DIRC-like TOF background analysis status report

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Outlook

→ Current geometry of the DIRC-Like TOF

→ Simulation of the MCP PMTs and electronics

→ How to get rate of the photons
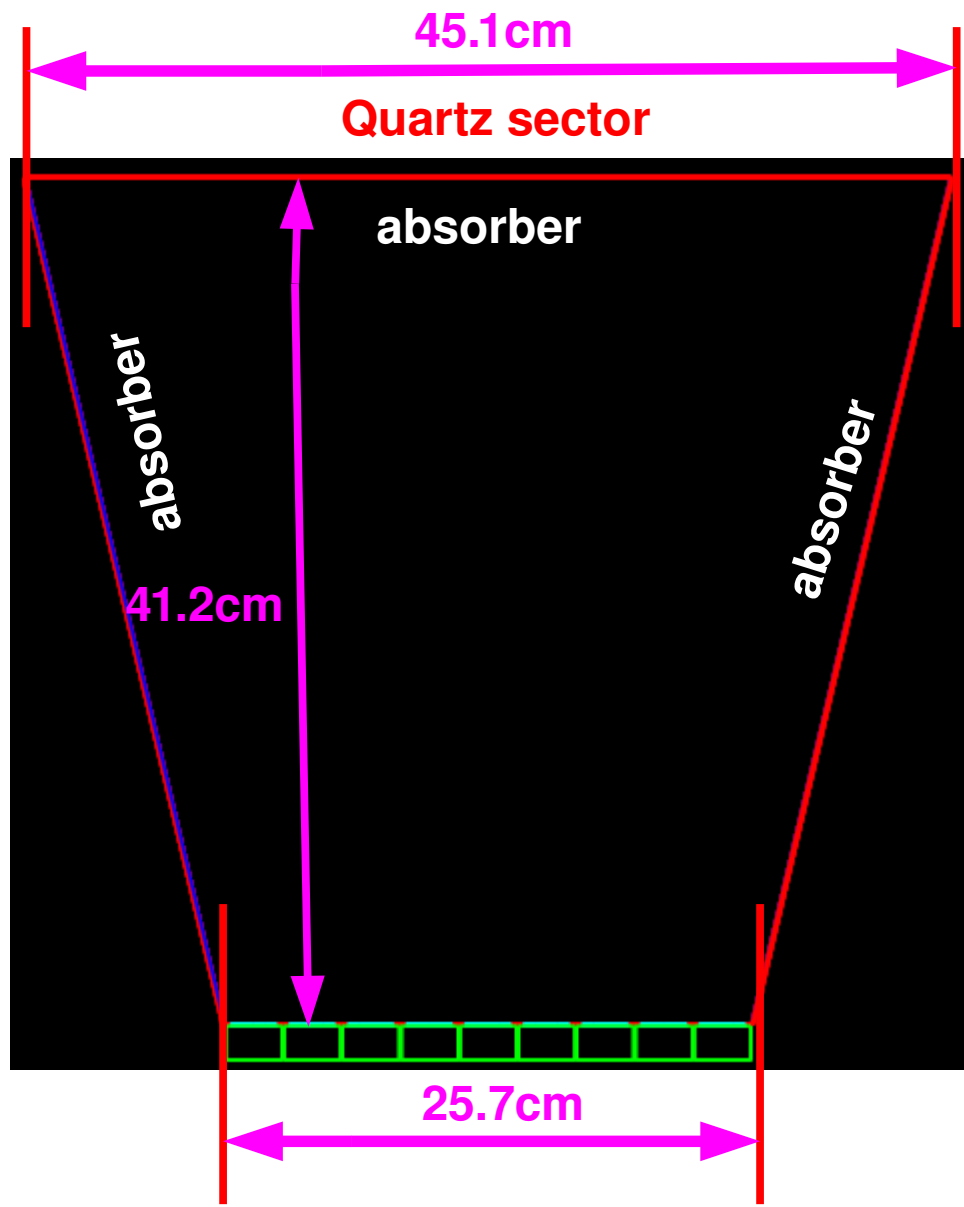
→ Results and conclusions

→ Question

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Standalone Geant4 simulation of the DIRC-like forward TOF detector

A very similar implementation of the fTOF is now available in Bruno. Few details (volume overlaps in particular) still need to be worked out.

