Summary of RUN Periods 30 and 31

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Run duration:	12.4. – 20.5.1996
	and 12.6. – 8.7.1996
People on shift:	≈ 50
Number of Spills:	≈ 1170
Average beam rate:	800 kHz
Days without beam:	4 out of 64 = 6%
$\Sigma\,\overline{p}$	$2.6 \cdot 10^{12}$
used $\overline{p}$	41 – 70%
Sum of written tapes:	6526
with one regenerator:	5157
(with all KK-events:)	1696
with two regenerators:	913
$\pi^+\pi^-$ candidates[†]	$\approx 45 \cdot 10^6$

[†]scaled for $\tau \geq 0$

Contents

1 Summary of RUN Periods 30 and 31

A cylindrical piece of carbon (2.5 cm thick, inner radius 5.8 cm, 115°, density 1.85 $\frac{\mathrm{g}}{\mathrm{cm}^3}$) had been inserted together with a special designed mechanism to move the carbon inside the detector to a larger radius as allowed by the beam tube. The installation of a veto counter for detecting decays inside the regenerator failed because of lack of space to pass everything through the upstream beam tube. This does not cause any problems since the regenerator is located close to PC1 which can be used as a veto counter if necessary.

The experiment was running after 1.5 days. The time included beam tuning, PID HV tuning, creation of new PID and DC calibration files. The ST calibration came only at the end of period 30. The calorimeter was not needed for this year measurement and therefore not operational.

LEAR had problems of delivering high intensities for more than 50 minutes during the first period. Otherwise, beam was stable at intensities $0.8 - 0.9\,\mathrm{MHz}$ for most of the run. One and a half days at the begin of period 31 had been given to LEAR to improve the spill length. In the middle of period 30, some unwanted person entered the PS control room causing an emergency switch off of all machines. This also destroyed three power supplies of the DC readout system. Two days had been lost before the beam came back.

Data taking was mainly devoted for measuring regeneration in carbon (Trigger used: T507110026). The trigger setting had been changed at begin of period 31: the kinematic decision ($P_{\mathrm{K}} P_{\pi}$) had been removed and additional events (events with two kaon candidates and without HWP2 decision) had been written on tape for trigger studies (T507010026). A second regenerator (copper, 7 mm thick, inner radius 2 cm, 240°) opposite to the first regenerator had been inserted for the last 10 days. During these days, the trigger was mainly T513 (= 503): no hits in PC0, at least one kaon candidate with a $P_t > 200$ MeV/c, 2, 3 or 4 primary tracks and any number of secondary tracks. In order to reject beam-wall events, a a silicon counter was mounted in front of the target window and used in conicidence with the trigger. The information of the silicon counter was also written on tape through an unused channel of Cherenkov 22 (since begin of P31). After a few days with the second regenerator, sudden increases of the PC1 current caused trips of the PC1 HV. The HV of PC1 had been reduced which resulted in a low efficiency ($< 80\%$) for the last days.

There had been again problems of the CAEN HV monitoring as in the periods before. This time in addition, the Slow Control decided to switch off and on the PC1 HV. The problem could only be solved by changing the channel of the PC1 HV on the CAEN crate. Since begin of P30, the readout stopped frequently due to the eventbuilder. Changing most of the hardware didn't cure the problem, the only solution was to 'go local' and 'go remote' on the EB valet in case the problem appeared. Also MSP stopped frequently which didn't caused any ineffeciency, only the monitoring was missing. Frequent stops of the PID RRO caused in average a loss of 7%.

A change of the HWP2 rejection factor as function of the beam intensity had been observed (page 21). The carbon regenerator is clearly seen through the reconstruction of γ-conversions (page 23). Its position had been measured geometricly and using γ-conversions.

CPLEAR data taking stopped at 8th of July, $08:21:33.00$.

2 Problems

- EB hickups
- RRO hickups mainly PID RRO
- The Slow control HV monitoring was sometimes unreliable due to CAEN network problems
- The software idle for the HV stopped working after P30
- Several power supplies of DC readout system broke, one spare was missing
- DC6 external strips at begin of P30
- Hardware problem with the USER disk
- Streamer tube calibration (page 22)

3 Conclusion

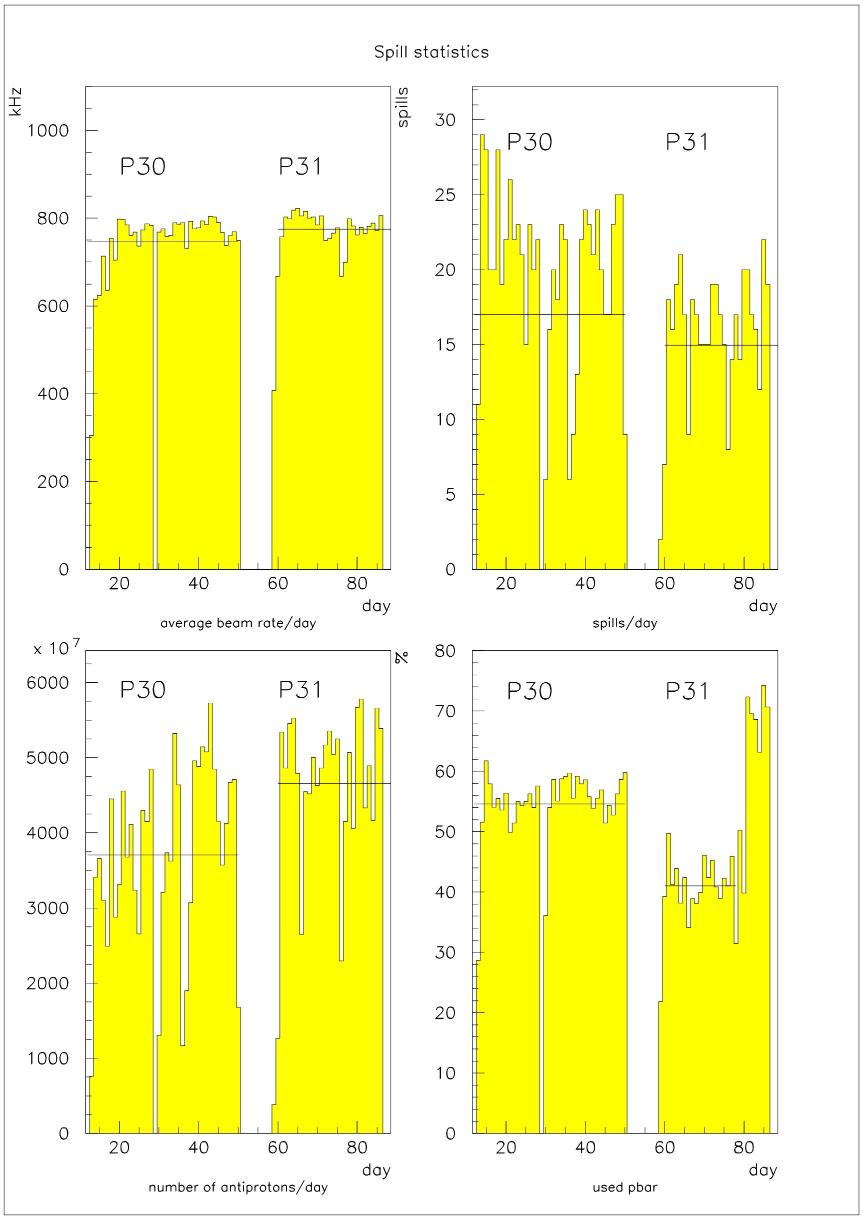
In general stable data taking. More problems with detector readouts and eventbuilder compared to previous periods. Number of good event candidates per tape dropped continously.

