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CM-P00072815

18 May 1982

ISR PERFORMANCE REPORT

Run 1260 and 1264 - Rings 1 & 2 - 26 GeV

Stacking in both rings and physics test for the DL machine

Purpose and conclusion

Run 1260 was devoted to stacking in both rings, testing space charge compensation and measuring the compensations for the experimental magnets R608 and AFM. 30 A were stacked in both rings, the space charge compensation was made with the SL table in TUCO and worked well. The effective heights were 4.54 mm in I5 and 2.62 mm in I1 (probably because of saturation of the counters the measurements in I8 were inconsistent).

Run 1264 was intended to be a 8 hour physics test. It was planned to make a luminosity measurement and a centring test before stacking. Due to problems with the horizontal orbit which took some time, the latter was dropped. The effective heights were 4.36 mm in I5, 2.46 mm in I1 and 0.62 mm in I8, which meets the theoretical predictions for a vertical emittance of $0.48\pi\ 10^{-6}$ rad m. Two 20 A stacks were made. The background conditions were good in ring 2 (the loss rate was between 2 and 4 ppm/mm) but not in ring 1, probably because of the fluctuation of the current of LBQ1. For this physics test a serious handicap was the bad conditions for measuring the working line and coupling due to a parasitic signal arising, probably from the injection in the AA, which appeared in the signals.

1. Run 1260

The set-up was made with the files created during run 1246 (see Perf. Rep. 19.03.82, "Preparation of the double low-β scheme for physics at 26 GeV). The orbits were very well reproduced in the whole aperture.

$ 1.1 Ring 1

It was not useful to correct the orbits. The effect of the experimental magnets R608 and AFM was corrected by means of INCO. The compensations found are listed in table 1. At the end of the set-up the currents were copied in the file DL26 (see table 3 a).

A 30 A stack was made with these experimental magnets ON. The space charge compensation was made automatically by TUCO; the density and the working line measurements at the end of stacking are shown on fig. 1.

1.2 Ring 2

In the previous run 1246, the settings of the 2QT5 chain was wrong (39.96% instead of 33.96%); this gave rise to a closed orbit distorsion which changed sign with momentum deviation. When the correct currents were set, the orbits could be easily corrected up to + 43.

The working line was measured under these conditions, it is shown in fig. 2 a. The correction necessary to obtain the SLSL line were applied with the SL coefficients in QPQQ, the subsequent measurement is shown on fig. 2 b. From these measurements we conclude that the SL coefficients of QPQQ are also valid for the DL machine.

The experimental magnets R608 and AFM were turned on. The AFM correction was good but the R608 correction was wrong due to a bad use of INCO and a closed orbit correction was made in order to make a stack. At the end of the set-up the currents were copied in the file DL26 (see table 3 b)

The 30 A stack was made with these experimental magnets ON. The space charge compensation was made as for ring 1. The measurement of the density profile and the working line at the end of stacking are shown in fig. 3.

1.3 Luminosity measurement

The effective heights were measured with the two 30 A stacks and gave consistent results only for I1 and I5, the computed values are given in table 4 as well as the count recording, which reveals that the accidental counting rate in I8 was indeed much too large.

1.4 Centring

The beam in ring 1 was centred with files created with the PF section of the SL centring files. The current lost was some mA but about 10 s after the centring the beam was lost and SL7 quenched.

1.5 Centring files

The change of the working line during centring was measured by S. Baird, the measurements are given in fig. 4. New files were created by applying:

$\Delta Q_h = -0.005$ $\Delta Q'_h = +0.5$ to the file DLA3 in ring 1,

$\Delta Q''_{h\ outer} = -40$ to DLA1 and $\Delta Q''_{h\ outer} = +40$ to DLA3 in ring 2.

These new files will have to be tested.

2. Run 1264

2.1 Set-up

It was made with the currents established by the program SUSA (ISR-OP-TN-81, V. Remondino). The solenoid was turned on and the compensations computed by P.J. Bryant (addendum to "Operation of the I1 solenoid for antiproton physics" Internal note ISR-BOM/PJB, 5.5.82) were set. Under these conditions injection was easily obtained. However, due to a wrong compensation of R608 made during the previous run, the orbit distortion in ring 2 was quite large. Thus R608 was turned off and the compensations were remade correctly, they are listed in table 1. Note that the compensators for R608 have excitations very similar to the FP machine.

2.2 Luminosity

Two centred stacks of 3.5 A were made in order to measure the effective height in I8 with a safe counting rate. The results are shown in fig. 5 and table 5. The formula giving the effective height is:

$$H_{eff} = \sqrt{\pi}\sqrt{\sigma_1^2 + \sigma_2^2} = \sqrt{E_v\,\bar{\beta}_v}$$

the indices 1 and 2 are associated with the two rings; $\bar{\beta}_v$ is the average of β_v over the two rings and over the stack width. The various β_v are given in table 2 as well as a computation of the vertical emittance according to the above formula. The average emittance is $0.48\ \pi\ 10^{-6}$ rad m. This is larger than the theoretical emittance $0.35\ \pi\ 10^{-6}$ but corresponds to a normal case without any shaving nor any careful coupling compensation.

At the end of stacking the currents of all ISR magnets were copied in the file DLDL (see tables 6). The injection orbits are in the files DLR1 and DLR2 (see figs. 6 and 7).

2.3 Physics test

Two beams of 20 A with the top at + 30 were made without any problem. The records of the loss rate is given in table 7.

The conditions in ring 2 were quite good. The stack had been drawn out of the 6th order resonances and this had a very strong effect on the background in I1 although it did not modify the loss rate.

The conditions in ring 1 were very bad for I8 but acceptable for the other intersections. The loss rate was continuously growing after each clean-up. A possible explanation is that there was an unstability of the power supply of LBQ1 which was revealed after the beginning of the stable beam period by the program XLOG. The following trials were made in order to improve the background conditions in I8, however without success:

- several clean ups,
- coupling compensation (however the signal after correction did not reach the usual low level and there was a parasitic signal created by the acceleration of the PS for AA),
- moving the working line out of the 6th order resonances,
- horizontal steering of the beam in the center arc upstream I8 (this shows that the value of the dispersion in this arc, which is a little larger than in the other arcs, was not the origin of this background).

It must be noted that inner collimation was not possible for 229, 237 and 241 because the beam was not centered.

T. Risselada A. Verdier

Table 1

Experimental magnets and their compensators for the DL conditions. The compensations for OAFM and R608 were measured, SO's are theoretical.

OAFM	+ 100	1AFC1	1.15	1H817	- 8.9
		2AFC4	3.8	2H816	- 8.4
R608/1	+ 100	1CR613	- 8.25	1CR561	- 16.8
		2CR556	+ 2.84	2CR604	10.4
SO	+ 100	1LBC1	45.47	1LBC3	58.92
		2LBC2	46.75	2LBC4	57.92

Table 2

Effective heights and β'_v for run 1264

Intersection	I1	I5	I8
β_v (central orbit, in meter)	3.82	12.37	0.281
Measured h_{eff} (mm)	2.46	4.36	0.621
h^2_{eff}/β_v in $\pi 10^{-6}$ rad m	0.504	0.489	0.437
Average vertical emittance	$0.48 \pm 0.03\ \pi\ 10^{-6}$ rad.m		

