Radiative Bhabha background studies

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Pre Elba meeting

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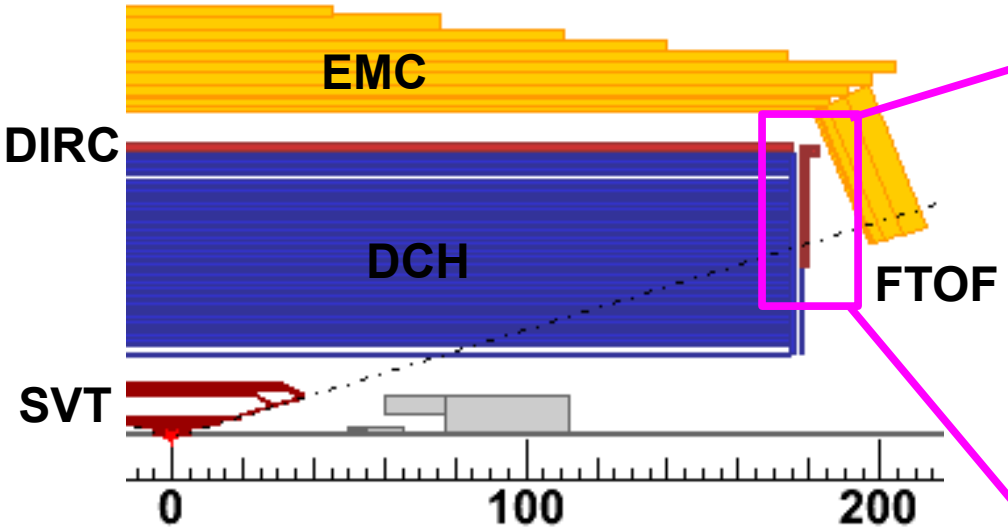
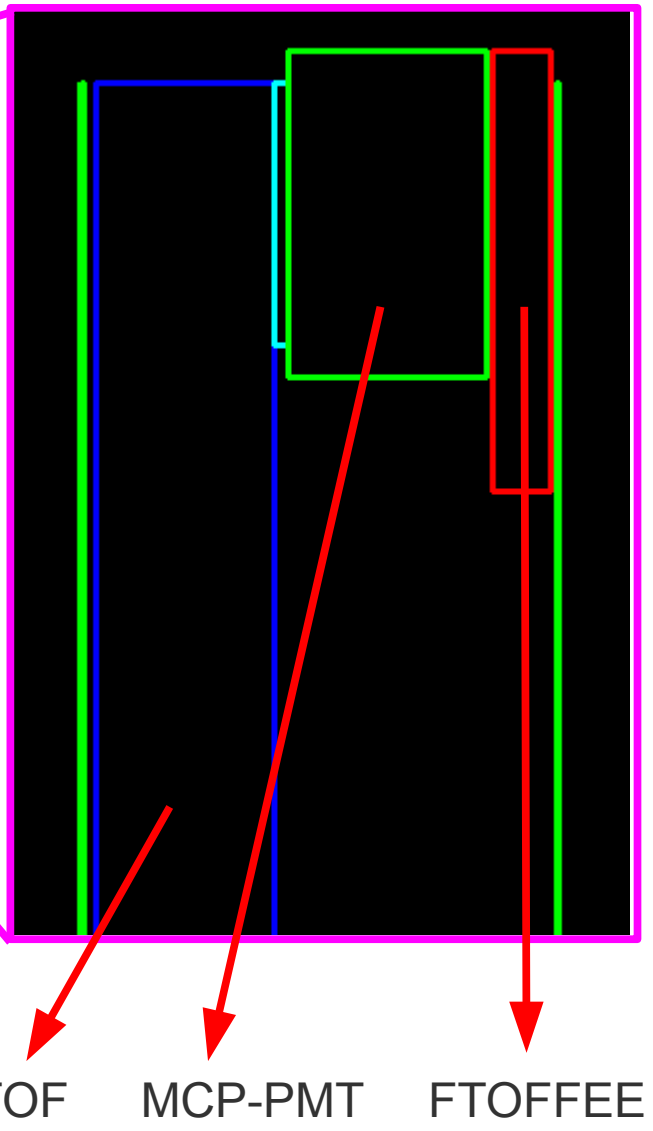
Some numbers we are using below for our calculations

- Seconds in the year $2*10^7$
- Data taken duration = years 5
- The acceptable integrated anode charge (SL10) per year 0.5 Q