4 Tape Summary

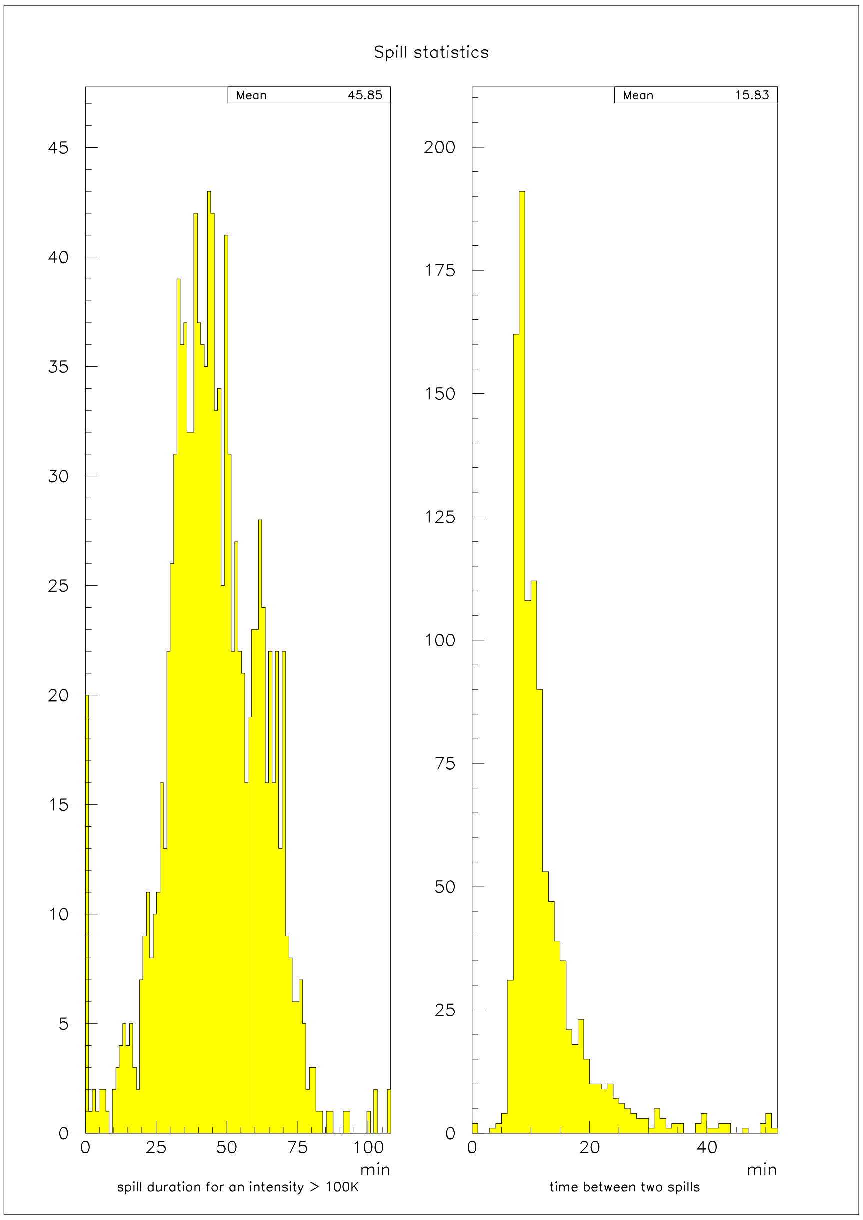
Trigger	positve field	negative field
	Period 30	
1	120	137
305	8	13
500110026	22	12
507110026	1640	1620
	Period 31	
1	71	74
305†	349	295
(† Some tapes without Cherenkov)		
315	146	123
507010026	840	856
507110026	112	89
	all tapes: 6526	

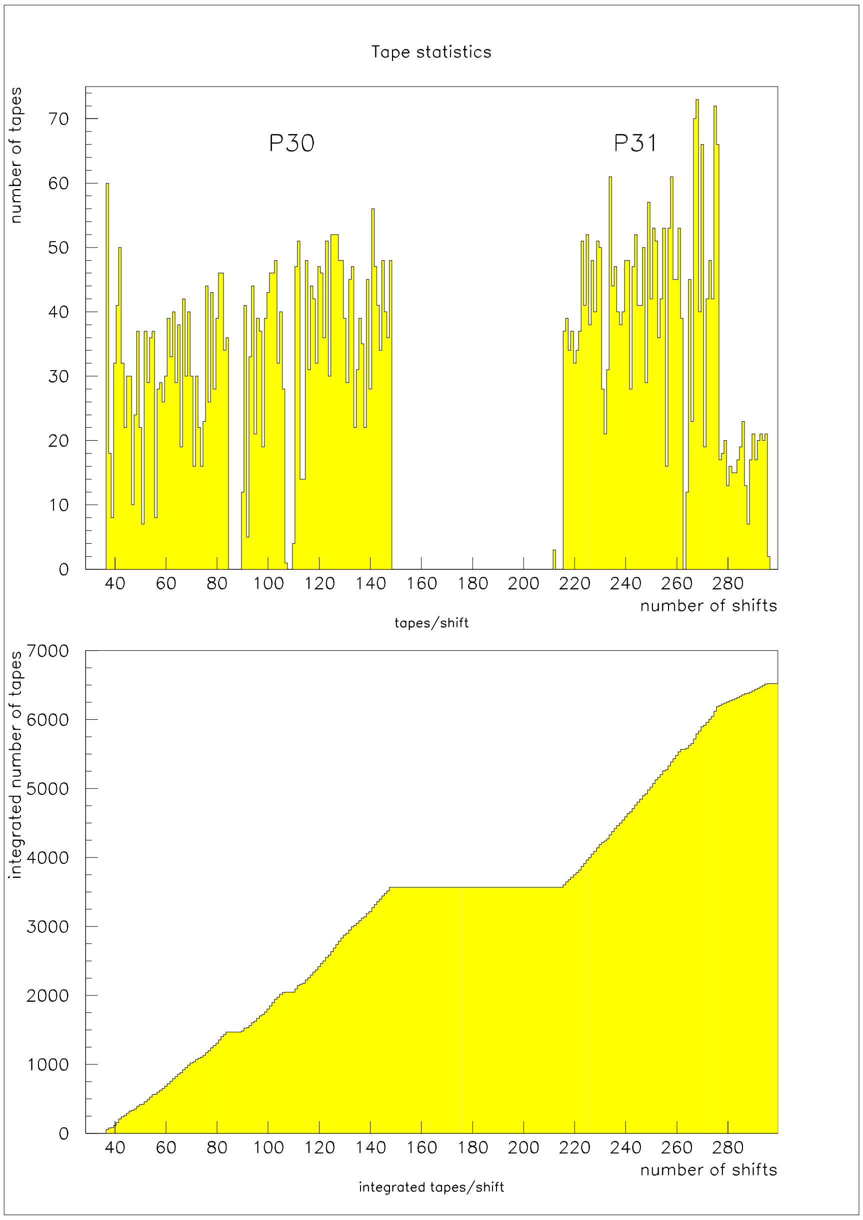
5 List of Histograms

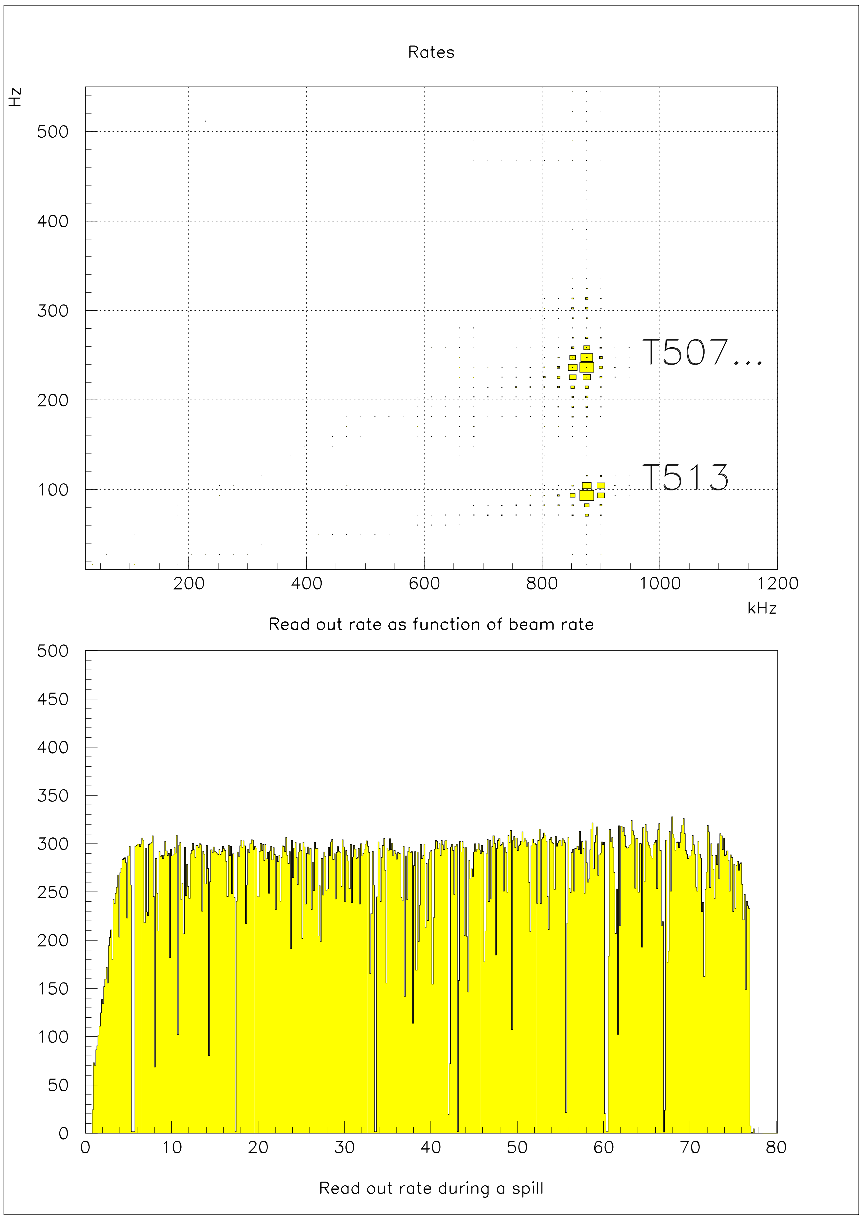
The algorithm for calculating the chamber efficiency does not work reliable for inclined tracks, therefore drop in efficiency for the last 10 days.