Table 3 a

File DL26 created during run 1260, ring 1, no experimental magnet except SFM.

```
/XOUT(IF=DL26,ALL,R1)    TIME:09H21M35S     DATE:82-05-11
/LAST-RUN:1260   LAST-TIME:21H25M05S    LAST-DATE:83-04-26
/MA RUN R1/R2:1260/1260
   1GEV     +26.5911     1DVM     +76.536      1WL       DL
   1CP      +47.19
/OT RUN R1/R2:1260/1260
   1QT2     -23.41       1QT1     +13.79       1QT8      +0.44
   1QT3     -19.34       1QT5     +33.96       1QT6     -21.02
   1QT7     +40.94       1SLQ9    +82.93
/PF RUN R1/R2:1260/1260
   1PFF1    -60.84       1PFF2    -61.94       1PFF3    -40.21
   1PFF4    -35.35       1PFF5    -25.20       1PFF6    -18.19
   1PFF7    -12.57       1PFF8     -4.66       1PFF9     +7.50
   1PFF10   +15.94       1PFF11   +23.61       1PFF12   +32.01
   1PFD1    +35.30       1PFD2    -31.32       1PFD3    -34.08
   1PFD4    -32.32       1PFD5    -26.56       1PFD6    -27.64
   1PFD7    -25.85       1PFD8    -23.34       1PFD9    -19.75
   1PFD10    -9.64       1PFD11    -5.59       1PFD12    -0.15
/H RUN R1/R2:1260/1260
   1H717     -2.71       1H749A    +0.34       1H853     -3.08
   1H117    +14.43       1H149    -14.94       1H217    -14.48
   1H253    -23.68       1H317     +1.34       1H349    +10.18
   1H417     -5.22       1H453     +4.42       1H517     +5.40
   1H549     +6.15       1H617     +6.42       1H653     -3.52
/CR RUN R1/R2:1260/1260
   1CR861    -0.66       1CR825    +5.69       1CR145    -4.00
   1CR261    +1.00       1CR729   -14.09
/SO RUN R1/R2:1260/1260
   1LBC1     -1.17       1LBC3     -0.56
/QS RUN R1/R2:1260/1260
   1QS1      -0.02       1QS2      -0.59       1QS3      +0.24
   1QS4      +1.03       1QS5     -17.04       1QS6      +9.08
   1QS7     -10.62
/SL RUN R1/R2:1260/1260
   1SLQ1    +74.178      1SLS1    +47.85       1SLD1    +68.75
   1SLQ3    +81.831      1SLS3    +47.85       1SLD3    +36.01
   1SLQ5    +73.503      1SLS5    +47.95       1SLD5    -23.39
   1SLQ7    +74.870      1SLS7    +34.35       1SLD7     +5.74
/LB RUN R1/R2:1260/1260
   1LBQ1    +84.62       1LBQ3    -65.21       1LBQ5    +65.82
   1LBQ7    +53.08       1LBQ9    -68.63
/AFM RUN R1/R2:1260/1260
   1AFC1     -0.20       1AFC3     -0.20
/T2 RUN R1/R2:1260/1260
   QF337M   +76.986      QD338M   +78.187      VB303M   +75.455
   HB332    +41.481      QD346    +54.749      QF347    +21.301
   QD348    +45.058      QF349    +56.210      VB309    +57.071
   QD350    +55.109      QF351    +82.405      VH301M   +85.161
/T6 RUN R1/R2:1260/1260
/T1U RUN R1/R2:1260/1260
/T1D RUN R1/R2:1260/1260
/EM RUN R1/R2:1260/1260
/SFM RUN R1/R2:1260/1260
   1TRIM     +6.674      SFM      -84.782      SCM1     +62.137
   LCM1     +64.447
/TH RUN R1/R2:1260/1260
   HB333    +12.500      HB334    +44.464      IK717    +69.85
/TV RUN R1/R2:1260/1260
   VB307    +37.978      VB308    +55.849
/END OF DATA
```

Table 3 b

File DL26 created during run 1260, ring 2. No experimental magnet except SFM.

```
/XOUT(IF=DL26,ALL,R2)    TIME:09H22M00S     DATE:82-05-11
/LAST-RUN:1260   LAST-TIME:21H25M05S     LAST-DATE:83-04-26
/MA RUN R1/R2:1260/1260
   2GEV     +26.5928     2DVM     +76.508     2WL      DL
   2CP      +42.65
/QT RUN R1/R2:1260/1260
   2QT2     -23.44       2QT1     +13.89      2QT8     +0.44
   2QT3     -19.31       2QT5     +33.96      2QT6     -21.02
   2QT7     +40.94       2SLQ10   +83.42
/PF RUN R1/R2:1260/1260
   2PFF1    -50.10       2PFF2    -56.59      2PFF3    -37.52
   2PFF4    -32.28       2PFF5    -21.97      2PFF6    -15.55
   2PFF7    -10.38       2PFF8     -2.47      2PFF9     +9.52
   2PFF10   +17.43       2PFF11   +25.34      2PFF12   +33.28
   2PFD1    +34.57       2PFD2    -20.75      2PFD3    -28.86
   2PFD4    -27.03       2PFD5    -22.17      2PFD6    -24.58
   2PFD7    -23.22       2PFD8    -20.39      2PFD9    -17.65
   2PFD10    -8.47       2PFD11    -4.37      2PFD12    -1.93
/H RUN R1/R2:1260/1260
   2H216A    -0.05       2H216B    -0.15      2H248     -1.12
   2H352     -6.30       2H316     -0.34      2H448     -6.84
   2H416     -6.59       2H552     +1.20      2H516     -5.25
   2H616     +0.27       2H648     -1.46      2H752     +0.27
   2H716     -1.39       2H848     +4.88      2H152     -0.34
   2H116     -2.69
/CR RUN R1/R2:1260/1260
   2CR420   +12.50       2CR520    -6.98
/SO RUN R1/R2:1260/1260
   2LBC2     -0.83       2LBC4     -0.39
/QS RUN R1/R2:1260/1260
   2QS2      -0.02       2QS3      +0.02      2QS4      +0.93
   2QS5      -2.56       2QS6      +2.27      2QS7      +1.29
/SL RUN R1/R2:1260/1260
   2SLQ2    +75.396      2SLS2    +41.16      2SLD2    +22.00
   2SLQ4    +81.967      2SLS4    +47.85      2SLD4    -17.55
   2SLQ6    +72.797      2SLS6    +47.97      2SLD6    -34.67
   2SLQ8    +74.411      2SLS8    +47.88      2SLD8    +45.14
/LB RUN R1/R2:1260/1260
   2LBQ2    +86.04       2LBQ4    -56.81      2LBQ6    +49.17
   2LBQ8    +58.06       2LBQ10   -67.48
/AFM RUN R1/R2:1260/1260
   2AFC2     +0.12       2AFC4    -17.26
/T2 RUN R1/R2:1260/1260
/T6 RUN R1/R2:1260/1260
/T1U RUN R1/R2:1260/1260
   QD403    +59.955      HB412    +75.507     QF409    +60.536
   HB404M   +75.630      QD410    +60.695     QF411    +64.584
   QD412    +66.759      QF413    +64.081     HB428M   +68.419
/T1D RUN R1/R2:1260/1260
   HB435C   -59.91       QD414M   +81.052     QF415M   +64.626
   VB403M   +75.595      HB432     +4.065     QD446    +61.928
   QF447    +49.854      QD448    +64.239     QF449    +55.820
   VB409    +57.666      QD450    +51.771     QF451    +61.368
   VH401M   +85.123
/EM RUN R1/R2:1260/1260
/SFM RUN R1/R2:1260/1260
   2TRIM    +29.771      SCM2     +62.169     LCM2     +64.447
/TH RUN R1/R2:1260/1260
   HB433    +14.786      HB434    +12.332     IK248    +72.34
/TV RUN R1/R2:1260/1260
```

Table 4

Effective heights and monitor constants for I1 and I5 for the DL machine. 30 A stacks run 1260. The measurements in I8 were unreliable.

TIME 20H58M25S --- BACKGROUND AND LUMINOSITY --- DATE 83-04-26
DATA TAKEN AT 20H50M36S DATE 83-04-26
CURRENT RING1: 30.2695 AMPS RING2: 30.2727 AMPS
RUN 1260 MOMENTUM RING1: 26.000 GEV/C RING2: 26.000 GEV/C SFM ON

PHYSICS MONITORS

WTBB= 40.00 SECS ITBB= 5.00 SECS ITBG= 0.10 SECS N=15

I	BG(R1) (KC/S)	BG(R2) (KC/S)	BEAM-BEAM (KC/S)	ACC (%)	SIGMA (MUB)	L (MUB-1SEC-1)	H EFF (MM)
1	0.0000	0.0000	0.0000				
2	0.0000	0.0000	0.0000				
3	0.0000	0.0000					
4	0.0000	0.0000	0.0000				
5	127.893	125.184	11.7744	0.15			
5HL			164.816	1.26			
6	0.0000	0.0140	0.0000				
7	0.0000	0.0000	0.0000				
8	0.0000	0.0000	0.0000				

STANDARD MONITORS

WTBB= 40.00 SECS ITBB= 5.00 SECS ITBG= 0.10 SECS N=15

I	BGUPSTR(R2) (KC/S)	BG(R1) (KC/S)	BG(R2) (KC/S)	BEAM-BEAM (KC/S)	ACC (%)	SIGMA (MUB)	L (MUB-1SEC-1)	H EFF (MM)
1	0.0000	5.3984	1.7942	17.8892	2.21	462.000	37.6652	2.42
2	0.0000	169.096	105.762	6.1548	26.69	300.000	15.0400	6.09
3	0.0000	285.949	335.281	0.8586	24.74	10.000	64.6201	1.42
4	0.0000	50.4766	196.521	13.1808	48.90	300.000	22.4492	3.35
5	0.0000	234.141	219.299	15.1517	1.82	719.000	20.6890	4.43
6	0.0000	53.4023	38.1411	3.2934	10.69	180.000	16.3401	5.61
7	0.0000	77.7949	70.2705	43.6636	7.86	1740.00	23.1216	3.96
8	0.0000	387.215	250.412	13.4584	39.61	50.000	162.561	0.56

RUN: 1260 LUMINOSITY MEASUREMENT
E1= 26.0000 GEV/C E2= 26.0000 GEV/C SFM ON
I1= 30.3433 AMPS I2= 30.3103 AMPS INITIAL
I1= 30.3201 AMPS I2= 30.2983 AMPS FINAL

INT	HEFF	OPT POS R1	R2	MON CONS	MAX BB	LUM	EL PT	NO PT	FQ
	MM	MM	MM	MUB	C/S	(*)			
STANDARD MONITORS									
1	2.616	0.51	-0.51	462.4	16400.7	35.47	1.06	6	8
5	4.539	-0.69	0.69	719.0	14696.7	20.44		6	6