FTOF and FTOFFEE geometry reminder





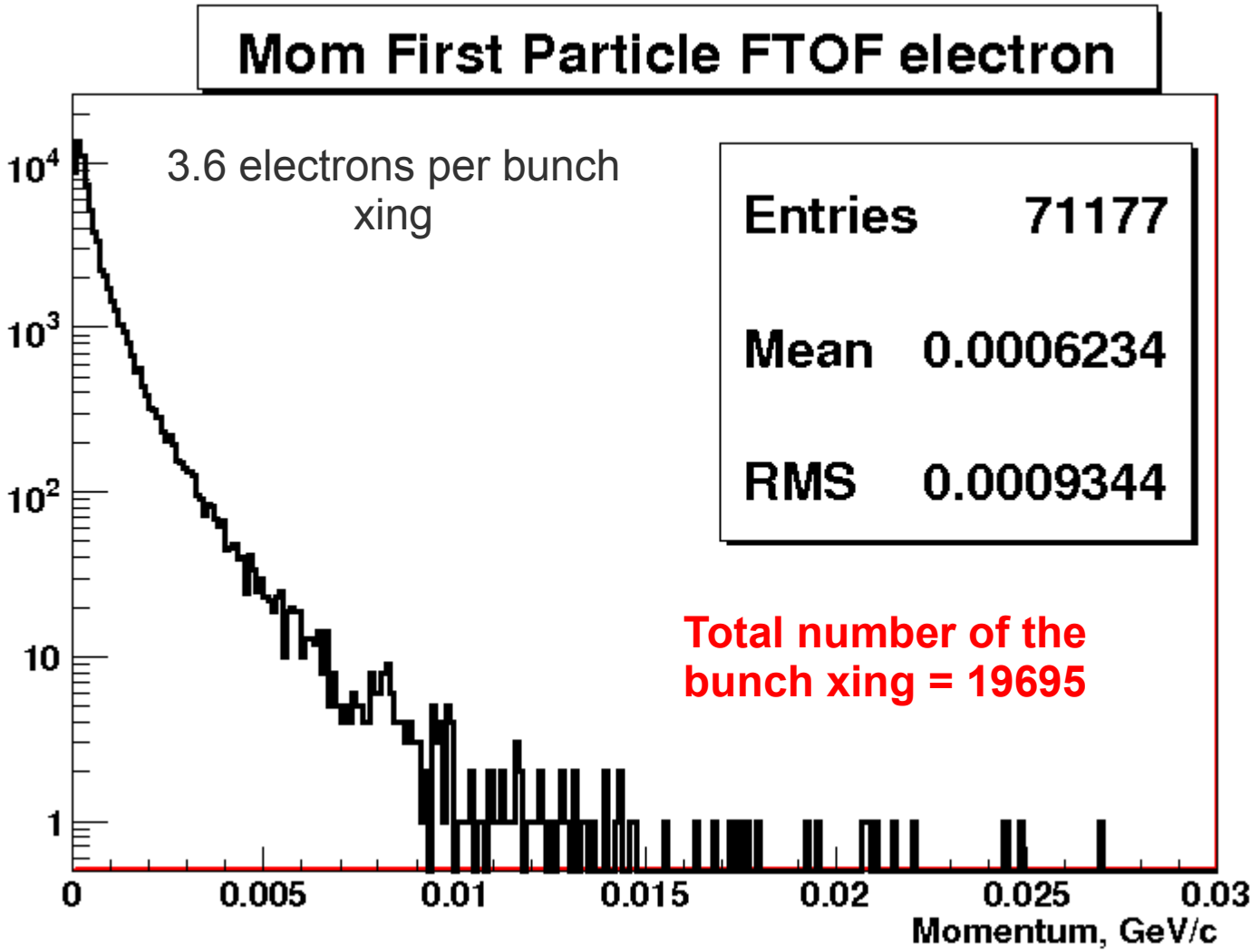
- FTOF is made of 12 1.5 cm thick quarts tails.
- 14 MCP-PMT connected form the top of the each quartz tail.
- Front end electronics (FEE) are connected to each MCP-PMT.

FTOF surface ~ $1.87*10^4$ cm^2, mass = 61.7 kg (ρ=2.2g/cm^3)

FTOFFEE surface ~ $1.3*10^3$ cm^2, mass = 1.5 kg (ρ=2.3g/cm^3)