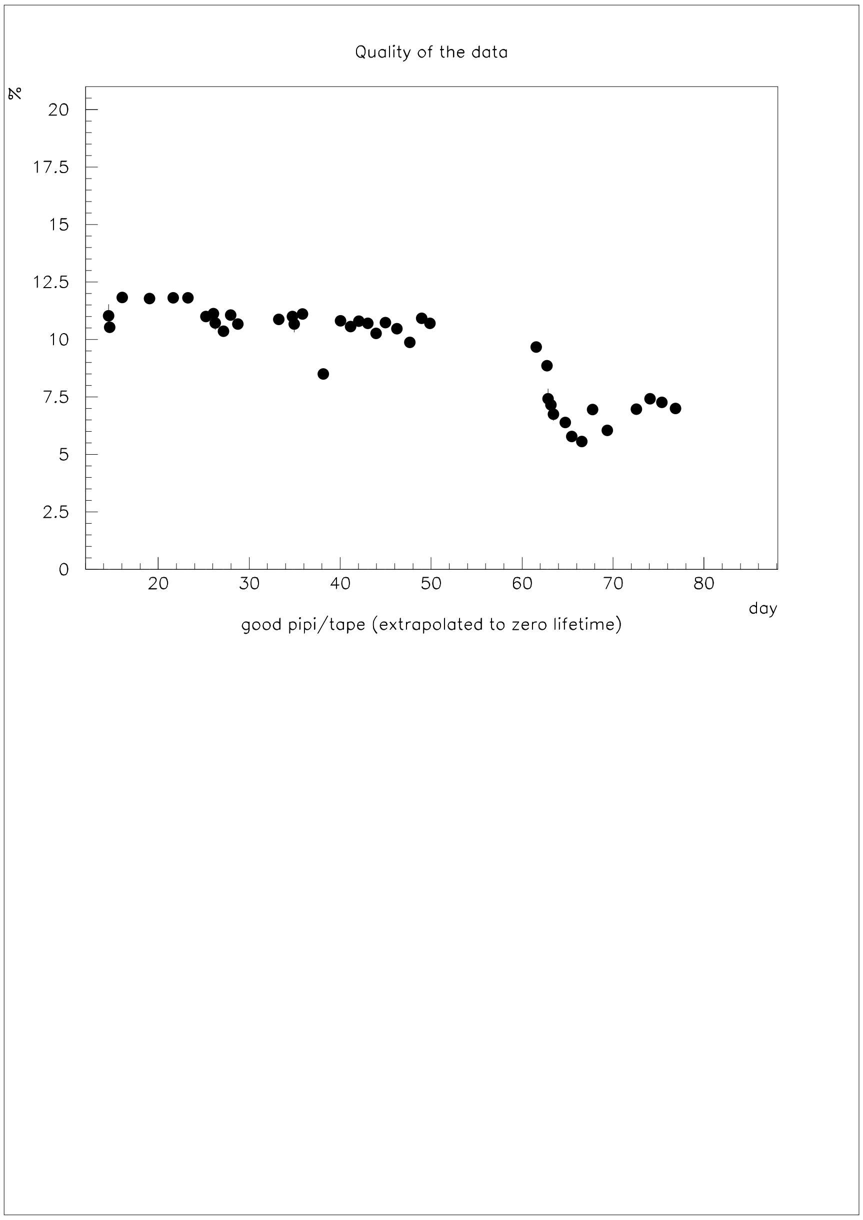
Spill statistics
kHz
P30
P31
1000
800
600
400
200
0
20
40
60
80
day
average beam rate/day
spills
30
25
20
15
10
5
spills/day
x 10^7
6000
5000
4000
3000
2000
1000
number of antiprotons/day
%
70
50
used pbar


Spill statistics
Mean 45.85
Mean 15.83
min
min
spill duration for an intensity > 100K
time between two spills

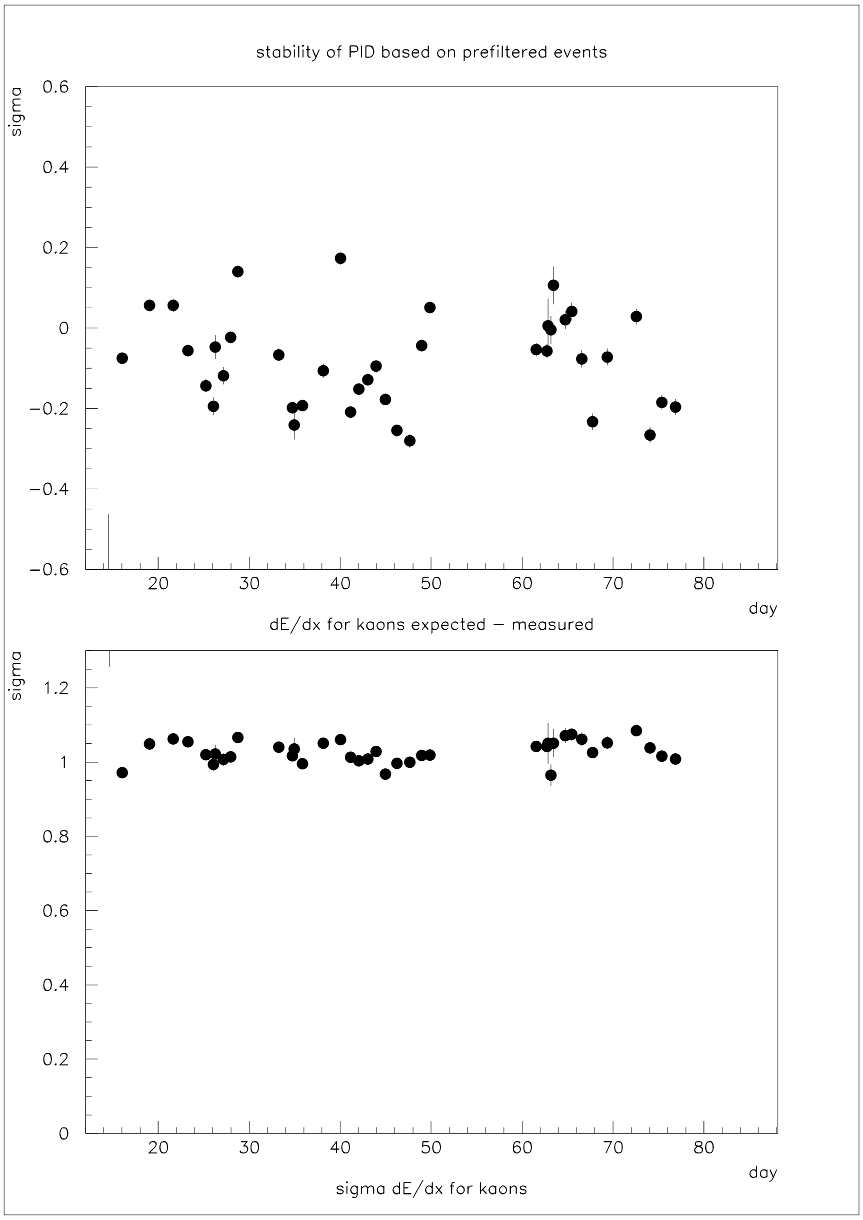

Tape statistics
number of tapes
P30
P31
number of shifts
tapes/shift
integrated number of tapes
number of shifts
integrated tapes/shift



