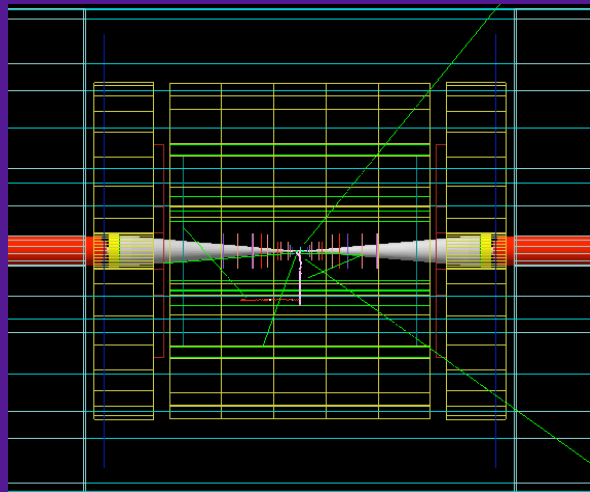


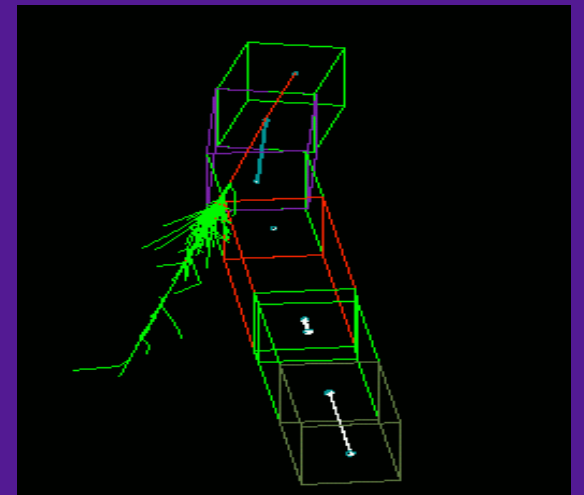
Background in the detector from beam losses in the extraction line

ILC software meeting
LAL Orsay 05/07



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<http://flc-mdi.lal.in2p3.fr/>



Contents

- Introduction
- Methodology with an example
- Conclusion & prospects
- Few words on Desktop Grid

Introduction

In spite of all the attention put into the design of the extraction line, the losses of some :

- disrupted beam particles,
 - or synchrotron radiation photons
- are **unavoidable**

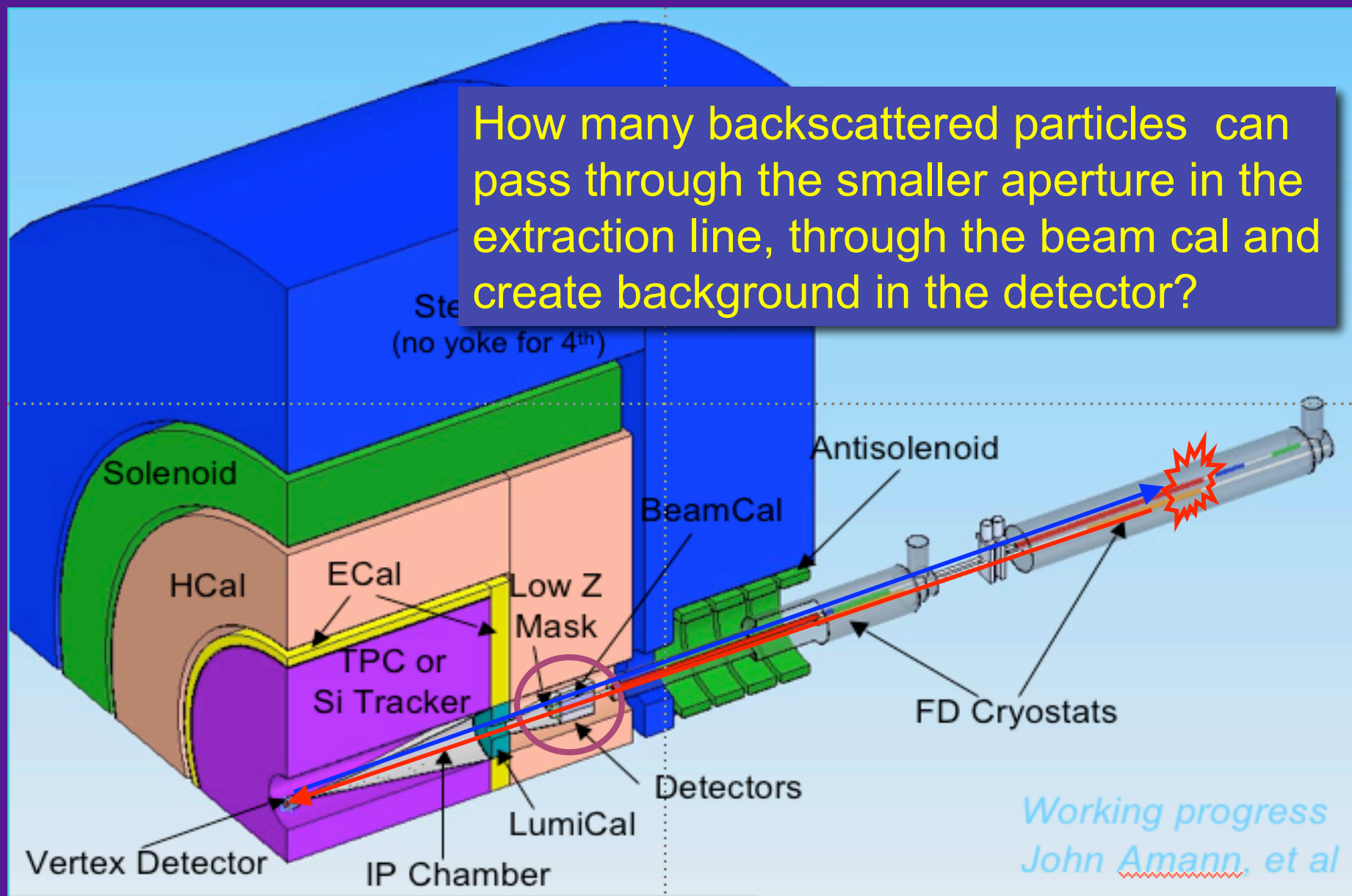
background sources at the IP

(several other sources: beamstrahlung, e^+e^- pairs, radiative Bhabhas, backscattered particles from the dump ...)

