Summary of RUN Period 30

Measurement of Regeneration

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Days allocated:	**37**
Days with beam:	**34**
People on shift:	$\approx$ **50**

Data overview

- **3573 tapes in total**
- **3261 with trigger T507110026:**
  $\geq$ **1 kaon, 2 clusters in PC0,** $\geq$ **2 primary tracks**
- **and 34 without HWP2 (T500110026)**
- **257 T1 tapes for minimum bias physics**
- **21 tapes T305 for** $K_S K_S / K_S K_L$

Problems in P30

- Veto counter + fibers found to be too large to pass through upstream beam tube,
PC1 can be used as veto counter if necessary

- Attack in the PS control room, 2 days lost

- Short spill times, loss $\approx 20\%$
(23 spills/day with 40min
$\rightarrow 8\frac{1}{2}$ hours/day waiting for beam,
last year: 17 spills/day with 70min
$\rightarrow$ 4 hours/day)
Reason: bad transfer efficiency (PS), LEAR, sharing with two other experiments

- Several trips of our magnet

- monitoring of CAEN crates

- New: Hiccups of EventBuilder
inelegant solution, but it works.

Beam statistics

Spills:	742
Average beam rate:	790kHz
$\Sigma\,\overline{p}$	$\approx 1.3 \cdot 10^{12}$
used $\overline{p}$	55%

$\Longrightarrow$ see figures

Detector and trigger performance

$\Longrightarrow$ see figures

$\pi^+\pi^-$ candidates	
with regeneration	$\approx 2.3 \cdot 10^{6}$
tapes/shift	35
maximum	56

Regenerator Position

Measured before insertion	
$R_{in} = 58 \pm 0.2$ mm	$R_{out} = 83 \pm 0.2$ mm
$L = 255 \pm 1$ mm	$\varphi = 115^\circ$
weight of 1668 g $\rightarrow \rho = 1.85\ \frac{g}{cm^3}$	

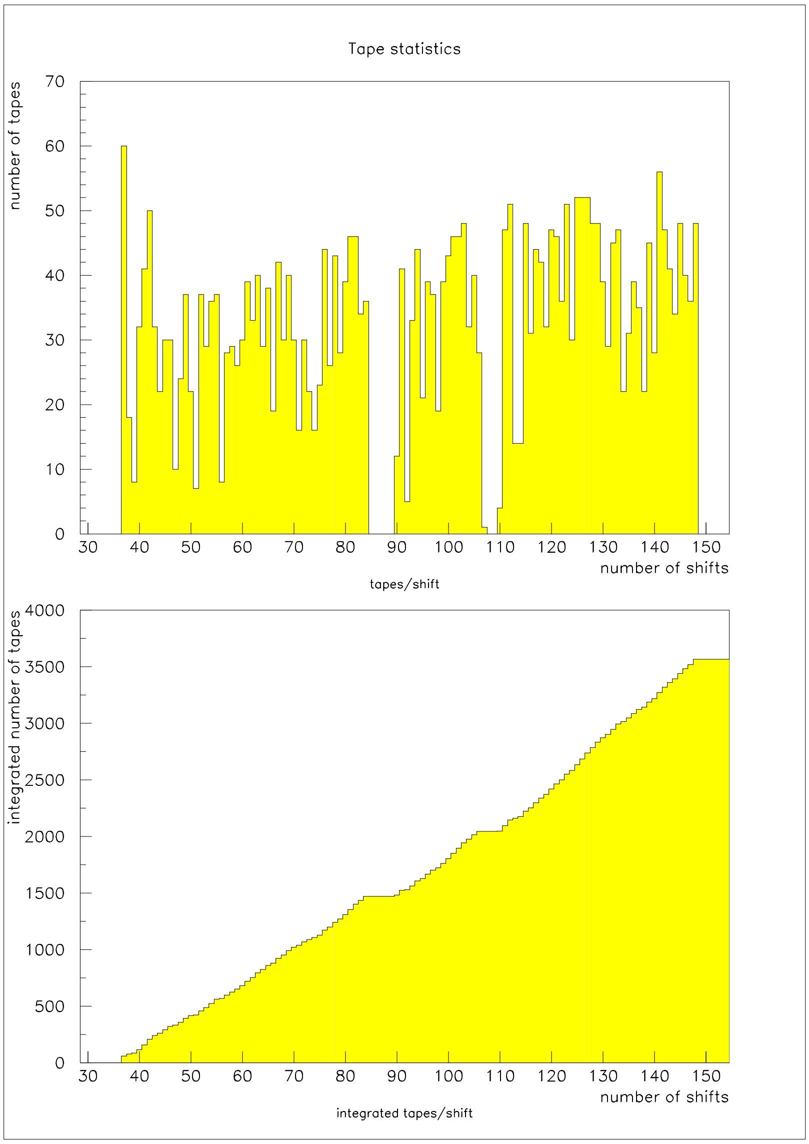
with γ conversion	
$\varphi_1 = 56^\circ \pm 1^\circ$	with $\langle r_1 \rangle = 77.8 \pm 2.0$ mm
$\varphi_2 = -54^\circ \pm 1^\circ$	with $\langle r_2 \rangle = 74.5 \pm 2.0$ mm
slope in z: < 1 mm for ± 5 cm	

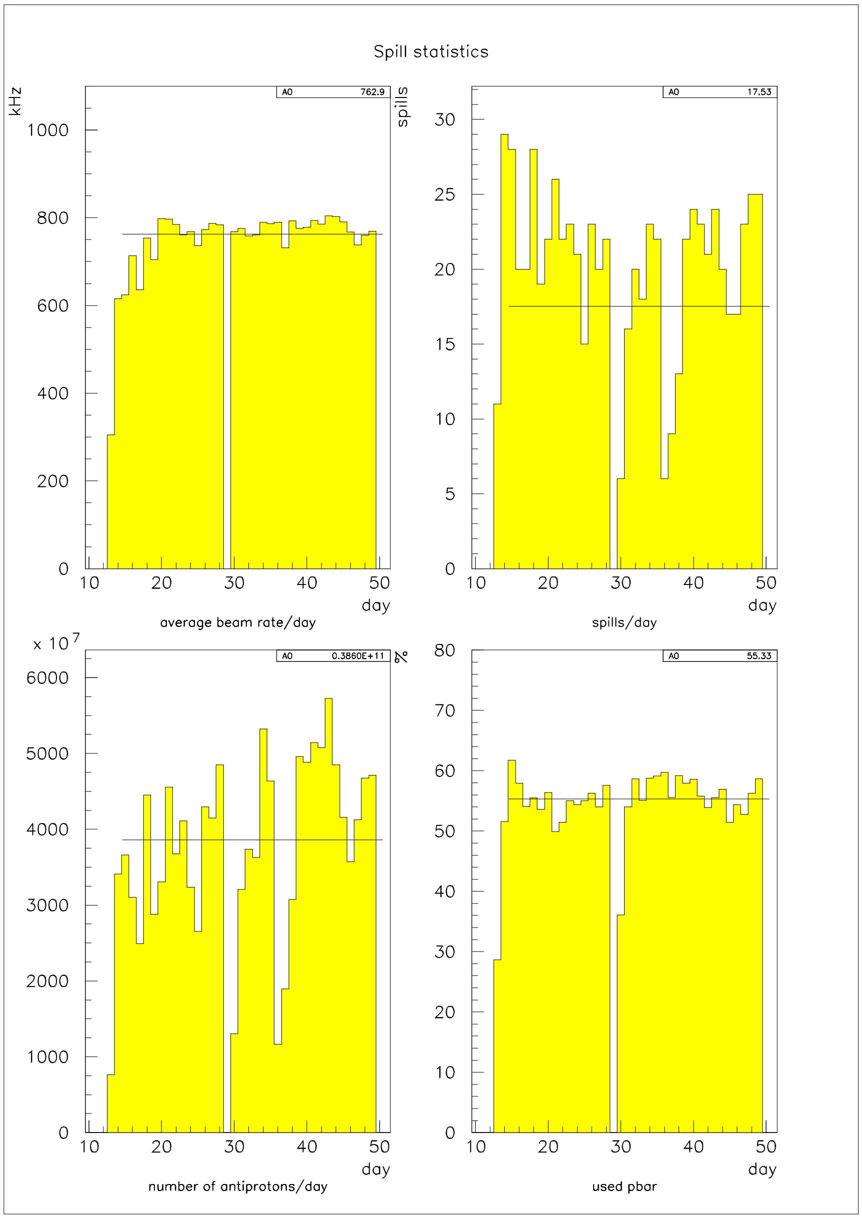
Work to be done:

