DAΦNE TECHNICAL NOTE

INFN - LNF, Accelerator Division

Frascati, March 8, 1994

Note: **L-13**

KLOE INTERACTION REGION UPDATE

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The definition of the KLOE solenoid field profile and iron yoke has permitted the update of the KLOE interaction region. The differences with respect to the previous design[1] are mainly:

- more realistic KLOE field model with a new iron yoke design[2];
- more space between the permanent magnets (p.m.) quadrupoles, to install beam diagnostics;
- more realistic compensator field model;
- more space left to the detector before the compensator;
- the third quadrupole of the triplet has been moved away from the region with fringing, to avoid radial field components superimposed to the quadrupolar field in the permanent magnet.

In Appendix A and Fig. 1 the 2D field profile on axis is presented[3].

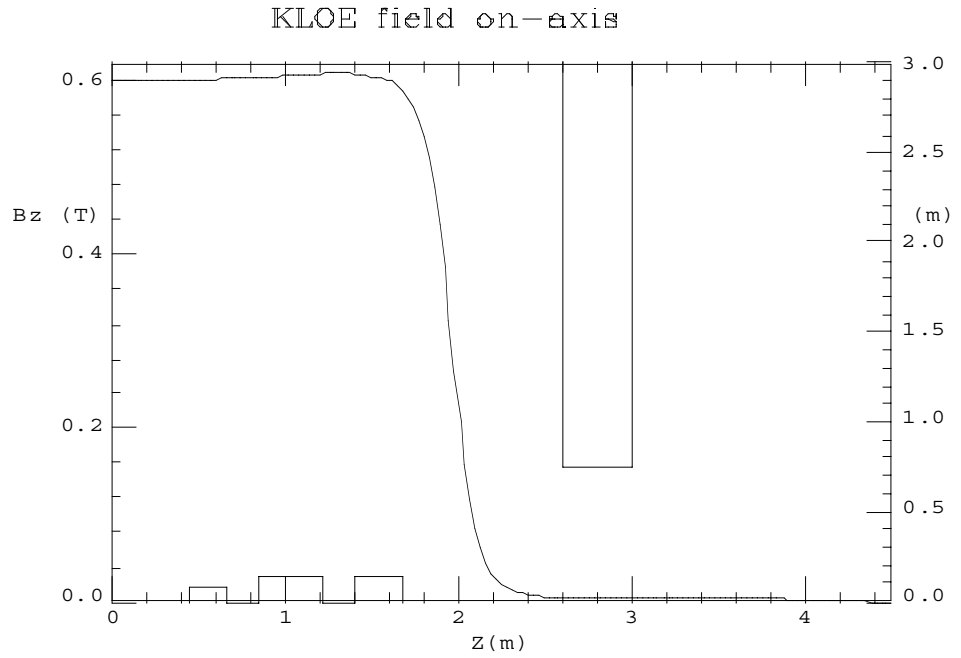

Fig.1 - KLOE field profile. The quadrupole locations is also shown.

The field is assumed to be zero @ $z_0 = 3.$ m on each side of the I.P. From this profile we calculate the field integral:

$$\int_{-z_0}^{z_0} B_z \, dl = 2.3862 \text{ T m.}$$

The magnetic length, corresponding to a constant field of $B_o = .6$ T is:

$$L_{mag} = \frac{1}{B_o} \int_{-z_0}^{z_0} B_z \, dl = 3.977 \text{ m.}$$

To give a further 5 cm free space to the detector, the overall superconducting compensator length has been reduced from 1.2 m to 1.15 m. The center of the compensator has been fixed at 4.06 m from the I.P. To increase its focusing effect (i.e. decreasing the horizontal betatron function at the splitter entrance) a new field profile[4] with a shorter magnetic length has been chosen. In Appendix B and Fig. 2 the compensator field profile on axis is given for solenoidal field integral compensation. Actually, the compensator field is used togheter with the rotation of the low-β quadrupoles, to exactly diagonalize the half IR transfer matrix. Therefore this profile can be assumed as a *form factor* of the field. Preliminary engineering evaluation*) indicate that such a compensator is feasible.

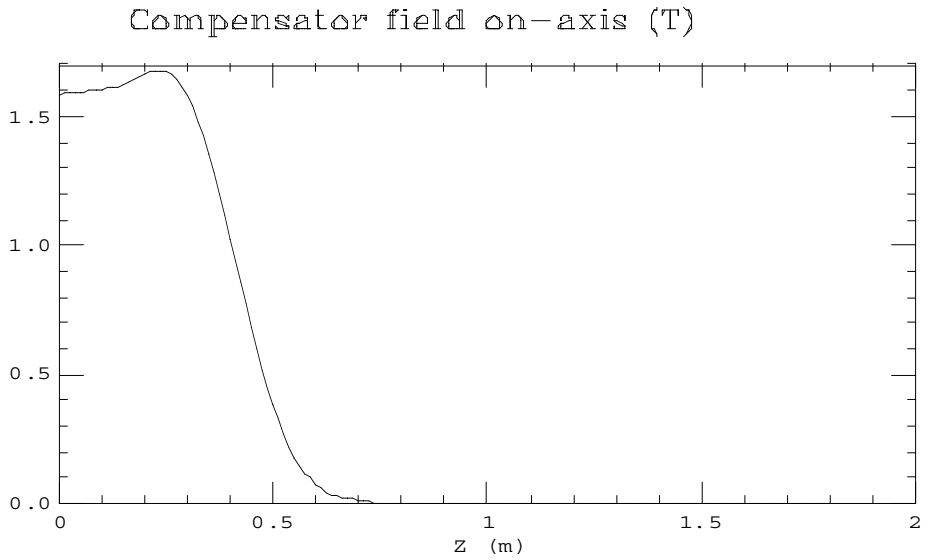

Fig. 2 - Compensator field profile.

The new half I.R. layout is listed in Table I below. The p.m. quadrupole gradients are slightly lower then the previous ones, thus allowing a more relaxed design.

*) Hank Hsieh, private communication.

TABLE I *- KLOE IR elements for half insertion*

Element	**Length (m)**	**Pos. (in/out) (m from IP)**	**K^2 (m^{-2})**	**G (T/m)**	**θ (deg)**
Detector	0.460	0.0/0.46			
QF1 + Detector	0.200	0.46/0.66	3.273897	5.57	+ 5.9743
Detector	0.200	0.66/0.86			
QD + Detector	0.350	0.86//1.21	-5.720083	-9.73	+ 10.4825
Detector	0.200	1.21/1.41			
QF2 + Detector	0.270	1.41/1.68	2.928834	4.98	+ 15.4515
Detector	1.320	1.68/3.0			+20.09*
Drift	.485	3.0/3.485			
Compensator	1.150	3.485/4.635			- 20.95**
Drift	0.415	4.635/5.05			

* Corresponds to half KLOE rotation angle.

** Corresponds to the total compensator rotation angle.

The first order transfer matrix from the I.P. to the splitter entrance is reported in Table II. With respect to the previous one the beam half separation at the splitter entrance has been kept the same, while the angle of the beam trajectory increases from 3.5 mrad to 3.8 mrad (@10 mrad crossing angle). The splitter and the horizontal corrector settings for 10, 12.5 and 15. mrad are shown in Table III.

TABLE II *- Half IR first order transfer matrix*

0.95948	4.700000	0.000000	0.000000
-0.135191	0.380000	0.000000	0.000000
0.000000	0.000000	-3.997040	0.111001
0.000000	0.000000	-1.017964	-0.221915

TABLE III - *Splitter and corrector settings*

ro,d1 9.518830 1.443859
D1,D2,d2c,ddc,x2,x3(m), xp2(rad) 1.443859 0.4938442 0.3703831
0.2469221 0.2540525 0.2736068 0.1570796
z1,z2,z3 6.493859 6.864243 7.111165

teta,xo,xpo **10. mrad** 4.6999998E-02 3.8000001E-03
alfa(mrad),arco(m),ro(m),B(T) 163.3611 1.450763 8.880711 0.1915586
x1(m), xp1 (mrad) @end of splitter 0.1707233 167.1611
x2(m), kick (mrad)@ corrector 0.2540525 -10.08147
z1,z2,z3 6.493859 6.864243 7.111165
dif 2.9802322E-08

alfa(mrad),arco(m),ro(m),B(T) 163.3619 1.450763 8.880665 0.1915586
x1(m), xp1 (mrad) @end of splitter 0.1707239 167.1619
x2(m), kick (mrad)@ corrector ,arco , rc 0.2540535 -10.08230
0.2502040 -24.81615
drift splitter-corrector l = 0.3756189 (+ 6.1890483E-04)
x3(m) 0.2736068

teta,xo,xpo **12.5 mrad** 5.8750000E-02 4.7499998E-03
alfa(mrad),arco(m),ro(m),B(T) 152.3296 1.450000 9.518831 0.1787170
x1(m), xp1 (mrad) @end of splitter 0.1758352 157.0796
x2(m), kick (mrad)@ corrector 0.2540524 2.9802322E-05
z1,z2,z3 6.493859 6.864242 7.111164
dif -5.9604645E-08

alfa(mrad),arco(m),ro(m),B(T) 152.3296 1.450000 9.518830 0.1787170
x1(m), xp1 (mrad) @end of splitter 0.1758352 157.0796
x2(m), kick (mrad)@ corrector ,arco , rc 0.2540524 1.4901161E-05
0.2500000 1.6777216E+07
drift splitter-corrector l = 0.3750000 (+ 0.0000000E+00)
x3(m) 0.2736067

teta,xo,xpo **15. mrad** 7.0500001E-02 5.7000001E-03
alfa(mrad),arco(m),ro(m),B(T) 141.2810 1.449281 10.25815 0.1658366
x1(m), xp1 (mrad) @end of splitter 0.1809395 146.9810
x2(m), kick (mrad)@ corrector 0.2540525 10.09867
z1,z2,z3 6.493859 6.864243 7.111165
dif 0.0000000E+00

alfa(mrad),arco(m),ro(m),B(T) 141.2810 1.449281 10.25815 0.1658366
x1(m), xp1 (mrad) @end of splitter 0.1809395 146.9810
x2(m), kick (mrad)@ corrector ,arco , rc 0.2540525 10.09867
0.2498045 24.73638
drift splitter-corrector l = 0.3744202 (+ -5.7977438E-04)

x3(m) 0.2736068

Fig. 3 shows the I.R. optical functions and the beam half separation, summarized also in Table IV. The MAD input deck and output are in Appendix C.

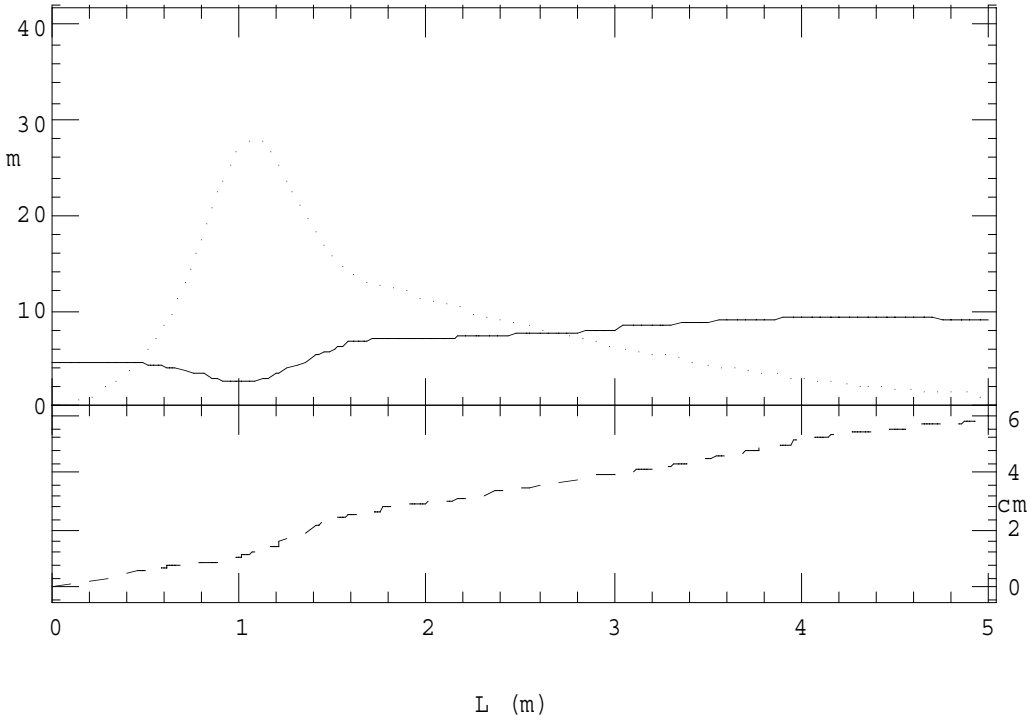

Fig.3 - KLOE I.R. betatron functions (x-solid line, y--dotted line) and beam horizontal half separation (dashed line)

TABLE IV - *Interaction Region main parameters summary*

@ IP	
β_x (m)	4.5
β_y (m)	0.045
@ SPLITTER	
β_x (m)	9.052
α_x	.187
δQ_x	.132
D_x(m)@ $\theta = \pm$ 12.5 mrad	-.034
D'_x @ $\theta = \pm$ 12.5 mrad	-.019
β_y (m)	.993
α_y	.364
δQ_y	.412
Δx (mm) @ $\theta = \pm$ 12.5 mrad	58.75
$\Delta x'$ (mrad) @ $\theta = \pm$ 12.5 mrad	4.75

In Fig.4 and Appendix D the beam stay-clear[6] needed for 15 mrad crossing is reported. 2 mm for closed orbit allowance has been included.

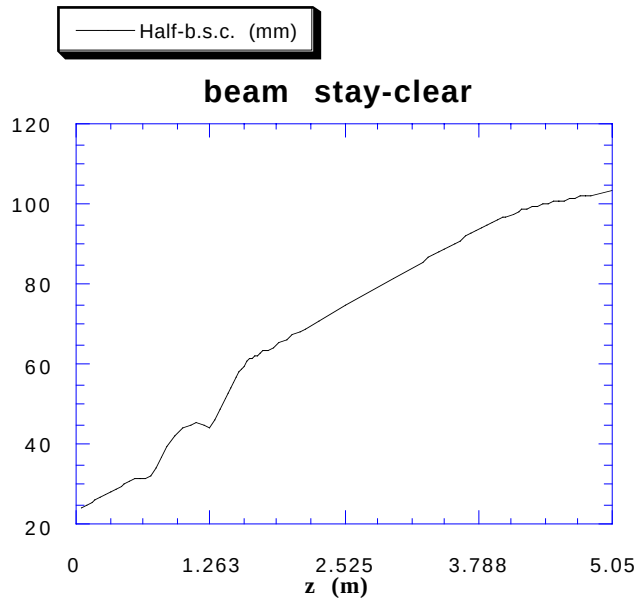

Fig. 4 - Beam stay-clear @ 15. mrad

In Fig. 5 the on-axis gradient of the new triplet is shown, as computed with the Multifringe program by ASTER Ent.[5]. In the calculations a constant gradient has been used inside the quadrupoles.