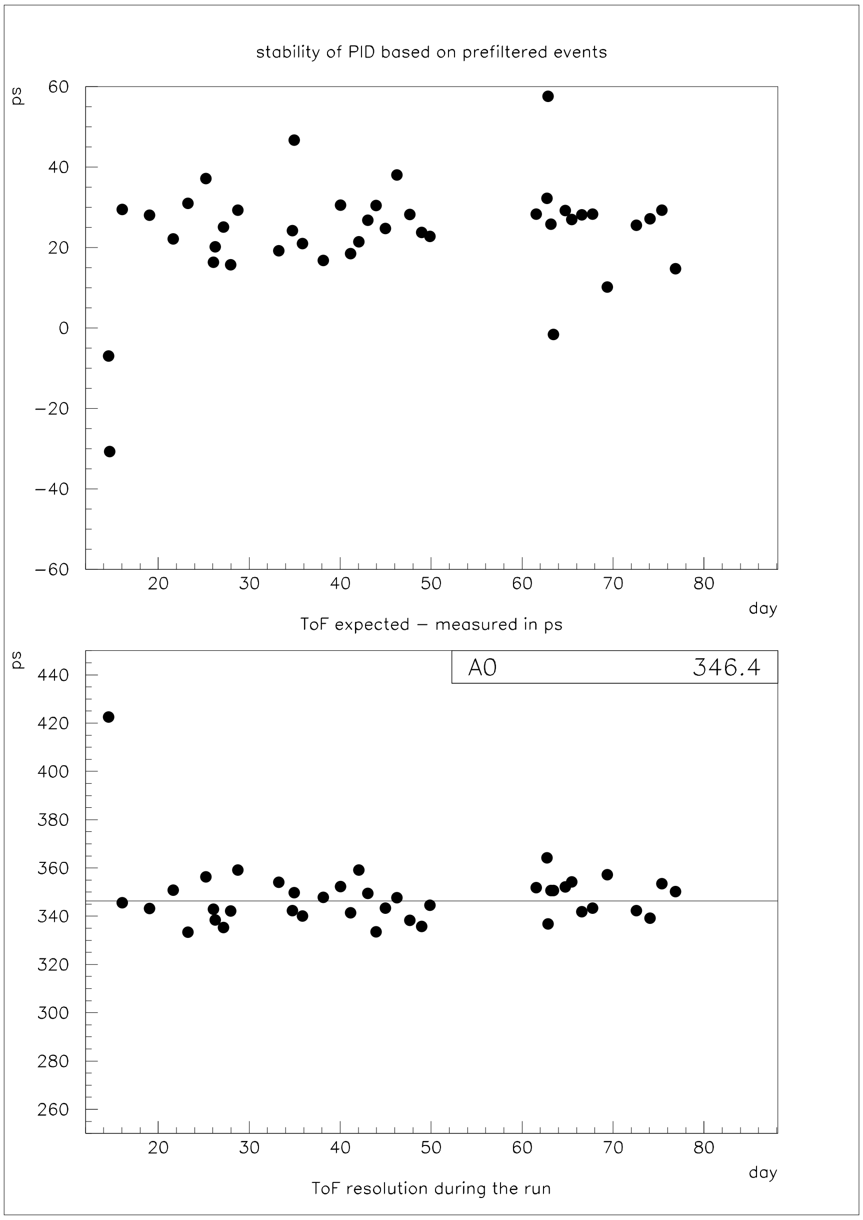
Rates
Hz
500
400
300
200
100
200
400
600
800
1000
1200
kHz
T507...
T513
Read out rate as function of beam rate
500
450
400
350
300
250
200
150
100
50
0
0
10
20
30
40
50
60
70
80
Read out rate during a spill

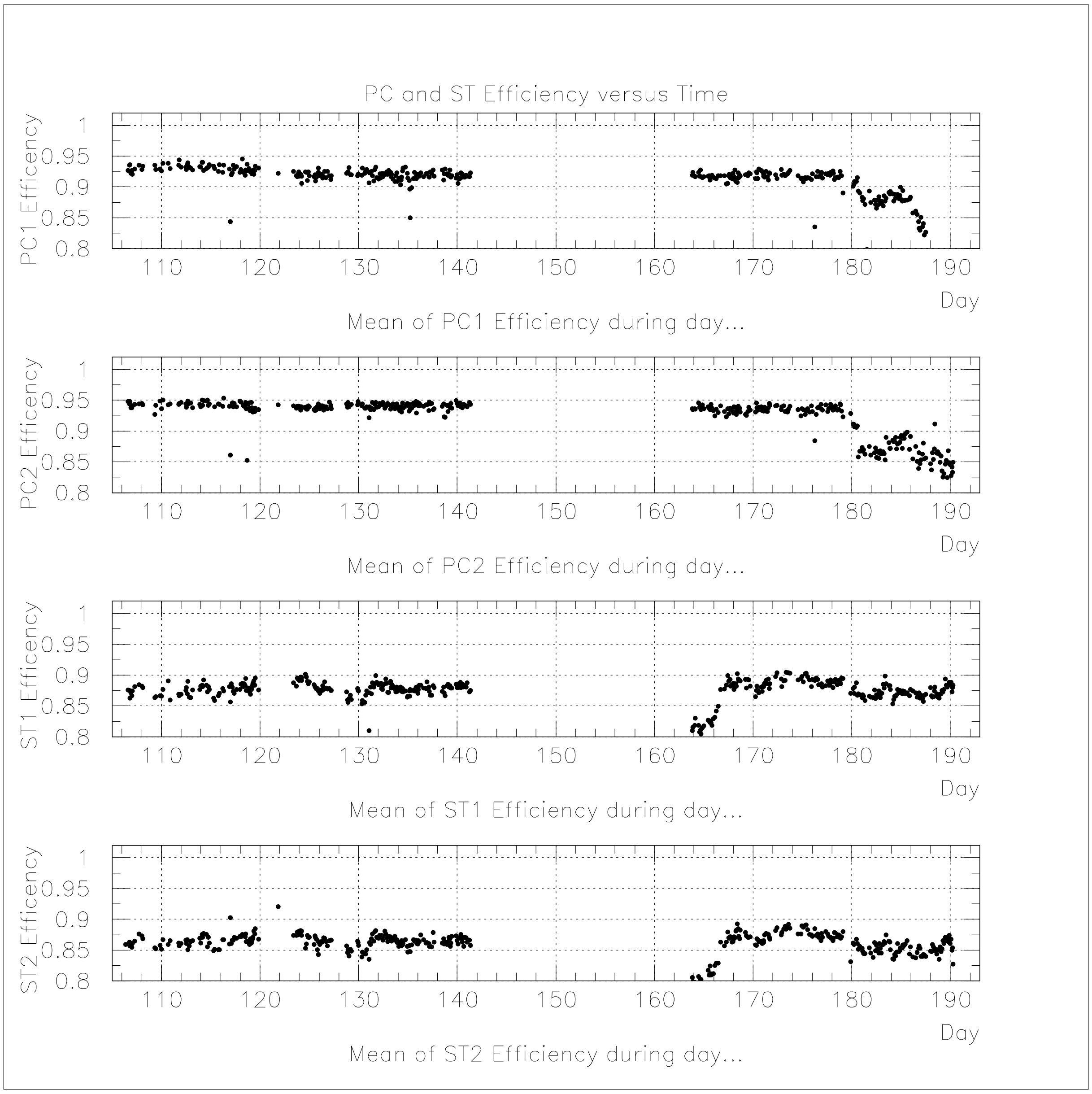


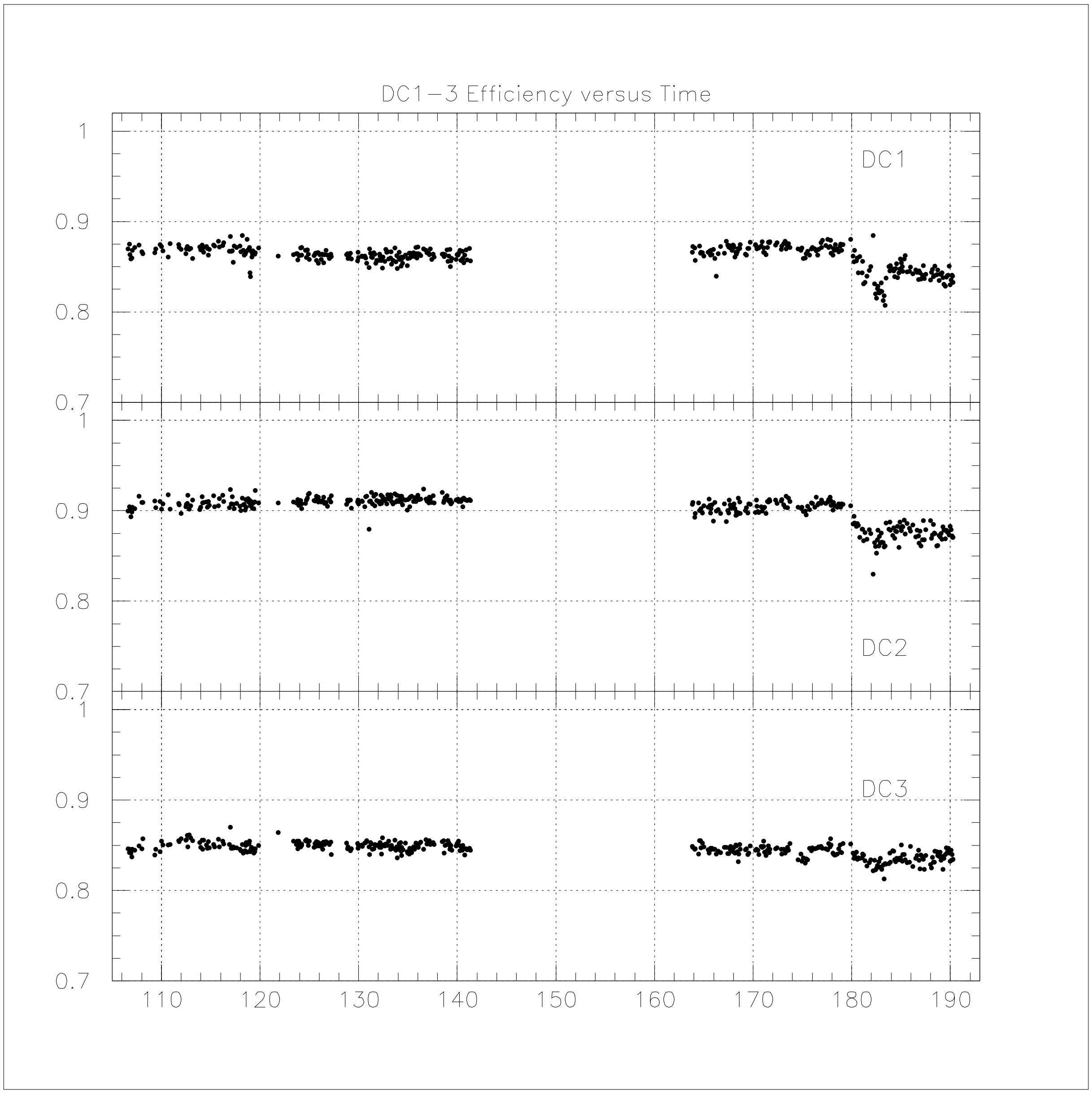
Quality of the data
%
20
17.5
15
12.5
10
7.5
5
2.5
0
20
30
40
50
60
70
80
day
good pipi/tape (extrapolated to zero lifetime)