We would like to quantify the number of such backscattered particles, for the different extraction lines and different concept detectors

Generic Detector

How many backscattered particles can pass through the smaller aperture in the extraction line, through the beam cal and create background in the detector?

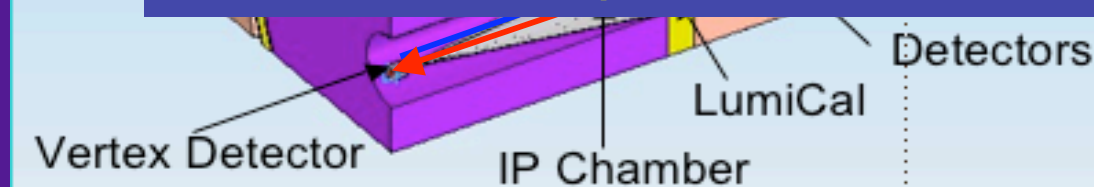


Working progress
John Amann, et al

Generic Detector

How many backscattered particles can pass through the smaller aperture in the extraction line, through the beam cal and create background in the detector?

1. Beam beam simulation using GuineaPig++:
disrupted beam, pairs ...
2. GP output as an input for BDSIM:
simulation of secondary particles in the extraction
3. BDSIM output as an input for Mokka:
detector response for those secondary particles



Working progress
John Amann, et al

GuineaPig++ output data files

GuineaPig++ (*<https://trac.lal.in2p3.fr/GuineaPig>) version can take a random seed generator in argument:

`rndm_seed` in `acc.dat`, that allows you to send GuineaPig++ grid

We stored very high static ($>12 \cdot 10^6$ Macro Particles simulated: disrupted, compton, ...) with the new beam parameters for 500 GeV and 1 TeV machine (total ~ 65 Go)

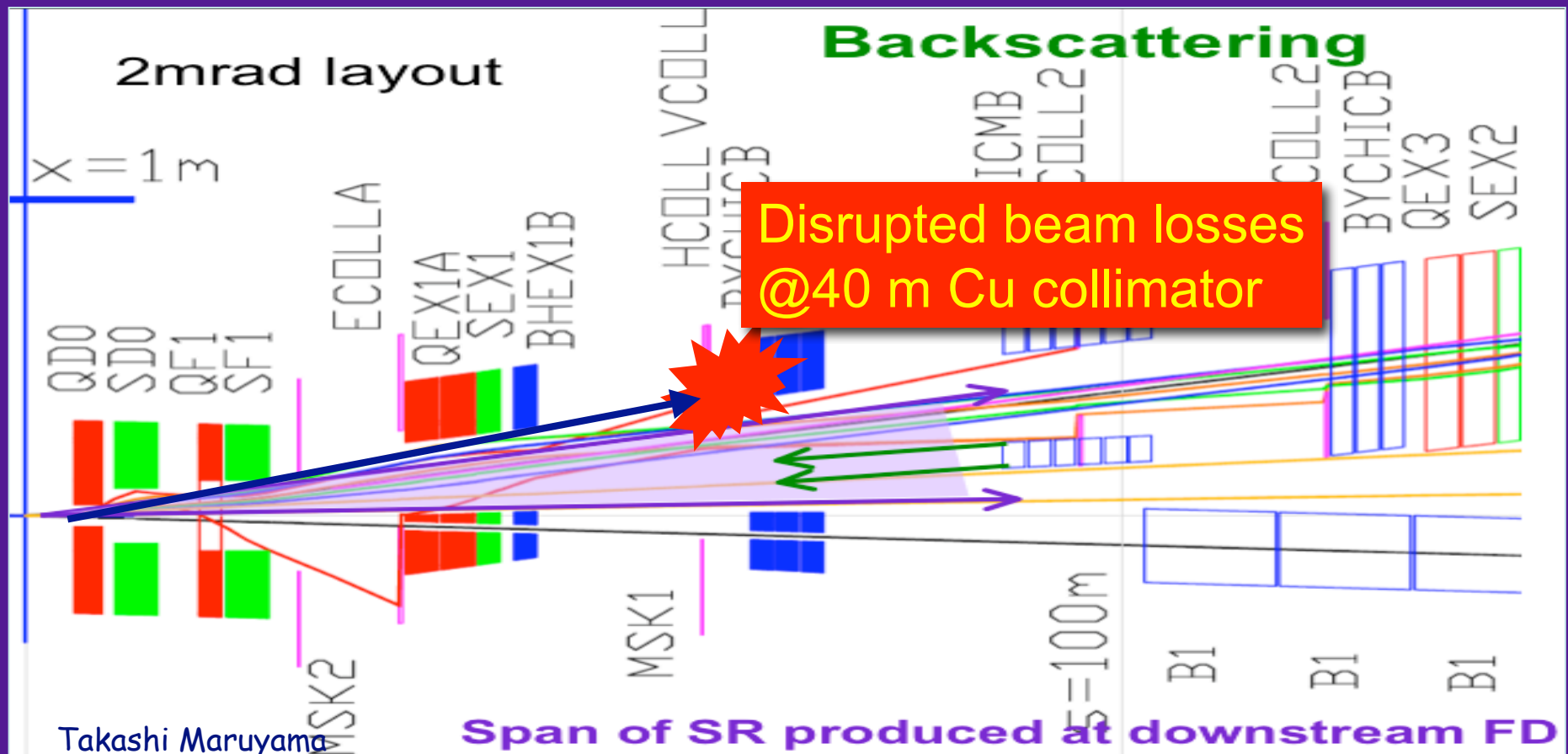
Data output can be found:

- On SE :
 - `/grid/ilc/DADOUN/GuineaPig++_DATA`
- On LAL ftp server :
 - <http://flc-mdi.lal.in2p3.fr/spip.php?rubrique17>