(*)=MUB-1SEC-1

Table 5

Calculation of effective heights and monitor constants in I1, I5 and I8 for the DL machine. 3.5 A stacks, run 1264.

```
I*****************************************************************************I
I RUN: 1264                LUMINOSITY MEASUREMENT                              I
I E1= 26.0000 GEV/C  E2= 26.0000 GEV/C                              SFM ON     I
I I1=  3.5752 AMPS   I2=  3.5720 AMPS   INITIAL                                I
I I1=  3.5752 AMPS   I2=  3.5712 AMPS   FINAL                                  I
I*****************************************************************************I
I INT I HEFF  I OPT POS     I MON      I  MAX      I LUM   I EL PT I NO I FQ  I
I     I       I  R1     R2  I CONS     I  BB       I       I      I PT I     I
I=============================================================================I
I     I  MM   I  MM    MM   I MUB      I C/S       I  (*)  I       I    I     I
I*****************************************************************************I
I                          STANDARD MONITORS                                  I
I*****************************************************************************I
I  1  I 2.457 I  0.18 -0.18 I   569.2 I    298.7 I  0.52 I       I  8 I   3 I
I  5  I 4.364 I -1.01  1.01 I   672.2 I    198.7 I  0.30 I       I  5 I   2 I
I  8  I 0.621 I -0.11  0.11 I    66.3 I    137.7 I  2.08 I  0.20 I  7 I   7 I
I*****************************************************************************I
I                          PHYSICS MONITORS                                   I
I*****************************************************************************I
I  5  I 4.351 I -1.01  1.01 I   589.1 I    174.6 I  0.30 I       I  5 I   5 I
I*****************************************************************************I
(*)=MUB-1SEC-1
```

```
TIME 19H15M07S          --- BACKGROUND AND LUMINOSITY ---          DATE 82-05-06
DATA TAKEN AT 19H13M42S   DATE 82-05-06
CURRENT RING1:  3.5752 AMPS   RING2:  3.5704 AMPS
RUN 1264   MOMENTUM RING1: 26.000 GEV/C   RING2: 26.000 GEV/C  SFM ON
```

PHYSICS MONITORS

WTBB= 40.00 SECS ITBB= 59.77 SECS ITBG= 0.10 SECS N=15

I	BG(R1) (KC/S)	BG(R2) (KC/S)	BEAM-BEAM (KC/S)	ACC (%)	SIGMA (MUB)	L (MUB-1SEC-1)	H EFF (MM)
1	0.0000	0.0000	0.0000				
2	0.0000	0.0000	0.0000				
3	0.0000	0.0000					
4	0.0000	0.0000	0.0000		264.000		
5	2.0836	1.9610	0.1771	0.00	590.000	0.3002	4.25
5HL			2.7778	0.32	10000.0	0.2769	4.61
6	0.0000	0.0000	0.0000				
7	0.0000	0.0000	0.0000				
8	0.0009	0.0000	0.0000				

STANDARD MONITORS

WTBB= 40.00 SECS ITBB= 59.77 SECS ITBG= 0.10 SECS N=15

I	BGUPSTR(R2) (KC/S)	BG(R1) (KC/S)	BG(R2) (KC/S)	BEAM-BEAM (KC/S)	ACC (%)	SIGMA (MUB)	L (MUB-1SEC-1)	H EFF (MM)
1	0.0000	0.0047	0.4170	0.2991	0.04	570.000	0.5246	2.43
2	0.0000	7.9547	5.3102	0.0766	5.33	350.000	0.2071	6.16
3	0.0000	50.2891	42.5532	0.0051	0.33	30.000	0.1707	7.48
4	0.0000	1.6501	6.7611	0.0742	1.26	800.000	0.0916	11.43
5	0.0000	1.1110	0.0100	0.1968	0.04	670.000	0.2936	4.35
6	0.0000	3.5739	18.4973	0.0417	1.80	230.000	0.1782	7.16
7	0.0000	12.5133	7.0297	0.3915	0.98	1200.00	0.3231	3.95
8	0.0000	13.9164	49.7554	0.1385	2.10	66.300	2.0456	0.62

Table 6 a

File DLDL created at the end of stacking, run 1264, ring 1. The PF currents include space charge compensation for 20 A. The PF currents for the unloaded machine are in the files DL26 and 26DL.

```
/XOUT(IF=DLDL,R1)    TIME:09H20M09S     DATE:82-05-11
/LAST-RUN:1264   LAST-TIME:23H37M31S    LAST-DATE:82-05-06
/MA RUN R1/R2:1264/1264
   1GEV     +26.5908     1DVM     +76.526      1WL       DL
   1CP      +47.19
/QT RUN R1/R2:1264/1264
   1QT2     -23.41       1QT1     +13.77       1QT8      +0.44
   1QT3     -19.34       1QT5     +33.96       1QT6     -21.02
   1QT7     +40.94       1SLQ9    +82.93
/PF RUN R1/R2:1264/1264
   1PFF1    -40.87       1PFF2    -55.18       1PFF3    -38.87
   1PFF4    -34.89       1PFF5    -24.66       1PFF6    -17.21
   1PFF7    -13.26       1PFF8     -6.20       1PFF9     +6.62
   1PFF10   +16.09       1PFF11   +24.02       1PFF12   +35.99
   1PFD1    +26.81       1PFD2    -28.96       1PFD3    -30.47
   1PFD4    -28.76       1PFD5    -23.58       1PFD6    -21.00
   1PFD7    -22.61       1PFD8    -22.46       1PFD9    -17.90
   1PFD10    -7.01       1PFD11    -1.81       1PFD12    +6.15
/H RUN R1/R2:1264/1264
   1H*701    +5.49       1H717     -4.27       1H749A    +0.54
   1H749B    +0.12       1H817     -9.08       1H853     -1.88
   1H117    +15.26       1H149    -15.97       1H217    -15.87
   1H253    -21.17       1H317     +3.05       1H349     +5.64
   1H417     -8.52       1H453     -0.17       1H517     -0.54
   1H549     +3.88       1H617     +4.42       1H653     -4.76
/CR RUN R1/R2:1264/1264
   1CR861    -0.66       1CR825    +5.69       1CR145    -4.00
   1CR261    +1.00       1CR561   -16.80       1CR613    -8.25
   1CR729   -14.09
/SO RUN R1/R2:1264/1264
   1LBC1    +47.14       1LBC3    +60.91
/QS RUN R1/R2:1264/1264
   1QS1      -0.02       1QS2      -0.56       1QS3      +0.27
   1QS4      +1.03       1QS5     -17.04       1QS6      +9.08
   1QS7     -10.64
/SL RUN R1/R2:1264/1264
   1SLQ1    +74.181      1SLS1    +47.85       1SLD1    +68.73
   1SLQ3    +81.833      1SLS3    +47.85       1SLD3    +36.01
   1SLQ5    +73.505      1SLS5    +47.95       1SLD5    -23.44
   1SLQ7    +74.875      1SLS7    +34.35       1SLD7     +5.74
/LB RUN R1/R2:1264/1264
   1LBQ1    +84.59       1LBQ3    -65.19       1LBQ5    +65.80
   1LBQ7    +53.05       1LBQ9    -68.60
/AFM RUN R1/R2:1264/1264
   0AFM     +99.997      1AFC1     -1.42       1AFC3     -2.69
/EM RUN R1/R2:1264/1264
   R608/1   +99.989
/SFM RUN R1/R2:1264/1264
   1TRIM    +21.204      SFM      -84.781      SCM1     +62.142
   LCM1     +64.447
/TH RUN R1/R2:1264/1264
/TV RUN R1/R2:1264/1264
/ END OF DATA
```