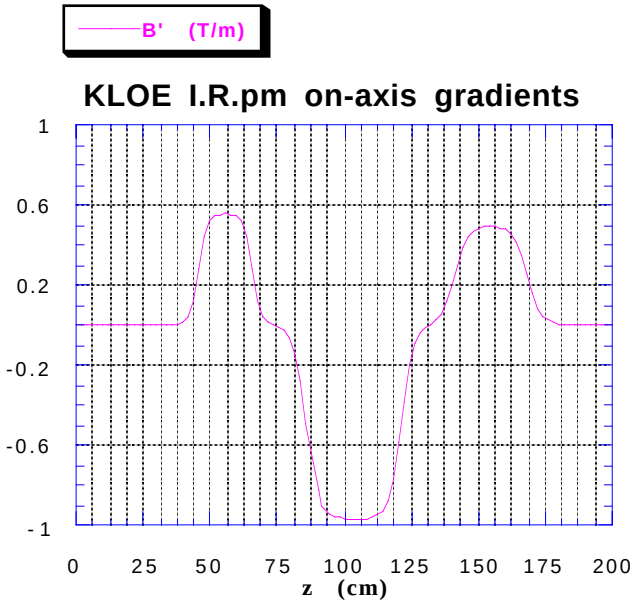

Fig. 5 - P.m. gradients on axis

Matching of the regular lattice with the new I.R. optical functions has been performed, keeping the same β-tune working point as the previous design. Fig. 6 and 7 show their behaviour for the Short and Long arcs. Their main characteristics are summarized in Table V. The Nolisy outputs are in Appendix E.

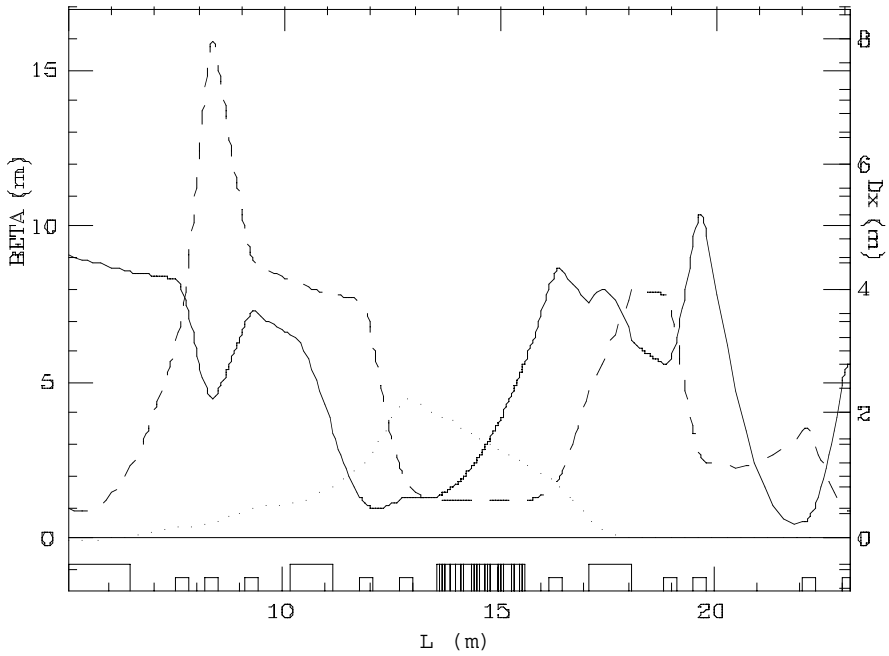

Fig. 6 - Optical functions in the short arc.

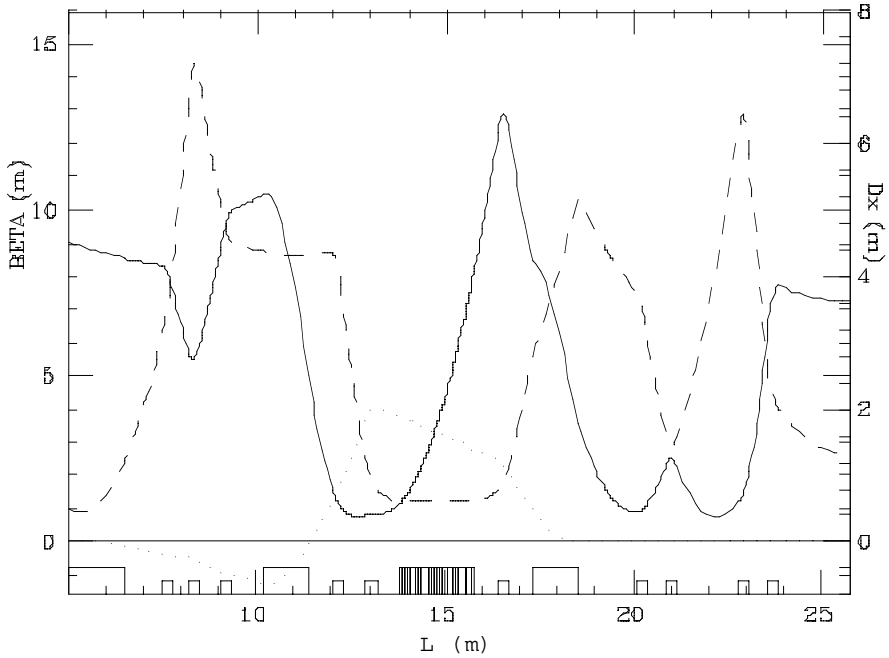

Fig. 7 - Optical functions in the long arc.

TABLE V *- Lattice general parameters*

Q_x	5.18	Q_y	6.15
δQ_x**(hshort)***	1.17	δQ_y**(hshort)***	1.569
δQ_x**(hlong)***	1.42	δQ_y**(hlong)***	1.506
β_x**(hshort)****	5.58	β_y**(hshort)****	.8805
β_x**(hlong)****	7.2409	β_y**(hlong)****	2.6596
C_x	-8.9	C_y	-20.6
α_c	.0059	NF_{sex}	***8***

***** *From IP to arc symmetry point.*
****** *At the arc symmetry point.*

A dynamic aperture calculation has been performed with a KLOE+KLOE lattice configuration, the results are comparable to the previous one.

REFERENCES

[1] M.E.Biagini et al., DAΦNE Technical Note L-9 (1993).
[2] A.Gaddi, S.Moccia, private communication.
[3] M.Modena, private communication.
[4] J.Brown, Revised compensator design, Oxford Instruments, England.
[5] R.Lown, Program Multifringe, Aster Enterprises, USA.
[6] C.Biscari, Program Apertures, private communication.
[7] C.Biscari, Program Splitter, private communication.

APPENDIX A - *KLOE field profile*

Z (m)	Bz (T)	Z (m)	Bz (T)	Z (m)	Bz (T)
0.	.600028	1.50	.605635	3.00	.0046059
.03	.6000339	1.53	.6043041	3.03	.004633
.06	.600051	1.56	.6025254	3.06	.0046566
.09	.600079	1.59	.6001285	3.09	.0046753
.12	.6001181	1.62	.5969508	3.12	.0046887
.15	.6001688	1.65	.5926653	3.15	.0046956
.18	.6002303	1.68	.5869598	3.18	.0046957
.21	.6003034	1.71	.5792033	3.21	.0046884
.24	.6003879	1.74	.5688	3.24	.0046736
.27	.6004838	1.77	.5545992	3.27	.0046504
.30	.6005911	1.80	.5355586	3.30	.0046192
.33	.6007103	1.83	.5099563	3.33	.0045803
.36	.6008607	1.86	.4765813	3.36	.0045334
.39	.6009831	1.89	.4341414	3.39	.0044785
.42	.6011368	1.92	.3830688	3.42	.004416
.45	.6013024	1.95	.3254938	3.45	.0043466
.48	.6014797	1.98	.2657688	3.48	.0042702
.51	.6016688	2.01	.2084781	3.51	.0041872
.54	.6018692	2.04	.1580375	3.54	.0040983
.57	.6020816	2.07	.1171227	3.57	.0040034
.60	.6023048	2.10	.0852766	3.60	.0039035
.63	.6025394	2.13	.0619297	3.63	.0037987
.66	.6027846	2.16	.0451094	3.66	.0036896
.69	.6030403	2.19	.0333922	3.69	.0035763
.72	.6033061	2.22	.0250906	3.72	.0034596
.75	.6035816	2.25	.0194109	3.75	.0033397
.78	.6038656	2.28	.0153313	3.78	.0032169
.81	.6041579	2.31	.0124738	3.81	.003092
.84	.6044573	2.34	.0103832	3.84	.0029647
.87	.6047627	2.37	.0088689	3.87	.0028357
.90	.6050731	2.40	.007741	3.90	.0027051
.93	.6053873	2.43	.0068992	3.93	.0025731
.96	.6057029	2.46	.0062596	3.96	.0024402
.99	.6060183	2.49	.0057788	3.99	.0023063
1.02	.6063306	2.52	.0054084	4.02	.0021718
1.05	.6066371	2.55	.0051276	4.05	.0020367
1.08	.6069353	2.58	.0049129	4.08	.0019012
1.11	.6072209	2.61	.0047534	4.11	.0017655
1.14	.6074896	2.64	.0046348	4.14	.0016296
1.17	.6077356	2.67	.0045507	4.17	.0014935
1.20	.6079542	2.70	.0044937	4.20	.0013574
1.23	.6081357	2.73	.0044588	4.23	.0012214
1.26	.6082738	2.76	.0044417	4.26	.0010854
1.29	.6083546	2.79	.0044392	4.29	.0009494
1.32	.6083668	2.82	.0044477	4.32	.0008136
1.35	.6082909	2.85	.004465	4.35	.0006778
1.38	.6081099	2.88	.0044885	4.38	.0005421
1.41	.6077914	2.91	.0045161	4.41	.0004065
1.44	.6073076	2.94	.004546	4.44	.0002708
1.47	.6066047	2.97	.0045764	4.47	.0001355

APPENDIX B - *Compensator field profile*

Z (m)	Bz (T)	Z (m)	Bz (T)
0.0	1.58192	0.95	0.00111898
0.05	1.58594	1.0	0.000814927
0.1	1.59879	1.05	0.00062107
0.15	1.62406	1.1	0.000477393
0.2	1.65734	1.15	0.000382074
0.25	1.66517	1.2	0.000306883
0.3	1.57806	1.25	0.0002057412
0.35	1.35264	1.3	0.000211356
0.4	1.02965	1.35	0.00018028
0.45	0.68251	1.4	0.000153553
0.5	0.38428	1.45	0.000128453
0.55	0185609	1.5	0.000113975
0.6	0.0812912	1.55	0.000099497
0.65	0.033386	1.6	0.00008502
0.7	0.0148083	1.65	0.000076478
0.75	0.00747871	1.7	0.000068208
0.8	0.00407373	1.75	0.000059938
0.85	0.00244669	1.8	0.000052327
0.9	0.00160179	1.85	0.0