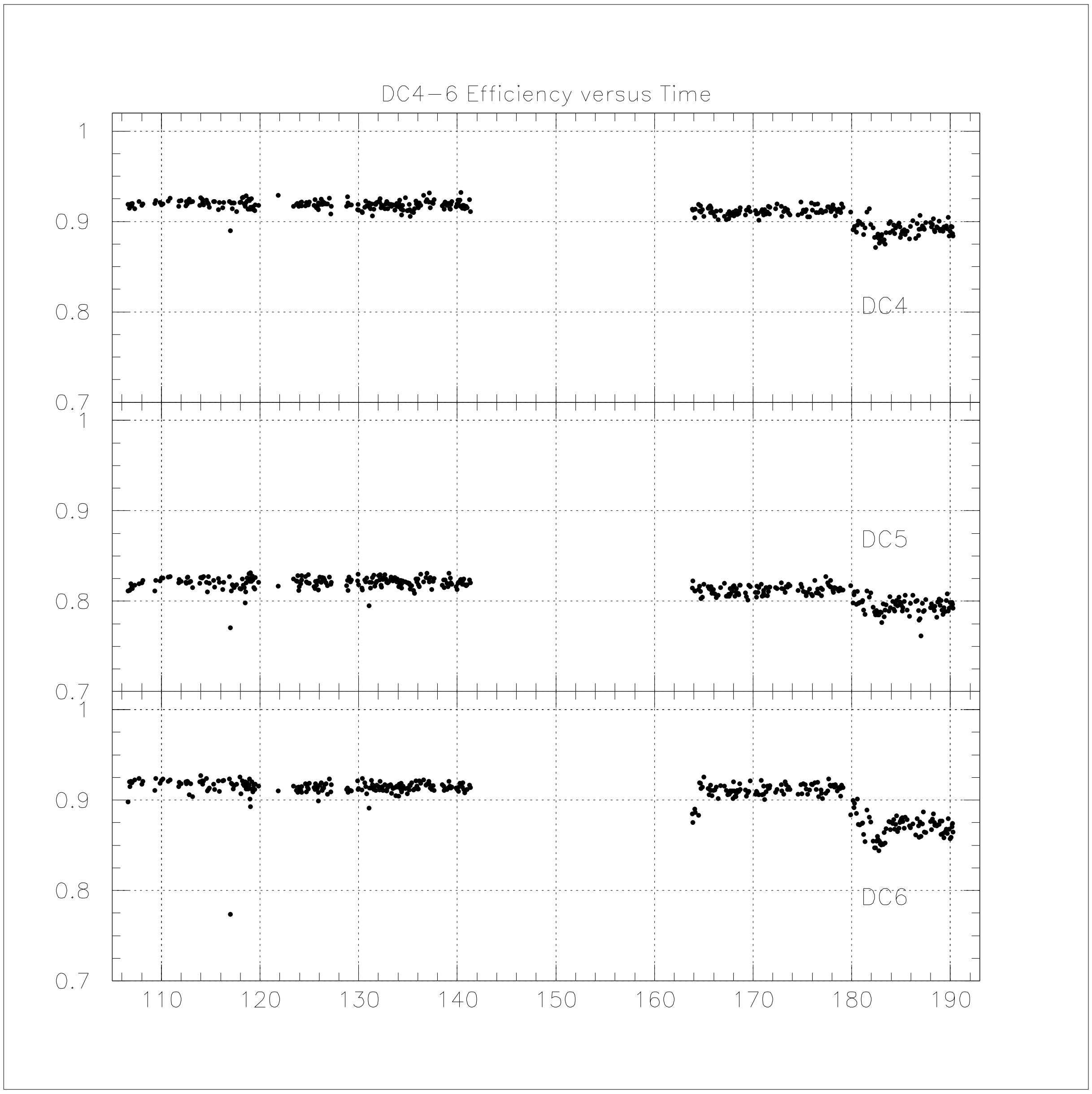


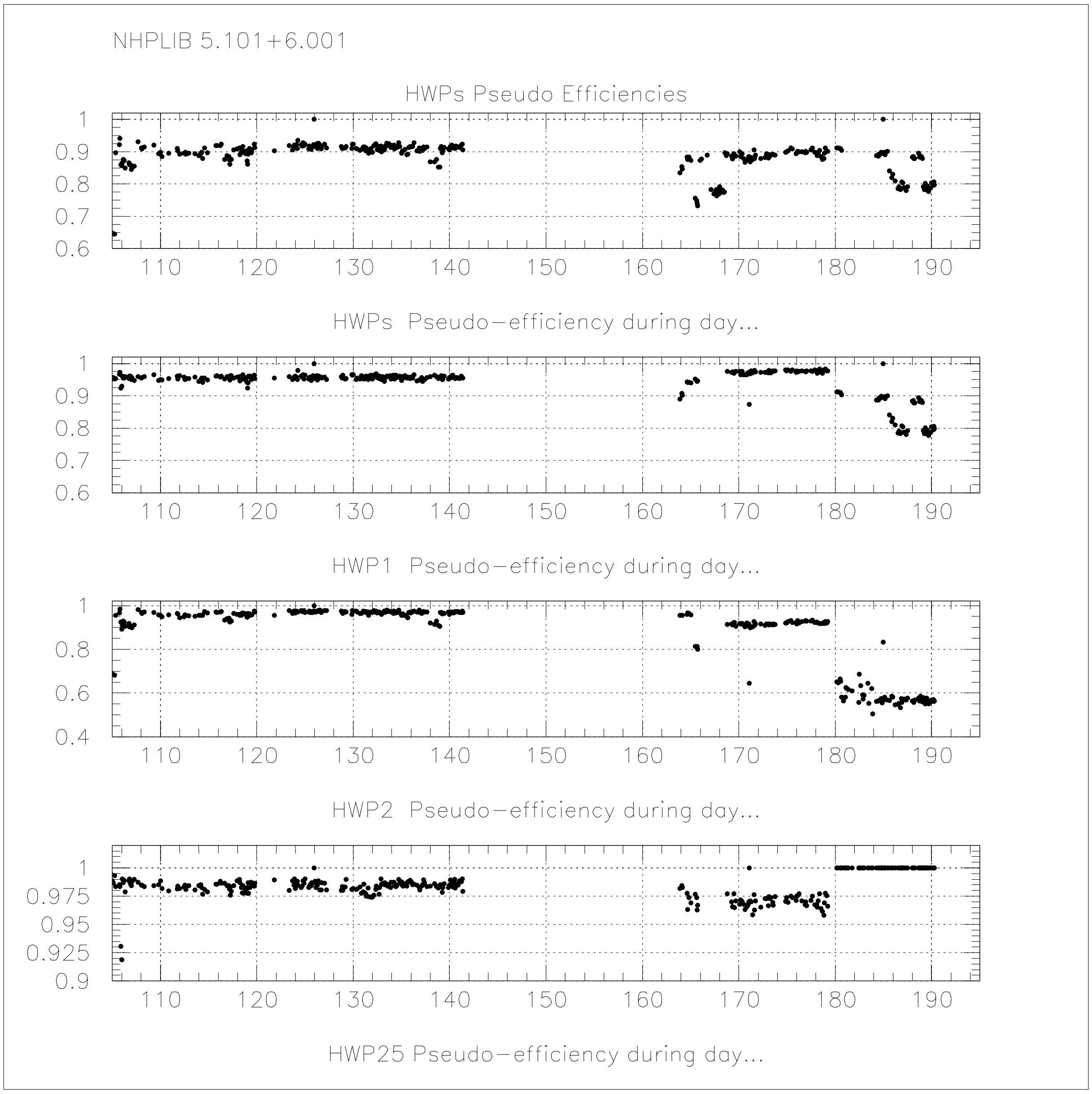
stability of PID based on prefiltered events
sigma
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
20
30
40
50
60
70
80
day
dE/dx for kaons expected − measured
sigma
1.2
1
0.8
0.6
0.4
0.2
0
20
30
40
50
60
70
80
day
sigma dE/dx for kaons

