# Summary of RUN Period 29

*Thomas Ruf*

*1th September 1995*

| | |
|---|---|
| Run duration | 7.7. – 1.9.1995 |
| People on shift: | $\approx 50$ |
| Number of Spills: | $\approx 850$ |
| Average beam rate: | $780 - 890\,\mathrm{kHz}$ |
| Days without beam: | 7 out of 62 = 11% |
| $\Sigma\,\overline{p}$ | $2.5 \cdot 10^{12}$ |
| used $\overline{p}$ | 44 – 52% |
| Recorded events on tape | $\approx 800 \cdot 10^6$ |
| $\pi^+\pi^-$ candidates[†] | $\approx 115 \cdot 10^6$ |
| $\pi^o\pi^o$ candidates | $\approx 4 \cdot 10^6$ |
| Sum of written tapes: | 8328 |
| Average number | |
| of tapes/shift | 51 |
| maximum | 101 |

[†]scaled for $\tau \geq 0$

# Contents



# 1 Summary of RUN Period 29

P29 started delayed by 20 hours due to problems in the PS and a consecutive delay of the LEAR set up after working with lead ions. The experiment was running after 12 hours. The time included beam tuning, PID HV tuning, creation of new PID and DC calibration files.

Beam was stable at high intensities ($0.9 - 1.0\,\mathrm{MHz}$) for most of the run. It happened several times that the focus of our beam became bad, having more annihilations in the entrance window. In these cases, the beam line had to been retuned.

Five days had been lost due to a vacuum problem in the e-cooling section of LEAR and another two days due to power cuts during thunderstorms. Since already 14 days had been lost this year, our running time was extended by 6 days.

At first of august, the two track events had been switched off by by switching off the HWP2.5 frontend cards. By doing this, we had been able to increase the number of $\pi^+\pi^-$, $\pi^+\pi^-\pi^0$ and semileptonic events recorded on tape per time by 30%.

Special tapes ($\approx 40$) with no hits in PC0 and at least two tracks had been taken for a determination of the ratio $\mathrm{p\overline{p}} \rightarrow \mathrm{K_S K_S}/\mathrm{p\overline{p}} \rightarrow \mathrm{K_S K_L}$.

Main problems on our side have been caused by failures of the CAEN HV monitoring as in the periods before. Either the corresponding crate 13 stopped working, causing trips of chambers during beam time or the connection to the CAEN crates was disturbed and the monitoring and automatic correction of tripped channels didn't worked. The situation improved in the second part of the run without any obvious reason. In addition we had a lot of problems this time either with tapes or with the tapedrives (STK-drives and exabyte drives). Mainly recycled tapes from outside CPLEAR (ex DD-tapes labelled CATASTROPHE and ex NA31 tapes) caused errors while writing filemark and didn't got unloaded automatically.

The magnet temperature was really at the limit ($> 60^\circ$ C) during hot days. Also a large number of magnet trips had been observed ($\approx 10$, not during hot days) which normally caused a stop of about 3 hours.

Several gas leaks had been detected on 18th of august in the DC gas rack after a gas alarm was released. Since it was impossible for the moment to fix the small leaks, a temporary solution until the end of the run was found by installing a big exhaust pipe.

Problems with trigger scalers had been solved by software modification.

During the last day, we accomplished a test for next years regeneration measurement. A piece of copper, covering 120 degrees at a radius of about 6cm, equivalent to 2cm thick carbon, was mounted on to the PC0 support structure and inserted into the detector. At a rate of 800 kHz $\overline{p}$'s, no increase of the currents in PC1-DC6 had been detected. The trigger rejection was slightly lower as before, 1900 instead of 2100. Five M1T1 and 24 M1T50711026 tapes had been written.

Run period P29 ended on thursday evening 11 o'clock, 9 hours earlier as foreseen, with a fire in a LEAR bending magnet.

# 2 Problems in P29

- DC gas leaks.
- The Slow control HV monitoring stops from time to time due to CAEN network problems.
- Magnet trips.
  High magnet temperature during hot days.
- 5V power supply of trigger control crate broke due to unsufficient cooling. It was delicate to change.
- Reset of PID Camac crate.
- The $\overline{\mathrm{p}}$ counter didn't worked for most of the time. Caused no effect on data taking.
- Five exabyte drives broke at the begin of the run.
- STK drives changed several times. Finally found empty gas patron in one drive.
- Bad tapes.

# 3 Conclusion

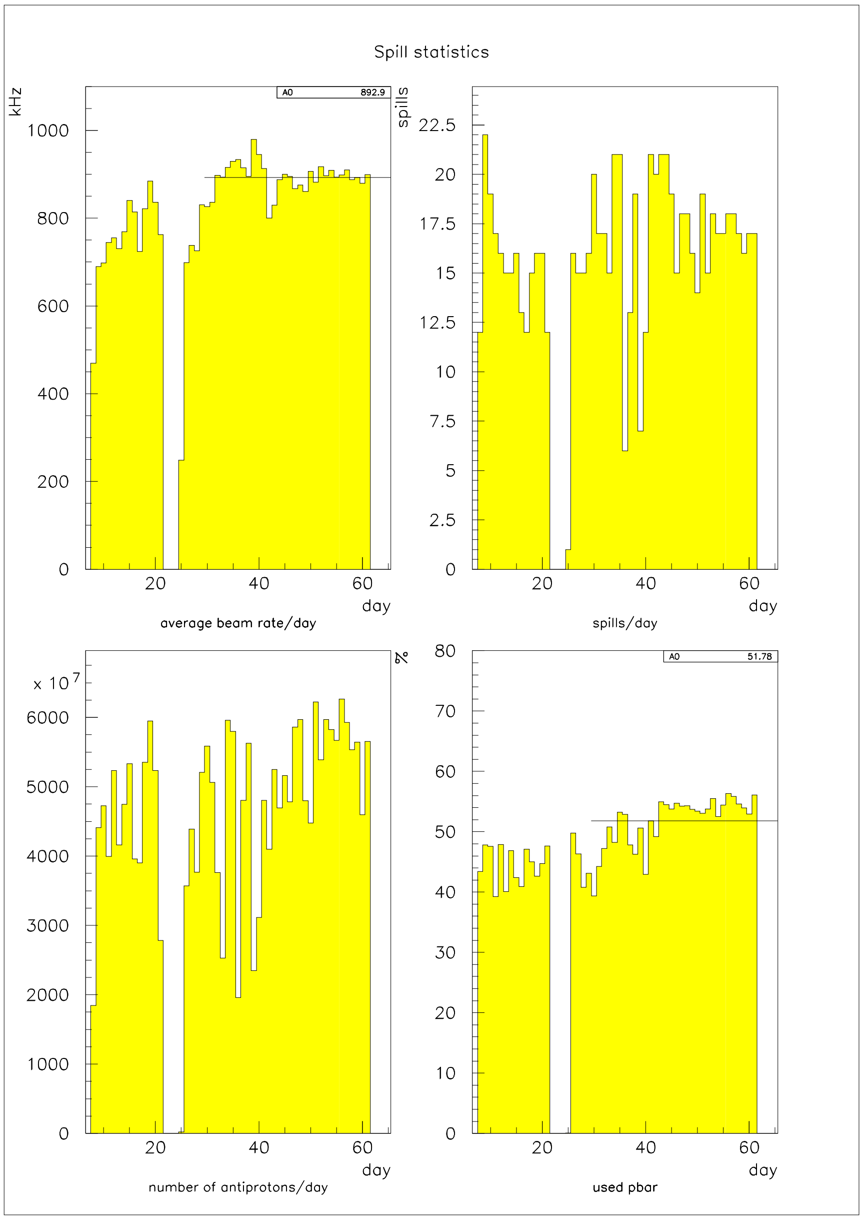
In general very stable data taking condition. No major problems with detector readouts, trigger performance, data acquisition system and the slow control.