We put 12 sectors at right position, and 9 PMT's for each sector

1.5 tesla magnetic field have been implemented

Reminder1
In Bruno envelop for this detector is small so to avoid overlaps we increase number of sector up to (48)
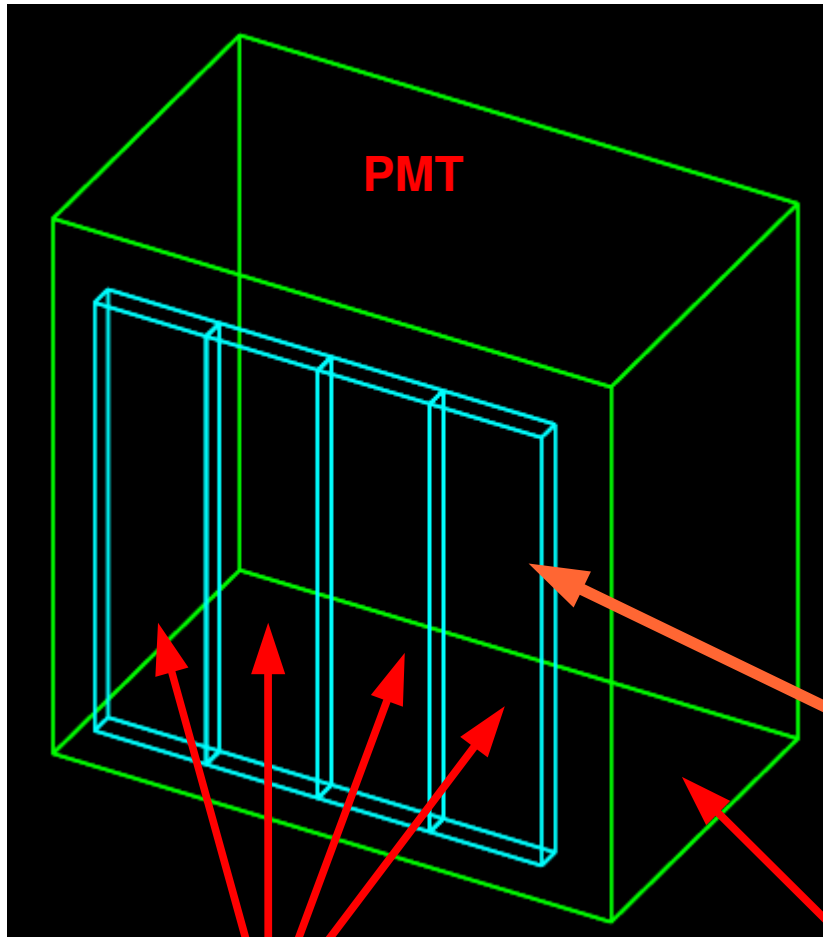
Reminder2
Thickness of the quartz sector is 1.2cm ~ 10% of radiation length

Enough space for 9 MCP-PMTs (see next slide for details)

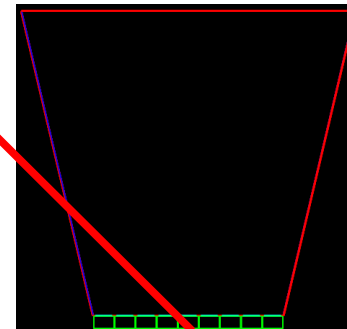# Simulation of the PMTs

2.75cm x 2.75cm x 1.66cm

PMT

When optical photon touch sensitive volume we record all needed information for analysis and set track status to StopandKill