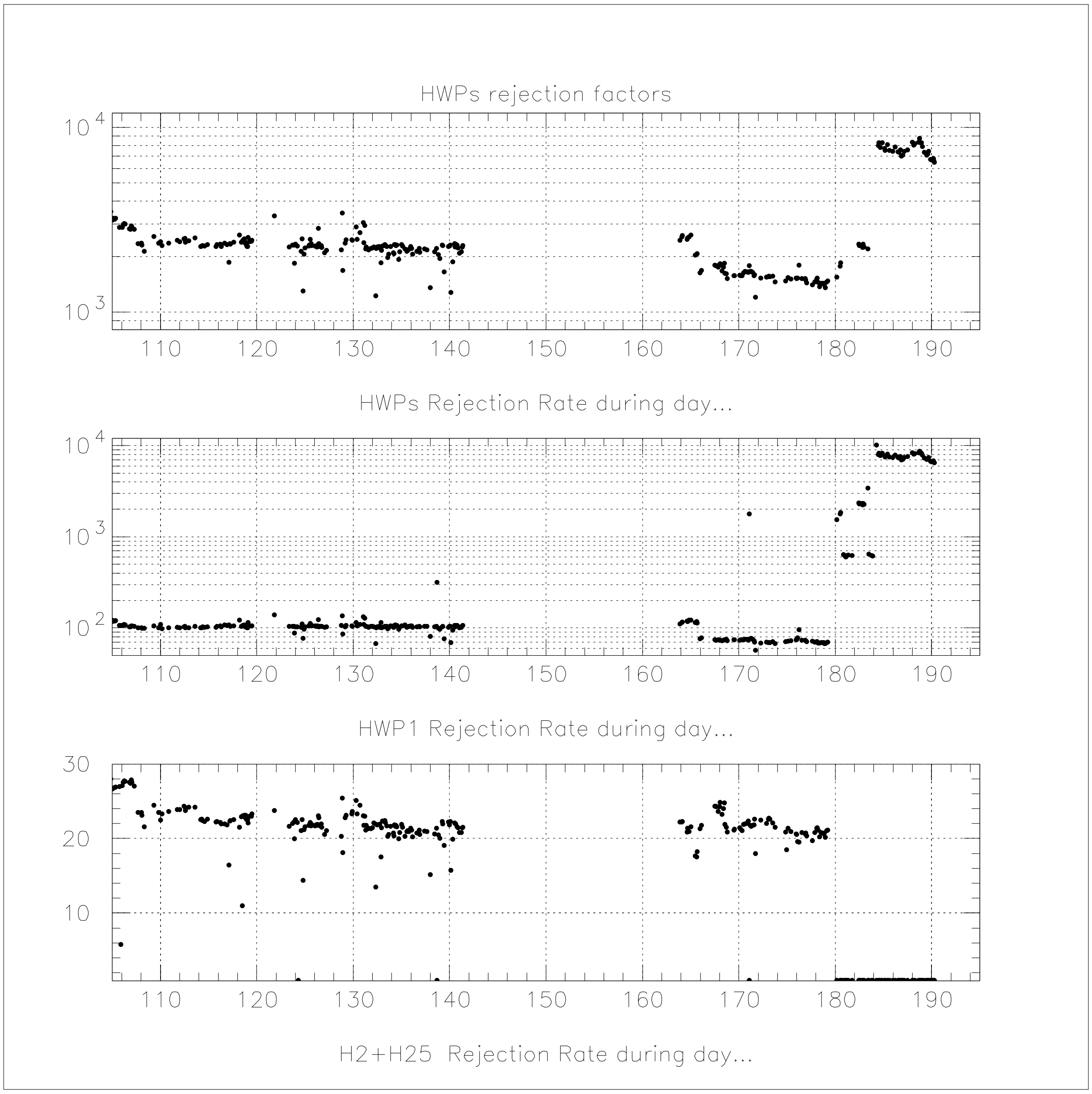

stability of PID based on prefiltered events
ps
60
40
20
0
−20
−40
−60
20
30
40
50
60
70
80
day
ToF expected − measured in ps
ps
A0
346.4
440
420
400
380
360
340
320
300
280
260
20
30
40
50
60
70
80
day
ToF resolution during the run

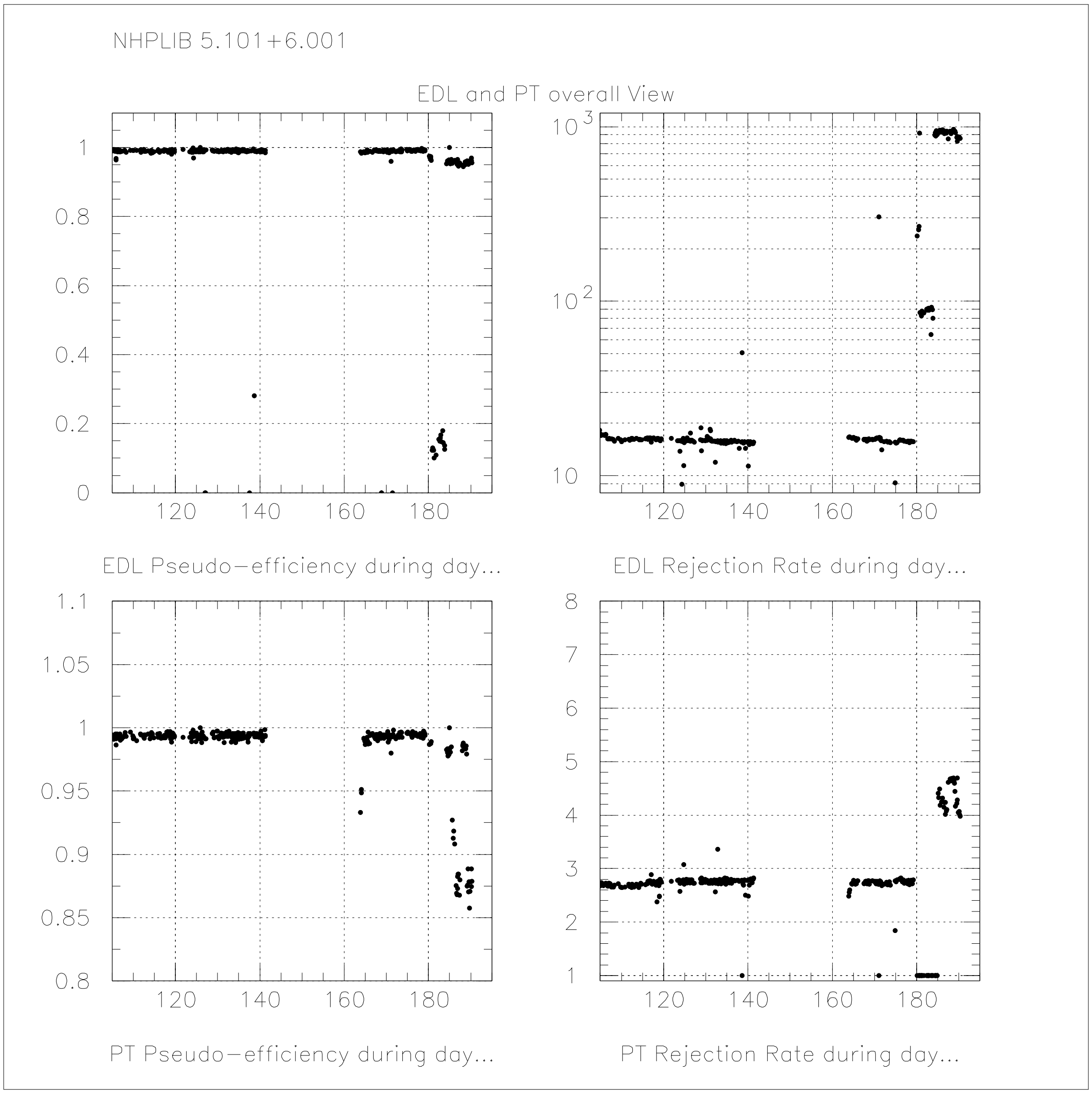

PC and ST Efficiency versus Time
PC1 Efficency
1
0.95
0.9
0.85
0.8
110
120
130
140
150
160
170
180
190
Day
Mean of PC1 Efficiency during day...
PC2 Efficency
Mean of PC2 Efficiency during day...
ST1 Efficency
Mean of ST1 Efficiency during day...
ST2 Efficency
Mean of ST2 Efficiency during day...