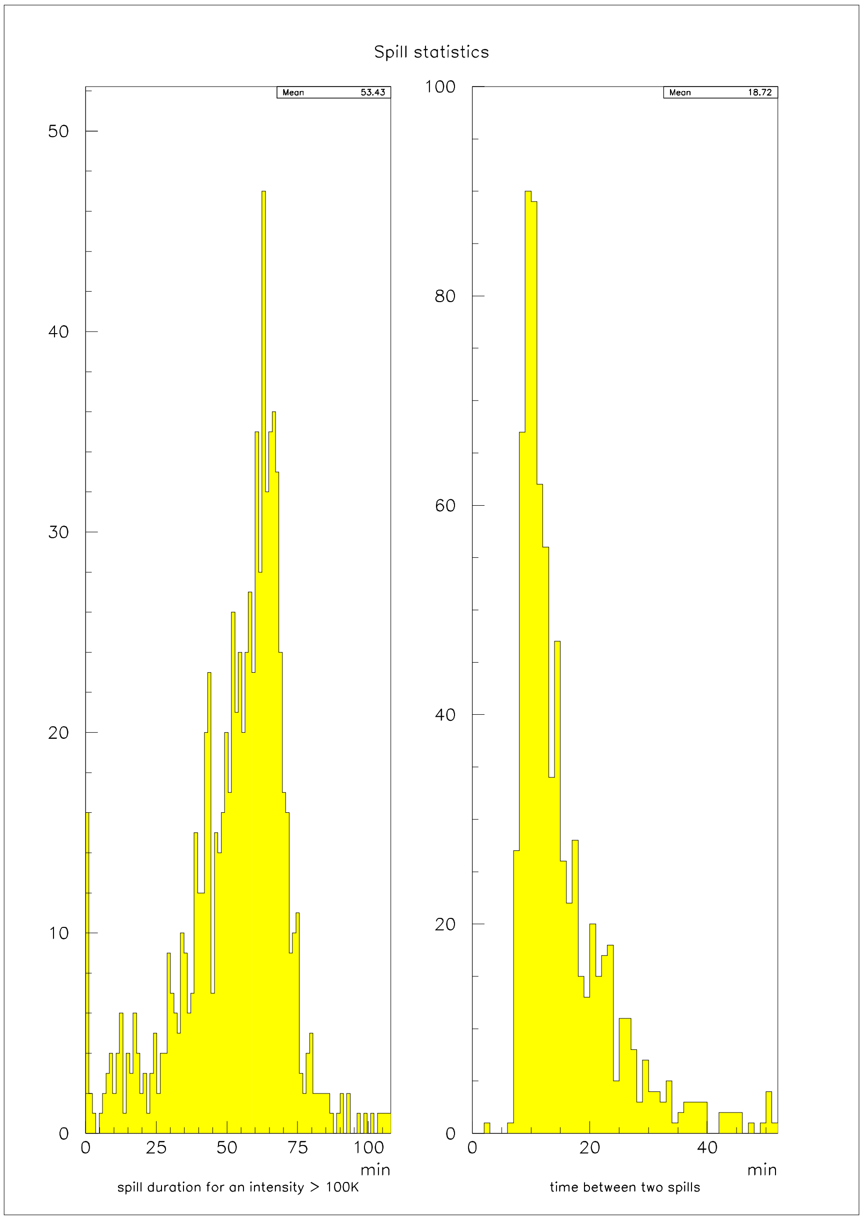
# 4 Tape Summary

| Trigger | positve field | negative field |
|---|---|---|
| 1 | 108 | 109 |
| 7 | 10 | 10 |
| 305 | 22 | 21 |
| 507110026 | 4017 | 4030 |
| 507180026 | 1 | 0 |
| 707110026 | 1 | 0 |
| all tapes: 8328 | | |

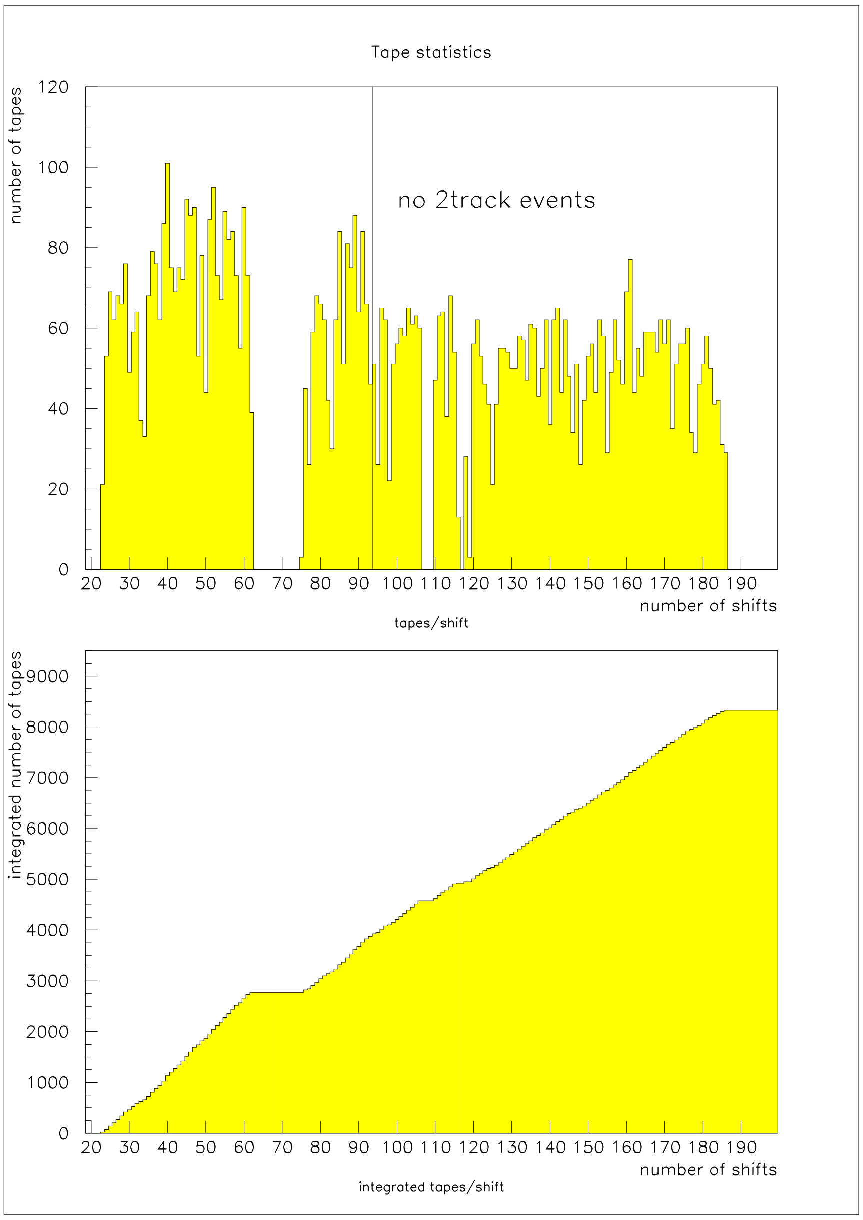
# 5 List of Histograms

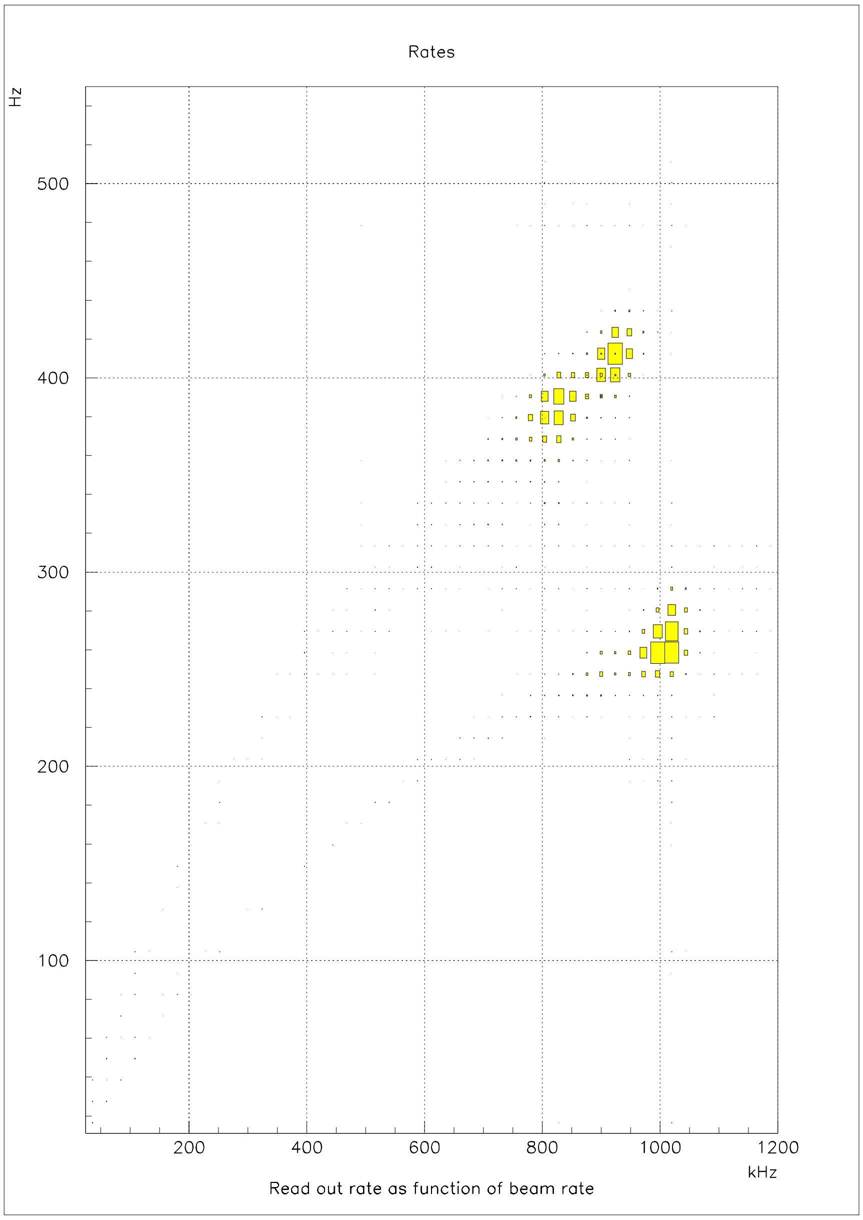
The histograms (page 18–20) which show results based on VME-scalers should be looked at with caution. Some fluctuations are due to temporary incorrect functionings of the VME-scalers.