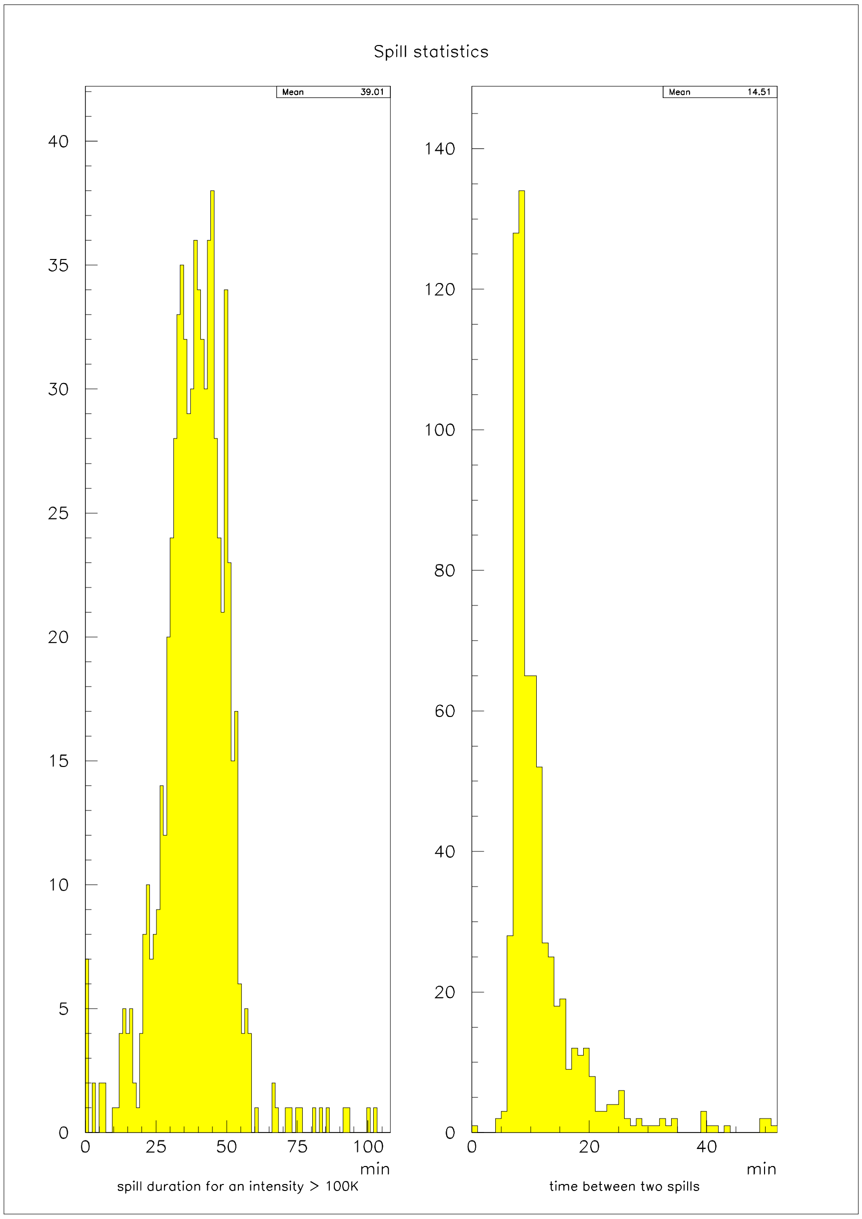
- Analysis of 1000 runs for regeneration, analysis of 21 runs for test of QM
- more regeneration data ?
- and/or data with all two kaon events ?
- or other physics ?

Summary

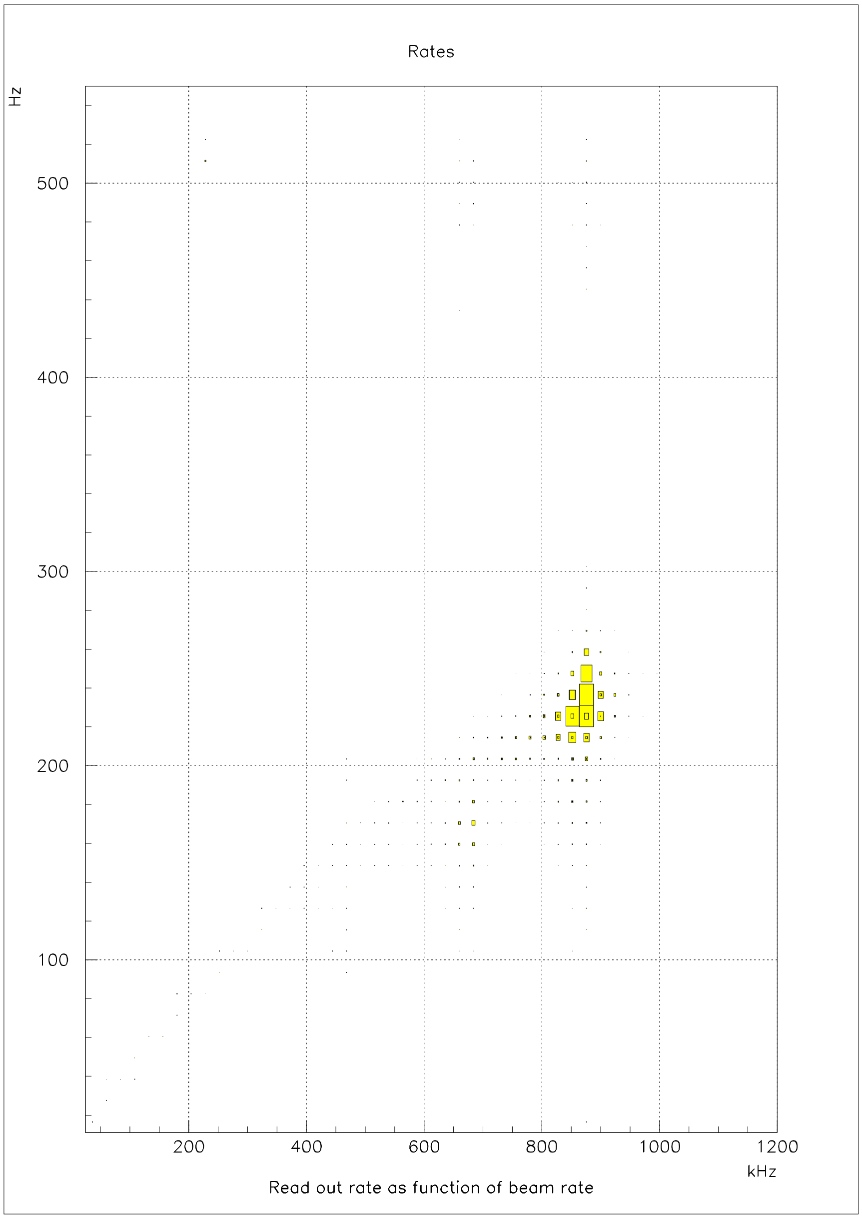
- **20% efficiency loss due to short spill times**
- **otherwise stable beam most of the time**
- **stable detector and trigger performance**



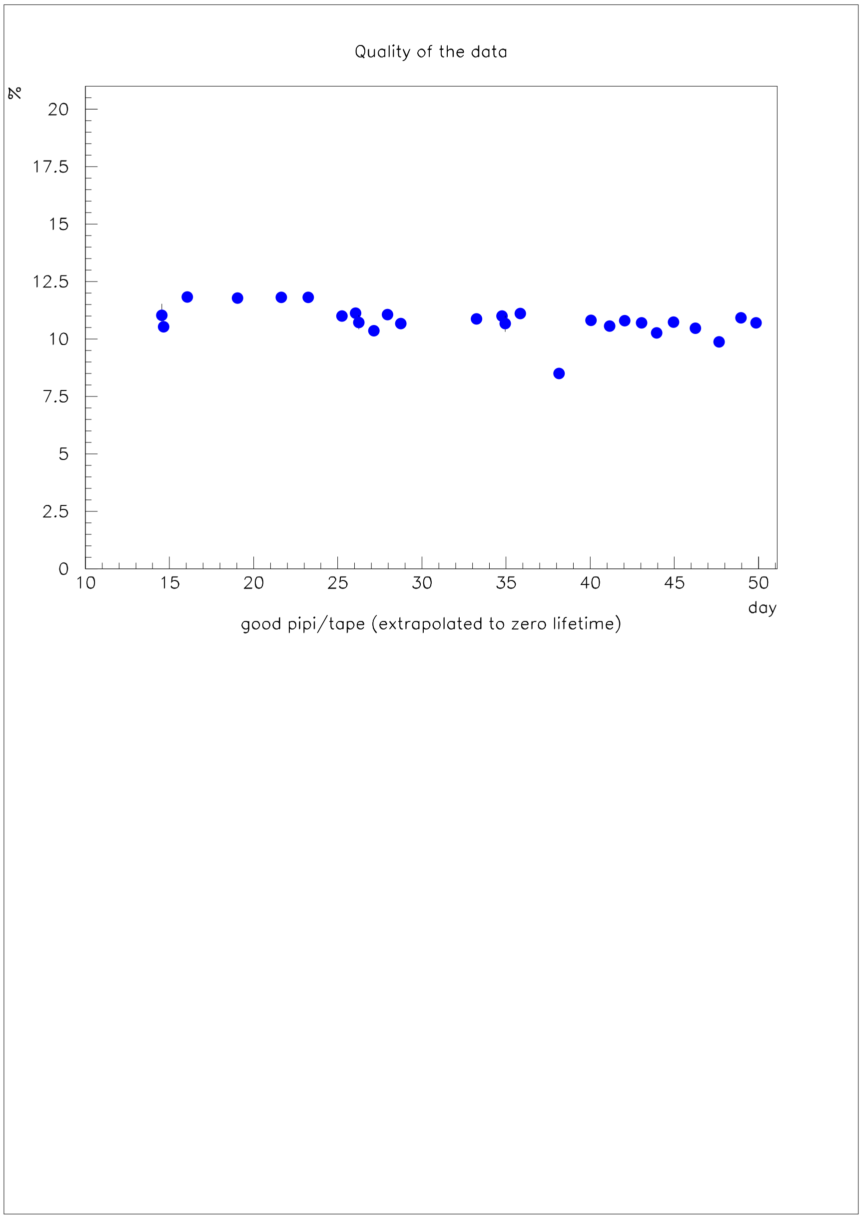

Spill statistics
A0 762.9
kHz
average beam rate/day
day
A0 17.53
spills
spills/day
A0 0.3860E+11
x 10^7
number of antiprotons/day
A0 55.33
%
used pbar



