Summary

Sensitivity and Schedule

T. Mori

Background and Sensitivity

	proposal	
δE_γ (%)	1.4 (2.0)	**4.0–4.5**
$\delta p_{\rm e}$ (%)	0.7	**0.7–0.9**
$\delta t_{{\rm e}\gamma}$ (nsec)	0.15	0.15
· $\delta t_{\rm e}$ (nsec)	0.1	0.1
· δt_γ (nsec)	0.1	0.1
· δz_γ (mm)	16	**16–18**
$\delta\theta_{{\rm e}\gamma}$ (mrad)	12 (14)	**17–20.5**
· $\delta\theta_{\rm e}$ (mrad)	9	**9–12**
· $\delta d_{\rm e}$ (mm)	2.1	**2.1–2.5**
· δx_γ (mm)	4 (7)	**9–10.5**
$\Omega/4\pi$	0.09	0.09
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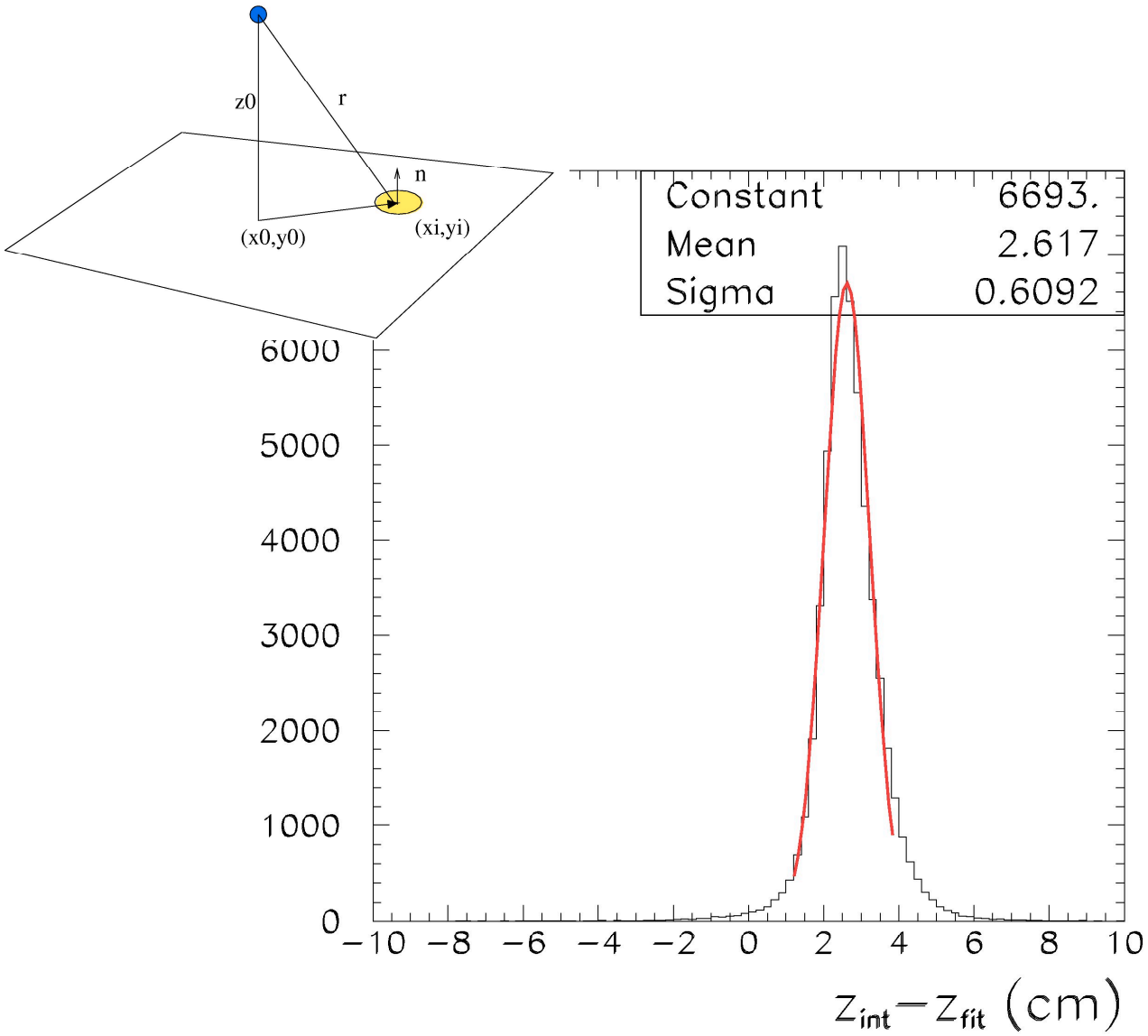
S_{90}	2.9×10^{-14}	$(1.0–1.6)\times10^{-13}$

14

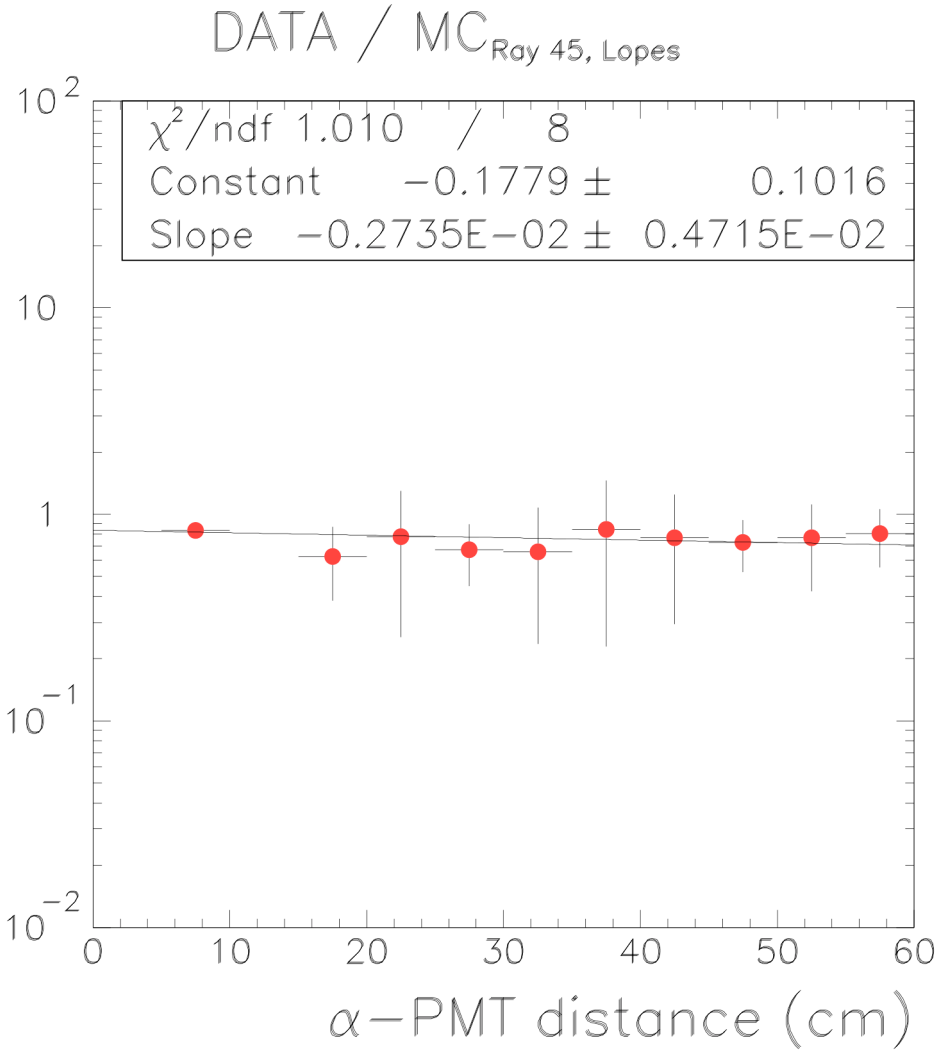
17 - 28 times worse sensitivity, 30% poorer acceptance