Table 6 b

File DLDL created at the end of stacking, run 1264, ring 2. The PF currents include space charge compensation for 20 A. The PF currents for the unloaded machine are in the files DL26 and 26DL.

```
/XOUT(IF=DLDL.R2)    TIME:09H19M49S     DATE:82-05-11
/LAST-RUN:1264    LAST-TIME:23H37M31S     LAST-DATE:82-05-06
/MA RUN R1/R2:1264/1264
   2GEV     +26.5923     2DVM     +76.507      2WL       DL
   2CP      +42.65
/QT RUN R1/R2:1264/1264
   2QT2     -23.44       2QT1     +13.89       2QT8      +0.44
   2QT3     -19.31       2QT5     +33.96       2QT6     -21.02
   2QT7     +40.94       2SLQ10   +83.42
/PF RUN R1/R2:1264/1264
   2PFF1    -36.38       2PFF2    -53.20       2PFF3    -38.09
   2PFF4    -33.94       2PFF5    -23.51       2PFF6    -16.72
   2PFF7    -12.84       2PFF8     -5.37       2PFF9     +7.59
   2PFF10   +16.89       2PFF11   +24.93       2PFF12   +37.30
   2PFD1    +18.73       2PFD2    -23.17       2PFD3    -27.61
   2PFD4    -25.78       2PFD5    -21.61       2PFD6    -20.46
   2PFD7    -22.14       2PFD8    -21.31       2PFD9    -17.43
   2PFD10    -7.06       2PFD11    -2.00       2PFD12    +3.66
/H RUN R1/R2:1264/1264
   2H216A    +0.05       2H216B    +0.95       2H248     -3.49
   2H352     -1.61       2H316     -3.27       2H448     -0.54
   2H416     -2.42       2H552     +2.69       2H516     -0.44
   2H616     +2.59       2H648     +0.71       2H752     +0.17
   2H716     +0.17       2H848     +3.93       2H816     -8.47
   2H152     +0.66       2H116     -4.05
/CR RUN R1/R2:1264/1264
   2CR420   +12.50       2CR520    -6.96       2CR556    +2.83
   2CR604   +10.40       2CR836   +12.16       2CR108    -2.71
/SO RUN R1/R2:1264/1264
   2LBC2    +46.36       2LBC4    +57.76
/QS RUN R1/R2:1264/1264
   2QS1      +0.02       2QS2      -0.10       2QS3      +0.02
   2QS4      -1.66       2QS5      -0.10       2QS6      -2.10
   2QS7      +1.86
/SL RUN R1/R2:1264/1264
   2SLQ2    +75.398      2SLS2    +41.16       2SLD2    +21.97
   2SLQ4    +81.971      2SLS4    +47.83       2SLD4    -17.53
   2SLQ6    +72.800      2SLS6    +47.97       2SLD6    -34.64
   2SLQ8    +74.413      2SLS8    +47.88       2SLD8    +45.14
/LB RUN R1/R2:1264/1264
   2LBQ2    +86.01       2LBQ4    -56.79       2LBQ6    +49.15
   2LBQ8    +58.03       2LBQ10   -67.46
/AFM RUN R1/R2:1264/1264
   2AFC2     +2.54       2AFC4    -11.08
/EM RUN R1/R2:1264/1264
/SFM RUN R1/R2:1264/1264
   2TRIM    +20.874      SCM2     +62.169      LCM2     +64.447
/TH RUN R1/R2:1264/1264
/TV RUN R1/R2:1264/1264
/ END OF DATA
```

Table 7

Current decay rate during the physics test run 1264.

-- PRINT-OUT OF BUFFER FILE MOUT,OB --

00H18M53S DATE:82-05-07 CURRENT DECAY LOG SHEET 1

R	TIME	I(A)	PPM/MIN	R	TIME	I(A)	PPM/MIN
1	001848	19.63996	7.7	2	001848	20.18878	1.7
1	003349	19.63430	19.2	2	003349	20.18788	3.0
				**2	004643	20.1606	5013
				**2	004704	20.1133	9534
1	004849	19.62552	29.8	2	004849	20.09902	294.7
				**2	005021	20.0703	5043
1	010349	19.51266	385.6	2	010349	20.03138	225.1
**1	010722	19.4192	7392				
1	011854	19.35360	544.9	2	011854	20.03080	1.9
1	013402	19.33126	76.4	2	013402	20.03014	2.2
1	014904	19.29116	138.3	2	014904	20.02938	2.5
**1	015524	19.2380	12944				
1	020413	19.14524	503.1	2	020413	20.02850	2.9
**1	021604	18.9939	3702				
**1	021724	18.9817	3010				

2H 17M 35S DATE: 1982-05-7

02H19M25S DATE:82-05-07 CURRENT DECAY LOG SHEET 2

R	TIME	I(A)	PPM/MIN	R	TIME	I(A)	PPM/MIN
1	021921	18.98124	570.9	2	021921	20.02756	3.1
**1	022542	18.9304	5726				
1	023422	18.88196	350.1	2	023422	20.02658	3.3
1	024924	18.86512	59.4	2	024924	20.02582	2.5
**1	025711	18.8411	3283				
1	030424	18.83090	121.1	2	030424	20.02504	2.6
1	031934	18.81176	67.1	2	031934	20.02420	2.8
1	033441	18.78842	82.2	2	033441	20.02336	2.8
**1	033721	18.7048	6813				
**1	034344	18.6079	5983				
1	034941	18.60190	668.5	2	034941	20.02256	2.7
**1	035112	18.5801	4888				
				**2	035624	19.9995	4907
1	040444	18.55728	159.8	2	040444	19.99908	78.0
1	041944	18.52574	113.5	2	041944	19.99836	2.4
1	043453	18.48852	132.9	2	043453	19.99764	2.4

4H 35M 14S DATE: 1982-05-7

04H50M05S DATE:82-05-07 CURRENT DECAY LOG SHEET 3

R	TIME	I(A)	PPM/MIN	R	TIME	I(A)	PPM/MIN
1	045001	18.43062	207.6	2	045001	19.99674	3.0
1	050504	18.40096	107.1	2	050504	19.99584	3.0
1	052004	18.37232	103.9	2	052004	19.99498	2.9
1	053523	18.34496	97.4	2	053523	19.99404	3.1
1	055030	18.31950	91.9	2	055030	19.99288	3.8
1	060532	18.29274	97.3	2	060532	19.99184	3.5
**1	061504	18.0967	3643				
1	062033	18.08470	766.1	2	062033	19.99070	3.8
1	063534	18.07030	53.1	2	063534	19.98952	3.9
1	065042	18.05450	57.8	2	065042	19.98828	4.1
1	070544	18.03254	81.0	2	070544	19.98696	4.4
1	072053	17.98360	179.6	2	072053	19.98564	4.4
1	073602	17.97560	29.4	2	073602	19.98424	4.6
**1	075052	0.0000	********				

7H 51M 4S DATE: 1982-05-7

RUN:1264
FROM:82-05-07 00H04M08S TO 82-05-07 07H25M20S
STABLE BEAMS DURATION : 2H59MN3SEC

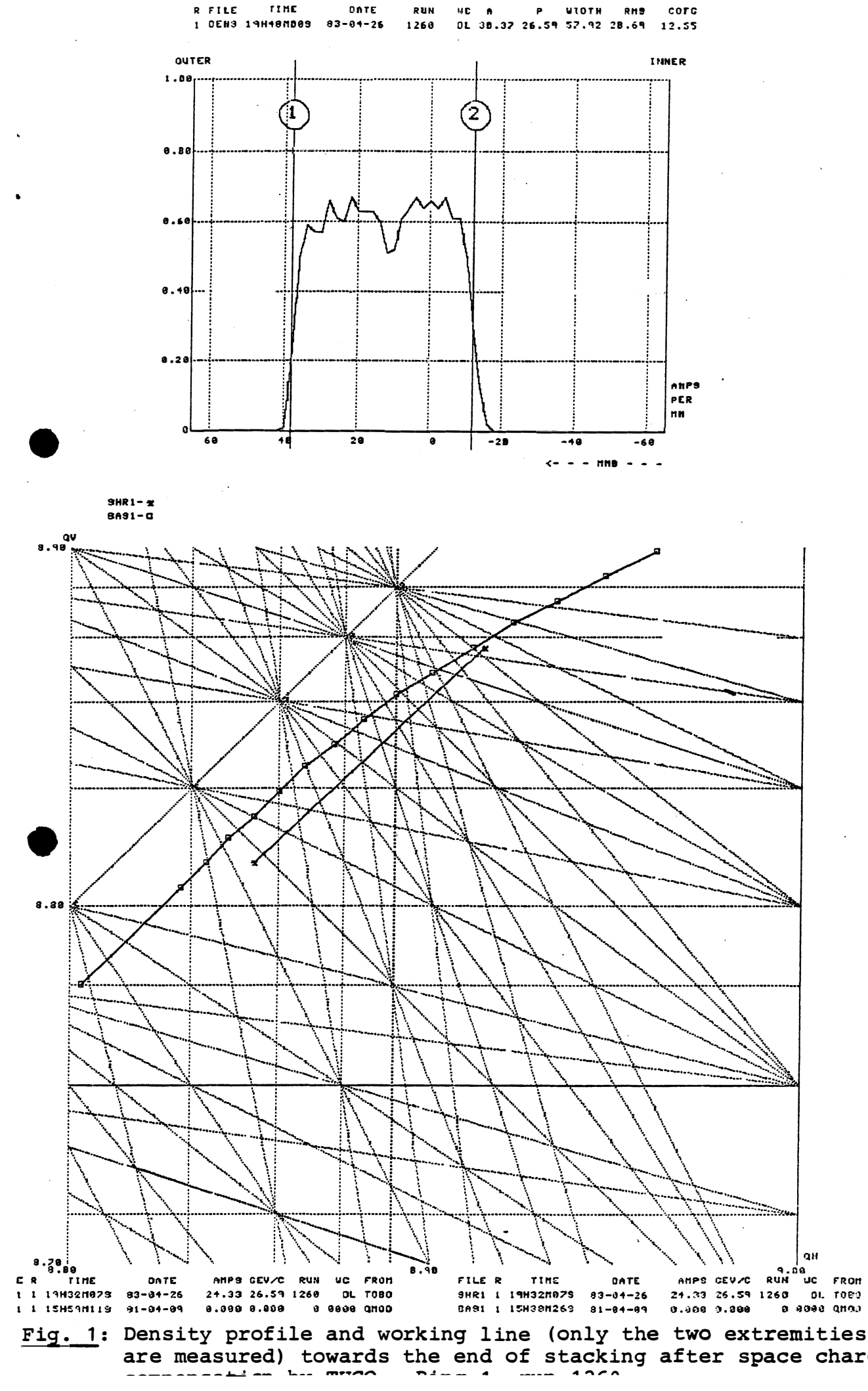


Fig. 1: Density profile and working line (only the two extremities are measured) towards the end of stacking after space charge compensation by TWIQ. Ring 1, run 1260