APPENDIX C.1 - *MAD Input deck*

```
TITLE " KLOE15 - compens. Oxford  centro a 4.06 form IP - 17/2/1994"
! PHYSICAL ELEMENTS FOLLOW
! Low beta insertion KLOE

tq1k=-.1042713
tq2k=-.1829537
tq3k=-.2696796

NL=10
bro=1.701176886

Q1Dk:MULTIPOLE, K1L=.6547794 /NL   ,T1=tq1K
Q2Dk:MULTIPOLE, K1L=-2.002029 /NL,T1=tq2K
Q3Dk:MULTIPOLE, K1L=.7907851 /NL   ,T1=tq3K

ksol1=0.60065/bro
ksol2=0.60374/bro
ksol3=0.6080/bro

l2k=.20
l3k=.20

DSOL1k:  SOLENOID  ,L=0.46, KS=ksol1
DSOL2k:  SOLENOID  ,L=l2k, KS=ksol2
DSOL3k:  SOLENOID  ,L=l3k, KS=ksol3

! dsol5k comincia a 1.68 m !
DSOL4k:  SOLENOID  ,L=.03, KS=.5792/bro
DSOL5k:  SOLENOID  ,L=0.03, KS=.5688/bro
DSOL6k:  SOLENOID  ,L=0.03, KS=.5546/bro
DSOL7k:  SOLENOID  ,L=0.03, KS=.5356/bro
DSOL8k:  SOLENOID  ,L=.06, KS=.50607/bro
DSOL9k:  SOLENOID  ,L=0.06, KS=.42983/bro
DSOL10k:  SOLENOID  ,L=0.06, KS=.32442/bro
DSOL11k:  SOLENOID  ,L=0.06, KS=.21191/bro
DSOL12k:  SOLENOID  ,L=0.06, KS=.121658/bro
DSOL13k:  SOLENOID  ,L=0.06, KS=.06519/bro
DSOL14k:  SOLENOID  ,L=0.12, KS=.03022/bro
DSOL15k:  SOLENOID  ,L=0.27, KS=.01023/bro
DSOL16k:  SOLENOID  ,L=0.45, KS=.00487/bro

! nel 1^ quadrupolo il campo e' costante!
DSOL111k:SOLENOID  ,L=0.10/NL  ,KS=.6021325/bro
DSOL112k:SOLENOID  ,L=0.20/NL , KS=.6021325/bro

! 2^ quad - comincia a .84 m ed e' lungo .35
DSOL21k:SOLENOID  ,L=0.175/NL , KS=.60635/bro
DSOL22k:SOLENOID  ,L=0.35/NL , KS=.60635/bro
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```
! 3^ quad - comincia a 1.39 m ed e' lungo .27
DSOL31k:SOLENOID  ,L=0.135/NL , KS=.6075/bro
DSOL32k:SOLENOID  ,L=0.27/NL, KS=.6070/bro
DSOL33k:SOLENOID  ,L=0.27/NL, KS=.6066/bro
DSOL34k:SOLENOID  ,L=0.27/NL, KS=.6056/bro
DSOL35k:SOLENOID  ,L=0.27/NL, KS=.6043/bro
DSOL36k:SOLENOID  ,L=0.27/NL, KS=.6025/bro
DSOL37k:SOLENOID  ,L=0.27/NL, KS=.6001/bro
DSOL38k:SOLENOID  ,L=0.27/NL, KS=.5969/bro
DSOL39k:SOLENOID  ,L=0.27/NL, KS=.5926/bro
DSOL310k:SOLENOID  ,L=0.27/NL, KS=.5898/bro
DSOL311k:SOLENOID  ,L=0.135/NL , KS=.5870/bro

dksk=2.026342e-01

ks1=-1.58192/bro
dc1: solenoid, l=.05,ks=ks1*(1.+dksk/ks1)
ks2=-1.58594/bro
dc2: solenoid, l=.05,ks=ks2*(1.+dksk/ks1)
ks3=-1.59879/bro
dc3: solenoid, l=.05,ks=ks3*(1.+dksk/ks1)
ks4=-1.62406/bro
dc4: solenoid, l=.05,ks=ks4*(1.+dksk/ks1)
ks5=-1.65734/bro
dc5: solenoid, l=.05,ks=ks5*(1.+dksk/ks1)
ks6=-1.66517/bro
dc6: solenoid, l=.05,ks=ks6*(1.+dksk/ks1)
ks7=-1.57806/bro
dc7: solenoid, l=.05,ks=ks7*(1.+dksk/ks1)
ks8=-1.35264/bro
dc8: solenoid, l=.05,ks=ks8*(1.+dksk/ks1)
ks9=-1.02965/bro
dc9: solenoid, l=.05,ks=ks9*(1.+dksk/ks1)
ks10=-.68251/bro
dc10: solenoid, l=.05,ks=ks10*(1.+dksk/ks1)
ks11=-.38428/bro
dc11: solenoid, l=.05,ks=ks11*(1.+dksk/ks1)
ks12=-.185609/bro
dc12: solenoid, l=.05,ks=ks12*(1.+dksk/ks1)
ks13=-.0812912/bro
dc13: solenoid, l=.05,ks=ks13*(1.+dksk/ks1)
ks14=-.033386/bro
dc14: solenoid, l=.05,ks=ks14*(1.+dksk/ks1)
ks15=-.0148083/bro
dc15: solenoid, l=.05,ks=ks15*(1.+dksk/ks1)
ks16=-.00747871/bro
dc16: solenoid, l=.05,ks=ks16*(1.+dksk/ks1)
ks17=-.00407373/bro
dc17: solenoid, l=.05,ks=ks17*(1.+dksk/ks1)
ks18=-.00244669/bro
dc18: solenoid, l=.05,ks=ks18*(1.+dksk/ks1)
ks19=-.00160179/bro
dc19: solenoid, l=.05,ks=ks19*(1.+dksk/ks1)
ks20=-.00111898/bro
dc20: solenoid, l=.04,ks=ks19*(1.+dksk/ks1)
```

```
compa: line=(dc1,dc2,dc3,dc4,dc5,dc6,dc7,dc8,dc9,dc10,&
         dc11,dc12,dc13,dc14,dc15,dc16)
comp: line=(-compa,compa)

trq1k: line=(dsol111k,9*(q1dk,dsol112k),q1dk,dsol111k)
trq2k: line=(dsol21k,9*(q2dk,dsol22k),q2dk,dsol21k)
trq3k: line=(dsol31k,q3dk,dsol32k,q3dk,dsol33k,&
       q3dk,dsol34k,q3dk,dsol35k,q3dk,dsol36k,&
       q3dk,dsol37k,q3dk,dsol38k,q3dk,dsol39k,&
       q3dk,dsol310k,q3dk,dsol311k)

! solenoidal low beta insertion

D1K: DRIFT,L=.26
D2k:DRIFT ,L=0.19

m11:marker
m21:marker
IP:marker

KLOE1:  LINE= (m11,DSOL1k,trq1K,DSOL2K,trq2K,DSOL3k,&
             trq3K,dsol4k,DSOL5K,&
            dsol6k,dsol7k,dsol8k,dsol9k,dsol10k,dsol11k,dsol12k,&
             dsol13k,DSOL14K,DSOL15K,DSOL16K,&
              D1K,Comp,D2K,m21)

KLOE: LINE=(KLOE2,IP,KLOE1)

use,kloe1
match,kloe1,betx=4.5,bety=0.045
vary,tq1k,step=0.001
vary,tq2k,step=0.001
vary,tq3k,step=0.001
vary,dksk,step=0.001
vary,q1dk[k1l],step=0.00001,upper=.06968
vary,q2dk[k1l],step=0.00001,lower=-.2117
vary,q3dk[k1l],step=0.00001,upper=.838
rmatrix,range=KLOE1,rm(1,3)=0.,rm(1,4)=0.,rm(2,3)=0.,rm(2,4)=0.
rmatrix,range=KLOE1,rm(1,2)=4.7,rm(2,2)=.38
constrai,#E,MUY=.412
simplex,calls=2000,tolerance=1.e-12
migrad,calls=2000,tolerance=1.e-12
endmatch
print,full
twiss,couple,betx=4.5,BETY=0.045,Dpx=1.25,px=12.5e-03,tape
stop
```

APPENDIX C.2 - *MAD Output*

```
115 KLOE1      1     5.050  end    RMATRIX range
      0.959480        4.700000        0.000000        0.000000        0.000000        0.000000
     -0.135191        0.379999       -0.000001       -0.000001        0.000000        0.000000
     -0.000004       -0.000023       -3.997040        0.111001        0.000000        0.000000
     -0.000001       -0.000004       -1.017964       -0.221915        0.000000        0.000000
      0.000000        0.000000        0.000000        0.000000        1.000000        0.000001
      0.000000        0.000000        0.000000        0.000000        0.000000        1.000000
                                 Contribution of this constraint:                                2.778866E-12
115 KLOE1      1     5.050  end    matching range
                                 BETX                    9.051596E+00
                                 ALFX                    1.868210E-01
                                 MUX                     1.317440E-01
                                 BETY                    9.927413E-01
                                 ALFY                    3.642998E-01
                                 MUY                     4.120000E-01
                                 DX                      0.000000E+00
                                 DPX                     0.000000E+00
                                 DY                      0.000000E+00
                                 DPY                     0.000000E+00

                                 Total penalty function:                                         3.243303E-12

Command: ENDMATCH            Time:      29.720          Calls:     296            Status: final values
Penalty function:                3.243303E-12          Estimated distance to minimum:   1.235660E-14

Element          attribute          value          step           lower          upper
Q3DK             K1L                7.907851E-02   1.000000E-05   0.000000E+00   8.380000E-01
Q2DK             K1L               -2.002029E-01   1.000000E-05  -2.117000E-01   0.000000E+00
Q1DK             K1L                6.547794E-02   1.000000E-05   0.000000E+00   6.968000E-02
DKSK                                2.026341E-01   1.000000E-03   0.000000E+00   0.000000E+00
TQ3K                               -2.696797E-01   1.000000E-03   0.000000E+00   0.000000E+00
TQ2K                               -1.829537E-01   1.000000E-03   0.000000E+00   0.000000E+00
TQ1K                               -1.042713E-01   1.000000E-03   0.000000E+00   0.000000E+00

 KLOE15 - compens. Oxford  centro a 4.06 form IP - 7/2/1994          "MAD" Version: 8.9/0     Run: 14/02/94  10.11.20
Coupled lattice functions.    TWISS              line: KLOE1          range: #S/#E
Delta(p)/p:      0.000000     symm: F            super:   1                                                  page      1
```

pos.	ELEMENT SEQUENCE element name	occ. no.	dist [m]	MODES betal / alfal / mu1 / beta2 / alfa2 / mu2	COUPLING R(1,1) / R(1,2) / R(2,1) / R(2,2)	ORBIT x(co) / px(co) / y(co) / py(co)	DISPERSION Dx / Dpx / Dy / Dpy
				[m] / [1] / [2pi] / [m] / [1] / [2pi]	[1] / [m] / [1/m] / [1]	[mm] / [.001] / [mm] / [.001]	[m] / [1] / [m] / [1]
begin	KLOE1	1	0.000	4.500 / 0.000 / 0.000	0.000 / 0.000	0.000 / 12.500	0.000 / 1.250
				0.045 / 0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
1	M11	1	0.000	4.500 / 0.000 / 0.000	0.000 / 0.000	0.000 / 12.500	0.000 / 1.250
				0.045 / 0.000 / 0.000	0.000 / 0.000	0.000 / 0.000	0.000 / 0.000
2	DSOL1K	1	0.460	4.517 / -0.038 / 0.016	0.081 / 0.000	5.725 / 12.418	0.567 / 1.242
				4.737 / -10.177 / 0.235	0.000 / 0.081	-0.466 / -1.011	-0.046 / -0.100
begin	TRQ1K	1	0.460	4.517 / -0.038 / 0.016	0.081 / 0.000	5.725 / 12.418	0.567 / 1.242
				4.737 / -10.177 / 0.235	0.000 / 0.081	-0.466 / -1.011	-0.046 / -0.100
3	DSOL111K	1	0.470	4.518 / -0.038 / 0.017	0.083 / 0.000	5.848 / 12.414	0.579 / 1.242
				4.942 / -10.396 / 0.235	0.000 / 0.083	-0.486 / -1.032	-0.048 / -0.102
4	Q1DK	1	0.470	4.518 / 0.256 / 0.017	0.083 / 0.000	5.848 / 12.033	0.579 / 1.204
				4.942 / -10.718 / 0.235	-0.003 / 0.083	-0.486 / -0.984	-0.048 / -0.097
5	DSOL112K	1	0.490	4.508 / 0.254 / 0.017	0.087 / 0.000	6.087 / 12.026	0.603 / 1.203
				5.380 / -11.184 / 0.235	-0.003 / 0.087	-0.528 / -1.027	-0.052 / -0.102
6	Q1DK	2	0.490	4.508 / 0.548 / 0.017	0.087 / 0.000	6.087 / 11.629	0.603 / 1.164
				5.380 / -11.535 / 0.235	-0.005 / 0.087	-0.528 / -0.978	-0.052 / -0.097
7	DSOL112K	2	0.510	4.486 / 0.545 / 0.018	0.090 / 0.000	6.317 / 11.621	0.626 / 1.163
				5.852 / -12.029 / 0.236	-0.005 / 0.090	-0.570 / -1.019	-0.056 / -0.101
8	Q1DK	3	0.510	4.486 / 0.838 / 0.018	0.090 / 0.000	6.317 / 11.209	0.626 / 1.122
				5.852 / -12.411 / 0.236	-0.007 / 0.090	-0.570 / -0.970	-0.056 / -0.096
9	DSOL112K	3	0.530	4.453 / 0.833 / 0.019	0.094 / 0.000	6.539 / 11.201	0.648 / 1.122
				6.359 / -12.937 / 0.237	-0.007 / 0.094	-0.612 / -1.009	-0.060 / -0.100
10	Q1DK	4	0.530	4.453 / 1.124 / 0.019	0.094 / 0.000	6.539 / 10.774	0.648 / 1.079
				6.359 / -13.352 / 0.237	-0.008 / 0.094	-0.612 / -0.959	-0.060 / -0.095
11	DSOL112K	4	0.550	4.408 / 1.117 / 0.019	0.097 / 0.000	6.753 / 10.766	0.669 / 1.078
				6.904 / -13.912 / 0.237	-0.008 / 0.098	-0.655 / -0.997	-0.064 / -0.099
12	Q1DK	5	0.550	4.408 / 1.405 / 0.019	0.097 / 0.000	6.753 / 10.325	0.669 / 1.035
				6.904 / -14.363 / 0.237	-0.009 / 0.098	-0.655 / -0.948	-0.064 / -0.094
13	DSOL112K	5	0.570	4.352 / 1.394 / 0.020	0.100 / 0.000	6.957 / 10.317	0.689 / 1.034
				7.490 / -14.959 / 0.237	-0.009 / 0.102	-0.699 / -0.984	-0.068 / -0.097
14	Q1DK	6	0.570	4.352 / 1.678 / 0.020	0.100 / 0.000	6.957 / 9.862	0.689 / 0.989
				7.490 / -15.449 / 0.237	-0.010 / 0.102	-0.699 / -0.934	-0.068 / -0.092
15	DSOL112K	6	0.590	4.285 / 1.663 / 0.021	0.104 / 0.000	7.151 / 9.854	0.708 / 0.988
				8.121 / -16.083 / 0.238	-0.010 / 0.105	-0.743 / -0.969	-0.073 / -0.096
16	Q1DK	7	0.590	4.285 / 1.944 / 0.021	0.104 / 0.000	7.151 / 9.386	0.708 / 0.942
				8.121 / -16.615 / 0.238	-0.010 / 0.105	-0.743 / -0.919	-0.073 / -0.091
17	DSOL112K	7	0.610	4.208 / 1.924 / 0.022	0.107 / 0.000	7.336 / 9.378	0.727 / 0.941
				8.799 / -17.292 / 0.238	-0.010 / 0.109	-0.787 / -0.952	-0.077 / -0.094
18	Q1DK	8	0.610	4.208 / 2.200 / 0.022	0.107 / 0.000	7.336 / 8.898	0.727 / 0.893
				8.799 / -17.869 / 0.238	-0.009 / 0.109	-0.787 / -0.903	-0.077 / -0.089
19	DSOL112K	8	0.630	4.120 / 2.175 / 0.022	0.111 / 0.000	7.511 / 8.890	0.744 / 0.893
				9.528 / -18.590 / 0.239	-0.009 / 0.113	-0.832 / -0.934	-0.081 / -0.092
20	Q1DK	9	0.630	4.120 / 2.445 / 0.022	0.111 / 0.000	7.511 / 8.397	0.744 / 0.844
				9.528 / -19.215 / 0.239	-0.008 / 0.113	-0.832 / -0.885	-0.081 / -0.087
21	DSOL112K	9	0.650	4.023 / 2.413 / 0.023	0.114 / 0.000	7.676 / 8.389	0.760 / 0.843
				10.312 / -19.986 / 0.239	-0.009 / 0.117	-0.877 / -0.914	-0.086 / -0.090
22	Q1DK	10	0.650	4.023 / 2.677 / 0.023	0.114 / 0.000	7.676 / 7.886	0.760 / 0.793
				10.312 / -20.663 / 0.239	-0.007 / 0.117	-0.877 / -0.867	-0.086 / -0.085
23	DSOL111K	2	0.660	3.970 / 2.658 / 0.024	0.116 / 0.000	7.753 / 7.882	0.768 / 0.793
				10.729 / -21.074 / 0.239	-0.007 / 0.119	-0.899 / -0.880	-0.088 / -0.087