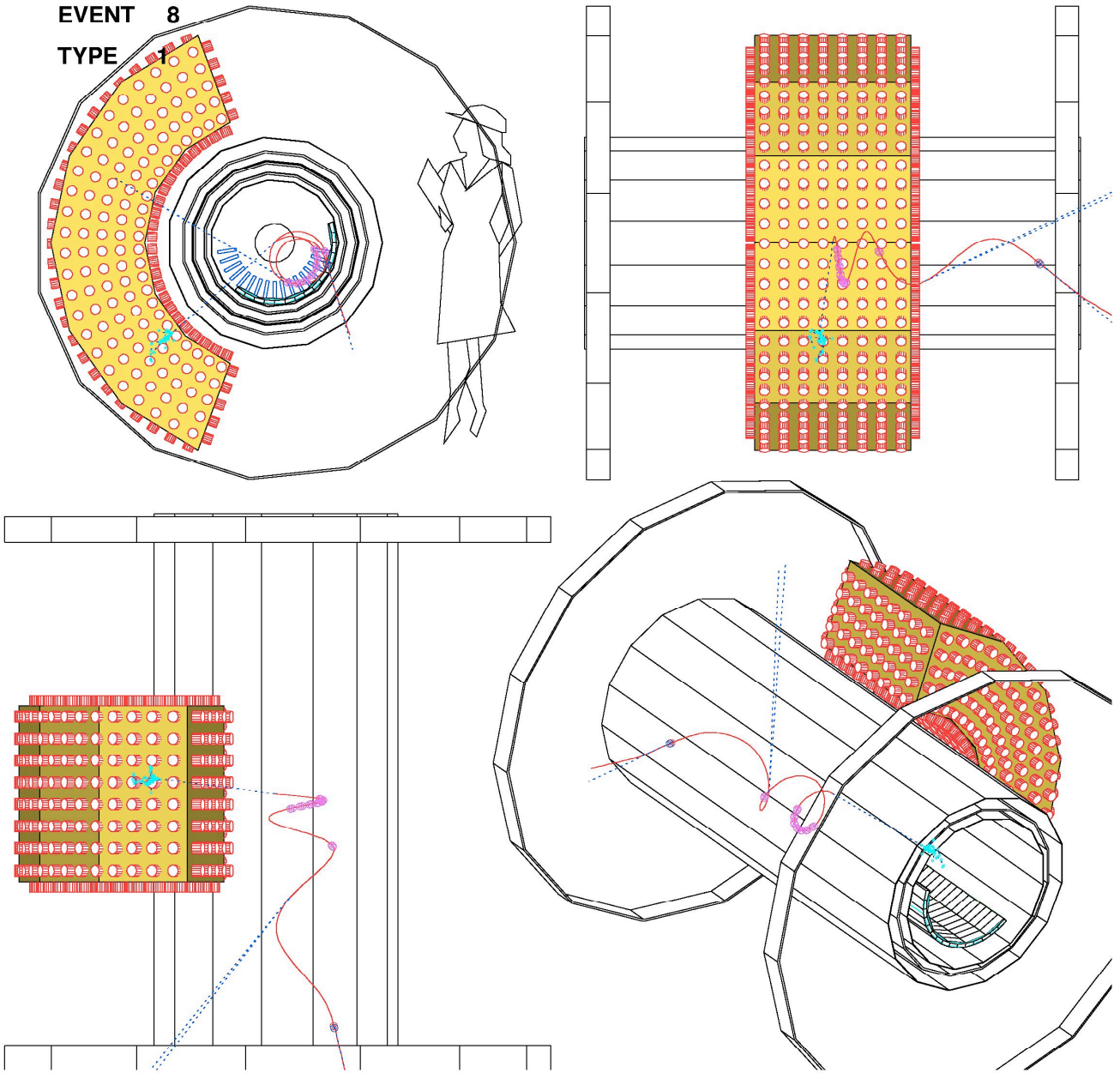

z0
r
n
(x0,y0)
(xi,yi)
Constant 6693.
Mean 2.617
Sigma 0.6092
6000
5000
4000
3000
2000
1000
0
−10 −8 −6 −4 −2 0 2 4 6 8 10
$z_{int} - z_{fit}$ (cm)

We anticipate further improvements in the detector performance:

