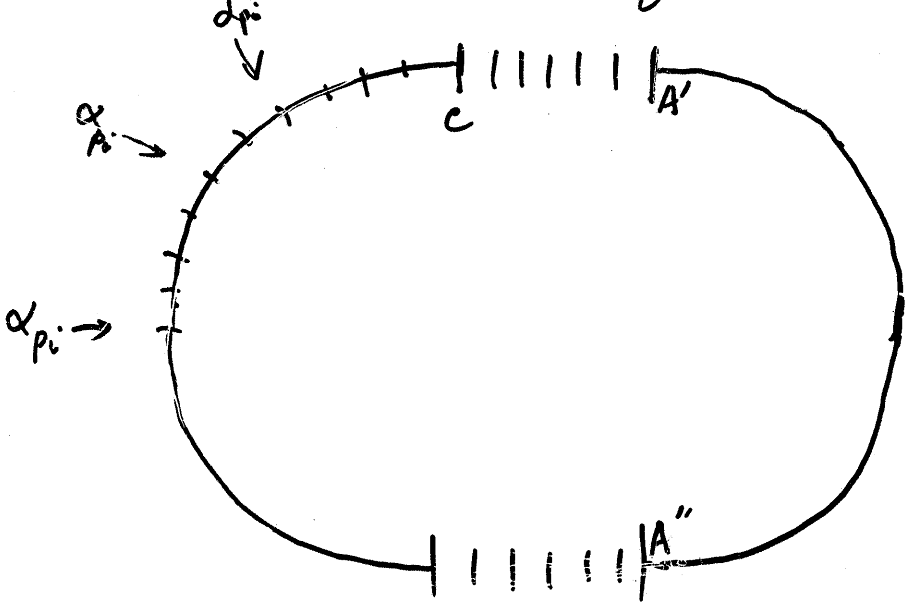
$\therefore$ for each period in insertion

$\Delta\mu_{H_1} \approx \frac{1}{6}\Delta\mu_H = 0.1707 \approx 61.45°$.

$\beta_H = 15.23$ $\beta_V = 11.34$.

Symmetric condition around the ring is distorted.

6. How to raise the η value in left side.



From A' to A"   matching condition

$$\beta_H|_{A'} = \beta_H|_{A''}$$
$$\beta_H'| = \beta_H'|$$
$$\beta_V = \beta_V$$
$$\beta_V' = \beta_V'$$
$$\alpha_p|_{A'} = \alpha_p|_{A''} = 0$$
$$\alpha_p'|_{A'} = \alpha_p'|_{A''}$$
$$\alpha_{p1} = 9.5\,m$$
$$\alpha_{p2} = 7.5\,m$$
$$\alpha_{p3} = 5.25\,m$$
$$\Delta\mu_H \doteq 2.15$$
$$\Delta\mu_V = 2.15$$
$$\alpha_c = 0$$
$$\alpha_c' = 0$$

β_H, β_V modulation as small as possible.

17 Q's as variable

AGS. Maximum variable 15.

$\bar{\alpha}_p \uparrow$ from (2) $\overline{-\Delta K \; \alpha_{p0} \, Q_0^2 \, \beta_{H0}^{3/2}} > 0$

$\therefore$ meanwhile $\Delta\mu_H \propto \Delta K \, \beta_{H0} < 0$

Final result

$\bar{\alpha} = 4.$ $\gamma_T = 2.49$ $\eta = 0.093$

11 Q_s' must change

6. Possible next steps improvement.

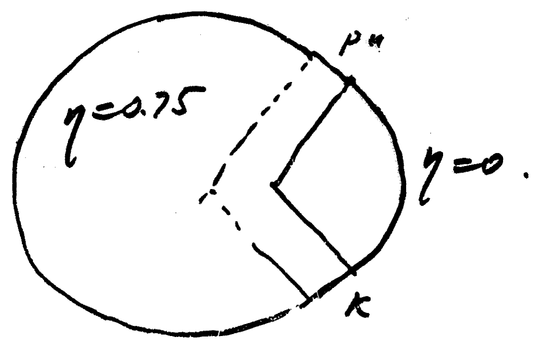
1) $Q_V - Q_H = 1$

2) $\beta_H \downarrow \; \beta_V \downarrow$

3) Chromaticity

Increase field strength is dispersion suppressors to 1.8 T (may also in nor. cell), in order to have space for sextupole arrangment (dynamic compensating chromaticity)

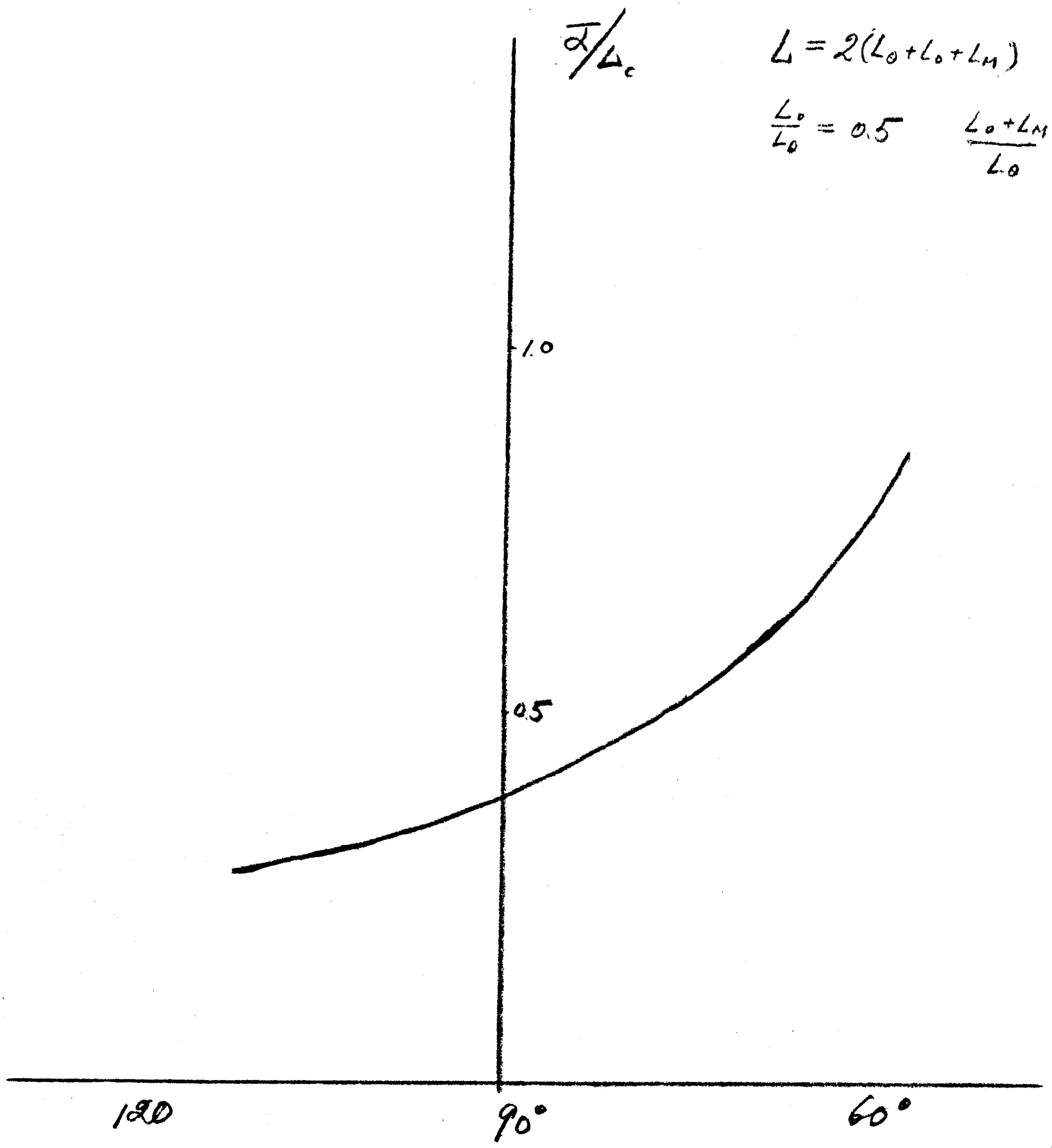
4. Increase the region of $\eta \neq 0$.

