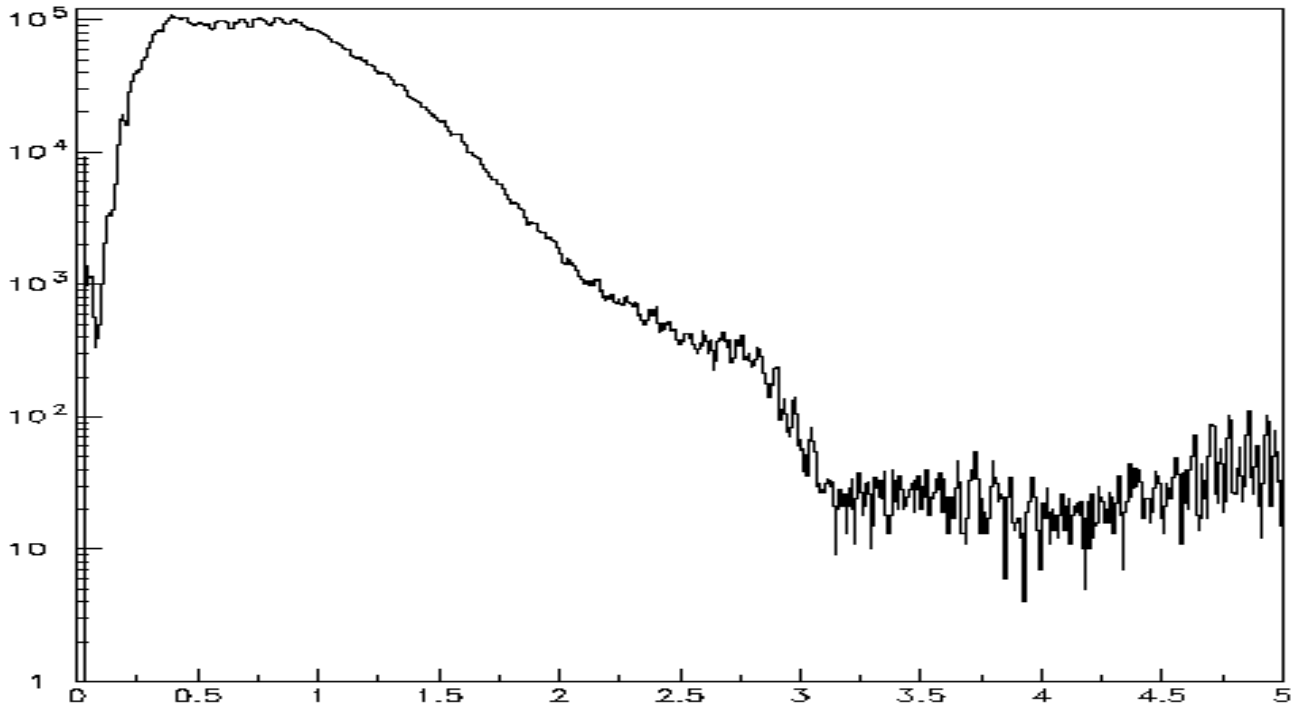
Some “new” things from the Cavity (some shown during H1- meeting)