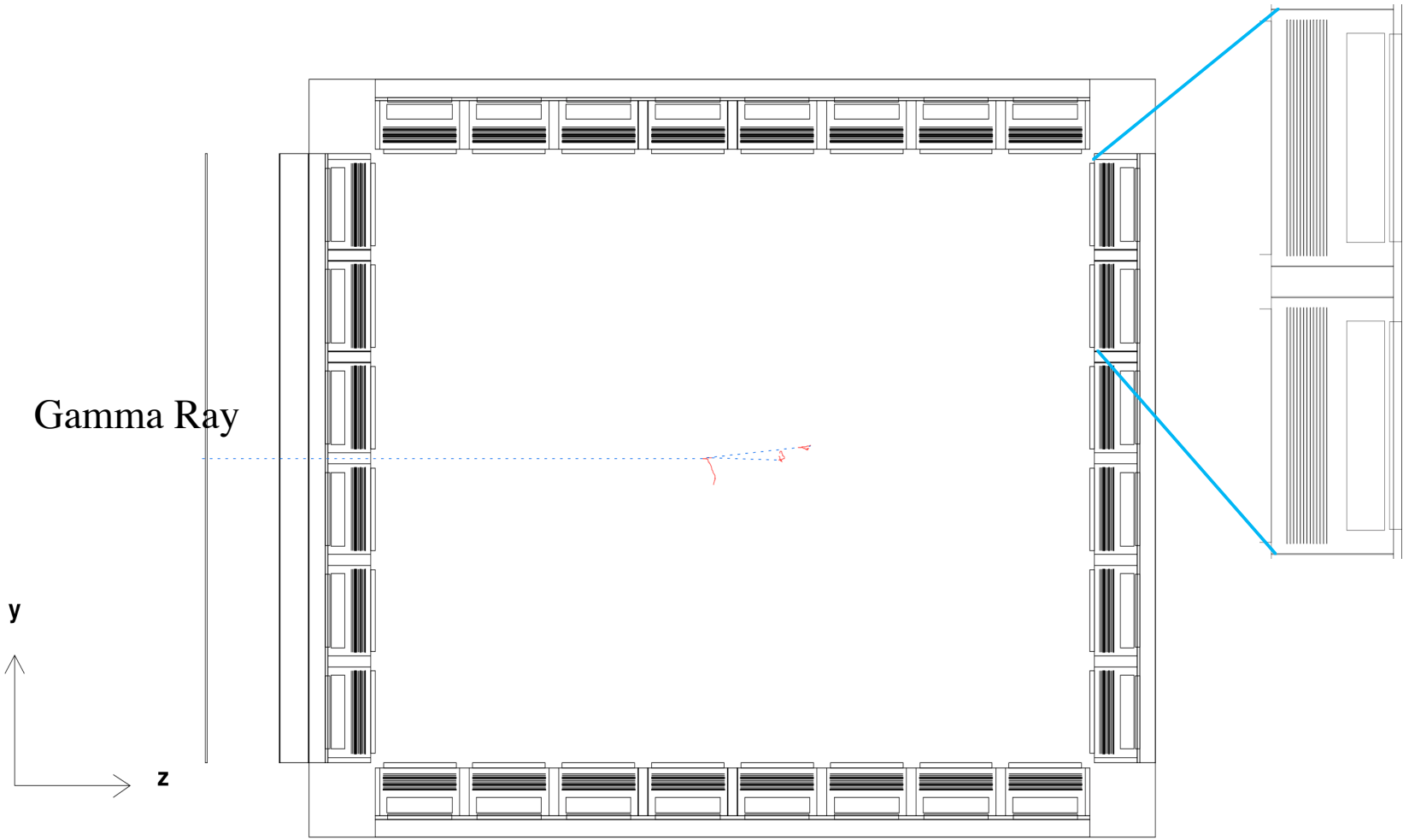
- absorption length of 100cm assumed
- present PMTs assumed
- no elaborate optimization of detector configuration has been made
- reconstruction methods are not sophisticated enough