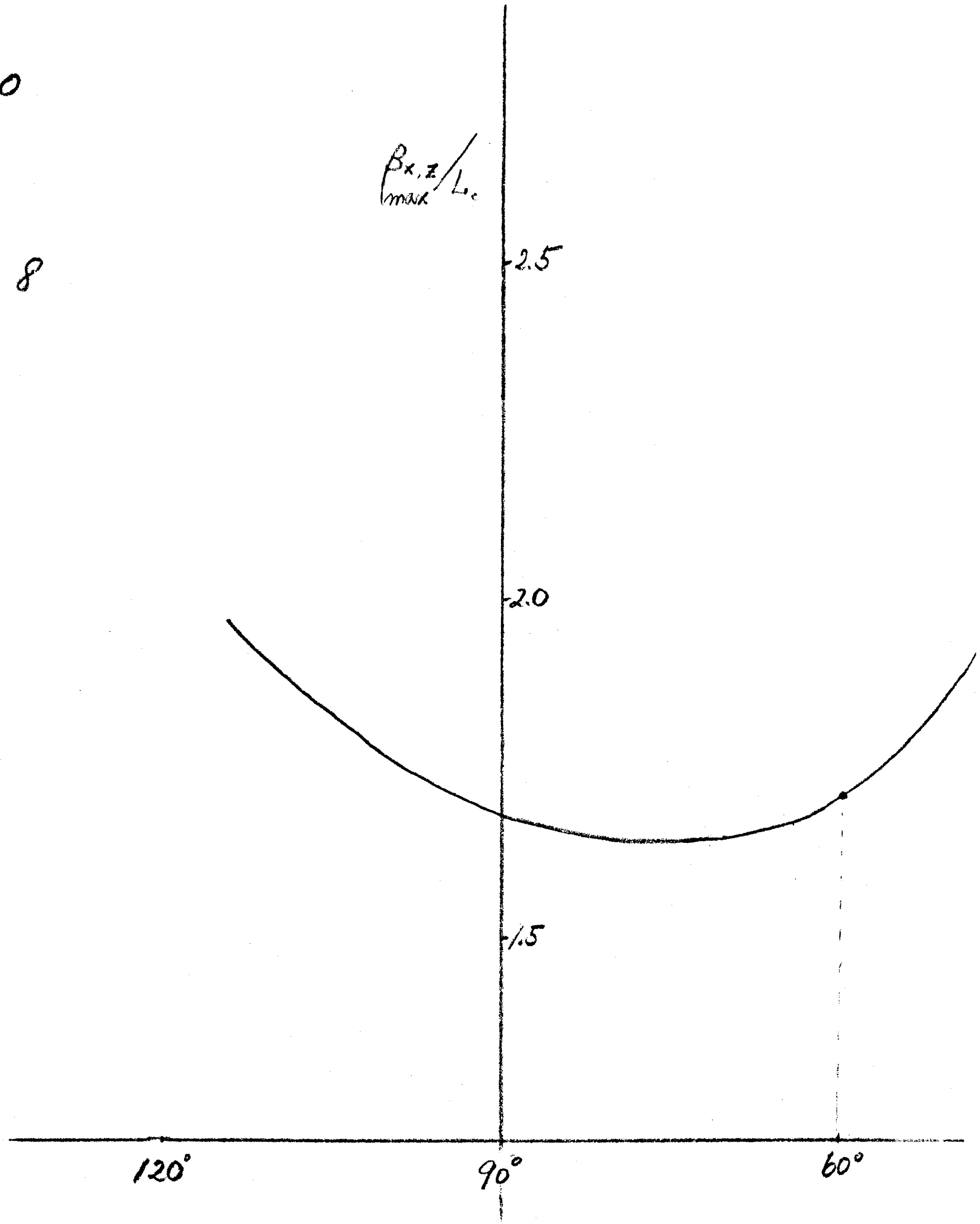


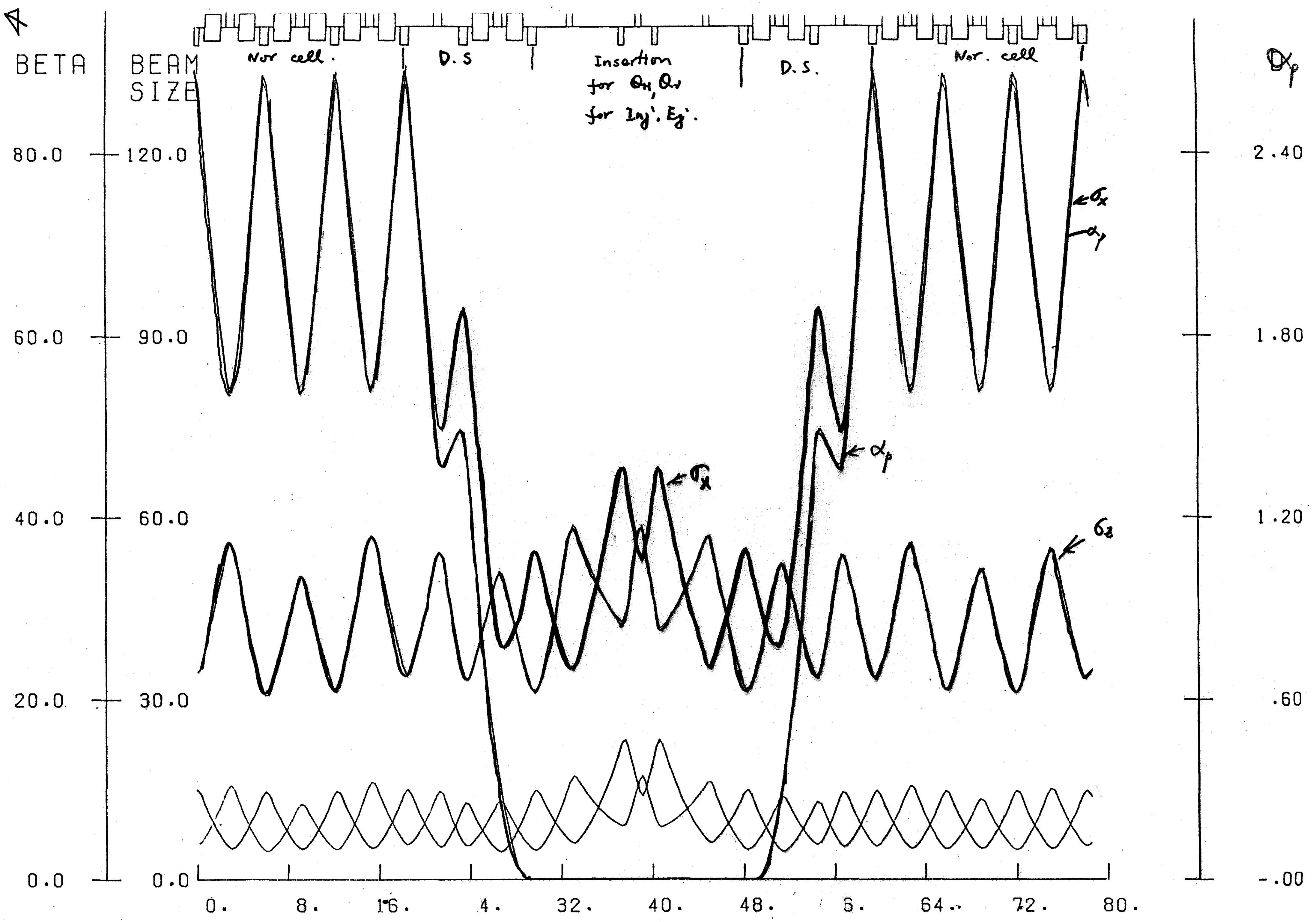
FODO

$L = 2(L_0 + L_0 + L_M)$

$\frac{L_0}{L_0} = 0.5 \qquad \frac{L_0 + L_M}{L_0} = 8$







BETA
BEAM SIZE
Nor cell.
D.S
Insertion for Q_H, Q_V for Inj'. Ej'.
D.S.
Nor. cell
α_p
80.0
60.0
40.0
20.0
0.0
120.0
90.0
60.0
30.0
0.0
2.40
1.80
1.20
.60
-.00
σ_x
α_p
σ_x
α_p
σ_z
0.
8.
16.
4.
32.
40.
48.
5.
64.
72.
80.

Initial state

SAA RING LATTICE TEST 20 AUG 1982   AGS VERSION 75.03   21/08/82 15.11.48

CIRCUMFERENCE = 156.49001   1 SUPERPERIODS   STRAIGHT MAGNETS   ALL VALUES AT EXIT OF ELEMENTS

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

NO ELEM	L(M)	DIST(M)	ANG(MR)	K(1/M2)	BETAV(M)	BETAH(M)	ALPHAV	ALPHAH	MUV/2PI	MUH/2PI	ALPHAP(M)	ALPHAP'
INITIAL		0.0000			3.50696	9.14905	.68905	-1.77174	0.00000	0.00000	.00013	.000075
1	.3750	.3750	0.00000	-.4584740	3.25910	9.90644	-.01394	-.20437	.01788	.00620	.00015	.000051
2	.3750	.7500	0.00000	-.4584740	3.52878	9.44260	-.72060	1.41458	.03571	.01231	.00017	.000023
3	2.6342	3.3842	0.00000	0.0000000	10.31265	4.19536	-1.85471	.57738	.10763	.08104	.00023	.000023
4	.5000	3.8842	0.00000	.5429974 (0.5461)	10.76913	4.24316	.98343	-.67728	.11501	.10037	.00025	.000088
5	4.0000	7.8842	0.00000	0.0000000	5.82431	15.16180	.25277	-2.05238	.19928	.18347	.00061	.000088
6	.5000	8.3842	0.00000	-.6410936 (0.662)	6.57624	14.78031	-1.83613	2.77416	.21250	.18864	.00060	-.000108
7	1.0000	9.3842	0.00000	0.0000000	10.91322	9.82033	-2.50085	2.18581	.23133	.20187	.00049	-.000108
8	.5000	9.8842	0.00000	.9000000	10.93280	9.83037	2.46467	-2.20738	.23835	.21028	.00049	.000110
9	1.0000	10.8842	0.00000	0.0000000	6.65055	14.84252	1.81757	-2.80476	.25705	.22347	.00060	.000110
10	.5000	11.3842	0.00000	-.6453132	5.93363	15.22821	-.30744	2.07532	.27008	.22862	.00061	-.000088
11	4.0000	15.3842	0.00000	0.0000000	11.34449	4.20155	-1.04528	.68134	.35113	.31197	.00025	-.000088
12	.5000	15.8842	0.00000	.5510232 (0.5461)	10.84811	4.15295	1.99204	-.57971	.35814	.33151	.00023	-.000023
13	2.6342	18.5184	0.00000	0.0000000	3.53118	9.43950	.78563	-1.42718	.42811	.40062	.00017	-.000023
14	.3750	18.8934	0.00000	-.4623419 (~0.463)	3.21650	9.90782	.07162	.20552	.44605	.40673	.00015	-.000051
15	.3750	19.2684	0.00000	-.4623419	3.41903	9.14441	-.62335	1.78591	.46429	.41293	.00013	-.000075
16	.4500	19.7184	0.00000	0.0000000	4.06229	7.62987	-.80611	1.57975	.48355	.42151	.00010	-.000075
17	1.4327	21.1511	196.34954	0.0000000	7.00623	4.05994	-1.20904	.92786	.52683	.46268	.14020	.196901
18	.4500	21.6011	0.00000	0.0000000	8.16552	3.31768	-1.36716	.72160	.53630	.48224	.22880	.196901
19	.7500	22.3511	0.00000	.4291005	8.26674	3.19908	1.24324	-.55094	.55027	.52075	.41066	.297778
20	.4500	22.8011	0.00000	0.0000000	7.21018	3.77744	1.10467	-.73431	.55955	.54141	.54466	.297778
21	1.4327	24.2339	196.34954	0.0000000	4.46262	6.69323	.77606	-1.31382	.60019	.58709	1.10874	.494689
22	.4500	24.6839	0.00000	0.0000000	3.83687	7.95815	.61449	-1.49710	.61753	.59691	1.33135	.494689
23	.7500	25.4339	0.00000	-.5287991	4.20297	7.84996	-1.15010	1.62676	.64896	.61129	1.49110	-.079300
24	1.5207	26.9546	0.00000	0.0000000	8.97889	3.97650	-1.99050	.92039	.68877	.65517	1.37051	-.079300
25	.7500	27.7046	0.00000	.5237674	9.29776	3.88752	1.60795	-.79032	.70121	.68725	1.51496	.473927
26	2.1807	29.8853	0.00000	0.0000000	4.11870	9.32171	.76701	-1.70163	.75853	.74625	2.54845	.473927
27	.3750	30.2603	0.00000	-.4846136	3.85955	9.97722	-.06029	-.00650	.77369	.75237	2.63782	-.000019
28	.3750	30.6353	0.00000	-.4846136	4.21331	9.33102	-.90440	1.69036	.78868	.75849	2.54844	-.473963
29	.4500	31.0853	0.00000	0.0000000	5.11465	7.89341	-1.09857	1.50434	.80414	.76684	2.33516	-.473963
30	1.4327	32.5180	196.34954	0.0000000	8.89232	4.44743	-1.48728	.91621	.83821	.80545	1.80051	-.277160
31	.4500	32.9680	0.00000	0.0000000	10.30402	3.70660	-1.64983	.73009	.84569	.82313	1.67579	-.277160
32	.7500	33.7180	0.00000	.4503946	10.17070	3.69095	1.81232	-.70749	.85687	.85704	1.67583	.277265
33	.4500	34.1680	0.00000	0.0000000	8.62491	4.41002	1.62275	-.89044	.86452	.87483	1.80060	.277265
34	1.4327	35.6008	196.34954	0.0000000	4.60002	7.76835	1.13233	-1.46854	.90105	.91393	2.33539	.474068
35	.4500	36.0508	0.00000	0.0000000	3.68138	9.17232	.90908	-1.65139	.91848	.92242	2.54872	.474068
36	.7500	36.8008	0.00000	-.4846136	3.45955	9.15047	-.58690	1.67783	.95376	.93487	2.54878	-.473934
37	.4500	37.2508	0.00000	0.0000000	4.06646	7.72485	-.76178	1.49021	.97290	.94340	2.33550	-.473934
38	1.4327	38.6835	196.34954	0.0000000	6.84971	4.32628	-1.14339	.89703	1.01666	.98300	1.80090	-.277131
39	.4500	39.1335	0.00000	0.0000000	7.94697	3.60342	-1.29497	.70932	1.02637	1.00117	1.67619	-.277131
40	.7500	39.8835	0.00000	.4503946	7.90263	3.59822	1.34901	-.70180	1.04082	1.03602	1.67630	.277440
41	.4500	40.3335	0.00000	0.0000000	6.76078	4.31383	1.18844	-.88846	1.05063	1.05424	1.80115	.277440
42	1.4327	41.7662	196.34954	0.0000000	3.89529	7.68325	.77301	-1.47831	1.09566	1.09400	2.33620	.474243
43	.4500	42.2162	0.00000	0.0000000	3.28263	9.09768	.58845	-1.66487	1.11574	1.10257	2.54961	.474243
44	.7500	42.9662	0.00000	-.4846136	3.46215	9.11536	-.84917	1.64348	1.15313	1.11511	2.54966	-.474089
45	.4500	43.4162	0.00000	0.0000000	4.32707	7.71845	-1.07288	1.46077	1.17167	1.12365	2.33632	-.474089
46	1.4327	44.8490	196.34954	0.0000000	8.19735	4.38160	-1.57637	.88312	1.21034	1.16301	1.80150	-.277286
47	.4500	45.2990	0.00000	0.0000000	9.70217	3.66905	-1.76768	.70032	1.21837	1.18091	1.67672	-.277286
48	.3750	45.6740	0.00000	.4503946	10.42954	3.41702	-.13087	-.01412	1.22424	1.19798	1.62502	.000080
49	.3750	46.0490	0.00000	.4503946	9.89028	3.69113	[illegible]	-.73221	[illegible]	[illegible]	[illegible]	[illegible]