Electrons produced by gammas which interact with FTOF

Elba production May 2011

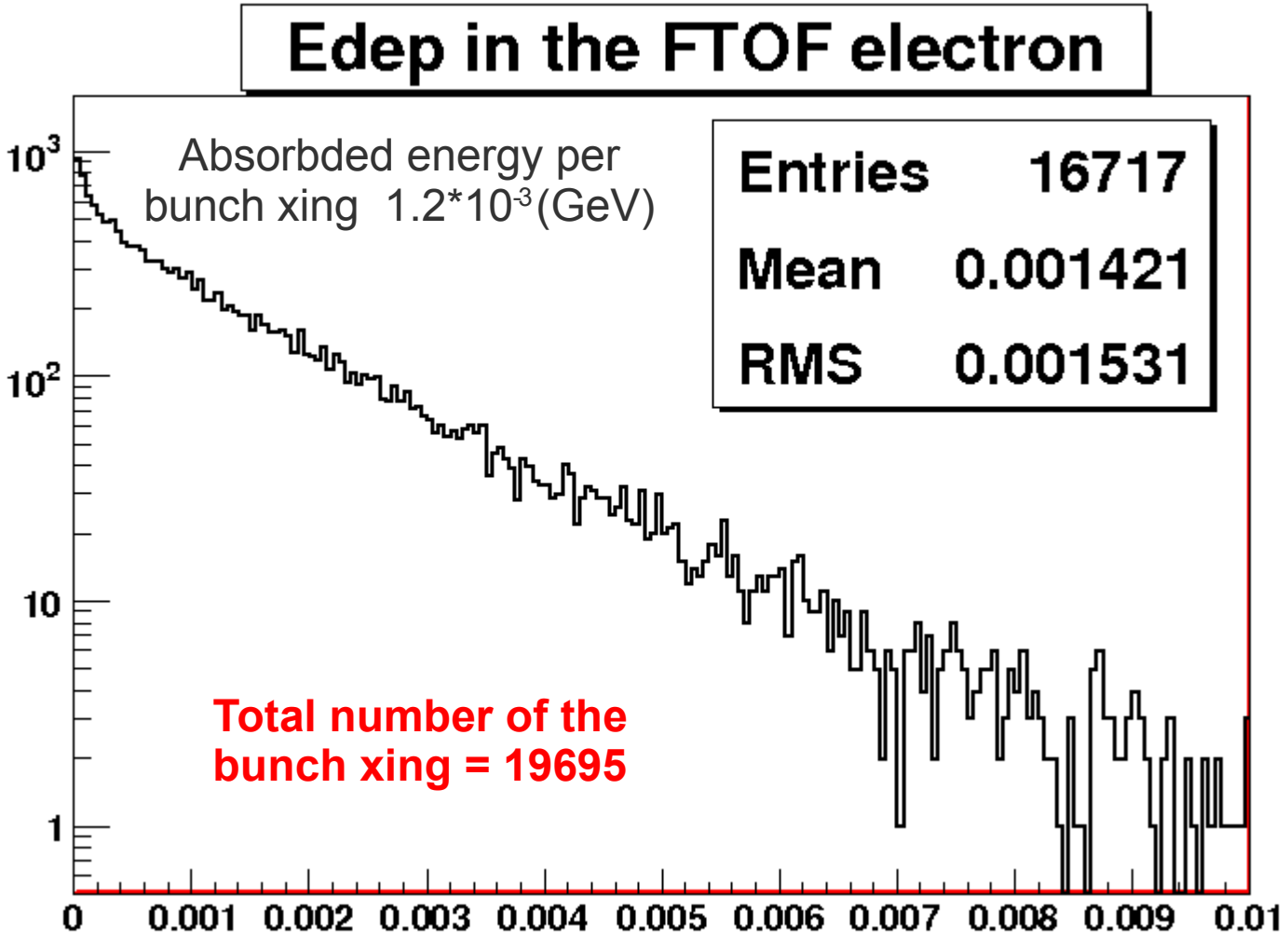


Electron rate =
(Average number of particles per bunch xing) *2.09*10^8(bunch xing/s)/(1.87*10^4cm^2) =
3.6*2.09*10^8/(1.87*10^4cm^2) = 40kHz/cm^2