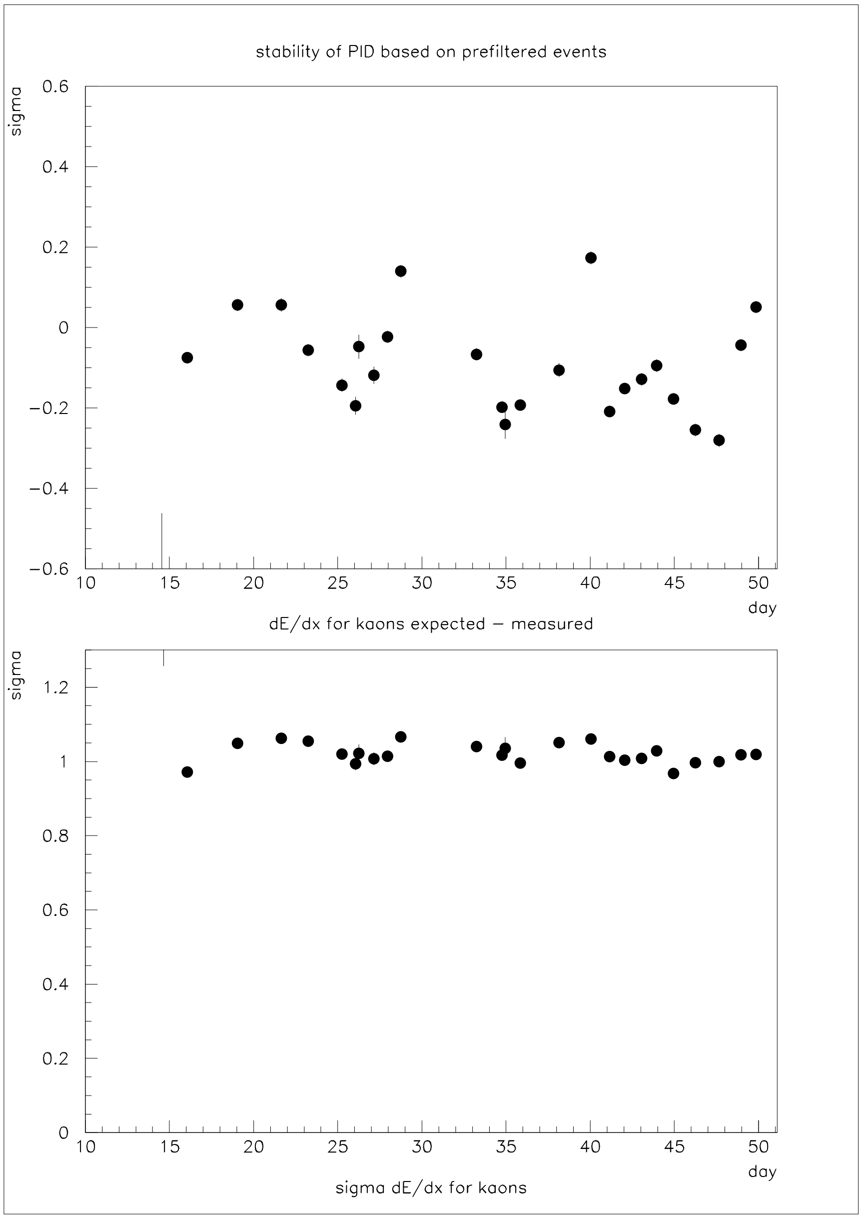
Spill statistics
Mean 39.01
Mean 14.51
min
spill duration for an intensity > 100K
min
time between two spills

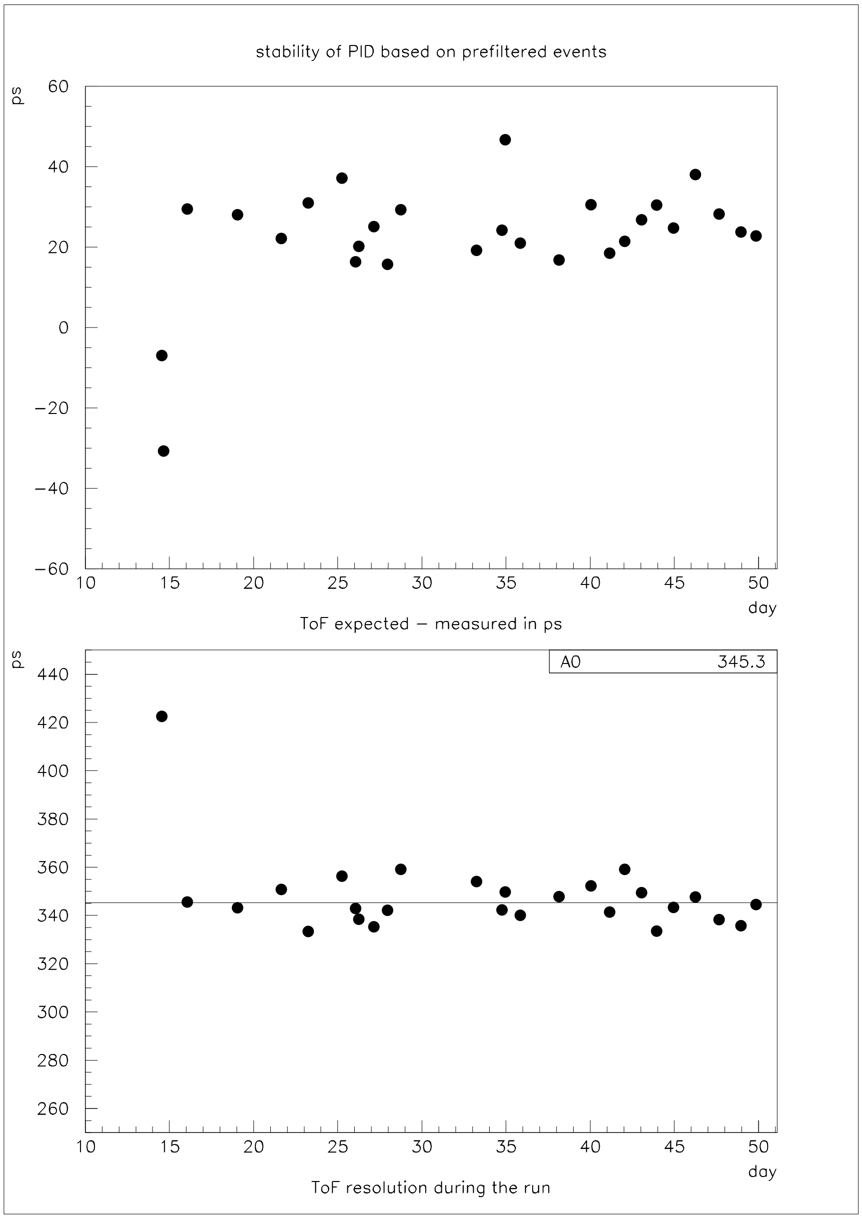


Rates
Hz
500
400
300
200
100
200
400
600
800
1000
1200
kHz
Read out rate as function of beam rate