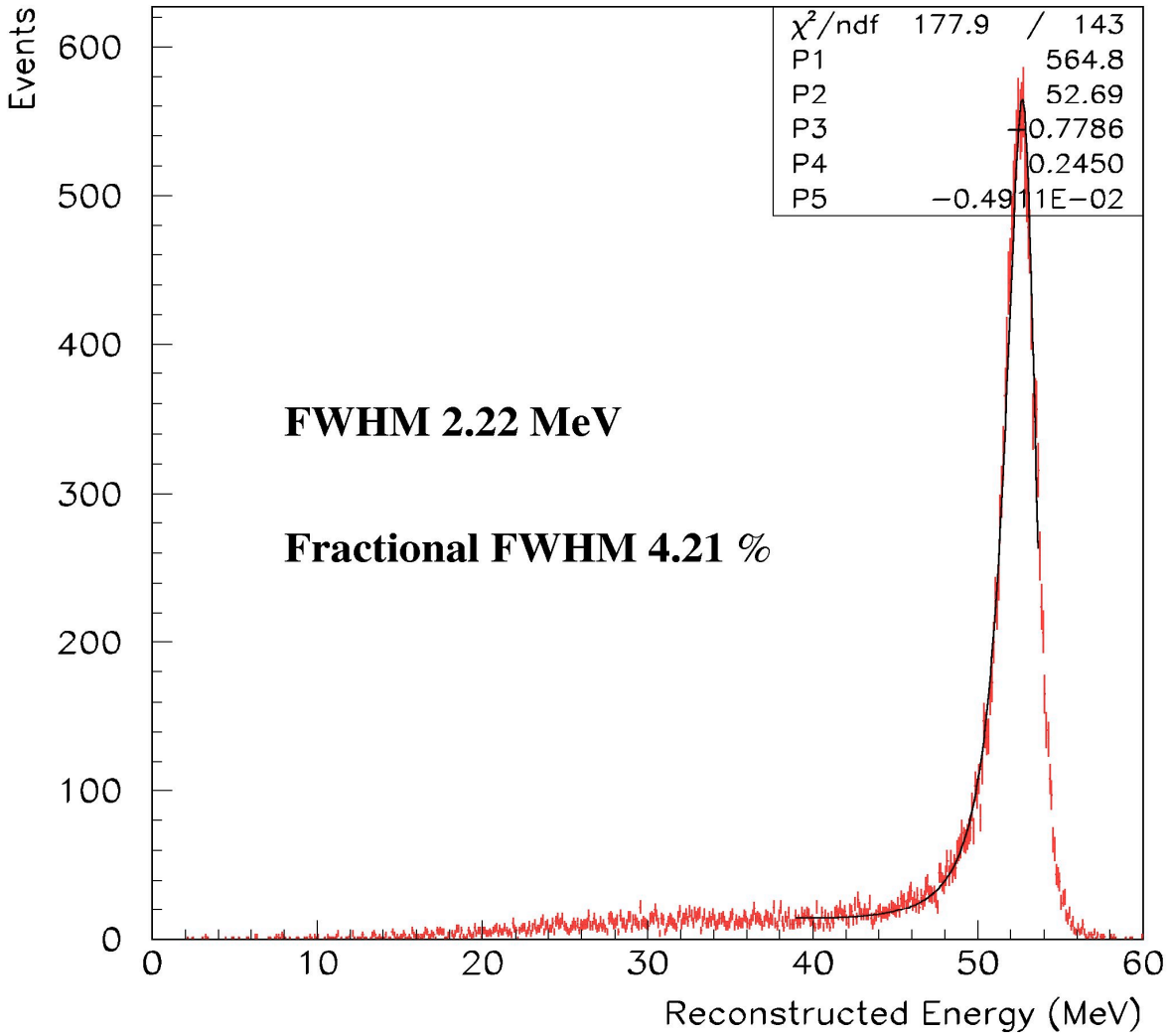
Absorption length of 100cm achieved

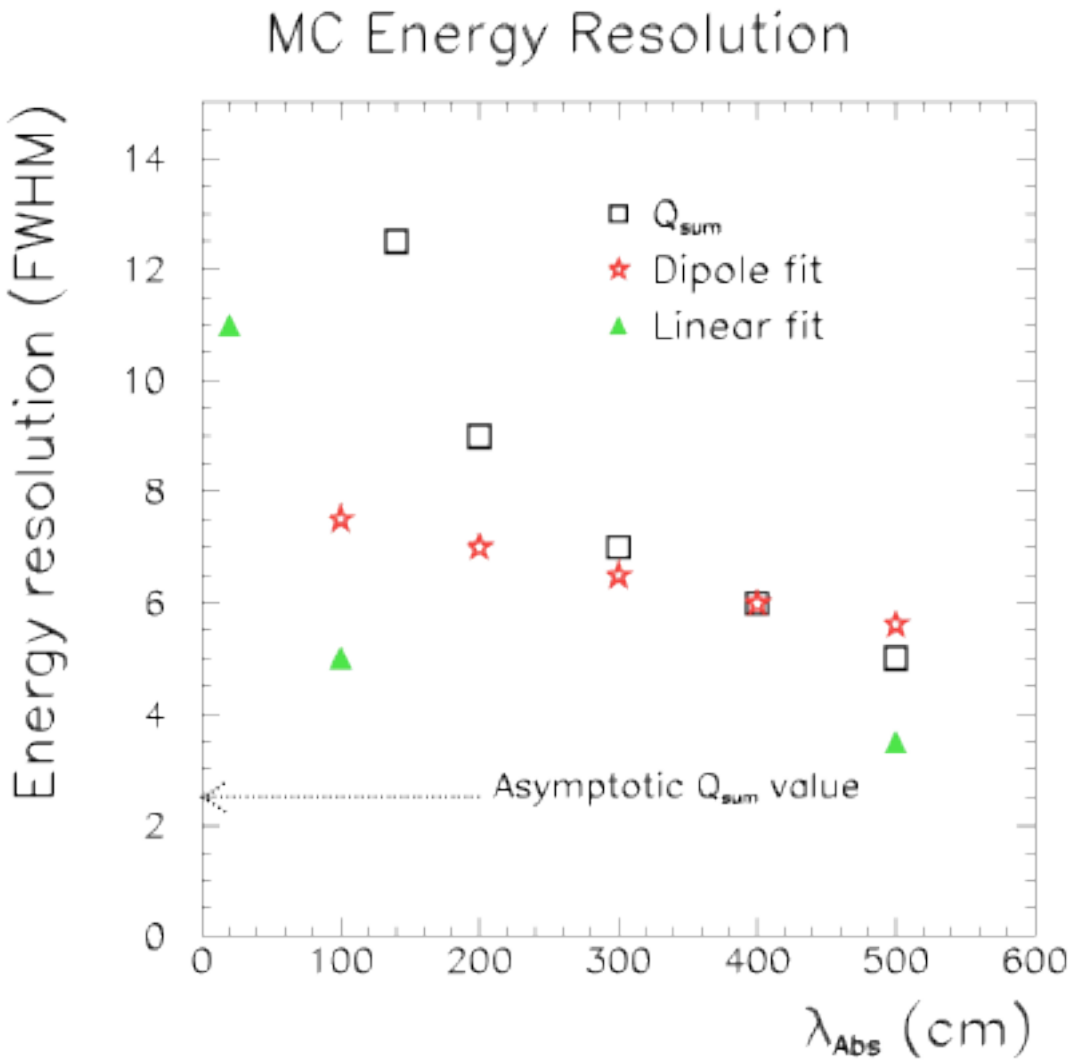



EVENT 8
TYPE 1

Simulation of the Photon Detector




Events
600
500
400
300
200
100
0
0
10
20
30
40
50
60
Reconstructed Energy (MeV)
χ²/ndf 177.9 / 143
P1 564.8
P2 52.69
P3 0.7786
P4 0.2450
P5 −0.4911E−02
FWHM 2.22 MeV
Fractional FWHM 4.21 %


MC Energy Resolution
Energy resolution (FWHM)
14
12
10
8
6
4
2
0
0
100
200
300
400
500
600
λ_{Abs} (cm)
Q_{sum}
Dipole fit
Linear fit
Asymptotic Q_{sum} value