Frascati, April 2011 electron rate = 1 kHz/cm^2

Absorbed dose by FTOF

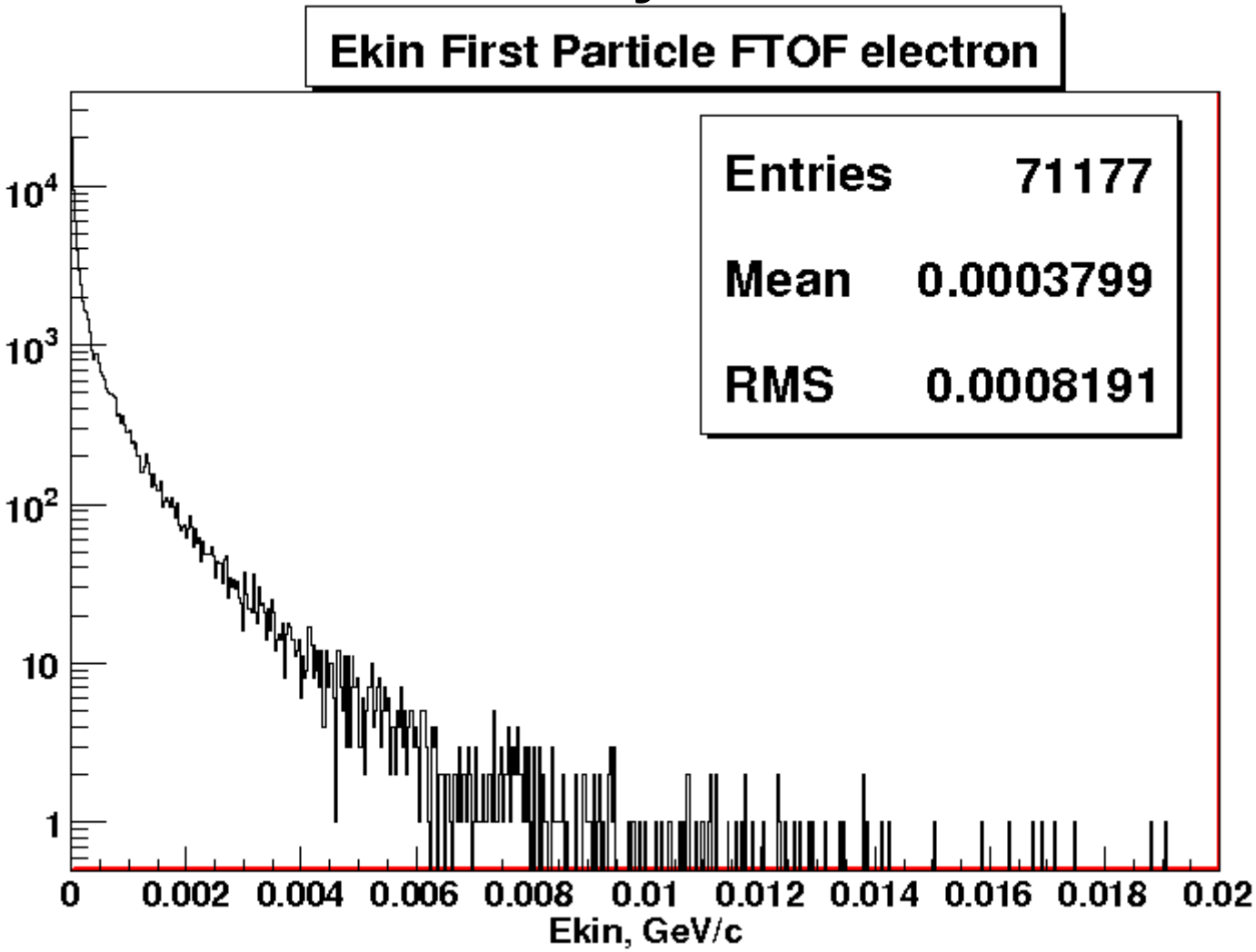
Elba production May 2011



Absorbed dose = (Absorbed energy)[J]/(mass[kg]) =
$2.0*10^{7}$(s in one year)*$2.09*10^{8}$(bunch xing/s)*$1.2*10^{-3}$(GeV)*$1.6*10^{-10}$ (J/GeV)/61.7kg
~ 13 (Gy in one year) = 1.3 kRad in one year

Absorbed dose by FTOF method2.