KLOE15 - compens. Oxford centro a 4.06 form IP - 7/2/1994 "MAD" Version: 8.9/0 Run: 14/02/94 10.11.20
Coupled lattice functions, TWISS line: KLOE1 range: #S/#E
Delta(p)/p: 0.000000 symm: F super: 1 page 2

pos. no.	element name	occ. no.	dist [m]	betal [m] / beta2 [m]	alfal [1] / alfa2 [1]	mul [2pi] / mu2 [2pi]	R(1,1) [1] / R(2,1) [1/m]	R(1,2) [m] / R(2,2) [1]	x(co) [mm] / y(co) [mm]	px(co) [.001] / py(co) [.001]	Dx [m] / Dy [m]	Dpx [1] / Dpy [1]
end	TRQ1K	1	0.660	3.970	2.658	0.024	0.116	0.000	7.753	7.882	0.768	0.793
				10.729	-21.074	0.239	-0.007	0.119	-0.899	-0.880	-0.088	-0.087
24	DSOL2K	1	0.860	2.985	2.270	0.033	0.150	0.001	9.280	7.792	0.920	0.784
				20.795	-29.240	0.241	-0.007	0.156	-1.405	-1.151	-0.138	-0.114
begin	TRQ2K	1	0.860	2.985	2.270	0.033	0.150	0.001	9.280	7.792	0.920	0.784
				20.795	-29.240	0.241	-0.007	0.156	-1.405	-1.151	-0.138	-0.114
25	DSOL21K	1	0.878	2.906	2.235	0.034	0.153	0.001	9.412	7.783	0.934	0.783
				21.831	-29.948	0.241	-0.007	0.160	-1.454	-1.175	-0.142	-0.116
26	Q2DK	1	0.878	2.906	1.660	0.034	0.153	0.001	9.412	9.647	0.934	0.968
				21.829	-25.617	0.241	0.004	0.159	-1.454	-1.577	-0.142	-0.156
27	DSOL22K	1	0.913	2.791	1.618	0.036	0.160	0.001	9.740	9.626	0.966	0.966
				23.658	-26.646	0.242	0.004	0.166	-1.570	-1.636	-0.154	-0.162
28	Q2DK	2	0.913	2.791	1.064	0.036	0.159	0.001	9.740	11.560	0.966	1.158
				23.655	-21.943	0.242	0.013	0.165	-1.570	-2.040	-0.154	-0.203
29	DSOL22K	2	0.948	2.717	1.041	0.038	0.166	0.002	10.134	11.536	1.005	1.155
				25.215	-22.631	0.242	0.013	0.171	-1.705	-2.110	-0.167	-0.210
30	Q2DK	3	0.948	2.717	0.501	0.038	0.166	0.002	10.134	13.552	1.005	1.355
				25.212	-17.608	0.242	0.020	0.171	-1.705	-2.517	-0.167	-0.250
31	DSOL22K	3	0.983	2.682	0.488	0.040	0.173	0.002	10.597	13.525	1.051	1.352
				26.459	-18.014	0.242	0.020	0.177	-1.859	-2.600	-0.182	-0.259
32	Q2DK	4	0.983	2.682	-0.047	0.040	0.173	0.002	10.597	15.639	1.051	1.562
				26.455	-12.734	0.242	0.024	0.176	-1.859	-3.011	-0.182	-0.300
33	DSOL22K	4	1.018	2.686	-0.057	0.042	0.180	0.002	11.132	15.608	1.104	1.559
				27.353	-12.923	0.242	0.024	0.182	-2.034	-3.106	-0.199	-0.309
34	Q2DK	5	1.018	2.685	-0.593	0.042	0.180	0.002	11.132	17.835	1.104	1.780
				27.349	-7.454	0.242	0.026	0.181	-2.034	-3.524	-0.199	-0.351
35	DSOL22K	5	1.053	2.727	-0.607	0.044	0.187	0.002	11.742	17.800	1.164	1.776
				27.873	-7.500	0.242	0.026	0.187	-2.230	-3.632	-0.219	-0.362
36	Q2DK	6	1.053	2.727	-1.154	0.044	0.187	0.002	11.742	20.155	1.164	2.009
				27.869	-1.917	0.242	0.025	0.187	-2.230	-4.057	-0.219	-0.404
37	DSOL22K	6	1.088	2.808	-1.180	0.046	0.194	0.002	12.432	20.115	1.232	2.006
				28.002	-1.896	0.243	0.025	0.192	-2.450	-4.180	-0.240	-0.416
38	Q2DK	7	1.088	2.808	-1.744	0.046	0.194	0.002	12.432	22.615	1.232	2.253
				27.999	3.724	0.243	0.022	0.192	-2.450	-4.612	-0.240	-0.460
39	DSOL22K	7	1.123	2.932	-1.791	0.048	0.201	0.002	13.207	22.577	1.309	2.249
				27.738	3.733	0.243	0.022	0.198	-2.694	-4.750	-0.264	-0.473
40	Q2DK	8	1.123	2.931	-2.381	0.048	0.200	0.002	13.207	25.234	1.309	2.513
				27.734	9.310	0.243	0.016	0.197	-2.694	-5.193	-0.264	-0.518
41	DSOL22K	8	1.158	3.101	-2.457	0.050	0.208	0.002	14.071	25.186	1.394	2.508
				27.086	9.227	0.243	0.016	0.203	-2.963	-5.347	-0.291	-0.533
42	Q2DK	9	1.158	3.100	-3.082	0.050	0.207	0.002	14.071	28.028	1.394	2.789
				27.083	14.684	0.243	0.008	0.203	-2.963	-5.801	-0.291	-0.578
43	DSOL22K	9	1.193	3.320	-3.197	0.052	0.214	0.002	15.032	27.976	1.489	2.784
				26.064	14.431	0.243	0.008	0.209	-3.260	-5.972	-0.320	-0.595
44	Q2DK	10	1.193	3.319	-3.868	0.052	0.214	0.002	15.032	31.019	1.489	3.085
				26.061	19.694	0.243	-0.002	0.209	-3.260	-6.439	-0.320	-0.642
45	DSOL21K	2	1.210	3.456	-3.951	0.052	0.217	0.001	15.564	30.991	1.541	3.082
				25.377	19.447	0.243	-0.002	0.212	-3.421	-6.534	-0.336	-0.651
end	TRQ2K	1	1.210	3.456	-3.951	0.052	0.217	0.001	15.564	30.991	1.541	3.082
				25.377	19.447	0.243	-0.002	0.212	-3.421	-6.534	-0.336	-0.651

KLOE15 - compens. Oxford centro a 4.06 form IP - 7/2/1994 "MAD" Version: 8.9/0 Run: 14/02/94 10.11.20
Coupled lattice functions. TWISS line: KLOE1 range: #S/#E
Delta(p)/p: 0.000000 symm: F super: 1 page 3

pos. no.	ELEMENT SEQUENCE element name	occ. no.	dist [m]	MODES beta1 [m] / beta2 [m]	alfa1 [1] / alfa2 [1]	mu1 [2pi] / mu2 [2pi]	COUPLING R(1,1) [1] / R(2,1) [1/m]	R(1,2) [m] / R(2,2) [1]	ORBIT x(co) [mm] / y(co) [mm]	px(co) [.001] / py(co) [.001]	DISPERSION Dx [m] / Dy [m]	Dpx [1] / Dpy [1]
	46 DSOL3K	1	1.410	5.222	-4.879	0.060	0.254	0.001	21.568	30.619	2.133	3.046
				18.172	16.574	0.245	-0.002	0.250	-5.500	-7.607	-0.541	-0.757
	begin TRQ3K	1	1.410	5.222	-4.879	0.060	0.254	0.001	21.568	30.619	2.133	3.046
				18.172	16.574	0.245	-0.002	0.250	-5.500	-7.607	-0.541	-0.757
	47 DSOL31K	1	1.424	5.354	-4.941	0.060	0.257	0.000	21.968	30.591	2.172	3.043
				17.727	16.377	0.245	-0.002	0.253	-5.655	-7.678	-0.556	-0.764
	48 Q3DK	1	1.424	5.354	-4.522	0.060	0.257	0.000	21.968	28.871	2.172	2.873
				17.727	14.992	0.245	-0.006	0.253	-5.655	-7.170	-0.556	-0.713
	49 DSOL32K	1	1.451	5.601	-4.625	0.061	0.262	0.000	22.719	28.817	2.246	2.868
				16.927	14.664	0.245	-0.006	0.258	-5.958	-7.304	-0.586	-0.727
	50 Q3DK	2	1.451	5.601	-4.186	0.061	0.262	0.000	22.719	27.033	2.246	2.692
				16.927	13.338	0.245	-0.008	0.258	-5.958	-6.786	-0.586	-0.675
	51 DSOL33K	1	1.478	5.830	-4.270	0.062	0.267	0.000	23.419	26.981	2.315	2.687
				16.214	13.067	0.245	-0.008	0.263	-6.254	-6.910	-0.615	-0.688
	52 Q3DK	3	1.478	5.830	-3.811	0.062	0.267	0.000	23.419	25.138	2.315	2.505
				16.215	11.793	0.245	-0.010	0.263	-6.254	-6.384	-0.615	-0.635
	53 DSOL34K	1	1.505	6.037	-3.879	0.062	0.272	0.000	24.066	25.086	2.379	2.500
				15.584	11.574	0.246	-0.010	0.269	-6.542	-6.499	-0.643	-0.647
	54 Q3DK	4	1.505	6.037	-3.402	0.062	0.272	0.000	24.066	23.188	2.379	2.312
				15.584	10.347	0.246	-0.011	0.269	-6.542	-5.965	-0.643	-0.594
	55 DSOL35K	1	1.532	6.222	-3.454	0.063	0.277	0.000	24.659	23.138	2.437	2.307
				15.030	10.173	0.246	-0.011	0.274	-6.822	-6.071	-0.670	-0.604
	56 Q3DK	5	1.532	6.222	-2.961	0.063	0.277	0.000	24.659	21.188	2.437	2.114
				15.030	8.986	0.246	-0.011	0.274	-6.822	-5.532	-0.670	-0.551
	57 DSOL36K	1	1.559	6.383	-2.999	0.064	0.281	0.000	25.198	21.140	2.491	2.110
				14.549	8.852	0.246	-0.011	0.280	-7.091	-5.627	-0.697	-0.560
	58 Q3DK	6	1.559	6.383	-2.493	0.064	0.281	0.000	25.198	19.142	2.491	1.912
				14.549	7.700	0.246	-0.011	0.280	-7.091	-5.085	-0.697	-0.506
	59 DSOL37K	1	1.586	6.518	-2.518	0.065	0.286	0.000	25.679	19.097	2.538	1.908
				14.136	7.600	0.247	-0.011	0.285	-7.351	-5.170	-0.722	-0.514
	60 Q3DK	7	1.586	6.518	-2.000	0.065	0.286	0.000	25.679	17.056	2.538	1.706
				14.136	6.477	0.247	-0.009	0.285	-7.351	-4.626	-0.722	-0.460
	61 DSOL38K	1	1.613	6.627	-2.016	0.065	0.291	0.000	26.104	17.012	2.581	1.702
				13.788	6.407	0.247	-0.009	0.291	-7.600	-4.700	-0.747	-0.468
	62 Q3DK	8	1.613	6.627	-1.488	0.065	0.291	0.000	26.104	14.932	2.581	1.497
				13.788	5.309	0.247	-0.007	0.291	-7.600	-4.156	-0.747	-0.414
	63 DSOL39K	1	1.640	6.707	-1.495	0.066	0.296	0.000	26.470	14.891	2.617	1.493
				13.503	5.263	0.247	-0.007	0.296	-7.836	-4.220	-0.770	-0.420
	64 Q3DK	9	1.640	6.707	-0.960	0.066	0.296	0.000	26.470	12.777	2.617	1.284
				13.503	4.185	0.247	-0.004	0.296	-7.836	-3.676	-0.770	-0.366
	65 DSOL310K	1	1.667	6.759	-0.962	0.066	0.301	0.000	26.777	12.738	2.648	1.280
				13.277	4.159	0.248	-0.004	0.301	-8.061	-3.730	-0.792	-0.371
	66 Q3DK	10	1.667	6.759	-0.421	0.066	0.301	0.000	26.777	10.593	2.648	1.068
				13.277	3.096	0.248	0.000	0.301	-8.061	-3.189	-0.792	-0.318
	67 DSOL311K	1	1.680	6.771	-0.420	0.067	0.304	0.000	26.901	10.575	2.660	1.066
				13.194	3.090	0.248	0.000	0.304	-8.167	-3.210	-0.803	-0.320
	end TRQ3K	1	1.680	6.771	-0.420	0.067	0.304	0.000	26.901	10.575	2.660	1.066
				13.194	3.090	0.248	0.000	0.304	-8.167	-3.210	-0.803	-0.320
	68 DSOL4K	1	1.710	6.796	-0.420	0.067	0.309	0.000	27.176	10.535	2.688	1.062
				13.009	3.078	0.248	0.000	0.309	-8.402	-3.252	-0.826	-0.324