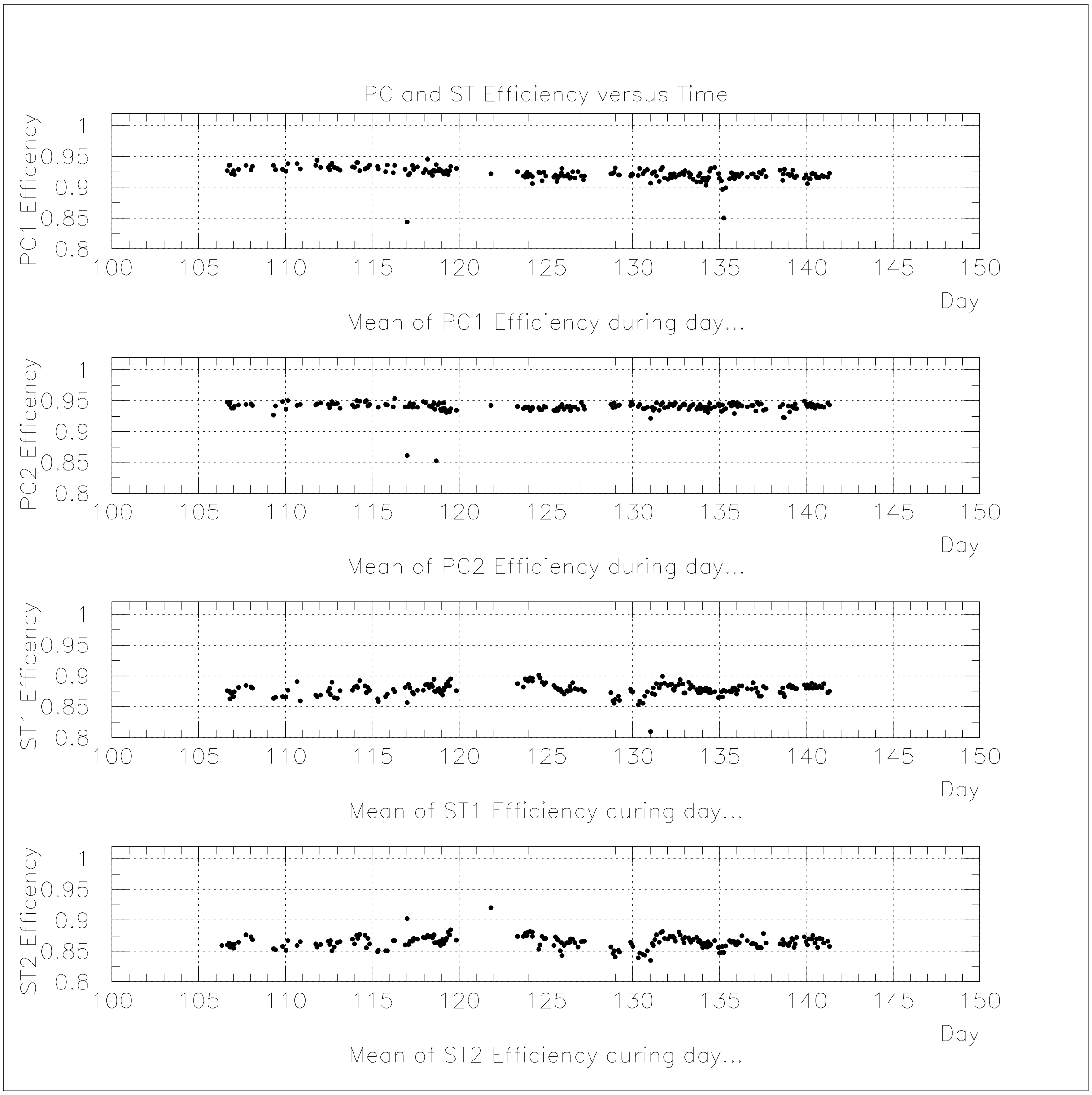


Quality of the data
%
20
17.5
15
12.5
10
7.5
5
2.5
0
10
15
20
25
30
35
40
45
50
day
good pipi/tape (extrapolated to zero lifetime)

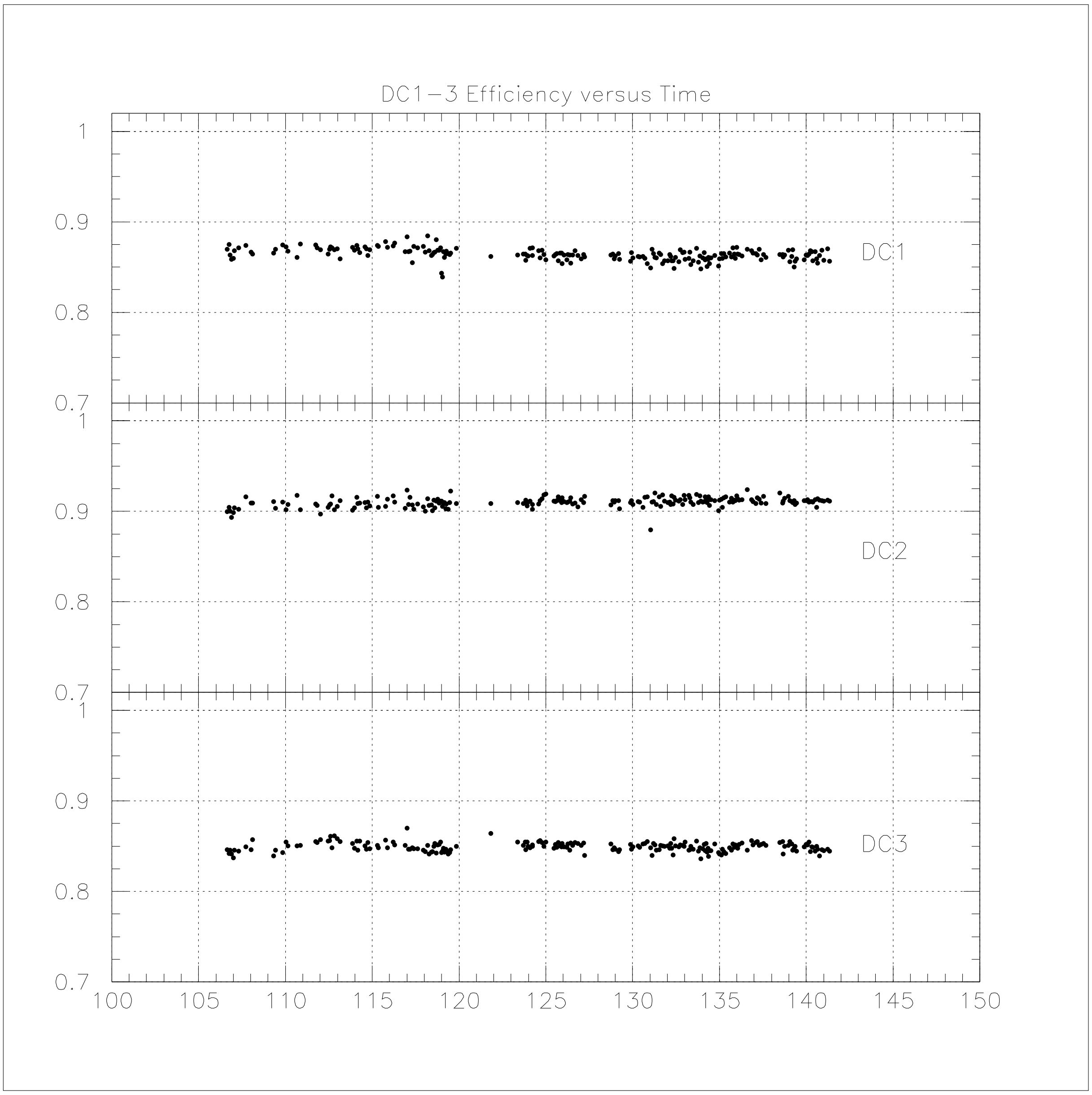

stability of PID based on prefiltered events
sigma
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
10
15
20
25
30
35
40
45
50
day
dE/dx for kaons expected − measured
sigma
1.2
1
0.8
0.6
0.4
0.2
0
10
15
20
25
30
35
40
45
50
day
sigma dE/dx for kaons