Elba production May 2011

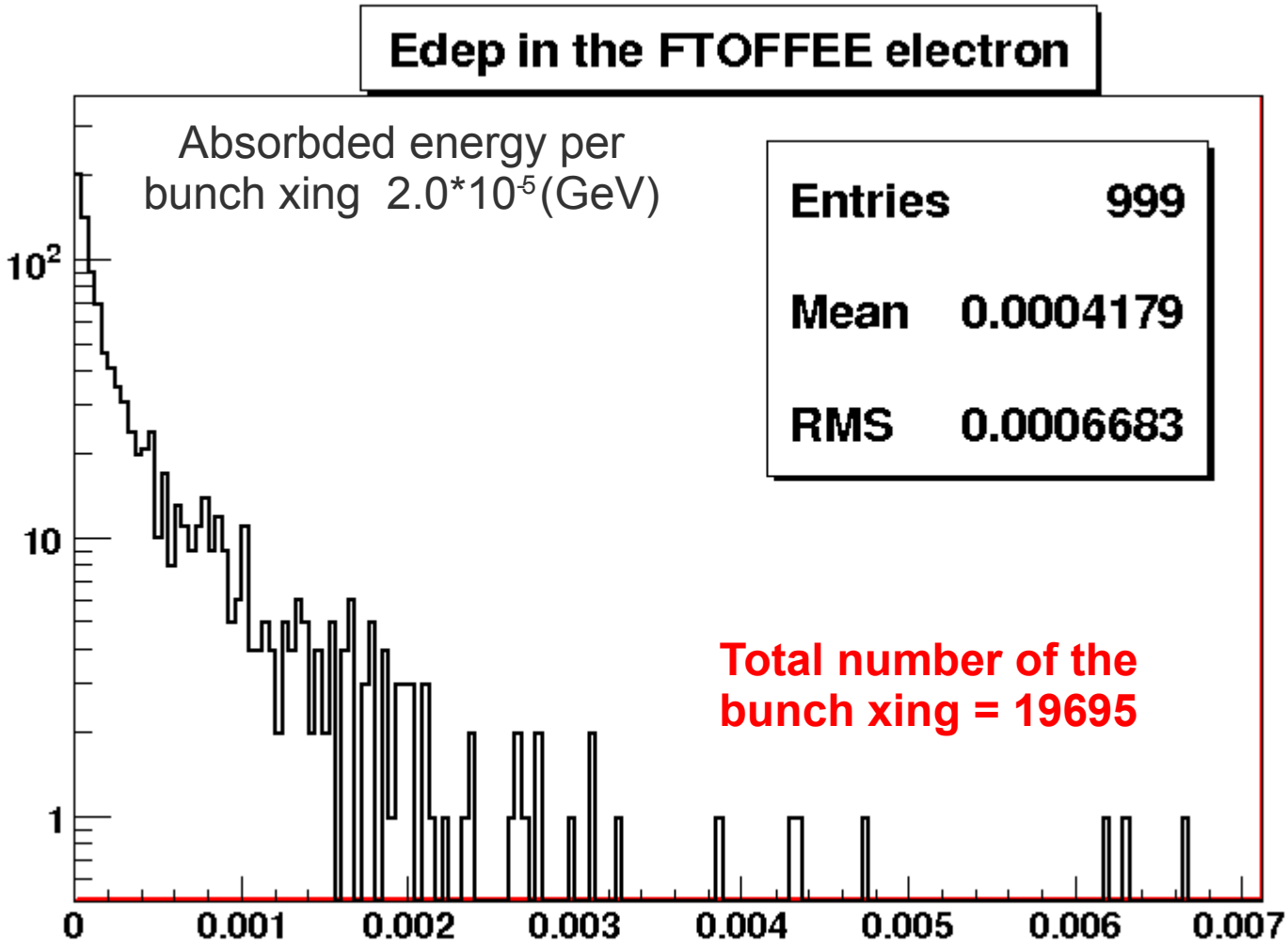


The electrons will leave all kinetic energy in the FTOF, knowing that we have 3.6 electrons / per bunch xing we can estimate deposit energy:

(3.6 electrons per bunch xing) * (<Ekin>) =
1.4 MeV/ per bunch xing

Absorbed dose by FTOFFEE

Elba production May 2011



Absorbed dose = (Absorbed energy)[J]/(mass[kg]) =
$2.0*10^{7}$(s in one year)*$2.09*10^{8}$(bunch xing/s)*$2.0*10^{-5}$(GeV)*$1.6*10^{-10}$ (J/GeV)/1.5kg
~ 9 (Gy in one year) = 0.9 kRad in one year

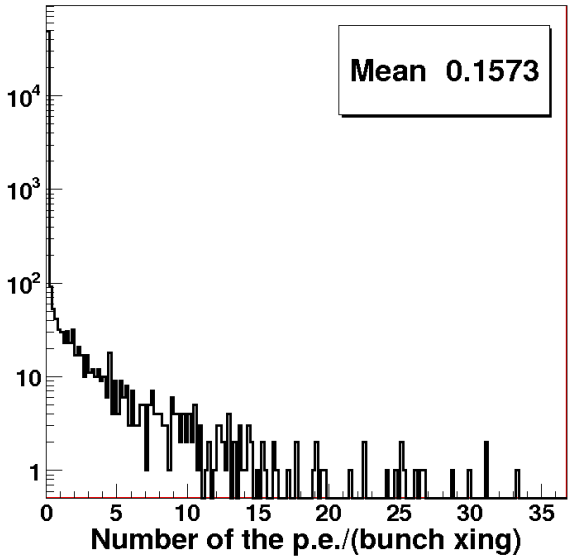
Background photoelectrons

Number of p.e. ~ No * L[cm] * $\sin^2$ (Theta_Cherenkov)