KLOE15 - compens. Oxford centro a 4.06 form IP - 7/2/1994 "MAD" Version: 8.9/0 Run: 14/02/94 10.11.20
Coupled lattice functions. TWISS line: KLOE1 range: #S/#E
Delta(p)/p: 0.000000 symm: F super: 1 page 4

pos. no.	ELEMENT name	SEQUENCE occ. no.	dist [m]	MODES betal [m] alfal [1] mu1 [2pi] beta2 [m] alfa2 [1] mu2 [2pi]	COUPLING R(1,1) [1] R(1,2) [m] R(2,1) [1/m] R(2,2) [1]	ORBIT x(co) [mm] px(co) [.001] y(co) [mm] py(co) [.001]	DISPERSION Dx [m] Dpx [1] Dy [m] Dpy [1]
69	DSOL5K	1	1.740	6.821 -0.419 0.068 12.824 3.064 0.248	0.315 0.000 0.000 0.315	27.449 10.496 -8.637 -3.303	2.715 1.059 -0.849 -0.329
70	DSOL6K	1	1.770	6.846 -0.419 0.069 12.641 3.050 0.249	0.320 0.000 0.000 0.320	27.720 10.458 -8.872 -3.347	2.742 1.055 -0.872 -0.333
71	DSOL7K	1	1.800	6.871 -0.419 0.070 12.459 3.035 0.249	0.325 0.000 0.000 0.325	27.991 10.421 -9.104 -3.390	2.769 1.051 -0.895 -0.338
72	DSOL8K	1	1.860	6.922 -0.420 0.071 12.096 3.002 0.250	0.335 0.000 0.000 0.335	28.531 10.353 -9.562 -3.470	2.823 1.045 -0.940 -0.346
73	DSOL9K	1	1.920	6.972 -0.423 0.072 11.738 2.963 0.251	0.344 0.000 0.000 0.344	29.076 10.299 -9.991 -3.539	2.878 1.039 -0.982 -0.353
74	DSOL10K	1	1.980	7.023 -0.430 0.074 11.385 2.920 0.252	0.350 0.000 0.000 0.350	29.635 10.262 -10.373 -3.592	2.934 1.036 -1.019 -0.358
75	DSOL11K	1	2.040	7.075 -0.438 0.075 11.038 2.872 0.252	0.354 0.000 0.000 0.354	30.210 10.242 -10.701 -3.628	2.992 1.034 -1.052 -0.362
76	DSOL12K	1	2.100	7.129 -0.448 0.076 10.696 2.822 0.253	0.357 0.000 0.000 0.357	30.801 10.232 -10.985 -3.649	3.051 1.033 -1.080 -0.364
77	DSOL13K	1	2.160	7.183 -0.458 0.078 10.361 2.772 0.254	0.358 0.000 0.000 0.358	31.402 10.227 -11.240 -3.661	3.111 1.032 -1.105 -0.365
78	DSOL14K	1	2.280	7.295 -0.478 0.080 9.707 2.672 0.256	0.359 0.000 0.000 0.359	32.617 10.223 -11.714 -3.671	3.232 1.032 -1.151 -0.366
79	DSOL15K	1	2.550	7.566 -0.523 0.086 8.326 2.446 0.261	0.360 0.000 0.000 0.360	35.367 10.220 -12.734 -3.680	3.507 1.031 -1.252 -0.367
80	DSOL16K	1	3.000	8.071 -0.599 0.095 6.294 2.068 0.271	0.361 0.000 0.000 0.361	39.956 10.217 -14.416 -3.686	3.966 1.031 -1.418 -0.367
81	D1K	1	3.260	8.394 -0.643 0.100 5.276 1.850 0.278	0.361 0.000 0.000 0.361	42.613 10.217 -15.374 -3.686	4.231 1.031 -1.512 -0.367
begin	COMP	1	3.260	8.394 -0.643 0.100 5.276 1.850 0.278	0.361 0.000 0.000 0.361	42.613 10.217 -15.374 -3.686	4.231 1.031 -1.512 -0.367
begin	COMPA	1	3.260	8.394 -0.643 0.100 5.276 1.850 0.278	0.361 0.000 0.000 0.361	42.613 10.217 -15.374 -3.686	4.231 1.031 -1.512 -0.367
82	DC16	1	3.310	8.458 -0.651 0.101 5.093 1.808 0.280	0.361 0.000 0.000 0.361	43.125 10.217 -15.555 -3.685	4.282 1.031 -1.530 -0.367
83	DC15	1	3.360	8.524 -0.660 0.102 4.914 1.766 0.281	0.360 0.000 0.000 0.360	43.639 10.218 -15.732 -3.684	4.334 1.031 -1.548 -0.367
84	DC14	1	3.410	8.590 -0.668 0.103 4.739 1.724 0.283	0.360 0.000 0.000 0.360	44.156 10.219 -15.899 -3.680	4.385 1.031 -1.564 -0.367
85	DC13	1	3.460	8.658 -0.676 0.104 4.569 1.683 0.285	0.359 0.000 0.000 0.359	44.682 10.222 -16.041 -3.670	4.438 1.032 -1.578 -0.366
86	DC12	1	3.510	8.726 -0.684 0.105 4.403 1.641 0.286	0.357 0.000 0.000 0.357	45.227 10.226 -16.128 -3.647	4.492 1.032 -1.587 -0.363
87	DC11	1	3.560	8.794 -0.689 0.106 4.241 1.601 0.288	0.352 0.000 0.000 0.352	45.809 10.224 -16.108 -3.595	4.550 1.032 -1.585 -0.358
88	DC10	1	3.610	8.863 -0.686 0.107 4.082 1.564 0.290	0.343 0.000 0.000 0.343	46.446 10.195 -15.923 -3.495	4.614 1.029 -1.567 -0.348
89	DC9	1	3.660	8.931 -0.670 0.108 3.928 1.533 0.292	0.330 0.000 0.000 0.330	47.139 10.104 -15.540 -3.331	4.682 1.020 -1.529 -0.332
90	DC8	1	3.710	8.996 -0.634 0.109 3.776 1.508 0.294	0.313 0.000 0.000 0.313	47.877 9.925 -14.963 -3.102	4.756 1.002 -1.473 -0.309
91	DC7	1	3.760	9.057 -0.583 0.109 3.626 1.489 0.296	0.293 0.000 0.000 0.293	48.632 9.661 -14.235 -2.828	4.830 0.977 -1.401 -0.282

KLOE15 - compens. Oxford centro a 4.06 form IP - 7/2/1994 "MAD" Version: 8.9/0 Run: 14/02/94 10.11.20
Coupled lattice functions. TWISS line: KLOE1 range: #S/#E
Delta(p)/p: 0.000000 symm: F super: 1 page 5

pos. no.	ELEMENT name	SEQUENCE occ. no.	dist [m]	MODES betal [m] / beta2 [m]	alfa1 [1] / alfa2 [1]	mu1 [2pi] / mu2 [2pi]	COUPLING R(1,1) [1] / R(1,2) [m] / R(2,1) [1/m] / R(2,2) [1]	ORBIT x(co) [mm] / px(co) [.001] / y(co) [mm] / py(co) [.001]	DISPERSION Dx [m] / Dpx [1] / Dy [m] / Dpy [1]
92	DC6	1	3.810	9.112	-0.523	0.110	0.272	49.372	9.353	4.904	0.946
				3.478	1.470	0.298	0.000	-13.432	-2.545	-1.322	-0.254
93	DC5	1	3.860	9.162	-0.464	0.111	0.252	50.080	9.038	4.974	0.915
				3.332	1.449	0.301	0.000	-12.605	-2.275	-1.241	-0.227
94	DC4	1	3.910	9.205	-0.406	0.112	0.232	50.751	8.727	5.041	0.885
				3.188	1.424	0.303	0.000	-11.771	-2.024	-1.159	-0.202
95	DC3	1	3.960	9.243	-0.350	0.113	0.213	51.389	8.417	5.104	0.854
				3.047	1.397	0.306	0.000	-10.928	-1.790	-1.076	-0.179
96	DC2	1	4.010	9.275	-0.295	0.114	0.194	51.993	8.104	5.164	0.824
				2.909	1.368	0.308	0.000	-10.070	-1.570	-0.992	-0.157
97	DC1	1	4.060	9.302	-0.239	0.115	0.175	52.566	7.785	5.221	0.792
				2.773	1.337	0.311	0.000	-9.193	-1.362	-0.906	-0.136
end	COMPA	1	4.060	9.302	-0.239	0.115	0.175	52.566	7.785	5.221	0.792
				2.773	1.337	0.311	0.000	-9.193	-1.362	-0.906	-0.136
begin	COMPA	2	4.060	9.302	-0.239	0.115	0.175	52.566	7.785	5.221	0.792
				2.773	1.337	0.311	0.000	-9.193	-1.362	-0.906	-0.136
98	DC1	2	4.110	9.323	-0.183	0.116	0.156	53.106	7.459	5.275	0.760
				2.641	1.304	0.314	0.000	-8.295	-1.165	-0.817	-0.117
99	DC2	2	4.160	9.338	-0.126	0.116	0.138	53.613	7.124	5.326	0.727
				2.513	1.270	0.317	0.000	-7.376	-0.980	-0.727	-0.098
100	DC3	2	4.210	9.348	-0.069	0.117	0.119	54.088	6.777	5.374	0.693
				2.387	1.234	0.321	0.000	-6.431	-0.806	-0.634	-0.081
101	DC4	2	4.260	9.352	-0.009	0.118	0.100	54.528	6.412	5.418	0.657
				2.266	1.197	0.324	0.000	-5.453	-0.641	-0.538	-0.064
102	DC5	2	4.310	9.350	0.054	0.119	0.081	54.933	6.025	5.459	0.619
				2.148	1.159	0.328	0.000	-4.439	-0.487	-0.438	-0.049
103	DC6	2	4.360	9.341	0.117	0.120	0.062	55.300	5.629	5.496	0.580
				2.034	1.119	0.331	0.000	-3.405	-0.347	-0.337	-0.035
104	DC7	2	4.410	9.327	0.173	0.121	0.043	55.625	5.270	5.529	0.545
				1.924	1.077	0.335	0.000	-2.413	-0.229	-0.239	-0.023
105	DC8	2	4.460	9.308	0.212	0.122	0.028	55.913	5.003	5.558	0.519
				1.819	1.029	0.340	0.000	-1.555	-0.139	-0.155	-0.013
106	DC9	2	4.510	9.285	0.232	0.122	0.016	56.174	4.847	5.585	0.503
				1.719	0.977	0.344	0.000	-0.897	-0.077	-0.090	-0.007
107	DC10	2	4.560	9.262	0.238	0.123	0.008	56.420	4.778	5.610	0.497
				1.624	0.923	0.349	0.000	-0.459	-0.039	-0.047	-0.003
108	DC11	2	4.610	9.238	0.236	0.124	0.004	56.659	4.756	5.635	0.494
				1.534	0.866	0.354	0.000	-0.210	-0.018	-0.022	-0.001
109	DC12	2	4.660	9.215	0.231	0.125	0.002	56.897	4.751	5.659	0.494
				1.450	0.809	0.359	0.000	-0.090	-0.008	-0.010	0.000
110	DC13	2	4.710	9.192	0.226	0.126	0.001	57.135	4.750	5.684	0.494
				1.372	0.752	0.365	0.000	-0.037	-0.003	-0.005	0.001
111	DC14	2	4.760	9.170	0.220	0.127	0.000	57.373	4.750	5.708	0.494
				1.300	0.695	0.371	0.000	-0.015	-0.001	-0.003	0.001
112	DC15	2	4.810	9.148	0.214	0.128	0.000	57.610	4.750	5.733	0.494
				1.233	0.638	0.377	0.000	-0.005	0.000	-0.002	0.001
113	DC16	2	4.860	9.127	0.209	0.128	0.000	57.848	4.750	5.757	0.494
				1.172	0.581	0.384	0.000	0.000	0.000	-0.001	0.001
end	COMPA	2	4.860	9.127	0.209	0.128	0.000	57.848	4.750	5.757	0.494
				1.172	0.581	0.384	0.000	0.000	0.000	-0.001	0.001

KLOE15 - compens. Oxford centro a 4.06 form IP - 7/2/1994 "MAD" Version: 8.9/0 Run: 14/02/94 10.11.20
Coupled lattice functions. TWISS line: KLOE1 range: #S/#E
Delta(p)/p: 0.000000 symm: F super: 1 page 6

pos. no.	ELEMENT name	SEQUENCE occ. no.	dist [m]	MODES betal [m] / beta2 [m]	alfa1 [1] / alfa2 [1]	mu1 [2pi] / mu2 [2pi]	COUPLING R(1,1) [1] / R(1,2) [m] / R(2,1) [1/m] / R(2,2) [1]	ORBIT x(co) [mm] / px(co) [.001] / y(co) [mm] / py(co) [.001]	DISPERSION Dx [m] / Dpx [1] / Dy [m] / Dpy [1]
end	COMP	1	4.860	9.127	0.209	0.128	0.000	57.848	4.750	5.757	0.494
				1.172	0.581	0.384	0.000	0.000	0.000	-0.001	0.001
114	D2K	1	5.050	9.052	0.187	0.132	0.000	58.750	4.750	5.850	0.494
				0.993	0.364	0.412	0.000	0.000	0.000	-0.001	0.001
115	M21	1	5.050	9.052	0.187	0.132	0.000	58.750	4.750	5.850	0.494
				0.993	0.364	0.412	0.000	0.000	0.000	-0.001	0.001
end	KLOE1	1	5.050	9.052	0.187	0.132	0.000	58.750	4.750	5.850	0.494
				0.993	0.364	0.412	0.000	0.000	0.000	-0.001	0.001

total length = 5.050000 mul = 0.131744 mu2 = 0.412000
delta(s) = 0.610658 mm
betal(max) = 9.351979 betal(max) = 28.002492
Dx(max) = 5.850153 Dy(max) = 1.586880

APPENDIX D - *Beam stay-clear @ 15 mrad*

Corrector Kicks (mrad) -4.846424 2.547062 2.000000
x = horizontal half-separation, apx = aperture in x in R.F. rotatin frame system (R.F.S.)
y = vertical bump, apy = aperture in y in R.F. **All units in mm**.
ap1**2 = y*y + apx**2 ap2**2 = x*x + apy**2 **apmax** = max(ap1,ap2)
px,py = projections on the axis of the aperture in the rotating frame
N.B. A 2 mm closed orbit should be added to apmax.