Methodology:

2mrad crossing angle as example

In the 2mrad scheme, the beam goes off axis through the first magnets of the incoming final focus beam (the beam passes off axis at QD0 and sees the coil pocket of QF1)

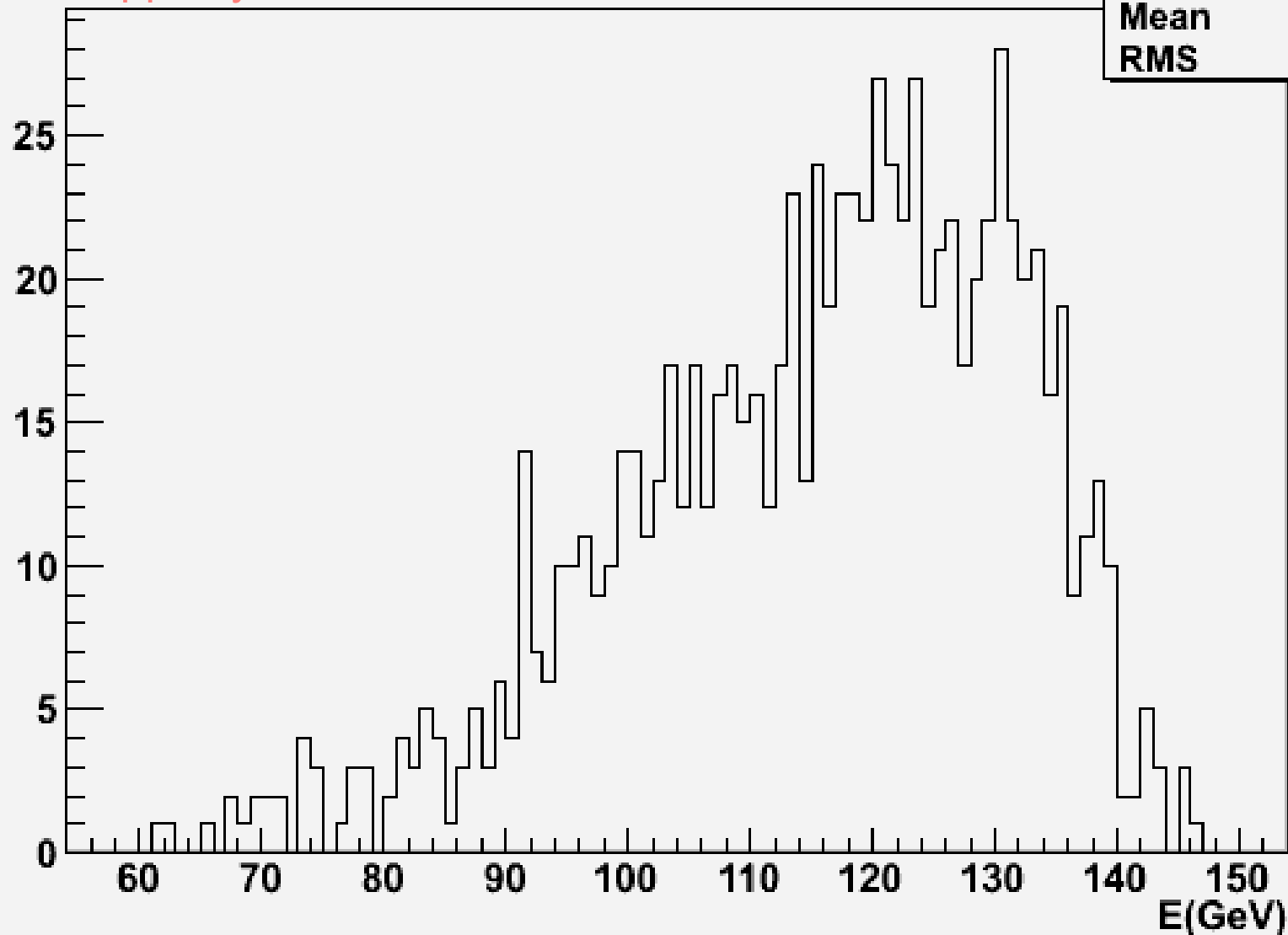


2mrad disrupted beam losses at Cu collimator (630K initial beam, 12kW power loss @ 40m)