$\sin^2(\theta_c) = 1 - 1/(n^2\beta^2)$

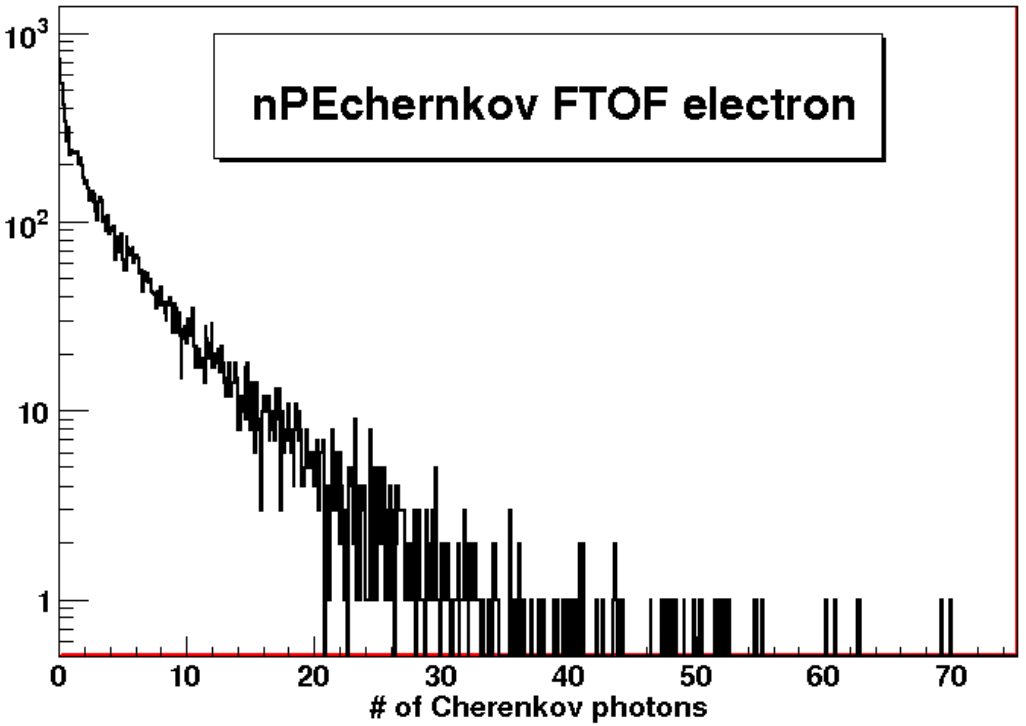
L – given by Bruno
No = 26
n = 1.47
β – given by Bruno

Frascati (April 2011) geometry with new Ganet4 (V4.9.3). With maximum Geant4 step size within DCH = **1mm** (mk2)