Nel	z(m)	x	ap1	px	y	ap2	py	apmax	angle
100	0.046	0.7	22.0	21.9	2.5	4.7	4.7	22.0	0.47
99	0.092	1.4	22.7	22.6	2.5	6.1	5.9	22.7	0.93
98	0.138	2.1	23.4	23.3	2.5	7.6	7.4	23.4	1.40
97	0.184	2.8	24.1	24.0	2.5	9.2	8.9	24.1	1.86
96	0.230	3.4	24.8	24.8	2.5	10.9	10.4	24.8	2.33
95	0.276	4.1	25.5	25.5	2.5	12.5	12.0	25.5	2.79
94	0.322	4.8	26.2	26.2	2.5	14.2	13.6	26.2	3.26
93	0.368	5.5	26.9	26.9	2.5	15.8	15.2	26.9	3.72
92	0.414	6.2	27.6	27.6	2.5	17.5	16.8	27.6	4.19
91	0.460	6.9	28.3	28.3	2.5	19.2	18.4	**28.3**	4.65
90	0.510	7.6	28.9	28.9	2.5	21.0	20.2	28.9	5.16
89	0.560	8.3	29.3	29.3	2.5	23.0	22.2	29.3	5.67
88	0.610	8.9	29.5	29.5	2.6	25.2	24.4	29.5	6.17
87	0.660	9.4	29.4	29.4	2.6	27.5	26.7	**29.4**	6.68
86	0.710	9.8	29.2	29.2	2.7	29.8	29.2	29.8	7.19
85	0.760	10.3	29.0	29.0	2.8	32.2	31.6	32.2	7.70
84	0.810	10.8	28.9	28.8	2.9	34.6	34.1	34.6	8.21
83	0.860	11.3	28.7	28.6	3.0	37.0	36.5	**37.0**	8.71
82	0.930	12.1	28.8	28.8	3.0	39.9	39.5	39.9	9.43
81	1.000	13.2	29.8	29.7	3.0	41.9	41.4	41.9	10.14
80	1.070	14.8	31.6	31.4	2.9	42.9	42.4	42.9	10.86
79	1.140	16.7	34.2	34.0	2.7	43.1	42.3	43.1	11.57
78	1.210	19.1	37.8	37.4	2.5	42.6	41.3	**42.6**	12.29
77	1.260	21.0	40.8	40.2	2.3	42.1	40.3	42.1	12.80
76	1.310	22.9	43.7	43.0	2.1	41.8	39.3	43.7	13.31
75	1.360	24.8	46.7	45.7	1.8	41.6	38.3	46.7	13.82
74	1.410	26.7	49.6	48.5	1.6	41.5	37.4	**49.6**	14.34
73	1.423	27.2	50.4	49.2	1.6	41.5	37.2	50.4	14.47
72	1.450	28.2	51.9	50.6	1.5	41.6	36.7	51.9	14.75
71	1.477	29.1	53.3	51.8	1.4	41.7	36.4	53.3	15.03
70	1.504	29.9	54.6	52.9	1.2	41.8	36.1	54.6	15.30
69	1.531	30.7	55.7	54.0	1.1	42.0	35.8	55.7	15.58
68	1.558	31.4	56.7	54.9	1.0	42.1	35.6	56.7	15.85
67	1.585	32.1	57.6	55.6	0.9	42.3	35.4	57.6	16.12
66	1.612	32.6	58.4	56.3	0.9	42.5	35.3	58.4	16.39
65	1.639	33.1	59.1	56.8	0.8	42.6	35.2	59.1	16.66
64	1.666	33.6	59.6	57.2	0.7	42.8	35.1	59.6	16.93
63	1.680	33.8	59.8	57.4	0.6	42.8	35.1	**59.8**	17.07
62	1.710	34.2	60.3	57.7	0.5	43.0	35.1	60.3	17.36
61	1.740	34.6	60.7	58.0	0.4	43.1	35.0	60.7	17.65
60	1.770	35.0	61.2	58.3	0.3	43.3	35.0	61.2	17.93
59	1.800	35.4	61.6	58.6	0.2	43.4	35.0	61.6	18.20
58	1.860	36.1	62.5	59.2	0.0	43.7	34.9	62.5	18.71
57	1.920	36.9	63.4	59.9	0.2	44.3	35.2	63.4	19.14
56	1.980	37.7	64.3	60.7	0.4	44.9	35.5	64.3	19.47

Nel	z(m)	x	ap1	px	y	ap2	py	apmax	angle
55	2.040	38.5	65.2	61.6	0.6	45.5	35.7	65.2	19.68
54	2.100	39.3	66.0	62.4	0.8	46.0	35.9	66.0	19.81
53	2.160	40.1	66.9	63.3	1.0	46.6	36.0	66.9	19.87
52	2.280	41.6	68.7	64.9	1.4	47.8	36.6	68.7	20.48
51	2.550	45.2	72.8	68.9	2.3	50.6	37.2	72.8	20.53
50	3.000	51.0	79.6	75.8	3.8	55.4	38.2	79.6	20.57
49	3.260	54.4	83.6	79.8	4.7	58.4	38.9	83.6	20.57
48	3.310	55.1	84.4	80.6	4.9	58.9	39.0	84.4	20.56
47	3.360	55.7	85.1	81.4	5.1	59.5	39.1	85.1	20.55
46	3.410	56.4	85.9	82.1	5.2	60.1	39.2	85.9	20.53
45	3.460	57.0	86.7	82.9	5.4	60.6	39.3	**86.7**	20.48
44	3.510	57.7	87.5	83.8	5.6	61.2	39.3	87.5	20.35
43	3.560	58.3	88.2	84.7	5.7	61.8	39.2	88.2	20.10
42	3.610	59.0	89.0	85.6	5.9	62.4	39.0	89.0	19.65
41	3.660	59.6	89.8	86.7	6.1	63.0	38.5	89.8	18.97
40	3.710	60.2	90.5	87.8	6.2	63.5	37.8	90.5	18.08
39	3.760	60.9	91.3	88.9	6.4	64.1	37.0	91.3	17.04
38	3.810	61.4	91.9	90.0	6.6	64.6	36.0	91.9	15.95
37	3.860	62.0	92.6	91.0	6.7	65.1	35.0	92.6	14.86
36	3.910	62.6	93.2	92.0	6.9	65.6	34.0	93.2	13.79
35	3.960	63.1	93.8	92.8	7.0	66.1	33.0	93.8	12.73
34	4.010	63.6	94.4	93.6	7.2	66.5	31.9	94.4	11.69
33	4.060	64.1	94.9	94.4	7.4	66.9	30.8	**94.9**	10.65
32	4.110	64.5	95.5	95.1	7.5	67.3	29.7	95.5	9.61
31	4.160	65.0	95.9	95.7	7.6	67.7	28.5	95.9	8.56
30	4.210	65.4	96.4	96.3	7.8	68.1	27.3	96.4	7.51
29	4.260	65.8	96.8	96.8	7.9	68.4	26.0	96.8	6.44
28	4.310	66.2	97.2	97.2	8.1	68.7	24.7	97.2	5.35
27	4.360	66.5	97.5	97.5	8.2	69.0	23.3	97.5	4.25
26	4.410	66.9	97.8	97.8	8.3	69.3	22.0	97.8	3.21
25	4.460	67.2	98.1	98.0	8.5	69.6	20.9	98.1	2.32
24	4.510	67.5	98.4	98.2	8.6	69.8	19.9	98.4	1.64
23	4.560	67.7	98.7	98.4	8.7	70.1	19.3	98.7	1.19
22	4.610	68.0	98.9	98.6	8.9	70.3	18.9	98.9	0.94
21	4.660	68.3	99.2	98.9	9.0	70.6	18.6	**99.2**	0.82
20	4.710	68.6	99.4	99.1	9.1	70.8	18.4	99.4	0.76
19	4.760	68.9	99.7	99.4	9.2	71.1	18.3	99.7	0.74
18	4.810	69.2	99.9	99.6	9.4	71.3	18.2	99.9	0.73
17	4.860	69.5	100.2	99.9	9.5	71.6	18.2	100.2	0.73
16	4.950	70.0	100.7	100.3	9.7	72.0	18.1	100.7	0.73
14	5.050	**70.5**	101.2	100.8	10.0	72.6	18.0	**101.2**	0.73
13	6.500	142.9	172.7	172.4	13.7	144.9	26.1	172.7	0.73
12	6.700	144.5	174.3	173.9	14.2	146.8	27.8	174.3	0.73
10	6.875	146.0	175.7	175.3	13.7	148.4	28.5	175.7	0.73
9	7.125	148.0	177.6	177.3	13.0	150.6	29.5	177.6	0.73
8	7.500	151.1	180.6	180.4	12.0	153.9	31.1	180.6	0.73
7	7.800	146.6	174.8	174.5	11.8	150.0	33.7	174.8	0.73
6	8.200	131.3	156.1	155.8	12.2	136.6	39.1	156.1	0.73
5	8.500	134.6	159.5	159.3	11.1	139.6	38.9	159.5	0.73
4	9.100	170.8	201.5	201.5	6.3	173.1	30.5	201.5	0.73
3	9.400	181.2	213.5	213.5	4.2	182.9	27.5	213.5	0.73
2	10.05	186.6	219.7	219.7	0.0	187.8	23.1	219.7	0.73

APPENDIX E.1 - *NOLISY output for Short arc.*

N	TYP	BETX	ALFX	BETY	ALFY	DX	DPX	QX	QY
0	0	9.0516	0.1868	0.9927	0.3643	-0.034000	-0.019000	0.000000	0.000000
8	4	8.5483	0.1576	2.3353	-1.2902	0.049176	0.133503	0.026253	0.200663
9	1	8.4470	0.1126	3.4634	-1.7181	0.099239	0.133503	0.033279	0.221710
10	1	8.4470	0.1126	3.4634	-1.7181	0.099239	0.133503	0.033279	0.221710
11	1	8.3982	0.0827	4.3938	-2.0034	0.132615	0.133503	0.038003	0.231917
12	1	8.3982	0.0827	4.3938	-2.0034	0.132615	0.133503	0.038003	0.231917
13	1	8.3530	0.0377	6.0567	-2.4313	0.182679	0.133503	0.045132	0.243497
14	2	7.3190	3.2609	8.5586	-6.2607	0.210323	0.048819	0.051110	0.250273
15	1	4.9646	2.6251	14.3186	-8.1393	0.229850	0.048819	0.061679	0.256025
16	3	4.6633	-1.5351	15.3787	4.9169	0.275640	0.263027	0.072045	0.259105
17	1	5.3061	-1.6790	13.4774	4.5895	0.328246	0.263027	0.078446	0.261316
18	1	6.0065	-1.8230	11.7071	4.2621	0.380851	0.263027	0.084085	0.263850
19	1	6.7645	-1.9670	10.0678	3.9347	0.433456	0.263027	0.089080	0.266783
20	2	7.2192	0.5063	8.8132	0.3966	0.487750	0.095666	0.095792	0.271944
21	1	6.5205	0.3671	8.2627	0.2916	0.564282	0.095666	0.114392	0.286886
22	4	3.4065	2.2362	7.8141	0.1616	0.851667	0.460532	0.145302	0.306545
23	1	1.3572	1.1793	7.6675	0.0828	1.127986	0.460532	0.190311	0.318895
24	3	0.9913	0.1134	6.3221	4.1267	1.374578	1.208269	0.233254	0.325548
25	1	0.9868	-0.0910	4.7854	3.5564	1.616232	1.208269	0.265660	0.331336
26	1	0.9868	-0.0910	4.7854	3.5564	1.616232	1.208269	0.265660	0.331336
27	1	1.2231	-0.4997	2.3967	2.4156	2.099540	1.208269	0.324970	0.350179
28	2	1.3178	0.2072	1.5661	0.5519	2.223443	-0.397363	0.361543	0.375843
29	1	1.3541	-0.2677	1.2037	0.0521	1.985025	-0.397363	0.435679	0.447823
30	3	1.3541	-0.2829	1.2037	0.0656	1.985025	-0.375031	0.435679	0.447823
31	4	1.4022	-0.3154	1.1985	-0.0013	1.954845	-0.376854	0.444952	0.458466
32	3	1.4022	-0.3312	1.1985	0.0121	1.954845	-0.354862	0.444952	0.458466
33	3	1.4022	-0.3627	1.1985	0.0391	1.954845	-0.310877	0.444952	0.458466
34	4	1.4300	-0.3307	1.1968	0.0056	1.941460	-0.356045	0.449462	0.463801
35	3	1.4300	-0.3629	1.1968	0.0325	1.941460	-0.312361	0.449462	0.463801
36	3	1.4300	-0.3790	1.1968	0.0460	1.941460	-0.290519	0.449462	0.463801
37	4	1.4934	-0.4096	1.1948	-0.0212	1.918100	-0.291439	0.458206	0.474492
38	3	1.4934	-0.4264	1.1948	-0.0078	1.918100	-0.269860	0.458206	0.474492
39	3	1.4934	-0.4432	1.1948	0.0056	1.918100	-0.248280	0.458206	0.474492
40	4	1.5669	-0.4723	1.1993	-0.0615	1.894741	-0.333677	0.466559	0.485173
41	3	1.5669	-0.4899	1.1993	-0.0481	1.894741	-0.312361	0.466559	0.485173
42	3	1.5669	-0.6313	1.1993	0.0601	1.894741	-0.141443	0.466559	0.485173
43	4	1.7437	-0.4591	1.2015	-0.0742	1.831226	-0.647938	0.481966	0.506522
44	3	1.7437	-0.6164	1.2015	0.0342	1.831226	-0.482750	0.481966	0.506522
45	3	1.7437	-0.6360	1.2015	0.0477	1.831226	-0.462148	0.481966	0.506522
46	4	1.8477	-0.6591	1.1992	-0.0193	1.790783	-0.545398	0.489083	0.517172
47	3	1.8477	-0.6799	1.1992	-0.0058	1.790783	-0.525251	0.489083	0.517172
48	3	1.8477	-0.7006	1.1992	0.0077	1.790783	-0.505104	0.489083	0.517172
49	4	1.9619	-0.7213	1.2034	-0.0592	1.750341	-0.502442	0.495793	0.527814
50	3	1.9619	-0.7434	1.2034	-0.0457	1.750341	-0.482750	0.495793	0.527814
51	3	1.9619	-0.9203	1.2034	0.0629	1.750341	-0.324858	0.495793	0.527814
52	4	2.2196	-0.6696	1.2047	-0.0711	1.686826	-0.464523	0.507990	0.549098
53	3	2.2196	-0.8698	1.2047	0.0376	1.686826	-0.312361	0.507990	0.549098
54	3	2.2196	-0.8948	1.2047	0.0512	1.686826	-0.293383	0.507990	0.549098
55	4	2.3643	-0.9067	1.2018	-0.0156	1.663467	-0.288574	0.513566	0.559723
56	3	2.3643	-0.9333	1.2018	-0.0021	1.663467	-0.269860	0.513566	0.559723
57	3	2.3643	-0.9599	1.2018	0.0114	1.663467	-0.251145	0.513566	0.559723
58	4	2.5192	-0.9685	1.2054	-0.0554	1.640107	-0.330812	0.518800	0.570345