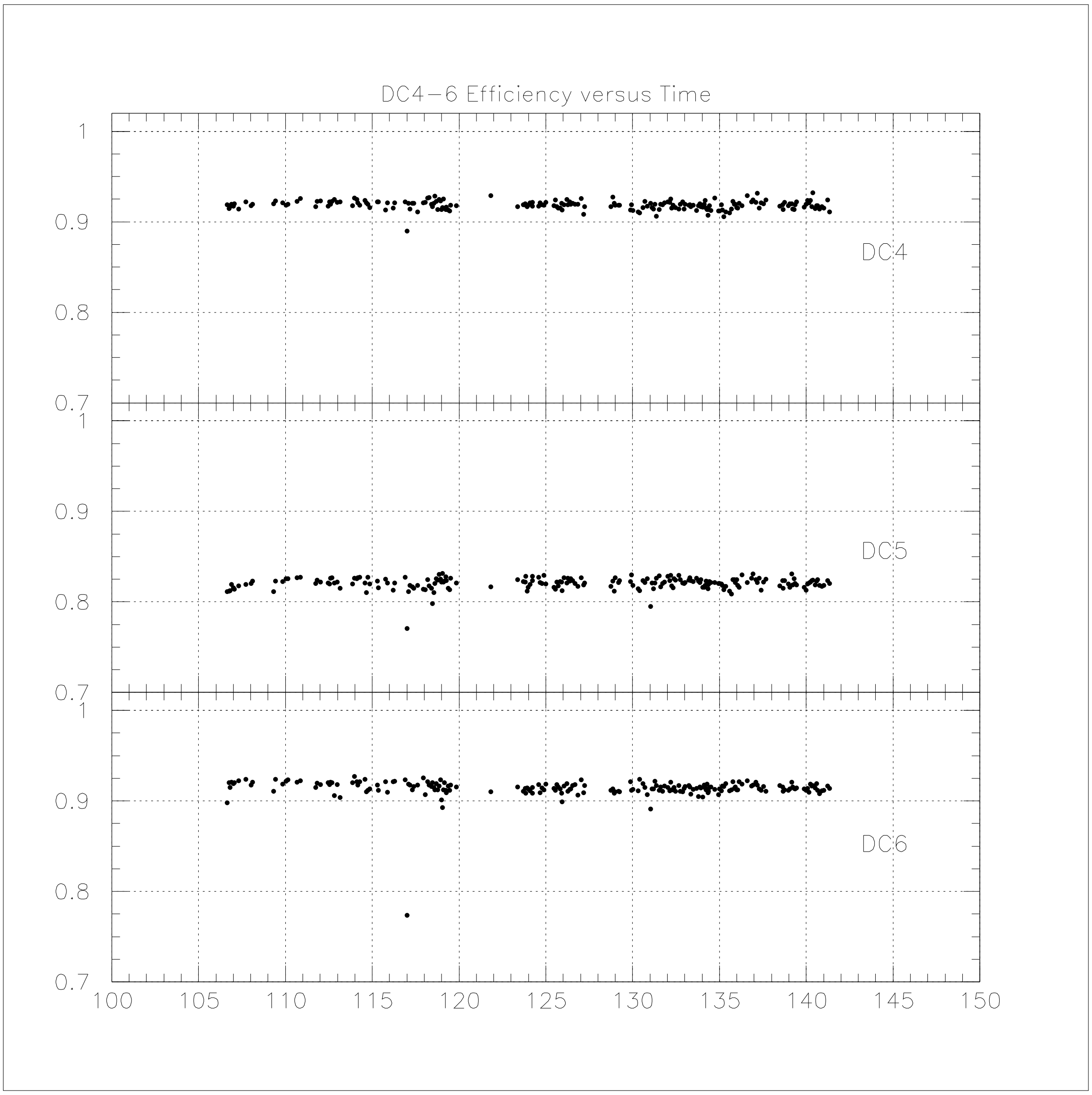
stability of PID based on prefiltered events
ps
60
40
20
0
−20
−40
−60
10
15
20
25
30
35
40
45
50
day
ToF expected − measured in ps
ps
A0 345.3
440
420
400
380
360
340
320
300
280
260
10
15
20
25
30
35
40
45
50
day
ToF resolution during the run

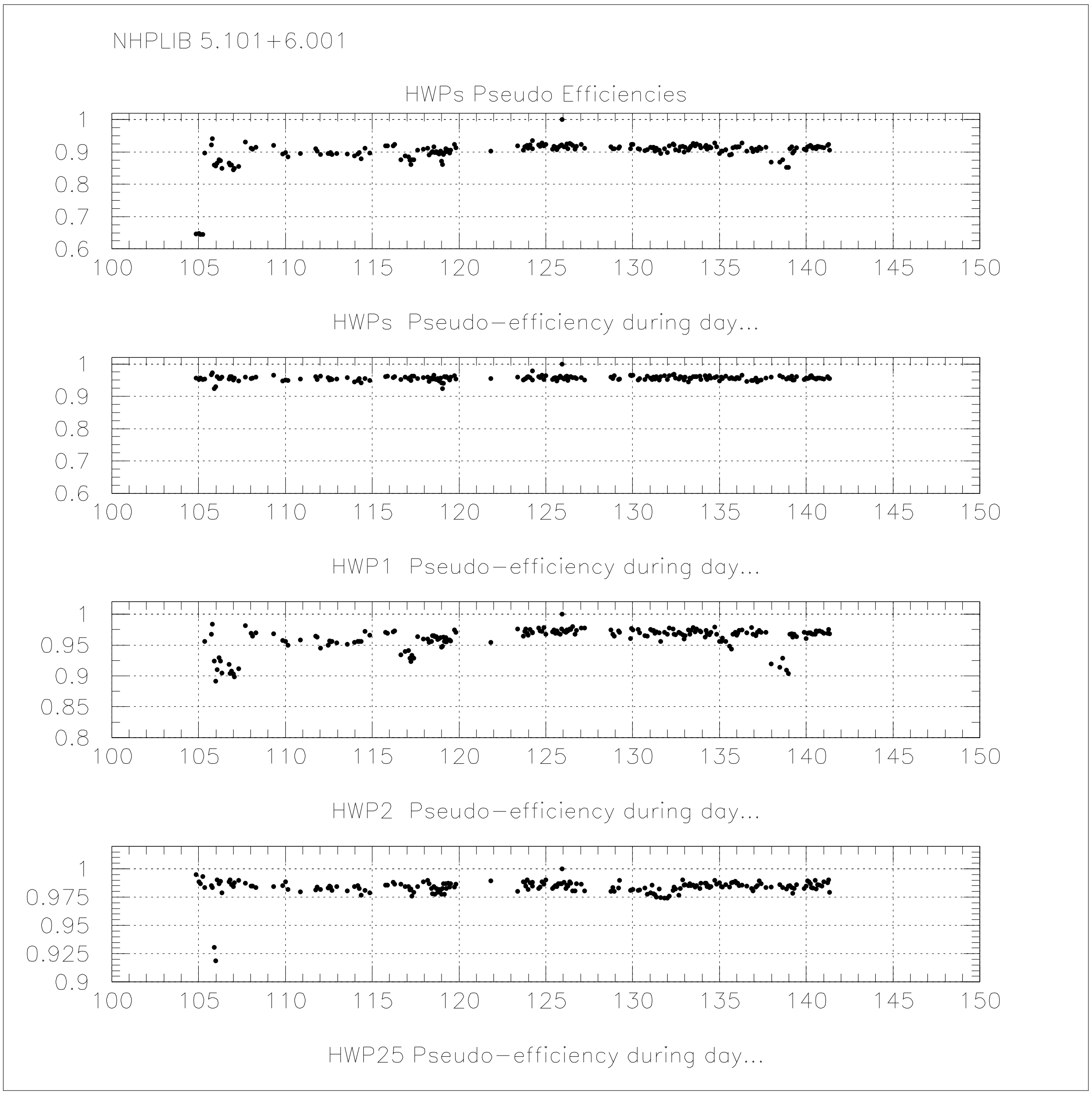


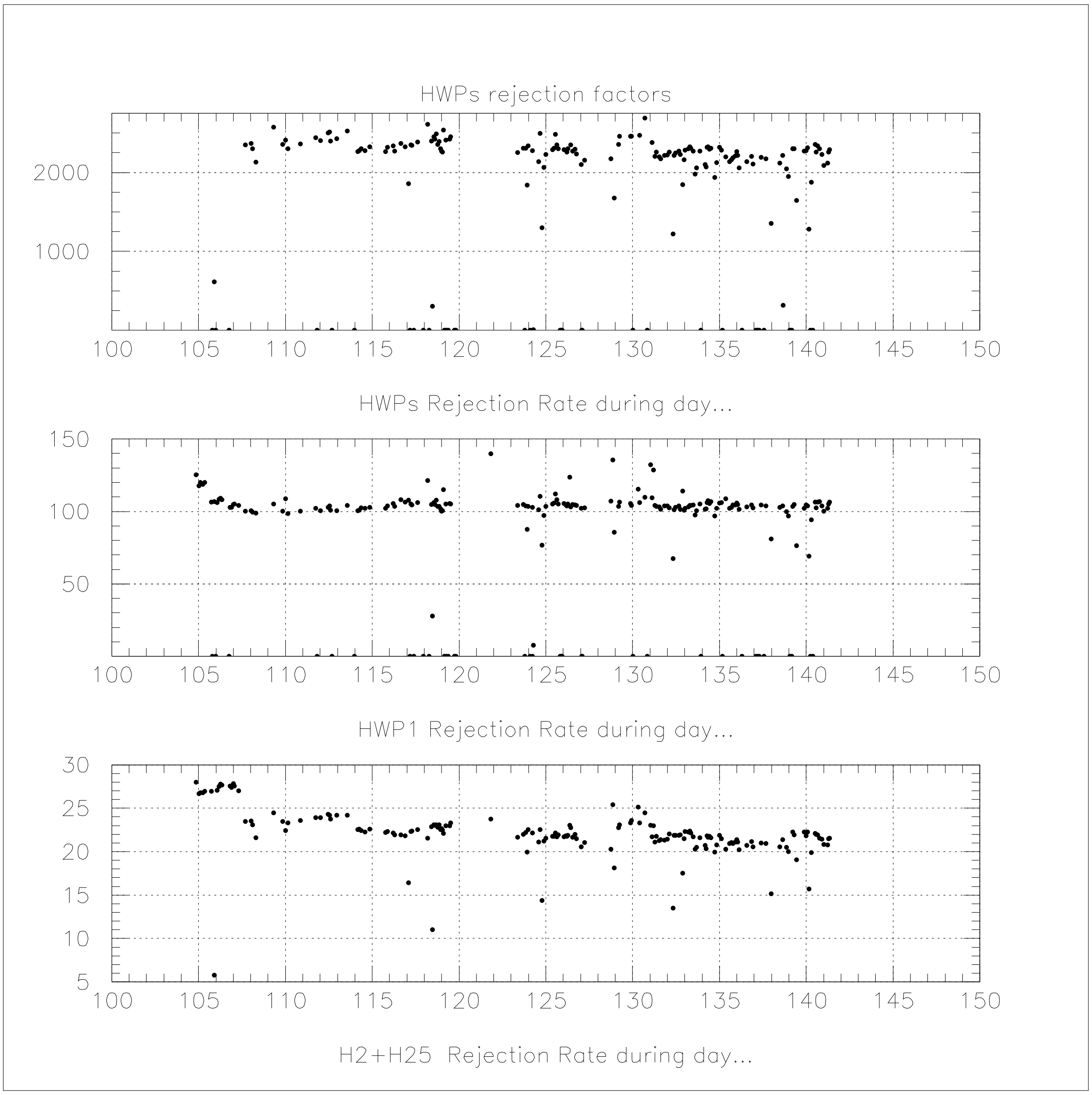
PC and ST Efficiency versus Time
PC1 Efficency
1
0.95
0.9
0.85
0.8
100 105 110 115 120 125 130 135 140 145 150
Day
Mean of PC1 Efficiency during day...
PC2 Efficency
1
0.95
0.9
0.85
0.8
100 105 110 115 120 125 130 135 140 145 150
Day
Mean of PC2 Efficiency during day...
ST1 Efficency
1
0.95
0.9
0.85
0.8
100 105 110 115 120 125 130 135 140 145 150
Day
Mean of ST1 Efficiency during day...
ST2 Efficency
1
0.95
0.9
0.85
0.8
100 105 110 115 120 125 130 135 140 145 150
Day
Mean of ST2 Efficiency during day...