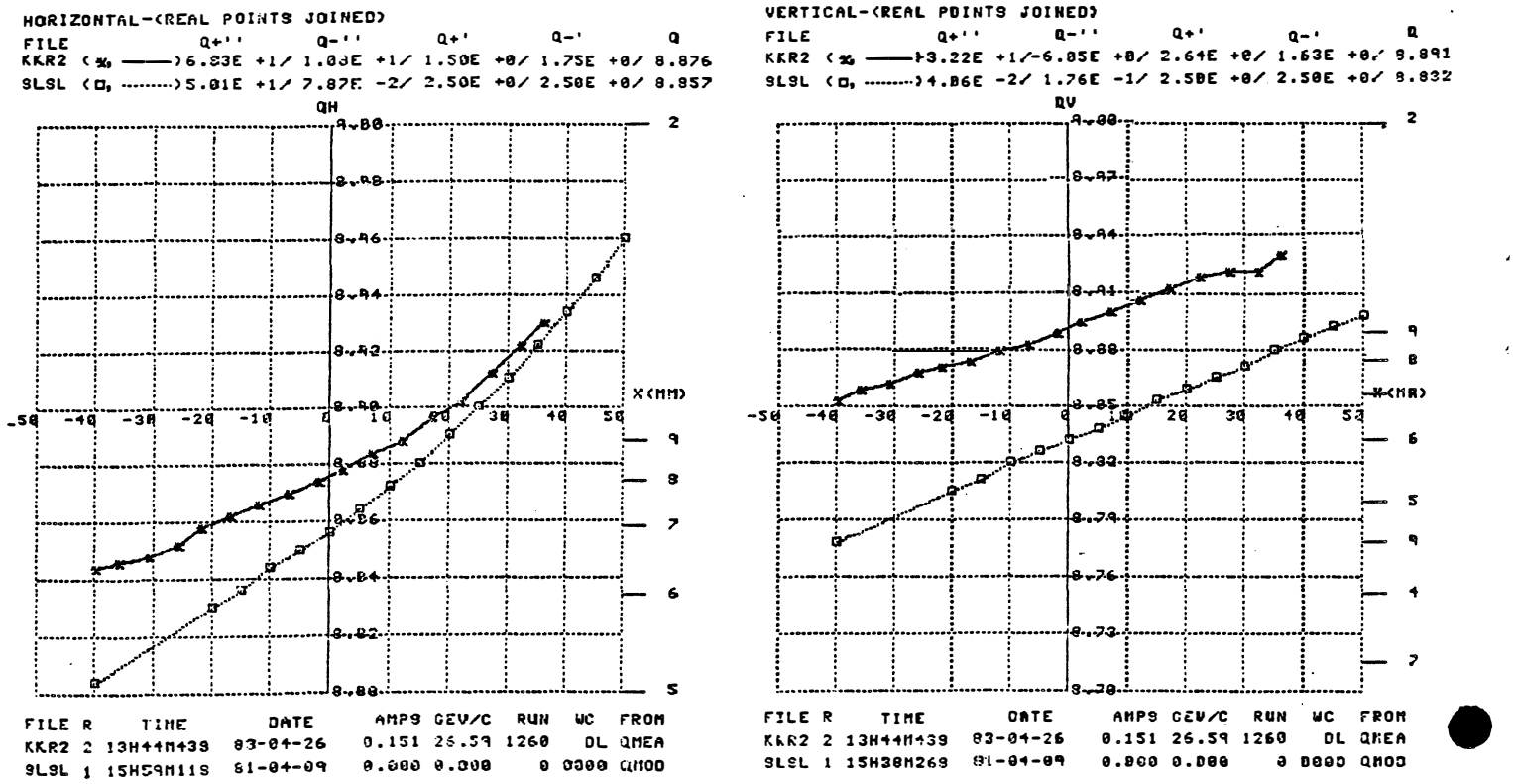


Fig. 2 a: Measurement of the working line after having set the QT5 currents to their correct value (upper curves). The starting line (with the incorrect setting of QT5) is the lower curve.

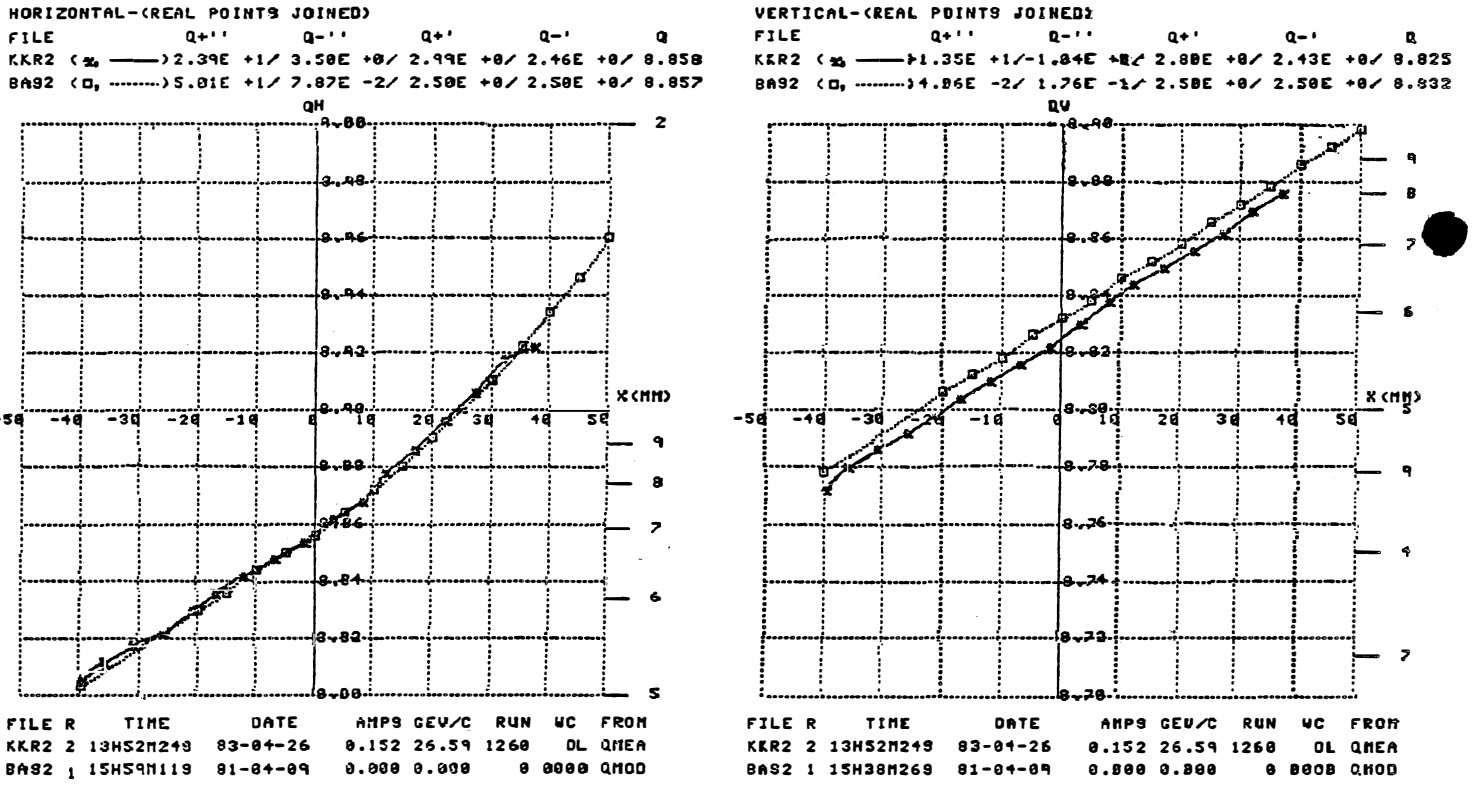


Fig. 2 b: Working line measurement after modification of the curves of fig. 2 a by QPQQ with the SL coefficients.

FIGURE 2: CHECK OF THE QPQQ PROGRAM FOR THE DL CONDITIONS.