	proposal	
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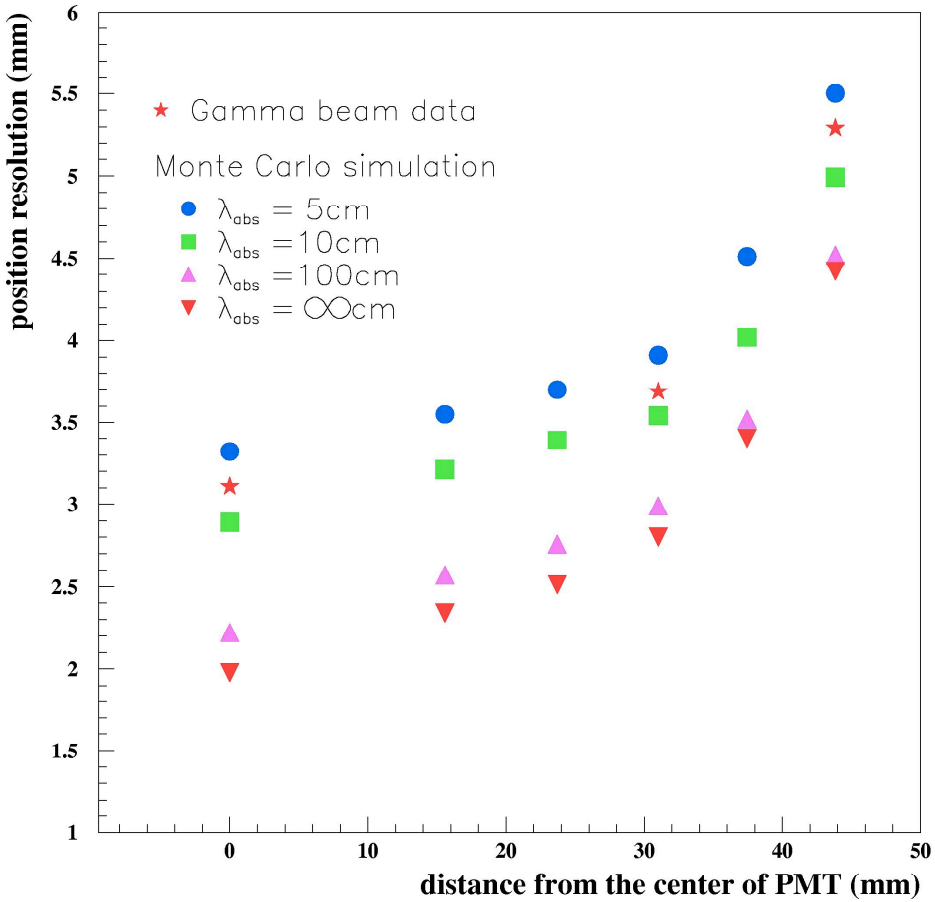
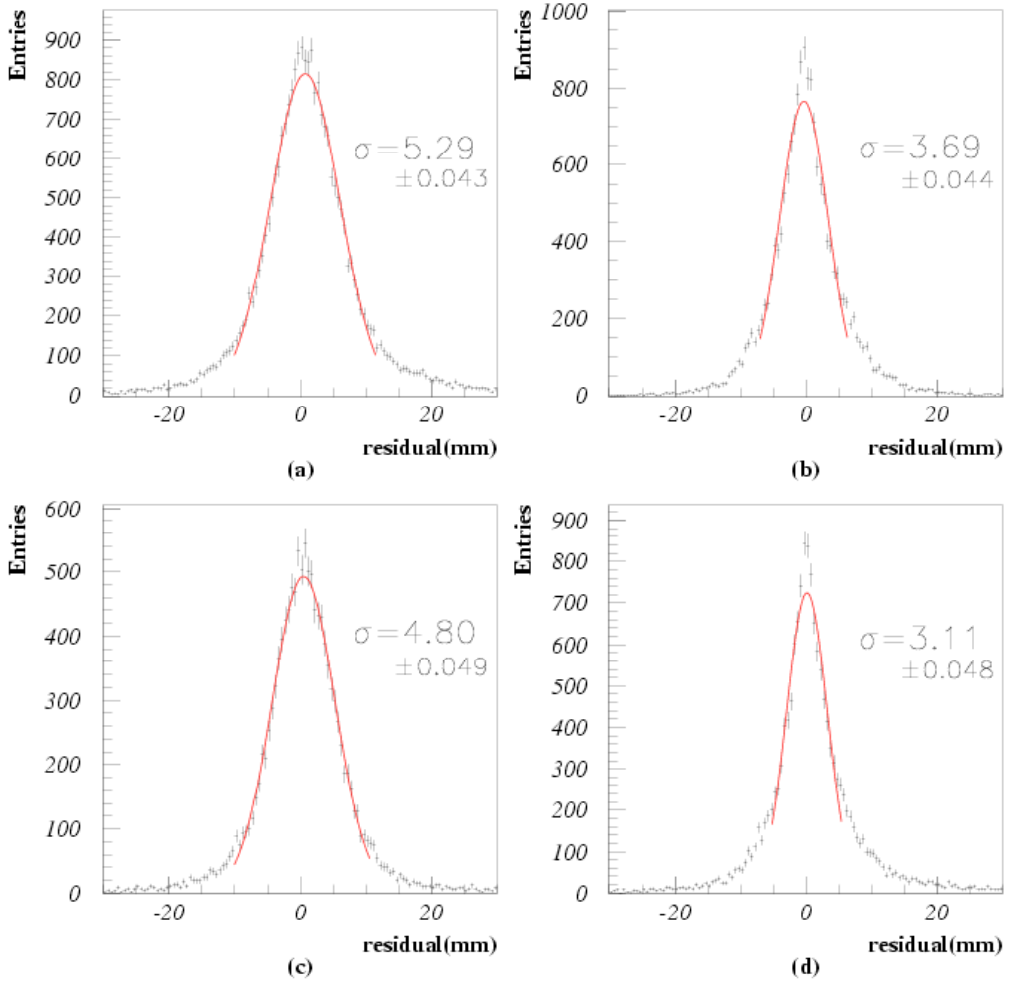

position resolution (mm)
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0
10
20
30
40
50
distance from the center of PMT (mm)
Gamma beam data
Monte Carlo simulation
λabs = 5cm
λabs =10cm
λabs =100cm
λabs = ∞cm


Entries
σ=5.29
±0.043
residual(mm)
(a)
Entries
σ=3.69
±0.044
residual(mm)
(b)
Entries
σ=4.80
±0.049
residual(mm)
(c)
Entries
σ=3.11
±0.048
residual(mm)
(d)