Robert Appleby

high luminosity head-on parameter set

htemp	
Entries	899
Mean	115.5
RMS	16.04

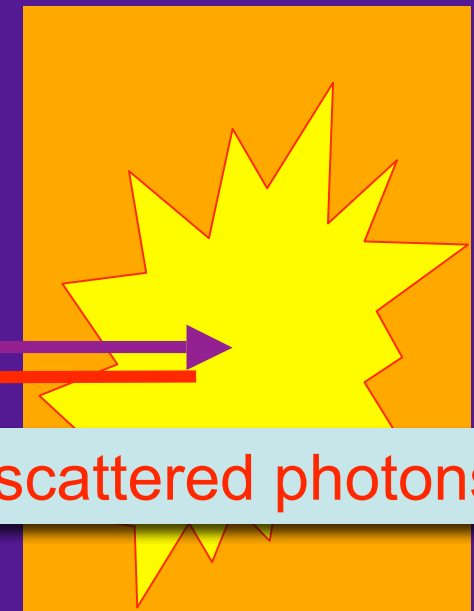
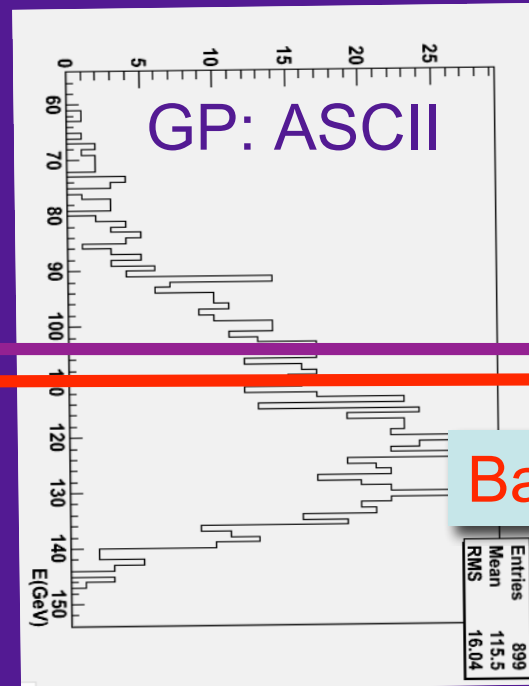
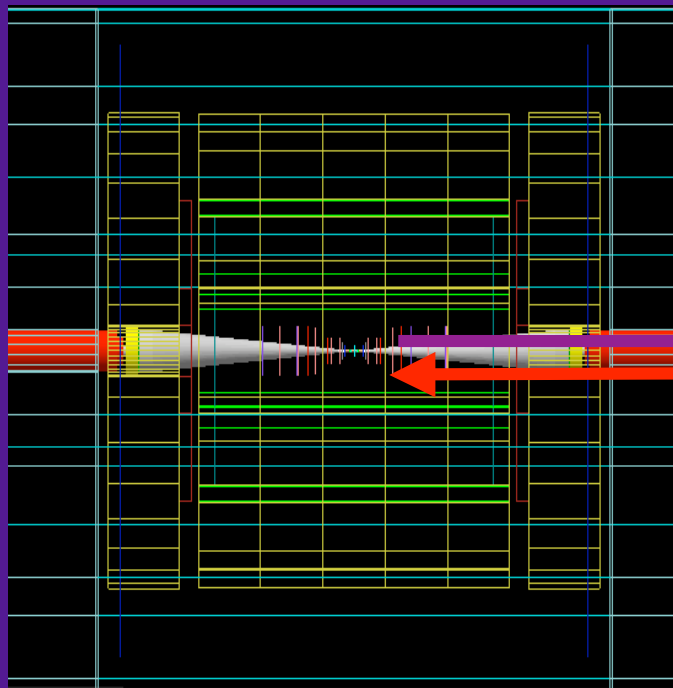