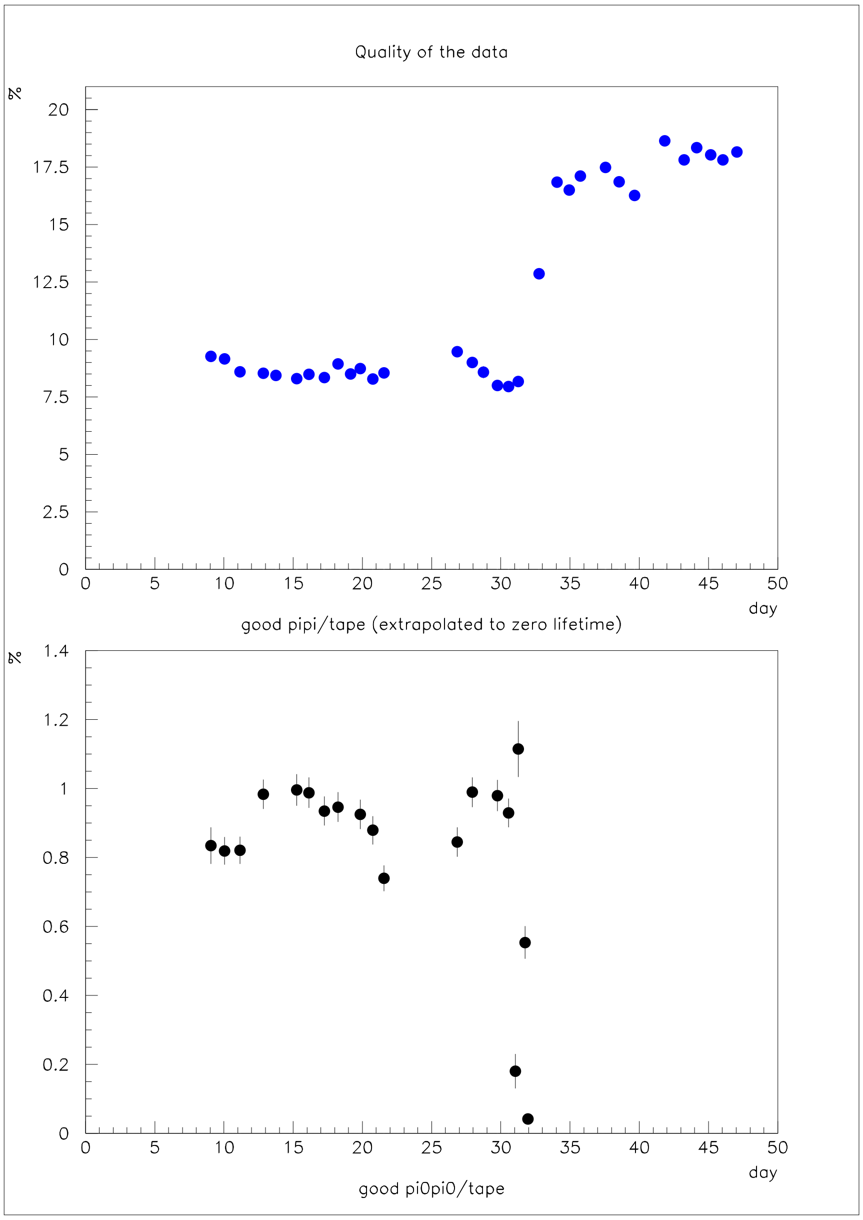

Spill statistics
kHz
A0 892.9
average beam rate/day
spills
spills/day
x 10^7
number of antiprotons/day
%
A0 51.78
used pbar
day