QE simulated offline while root-tuple is analyses

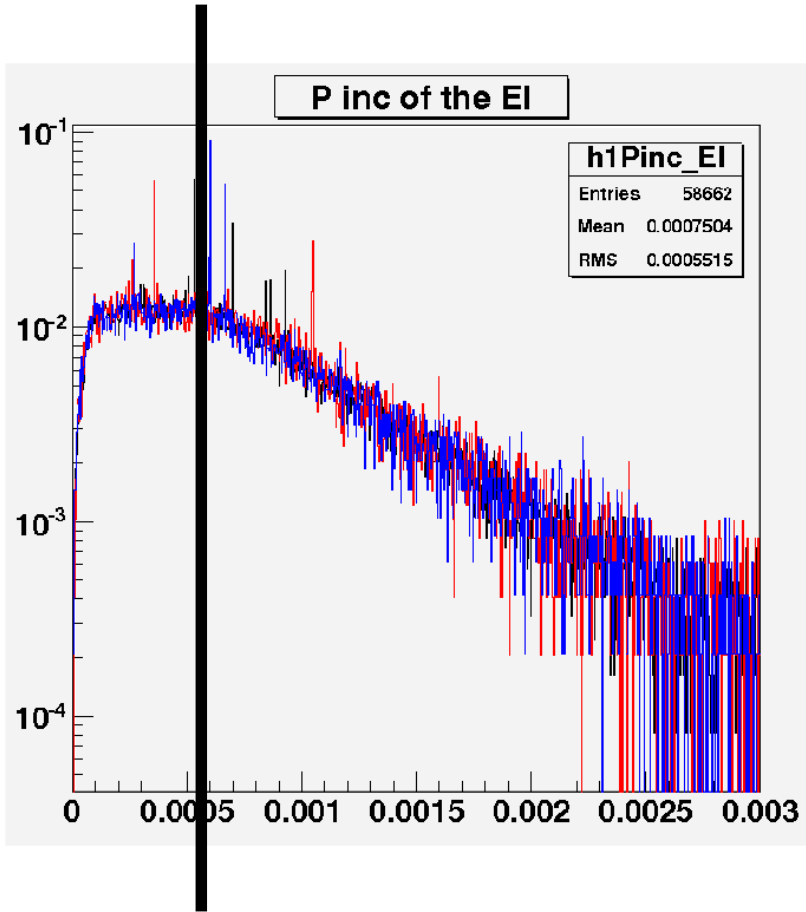Dimension of each channel is 2.2cm x 0.55cm x 0.12cm

Sensitive surface correspond to the readout channel
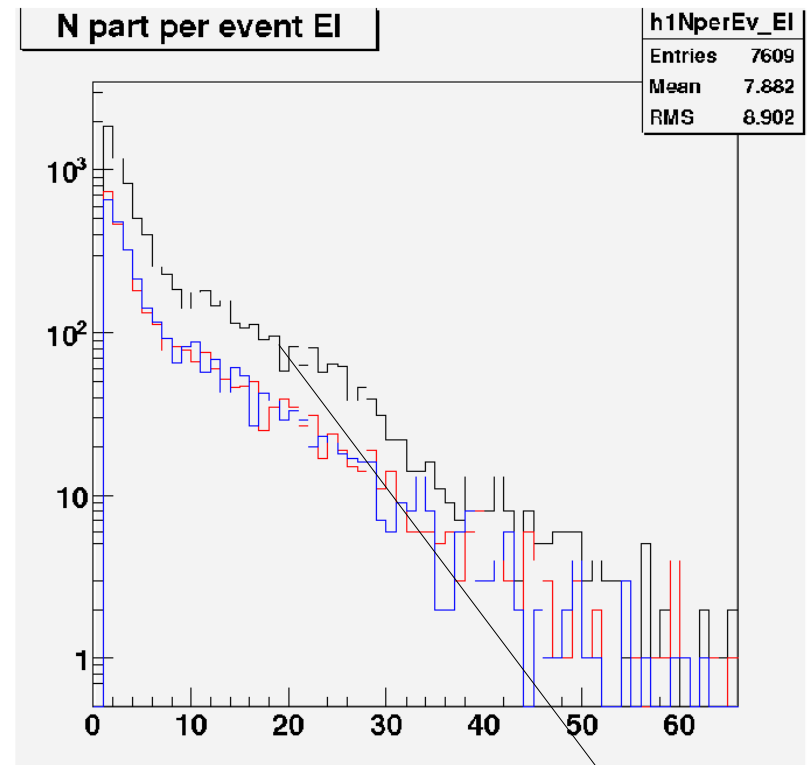
In total 9x4 = 36 channels