51	1.4327	47.9317	196.34954	0.0000000	5.05322	7.89492	1.02524	-1.51128	1.27276	1.27140	2.33669	.474254
52	.4500	48.3817	0.00000	0.0000000	4.21270	9.33930	.84258	-1.69846	1.28831	1.27975	2.55011	.474254
53	.3750	48.7567	0.00000	-.4846136	3.90372	9.99109	-.00000	-.00000	1.30321	1.28586	2.63954	-.000000
54	.3750	49.1317	0.00000	-.4846136	4.21270	9.33930	-.84258	1.69846	1.31812	1.29197	2.55011	-.474254
55	.4500	49.5817	0.00000	0.0000000	5.05322	7.89492	-1.02524	1.51128	1.33367	1.30031	2.33669	-.474254
56	1.4327	51.0144	196.34954	0.0000000	8.57465	4.43439	-1.38522	.91949	1.36859	1.33898	1.80163	-.277451
57	.4500	51.4644	0.00000	0.0000000	9.89028	3.69113	-1.53840	.73221	1.37637	1.35672	1.67678	-.277451
58	.3750	51.8394	0.00000	.4503946	10.42954	3.41702	.13087	.01412	1.38219	1.37374	1.62502	-.000080
59	.3750	52.2144	0.00000	.4503946	9.70217	3.66905	1.76768	-.70032	1.38806	1.39080	1.67672	.277286
60	.4500	52.6644	0.00000	0.0000000	8.19735	4.38160	1.57637	-.88312	1.39609	1.40870	1.80150	.277286
61	1.4327	54.0972	196.34954	0.0000000	4.32707	7.71845	1.07288	-1.46077	1.43476	1.44806	2.33632	.474089
62	.4500	54.5472	0.00000	0.0000000	3.46215	9.11536	.84917	-1.64348	1.45330	1.45661	2.54966	.474089
63	.7500	55.2972	0.00000	-.4846136	3.28263	9.09768	-.58845	1.66487	1.49069	1.46914	2.54961	-.474243
64	.4500	55.7472	0.00000	0.0000000	3.89529	7.68325	-.77301	1.47831	1.51077	1.47771	2.33620	-.474243
65	1.4327	57.1799	196.34954	0.0000000	6.76078	4.31383	-1.18844	.88846	1.55580	1.51748	1.80115	-.277440
66	.4500	57.6299	0.00000	0.0000000	7.90263	3.59822	-1.34901	.70180	1.56561	1.53569	1.67630	-.277440
67	.7500	58.3799	0.00000	.4503946	7.94697	3.60342	1.29497	-.70932	1.58006	1.57054	1.67619	.277131
68	.4500	58.8299	0.00000	0.0000000	6.84971	4.32628	1.14339	-.89703	1.58977	1.58872	1.80090	.277131
69	1.4327	60.2627	196.34954	0.0000000	4.06646	7.72485	.76178	-1.49021	1.63353	1.62832	2.33550	.473934
70	.4500	60.7127	0.00000	0.0000000	3.45955	9.15047	.58690	-1.67783	1.65267	1.63684	2.54878	.473934
71	.7500	61.4627	0.00000	-.4846136	3.68138	9.17232	-.90908	1.65139	1.68794	1.64930	2.54872	-.474068
72	.4500	61.9127	0.00000	0.0000000	4.60002	7.76835	-1.13233	1.46854	1.70538	1.65779	2.33539	-.474068
73	1.4327	63.3454	196.34954	0.0000000	8.62491	4.41002	-1.62275	.89044	1.74191	1.69689	1.80060	-.277265
74	.4500	63.7954	0.00000	0.0000000	10.17070	3.69095	-1.81232	.70749	1.74956	1.71468	1.67583	-.277265
75	.7500	64.5454	0.00000	.4503946	10.30402	3.70660	1.64983	-.73009	1.76074	1.74858	1.67579	.277160
76	.4500	64.9954	0.00000	0.0000000	8.89232	4.44743	1.48728	-.91621	1.76822	1.76626	1.80051	.277160
77	1.4327	66.4281	196.34954	0.0000000	5.11465	7.89341	1.09857	-1.50434	1.80229	1.80488	2.33516	.473963
78	.4500	66.8781	0.00000	0.0000000	4.21331	9.33102	.90440	-1.69036	1.81775	1.81323	2.54844	.473963
79	.3750	67.2531	0.00000	-.4846136	3.85955	9.97722	.06029	.00650	1.83274	1.81934	2.63782	.000019
80	.3750	67.6281	0.00000	-.4846136	4.11870	9.32171	-.76701	1.70163	1.84790	1.82546	2.54845	-.473927
81	2.1807	69.8088	0.00000	0.0000000	9.29776	3.88752	-1.60795	.79032	1.90522	1.88446	1.51496	-.473927
82	.7500	70.5588	0.00000	.5237674	8.97889	3.97650	1.99050	-.92039	1.91766	1.91655	1.37051	.079300
83	1.5207	72.0795	0.00000	0.0000000	4.20297	7.84996	1.15010	-1.62676	1.95747	1.96042	1.49110	.079300
84	.7500	72.8295	0.00000	-.5287991	3.83687	7.95815	-.61449	1.49710	1.98890	1.97481	1.33135	-.494689
85	.4500	73.2795	0.00000	0.0000000	4.46262	6.69323	-.77606	1.31382	2.00624	1.98462	1.10874	-.494689
86	1.4327	74.7123	196.34954	0.0000000	7.21018	3.77744	-1.10467	.73431	2.04688	2.03031	.54466	-.297778
87	.4500	75.1623	0.00000	0.0000000	8.26674	3.19908	-1.24324	.55094	2.05616	2.05097	.41066	-.297778
88	.7500	75.9123	0.00000	.4291005	8.16552	3.31768	1.36716	-.72160	2.07013	2.08947	.22880	-.196901
89	.4500	76.3623	0.00000	0.0000000	7.00623	4.05994	1.20904	-.92786	2.07960	2.10904	.14020	-.196901
90	1.4327	77.7950	196.34954	0.0000000	4.06229	7.62987	.80611	-1.57975	2.12288	2.15020	.00010	.000075
91	.4500	78.2450	0.00000	0.0000000	3.41903	9.14441	.62335	-1.78591	2.14214	2.15878	.00013	.000075
92	.3750	78.6200	0.00000	-.4623419	3.21650	9.90782	-.07162	-.20552	2.16038	2.16499	.00015	.000051
93	.3750	78.9950	0.00000	-.4623419	3.53118	9.43950	-.78563	1.42718	2.17832	2.17109	.00017	.000023
94	2.6342	81.6292	0.00000	0.0000000	10.84811	4.15295	-1.99204	.57971	2.24829	2.24020	.00023	.000023
95	.5000	82.1292	0.00000	.5510232	11.34449	4.20155	1.04528	-.68134	2.25530	2.25974	.00025	.000088
96	4.0000	86.1292	0.00000	0.0000000	5.93363	15.22821	.30744	-2.07532	2.33635	2.34309	.00061	.000088
97	.5000	86.6292	0.00000	-.6453132	6.65055	14.84252	-1.81757	2.80476	2.34938	2.34824	.00060	-.000110
98	1.0000	87.6292	0.00000	0.0000000	10.93280	9.83037	-2.46467	2.20738	2.36808	2.36143	.00049	-.000110
99	.5000	88.1292	0.00000	.9000000	10.91322	9.82033	2.50085	-2.18581	2.37510	2.36984	.00049	.000108
100	1.0000	89.1292	0.00000	0.0000000	6.57624	14.78031	1.83613	-2.77416	2.39393	2.38307	.00060	.000108
101	.5000	89.6292	0.00000	-.6410936	5.82431	15.16180	-.25277	2.05238	2.40715	2.38825	.00061	-.000088
102	4.0000	93.6292	0.00000	0.0000000	10.76913	4.24316	-.98343	.67728	2.49142	2.47134	.00025	-.000088
103	.5000	94.1292	0.00000	.5429974	10.31265	4.19536	1.85471	-.57738	2.49880	2.49068	.00023	-.000023
104	2.6342	96.7634	0.00000	0.0000000	3.52878	9.44260	.72060	-1.41458	2.57072	2.55940	.00017	-.000023
105	.3750	97.1384	0.00000	-.4584740	3.25910	9.90644	.01394	.20437	2.58855	2.56551	.00015	-.000051
106	.3750	97.5134	0.00000	-.4584740	3.50696	9.14905	-.68905	1.77174	2.60643	2.57171	.00013	-.000075
107	.4500	97.9634	0.00000	0.0000000	4.21226	7.64610	-.87828	1.56816	2.62511	2.58028	.00009	-.000075
108	1.4327	99.3961	196.34954	0.0000000	7.38286	4.09752	-1.29202	.92446	2.66646	2.62121	.14019	.196902
109	.4500	99.8461	0.00000	0.0000000	8.61889	3.35717	-1.45472	.72078	2.67544	2.64057	.22880	.196902
110	.7500	100.5961	0.00000	.4291005	8.73570	3.24683	1.31172	-.56202	2.68867	2.67855	.41066	.297779
111	.4500	101.0461	0.00000	0.0000000	7.61821	3.83472	1.17158	-.74439	2.69745	2.69890	.54466	.297779
112	1.4327	102.4789	196.34954	0.0000000	4.67423	6.77475	.84361	-1.32077	2.73604	2.74395	1.10874	.494690
113	.4500	102.9289	0.00000	0.0000000	3.98913	8.04548	.67882	-1.50306	2.75266	2.75366	1.33135	.494690