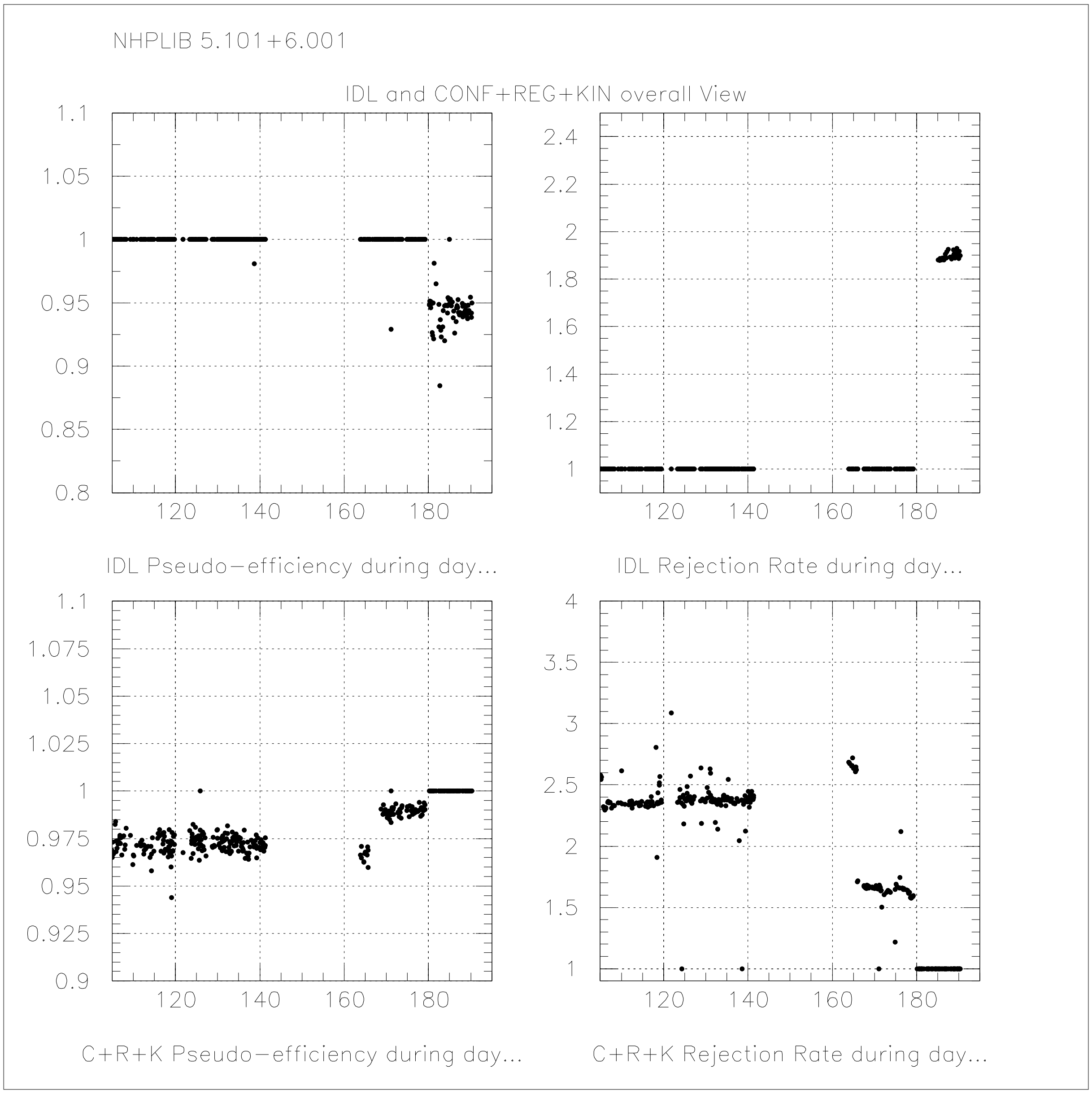

DC1−3 Efficiency versus Time
DC1
DC2
DC3
1
0.9
0.8
0.7
110
120
130
140
150
160
170
180
190

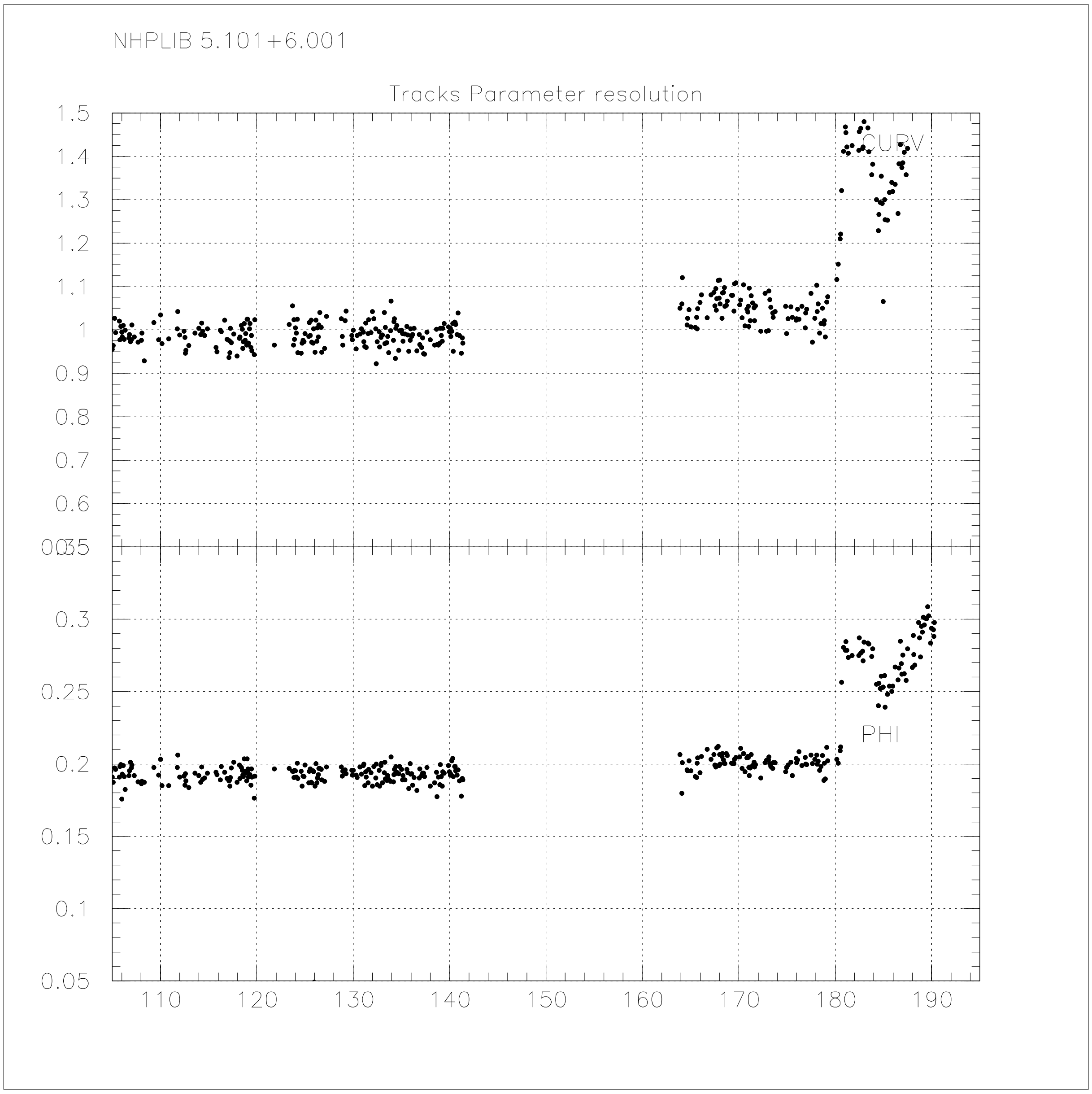

DC4−6 Efficiency versus Time
1
0.9
0.8
0.7
DC4
DC5
DC6
110
120
130
140
150
160
170
180
190


NHPLIB 5.101+6.001
HWPs Pseudo Efficiencies
HWPs Pseudo−efficiency during day...
HWP1 Pseudo−efficiency during day...
HWP2 Pseudo−efficiency during day...
HWP25 Pseudo−efficiency during day...