First look at the background

→ For the moment we concentrate on the RadBhaBha

Cerenkov threshold for electrons

Momentum of incoming electron
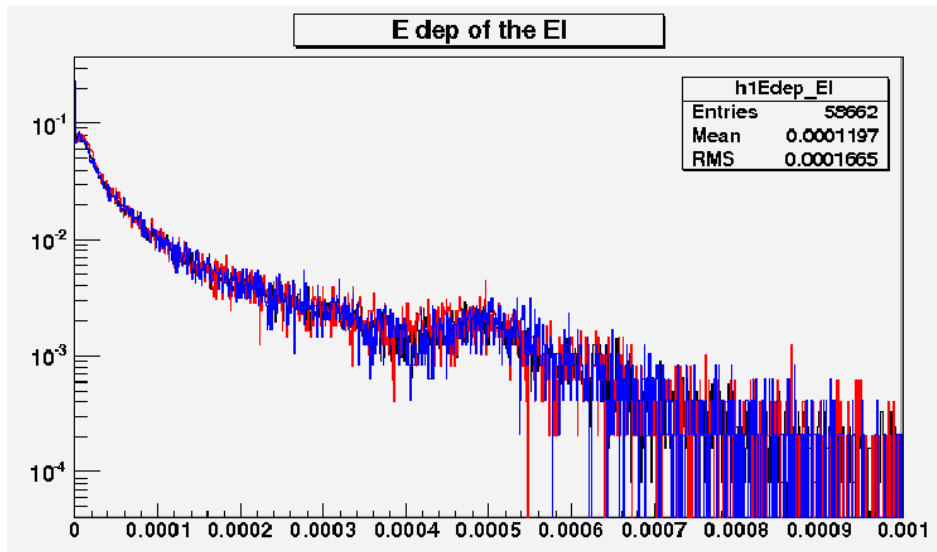Number normalized by n bunch X

—— Wolf shielded

—— Wolf shielded DeltaE 0.05

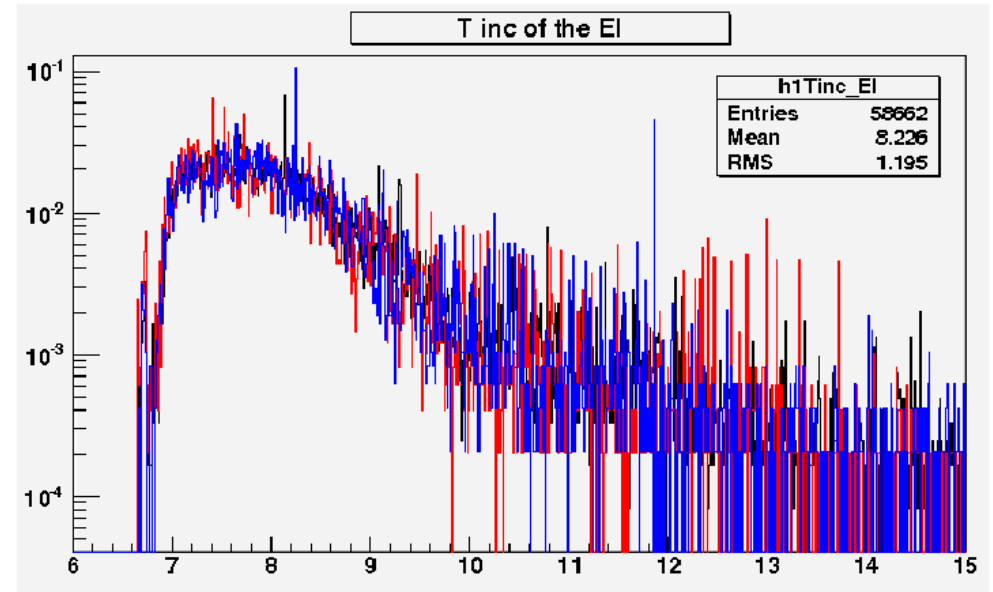—— Wolf shielded DeltaE 0.002

Number of electrons per bunch X

We have to look more careful on this . Can be a problem of the root-tuple reading

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Stability of the simulation


Energy deposit by electrons [GeV]

Time [ns]

— **Wolf shielded**

— **Wolf shielded DeltaE 0.05**

— **Wolf shielded DeltaE 0.002**

Energy deposit and time of the hit does not depend from unphysical cut which is a good sign for simulation

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How to get rate of the photons?