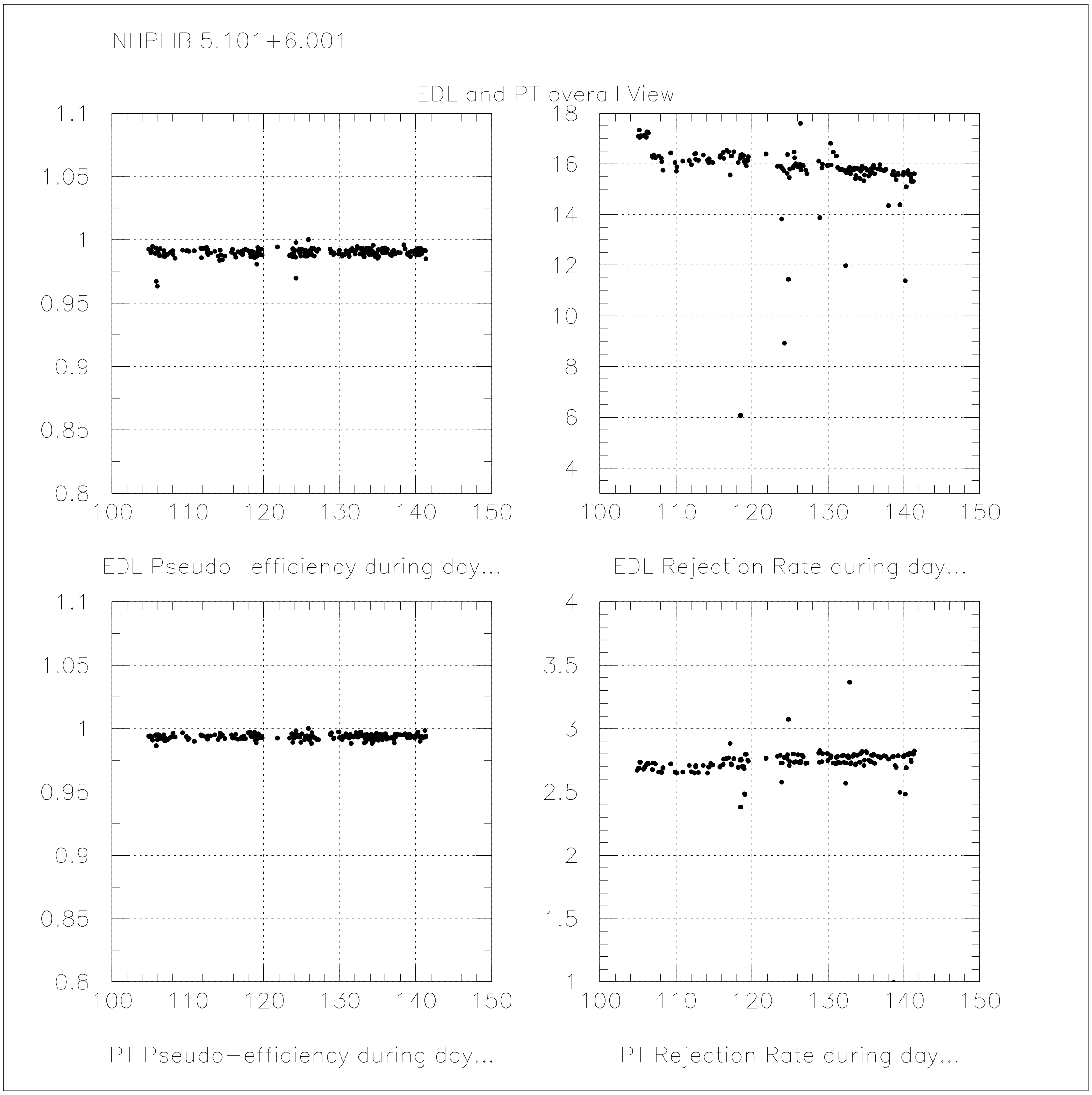


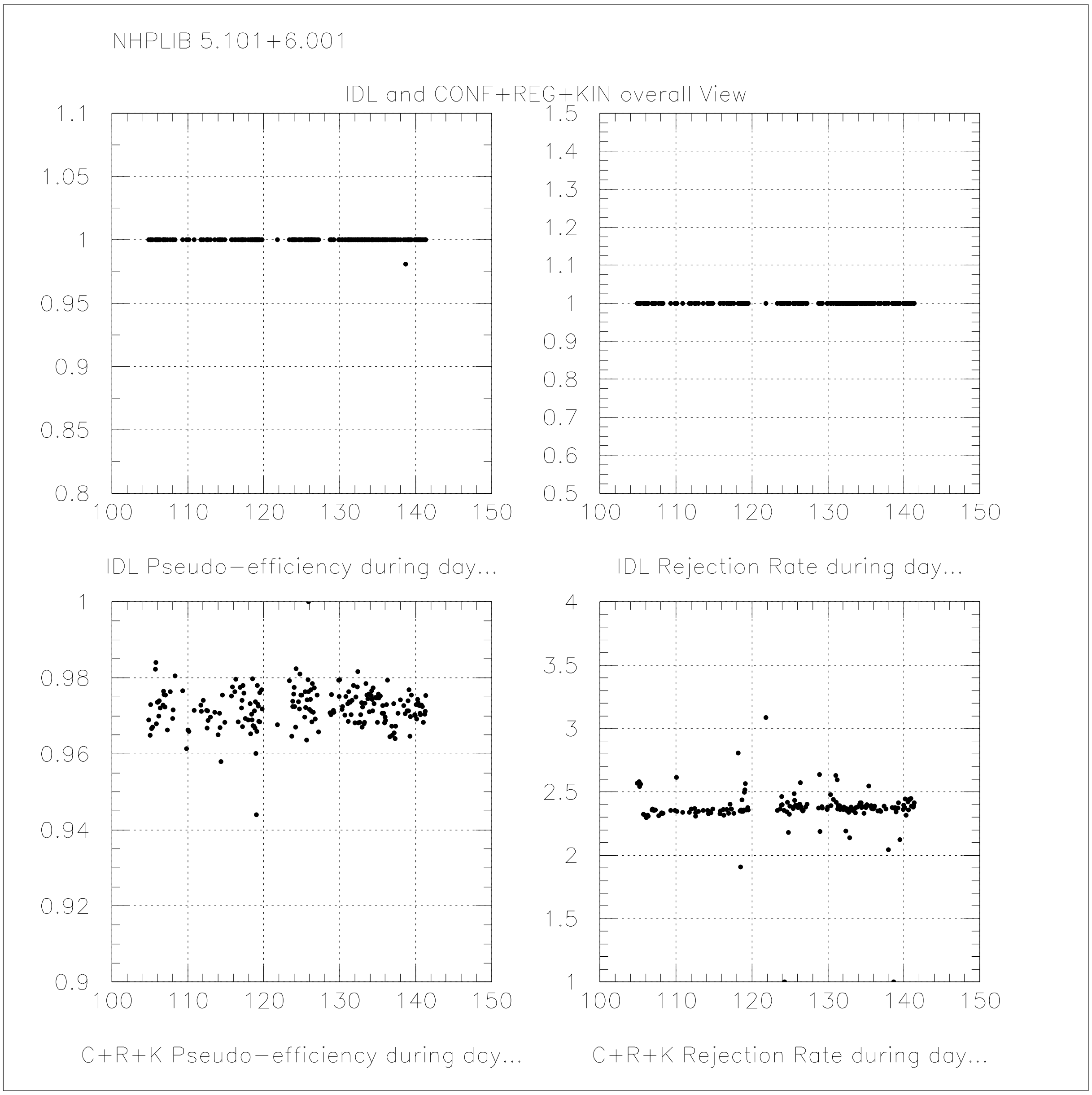
DC1−3 Efficiency versus Time
DC1
DC2
DC3
1
0.9
0.8
0.7
100
105
110
115
120
125
130
135
140
145
150