0.1 p.e./(bunch xing)
45kHz/cm²

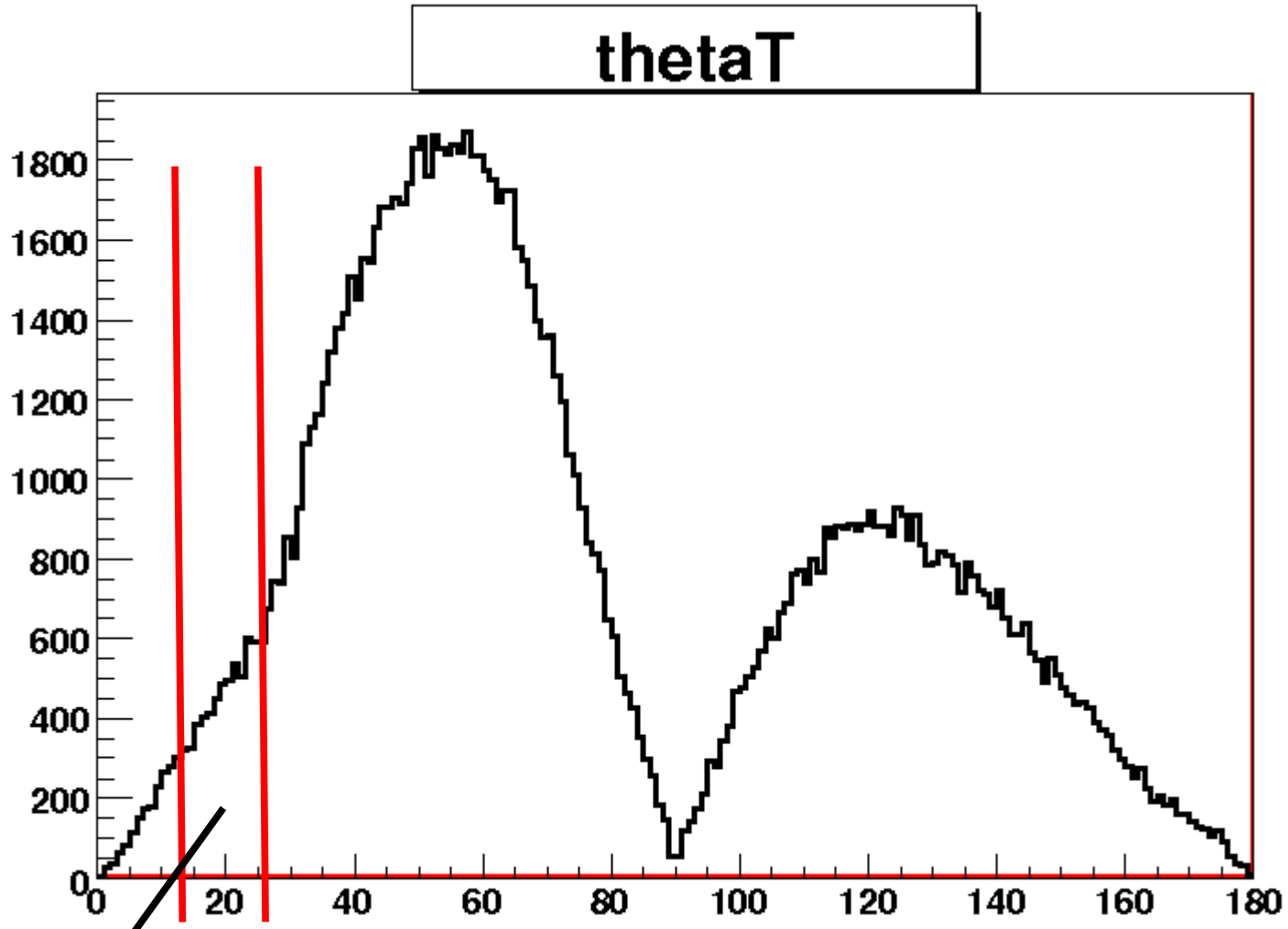
Elba production May 2011



3.2 p.e./(bunch xing) => 1MHz/cm²

2 p.e./(bunch xing) => 0.7MHz/cm²
using Bruno output for stand alone sim.

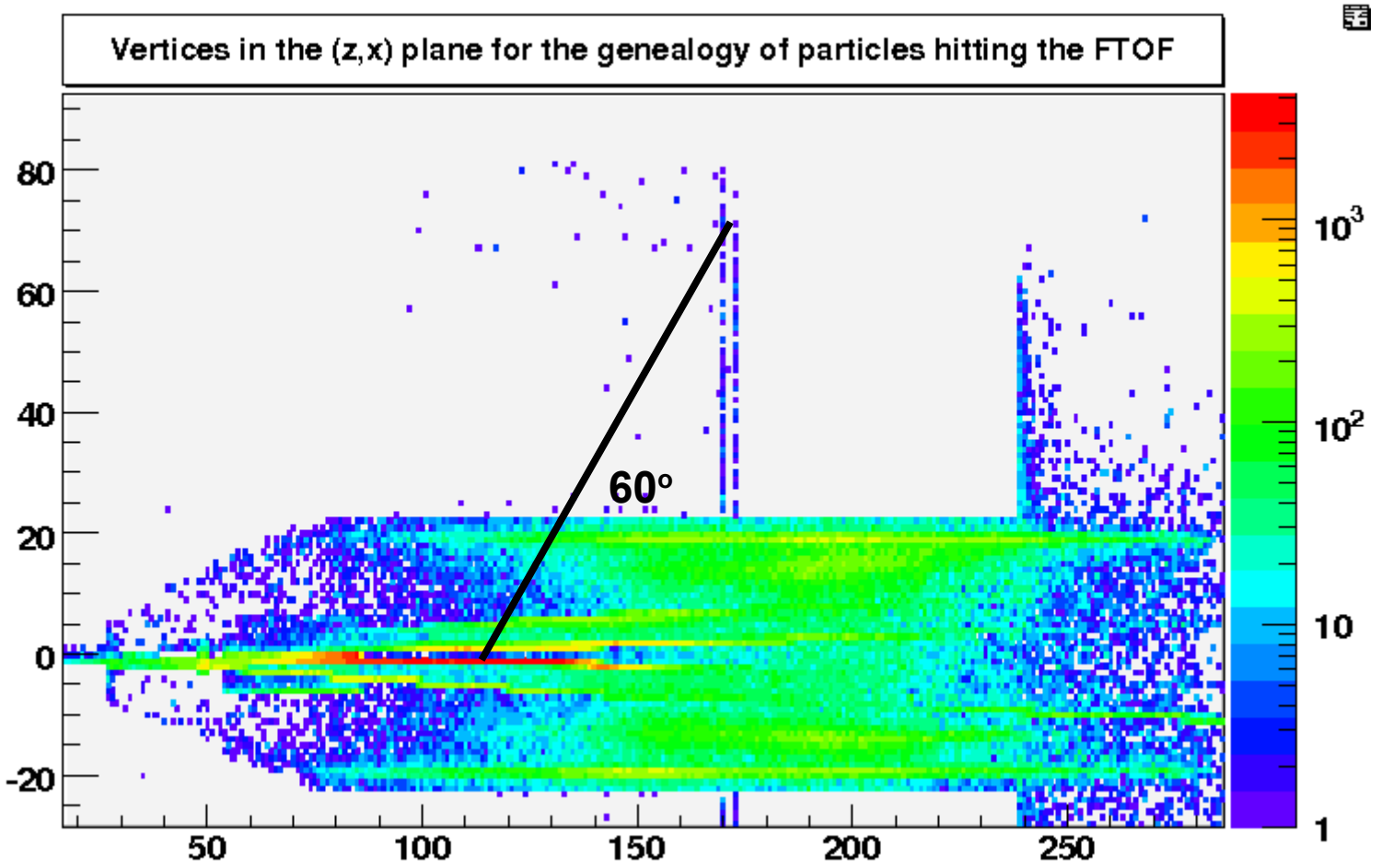
Where they come from?