N	TYP	BETX	ALFX	BETY	ALFY	DX	DPX	QX	QY
59	3	2.5192	-0.9968	1.2054	-0.0418	1.640107	-0.312361	0.518800	0.570345
60	3	2.5192	-1.2240	1.2054	0.0669	1.640107	-0.164413	0.518800	0.570345
61	4	2.7029	-1.0600	1.2000	0.0000	1.617597	-0.396120	0.523691	0.580975
62	4	2.8579	-0.8654	1.2054	-0.0669	1.576592	-0.624968	0.528282	0.591605
63	3	2.8579	-1.1232	1.2054	0.0418	1.576592	-0.482750	0.528282	0.591605
64	3	2.8579	-1.1554	1.2054	0.0554	1.576592	-0.465013	0.528282	0.591605
65	4	3.0432	-1.1525	1.2018	-0.0114	1.536150	-0.542533	0.532613	0.602226
66	3	3.0432	-1.1867	1.2018	0.0021	1.536150	-0.525251	0.532613	0.602226
67	3	3.0432	-1.2210	1.2018	0.0156	1.536150	-0.507969	0.532613	0.602226
68	4	3.2388	-1.2138	1.2047	-0.0512	1.495707	-0.499577	0.536682	0.612851
69	3	3.2388	-1.2502	1.2047	-0.0376	1.495707	-0.482750	0.536682	0.612851
70	3	3.2388	-1.5424	1.2047	0.0711	1.495707	-0.347828	0.536682	0.612851
71	4	3.6585	-1.0467	1.2034	-0.0629	1.432193	-0.441553	0.544071	0.634135
72	3	3.6585	-1.3767	1.2034	0.0457	1.432193	-0.312361	0.544071	0.634135
73	3	3.6585	-1.4178	1.2034	0.0592	1.432193	-0.296248	0.544071	0.634135
74	4	3.8845	-1.3965	1.1992	-0.0077	1.408833	-0.285709	0.547459	0.644777
75	3	3.8845	-1.4402	1.1992	0.0058	1.408833	-0.269860	0.547459	0.644777
76	3	3.8845	-1.4839	1.1992	0.0193	1.408833	-0.254010	0.547459	0.644777
77	4	4.1207	-1.4573	1.2015	-0.0477	1.385473	-0.327948	0.550651	0.655428
78	3	4.1207	-1.5037	1.2015	-0.0342	1.385473	-0.312361	0.550651	0.655428
79	3	4.1207	-1.8754	1.2015	0.0742	1.385473	-0.187382	0.550651	0.655428
80	4	4.6214	-1.2132	1.1993	-0.0601	1.321959	-0.601999	0.556479	0.676776
81	3	4.6214	-1.6301	1.1993	0.0481	1.321959	-0.482750	0.556479	0.676776
82	3	4.6214	-1.6821	1.1993	0.0615	1.321959	-0.467877	0.556479	0.676776
83	4	4.8881	-1.6386	1.1948	-0.0056	1.281516	-0.539668	0.559167	0.687457
84	3	4.8881	-1.6936	1.1948	0.0078	1.281516	-0.525251	0.559167	0.687457
85	3	4.8881	-1.7486	1.1948	0.0212	1.281516	-0.510833	0.559167	0.687457
86	4	5.1650	-1.6990	1.1968	-0.0460	1.241073	-0.496712	0.561708	0.698148
87	3	5.1650	-1.7571	1.1968	-0.0325	1.241073	-0.482750	0.561708	0.698148
88	3	5.1650	-1.8733	1.1968	-0.0056	1.241073	-0.454825	0.561708	0.698148
89	4	5.3073	-1.6695	1.1985	-0.0391	1.222557	-0.467757	0.562928	0.703483
90	3	5.3073	-1.7889	1.1985	-0.0121	1.222557	-0.440249	0.562928	0.703483
91	3	5.3073	-1.8486	1.1985	0.0013	1.222557	-0.426495	0.562928	0.703483
92	4	5.5995	-1.7894	1.2037	-0.0656	1.188936	-0.411124	0.565271	0.714127
93	3	5.5995	-1.8524	1.2037	-0.0521	1.188936	-0.397748	0.565271	0.714127
94	1	6.4731	-2.0304	1.2693	-0.2395	1.099442	-0.397748	0.571220	0.743260
95	1	6.4731	-2.0304	1.2693	-0.2395	1.099442	-0.397748	0.571220	0.743260
96	1	8.1072	-2.3272	1.5661	-0.5519	0.950287	-0.397748	0.579463	0.786106
97	2	8.5544	0.8952	2.1919	-1.6148	0.778270	-0.737839	0.585086	0.812502
98	1	7.5559	0.7688	4.7222	-2.6023	0.335567	-0.737839	0.596975	0.842358
99	3	7.5559	-1.2214	4.7222	-1.3585	0.335567	-0.649448	0.596975	0.842358
100	4	6.3315	2.2451	8.0026	-1.9550	0.000000	0.000000	0.617966	0.868102
101	3	6.3315	0.5773	8.0026	0.1529	0.000000	0.000000	0.617966	0.868102
102	1	6.0041	0.5141	7.9223	0.1146	0.000000	0.000000	0.625713	0.874100
103	1	5.8546	0.4825	7.8908	0.0954	0.000000	0.000000	0.629740	0.877119
104	1	5.5840	0.4194	7.8451	0.0570	0.000000	0.000000	0.638094	0.883189
105	3	6.4755	-3.5810	6.3982	4.4497	0.000000	0.000000	0.646298	0.889714
106	1	9.6818	-4.4349	3.3585	3.1493	0.000000	0.000000	0.654342	0.903465
107	2	9.6774	4.4482	2.4212	0.2513	0.000000	0.000000	0.659056	0.921007
108	1	0.5133	-0.3202	3.4695	-0.7235	0.000000	0.000000	0.923180	1.059872
109	3	1.1120	-1.8576	2.9828	2.1925	0.000000	0.000000	0.991428	1.074053
110	1	4.9037	-4.3158	1.0240	0.9967	0.000000	0.000000	1.033788	1.131208
111	2	5.5800	0.0000	0.8805	0.0000	0.000000	0.000000	1.038256	1.157000

CROMATICITY : CX = 1.55358 CY = 1.95789
MOMENTUM COMPACTION = 0.3009 D-01
D = 0.6776 D-01
ENERGY SPREAD = 0.3917 D-03
RADIAL EMITTANCE = 0.1000 D-05

N	TY	LENGTH	DL	STRENGTH	ANGLE
8	4	1.450	1.450	0.000000	0.152330
9	1	1.825	0.375	0.000000	0.000000
10	1	1.825	0.000	0.000000	0.000000
11	1	2.075	0.250	0.000000	0.000000
12	1	2.075	0.000	0.000000	0.000000
13	1	2.450	0.375	0.000000	0.000000
14	2	2.750	0.300	1.421192	0.000000
15	1	3.150	0.400	0.000000	0.000000
16	3	3.450	0.300	-2.885971	0.000000
17	1	3.650	0.200	0.000000	0.000000
18	1	3.850	0.200	0.000000	0.000000
19	1	4.050	0.200	0.000000	0.000000
20	2	4.350	0.300	1.200254	0.000000
21	1	5.150	0.800	0.000000	0.000000
22	4	6.140	0.990	0.000000	0.706858
23	1	6.740	0.600	0.000000	0.000000
24	3	7.040	0.300	-2.022039	0.000000
25	1	7.240	0.200	0.000000	0.000000
26	1	7.240	0.000	0.000000	0.000000
27	1	7.640	0.400	0.000000	0.000000
28	2	7.940	0.300	2.430810	0.000000
29	1	8.540	0.600	0.000000	0.000000
30	3	8.540	0.000	-0.011250	0.000000
31	4	8.620	0.080	0.000000	0.042495
32	3	8.620	0.000	-0.011250	0.000000
33	3	8.620	0.000	-0.022501	0.000000
34	4	8.660	0.040	0.000000	0.042495
35	3	8.660	0.000	-0.022501	0.000000
36	3	8.660	0.000	-0.011250	0.000000
37	4	8.741	0.080	0.000000	0.042495
38	3	8.741	0.000	-0.011250	0.000000
39	3	8.741	0.000	-0.011250	0.000000
40	4	8.821	0.080	0.000000	-0.042495
41	3	8.821	0.000	-0.011250	0.000000
42	3	8.821	0.000	-0.090206	0.000000
43	4	8.981	0.161	0.000000	-0.169979
44	3	8.981	0.000	-0.090206	0.000000
45	3	8.981	0.000	-0.011250	0.000000
46	4	9.062	0.080	0.000000	-0.042495
47	3	9.062	0.000	-0.011250	0.000000
48	3	9.062	0.000	-0.011250	0.000000
49	4	9.142	0.080	0.000000	0.042495
50	3	9.142	0.000	-0.011250	0.000000
51	3	9.142	0.000	-0.090206	0.000000
52	4	9.303	0.161	0.000000	0.169979
53	3	9.303	0.000	-0.090206	0.000000
54	3	9.303	0.000	-0.011250	0.000000
55	4	9.383	0.080	0.000000	0.042495

N	TY	LENGTH	DL	STRENGTH	ANGLE
56	3	9.383	0.000	-0.011250	0.000000
57	3	9.383	0.000	-0.011250	0.000000
58	4	9.463	0.080	0.000000	-0.042495
59	3	9.463	0.000	-0.011250	0.000000
60	3	9.463	0.000	-0.090206	0.000000
61	4	9.543	0.080	0.000000	-0.084989
62	4	9.624	0.080	0.000000	-0.084989
63	3	9.624	0.000	-0.090206	0.000000
64	3	9.624	0.000	-0.011250	0.000000
65	4	9.704	0.080	0.000000	-0.042495
66	3	9.704	0.000	-0.011250	0.000000
67	3	9.704	0.000	-0.011250	0.000000
68	4	9.784	0.080	0.000000	0.042495
69	3	9.784	0.000	-0.011250	0.000000
70	3	9.784	0.000	-0.090206	0.000000
71	4	9.945	0.161	0.000000	0.169979
72	3	9.945	0.000	-0.090206	0.000000
73	3	9.945	0.000	-0.011250	0.000000
74	4	10.025	0.080	0.000000	0.042495
75	3	10.025	0.000	-0.011250	0.000000
76	3	10.025	0.000	-0.011250	0.000000
77	4	10.105	0.080	0.000000	-0.042495
78	3	10.105	0.000	-0.011250	0.000000
79	3	10.105	0.000	-0.090206	0.000000
80	4	10.266	0.161	0.000000	-0.169979
81	3	10.266	0.000	-0.090206	0.000000
82	3	10.266	0.000	-0.011250	0.000000
83	4	10.346	0.080	0.000000	-0.042495
84	3	10.346	0.000	-0.011250	0.000000
85	3	10.346	0.000	-0.011250	0.000000
86	4	10.426	0.080	0.000000	0.042495
87	3	10.426	0.000	-0.011250	0.000000
88	3	10.426	0.000	-0.022501	0.000000
89	4	10.466	0.040	0.000000	0.042495
90	3	10.466	0.000	-0.022501	0.000000
91	3	10.466	0.000	-0.011250	0.000000
92	4	10.547	0.080	0.000000	0.042495
93	3	10.547	0.000	-0.011250	0.000000
94	1	10.772	0.225	0.000000	0.000000
95	1	10.772	0.000	0.000000	0.000000
96	1	11.147	0.375	0.000000	0.000000
97	2	11.447	0.300	1.298856	0.000000
98	1	12.047	0.600	0.000000	0.000000
99	3	12.047	0.000	-0.263408	0.000000
100	4	13.037	0.990	0.000000	0.706858
101	3	13.037	0.000	-0.263408	0.000000
102	1	13.337	0.300	0.000000	0.000000
103	1	13.487	0.150	0.000000	0.000000
104	1	13.787	0.300	0.000000	0.000000
105	3	14.087	0.300	-2.158360	0.000000
106	1	14.487	0.400	0.000000	0.000000
107	2	14.787	0.300	2.999862	0.000000
108	1	17.007	2.220	0.000000	0.000000
109	3	17.307	0.300	-3.097332	0.000000
110	1	17.921	0.614	0.000000	0.000000
111	2	18.071	0.150	5.653070	0.000000

APPENDIX E. 2 - *NOLISY output for Long arc.*

N	TYP	BETX	ALFX	BETY	ALFY	DX	DPX	QX	QY
0	0	9.0516	0.1868	0.9927	0.3643	0.034000	0.019000	0.000000	0.000000
8	4	8.5483	0.1576	2.3353	-1.2902	-0.049176	-0.133503	0.026253	0.200663
9	1	8.4470	0.1126	3.4634	-1.7181	-0.099239	-0.133503	0.033279	0.221710
10	1	8.4470	0.1126	3.4634	-1.7181	-0.099239	-0.133503	0.033279	0.221710
11	1	8.3982	0.0827	4.3938	-2.0034	-0.132615	-0.133503	0.038003	0.231917
12	1	8.3982	0.0827	4.3938	-2.0034	-0.132615	-0.133503	0.038003	0.231917
13	1	8.3530	0.0377	6.0567	-2.4313	-0.182679	-0.133503	0.045132	0.243497
14	2	7.5886	2.4309	8.2951	-5.2600	-0.213676	-0.071536	0.051037	0.250340
15	1	5.7896	2.0667	13.0560	-6.6423	-0.242290	-0.071536	0.060648	0.256459
16	3	5.8554	-2.3022	14.0140	3.6938	-0.292531	-0.269702	0.069165	0.259857
17	1	6.8193	-2.5174	12.5783	3.4848	-0.346471	-0.269702	0.074204	0.262255
18	1	7.8693	-2.7326	11.2262	3.2758	-0.400412	-0.269702	0.078549	0.264934
19	1	9.0054	-2.9478	9.9577	3.0668	-0.454352	-0.269702	0.082331	0.267944
20	2	9.9989	-0.2665	9.0047	0.2023	-0.514292	-0.126967	0.087290	0.273062
21	1	10.4939	-0.3522	8.7550	0.1098	-0.615866	-0.126967	0.099733	0.287421
22	4	5.0348	3.6812	8.6585	-0.0301	-0.044222	1.012318	0.123136	0.309611
23	1	1.6578	1.9471	8.7362	-0.0994	0.563168	1.012318	0.156431	0.320600
24	3	0.9588	0.5357	7.1696	4.9697	0.934104	1.501515	0.195978	0.326436
25	1	0.7982	0.2673	5.3251	4.2529	1.234407	1.501515	0.232688	0.331588
26	1	0.7982	0.2673	5.3251	4.2529	1.234407	1.501515	0.232688	0.331588
27	1	0.7992	-0.2697	2.4963	2.8191	1.835013	1.501515	0.316173	0.349084
28	2	0.8497	0.1165	1.5661	0.5519	2.026881	-0.250895	0.372764	0.374425
29	1	1.1393	-0.5993	1.2037	0.0521	1.876344	-0.250895	0.477142	0.446404
30	3	1.1393	-0.6121	1.2037	0.0656	1.876344	-0.229785	0.477142	0.446404
31	4	1.2432	-0.6810	1.1985	-0.0013	1.857916	-0.229296	0.487881	0.457048
32	3	1.2432	-0.6950	1.1985	0.0121	1.857916	-0.208394	0.487881	0.457048
33	3	1.2432	-0.7230	1.1985	0.0391	1.857916	-0.166590	0.487881	0.457048
34	4	1.3009	-0.7136	1.1968	0.0056	1.850408	-0.207528	0.492903	0.462383
35	3	1.3009	-0.7428	1.1968	0.0325	1.850408	-0.165893	0.492903	0.462383
36	3	1.3009	-0.7575	1.1968	0.0460	1.850408	-0.145075	0.492903	0.462383
37	4	1.4278	-0.8225	1.1948	-0.0212	1.838801	-0.144079	0.502279	0.473074
38	3	1.4278	-0.8386	1.1948	-0.0078	1.838801	-0.123392	0.502279	0.473074
39	3	1.4278	-0.8546	1.1948	0.0056	1.838801	-0.102705	0.502279	0.473074
40	4	1.5700	-0.9166	1.1993	-0.0615	1.827195	-0.186449	0.510813	0.483755
41	3	1.5700	-0.9343	1.1993	-0.0481	1.827195	-0.165893	0.510813	0.483755
42	3	1.5700	-1.0759	1.1993	0.0601	1.827195	-0.001069	0.510813	0.483755
43	4	1.8990	-0.9536	1.2015	-0.0742	1.787080	-0.497487	0.525560	0.505103
44	3	1.8990	-1.1249	1.2015	0.0342	1.787080	-0.336282	0.525560	0.505103
45	3	1.8990	-1.1462	1.2015	0.0477	1.787080	-0.316177	0.525560	0.505103
46	4	2.0872	-1.1971	1.1992	-0.0193	1.758391	-0.398565	0.531976	0.515754
47	3	2.0872	-1.2206	1.1992	-0.0058	1.758391	-0.378783	0.531976	0.515754
48	3	2.0872	-1.2441	1.1992	0.0077	1.758391	-0.359000	0.531976	0.515754
49	4	2.2908	-1.2905	1.2034	-0.0592	1.729701	-0.355741	0.537818	0.526396
50	3	2.2908	-1.3163	1.2034	-0.0457	1.729701	-0.336282	0.537818	0.526396
51	3	2.2908	-1.5229	1.2034	0.0629	1.729701	-0.180252	0.537818	0.526396
52	4	2.7418	-1.2595	1.2047	-0.0711	1.689587	-0.318304	0.547971	0.547680
53	3	2.7418	-1.5069	1.2047	0.0376	1.689587	-0.165893	0.547971	0.547680
54	3	2.7418	-1.5377	1.2047	0.0512	1.689587	-0.146884	0.547971	0.547680
55	4	2.9913	-1.5689	1.2018	-0.0156	1.677980	-0.142270	0.552431	0.558305
56	3	2.9913	-1.6026	1.2018	-0.0021	1.677980	-0.123392	0.552431	0.558305
57	3	2.9913	-1.6363	1.2018	0.0114	1.677980	-0.104514	0.552431	0.558305
58	4	3.2562	-1.6617	1.2054	-0.0554	1.666374	-0.184640	0.556523	0.568926