From the IP to ... the IP

Mokka: Icio

Beam $\langle E \rangle \sim 116$ GeV

Cu collimator



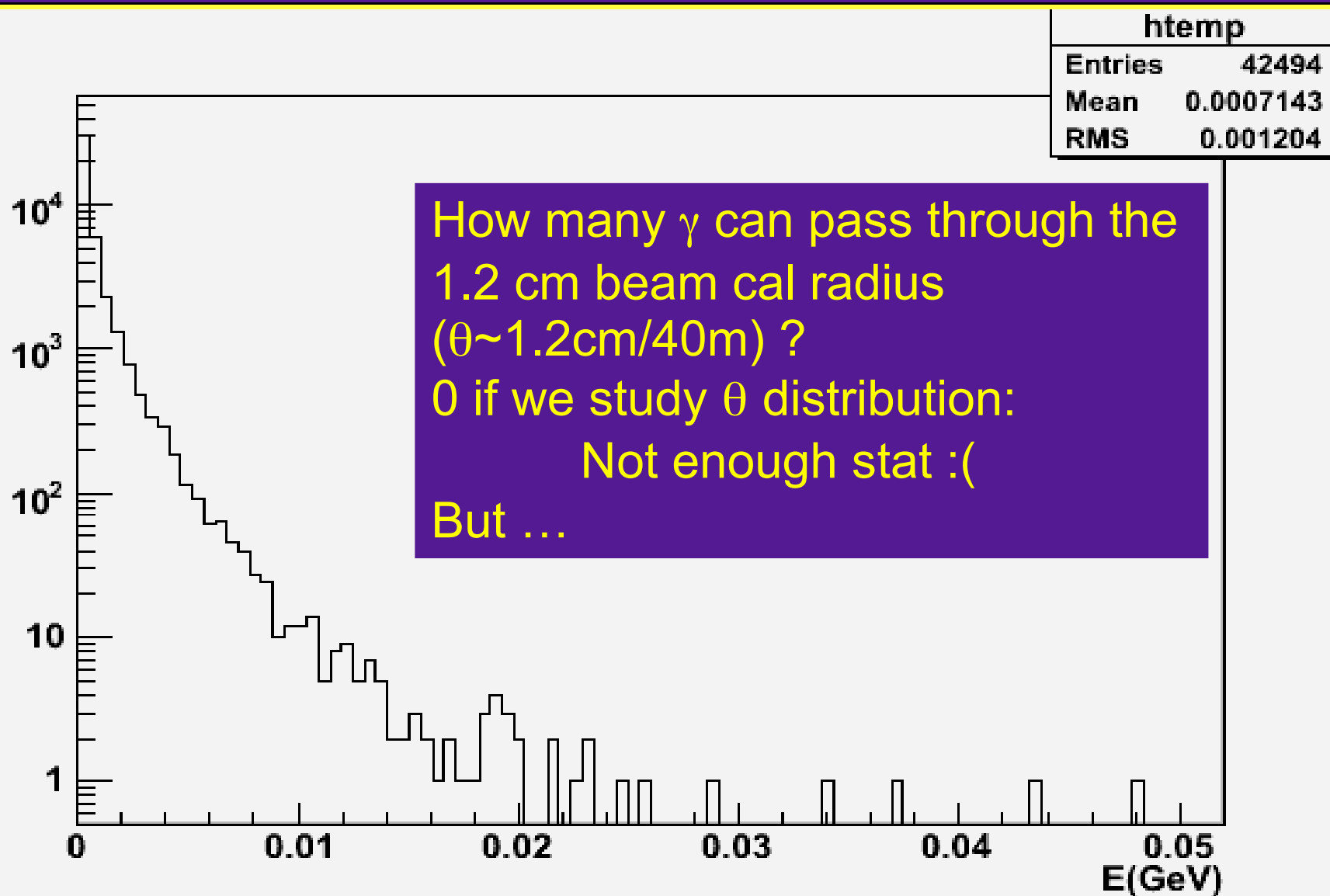
Backscattered photons

BDSIM: ROOT

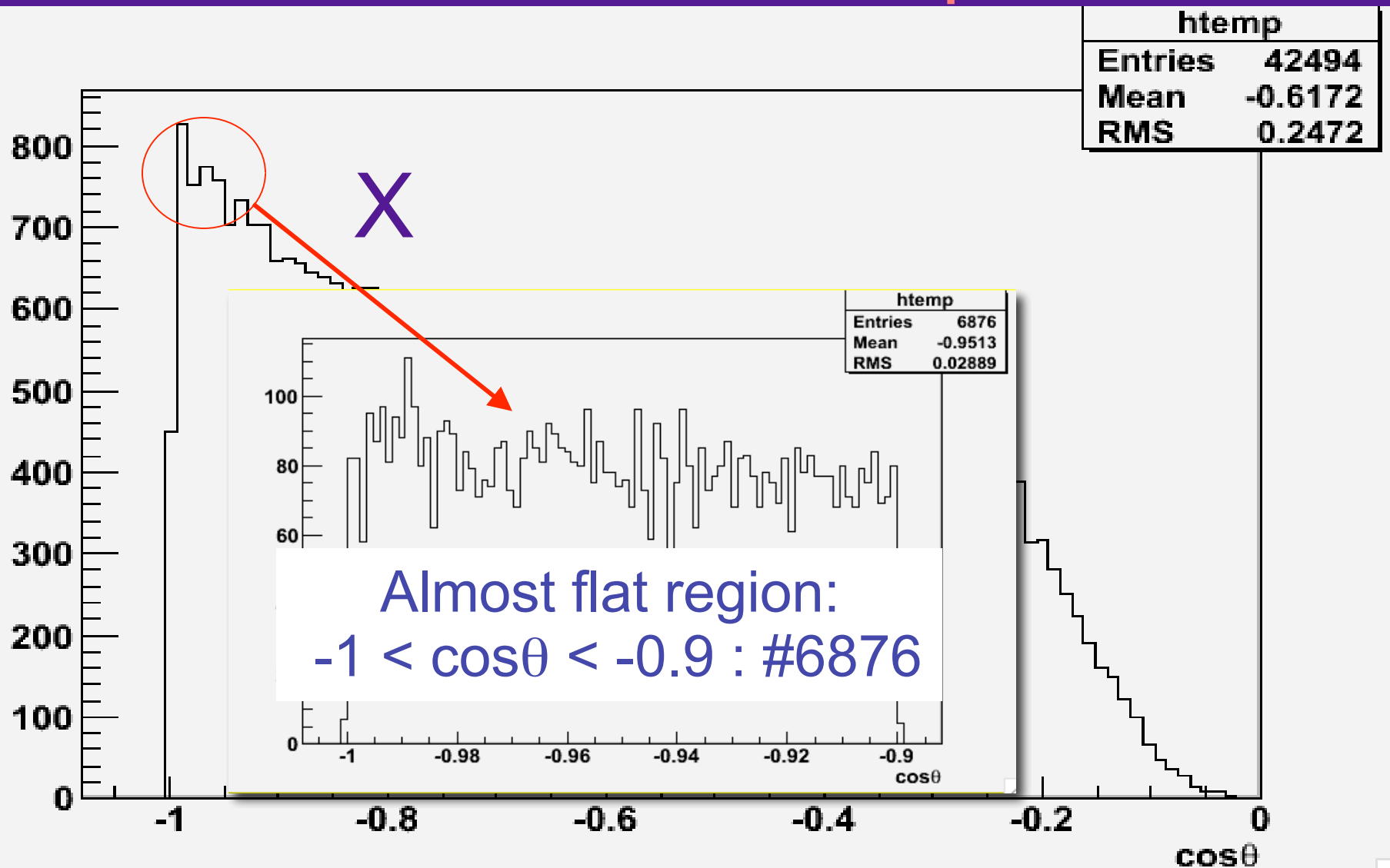


40m

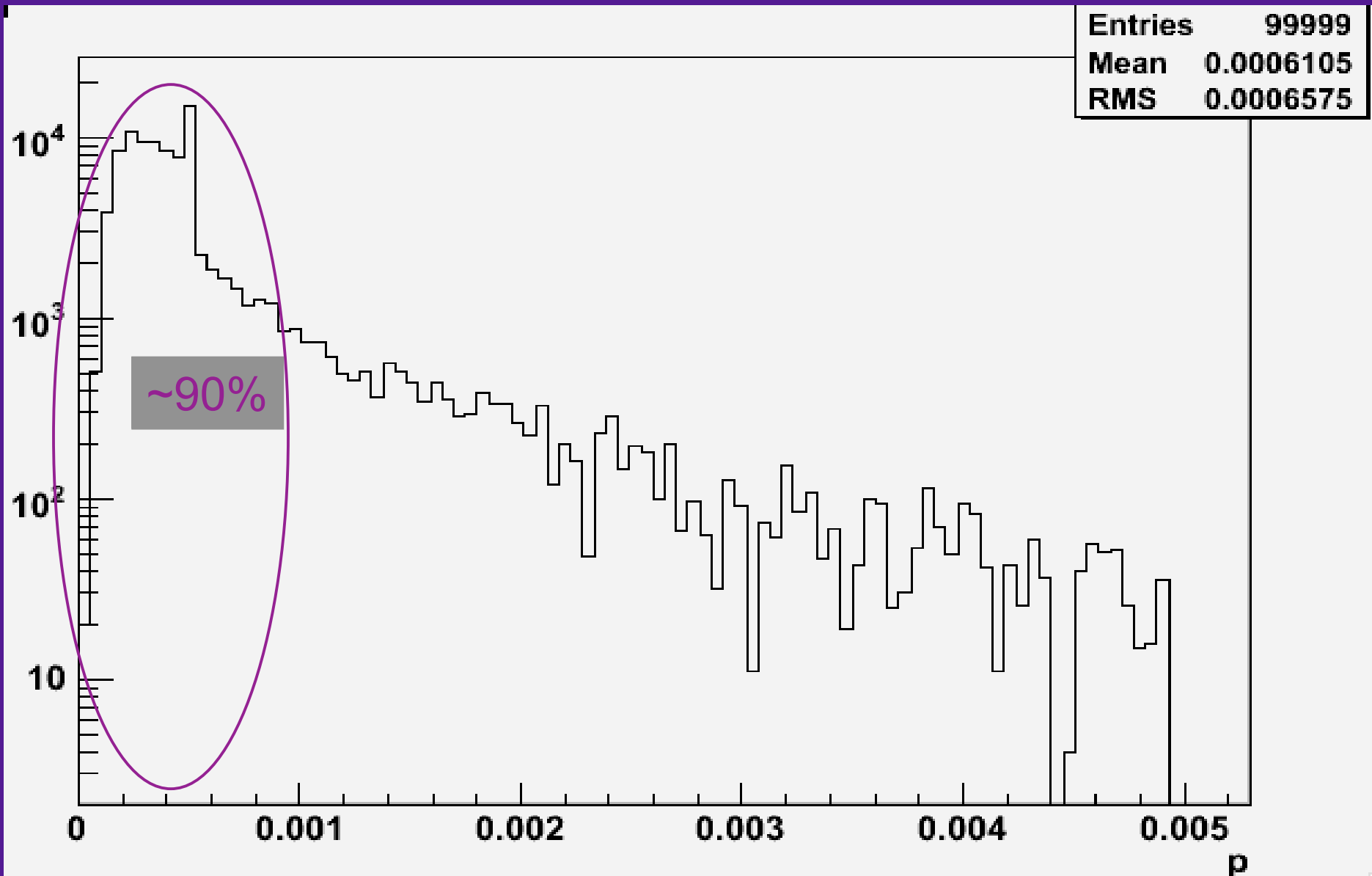
Backscattered γ : energy spectrum (42494)