➤ For the moment in Bruno optical properties is not simulated

➤ We can use information about particles entering envelop for fTOF from Bruno as input in stand alone DIRC-like Gant4 simulation.
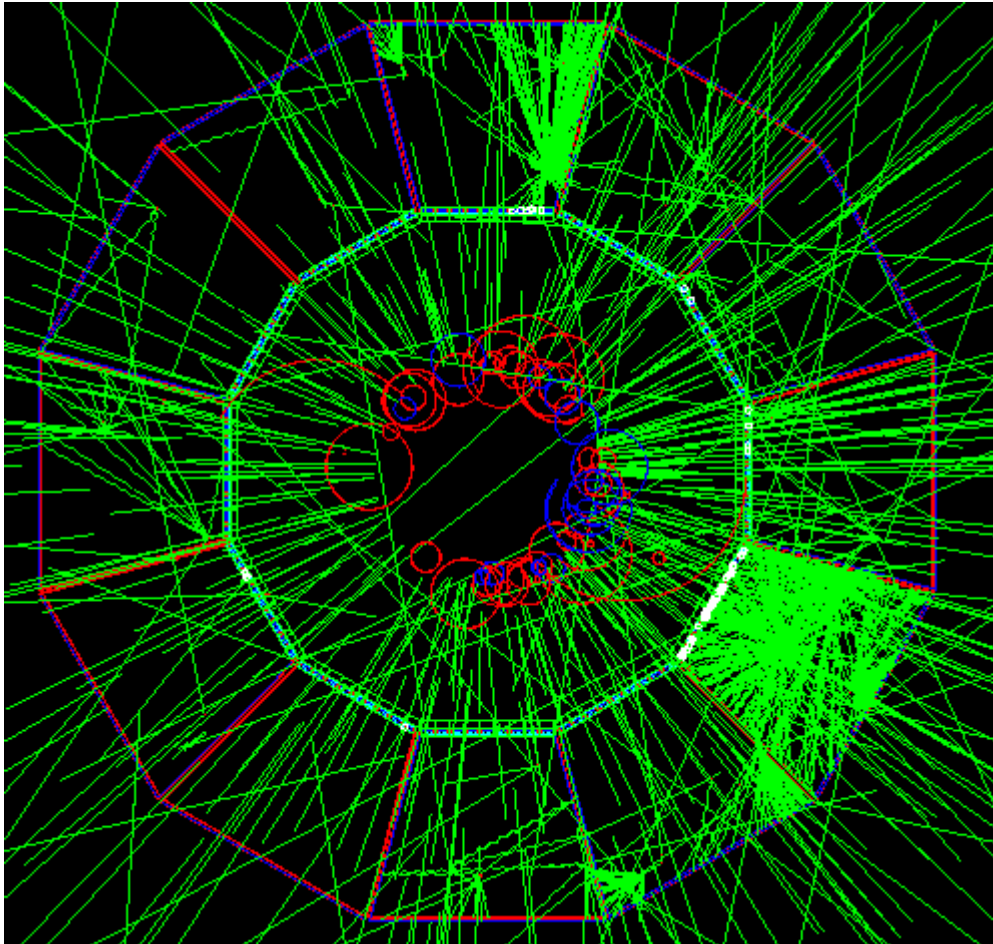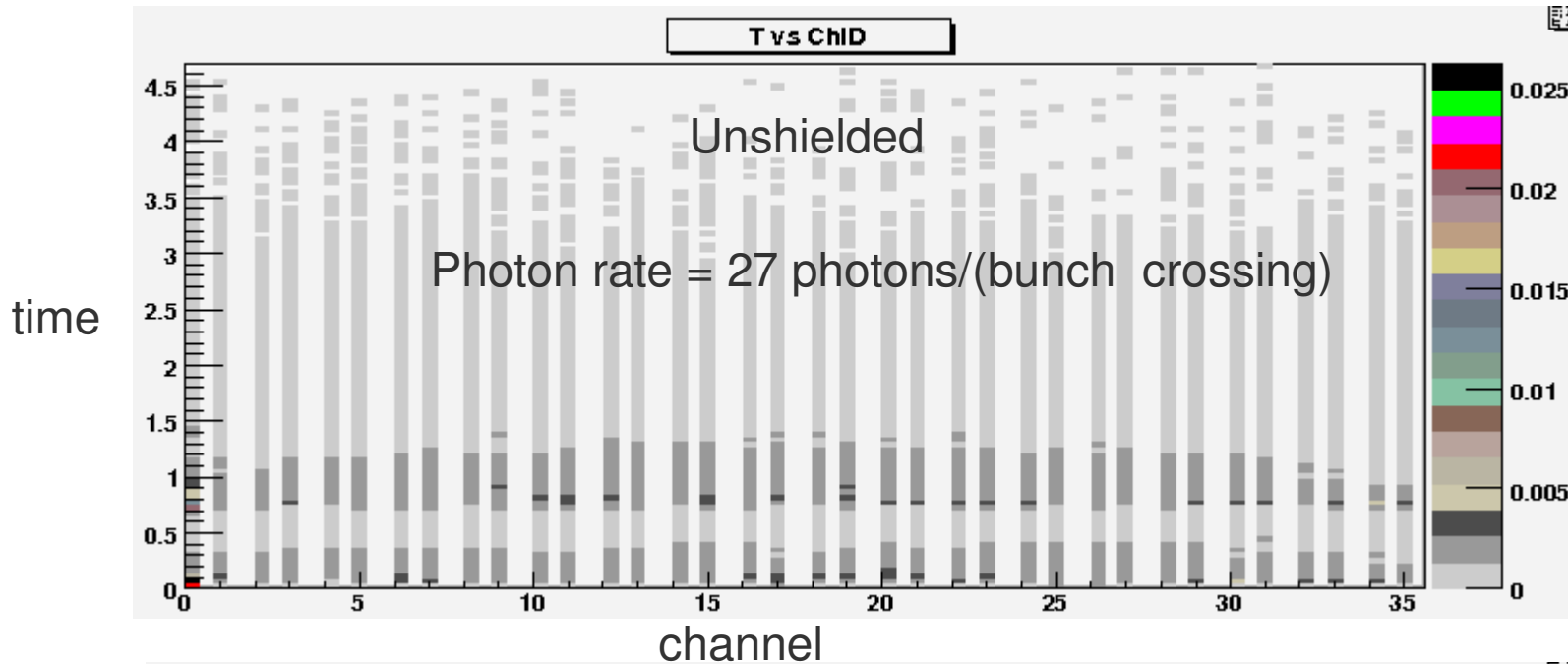