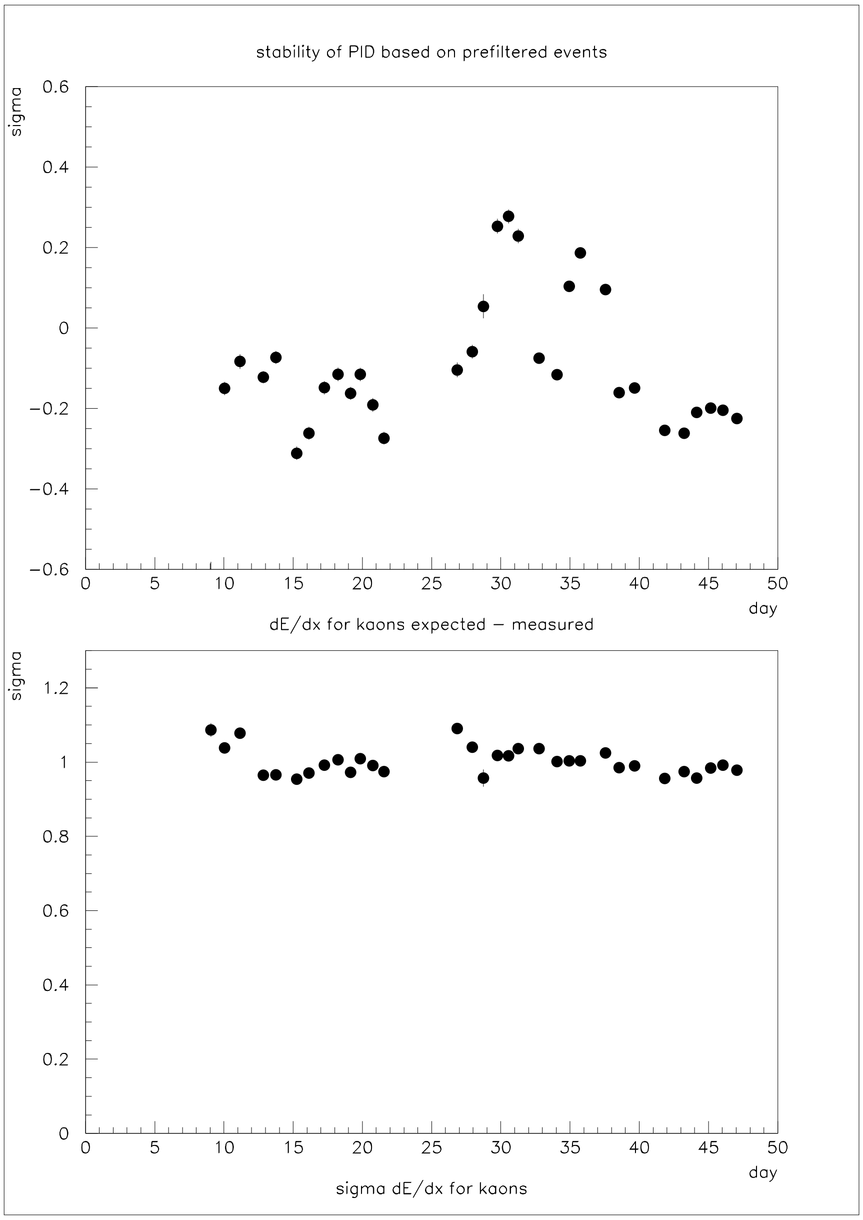


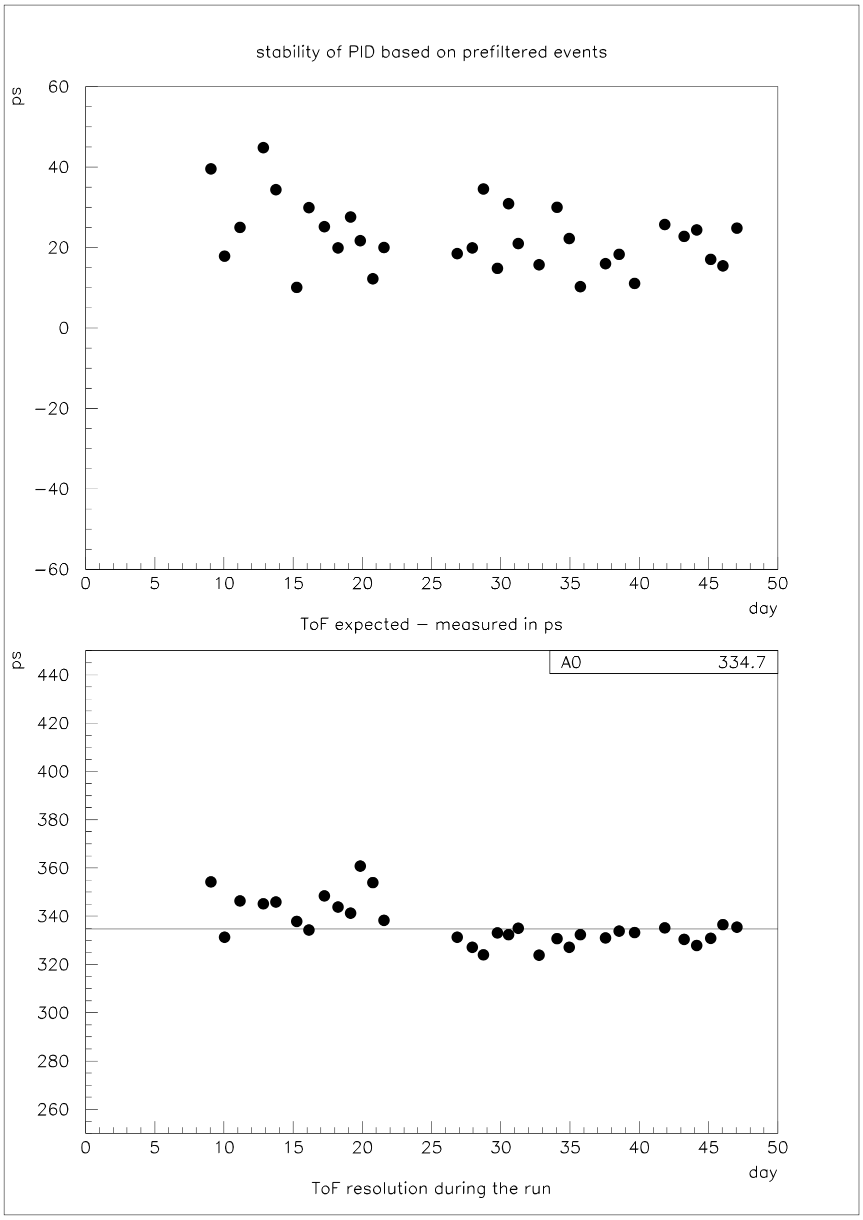
Spill statistics
Mean 53.43
Mean 18.72
50
40
30
20
10
0
0
25
50
75
100
min
spill duration for an intensity > 100K
100
80
60
40
20
0
0
20
40
min
time between two spills

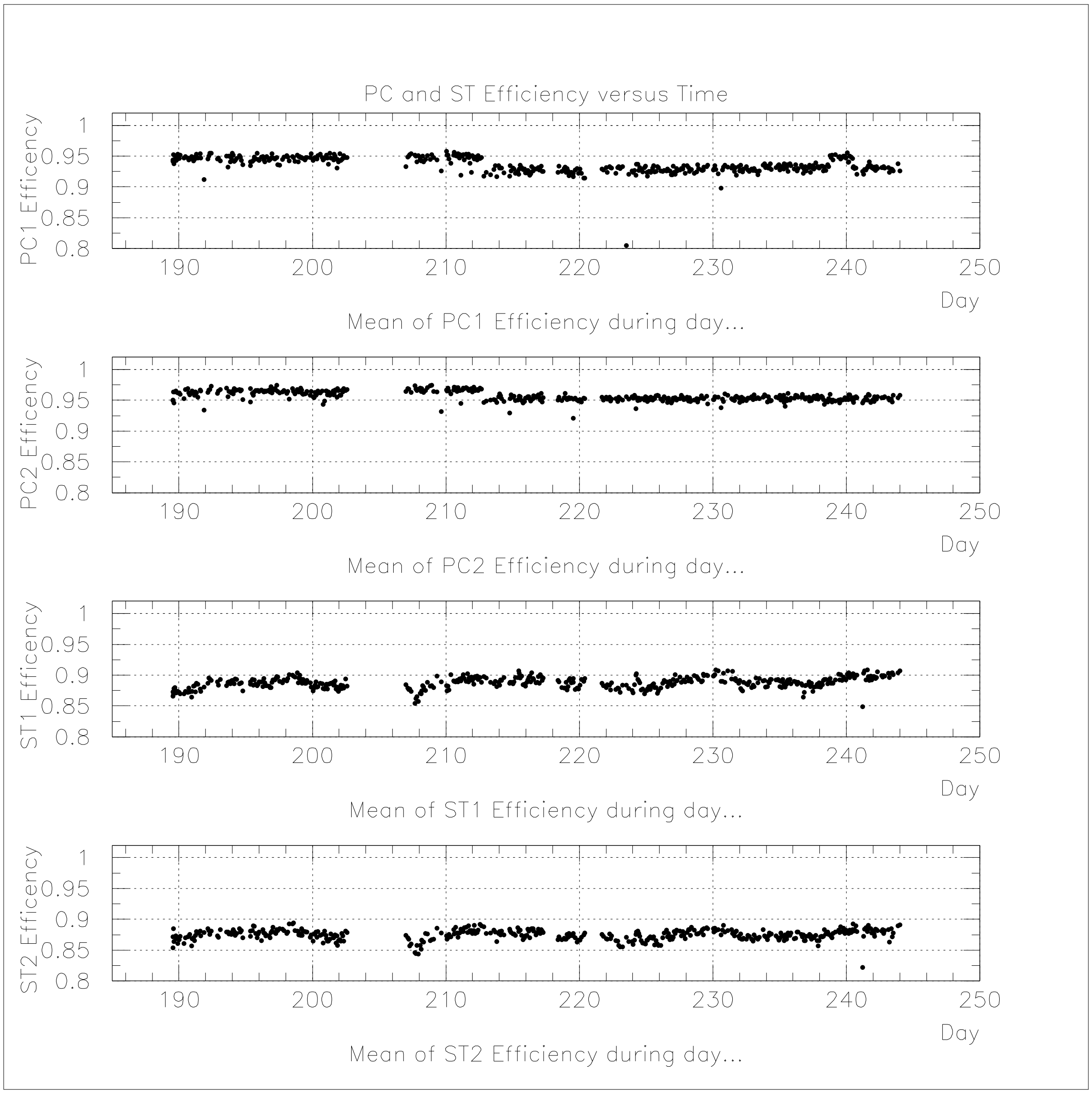

Tape statistics
number of tapes
no 2track events
number of shifts
tapes/shift
integrated number of tapes
number of shifts
integrated tapes/shift