N.Coppola

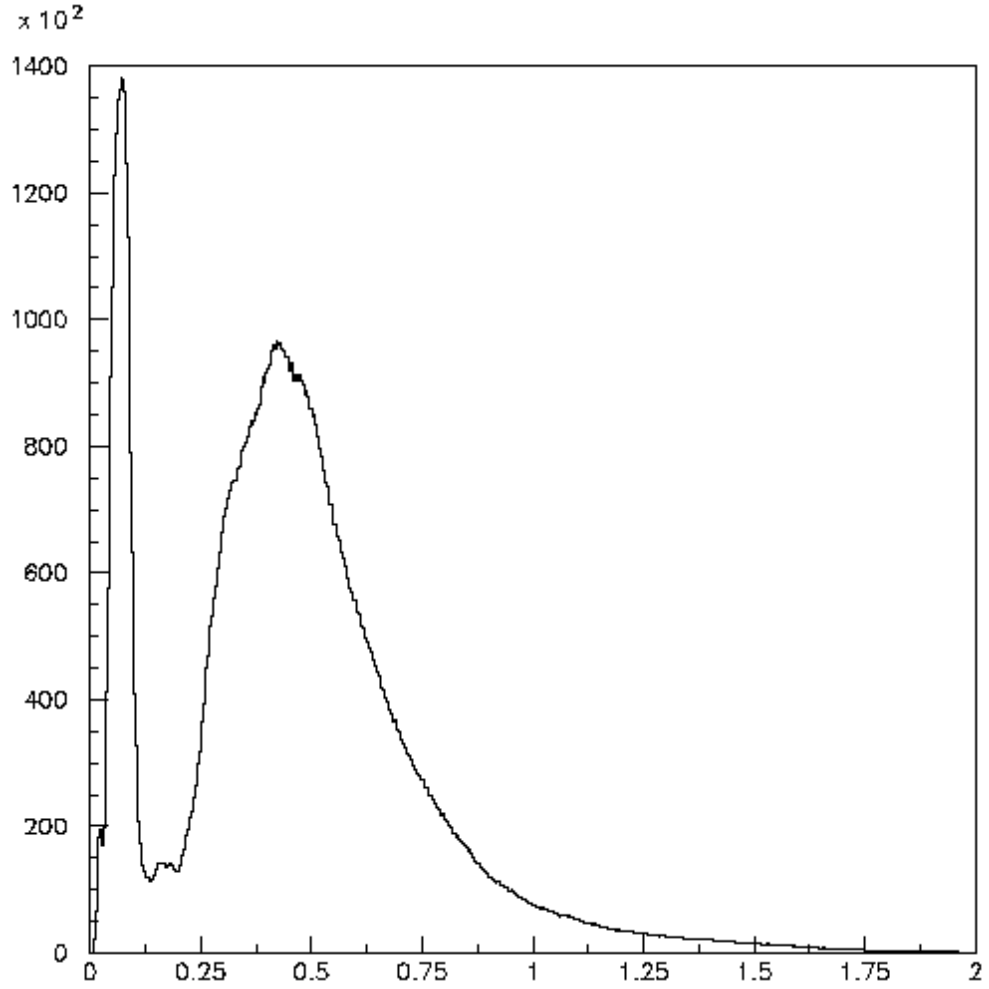
task force meeting

30th Sept. 2008

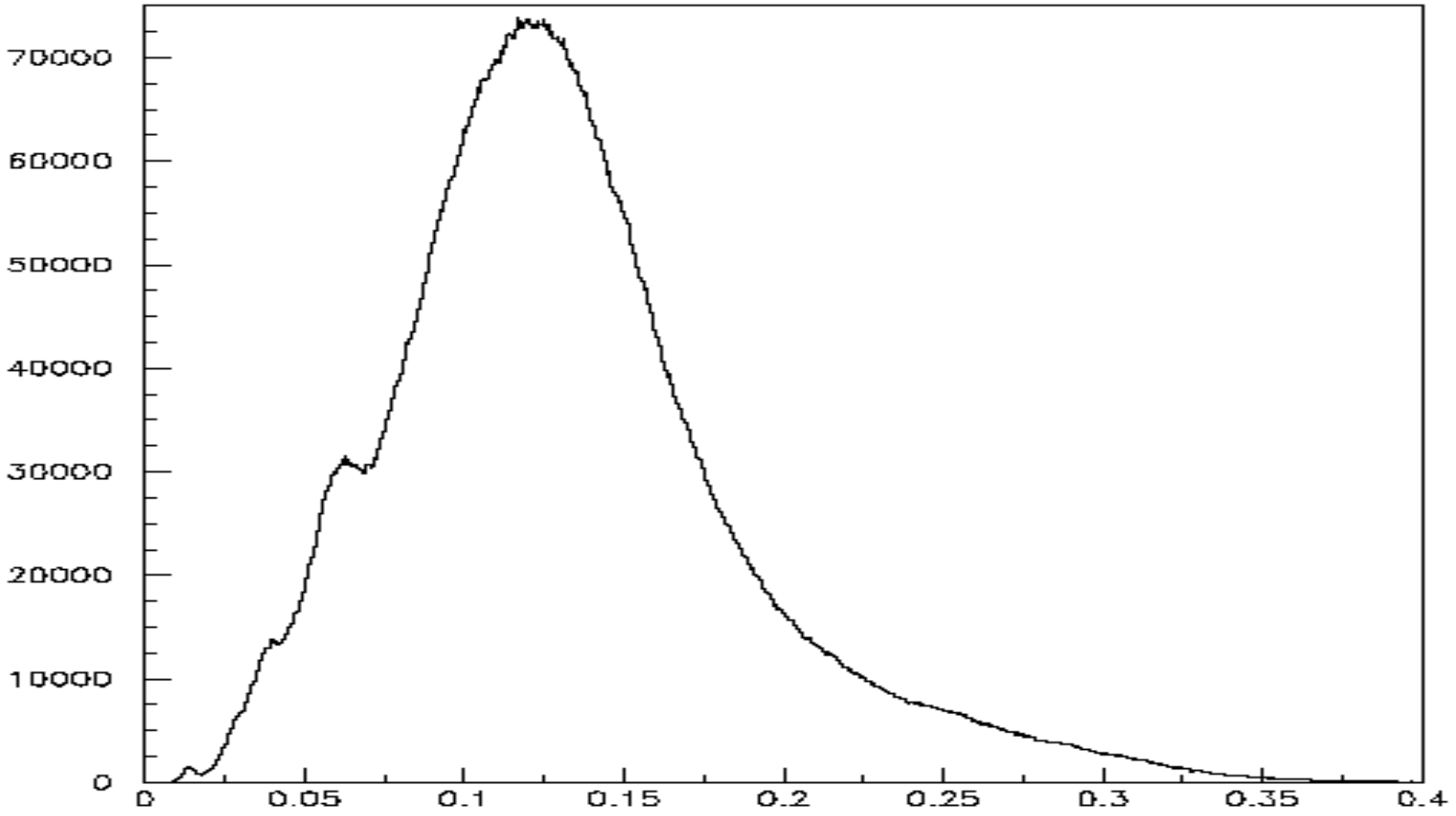
Rads peak energy



Distribution of number of brem



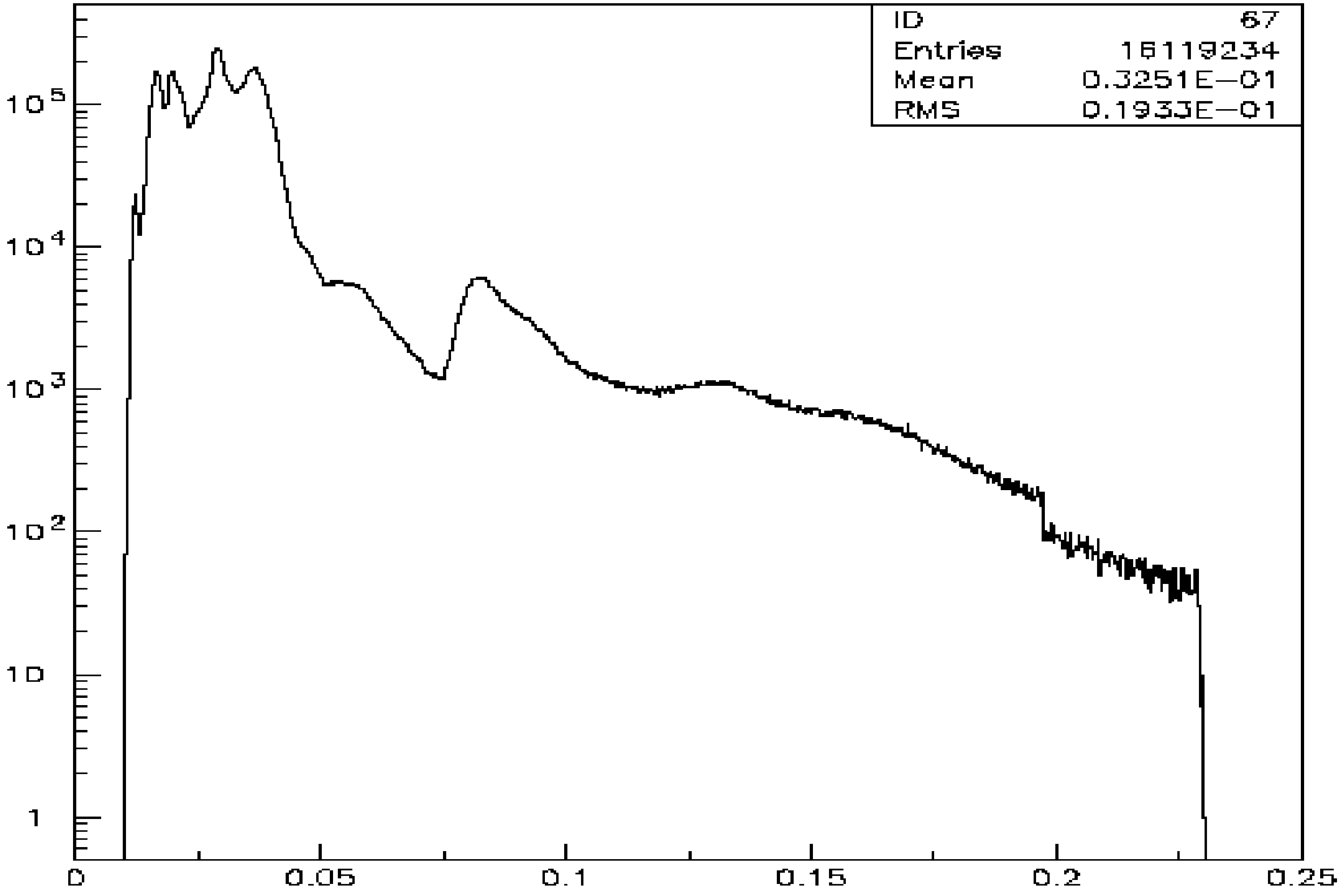
Distribution of number of Compton



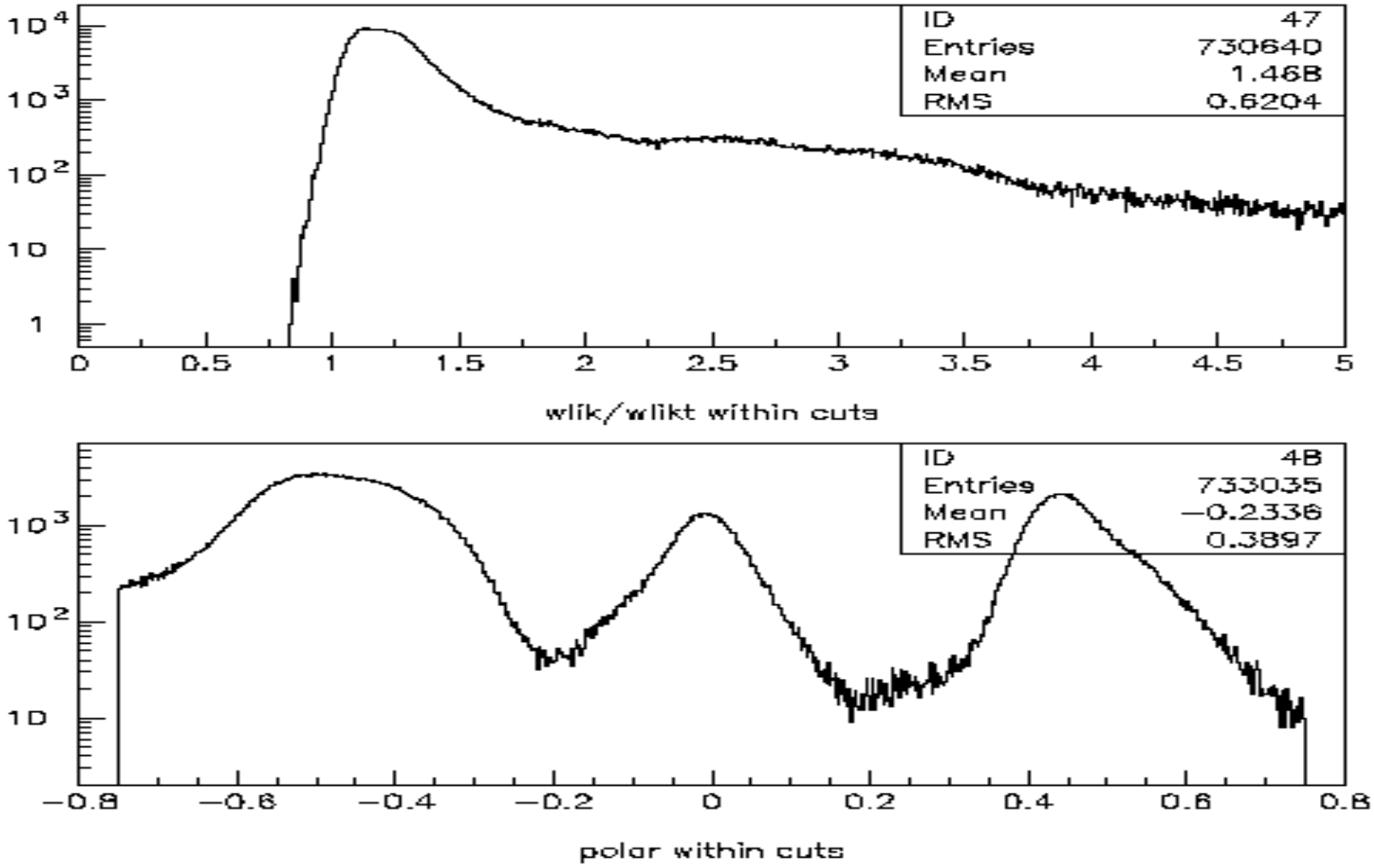
Errors determination

- Produce all the doublets
- Subdivide whole sample in ~80 sub periods
- Discriminate on rads brem compton and Tpol flatness
- For each error source choose a smaller sub sample (10,6,2) and vary conditions
- Run detector parameter measurements every 25 doublets
- Run polarization measurements
- Make plots comparison

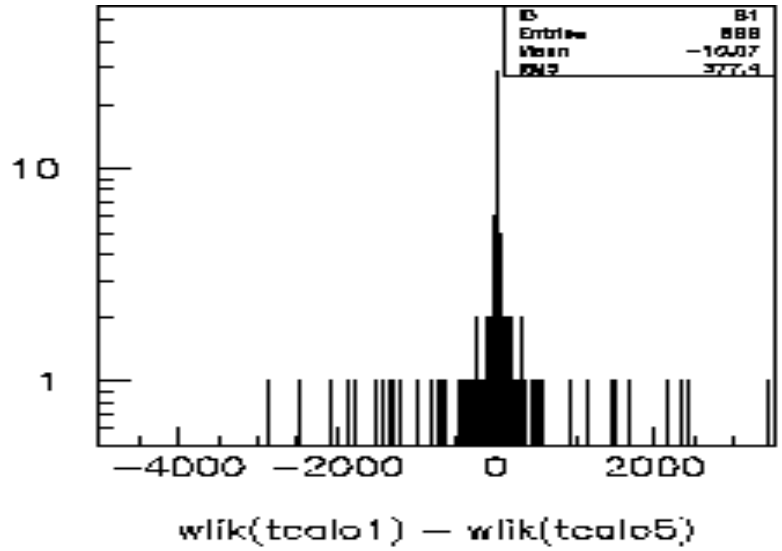
Error distribution for one bunch per 10 s