116	.7500	105.9496	0.00000	.5237674	9.16555	3.86886	1.63804	-.77226	2.83521	2.84370	1.51497	.473928
117	-2.1807	108.1303	0.00000	0.0000000	3.93240	9.19920	.76173	-1.67207	2.89438	2.90326	2.54846	.473928
118	.3750	108.5053	0.00000	-.4846136	3.66673	9.84097	-.03725	-.000[illegible]	2.91030	2.90946	2.63782	-.000019
119	.3750	108.8803	0.00000	-.4846136	3.99085	9.19957	-.84662	1.671[illegible]	2.92610	2.91566	2.54844	-.473964
120	.4500	109.3303	0.00000	0.0000000	4.83992	7.77862	-1.04020	1.48603	2.94243	2.92413	2.33516	-.473964
121	1.4327	110.7630	196.34954	0.0000000	8.46138	4.38287	-1.43872	.89923	2.97837	2.96333	1.80051	-.277160
122	.4500	111.2130	0.00000	0.0000000	9.82970	3.65713	-1.60199	.71354	2.98622	2.98126	1.67579	-.277160
123	.7500	111.9630	0.00000	.4503946	9.74732	3.65652	1.70239	-.71266	2.99792	3.01556	1.67583	.277265
124	.4500	112.4130	0.00000	0.0000000	8.29616	4.38141	1.52242	-.89823	3.00589	3.03349	1.80060	.277265
125	1.4327	113.8458	196.34954	0.0000000	4.52195	7.77375	1.06106	-1.48464	3.04346	3.07271	2.33539	.474069
126	.4500	114.2958	0.00000	0.0000000	3.66219	9.19339	.84951	-1.67012	3.06110	3.08118	2.54873	.474069
127	.7500	115.0458	0.00000	-.4846136	3.52513	9.19254	-.65045	1.67114	3.09613	3.09360	2.54878	-.473935
128	.4500	115.4958	0.00000	0.0000000	4.19228	7.77206	-.83211	1.48548	3.11481	3.10208	2.33551	-.473935
129	1.4327	116.9285	196.34954	0.0000000	7.19932	4.37816	-1.22624	.89849	3.15680	3.14131	1.80090	-.277131
130	.4500	117.3785	0.00000	0.0000000	8.37335	3.65311	-1.38273	.71273	3.16603	3.15926	1.67619	-.277131
131	.7500	118.1285	0.00000	.4503946	8.34596	3.65291	1.41613	-.71244	3.17973	3.19360	1.67630	.277439
132	.4500	118.5785	0.00000	0.0000000	7.14436	4.37767	1.25408	-.89815	3.18901	3.21155	1.80115	.277439
133	1.4327	120.0112	196.34954	0.0000000	4.08652	7.77044	.83905	-1.48502	3.23172	3.25079	2.33620	.474242
134	.4500	120.4612	0.00000	0.0000000	3.41581	9.19048	.65141	-1.67064	3.25094	3.25927	2.54961	.474242
135	.7500	121.2112	0.00000	-.4846136	3.52673	9.19117	-.81250	1.66981	3.28723	3.27169	2.54966	-.474089
136	.4500	121.6612	0.00000	0.0000000	4.35330	7.77181	-1.02433	1.48433	3.30555	3.28016	2.33632	-.474089
137	1.4327	123.0940	196.34954	0.0000000	8.03198	4.38031	-1.49376	.89794	3.34450	3.31939	1.80150	-.277286
138	.4500	123.5440	0.00000	0.0000000	9.45783	3.65566	-1.67480	.71238	3.35272	3.33733	1.67672	-.277286
139	.7500	124.2940	0.00000	.4503946	9.57407	3.65652	1.53314	-.71362	3.36475	3.37164	1.67678	.277450
140	.4500	124.7440	0.00000	0.0000000	8.26510	4.38236	1.37566	-.89936	3.37280	3.38957	1.80163	.277450
141	1.4327	126.1767	196.34954	0.0000000	4.80197	7.77868	.99489	-1.48630	3.40932	3.42877	2.33669	.474254
142	.4500	126.6267	0.00000	0.0000000	3.99047	9.19989	.80842	-1.67195	3.42571	3.43724	2.55011	.474254
143	.3750	127.0017	0.00000	-.4846136	3.69402	9.84151	-.00000	.00000	3.44146	3.44344	2.63954	-.000000
144	.3750	127.3767	0.00000	-.4846136	3.99047	9.19989	-.80842	1.67195	3.45720	3.44964	2.55011	-.474254
145	.4500	127.8267	0.00000	0.0000000	4.80197	7.77868	-.99489	1.48630	3.47359	3.45811	2.33669	-.474254
146	1.4327	129.2594	196.34954	0.0000000	8.26510	4.38236	-1.37566	.89936	3.51011	3.49731	1.80163	-.277450
147	.4500	129.7094	0.00000	0.0000000	9.57407	3.65652	-1.53314	.71362	3.51816	3.51524	1.67678	-.277450
148	.7500	130.4594	0.00000	.4503946	9.45783	3.65566	1.67480	-.71238	3.53020	3.54955	1.67672	.277286
149	.4500	130.9094	0.00000	0.0000000	8.03198	4.38031	1.49376	-.89794	3.53842	3.56749	1.80150	.277286
150	1.4327	132.3422	196.34954	0.0000000	4.35330	7.77181	1.02433	-1.48433	3.57737	3.60671	2.33632	.474089
151	.4500	132.7922	0.00000	0.0000000	3.52673	9.19117	.81250	-1.66981	3.59569	3.61519	2.54966	.474089
152	.7500	133.5422	0.00000	-.4846136	3.41581	9.19048	-.65141	1.67064	3.63198	3.62761	2.54961	-.474242
153	.4500	133.9922	0.00000	0.0000000	4.08652	7.77044	-.83905	1.48502	3.65119	3.63609	2.33620	-.474242
154	1.4327	135.4249	196.34954	0.0000000	7.14436	4.37767	-1.25408	.89815	3.69390	3.67533	1.80115	-.277439
155	.4500	135.8749	0.00000	0.0000000	8.34596	3.65291	-1.41613	.71244	3.70318	3.69328	1.67630	-.277439
156	.7500	136.6249	0.00000	.4503946	8.37335	3.65311	1.38273	-.71273	3.71688	3.72762	1.67619	.277131
157	.4500	137.0749	0.00000	0.0000000	7.19932	4.37816	1.22624	-.89849	3.72611	3.74556	1.80090	.277131
158	1.4327	138.5077	196.34954	0.0000000	4.19228	7.77206	.83211	-1.48548	3.76811	3.78480	2.33551	.473935
159	.4500	138.9577	0.00000	0.0000000	3.52513	9.19254	.65045	-1.67114	3.78678	3.79328	2.54878	.473935
160	.7500	139.7077	0.00000	-.4846136	3.66219	9.19339	-.84951	1.67012	3.82181	3.80569	2.54873	-.474069
161	.4500	140.1577	0.00000	0.0000000	4.52195	7.77375	-1.06106	1.48464	3.83945	3.81417	2.33539	-.474069
162	1.4327	141.5904	196.34954	0.0000000	8.29616	4.38141	-1.52242	.89823	3.87703	3.85339	1.80060	-.277265
163	.4500	142.0404	0.00000	0.0000000	9.74732	3.65652	-1.70239	.71266	3.88499	3.87132	1.67583	-.277265
164	.7500	142.7904	0.00000	.4503946	9.82970	3.65713	1.60199	-.71354	3.89669	3.90562	1.67579	.277160
165	.4500	143.2404	0.00000	0.0000000	8.46138	4.38287	1.43872	-.89923	3.90455	3.92355	1.80051	.277160
166	1.4327	144.6731	196.34954	0.0000000	4.83992	7.77862	1.04020	-1.48603	3.94048	3.96274	2.33516	.473964
167	.4500	145.1231	0.00000	0.0000000	3.99085	9.19957	.84662	-1.67163	3.95681	3.97122	2.54844	.473964
168	.3750	145.4981	0.00000	-.4846136	3.66673	9.84097	.03725	.00025	3.97261	3.97742	2.63782	.000019
169	.3750	145.8731	0.00000	-.4846136	3.93240	9.19920	-.76173	1.67207	3.98854	3.98362	2.54846	-.473928
170	2.1807	148.0538	0.00000	0.0000000	9.16555	3.86886	-1.63804	.77226	4.04770	4.04318	1.51497	-.473928
171	.7500	148.8038	0.00000	.5237674	8.92700	3.98124	1.92424	-.93653	4.06027	4.07533	1.37051	.079300
172	1.5207	150.3245	0.00000	0.0000000	4.29284	7.91993	1.12314	-1.65352	4.09977	4.11897	1.49110	.079300
173	.7500	151.0745	0.00000	-.5287991	3.98913	8.04548	-.67882	1.50306	4.13026	4.13322	1.33135	-.494690
174	.4500	151.5245	0.00000	0.0000000	4.67423	6.77475	-.84361	1.32077	4.14687	4.14292	1.10874	-.494690
175	1.4327	152.9573	196.34954	0.0000000	7.61821	3.83472	-1.17158	.74439	4.18546	4.18797	.54466	-.297779
176	.4500	153.4073	0.00000	0.0000000	8.73570	3.24683	-1.31172	.56202	4.19425	4.20833	.41066	-.297779
177	.7500	154.1573	0.00000	.4291005	8.61889	3.35717	1.45472	-.72078	4.20747	4.24631	.22880	-.196902
178	.4500	154.6073	0.00000	0.0000000	7.36285	4.09752	1.29202	-.92446	4.21645	4.26567	.14019	-.196902
179	1.4327	156.0400	196.34954	0.0000000	4.21226	7.64610	.87828	-1.56816	4.25781	4.30660	.00009	.000075
180	.4500	156.4900	0.00000	0.0000000	3.50696	9.14905	.68905	-1.77174	4.27648	4.31516	.00013	.000075