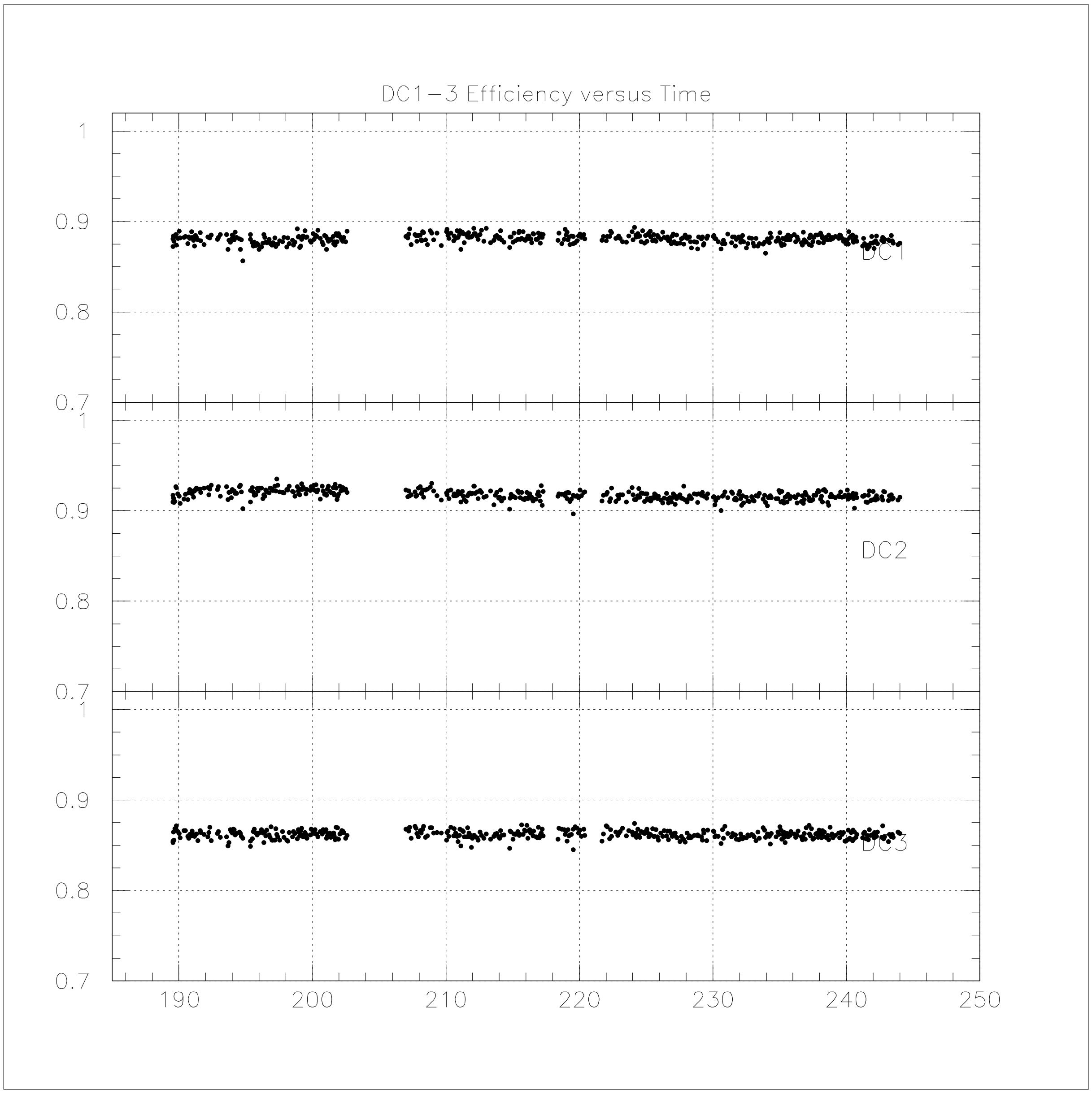

Rates
Hz
500
400
300
200
100
200
400
600
800
1000
1200
kHz
Read out rate as function of beam rate


Quality of the data
%
20
17.5
15
12.5
10
7.5
5
2.5
0
0 5 10 15 20 25 30 35 40 45 50
day
good pipi/tape (extrapolated to zero lifetime)
%
1.4
1.2
1
0.8
0.6
0.4
0.2
0
0 5 10 15 20 25 30 35 40 45 50
day
good pi0pi0/tape

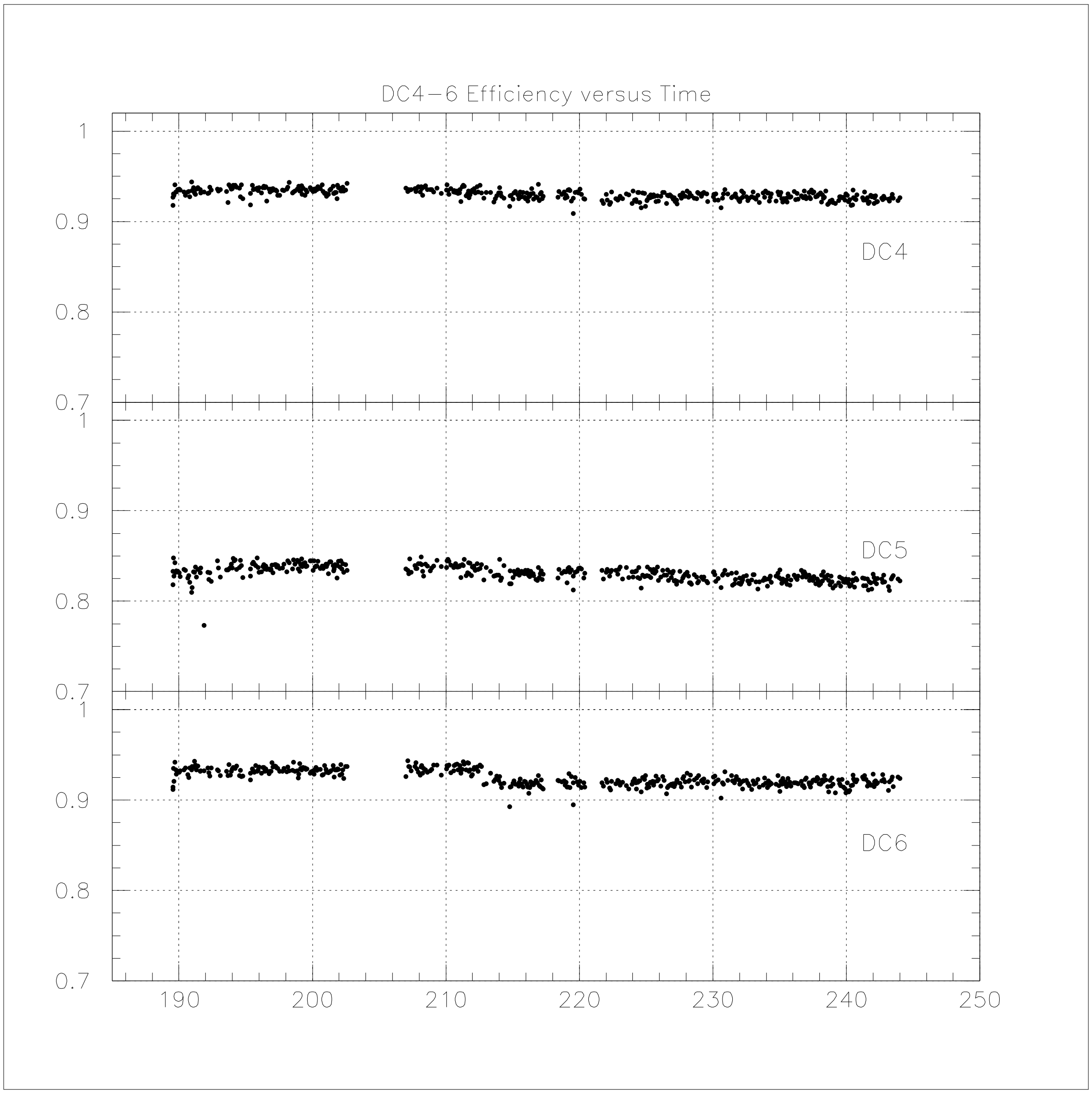

stability of PID based on prefiltered events
sigma
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
0 5 10 15 20 25 30 35 40 45 50
day
dE/dx for kaons expected − measured
sigma
1.2
1
0.8
0.6
0.4
0.2
0
0 5 10 15 20 25 30 35 40 45 50
day
sigma dE/dx for kaons