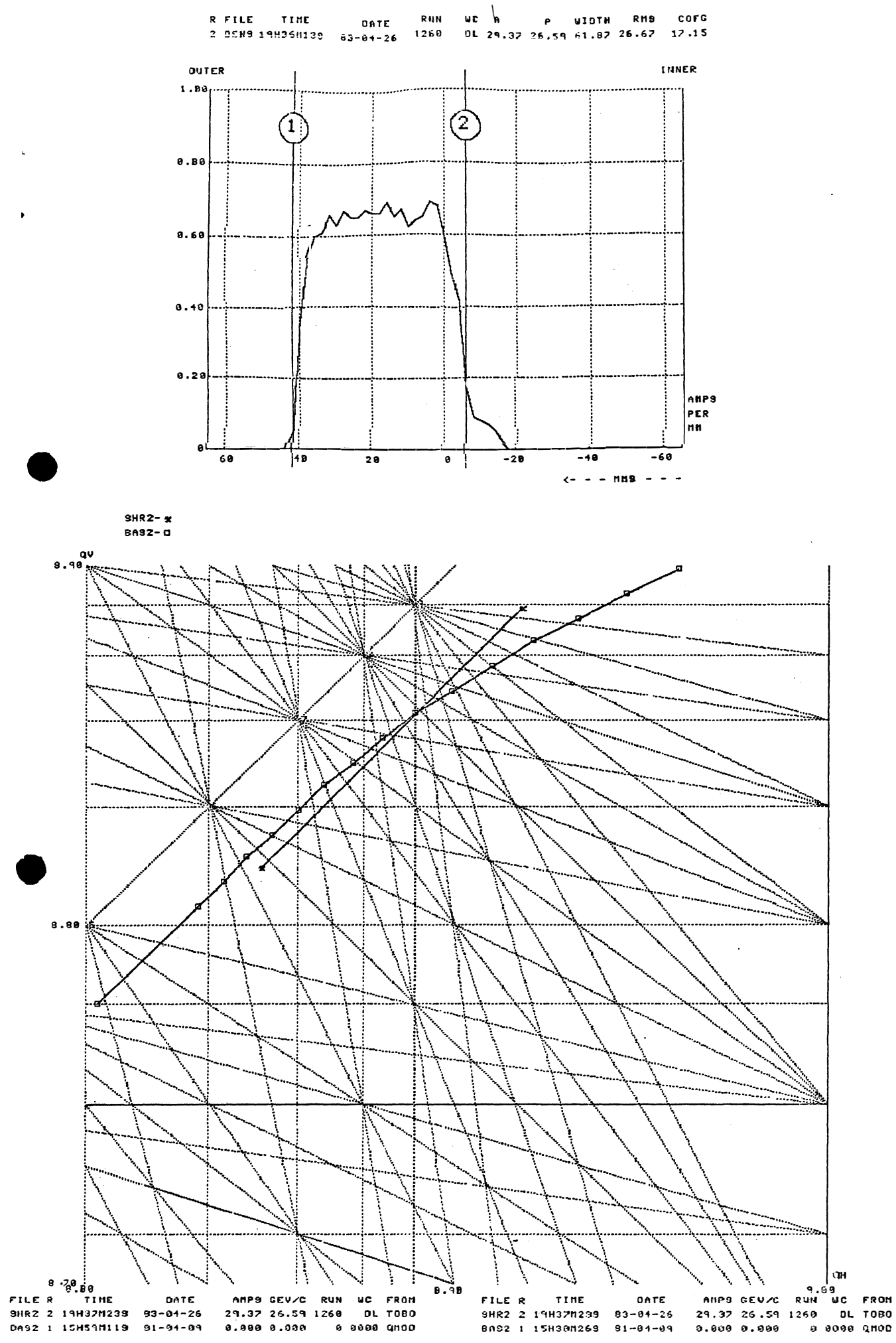
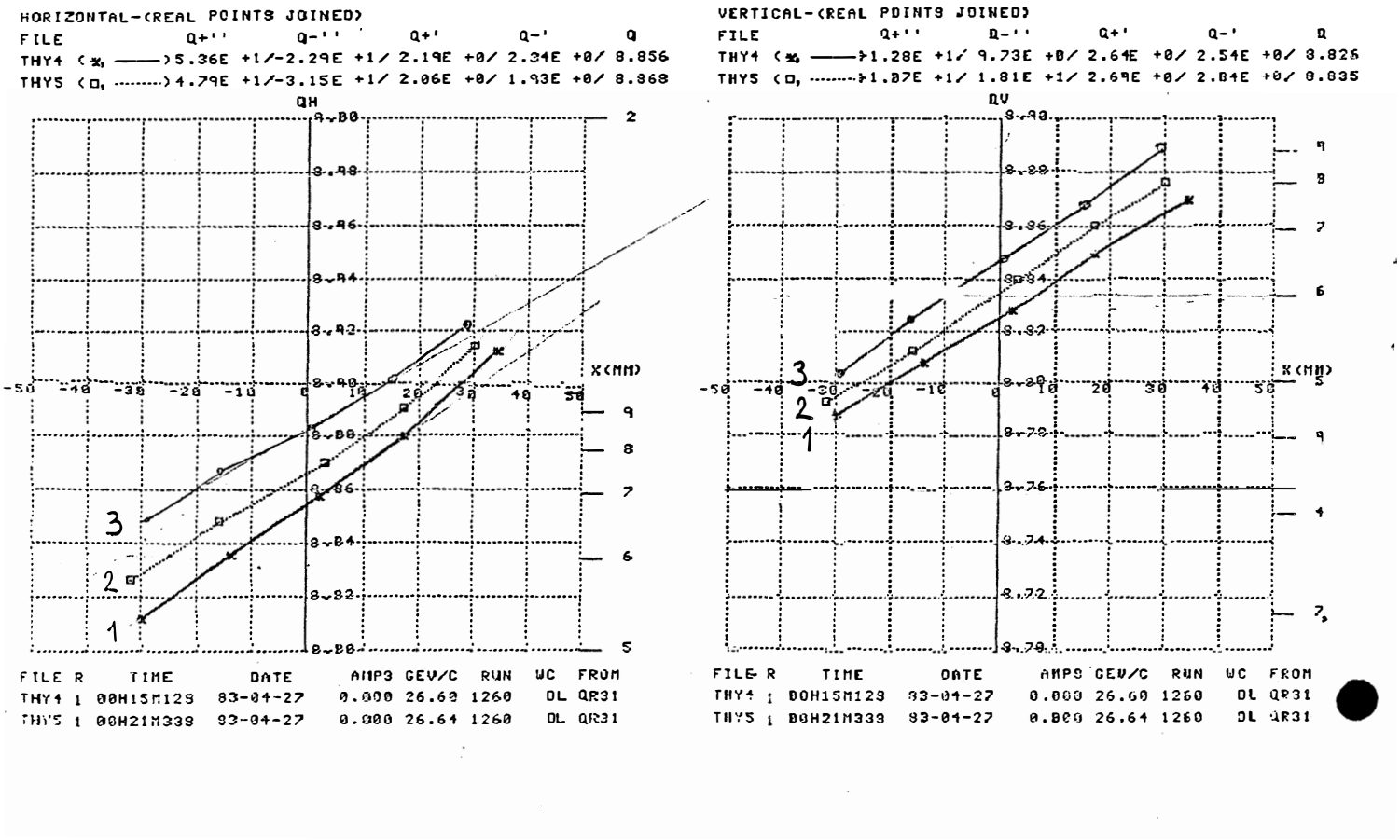


Fig. 3: Density profile and working line (only the two extremities are measured) at the end of stacking after the space charge compensation by TUCO. Ring 2, run 1260.