N	TYP	BETX	ALFX	BETY	ALFY	DX	DPX	QX	QY
59	3	3.2562	-1.6983	1.2054	-0.0418	1.666374	-0.165893	0.556523	0.568926
60	3	3.2562	-1.9921	1.2054	0.0669	1.666374	-0.015576	0.556523	0.568926
61	4	3.5608	-1.7936	1.2000	0.0000	1.655701	-0.250181	0.560271	0.579556
62	4	3.8293	-1.5435	1.2054	-0.0669	1.626259	-0.482980	0.563726	0.590186
63	3	3.8293	-1.8889	1.2054	0.0418	1.626259	-0.336282	0.563726	0.590186
64	3	3.8293	-1.9320	1.2054	0.0554	1.626259	-0.317986	0.563726	0.590186
65	4	4.1401	-1.9380	1.2018	-0.0114	1.597570	-0.396756	0.566934	0.600808
66	3	4.1401	-1.9846	1.2018	0.0021	1.597570	-0.378783	0.566934	0.600808
67	3	4.1401	-2.0312	1.2018	0.0156	1.597570	-0.360810	0.566934	0.600808
68	4	4.4663	-2.0301	1.2047	-0.0512	1.568880	-0.353932	0.569904	0.611433
69	3	4.4663	-2.0803	1.2047	-0.0376	1.568880	-0.336282	0.569904	0.611433
70	3	4.4663	-2.4832	1.2047	0.0711	1.568880	-0.194759	0.569904	0.611433
71	4	5.1615	-1.8053	1.2034	-0.0629	1.528766	-0.303797	0.575201	0.632717
72	3	5.1615	-2.2709	1.2034	0.0457	1.528766	-0.165893	0.575201	0.632717
73	3	5.1615	-2.3290	1.2034	0.0592	1.528766	-0.148694	0.575201	0.632717
74	4	5.5336	-2.3044	1.1992	-0.0077	1.517159	-0.140460	0.577591	0.643359
75	3	5.5336	-2.3666	1.1992	0.0058	1.517159	-0.123392	0.577591	0.643359
76	3	5.5336	-2.4289	1.1992	0.0193	1.517159	-0.106323	0.577591	0.643359
77	4	5.9211	-2.3957	1.2015	-0.0477	1.505553	-0.182831	0.579822	0.654009
78	3	5.9211	-2.4624	1.2015	-0.0342	1.505553	-0.165893	0.579822	0.654009
79	3	5.9211	-2.9965	1.2015	0.0742	1.505553	-0.030083	0.579822	0.654009
80	4	6.7384	-2.0451	1.1993	-0.0601	1.465438	-0.468473	0.583848	0.675358
81	3	6.7384	-2.6529	1.1993	0.0481	1.465438	-0.336282	0.583848	0.675358
82	3	6.7384	-2.7287	1.1993	0.0615	1.465438	-0.319795	0.583848	0.675358
83	4	7.1718	-2.6680	1.1948	-0.0056	1.436749	-0.394947	0.585685	0.686039
84	3	7.1718	-2.7487	1.1948	0.0078	1.436749	-0.378783	0.585685	0.686039
85	3	7.1718	-2.8293	1.1948	0.0212	1.436749	-0.362619	0.585685	0.686039
86	4	7.6206	-2.7586	1.1968	-0.0460	1.408059	-0.352123	0.587413	0.696730
87	3	7.6206	-2.8444	1.1968	-0.0325	1.408059	-0.336282	0.587413	0.696730
88	3	7.6206	-3.0159	1.1968	-0.0056	1.408059	-0.304600	0.587413	0.696730
89	4	7.8508	-2.7156	1.1985	-0.0391	1.395419	-0.325178	0.588238	0.702065
90	3	7.8508	-2.8922	1.1985	-0.0121	1.395419	-0.293781	0.588238	0.702065
91	3	7.8508	-2.9806	1.1985	0.0013	1.395419	-0.278082	0.588238	0.702065
92	4	8.3226	-2.8943	1.2037	-0.0656	1.373551	-0.266733	0.589818	0.712708
93	3	8.3226	-2.9880	1.2037	-0.0521	1.373551	-0.251280	0.589818	0.712708
94	1	9.7276	-3.2564	1.2693	-0.2395	1.317013	-0.251280	0.593798	0.741841
95	1	9.7276	-3.2564	1.2693	-0.2395	1.317013	-0.251280	0.593798	0.741841
96	1	12.3376	-3.7037	1.5661	-0.5519	1.222783	-0.251280	0.599247	0.784688
97	2	12.3756	3.5846	2.3070	-2.0601	1.044178	-0.922013	0.603000	0.810661
98	1	8.4769	2.9131	5.5974	-3.4239	0.490970	-0.922013	0.612329	0.837360
99	3	8.4769	0.1229	5.5974	-1.5815	0.490970	-0.760406	0.612329	0.837360
100	4	3.5412	2.8869	10.3404	-2.3383	0.000000	0.000000	0.643463	0.862781
101	3	3.5412	1.7213	10.3404	1.0653	0.000000	0.000000	0.643463	0.862781
102	1	1.6797	0.9380	8.9501	0.9208	0.000000	0.000000	0.689794	0.874372
103	1	1.2177	0.6022	8.4163	0.8588	0.000000	0.000000	0.723430	0.879874
104	1	0.8937	-0.0133	7.5340	0.7453	0.000000	0.000000	0.811812	0.890876
105	3	1.1301	-0.8088	6.1966	3.5159	0.000000	0.000000	0.861153	0.897714
106	1	2.2438	-1.5114	3.3182	2.4809	0.000000	0.000000	0.909886	0.914593
107	2	2.2638	1.4536	3.1273	-1.7627	0.000000	0.000000	0.929746	0.930443
108	1	1.1944	-0.8016	12.4410	-3.9164	0.000000	0.000000	1.191381	0.972787
109	3	2.2779	-3.1443	11.2814	7.4103	0.000000	0.000000	1.221897	0.976630
110	1	6.0755	-5.2948	5.6158	5.1800	0.000000	0.000000	1.241196	0.985633
111	2	7.7278	0.2593	3.9851	0.7060	0.000000	0.000000	1.247876	0.996164
112	1	7.2409	0.0000	2.6596	0.0000	0.000000	0.000000	1.288256	1.094000

CROMATICITY : CX = 1.88799 CY = 2.73120
MOMENTUM COMPACTION = - 0.1240 D-01
D = - 0.9891 D-01
ENERGY SPREAD = 0.4060 D-03
RADIAL EMITTANCE = 0.1000 D-05

I	TY	LENGTH	DL	STRENGTH	ANGLE
8	4	1.450	1.450	0.000000	-0.152330
9	1	1.825	0.375	0.000000	0.000000
10	1	1.825	0.000	0.000000	0.000000
11	1	2.075	0.250	0.000000	0.000000
12	1	2.075	0.000	0.000000	0.000000
13	1	2.450	0.375	0.000000	0.000000
14	2	2.750	0.300	1.034186	0.000000
15	1	3.150	0.400	0.000000	0.000000
16	3	3.450	0.300	-2.516633	0.000000
17	1	3.650	0.200	0.000000	0.000000
18	1	3.850	0.200	0.000000	0.000000
19	1	4.050	0.200	0.000000	0.000000
20	2	4.350	0.300	0.975172	0.000000
21	1	5.150	0.800	0.000000	0.000000
22	4	6.360	1.210	0.000000	0.863938
23	1	6.960	0.600	0.000000	0.000000
24	3	7.260	0.300	-2.214219	0.000000
25	1	7.460	0.200	0.000000	0.000000
26	1	7.460	0.000	0.000000	0.000000
27	1	7.860	0.400	0.000000	0.000000
28	2	8.160	0.300	2.957724	0.000000
29	1	8.760	0.600	0.000000	0.000000
30	3	8.760	0.000	-0.011250	0.000000
31	4	8.840	0.080	0.000000	0.042495
32	3	8.840	0.000	-0.011250	0.000000
33	3	8.840	0.000	-0.022501	0.000000
34	4	8.880	0.040	0.000000	0.042495
35	3	8.880	0.000	-0.022501	0.000000
36	3	8.880	0.000	-0.011250	0.000000
37	4	8.961	0.080	0.000000	0.042495
38	3	8.961	0.000	-0.011250	0.000000
39	3	8.961	0.000	-0.011250	0.000000
40	4	9.041	0.080	0.000000	-0.042495
41	3	9.041	0.000	-0.011250	0.000000
42	3	9.041	0.000	-0.090206	0.000000
43	4	9.201	0.161	0.000000	-0.169979
44	3	9.201	0.000	-0.090206	0.000000
45	3	9.201	0.000	-0.011250	0.000000
46	4	9.282	0.080	0.000000	-0.042495
47	3	9.282	0.000	-0.011250	0.000000
48	3	9.282	0.000	-0.011250	0.000000
49	4	9.362	0.080	0.000000	0.042495
50	3	9.362	0.000	-0.011250	0.000000
51	3	9.362	0.000	-0.090206	0.000000
52	4	9.523	0.161	0.000000	0.169979
53	3	9.523	0.000	-0.090206	0.000000
54	3	9.523	0.000	-0.011250	0.000000
55	4	9.603	0.080	0.000000	0.042495
56	3	9.603	0.000	-0.011250	0.000000

I	TY	LENGTH	DL	STRENGTH	ANGLE
57	3	9.603	0.000	-0.011250	0.000000
58	4	9.683	0.080	0.000000	-0.042495
59	3	9.683	0.000	-0.011250	0.000000
60	3	9.683	0.000	-0.090206	0.000000
61	4	9.763	0.080	0.000000	-0.084989
62	4	9.844	0.080	0.000000	-0.084989
63	3	9.844	0.000	-0.090206	0.000000
64	3	9.844	0.000	-0.011250	0.000000
65	4	9.924	0.080	0.000000	-0.042495
66	3	9.924	0.000	-0.011250	0.000000
67	3	9.924	0.000	-0.011250	0.000000
68	4	10.004	0.080	0.000000	0.042495
69	3	10.004	0.000	-0.011250	0.000000
70	3	10.004	0.000	-0.090206	0.000000
71	4	10.165	0.161	0.000000	0.169979
72	3	10.165	0.000	-0.090206	0.000000
73	3	10.165	0.000	-0.011250	0.000000
74	4	10.245	0.080	0.000000	0.042495
75	3	10.245	0.000	-0.011250	0.000000
76	3	10.245	0.000	-0.011250	0.000000
77	4	10.325	0.080	0.000000	-0.042495
78	3	10.325	0.000	-0.011250	0.000000
79	3	10.325	0.000	-0.090206	0.000000
80	4	10.486	0.161	0.000000	-0.169979
81	3	10.486	0.000	-0.090206	0.000000
82	3	10.486	0.000	-0.011250	0.000000
83	4	10.566	0.080	0.000000	-0.042495
84	3	10.566	0.000	-0.011250	0.000000
85	3	10.566	0.000	-0.011250	0.000000
86	4	10.646	0.080	0.000000	0.042495
87	3	10.646	0.000	-0.011250	0.000000
88	3	10.646	0.000	-0.022501	0.000000
89	4	10.686	0.040	0.000000	0.042495
90	3	10.686	0.000	-0.022501	0.000000
91	3	10.686	0.000	-0.011250	0.000000
92	4	10.767	0.080	0.000000	0.042495
93	3	10.767	0.000	-0.011250	0.000000
94	1	10.992	0.225	0.000000	0.000000
95	1	10.992	0.000	0.000000	0.000000
96	1	11.367	0.375	0.000000	0.000000
97	2	11.667	0.300	1.943650	0.000000
98	1	12.267	0.600	0.000000	0.000000
99	3	12.267	0.000	-0.329158	0.000000
100	4	13.477	1.210	0.000000	0.863938
101	3	13.477	0.000	-0.329158	0.000000
102	1	14.177	0.700	0.000000	0.000000
103	1	14.477	0.300	0.000000	0.000000
104	1	15.027	0.550	0.000000	0.000000
105	3	15.327	0.300	-1.457952	0.000000
106	1	15.807	0.480	0.000000	0.000000
107	2	16.107	0.300	4.417742	0.000000
108	1	17.747	1.640	0.000000	0.000000
109	3	18.047	0.300	-3.141589	0.000000
110	1	18.497	0.450	0.000000	0.000000
111	2	18.797	0.300	2.808785	0.000000
112	1	20.674	1.878	0.000000	0.000000