1000 tracks unshielded
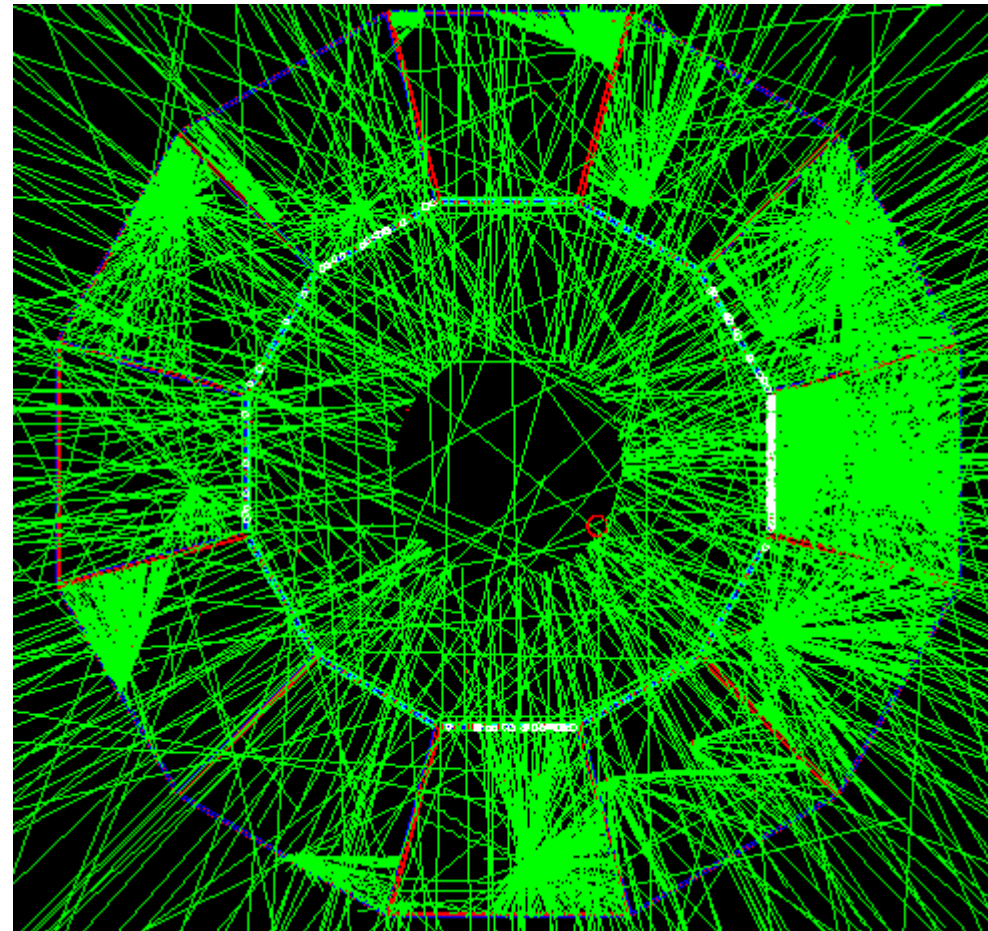
1000 tracks Wolf shield