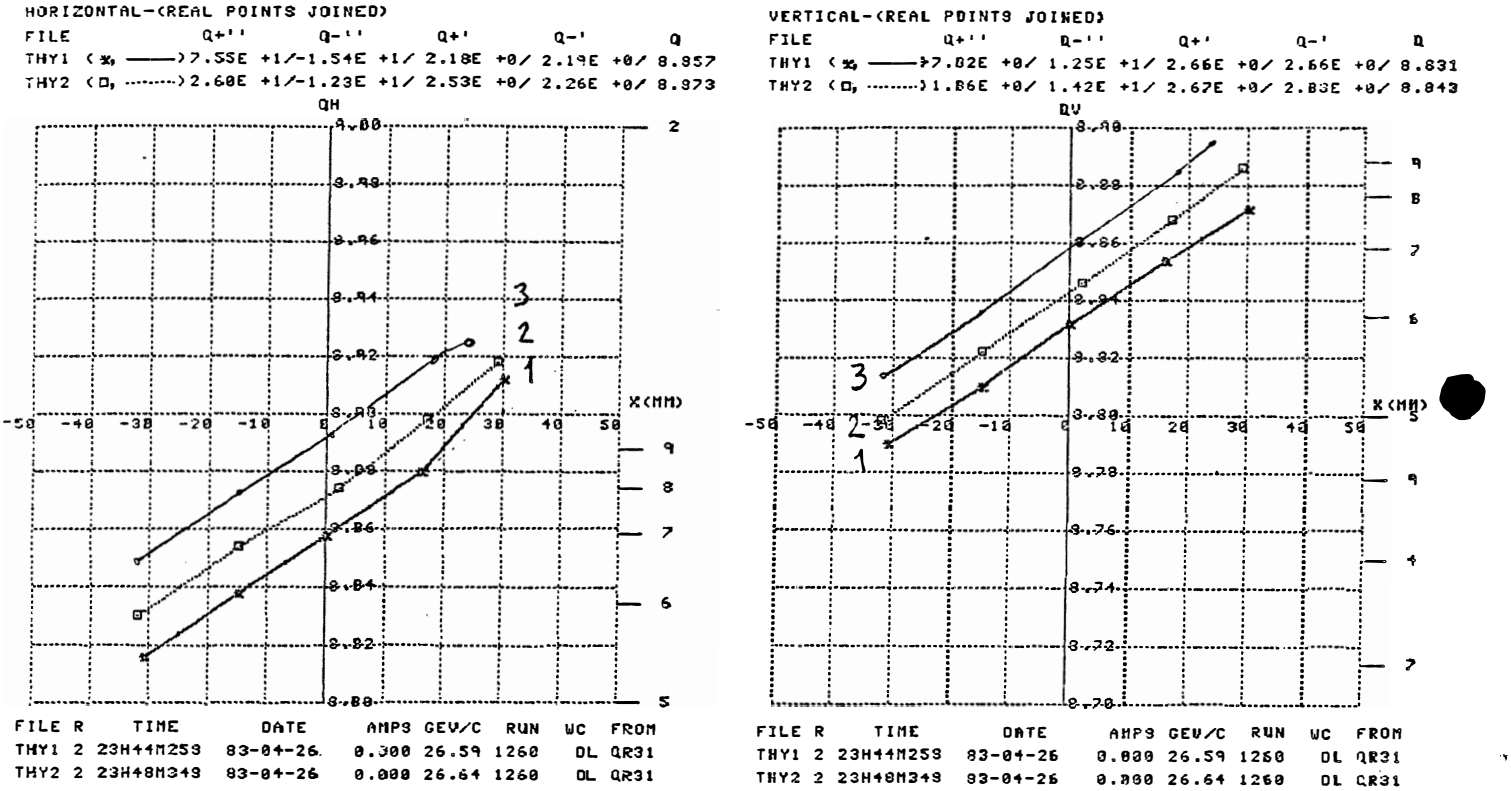


Fig. 4: Working lines 1, 2, 3 obtained with the files DLA1, DLA2, DLA3 which were created from the OT, LB and SL computed currents and the PF currents of the files SLA1, SLA2 and SLA3 which were used with the SL machine.

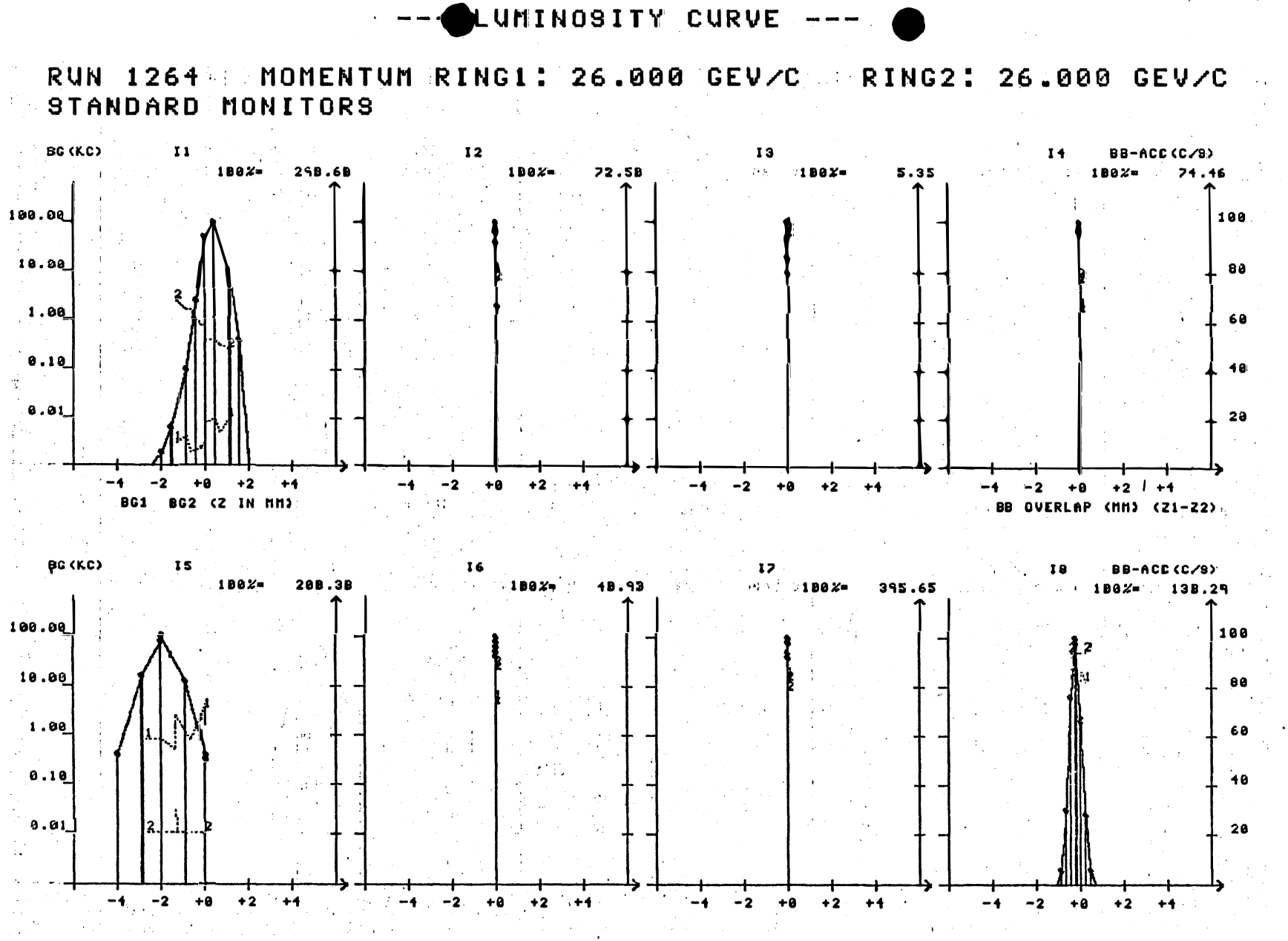
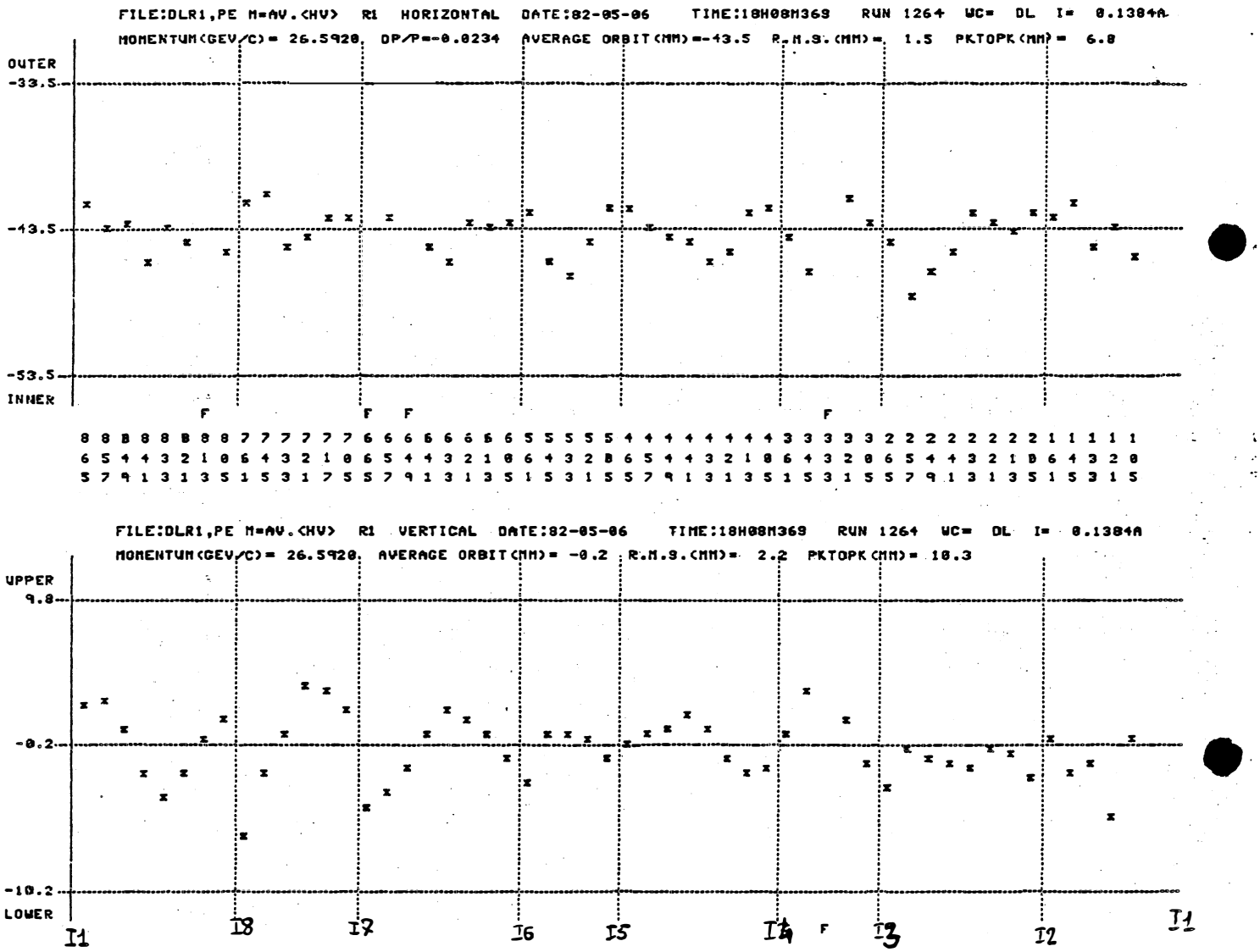
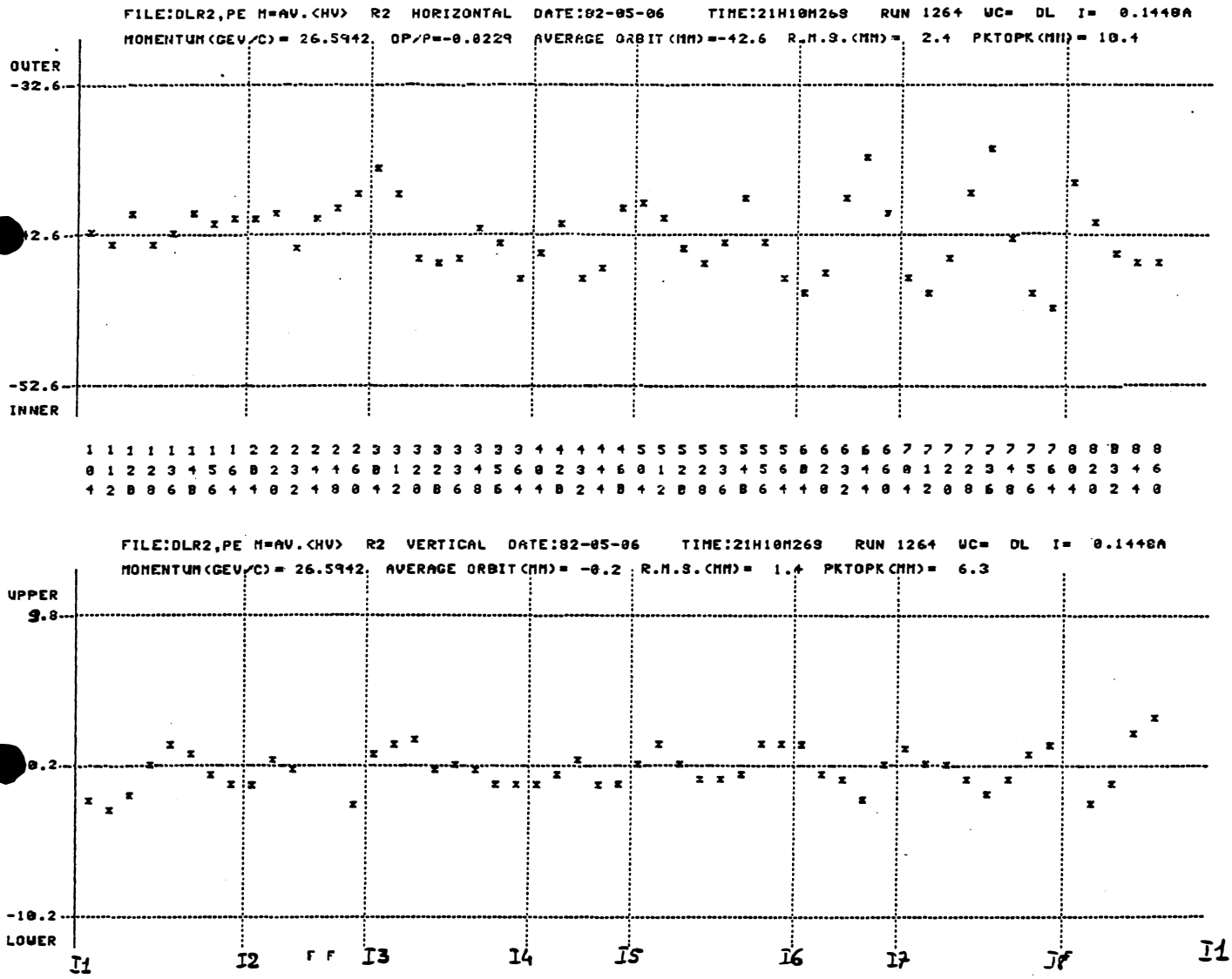