DP/P	COSMU(H)	Q(H)	QPRIME(H)	BETAMAX(H)	COSMU(V)	Q(V)	QPRIME(V)	BETAMAX(V)	XMAX(H)	GAMMA TR.
0.0000	-.39809	4.3152	-5.0381	15.2282	-.16564	4.2765	-4.0733	11.3445	2.6395	3.8971

DP/P = 0.0000 AVERAGE X = 0.0000 AVERAGE ALPHAP = 1.6400 - R.F. GAMMA TR. = 3.8971

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

TIME = .148 SECONDS

Final state

33 .450000 33.718013 0.00000000 0.00000000

SAA RING LATTICE TEST 20 AUG 1982 AGS VERSION 75.03 25/08/82 16.37.59

CIRCUMFERENCE = 156.49001 1 SUPERPERIODS STRAIGHT MAGNETS ALL VALUES AT EXIT OF ELEMENTS

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

NO	ELEM	L(M)	DIST(M)	ANG(MR)	K(1/M2)	BETAV(M)	BETAH(M)	ALPHAV	ALPHAH	MUV/2PI	MUH/2PI	ALPHAP(M)	ALPHAP'
INITIAL			0.0000			3.51400	9.14906	.69407	-1.77170	0.00000	0.00000	-.00258	-.000757
1		.3750	.3750	0.00000	-.5785943	3.31943	9.74440	-.16121	.22744	.01775	.00624	-.00275	-.000175
2		.3750	.7500	0.00000	-.5785943	3.76915	8.82612	-1.07039	2.15454	.03489	.01259	-.00271	.000421
3		2.6342	3.3842	0.00000	0.0000000	13.35872	1.91086	-2.57002	.47064	.09542	.12342	-.00160	.000421
4		.5000	3.8842	0.00000	.5345268	14.13489	1.83114	1.08746	-.30417	.10108	.16747	-.00149	.000014
5		4.0000	7.8842	0.00000	0.0000000	7.90577	13.81060	.46982	-2.69070	.16284	.31385	-.00143	.000014
6		.5000	8.3842	0.00000	-.6318594	8.74155	14.29912	-2.22850	1.76566	.17268	.31936	-.00131	.000454
7		1.0000	9.3842	0.00000	0.0000000	13.88105	11.05576	-2.91100	1.47770	.18714	.33203	-.00086	.000454
8		.5000	9.8842	0.00000	.9200000	13.56847	12.16236	3.48748	-3.85803	.19272	.33917	-.00073	.000095
9		1.0000	10.8842	0.00000	0.0000000	7.56360	21.18445	2.51740	-5.16406	.20846	.34909	-.00063	.000095
10		.5000	11.3842	0.00000	-.8368963	6.63596	21.83044	-.53451	3.96346	.22010	.35266	-.00052	.000340
11		4.0000	15.3842	0.00000	0.0000000	14.01204	2.36916	-1.30951	.90186	.28818	.44653	-.00084	.000340
12		.5000	15.8842	0.00000	.5922195	13.26800	1.94501	2.72343	-.01211	.29387	.48489	.00108	.000622
13		2.6342	18.5184	0.00000	0.0000000	3.32192	5.57692	1.05232	-1.36664	.35881	.63243	.00272	.000622
14		.3750	18.8934	0.00000	-.5916554	2.86401	6.16503	.20243	-.15792	.37848	.64247	.00283	.000001
15		.3750	19.2684	0.00000	-.5916554	3.00115	5.80088	-.57821	1.10192	.39918	.65232	.00272	-.000619
16		.4500	19.7184	0.00000	0.0000000	3.61157	4.88645	-.77828	.93015	.42100	.66579	.00244	-.000619
17		1.4327	21.1511	196.34954	0.0000000	6.57349	3.01130	-1.24918	.38700	.46850	.72630	.14177	.196358
18		.4500	21.6011	0.00000	0.0000000	7.77663	2.74032	-1.42446	.21518	.47852	.75134	.23013	.196358
19		.7500	22.3511	0.00000	.3900871	8.23257	3.24574	.86168	-.93766	.49292	.79332	.40855	.288114
20		.4500	22.8011	0.00000	0.0000000	7.49992	4.20687	.76643	-1.19820	.50204	.81276	.53820	.288114
21		1.4327	24.2339	196.34954	0.0000000	5.49419	8.79081	.60651	-2.02168	.53787	.85036	1.08852	.485026
22		.4500	24.6839	0.00000	0.0000000	4.99874	10.72752	.49448	-2.28210	.55155	.85774	1.30678	.485026
23		.7500	25.4339	0.00000	-.5153464	5.85383	11.00108	-1.74270	1.95329	.57478	.86821	1.46836	-.064626
24		1.5207	26.9546	0.00000	0.0000000	12.74890	6.07255	-2.79143	1.28766	.60294	.89800	1.37008	-.064626
25		.7500	27.7046	0.00000	.5565730	12.87252	6.09295	2.64417	-1.31764	.61179	.91872	1.53916	.527215
26		2.1807	29.8853	0.00000	0.0000000	4.29258	13.97523	1.29033	-2.29693	.65917	.95669	2.68886	.527215
27		.3750	30.2603	0.00000	-.3415468	3.59175	15.04489	.60837	-.50968	.67452	.96077	2.82067	.172966
28		.3750	30.6353	0.00000	-.3415468	3.35052	14.71550	.04518	1.37394	.69190	.96475	2.81755	-.189558
29		.4500	31.0853	0.00000	0.0000000	3.37042	13.51869	-.08940	1.28563	.71327	.96983	2.73225	-.189558
30		1.4327	32.5180	196.34954	0.0000000	4.10689	10.25459	-.41472	1.00715	.77619	.98912	2.60244	.007194
31		.4500	32.9680	0.00000	0.0000000	4.53793	9.38793	-.54314	.91876	.79281	.99642	2.60568	.007194
32		.7500	33.7180	0.00000	.4400000	4.33893	10.41243	.78621	-2.39564	.81873	1.00901	2.94045	.903887
33		.4500	34.1680	0.00000	0.0000000	3.70686	12.69956	.61839	-2.68689	.83662	1.01524	3.34720	.903887
34		1.4327	35.6008	196.34954	0.0000000	2.59304	21.65893	.14403	-3.60641	.91308	1.02892	4.77393	1.100517
35		.4500	36.0508	0.00000	0.0000000	2.54312	25.03565	-.03311	-3.89741	.94111	1.03200	5.26916	1.100517
36		.7500	36.8008	0.00000	-.4125922	3.47724	24.98024	-1.30728	3.96548	.98332	1.03659	5.46329	-.592909
37		.4500	37.2508	0.00000	0.0000000	4.81155	21.54688	-1.65785	3.66419	1.00086	1.03967	5.19648	-.592909
38		1.4327	38.6835	196.34954	0.0000000	10.88600	12.46934	-2.50017	2.71211	1.03258	1.05351	4.49233	-.396346
39		.4500	39.1335	0.00000	0.0000000	13.27103	10.16414	-2.79990	2.41057	1.03854	1.05988	4.31397	-.396346
40		.7500	39.8835	0.00000	.4461293	14.08613	9.09308	1.80557	-.86499	1.04691	1.07283	4.55683	1.057450
41		.4500	40.3335	0.00000	0.0000000	12.52236	9.91051	1.66948	-.95151	1.05231	1.08038	5.03268	1.057450
42		1.4327	41.7662	196.34954	0.0000000	7.97342	13.00777	1.44432	-1.22409	1.07521	1.10039	6.67791	1.253924
43		.4500	42.2162	0.00000	0.0000000	6.75191	14.14834	1.27015	-1.31052	1.08497	1.10567	7.24218	1.253924
44		.7500	42.9662	0.00000	-.3895925	6.38092	13.05905	-.73987	2.65523	1.10387	1.11414	7.36948	-.920656
45		.4500	43.4162	0.00000	0.0000000	7.09591	10.79417	-.84900	2.37782	1.11453	1.12017	6.95519	-.920656
46		1.4327	44.8490	196.34954	0.0000000	9.70868	5.27258	-.93946	1.50068	1.14214	1.15038	5.78437	-.724226
47		.4500	45.2990	0.00000	0.0000000	10.59346	4.04687	-1.02672	1.22313	1.14920	1.16591	5.45847	-.724226