Results

For our analysis we use 44177 bunch crossing (with shielding)

25777 bunch crossing (without shielding)

Unshielded

Photon rate = 27 photons/(bunch crossing)

time

channel

Wolf shielding

Photon rate = 12 photons/(bunch crossing)

time

channel

For 12 sector

Unshielded

T = 0
Particle is shouted from the border of the envelop
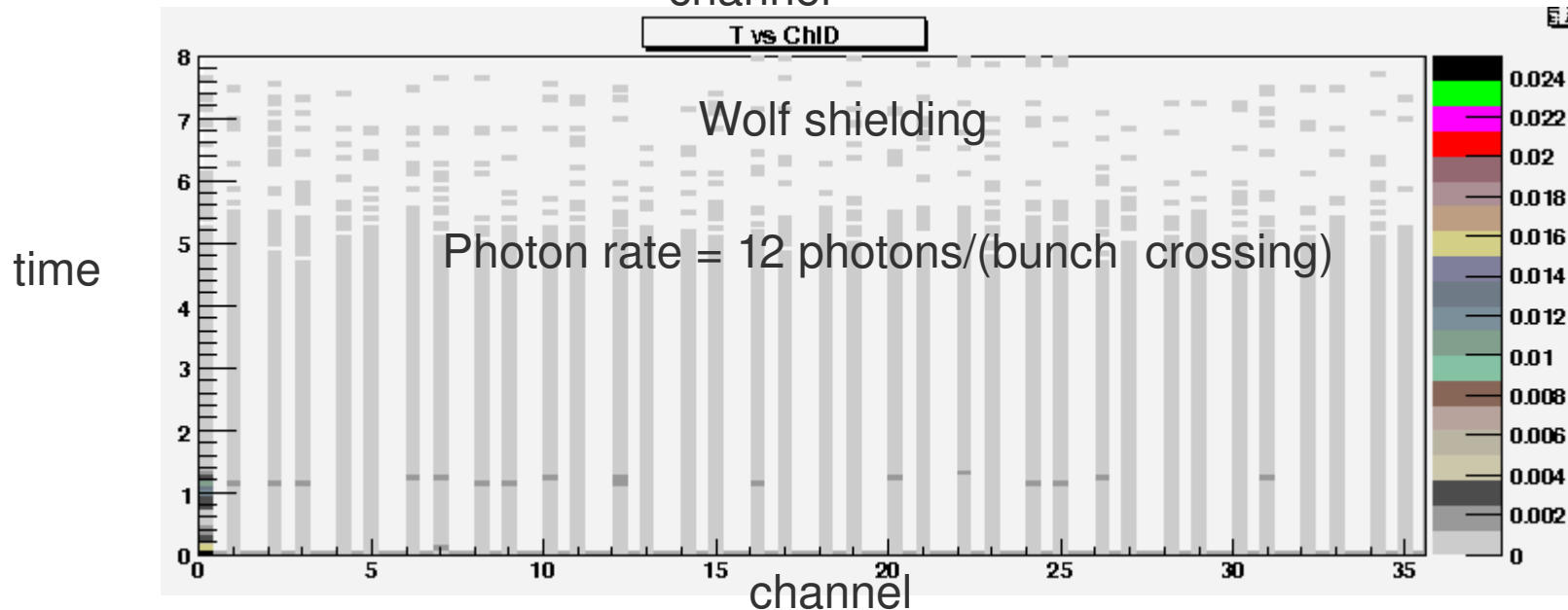
QE not taken into account

Wolf shielding

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Problem

Some root files are create a run time crash

*** Break *** segmentation violation
0x0804b929 in <unknown function>
0x080500ca in <unknown function>

One example of file like this you can find here:

/storage/gpfs_babar6/sb/prod/2010_02_full/FullSim/SuperB_unshielded/100801