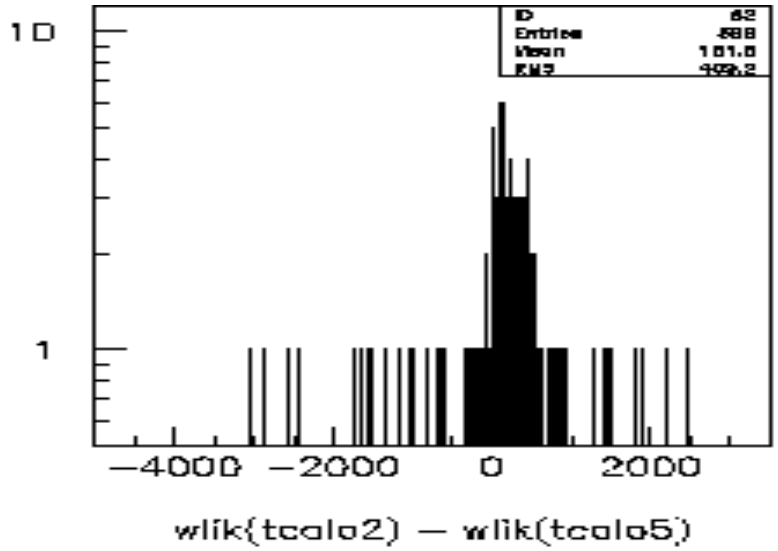


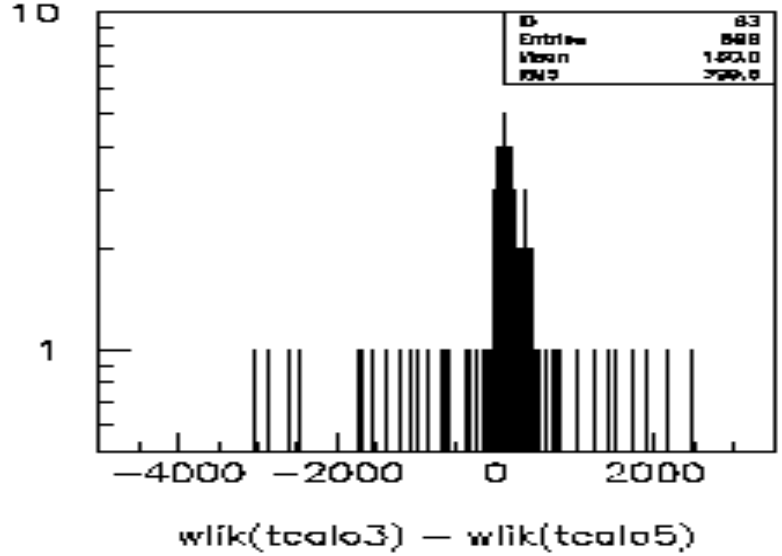
Detector analytical representation

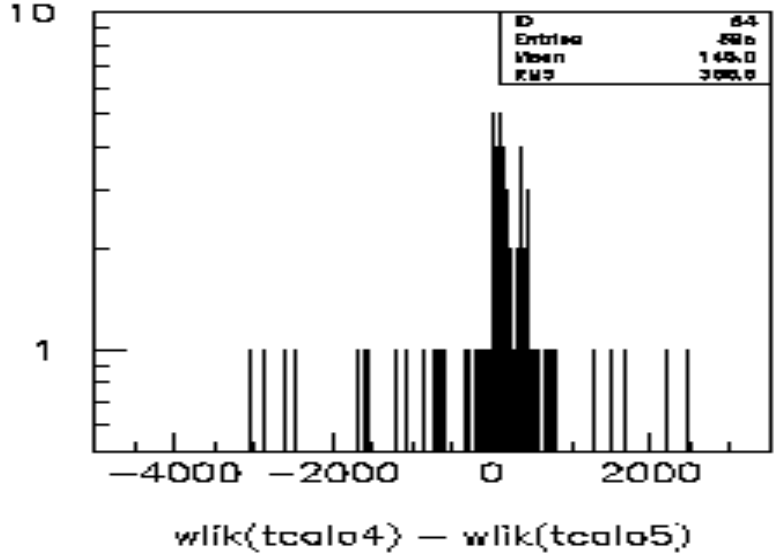


Detector analytical representation

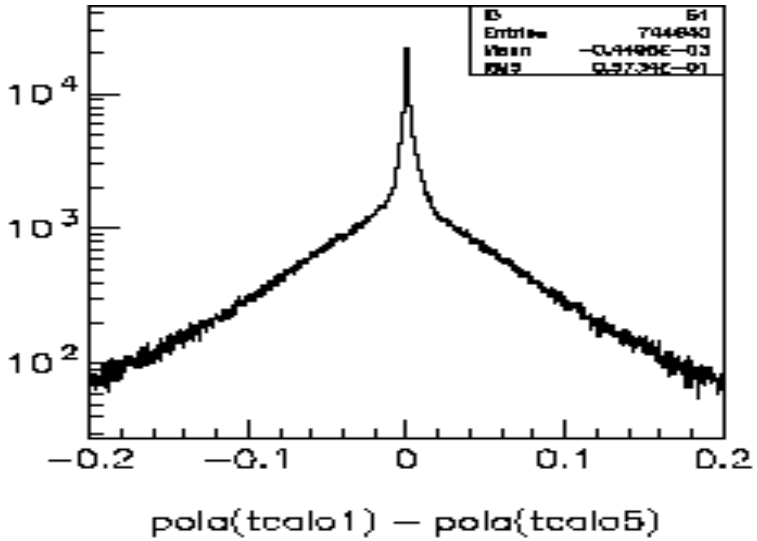


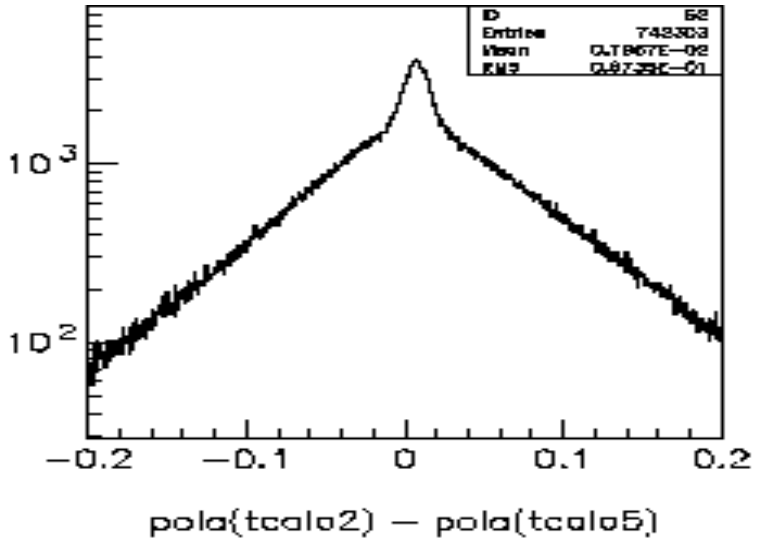


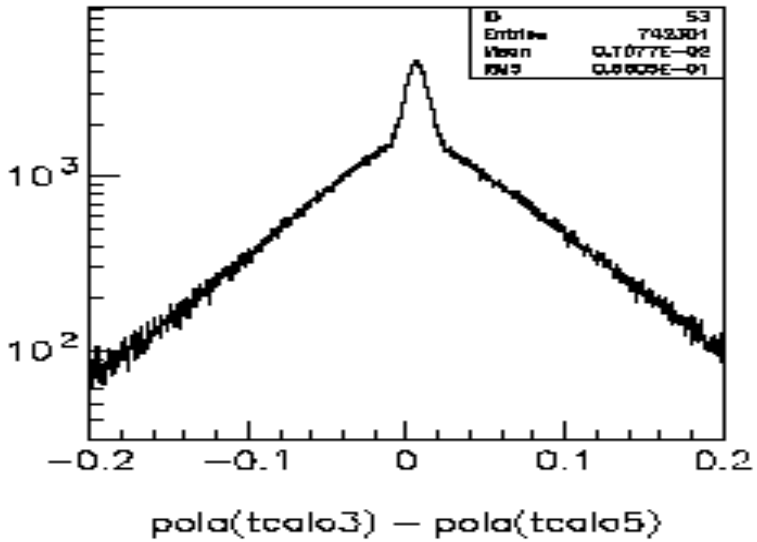


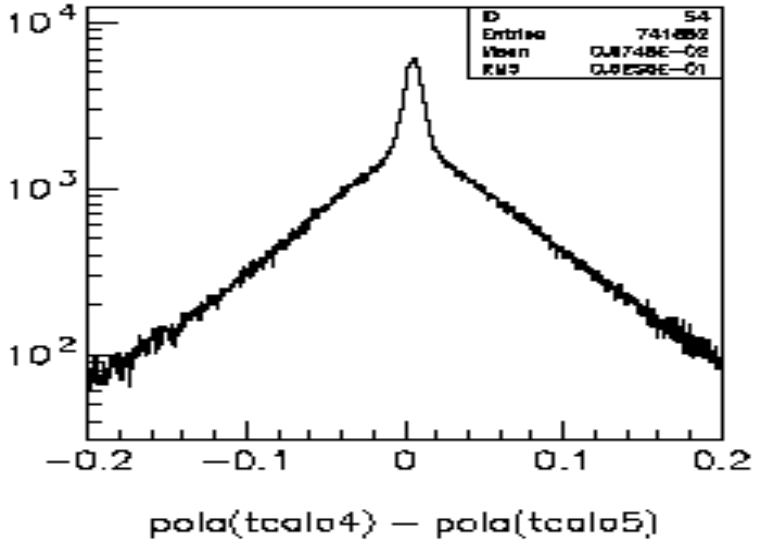


Detector analytical representation

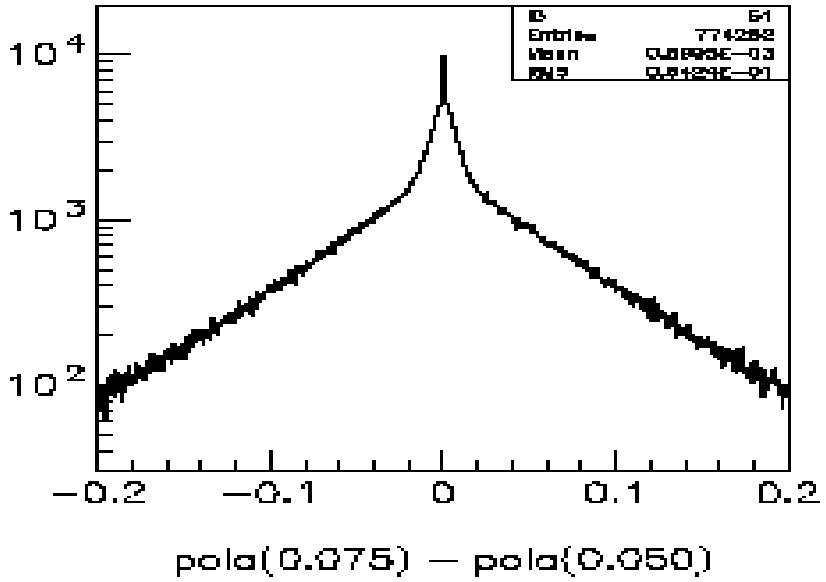




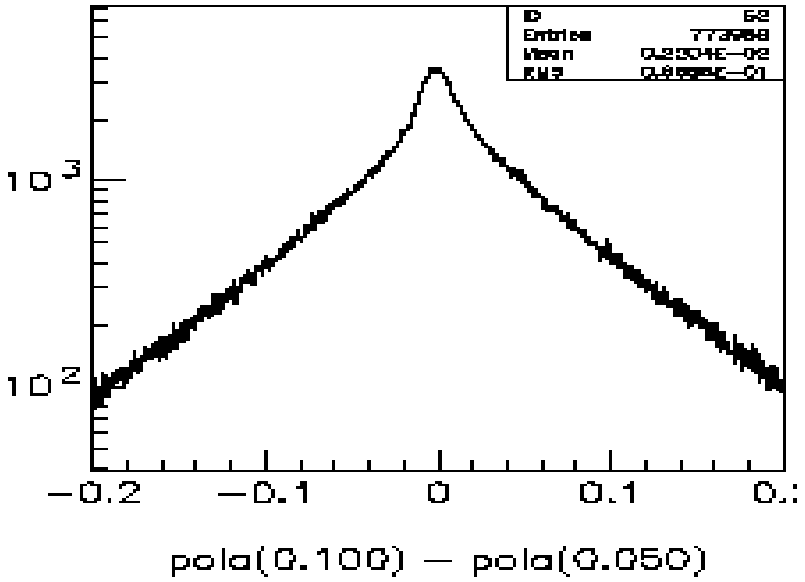




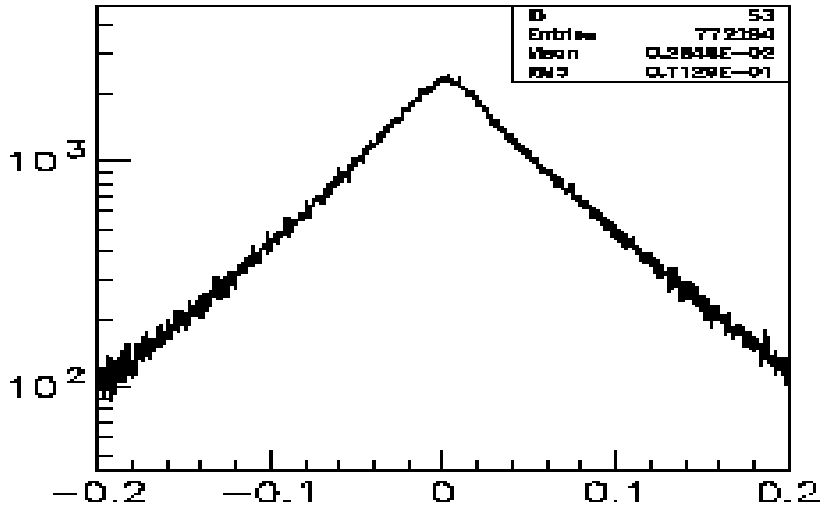
Radiation peak cut study



pola(0.075) − pola(0.050)