49	.3750	46.0490	0.00000	.5169429	9.15765	3.51247	2.75188	-.44284	1.16075	1.19938	5.70161	1.388252
50	.4500	46.4990	0.00000	0.0000000	6.87052	3.97998	2.33062	-.59608	1.16979	1.21858	6.32632	1.388252
51	1.4327	47.9317	196.34954	0.0000000	1.98025	6.36655	1.01682	-1.08032	1.23328	1.26421	8.44239	1.584594
52	.4500	48.3817	0.00000	0.0000000	1.27310	7.40777	.55462	-1.23349	1.27901	1.27465	9.15545	1.584594
53	.3750	48.7567	0.00000	-.4517228	1.06941	7.88037	-.00000	.00000	1.33166	1.28238	9.45415	.000000
54	.3750	49.1317	0.00000	-.4517228	1.27310	7.40777	-.55462	1.23349	1.38431	1.29011	9.15545	-1.584594
55	.4500	49.5817	0.00000	0.0000000	1.98025	6.36655	-1.01682	1.08032	1.43004	1.30055	8.44239	-1.584594
56	1.4327	51.0144	196.34954	0.0000000	6.87052	3.97998	-2.33062	.59608	1.49353	1.34618	6.32632	-1.388252
57	.4500	51.4644	0.00000	0.0000000	9.15765	3.51247	-2.75188	.44284	1.50257	1.36538	5.70161	-1.388252
58	.3750	51.8394	0.00000	.5169429	10.60173	3.47465	-1.00522	-.33957	1.50855	1.38271	5.38318	-.320300
59	.3750	52.2144	0.00000	.5169429	10.59346	4.04687	1.02672	-1.22313	1.51412	1.39884	5.45847	.724226
60	.4500	52.6644	0.00000	0.0000000	9.70868	5.27258	.93946	-1.50068	1.52118	1.41437	5.78437	.724226
61	1.4327	54.0972	196.34954	0.0000000	7.09591	10.79417	.84900	-2.37782	1.54879	1.44459	6.95519	.920656
62	.4500	54.5472	0.00000	0.0000000	6.38092	13.05905	.73987	-2.65523	1.55944	1.45062	7.36948	.920656
63	.7500	55.2972	0.00000	-.3895925	6.75191	14.14834	-1.27015	1.31052	1.57834	1.45909	7.24218	-1.253924
64	.4500	55.7472	0.00000	0.0000000	7.97342	13.00777	-1.44432	1.22409	1.58811	1.46437	6.67791	-1.253924
65	1.4327	57.1799	196.34954	0.0000000	12.52236	9.91051	-1.66948	.95151	1.61101	1.48438	5.03268	-1.057450
66	.4500	57.6299	0.00000	0.0000000	14.08613	9.09308	-1.80557	.86499	1.61640	1.49192	4.55683	-1.057450
67	.7500	58.3799	0.00000	.4461293	13.27103	10.16414	2.79990	-2.41057	1.62478	1.50488	4.31397	.396346
68	.4500	58.8299	0.00000	0.0000000	10.88600	12.46934	2.50017	-2.71211	1.63074	1.51124	4.49233	.396346
69	1.4327	60.2627	196.34954	0.0000000	4.81155	21.54688	1.65785	-3.66419	1.66245	1.52508	5.19648	.592909
70	.4500	60.7127	0.00000	0.0000000	3.47724	24.98024	1.30728	-3.96548	1.68000	1.52817	5.46329	.592909
71	.7500	61.4627	0.00000	-.4125922	2.54312	25.03565	.03311	3.89741	1.72220	1.53276	5.26916	-1.100517
72	.4500	61.9127	0.00000	0.0000000	2.59304	21.65893	-.14403	3.60641	1.75024	1.53584	4.77393	-1.100517
73	1.4327	63.3454	196.34954	0.0000000	3.70686	12.69956	-.61839	2.68689	1.82669	1.54951	3.34720	-.903887
74	.4500	63.7954	0.00000	0.0000000	4.33893	10.41243	-.78621	2.39564	1.84459	1.55574	2.94045	-.903887
75	.7500	64.5454	0.00000	.4400000	4.53793	9.38793	.54314	-.91876	1.87051	1.56834	2.60568	-.007194
76	.4500	64.9954	0.00000	0.0000000	4.10689	10.25459	.41472	-1.00715	1.88713	1.57564	2.60244	-.007194
77	1.4327	66.4281	196.34954	0.0000000	3.37042	13.51869	.08940	-1.28563	1.95005	1.59493	2.73225	.189558
78	.4500	66.8781	0.00000	0.0000000	3.35052	14.71550	-.04518	-1.37394	1.97142	1.60001	2.81755	.189558
79	.3750	67.2531	0.00000	-.3415468	3.59175	15.04489	-.60837	.50968	1.98880	1.60399	2.82067	-.172966
80	.3750	67.6281	0.00000	-.3415468	4.29258	13.97523	-1.29033	2.29693	2.00414	1.60807	2.68886	-.527215
81	2.1807	69.8088	0.00000	0.0000000	12.87252	6.09295	-2.64417	1.31764	2.05153	1.64604	1.53916	-.527215
82	.7500	70.5588	0.00000	.5565730	12.74890	6.07255	2.79143	-1.28766	2.06038	1.66676	1.37008	.064626
83	1.5207	72.0795	0.00000	0.0000000	5.85383	11.00108	1.74270	-1.95329	2.08854	1.69655	1.46836	.064626
84	.7500	72.8295	0.00000	-.5153464	4.99874	10.72752	-.49448	2.28210	2.11177	1.70702	1.30678	-.485026
85	.4500	73.2795	0.00000	0.0000000	5.49419	8.79081	-.60651	2.02168	2.12545	1.71440	1.08852	-.485026
86	1.4327	74.7123	196.34954	0.0000000	7.49992	4.20687	-.76643	1.19820	2.16128	1.75200	.53820	-.288114
87	.4500	75.1623	0.00000	0.0000000	8.23257	3.24574	-.86168	.93766	2.17040	1.77143	.40855	-.288114
88	.7500	75.9123	0.00000	.3900871	7.77663	2.74032	1.42446	-.21518	2.18479	1.81342	.23013	-.196358
89	.4500	76.3623	0.00000	0.0000000	6.57349	3.01130	1.24918	-.38700	2.19482	1.83846	.14177	-.196358
90	1.4327	77.7950	196.34954	0.0000000	3.61157	4.88645	.77828	-.93015	2.24232	1.89897	.00244	.000619
91	.4500	78.2450	0.00000	0.0000000	3.00115	5.80088	.57821	-1.10192	2.26414	1.91244	.00272	.000619
92	.3750	78.6200	0.00000	-.5916554	2.86401	6.16503	-.20243	.15792	2.28484	1.92228	.00283	-.000001
93	.3750	78.9950	0.00000	-.5916554	3.32192	5.57692	-1.05232	1.36664	2.30451	1.93233	.00272	-.000622
94	2.6342	81.6292	0.00000	0.0000000	13.26800	1.94501	-2.72343	.01211	2.36945	2.07986	.00108	-.000622
95	.5000	82.1292	0.00000	.5922195	14.01204	2.36916	1.30951	-.90186	2.37514	2.11823	.00084	-.000340
96	4.0000	86.1292	0.00000	0.0000000	6.63596	21.83044	.53451	-3.96346	2.44322	2.21210	-.00052	-.000340
97	.5000	86.6292	0.00000	-.8368963	7.56360	21.18445	-2.51740	5.16406	2.45486	2.21567	-.00063	-.000095
98	1.0000	87.6292	0.00000	0.0000000	13.56847	12.16236	-3.48748	3.85803	2.47059	2.22559	-.00073	-.000095
99	.5000	88.1292	0.00000	.9200000	13.88105	11.05576	2.91100	-1.47770	2.47617	2.23272	-.00086	-.000454
100	1.0000	89.1292	0.00000	0.0000000	8.74155	14.29912	2.22850	-1.76566	2.49064	2.24539	-.00131	-.000454
101	.5000	89.6292	0.00000	-.6318594	7.90577	13.81060	-.46982	2.69070	2.50047	2.25091	-.00143	-.000014
102	4.0000	93.6292	0.00000	0.0000000	14.13489	1.83114	-1.08746	.30417	2.56224	2.39728	-.00149	-.000014
103	.5000	94.1292	0.00000	.5345268	13.35872	1.91086	2.57002	.47064	2.56790	2.44134	-.00160	-.000421
104	2.6342	96.7634	0.00000	0.0000000	3.76915	8.82612	1.07039	-2.15454	2.62843	2.55217	-.00271	-.000421
105	.3750	97.1384	0.00000	-.5785943	3.31943	9.74440	.16121	-.22744	2.64557	2.55852	-.00275	.000175
106	.3750	97.5134	0.00000	-.5785943	3.51400	9.14906	-.69407	1.77170	2.66332	2.56476	-.00258	.000757
107	.4500	97.9634	0.00000	0.0000000	4.22405	7.64614	-.88382	1.56813	2.68195	2.57332	-.00224	.000757
108	1.4327	99.3961	196.34954	0.0000000	7.41208	4.09761	-1.29842	.92445	2.72316	2.61425	.13905	.197734
109	.4500	99.8461	0.00000	0.0000000	8.65403	3.35726	-1.46148	.72077	2.73211	2.63361	.22803	.197734
110	.7500	100.5961	0.00000	.4291005	8.77202	3.24695	1.31703	-.56204	2.74528	2.67159	.41045	.298455
111	.4500	101.0461	0.00000	0.0000000	7.64982	3.83486	1.17675	-.74442	2.75403	2.69194	.54475	.298455
112	1.4327	102.4789	196.34954	0.0000000	4.69071	6.77496	.84879	-1.32079	2.79246	2.73699	1.10979	.495366