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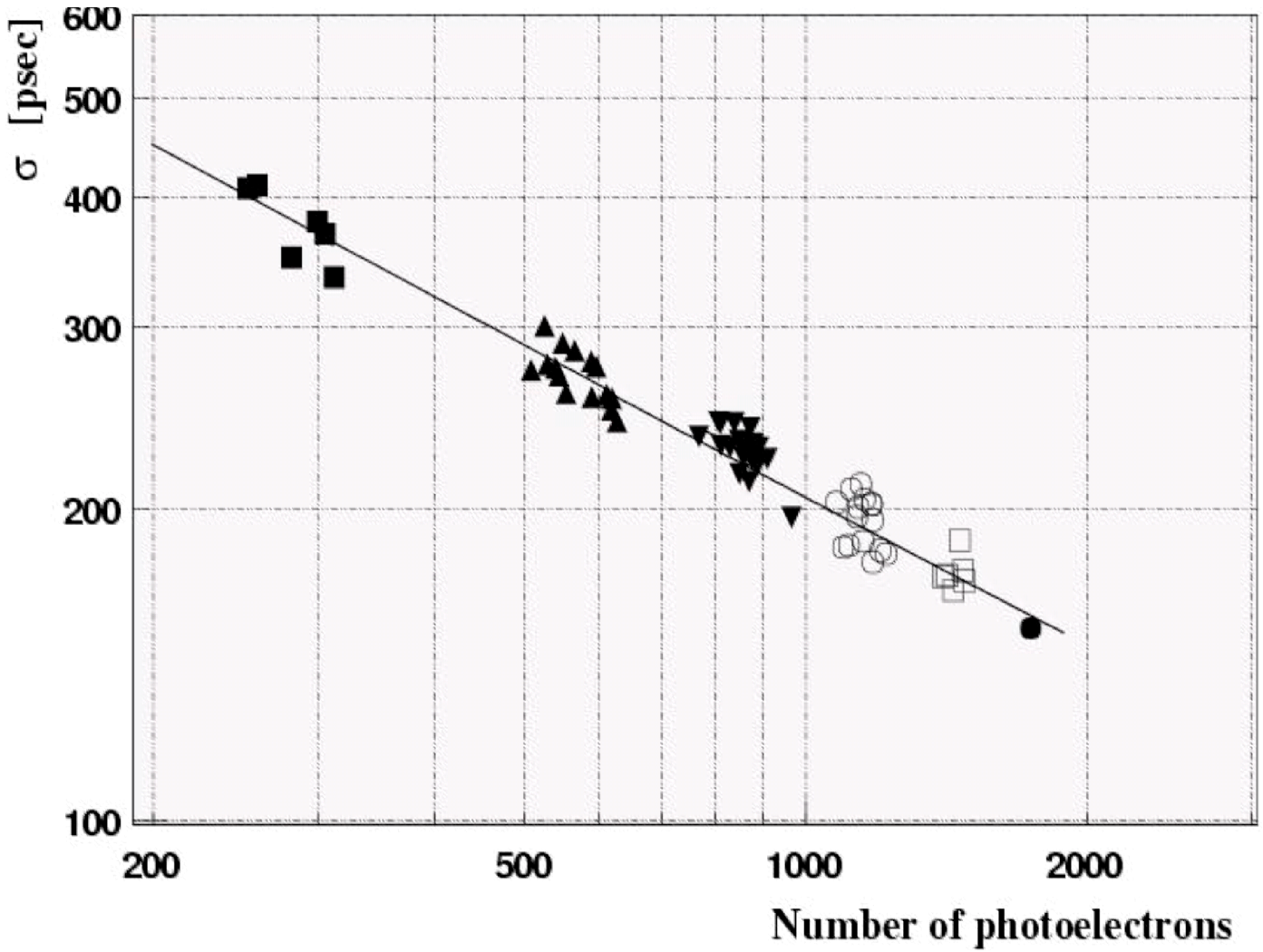
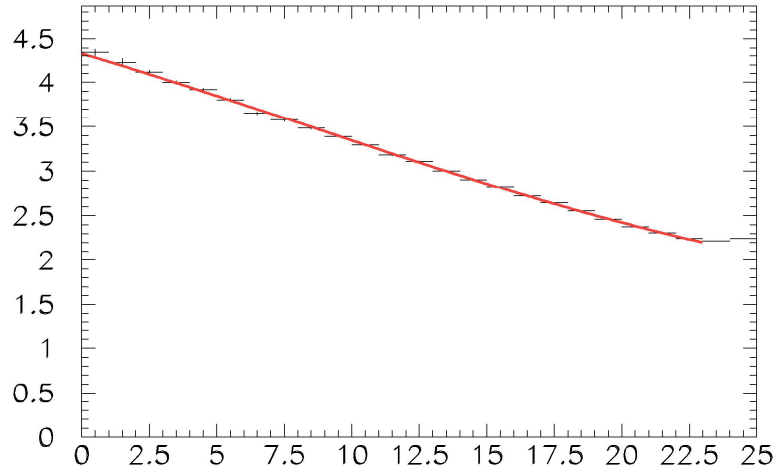
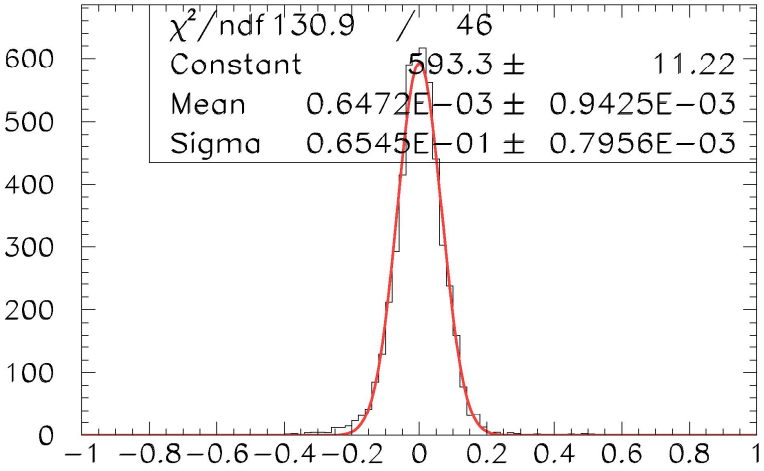
Small Prototype Tests