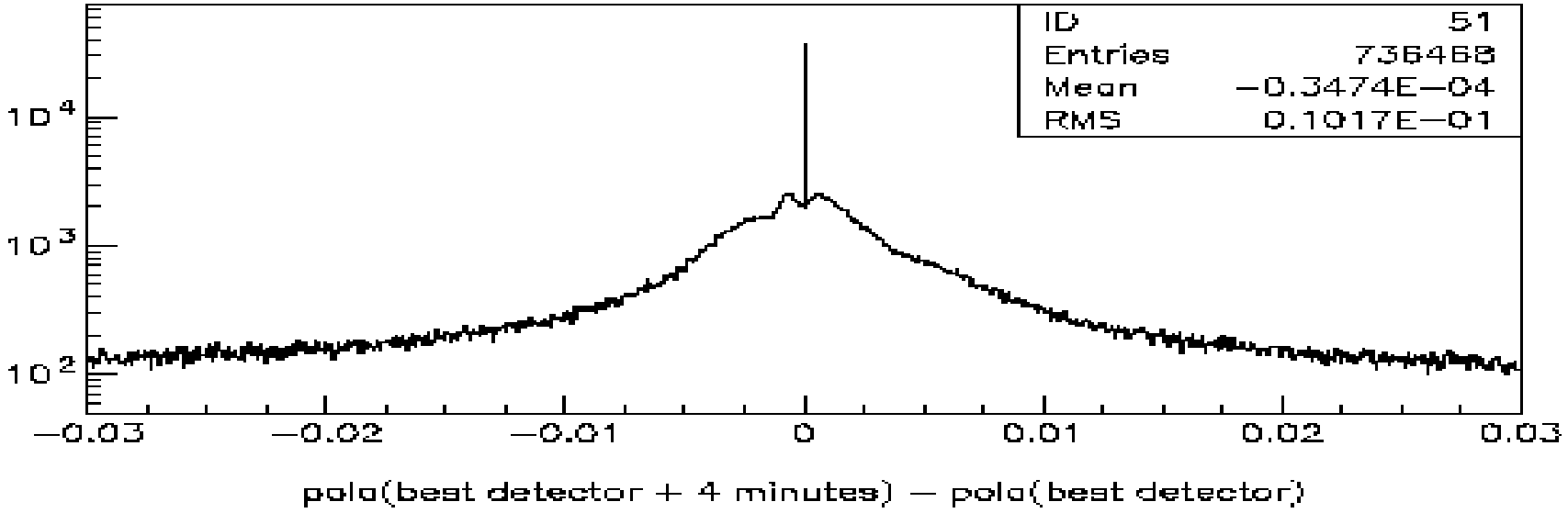


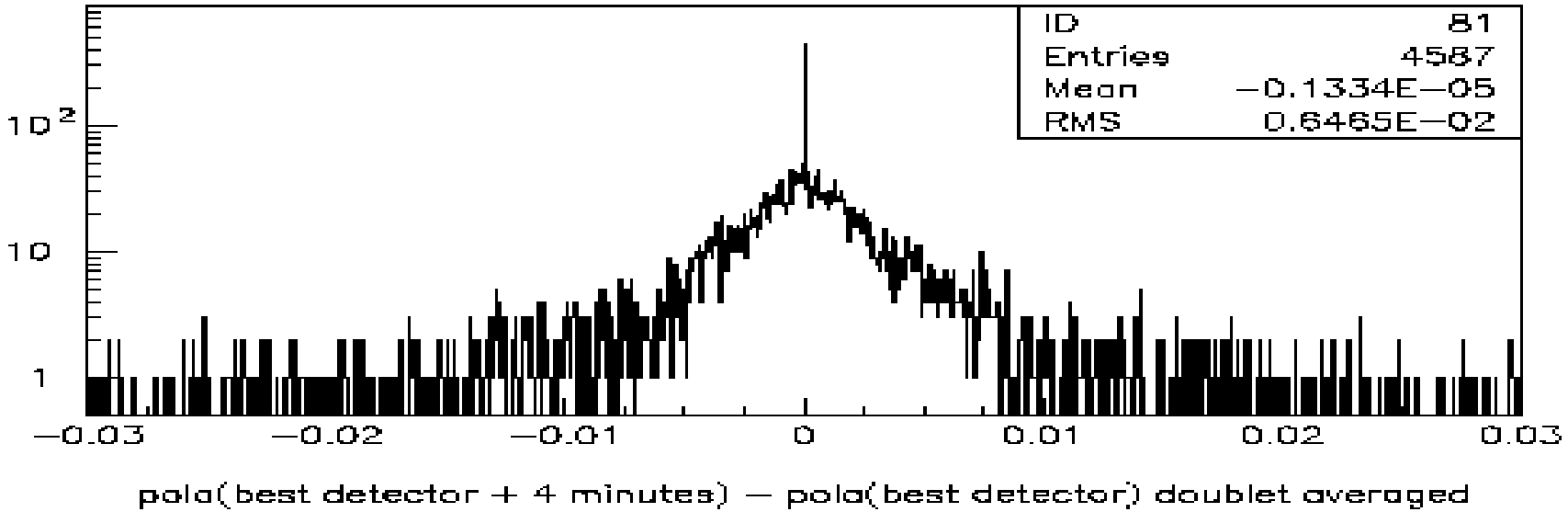
pola(0.100) − pola(0.050)



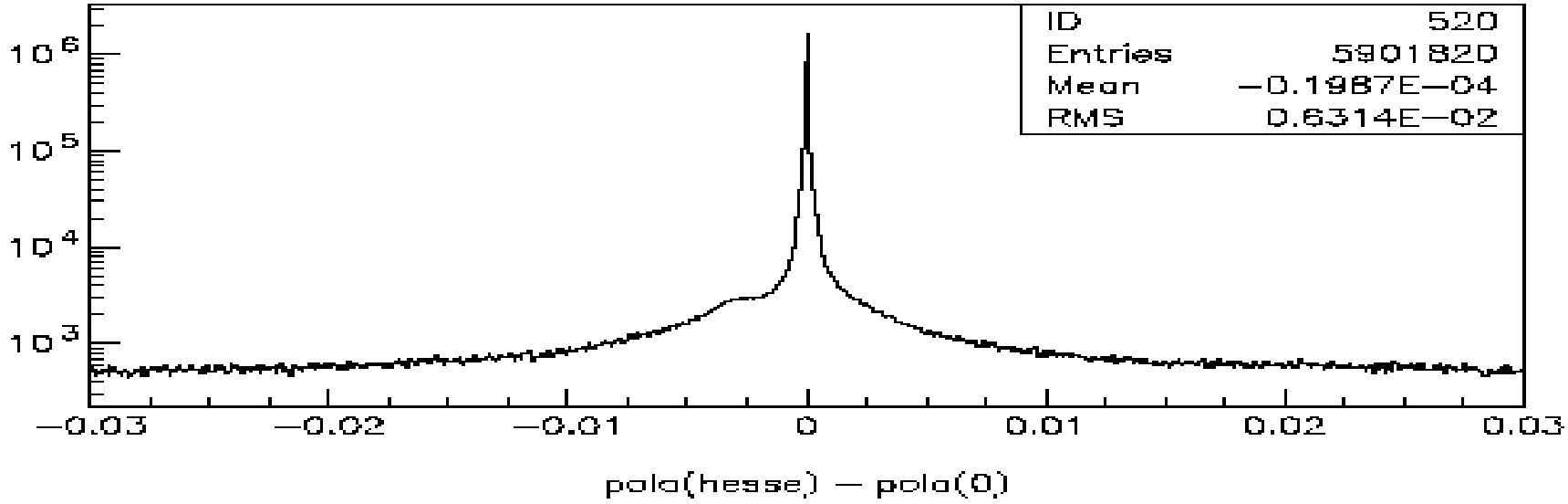
pola(0.150) − pola(0.050)