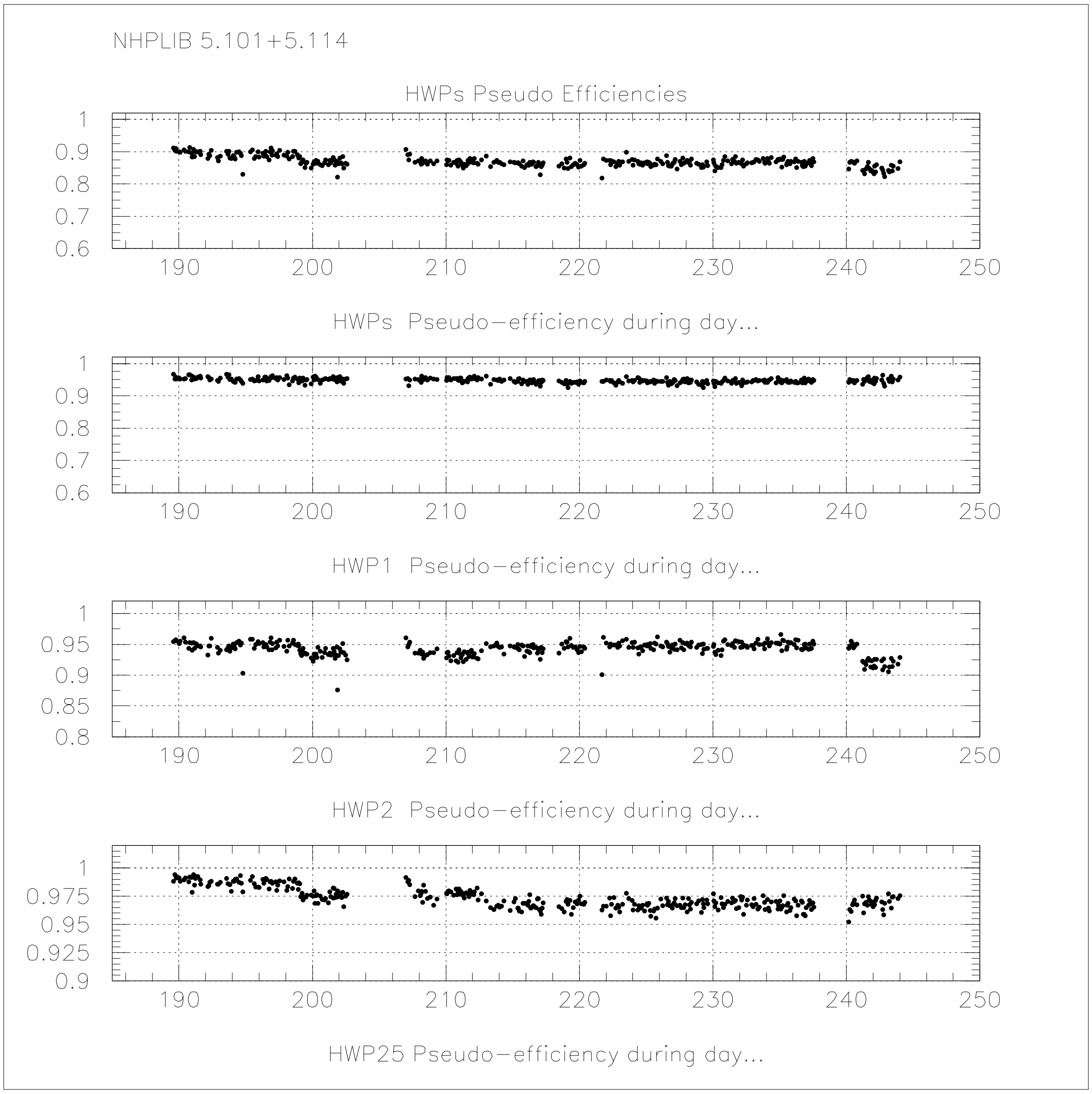

stability of PID based on prefiltered events
ps
60
40
20
0
−20
−40
−60
0
5
10
15
20
25
30
35
40
45
50
day
ToF expected − measured in ps
ps
A0
334.7
440
420
400
380
360
340
320
300
280
260
day
ToF resolution during the run

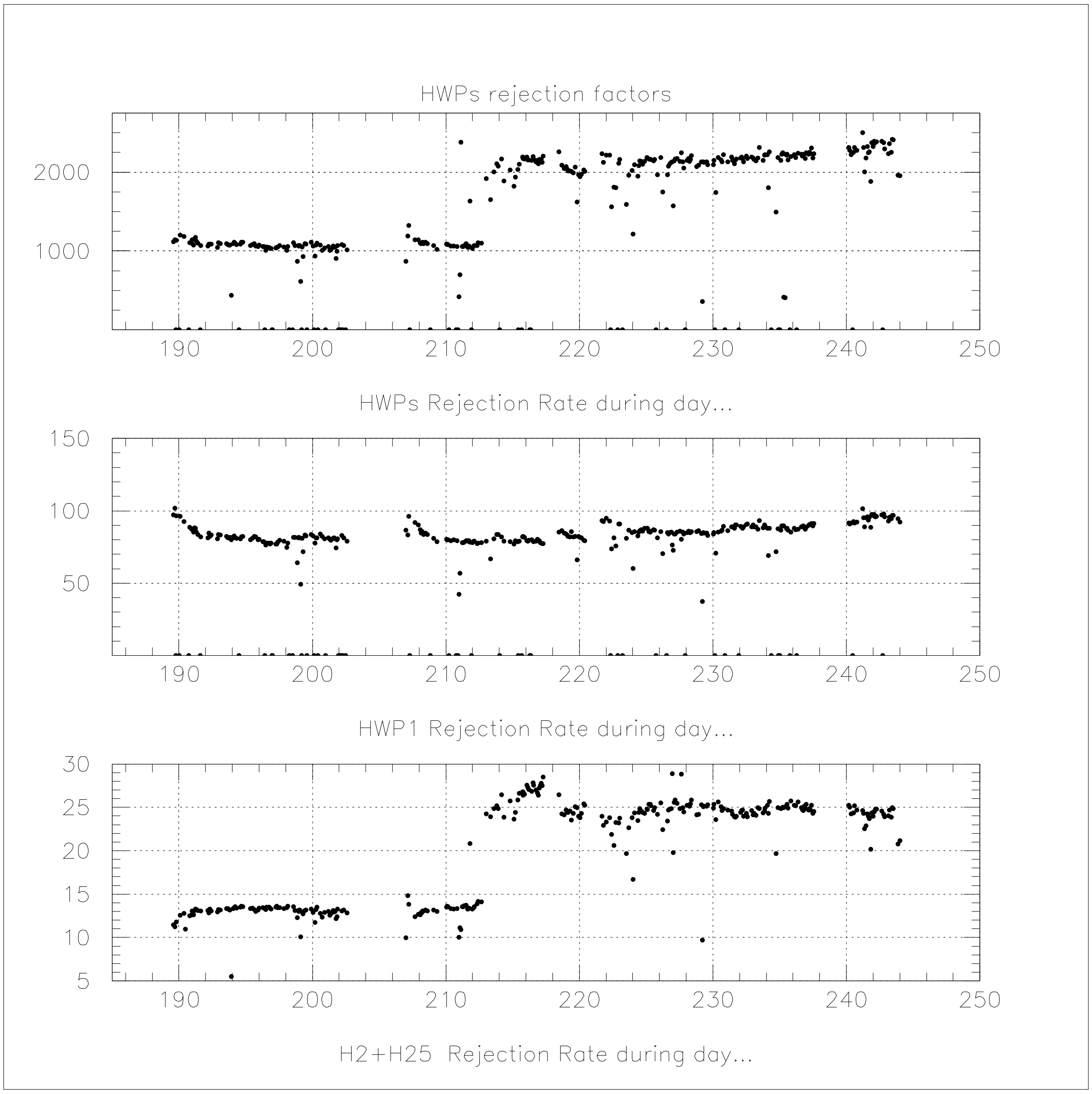

PC and ST Efficiency versus Time
PC1 Efficency
Mean of PC1 Efficiency during day...
PC2 Efficency
Mean of PC2 Efficiency during day...
ST1 Efficency
Mean of ST1 Efficiency during day...
ST2 Efficency
Mean of ST2 Efficiency during day...
Day