Fig. 5: Counting rates as a function of the beam separations in I1, I5, I8. The separation is deduced from the theoretical amplitudes of the vertical bumps. The variation of the counting rate in the other intersection comes from a non perfect localisation of the bumps.



08	H	V	07	H	V	06	H	V	05	H	V	04	H	V	03	H	V	02	H	V	01	H	V
65	-35.8	2.9	61	-36.0	-6.3	65	xFLTx	-4.1	61	-38.8	-2.5	65	-37.3	0.3	61	-42.0	0.9	65	-39.7	-2.8	61	-41.7	0.5
57	-40.9	3.1	45	-37.2	-1.9	57	-42.4	-3.3	45	-42.8	0.9	57	-43.7	0.8	45	-44.9	4.0	57	-49.1	-0.3	45	-39.6	-1.8
49	-45.2	1.1	33	-55.5	0.6	49	xFLTx	-1.7	33	-58.4	0.9	49	-47.9	1.1	33	xFLTx	xFLTx	49	-51.3	-0.8	33	-55.1	-1.2
41	-50.6	-1.8	21	-43.1	4.0	41	-48.1	0.7	21	-42.5	0.6	41	-48.8	2.1	21	-38.2	1.7	41	-49.4	-1.1	21	-39.3	-4.7
33	-48.0	-3.6	17	-46.1	3.7	33	-48.2	2.5	05	-34.4	-0.9	33	-48.1	1.0	05	-34.3	-1.3	33	-43.9	-1.4	05	-35.8	0.3
21	-48.5	-1.8	05	-36.6	2.4	21	-47.3	1.9				21	-48.8	-0.8				21	-45.2	-0.3			
13	xFLTx	0.6				13	-46.0	0.8				13	-44.5	-1.9				13	-46.1	-0.6			
05	-42.9	1.6				05	-43.8	-1.8				05	-42.7	-1.5				05	-44.8	-2.2			

Fig. 6: Injection orbit for the DL machine, R1, run 1264.
All experimental magnets ON (SFM, AFM, R608, Solenoid I1).



I1	H	V	02	H	V	03	H	V	04	H	V	05	H	V	06	H	V	07	H	V	08	H	V
4	-40.5	-2.2	04	-38.6	-1.3	04	-35.4	0.9	04	-41.1	-1.1	04	-36.4	0.2	04	-46.0	1.5	04	-42.3	1.1	04	-32.4	xFLTx
2	-44.8	-3.8	20	-38.0	0.3	12	-41.8	1.5	20	-40.3	-0.5	12	-42.5	1.5	20	-44.7	-0.4	12	-48.9	0.2	20	-36.6	-2.5
0	-45.2	-1.9	32	-53.7	-0.1	20	-48.2	1.7	32	-57.3	0.6	20	-48.9	0.2	32	-51.3	-0.7	20	-50.2	0.0	32	-54.1	-1.2
8	-47.1	0.2	44	-39.2	xFLTx	28	-49.4	-0.3	44	-42.0	-1.1	28	-50.8	-0.8	44	-33.1	-2.3	28	-45.2	-0.9	44	-44.1	2.2
6	-45.4	1.4	48	-44.3	xFLTx	36	-48.1	-0.0	60	-31.9	-1.1	36	-47.1	-1.0	60	-31.7	0.2	36	-39.6	-1.8	60	-36.3	3.3
8	-44.1	1.0	60	-33.0	-2.5	48	-44.6	-0.2				48	-41.3	-0.6				48	-43.7	-1.0			
6	-43.8	-0.4				56	-44.0	-1.4				56	-42.9	1.5				56	-47.4	0.9			
4	-40.5	-1.3				64	-43.9	-1.4				64	-44.4	1.5				64	-47.5	1.5			

Fig. 7: Injection orbit for the DL machine, R2, run 1264.
All experimental magnets ON. (SFM, AFM, R608, Solenoid I1)