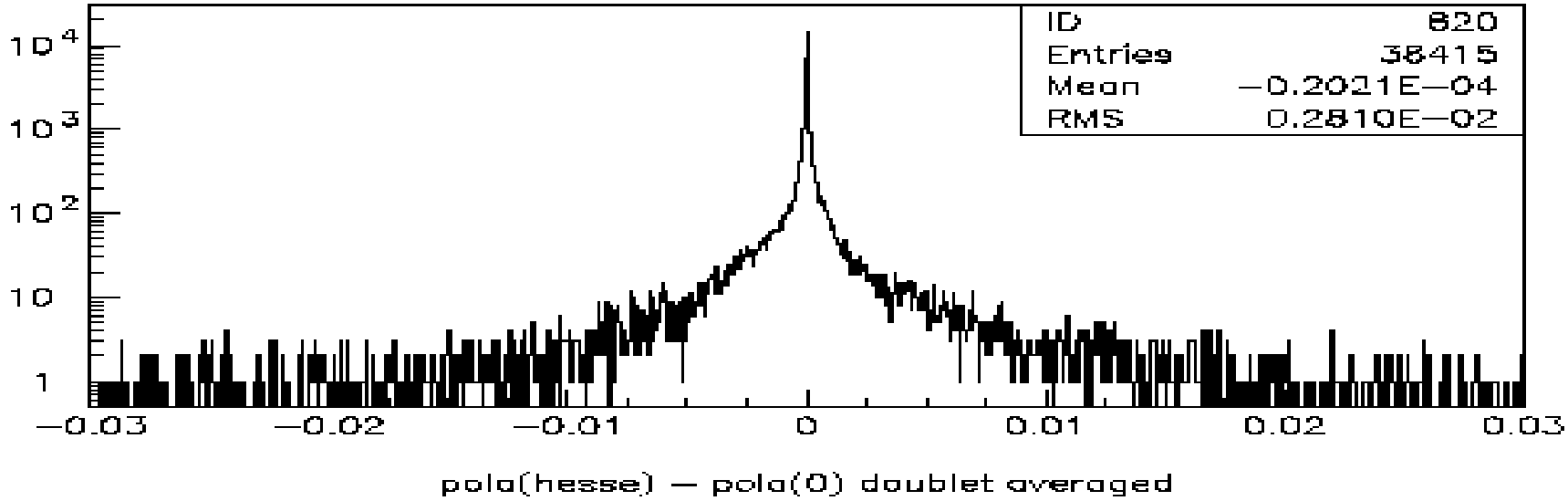
Detector fluctuation method 1



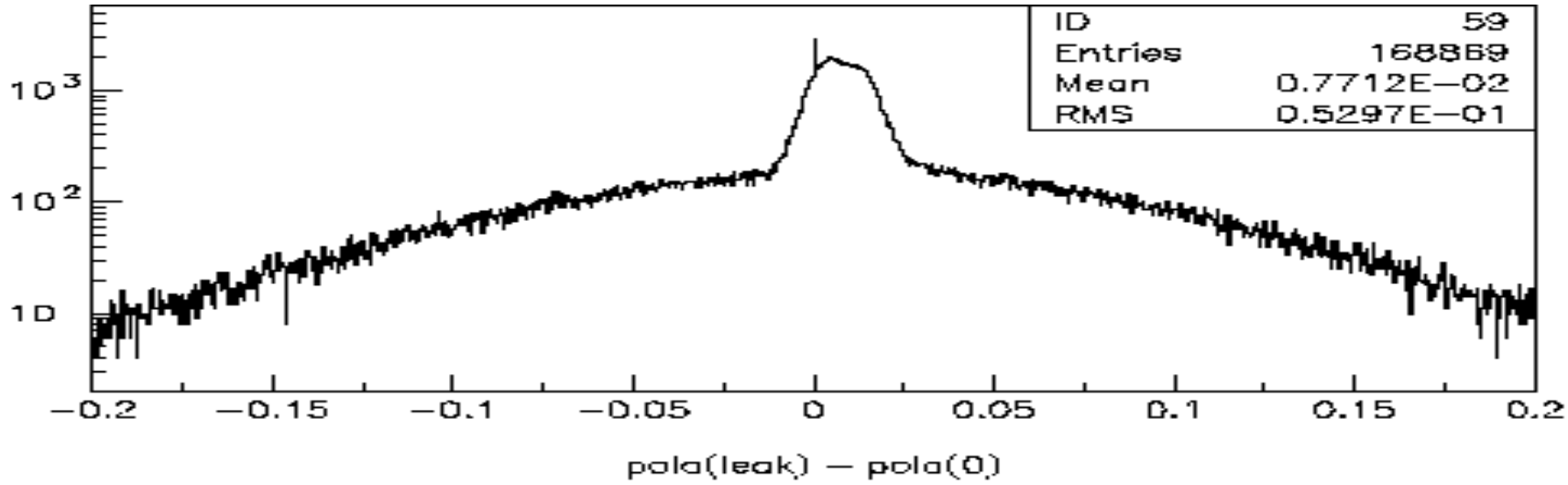


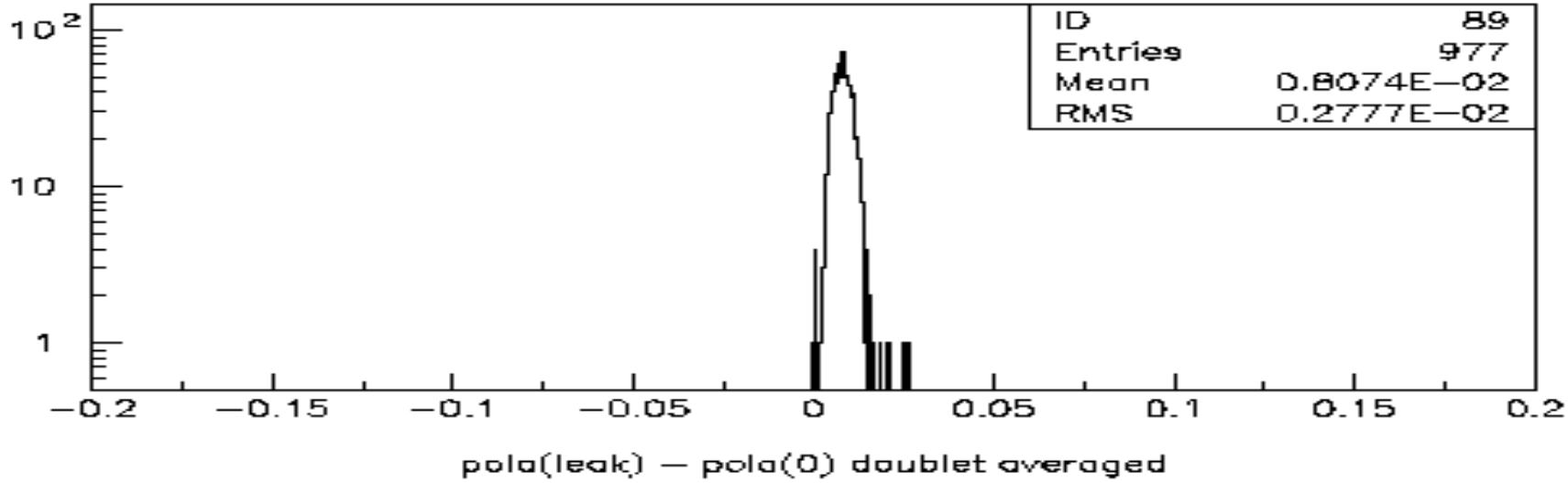
Detector fluctuation method 2





Leak

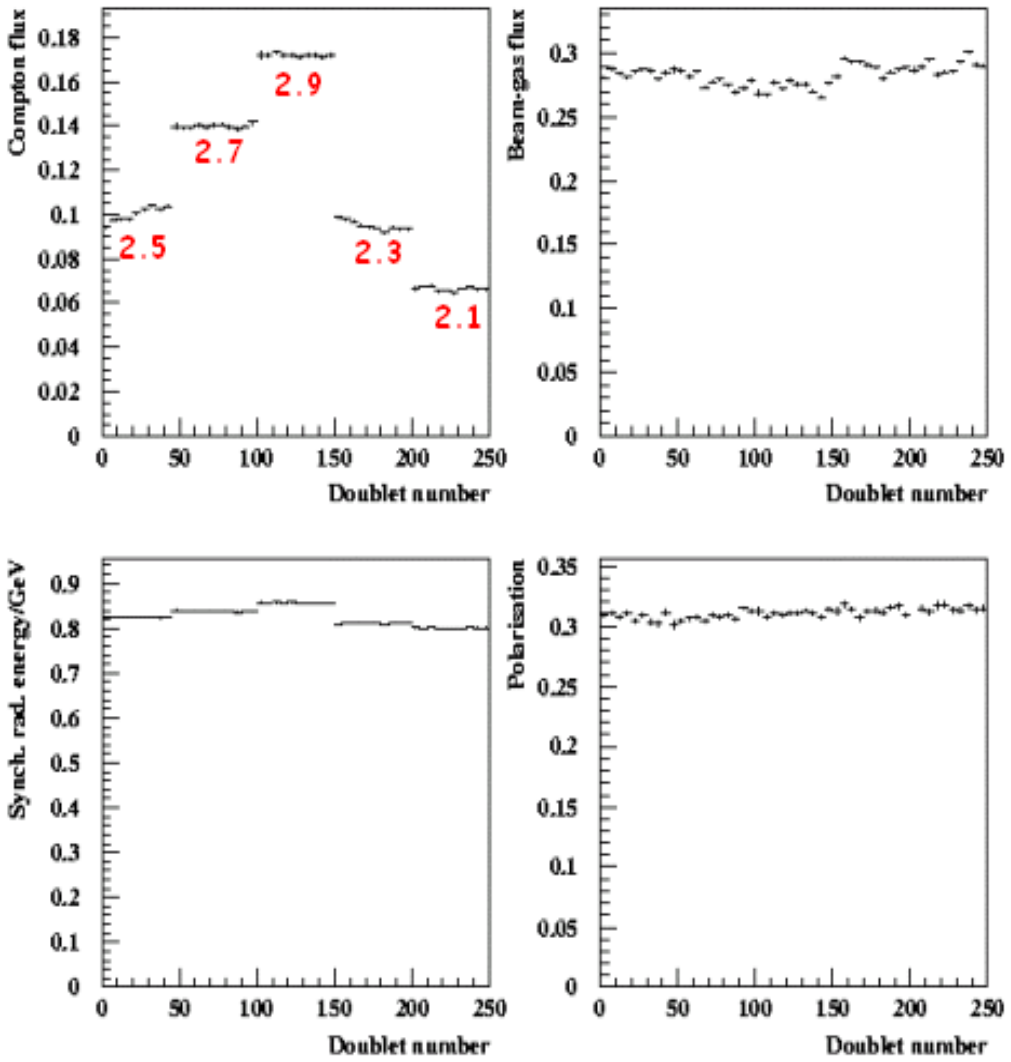

ID 59
Entries 168869
Mean 0.7712E−02
RMS 0.5297E−01
10³
10²
10
−0.2
−0.15
−0.1
−0.05
0
0.05
0.1
0.15
0.2
pola(leak) − pola(0)


ID 89
Entries 977
Mean 0.8074E−02
RMS 0.2777E−02
10²
10
1
−0.2
−0.15
−0.1
−0.05
0
0.05
0.1
0.15
0.2
pola(leak) − pola(0) doublet averaged

Beam position

Position (mm)	$\langle P_e \rangle$ (%)
2.5	30.98 ± 0.06
2.7	31.03 ± 0.05
2.9	31.20 ± 0.04
2.3	31.45 ± 0.07
2.1	31.77 ± 0.09

→ $\delta P_e \leq 0.32\%$



Statistical uncertainties

- Pola error per bunch and for 10s : 3%
- From detector parameters (*) : 0.5 % (fully bunches and doublet correlated during 6mn)

Systematic uncertainties

- From Hera :   0.70%
- From Laser :   0.75%
- From detector: 0.10%
- ---------------------------
- Total   1. %

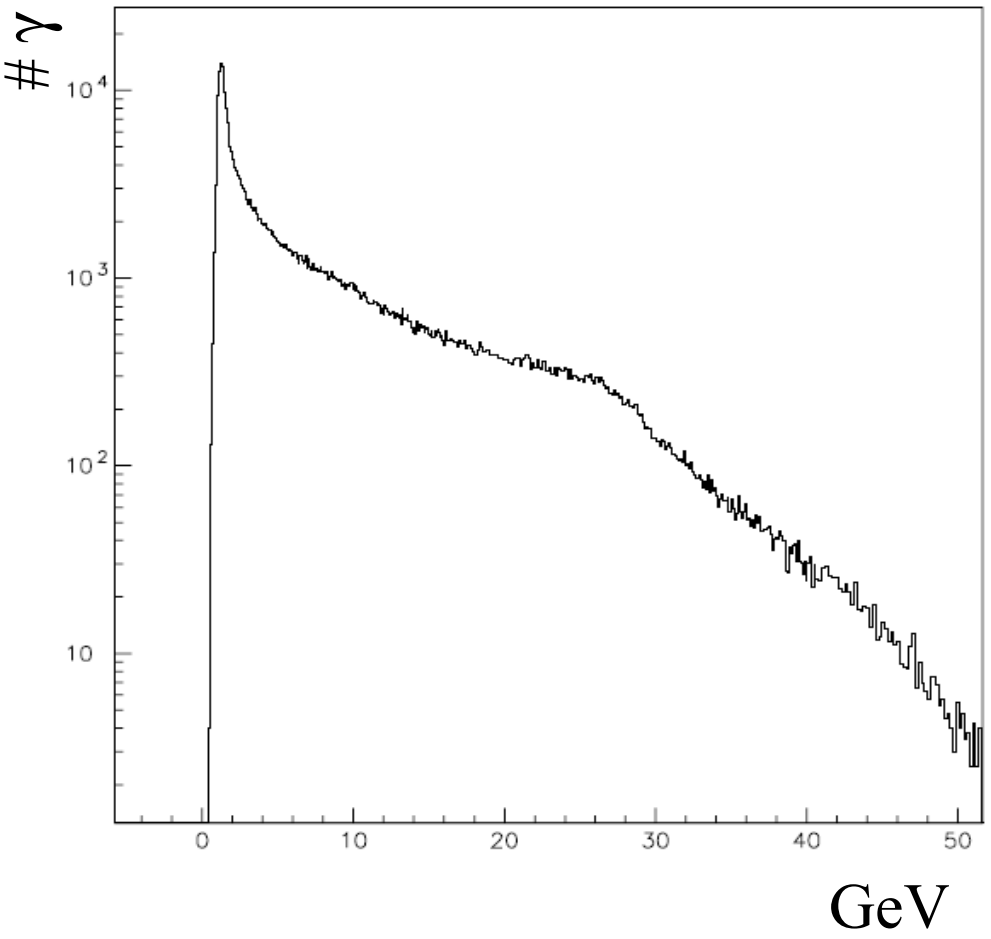
Future prospect

Everything done so far once but needs to be improved before final result

- Optimize detector parameters finding (done)
- Choose between tcalo1 and tcalo5 .Eventually run tcalo15 (one parameter more in widening technique $E=?x^{\mu}$)
- Revisit systematic issues with test sub periods
- Run detector parameters finding on all periods
- Run polar extraction on all periods
- Extend to earlier 16 bits daq output and check quality (these go back to October 2006)

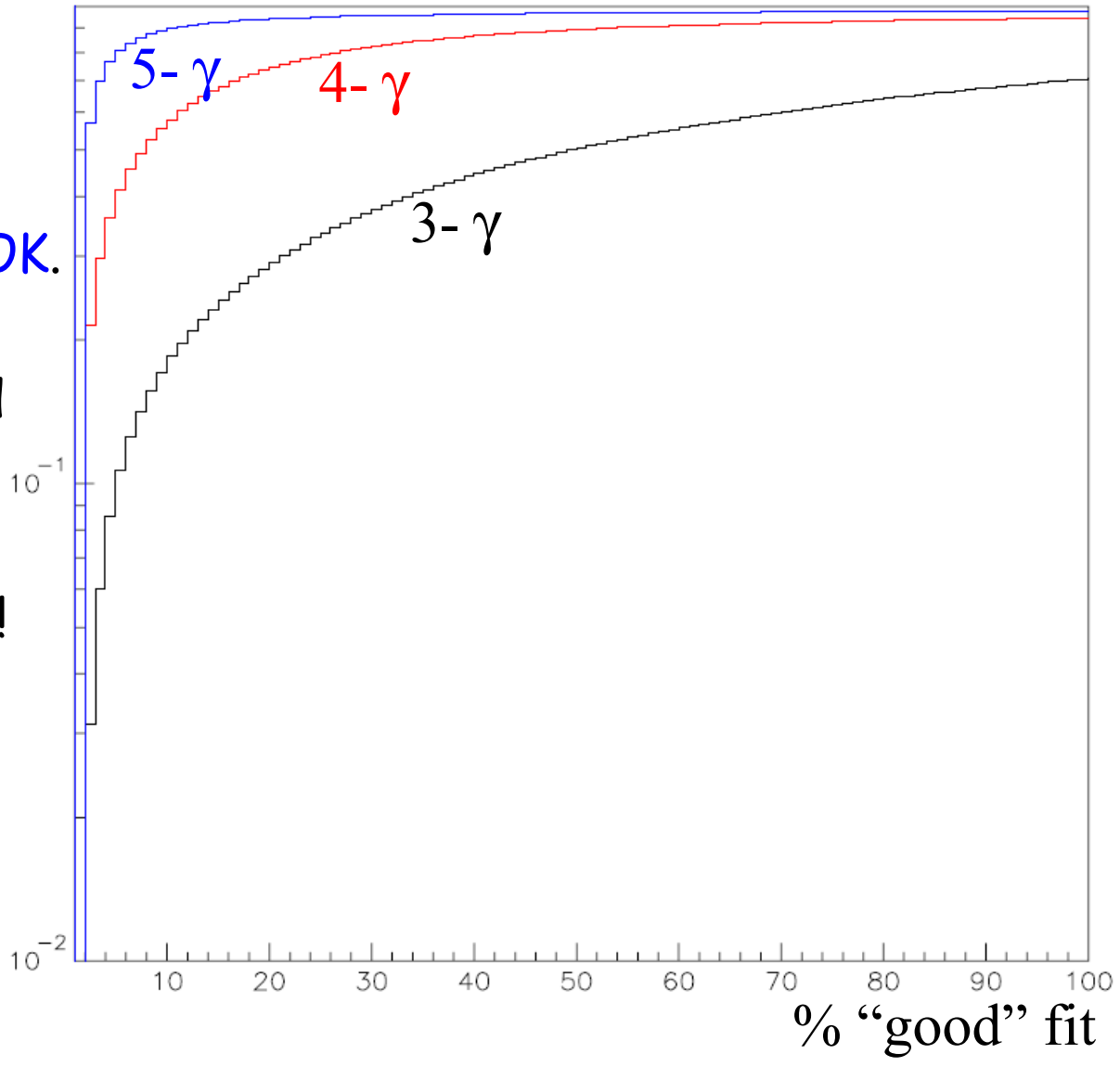
3- vs 4- 5- Photons statistics

during HD run
there are "more" than
3- simultaneous
bremsstrahlung
photons. In order
to improve the fit
introduce use of
also 4- and/or
5- photon statistics
for both brems. and
Compton photons



3- vs 4- 5- Photons statistics

The fit program
is slower, but still OK.
above 5-photons
the memory needed
is beyond what
available and the
program cannot run!