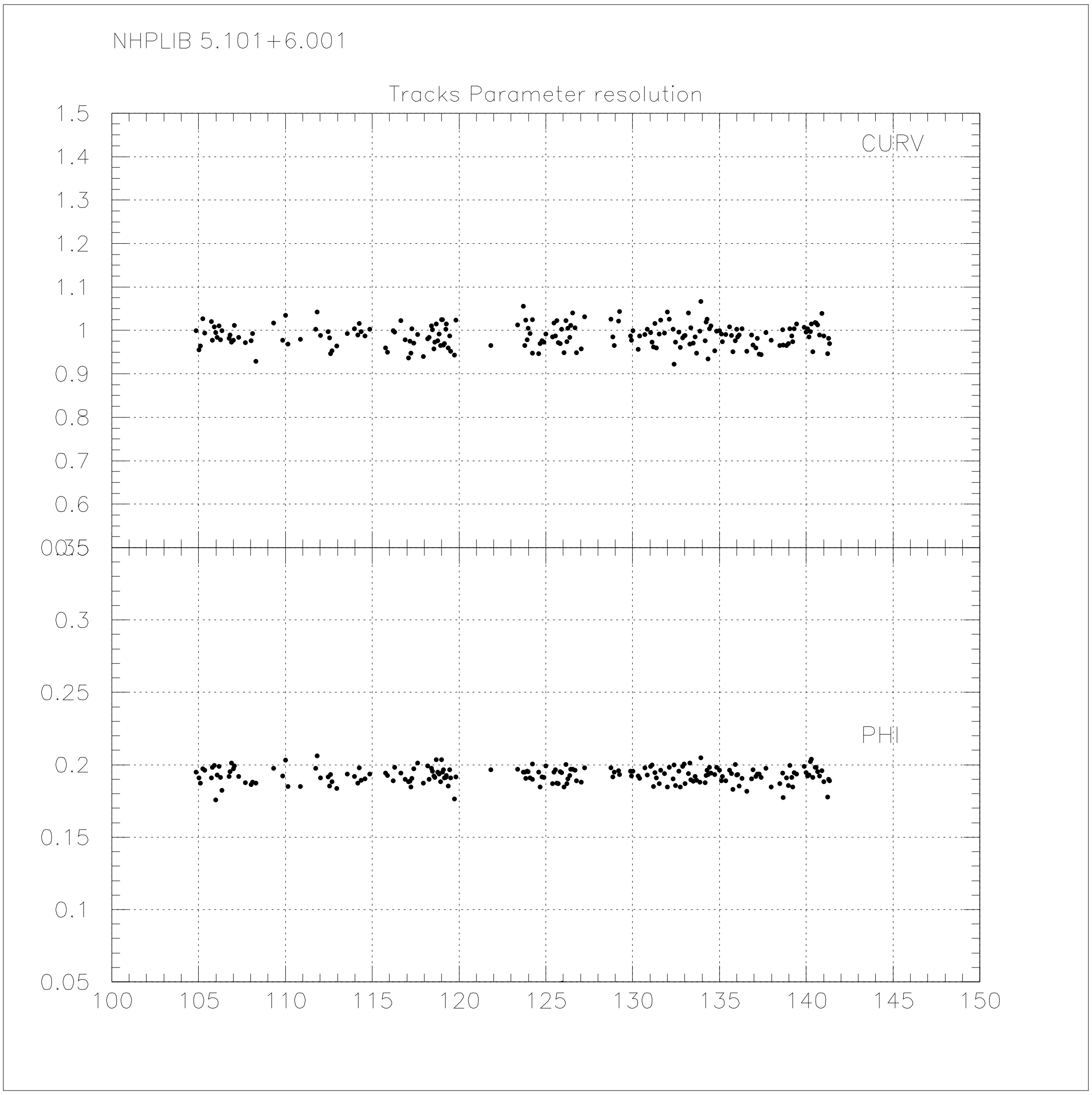

DC4−6 Efficiency versus Time
DC4
DC5
DC6
1
0.9
0.8
0.7
100
105
110
115
120
125
130
135
140
145
150

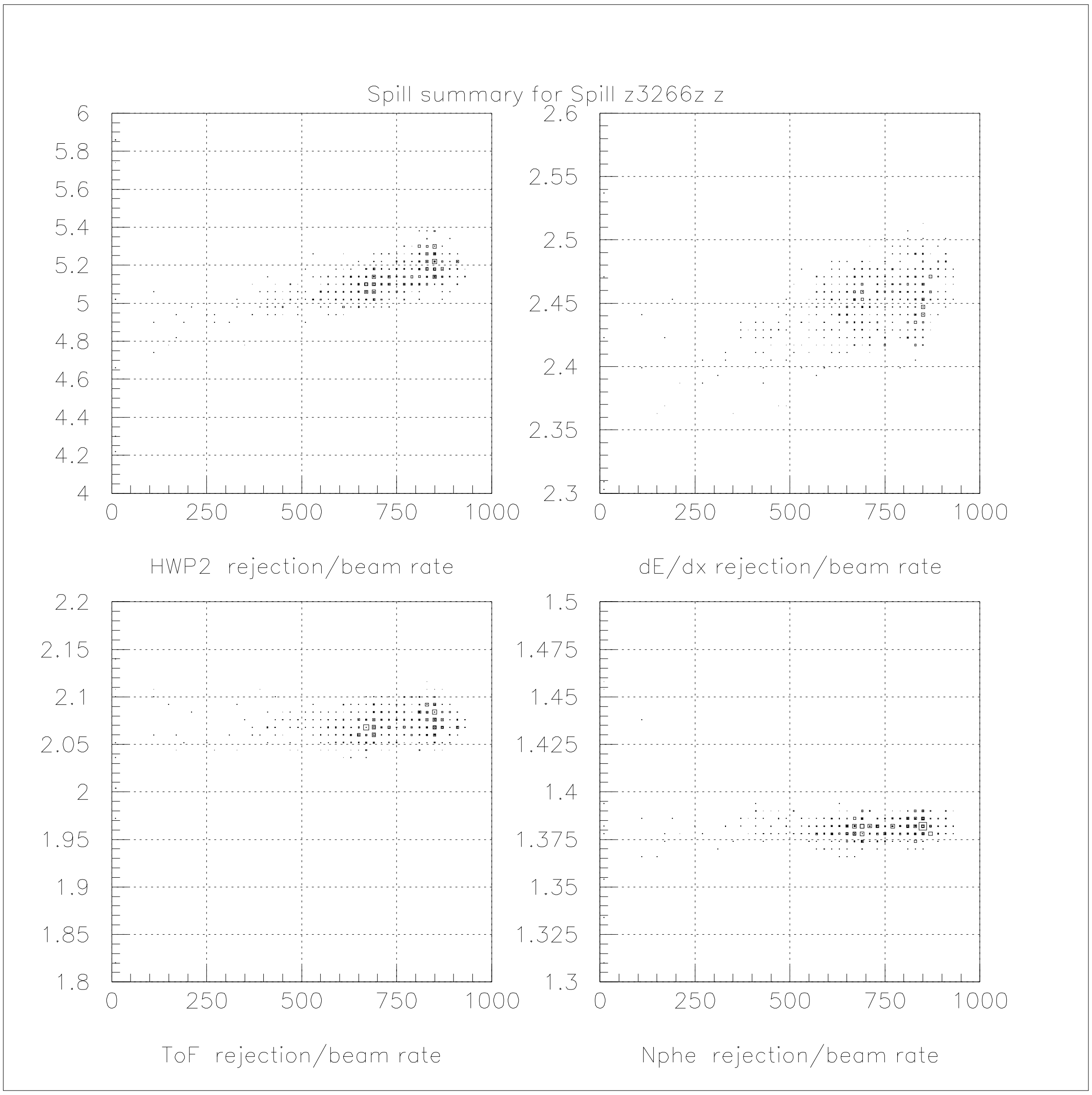

NHPLIB 5.101+6.001
HWPs Pseudo Efficiencies
1
0.9
0.8
0.7
0.6
100 105 110 115 120 125 130 135 140 145 150
HWPs Pseudo−efficiency during day...
1
0.9
0.8
0.7
0.6
100 105 110 115 120 125 130 135 140 145 150
HWP1 Pseudo−efficiency during day...
1
0.95
0.9
0.85
0.8
100 105 110 115 120 125 130 135 140 145 150
HWP2 Pseudo−efficiency during day...
1
0.975
0.95
0.925
0.9
100 105 110 115 120 125 130 135 140 145 150
HWP25 Pseudo−efficiency during day...