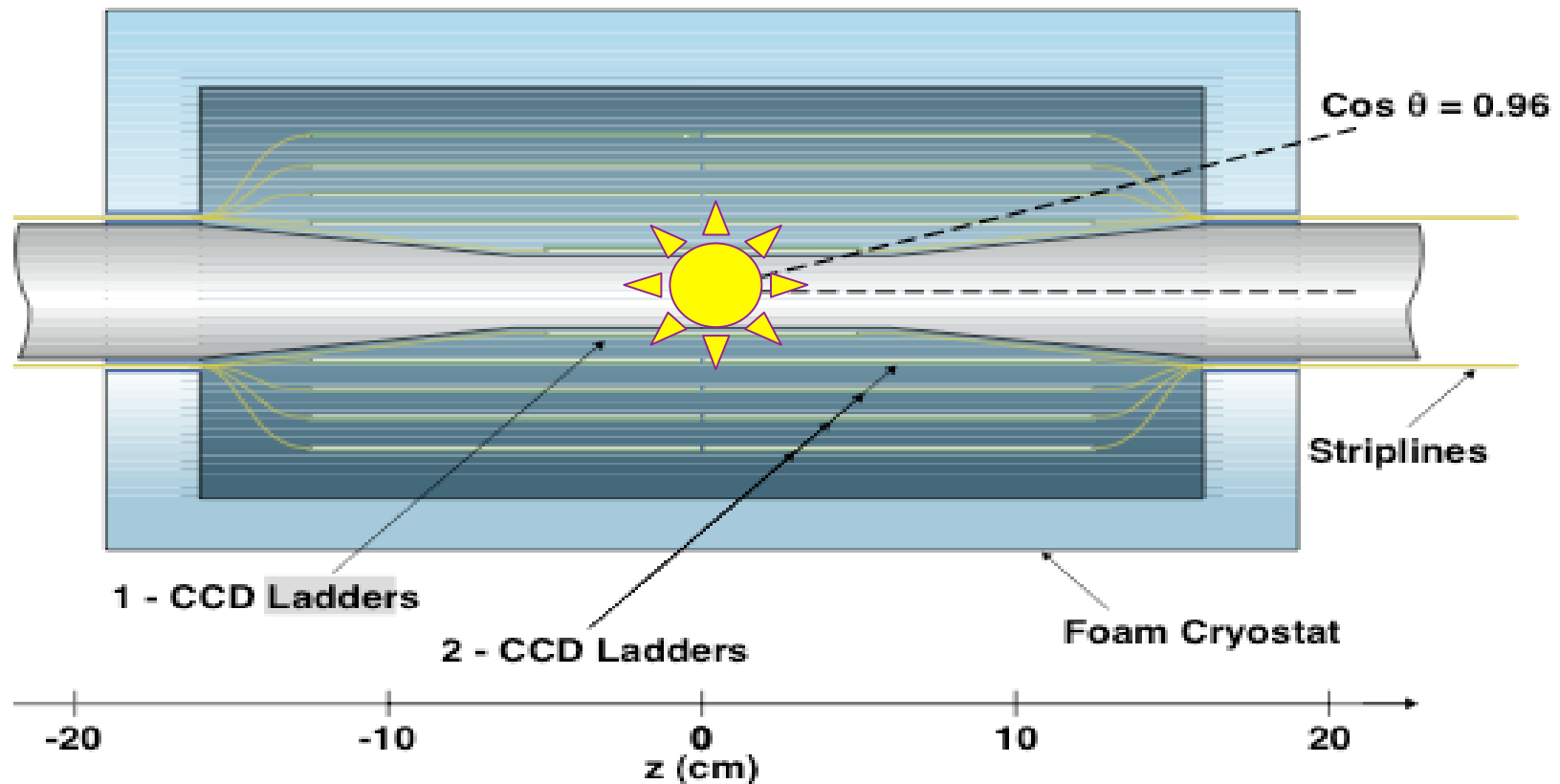
If we study the $\cos\theta$ distribution we can avoid this statistics problem



Energy spectrum for this distribution



VD description



Shoot at the IP: $\mathbf{X}(0,0,0)$, $\varphi \in [0, 2\pi]$ and $\cos\theta \in [-0.96, 0.96]$
With the previous energy spectrum ...