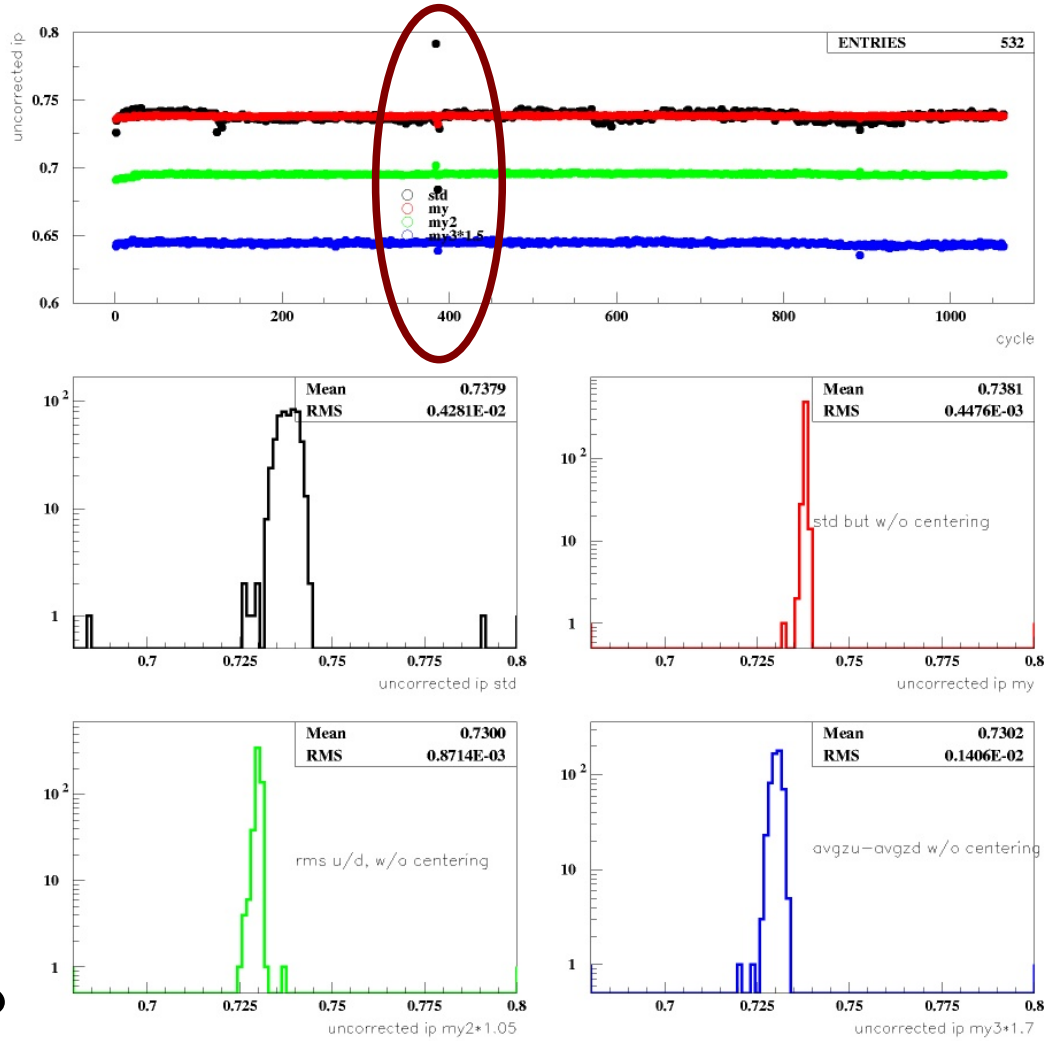
Few things for the TPOL data analysis

TPOL- IP distance (data)

4 algo at the moment:

std
my=std w/o centering
my2=separately consider up/down channels and use same math as "my"
my3=separately consider up/down channels use "distance" of maxima

eliminate bkg subtraction?

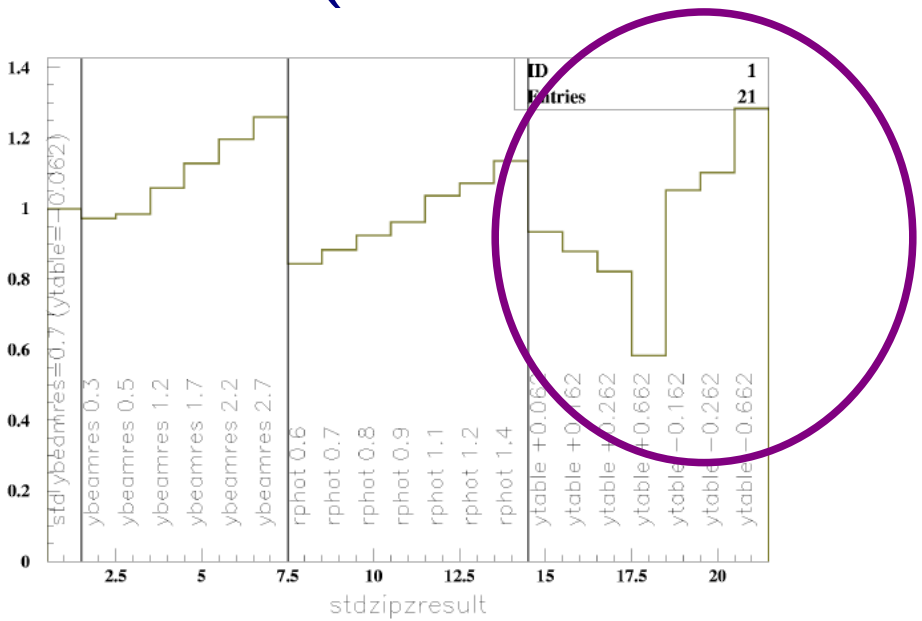


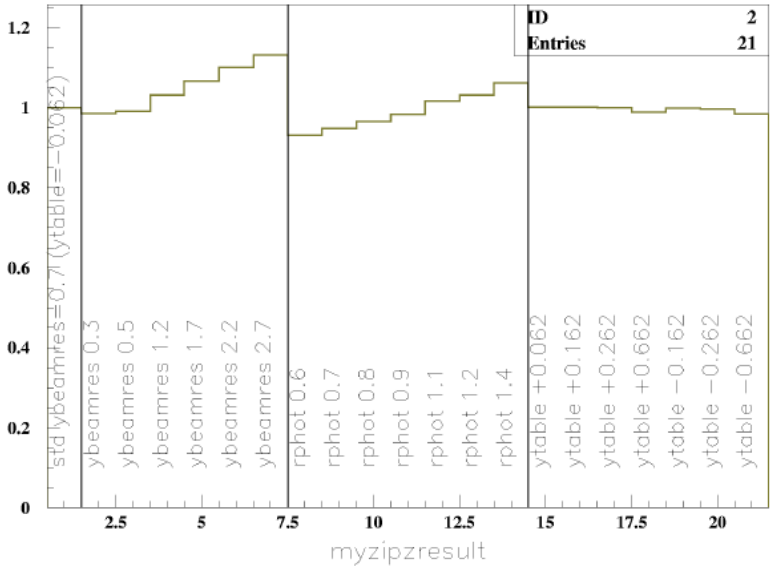
TPOL- IP distance (Blanka's MC)

std

my=std w/o centering

"std" case ==1





TPOL- focus (data)

4 algo at the moment:

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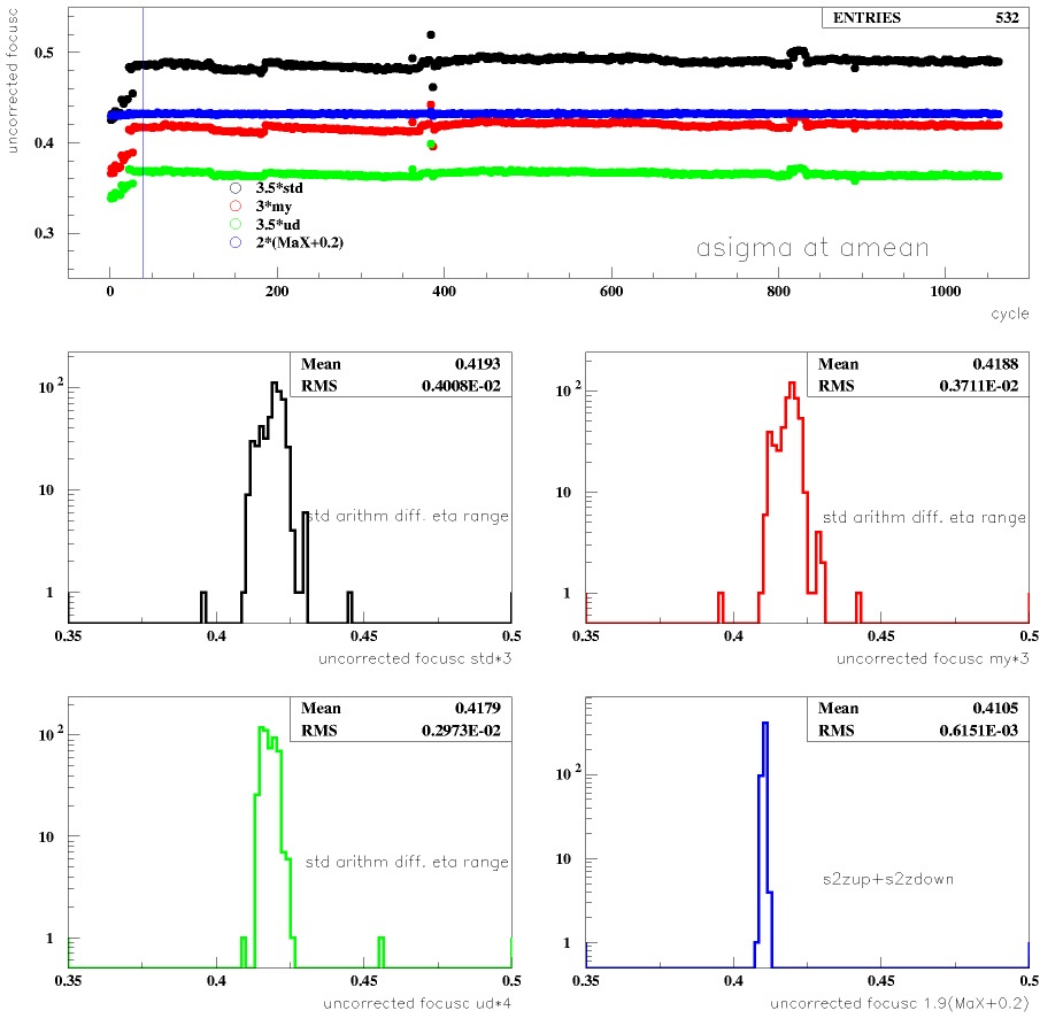
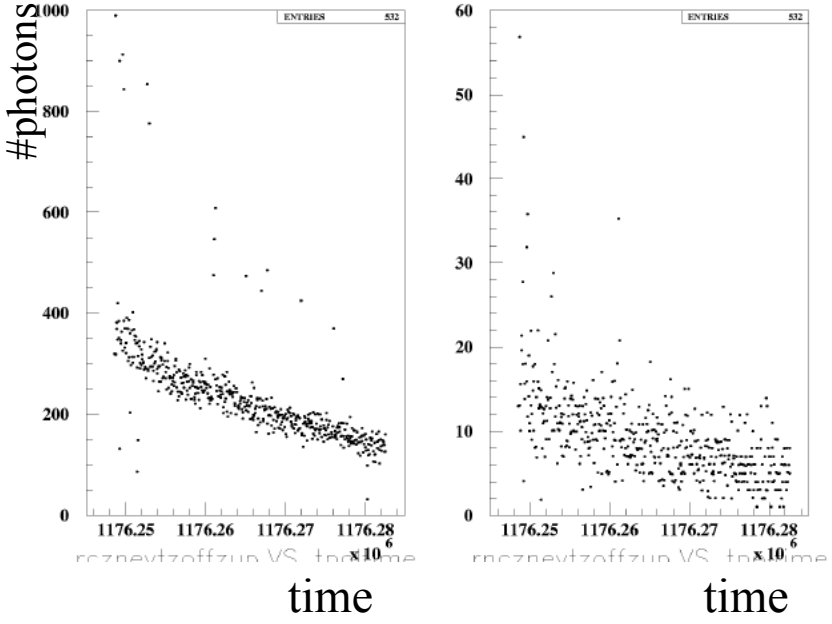
my3=separately consider up/down channels use "distance" of maxima