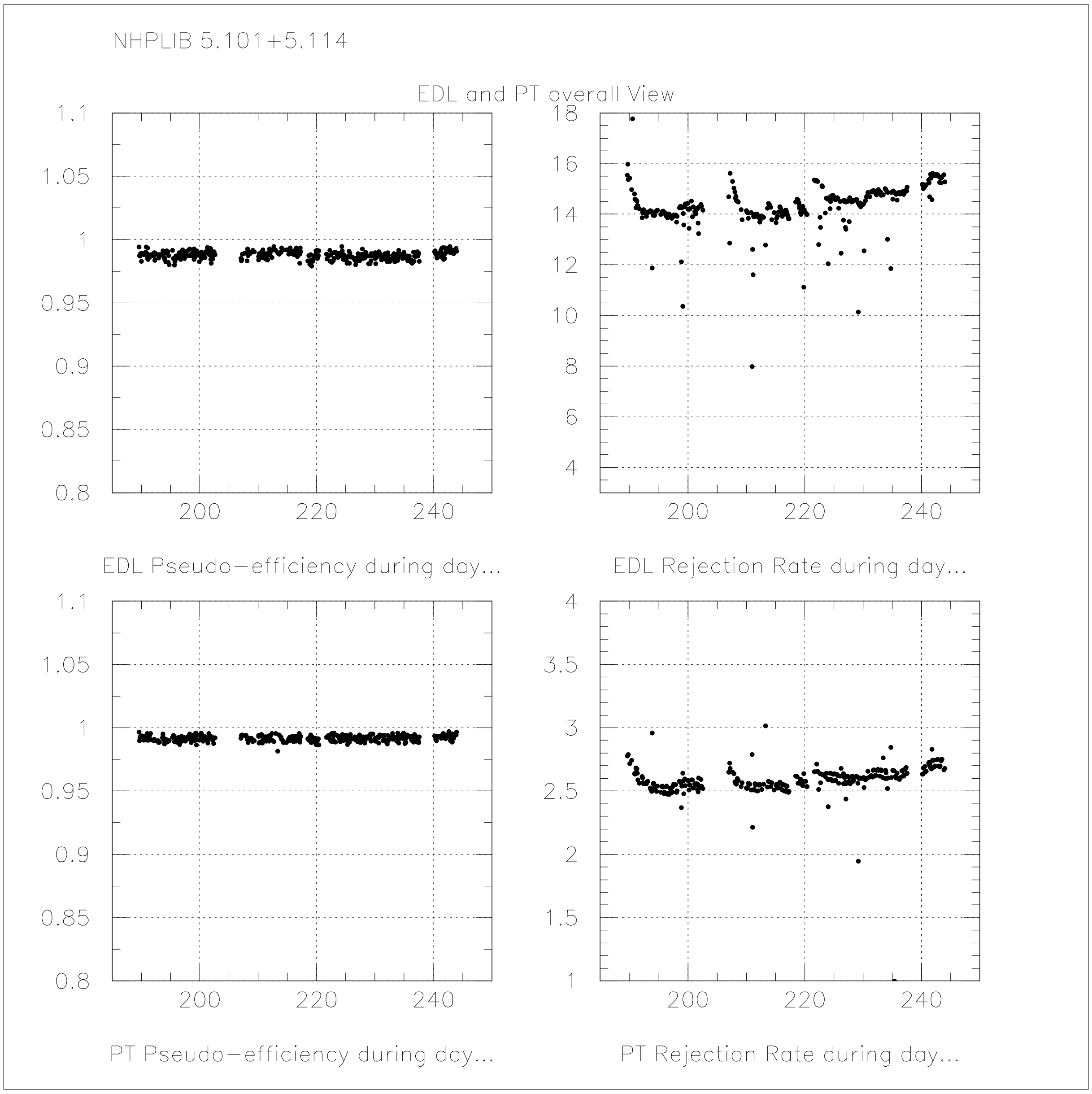


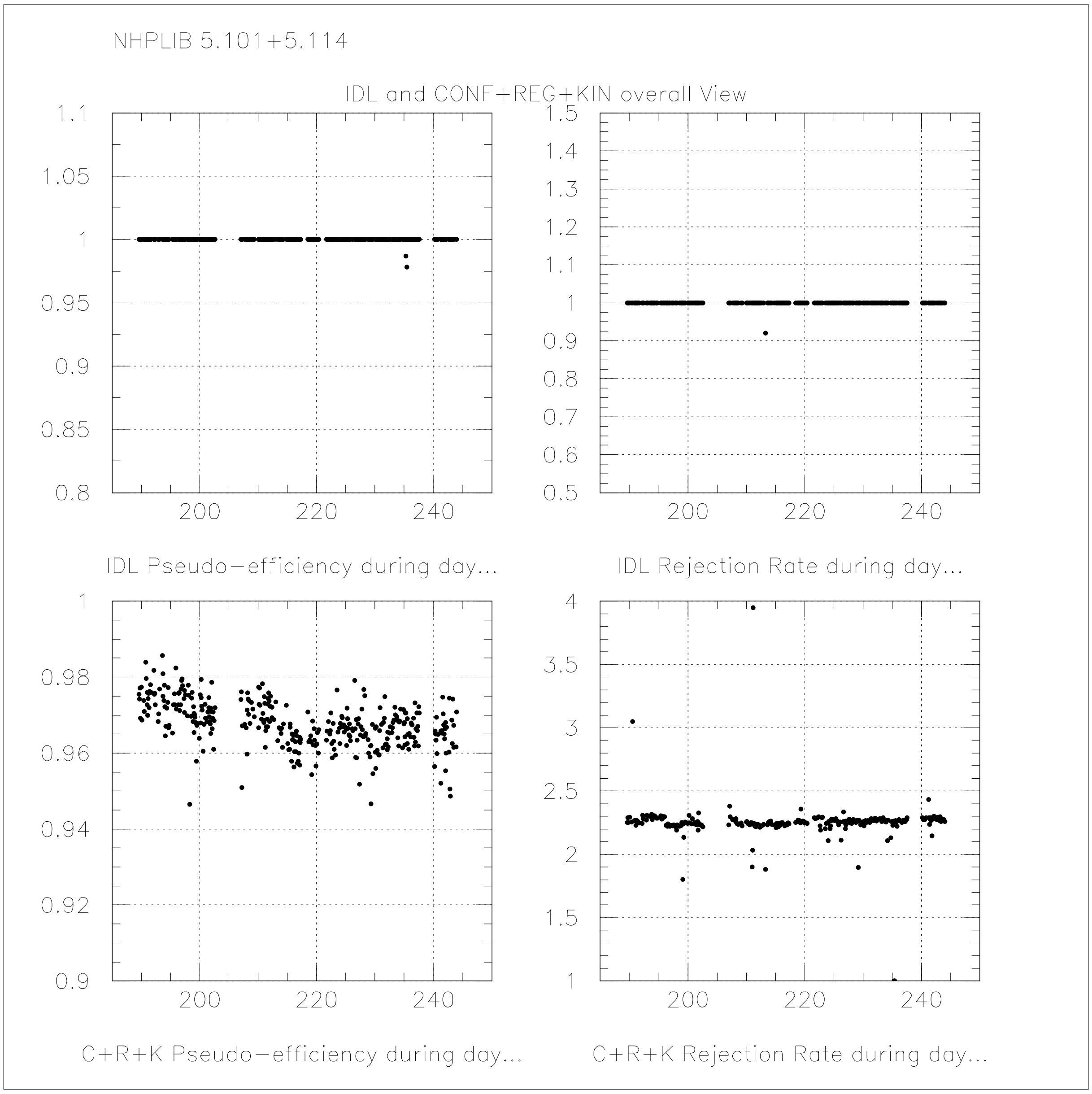
DC1−3 Efficiency versus Time
1
0.9
0.8
0.7
DC1
DC2
DC3
190
200
210
220
230
240
250