Mokka input

- From the BDSIM ROOT file:
 - create the .mac files and associated steering files

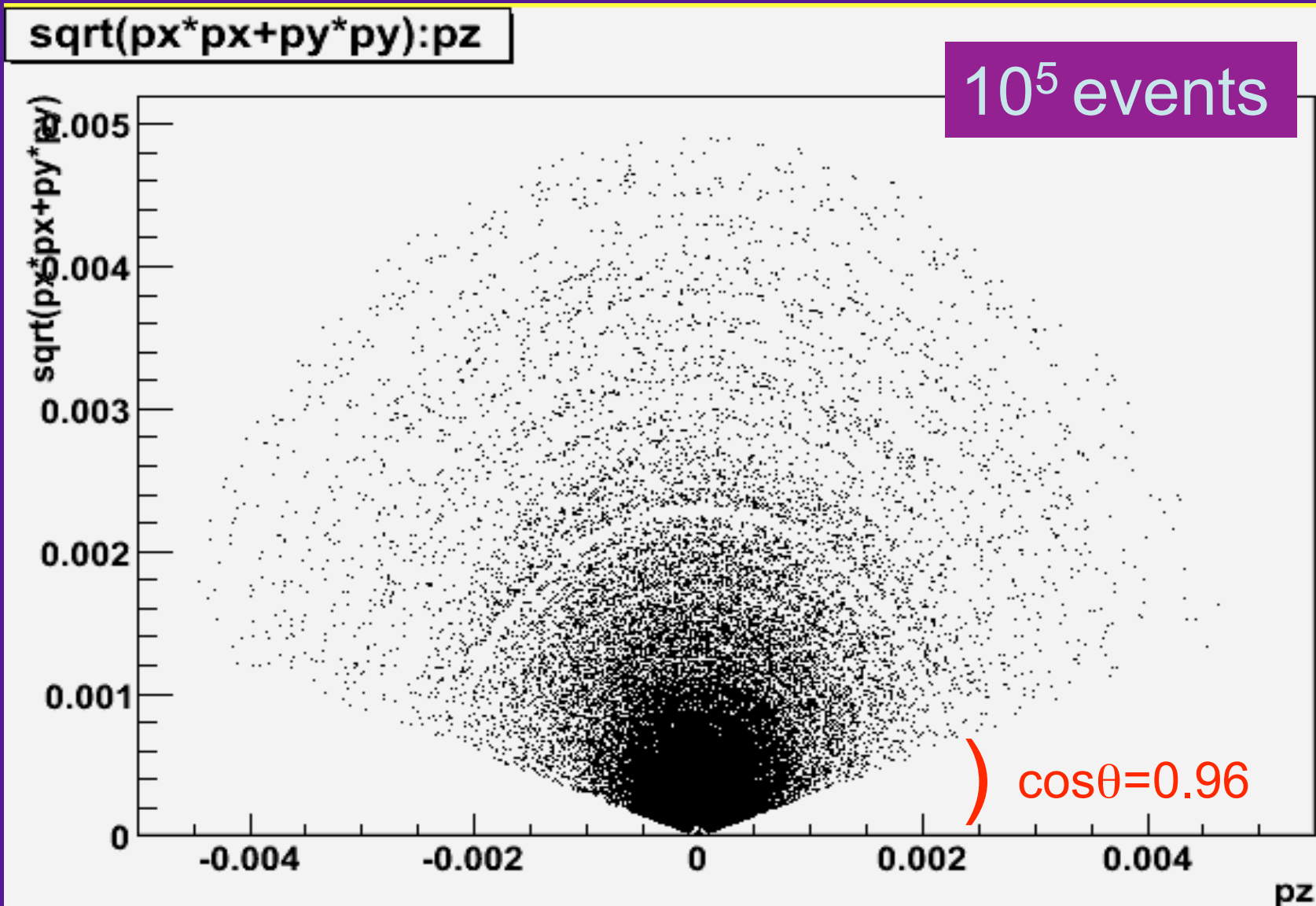
.mac and .steer in the InputSandbox

•/gun/energy X MeV
•/gun/particle photon
•/gun/position 0 0 0
•/gun/direction Px Py Pz
•/run/beamOn 1

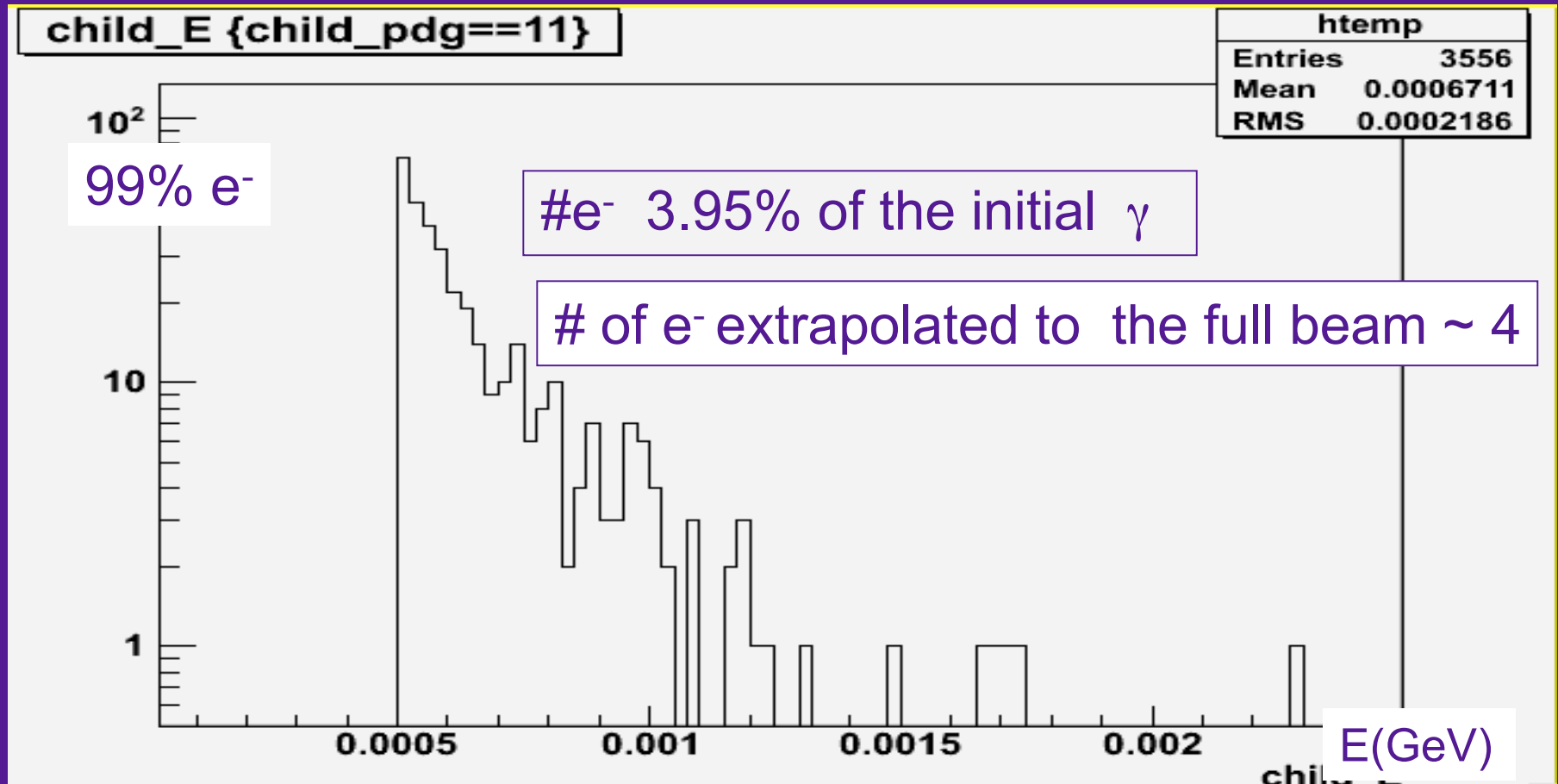
“Et hop”
→
To the Grid
(Thank to
the Hengne’s
parachute)