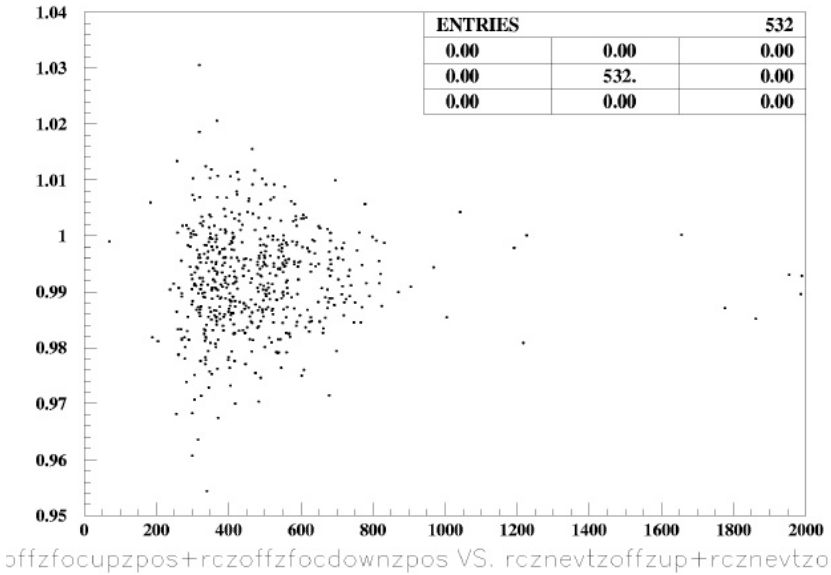


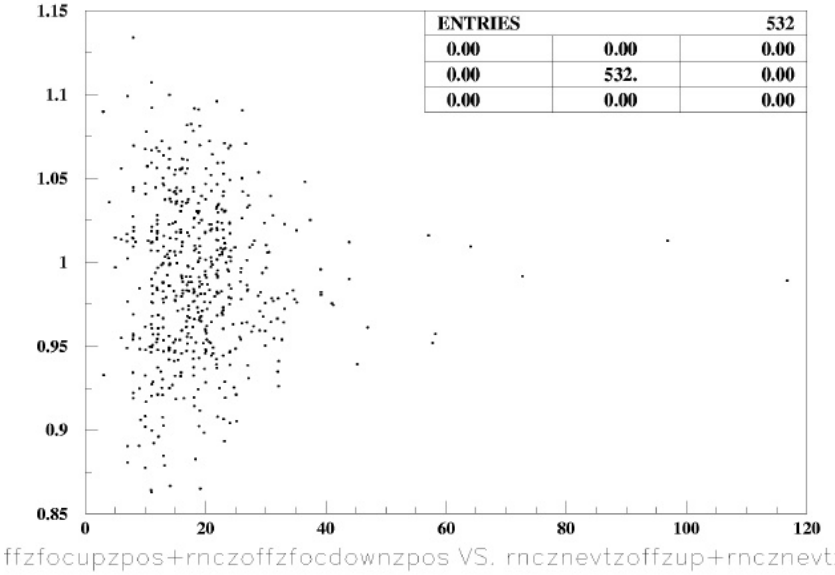
TPOL- focus (data 2)

photons in E- range
vs “position determination”

Brems (example)

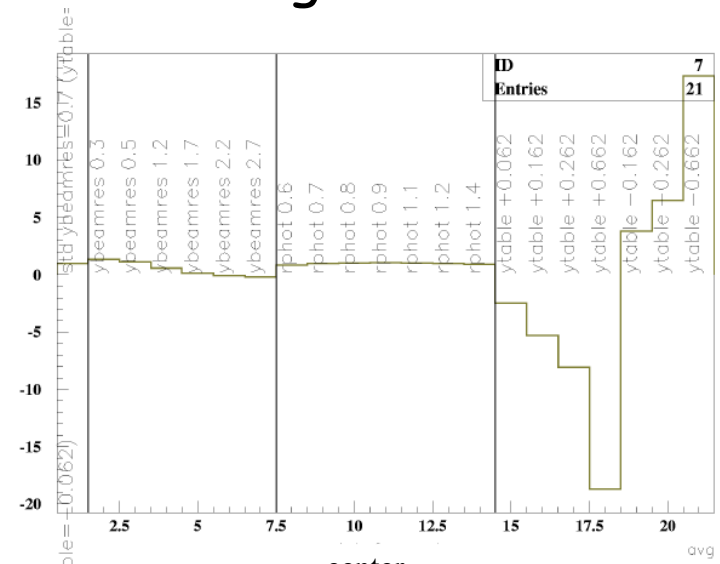




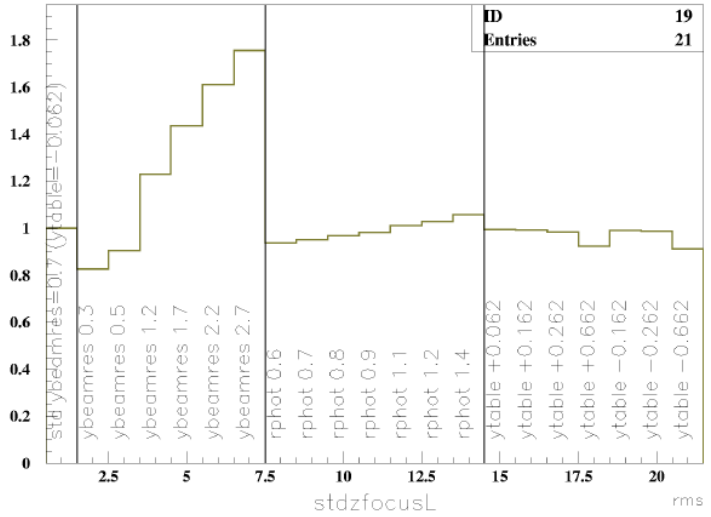


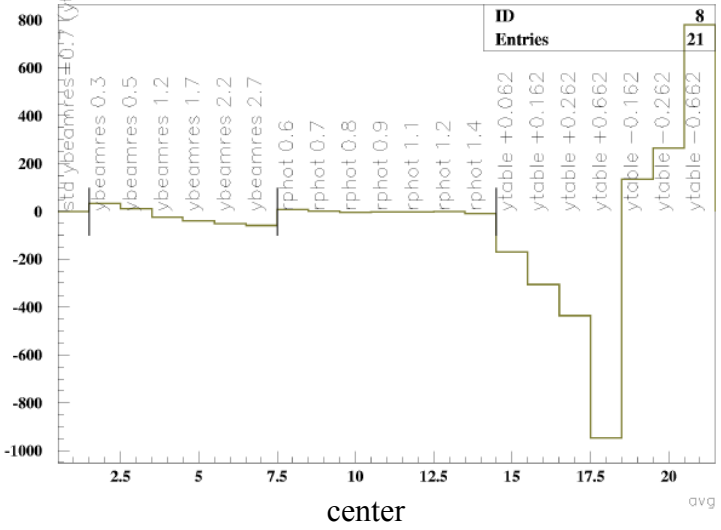
TPOL- spot- focus (Blanka's MC)

Std algorithm "std" case ==1

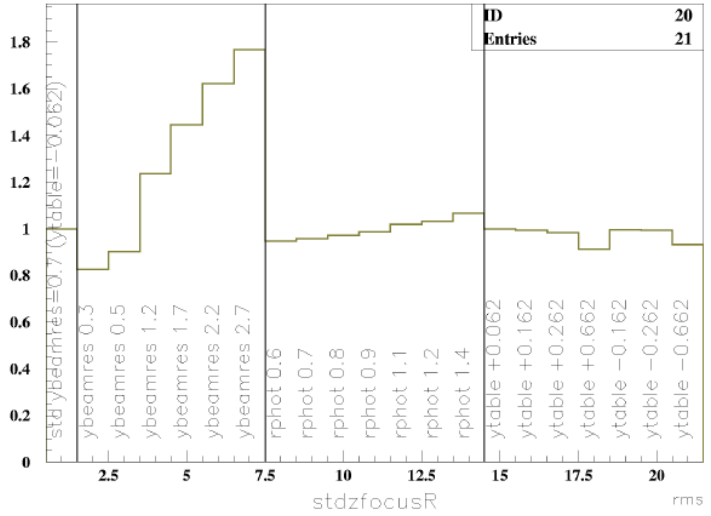


center





center

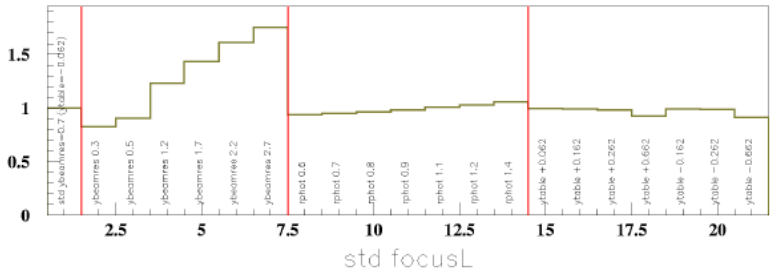


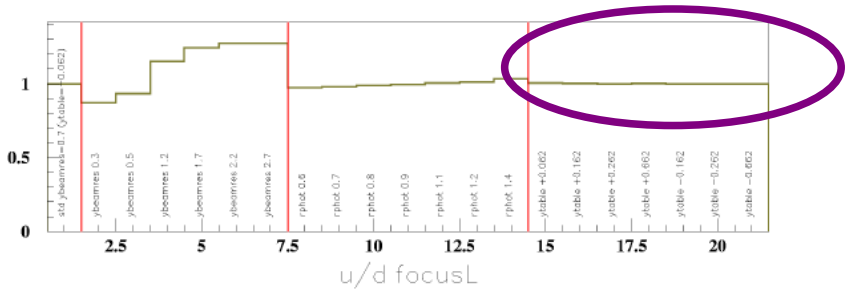
TPOL- focus (Blanka' s MC)