HWPs rejection factors
HWPs Rejection Rate during day...
HWP1 Rejection Rate during day...
H2+H25 Rejection Rate during day...

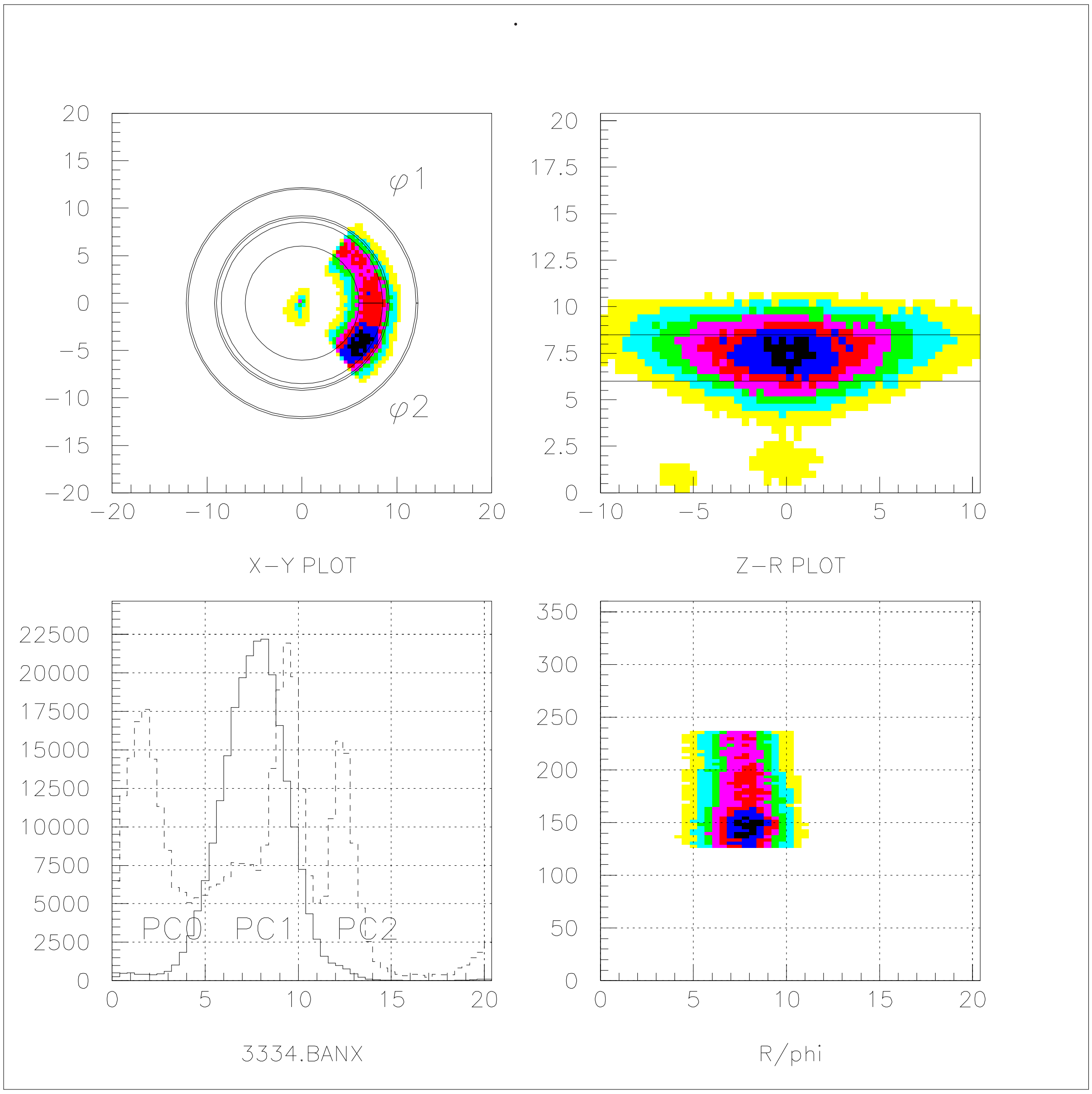

NHPLIB 5.101+6.001
EDL and PT overall View
EDL Pseudo−efficiency during day...
EDL Rejection Rate during day...
PT Pseudo−efficiency during day...
PT Rejection Rate during day...

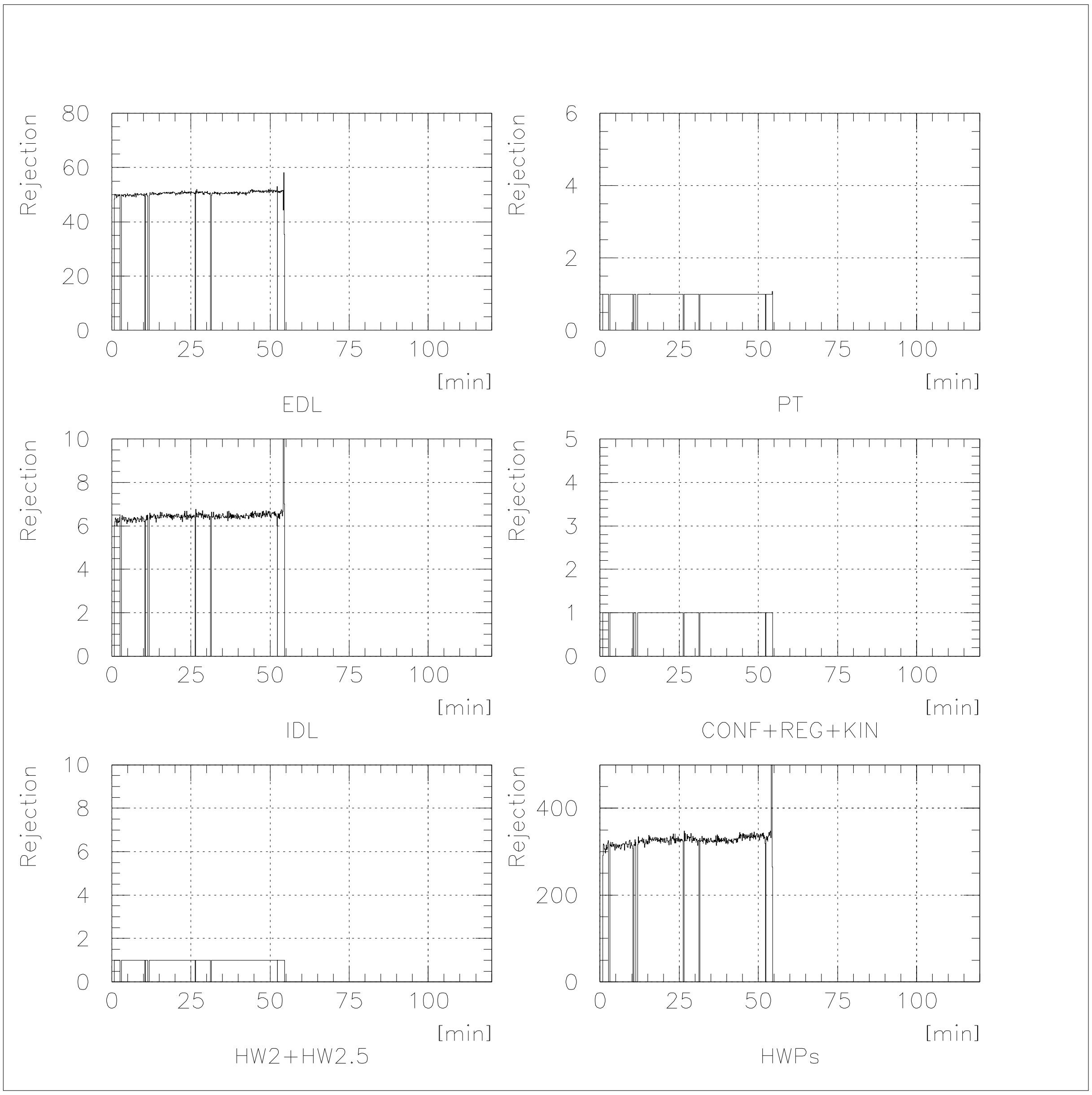

NHPLIB 5.101+6.001
IDL and CONF+REG+KIN overall View
IDL Pseudo−efficiency during day...
IDL Rejection Rate during day...
C+R+K Pseudo−efficiency during day...
C+R+K Rejection Rate during day...


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
100
105
110
115
120
125
130
135
140
145
150



Spill summary for Spill z3266z z
6
5.8
5.6
5.4
5.2
5
4.8
4.6
4.4
4.2
4
0
250
500
750
1000
HWP2 rejection/beam rate
2.6
2.55
2.5
2.45
2.4
2.35
2.3
dE/dx rejection/beam rate
2.2
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
ToF rejection/beam rate
1.5
1.475
1.45
1.425
1.4
1.375
1.35
1.325
1.3
Nphe rejection/beam rate


φ1
φ2
X−Y PLOT
Z−R PLOT
PC0
PC1
PC2
3334.BANX
R/phi


Rejection
[min]
EDL
PT
IDL
CONF+REG+KIN
HW2+HW2.5
HWPs