114	.7500	103.6789	0.00000	-.5287991	4.30012	7.92011	-1.12125	1.65358	2.83944	2.76094	1.49274	-.079233
115	1.5207	105.1996	0.00000	0.0000000	8.92420	3.98125	-1.91950	.93657	2.87891	2.80459	1.37225	-.079233
116	.7500	105.9496	0.00000	.5237674	9.15674	3.86881	1.64050	-.772[illegible]	2.89149	2.83674	1.51702	.474723
117	2.1807	108.1303	0.00000	0.0000000	3.91888	9.19891	.76142	-1.672[illegible]	2.95079	2.89629	2.55225	.474723
118	.3750	108.5053	0.00000	-.4846136	3.65269	9.84064	-.03553	-.00024	2.96677	2.90250	2.64178	.000069
119	.3750	108.8803	0.00000	-.4846136	3.97462	9.19925	-.84238	1.67159	2.98264	2.90870	2.55230	-.474591
120	.4500	109.3303	0.00000	0.0000000	4.81987	7.77834	-1.03594	1.48598	2.99903	2.91717	2.33873	-.474591
121	1.4327	110.7630	196.34954	0.0000000	8.43003	4.38271	-1.43525	.89919	3.03511	2.95637	1.80319	-.277787
122	.4500	111.2130	0.00000	0.0000000	9.79526	3.65700	-1.59859	.71350	3.04300	2.97430	1.67819	-.277787
123	.7500	111.9630	0.00000	.4503946	9.71670	3.65643	1.69433	-.71267	3.05473	3.00860	1.67805	.277402
124	.4500	112.4130	0.00000	0.0000000	8.27247	4.38135	1.51507	-.89825	3.06272	3.02653	1.80288	.277402
125	1.4327	113.8458	196.34954	0.0000000	4.51664	7.77377	1.05583	-1.48468	3.10038	3.06575	2.33787	.474205
126	.4500	114.2958	0.00000	0.0000000	3.66120	9.19344	.84514	-1.67016	3.11803	3.07423	2.55126	.474205
127	.7500	115.0458	0.00000	-.4846136	3.53049	9.19265	-.65530	1.67113	3.15304	3.08664	2.55107	-.474697
128	.4500	115.4958	0.00000	0.0000000	4.20225	7.77218	-.83750	1.48547	3.17168	3.09512	2.33746	-.474697
129	1.4327	116.9285	196.34954	0.0000000	7.22648	4.37828	-1.23262	.89849	3.21354	3.13436	1.80177	-.277894
130	.4500	117.3785	0.00000	0.0000000	8.40643	3.65323	-1.38950	.71274	3.22273	3.15230	1.67672	-.277894
131	.7500	118.1285	0.00000	.4503946	8.38031	3.65304	1.42134	-.71246	3.23638	3.18664	1.67630	.276763
132	.4500	118.5785	0.00000	0.0000000	7.17408	4.37783	1.25917	-.89818	3.24562	3.20459	1.80084	.276763
133	1.4327	120.0112	196.34954	0.0000000	4.10140	7.77066	.84411	-1.48503	3.28816	3.24383	2.33493	.473566
134	.4500	120.4612	0.00000	0.0000000	3.42625	9.19072	.65622	-1.67065	3.30731	3.25231	2.54803	.473566
135	.7500	121.2112	0.00000	-.4846136	3.53202	9.19136	-.80984	1.66987	3.34352	3.26472	2.54782	-.474129
136	.4500	121.6612	0.00000	0.0000000	4.35581	7.77194	-1.02080	1.48439	3.36182	3.27320	2.33446	-.474129
137	1.4327	123.0940	196.34954	0.0000000	8.02054	4.38031	-1.48774	.89798	3.40078	3.31243	1.79957	-.277326
138	.4500	123.5440	0.00000	0.0000000	9.44063	3.65563	-1.66803	.71241	3.40902	3.33036	1.67478	-.277326
139	.7500	124.2940	0.00000	.4503946	9.55148	3.65644	1.53294	-.71357	3.42108	3.36467	1.67456	.276722
140	.4500	124.7440	0.00000	0.0000000	8.24285	4.38224	1.37511	-.89931	3.42915	3.38260	1.79908	.276722
141	1.4327	126.1767	196.34954	0.0000000	4.78367	7.77839	.99273	-1.48624	3.46579	3.42181	2.33311	.473526
142	.4500	126.6267	0.00000	0.0000000	3.97426	9.19955	.80596	-1.67188	3.48224	3.43028	2.54619	.473526
143	.3750	127.0017	0.00000	-.4846136	3.67871	9.84115	-.00000	-.00000	3.49806	3.43648	2.63549	.000000
144	.3750	127.3767	0.00000	-.4846136	3.97426	9.19955	-.80596	1.67188	3.51387	3.44268	2.54619	-.473526
145	.4500	127.8267	0.00000	0.0000000	4.78367	7.77839	-.99273	1.48624	3.53032	3.45115	2.33311	-.473526
146	1.4327	129.2594	196.34954	0.0000000	8.24285	4.38224	-1.37511	.89931	3.56696	3.49035	1.79908	-.276722
147	.4500	129.7094	0.00000	0.0000000	9.55148	3.65644	-1.53294	.71357	3.57503	3.50828	1.67456	-.276722
148	.7500	130.4594	0.00000	.4503946	9.44063	3.65563	1.66803	-.71241	3.58709	3.54259	1.67478	.277326
149	.4500	130.9094	0.00000	0.0000000	8.02054	4.38031	1.48774	-.89798	3.59533	3.56053	1.79957	.277326
150	1.4327	132.3422	196.34954	0.0000000	4.35581	7.77194	1.02080	-1.48439	3.63429	3.59976	2.33446	.474129
151	.4500	132.7922	0.00000	0.0000000	3.53202	9.19136	.80984	-1.66987	3.65259	3.60823	2.54782	.474129
152	.7500	133.5422	0.00000	-.4846136	3.42625	9.19072	-.65622	1.67065	3.68880	3.62065	2.54803	-.473566
153	.4500	133.9922	0.00000	0.0000000	4.10140	7.77066	-.84411	1.48503	3.70795	3.62913	2.33493	-.473566
154	1.4327	135.4249	196.34954	0.0000000	7.17408	4.37783	-1.25917	.89818	3.75049	3.66837	1.80084	-.276763
155	.4500	135.8749	0.00000	0.0000000	8.38031	3.65304	-1.42134	.71246	3.75973	3.68632	1.67630	-.276763
156	.7500	136.6249	0.00000	.4503946	8.40643	3.65323	1.38950	-.71274	3.77338	3.72066	1.67672	.277894
157	.4500	137.0749	0.00000	0.0000000	7.22648	4.37828	1.23262	-.89849	3.78257	3.73860	1.80177	.277894
158	1.4327	138.5077	196.34954	0.0000000	4.20225	7.77218	.83750	-1.48547	3.82443	3.77784	2.33746	.474697
159	.4500	138.9577	0.00000	0.0000000	3.53049	9.19265	.65530	-1.67113	3.84307	3.78632	2.55107	.474697
160	.7500	139.7077	0.00000	-.4846136	3.66120	9.19344	-.84514	1.67016	3.87808	3.79873	2.55126	-.474205
161	.4500	140.1577	0.00000	0.0000000	4.51664	7.77377	-1.05583	1.48468	3.89573	3.80721	2.33787	-.474205
162	1.4327	141.5904	196.34954	0.0000000	8.27247	4.38135	-1.51507	.89825	3.93339	3.84642	1.80288	-.277402
163	.4500	142.0404	0.00000	0.0000000	9.71670	3.65643	-1.69433	.71267	3.94138	3.86436	1.67805	-.277402
164	.7500	142.7904	0.00000	.4503946	9.79526	3.65700	1.59859	-.71350	3.95311	3.89866	1.67819	.277787
165	.4500	143.2404	0.00000	0.0000000	8.43003	4.38271	1.43525	-.89919	3.96100	3.91659	1.80319	.277787
166	1.4327	144.6731	196.34954	0.0000000	4.81987	7.77834	1.03594	-1.48598	3.99708	3.95579	2.33873	.474591
167	.4500	145.1231	0.00000	0.0000000	3.97462	9.19925	.84238	-1.67159	4.01347	3.96426	2.55230	.474591
168	.3750	145.4981	0.00000	-.4846136	3.65269	9.84064	.03553	.00024	4.02934	3.97046	2.64178	-.000069
169	.3750	145.8731	0.00000	-.4846136	3.91888	9.19891	-.76142	1.67200	4.04532	3.97666	2.55225	-.474723
170	2.1807	148.0538	0.00000	0.0000000	9.15674	3.86881	-1.64050	.77222	4.10462	4.03622	1.51702	-.474723
171	.7500	148.8038	0.00000	.5237674	8.92420	3.98125	1.91950	-.93657	4.11720	4.06837	1.37225	.079233
172	1.5207	150.3245	0.00000	0.0000000	4.30012	7.92011	1.12125	-1.65358	4.15667	4.11202	1.49274	.079233
173	.7500	151.0745	0.00000	-.5287991	4.00107	8.04569	-.68374	1.50308	4.18708	4.12626	1.33270	-.495366
174	.4500	151.5245	0.00000	0.0000000	4.69071	6.77496	-.84879	1.32079	4.20365	4.13597	1.10979	-.495366
175	1.4327	152.9573	196.34954	0.0000000	7.64982	3.83486	-1.17675	.74442	4.24208	4.18101	.54475	-.298455
176	.4500	153.4073	0.00000	0.0000000	8.77202	3.24695	-1.31703	.56204	4.25083	4.20137	.41045	-.298455
177	.7500	154.1573	0.00000	.4291005	8.65403	3.35726	1.46148	-.72077	4.26400	4.23935	.22803	-.197734
178	.4500	154.6073	0.00000	0.0000000	7.41208	4.09761	1.29842	-.92445	4.27295	4.25871	.13905	-.197734
179	1.4327	156.0400	196.34954	0.0000000	4.22405	7.64614	.88382	-1.56813	4.31416	4.29963	-.00224	-.000757
180	.4500	156.4900	0.00000	0.0000000	3.51400	9.14906	.69407	-1.77170	4.33279	4.30820	-.00258	-.000757

DP/P	COSMU(H)	Q(H)	QPRIME(H)	BETAMAX(H)	COSMU(V)	Q(V)	QPRIME(V)	BETAMAX(V)	AX(H)	GAMMA TR.
0.0000	-.35759	4.3082	-6.0677	25.0356	-.49706	4.3328	-4.6300	14.1349	9.4541	2.9759

DP/P = 0.0000   AVERAGE X = 0.0000   AVERAGE ALPHAP = 2.8124   R.F. GAMMA TR. = 2.9759

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

TIME = .149 SECONDS

B. Autin PS
R. Billinge PS
G. Carron ISR
Fang PS AA visitor
C. Johnson PS
E. Jones PS
H. Koziol — PS — 10 copies
C. Metzger PS
F. Pedersen PS
W. Pirkl PS
A. Poncet PS
K.H. Schindl PS
R. Sherwood PS
C. Taylor PS
L. Thorndahl ISR
S. van der Meer PS
EJN Wilson PS

V. Chohan PS
L. Henny PS
S. Maury PS
L. Rinolfi PS
M. Martini PS

C. Rubbia EP
D. Möhl PS
P. Lefèvre PS
W. Hardt PS
J. Borer ISR
Y. Baconnier PS
E. Brouzet PS

Dr. G. Piskounov Novosibirsk

R. Johnson PS AA visitor

Anne

Voici une liste de distribution pour le rapport russe. 10 copies pour moi pour envoi aux personnes dont je me souviendrai plus tard

Merci Helmut Koziol

AA Long Term Note n° 17

Summary of the meeting of August 31, 1982

Present : B. AUTIN, R. BILLINGE, R. BROWN, V. CHOHAN, W. HARDT, R. JOHNSON, E. JONES, H. KOZIOL, C. METZGER, G. NASSIBIAN, K.H. SCHINDL, J.C. SCHNURIGER, R. SHERWOOD, A. SULLIVAN, H.H. UMSTAETTER, S. VAN DER MEER, E.J.N. WILSON.