Conversion Point Resolution

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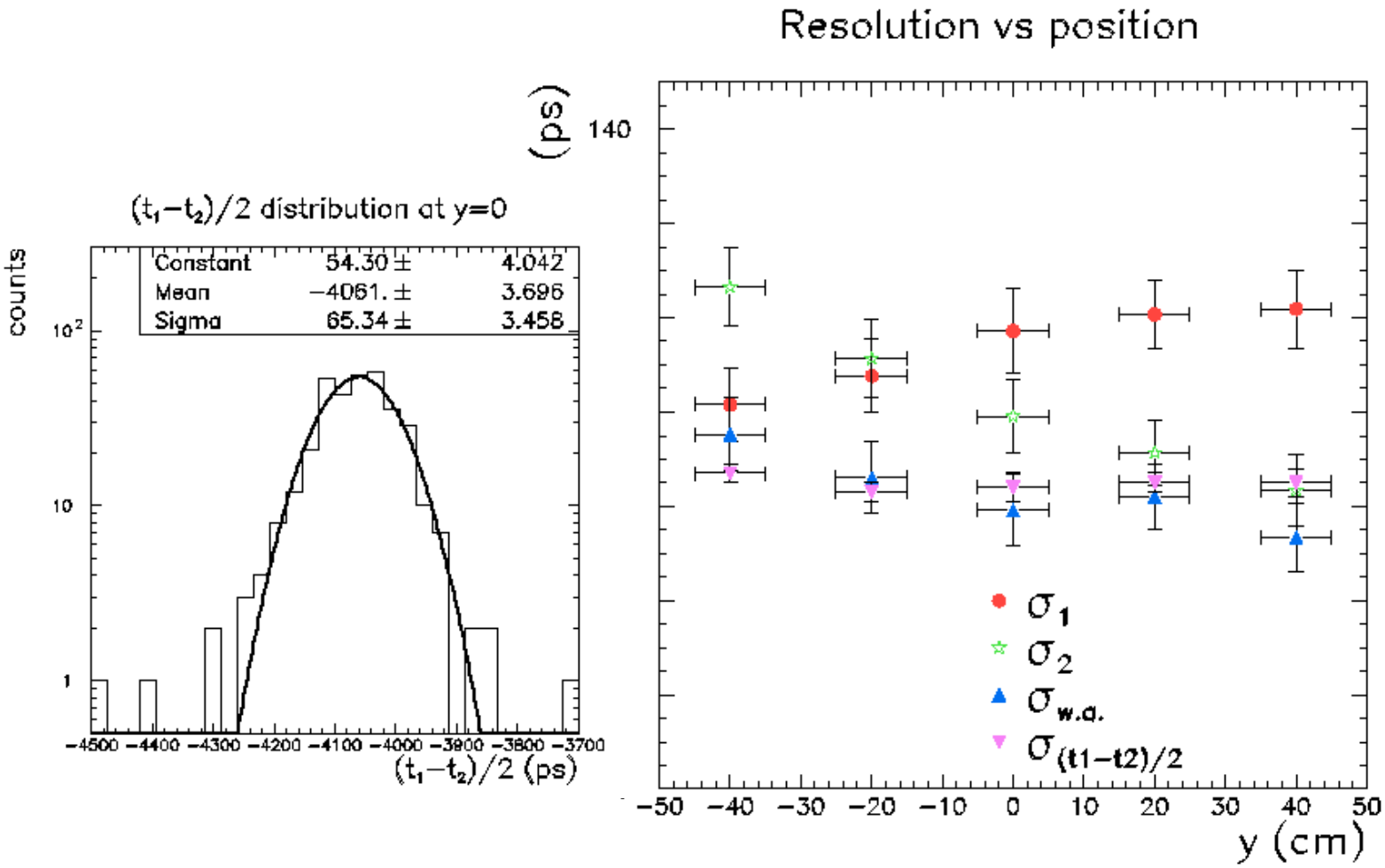
- E > 5 MeV energy deposit on adjacent
- -cells to achieve 100 ps FWHM resolution



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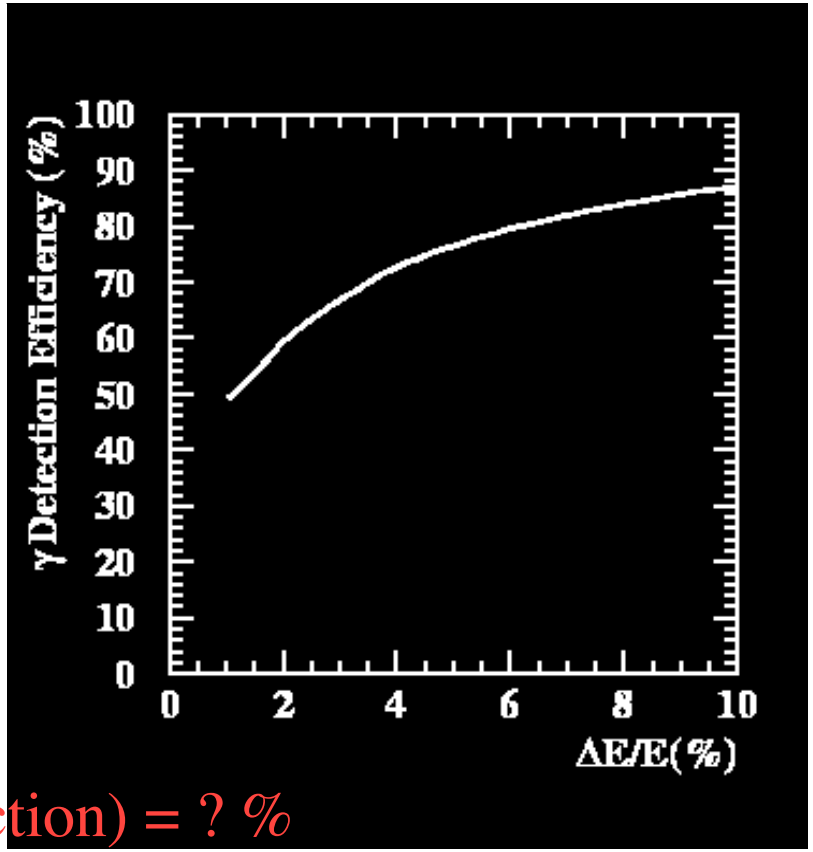
□(□) = 60%

Detector		Radiation thickness X_0
Magnet	Coil	0.153
	Cryostat	0.048
Photon Detector	Outer wall	0.03
	Honeycomb	0.068
	PMT+holder	0.21
Total		0.482