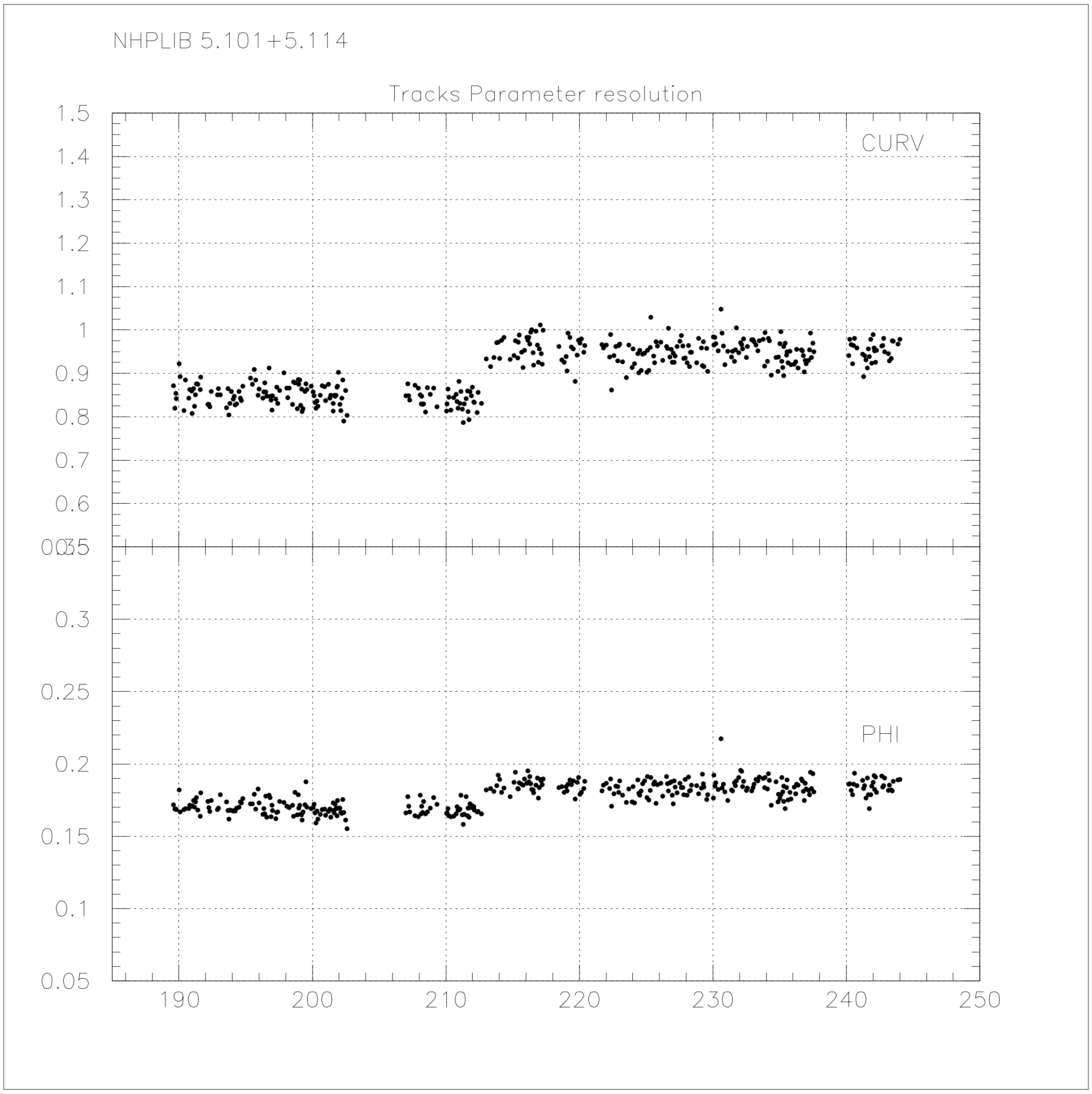

DC4−6 Efficiency versus Time
1
0.9
0.8
0.7
DC4
DC5
DC6
190
200
210
220
230
240
250

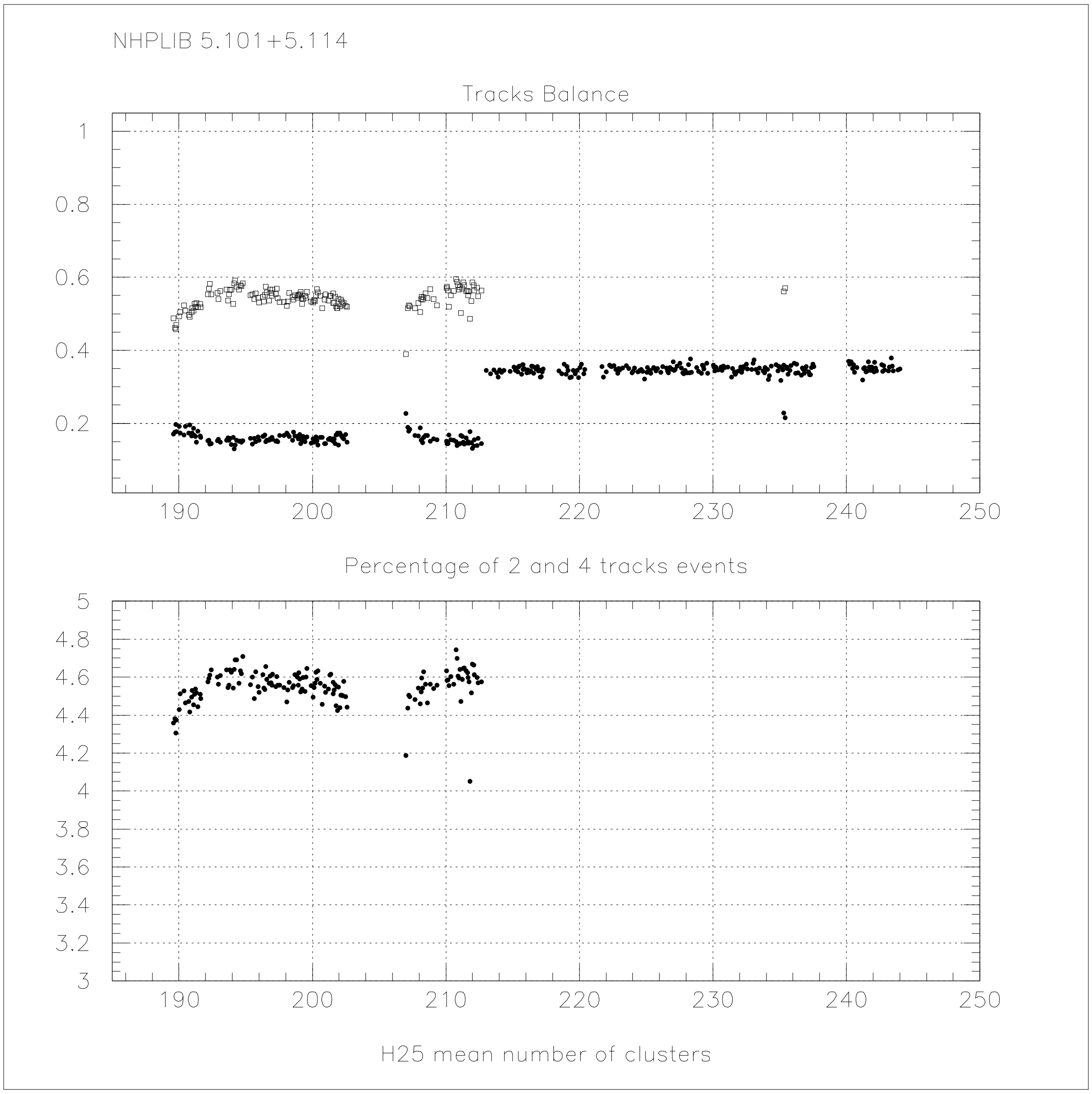

NHPLIB 5.101+5.114
HWPs Pseudo Efficiencies
HWPs Pseudo−efficiency during day...
HWP1 Pseudo−efficiency during day...
HWP2 Pseudo−efficiency during day...
HWP25 Pseudo−efficiency during day...


HWPs rejection factors
2000
1000
190 200 210 220 230 240 250
HWPs Rejection Rate during day...
150
100
50
190 200 210 220 230 240 250
HWP1 Rejection Rate during day...
30
25
20
15
10
5
190 200 210 220 230 240 250
H2+H25 Rejection Rate during day...


NHPLIB 5.101+5.114
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+5.114
IDL and CONF+REG+KIN overall View
1.1
1.05
1
0.95
0.9
0.85
0.8
200
220
240
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
200
220
240
IDL Pseudo−efficiency during day...
IDL Rejection Rate during day...
1
0.98
0.96
0.94
0.92
0.9
200
220
240
4
3.5
3
2.5
2
1.5
1
200
220
240
C+R+K Pseudo−efficiency during day...
C+R+K Rejection Rate during day...


NHPLIB 5.101+5.114
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
190
200
210
220
230
240
250


NHPLIB 5.101+5.114
Tracks Balance
1
0.8
0.6
0.4
0.2
190
200
210
220
230
240
250
Percentage of 2 and 4 tracks events
5
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
3
190
200
210
220
230
240
250
H25 mean number of clusters