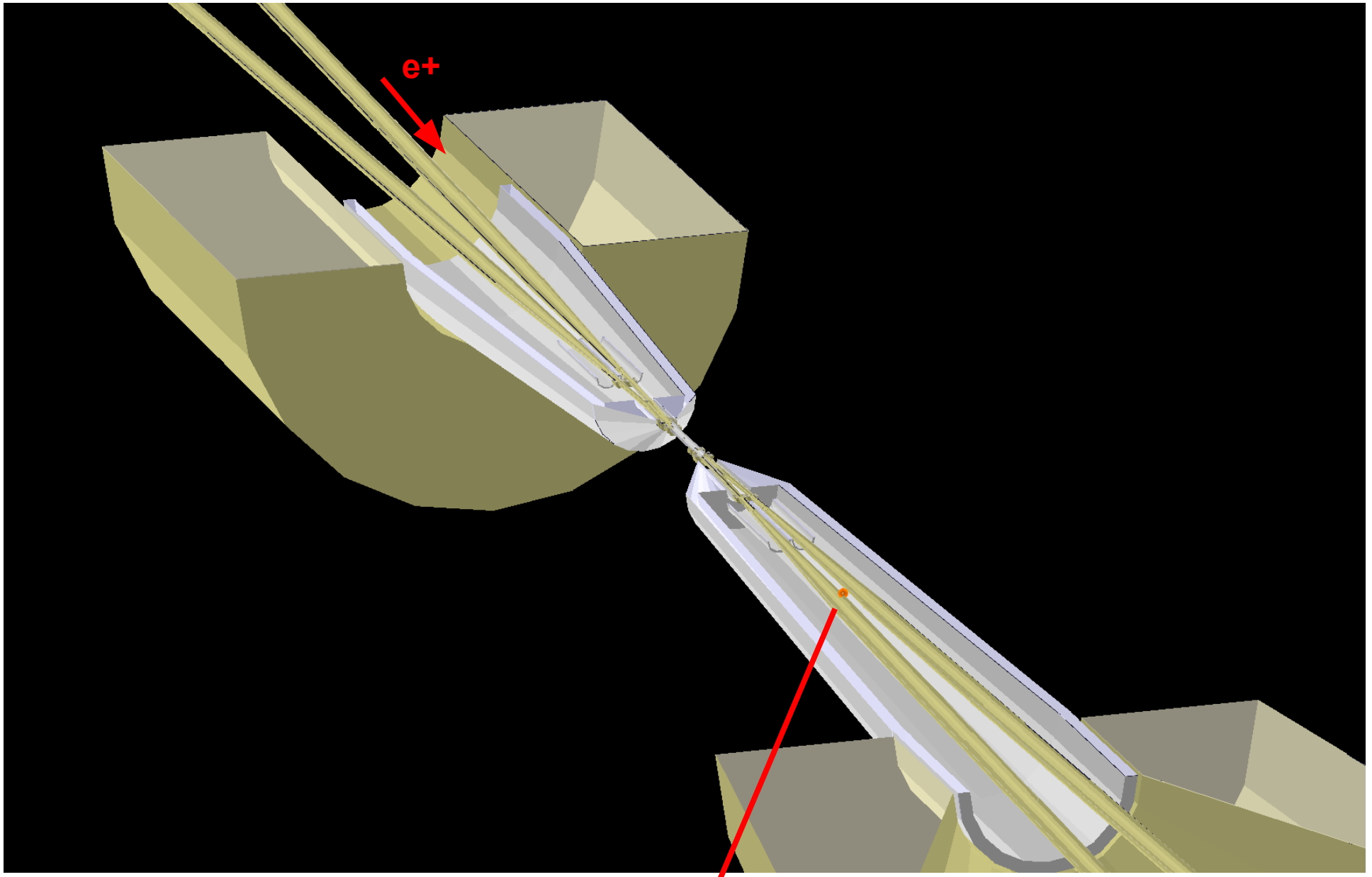
FTOF

They do not come from interaction region :-)

Where they come from?



The positrons hit the beam pipe around z = 130 cm , x = -1cm



z = 130 cm , x = -1cm

Thank you for your attention!!!