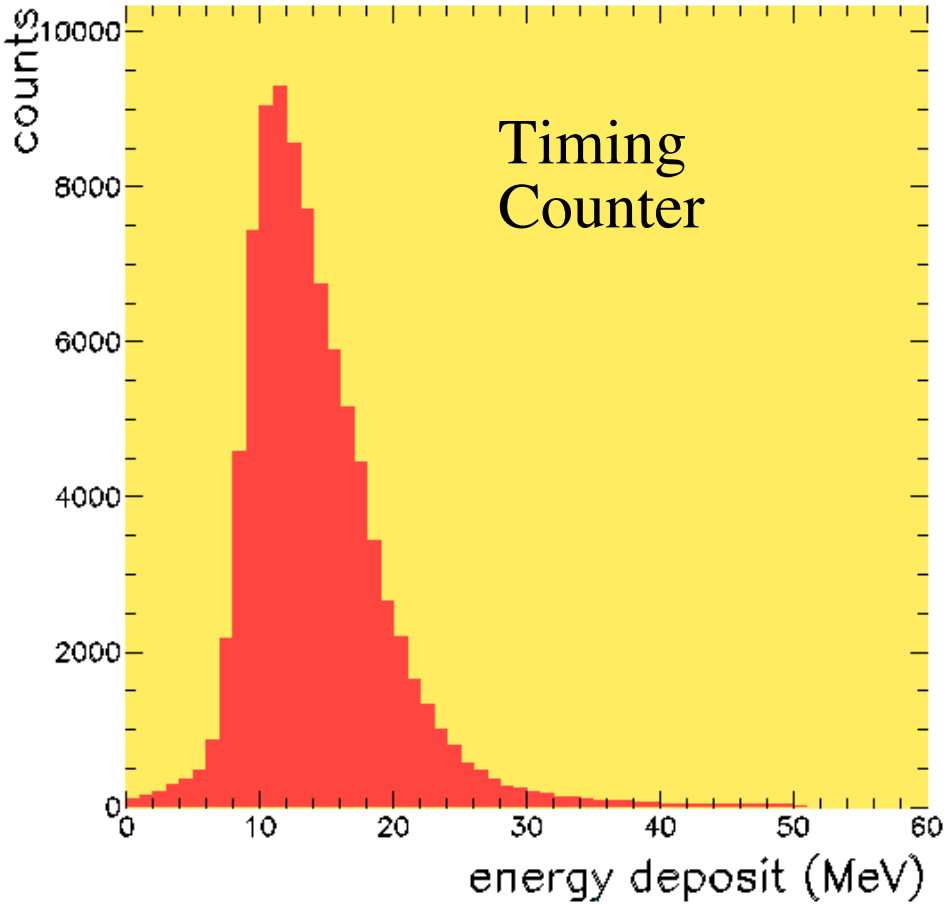
□(reconstruction) = ? %

□(e+) = 90%

□(trig) > 97%

□(100ps)=94%
□(140ps)=99%

□(tracking)= ?%



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Schedule

Obtain the Result (Discovery or Limit):

Before the LHC Experiments (>2007)

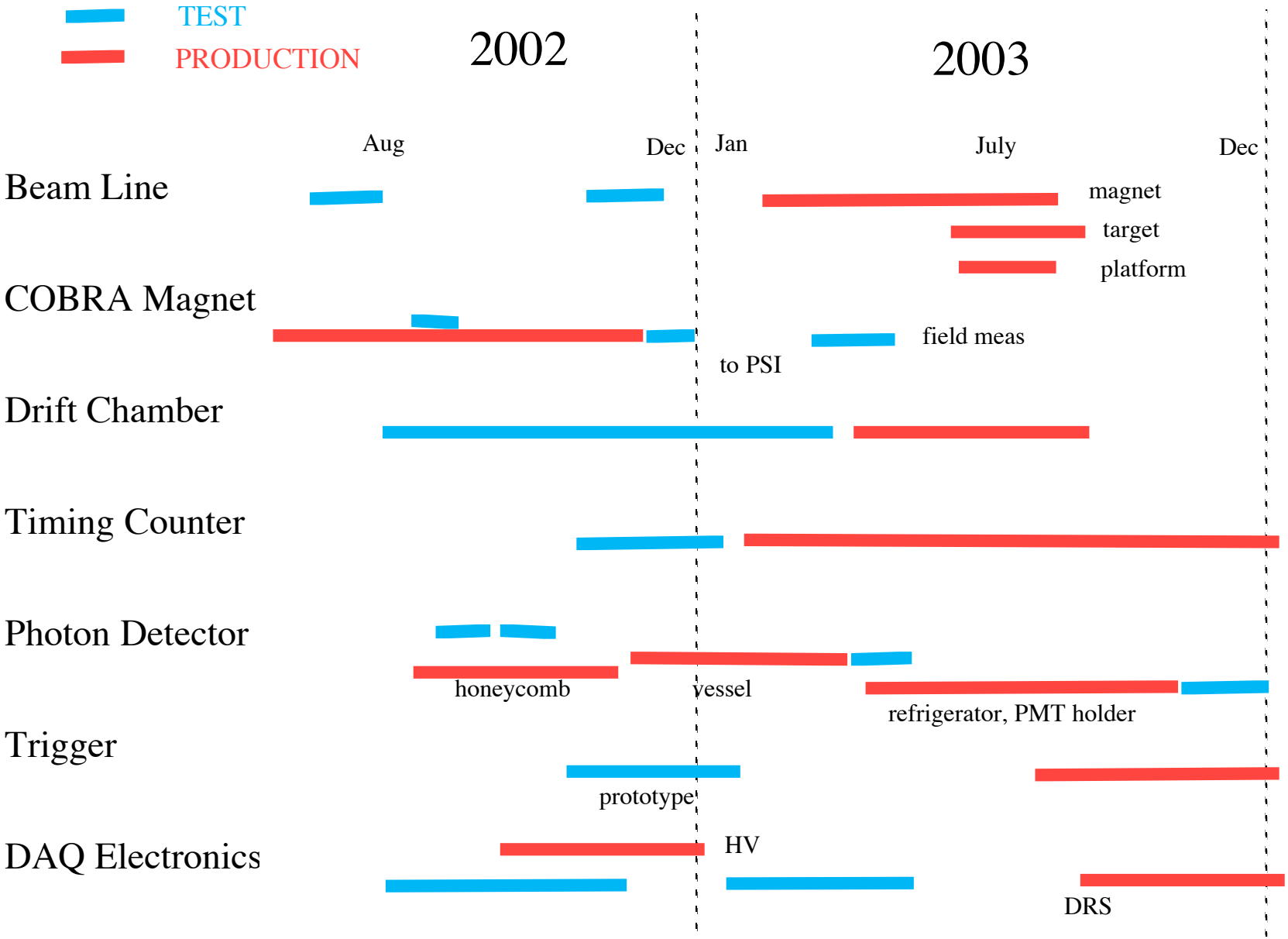
and

Before the MECO Experiment
(still waiting to be funded)

We foresee:

- Start beam tuning with the COBRA toward the end of 2003
- Engineering runs to start in 2004

Depends on budget approval


TEST
PRODUCTION
2002
2003
Aug
Dec
Jan
July
Dec
Beam Line
magnet
target
platform
COBRA Magnet
field meas
to PSI
Drift Chamber
Timing Counter
Photon Detector
honeycomb
vessel
refrigerator, PMT holder
Trigger
prototype
DAQ Electronics
HV
DRS

Requests to PSI

Understanding a new postdoc will be appointed to work on the DC this fall, we request the PSI:

- to support at least 2 students from outside institutes to stay at PSI, and
- to secure a budget of order of $1.3M so that the collaboration can proceed and complete the construction of the detectors in a timely fashion.

Conclusion