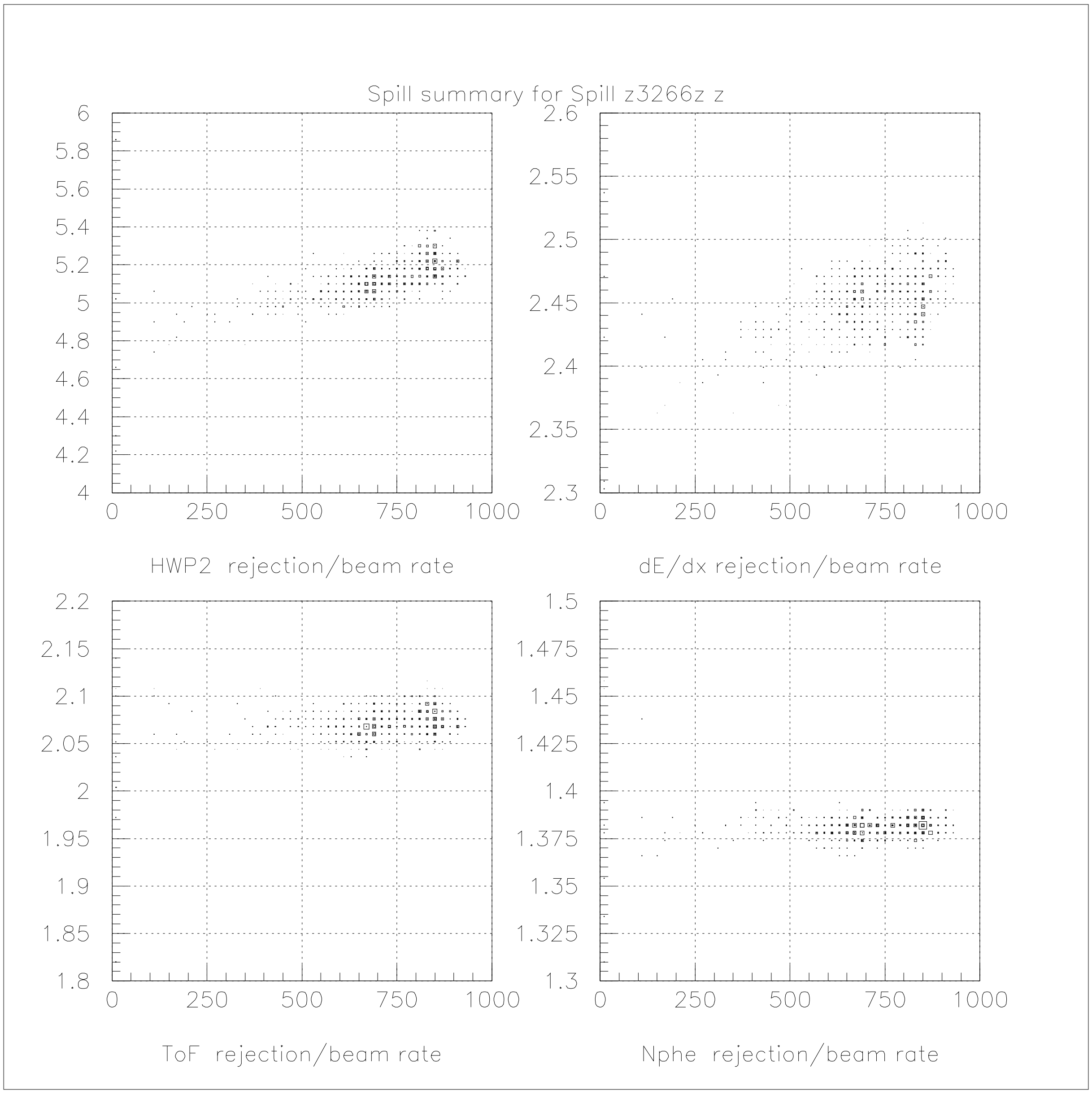

HWPs rejection factors
10^4
10^3
110 120 130 140 150 160 170 180 190
HWPs Rejection Rate during day...
10^4
10^3
10^2
110 120 130 140 150 160 170 180 190
HWP1 Rejection Rate during day...
30
20
10
110 120 130 140 150 160 170 180 190
H2+H25 Rejection Rate during day...


NHPLIB 5.101+6.001
EDL and PT overall View
EDL Pseudo−efficiency during day...
EDL Rejection Rate during day...
PT Pseudo−efficiency during day...
PT Rejection Rate during day...

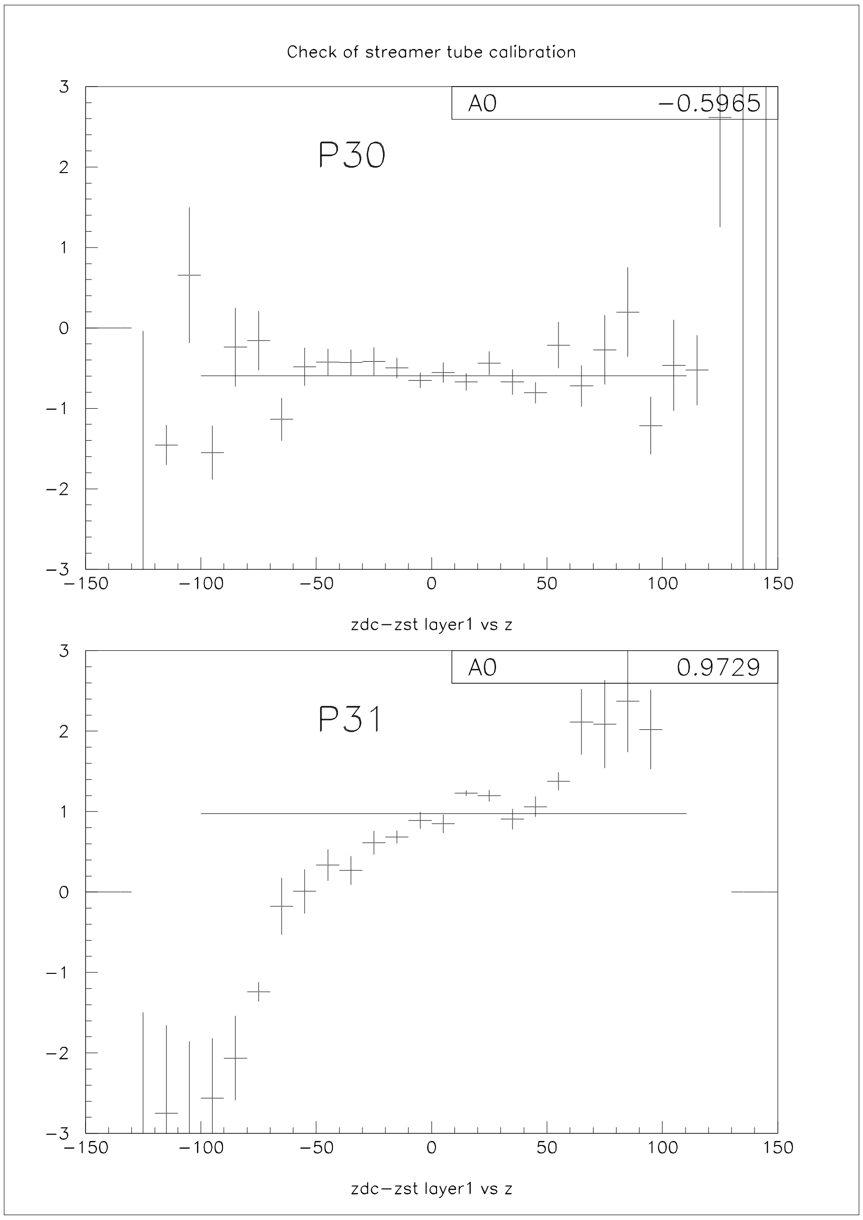

NHPLIB 5.101+6.001
IDL and CONF+REG+KIN overall View
IDL Pseudo−efficiency during day...
IDL Rejection Rate during day...
C+R+K Pseudo−efficiency during day...
C+R+K Rejection Rate during day...



NHPLIB 5.101+6.001
Tracks Parameter resolution
CURV
PHI
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.35
0.3
0.25
0.2
0.15
0.1
0.05
110
120
130
140
150
160
170
180
190



Spill summary for Spill z3266z z
HWP2 rejection/beam rate
dE/dx rejection/beam rate
ToF rejection/beam rate
Nphe rejection/beam rate


Check of streamer tube calibration
A0 −0.5965
P30
zdc−zst layer1 vs z
A0 0.9729
P31
zdc−zst layer1 vs z

X-ray image of the regenerator