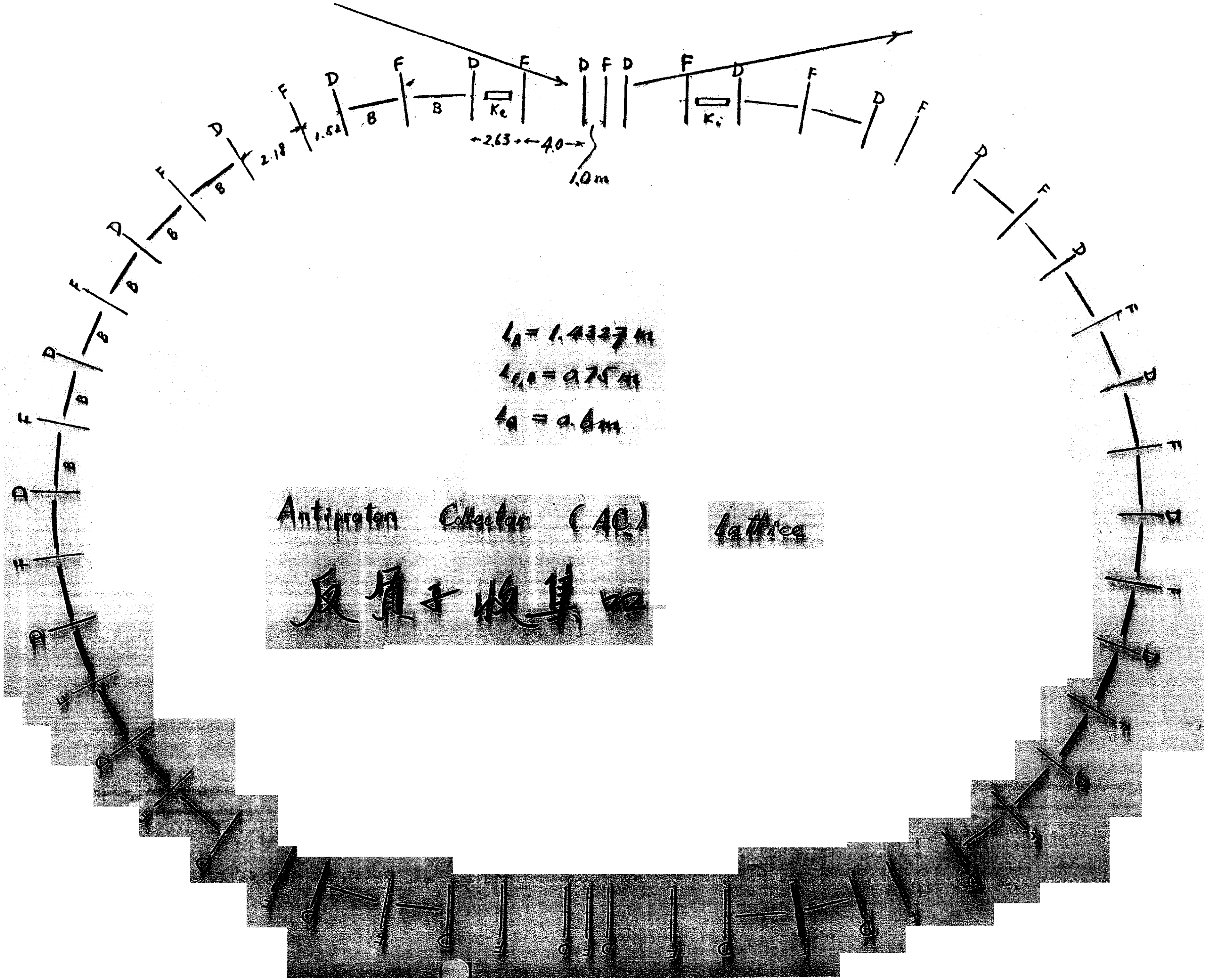
Topic : Lattice of the Antiproton Collector, by S.X. FANG

The lattice of the Antiproton Collector (AC) has a focussing structure which varies with time in order to cope with two régimes of operation.
During the "bunch rotation" régime, the dispersion in revolution frequency η is small in order to maintain the RF voltage low. This situation is maintained during a quarter of the synchrotron period and, for simplicity, corresponds to $\eta = 0$ in the following but it is obvious that η can be adjusted to any finite value in practice.
Once the beam is debunched, the quadrupole currents are varied in one half of the ring to reach the "cooling" régime. Under these conditions, the half ring which is still in its initial state is isochronous and the signal picked-up by the cooling electrodes is transmitted without alteration to the cooling kickers. In contrast, in the other half ring

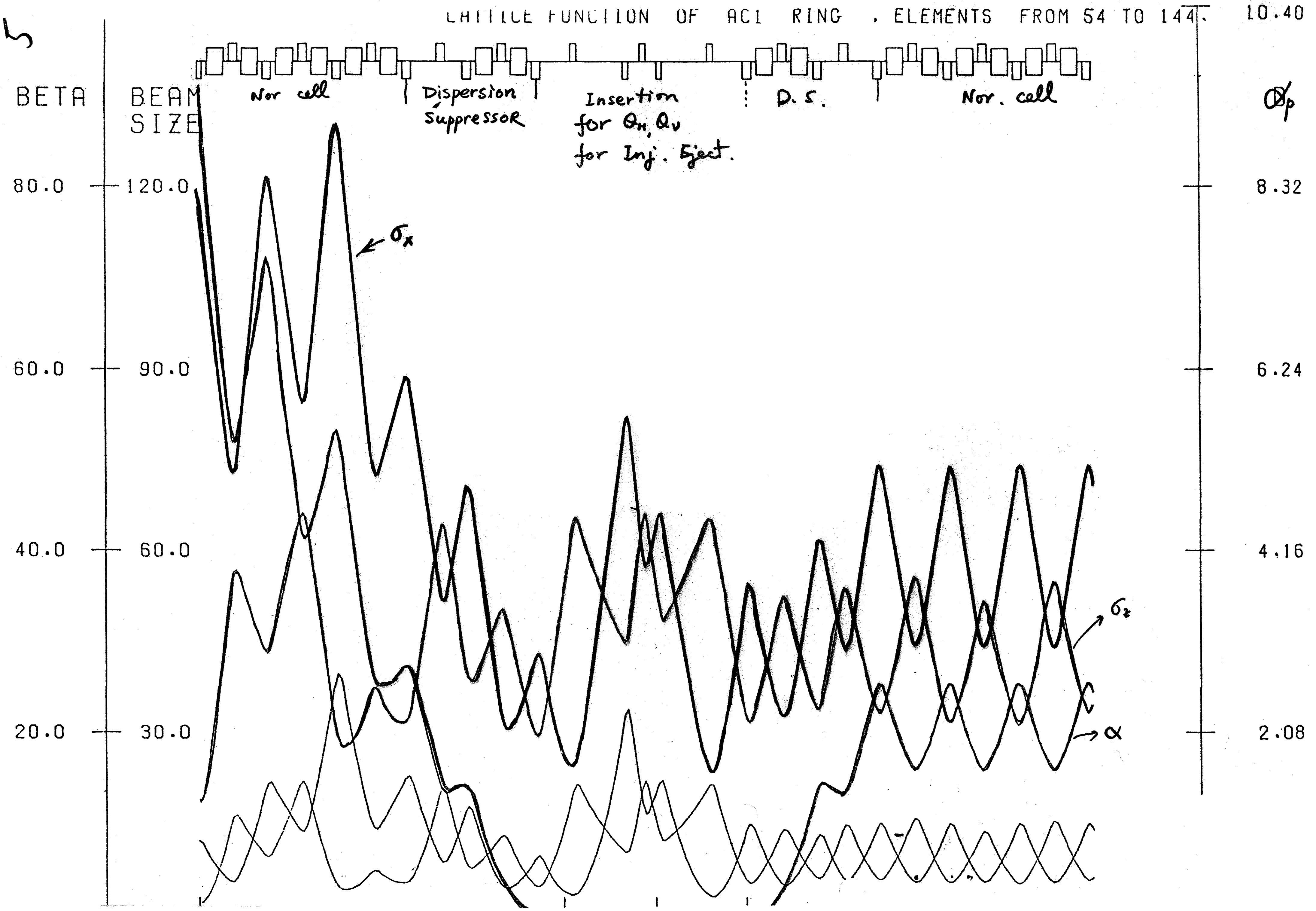
The dispersion in particle ~~flight time~~ time of flight is high, it corresponds to an η value of 0.1 and the population of the beam sample sensed by the pick-ups is fastly renewed at each turn.

The attached copies of transparencies describe the properties of the proposed AC ring

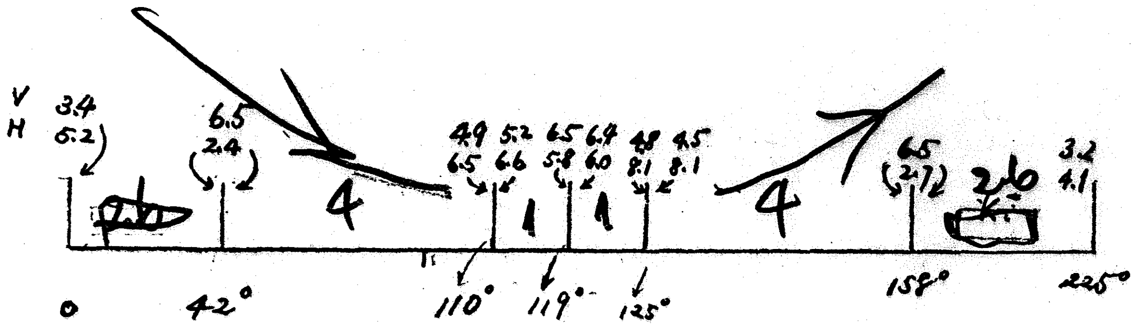
B. AUTIN



Antiproton Collector (AC) lattice
反質子收集器
$l_B = 1.4327$ m
$l_{F,D} = 0.75$ m
$l_{a} = 0.6$ m
K_e
K_i
2.63
4.0
1.0m
2.18
1.52

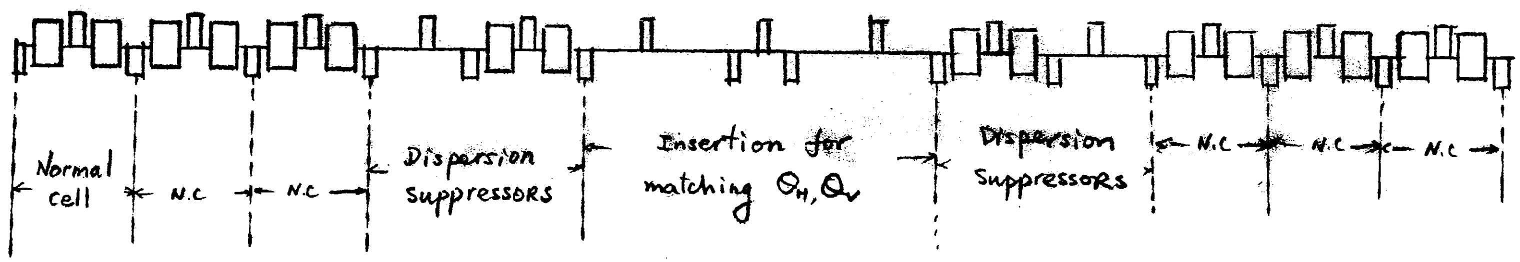


LATTICE FUNCTION OF AC1 RING , ELEMENTS FROM 54 TO 144.
BETA
BEAM SIZE
80.0
60.0
40.0
20.0
120.0
90.0
60.0
30.0
10.40
8.32
6.24
4.16
2.08
Nor cell
Dispersion Suppressor
Insertion
for Q_H, Q_V
for Inj. Eject.
D. S.
Nor. cell
σ_x
σ_z
α



Beam size in the injection and ejection region.

½ ring


Normal cell
N.C
N.C
Dispersion suppressors
Insertion for matching Q_H, Q_V
Dispersion suppressors
N.C
N.C
N.C