I shoot at the IP
to understand
the Mokka output with well
define initial trajectories

$(P_x^2 + P_y^2)^{1/2}$ vs P_z

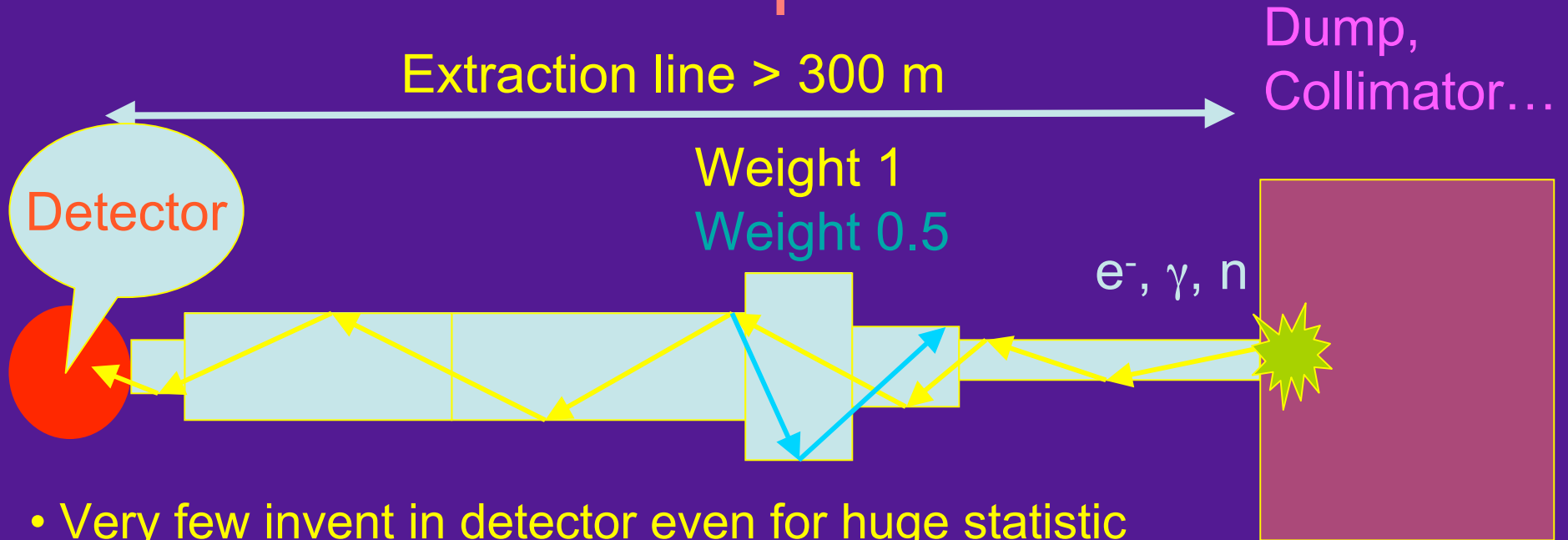


Conclusion



Takashi Maruyama predicted @ the IP (for the backscattered photon due to SR losses @ the septum $\sim 90\text{m}$): 2200 γ which corresponds to 88 e^- (this must be compare to the 250 hit from incoherent pairs cf. Cecile Rimbault)

Prospects



- Very few invent in detector even for huge statistic
- Event biasing method class already exist in Geant4 (for hadronic process)

Biasing secondary production in terms of particle type, momentum distribution, cross-section ...

- Need to implement it in BDSIM simulation
- Collaboration with Marc Verderi & Hayg Guler from LLR (ANR ATF2)

Few words on Desktop grid

The most famous desktop grid is certainly the SETI@home project (Search for Extra-Terrestrial Intelligence):

Use the CPU of your personal desktop when the CPU is free

Why not doing the same for ILC simulation ?

2 mains projects:

- XtremWeb (OpenSource LRI & LAL project)

- Linux, Mac Os X & Windows

Successfully used with GuineaPig++ and BDSIM

- Xgrid (Apple)

- 100% Mac Os X

Not yet tested

Future plan:

Interconnecting the desktop Grid with LCG/EGEE Grid

Oleg Lodygensky , Charles Loomis, Christian Helft (LAL)