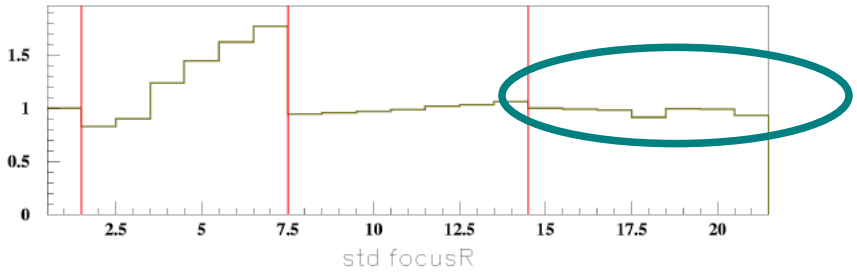
Std algorithm

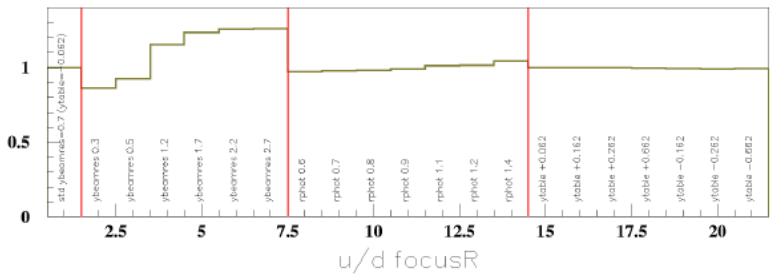
vs u/d algorithm

"std" case ==1







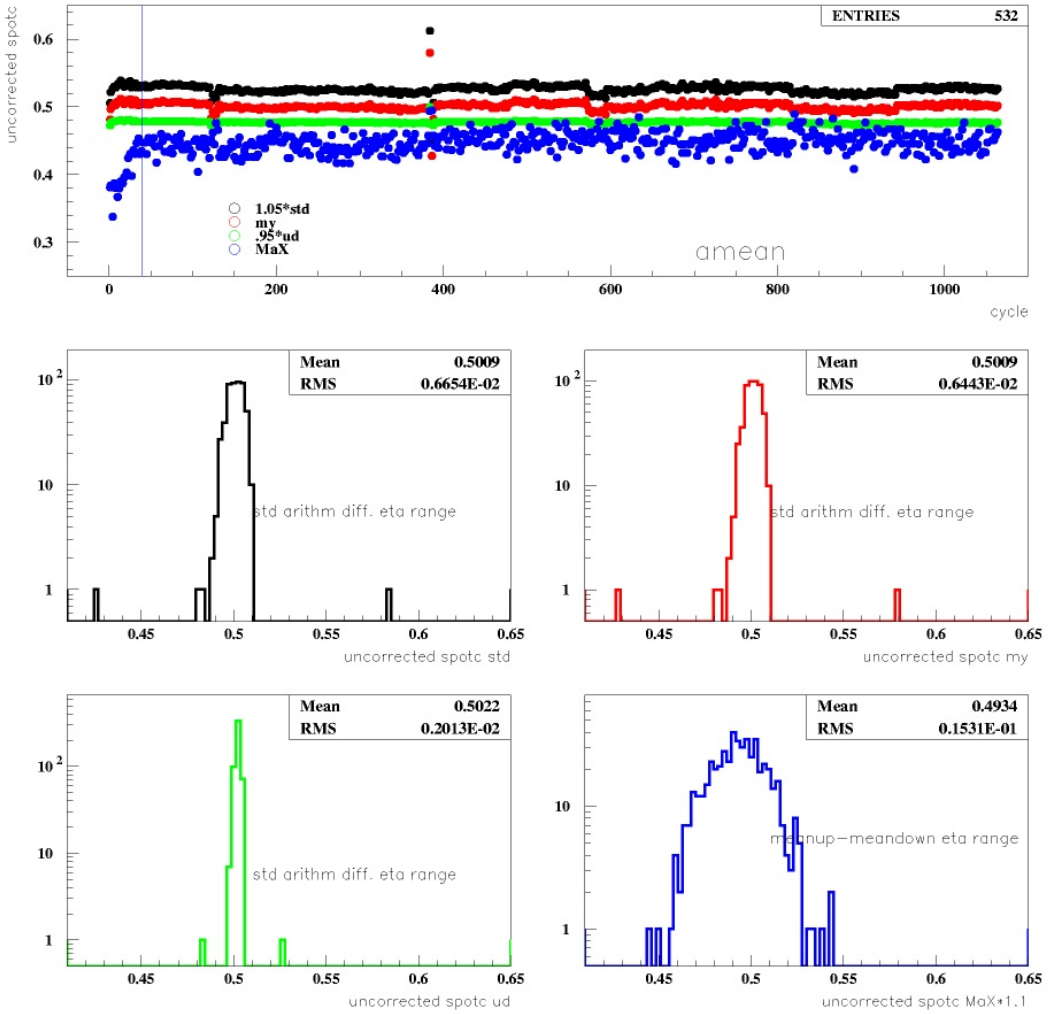


TPOL- spot (data)

4 algo at the moment:

std
my=std w/o centering
my2=separately consider
up/down channels and use
same math as "my"
my3=separately consider
up/down channels use
"distance" of maxima

eliminate bkg subtractior



What next

4 algo at the moment:

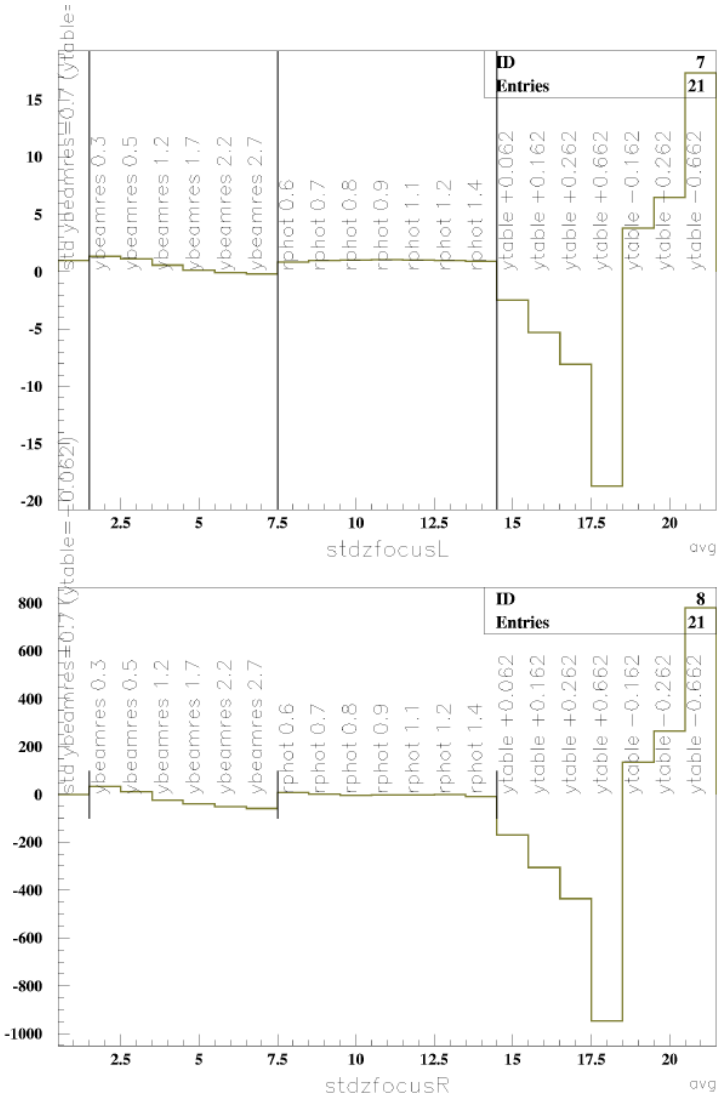
- do a bit of tune up,
- some "statistic" evaluation (with MC and data),
- decide which is best for what,
- try "something similar" as an estimator of the

"energy asymmetry"=$\langle\eta\rangle_L - \langle\eta\rangle_R$

TPOL- spot (Blanka' s MC)

4 algo at the moment:

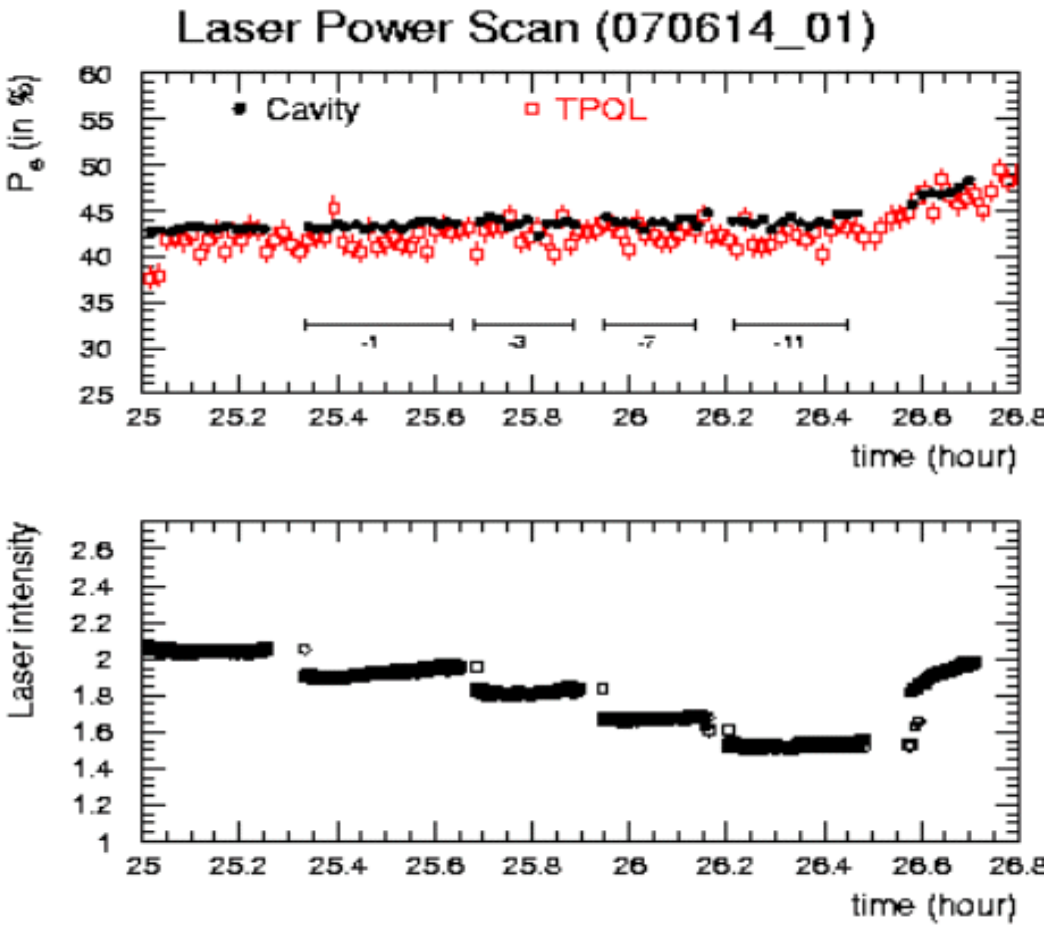
std
my=std w/o centering
my2=separately consider up/down channels and use same math as “my”
my3=separately consider up/down channels use “distance” of maxima



Laser power?

Power	$\langle P_e \rangle$ (%)
Standard	43.44 ± 0.05
-1	43.70 ± 0.04
-3	44.07 ± 0.05
-7	44.09 ± 0.05
-11	44.21 ± 0.05

➔ $\delta P_e \leq 0.37\%$



MOCO Position Scan?

Position (S_γ)	<P_e> (%)
1 (0.9936/- 0.9834)	51.48 ± 0.09
2 (0.9936/- 0.9909)	51.67 ± 0.08
3 (0.9973/- 0.9968)	51.12 ± 0.08
4 (0.9842/- 0.9968)	51.45 ± 0.08
5(default) (0.9957/- 0.9950)	51.23 ± 0.06

➔ δP_e ? 0.44%