Influence of the radiative BhaBha on fTOF background

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Outlook

- ⟶ Main sources of background, **using inputs from Bruno**
- ⟶ Two methods to estimate the number of photo electrons (p.e.) in fTOF
- ⟶ Estimation of the PMT rate and collected charge

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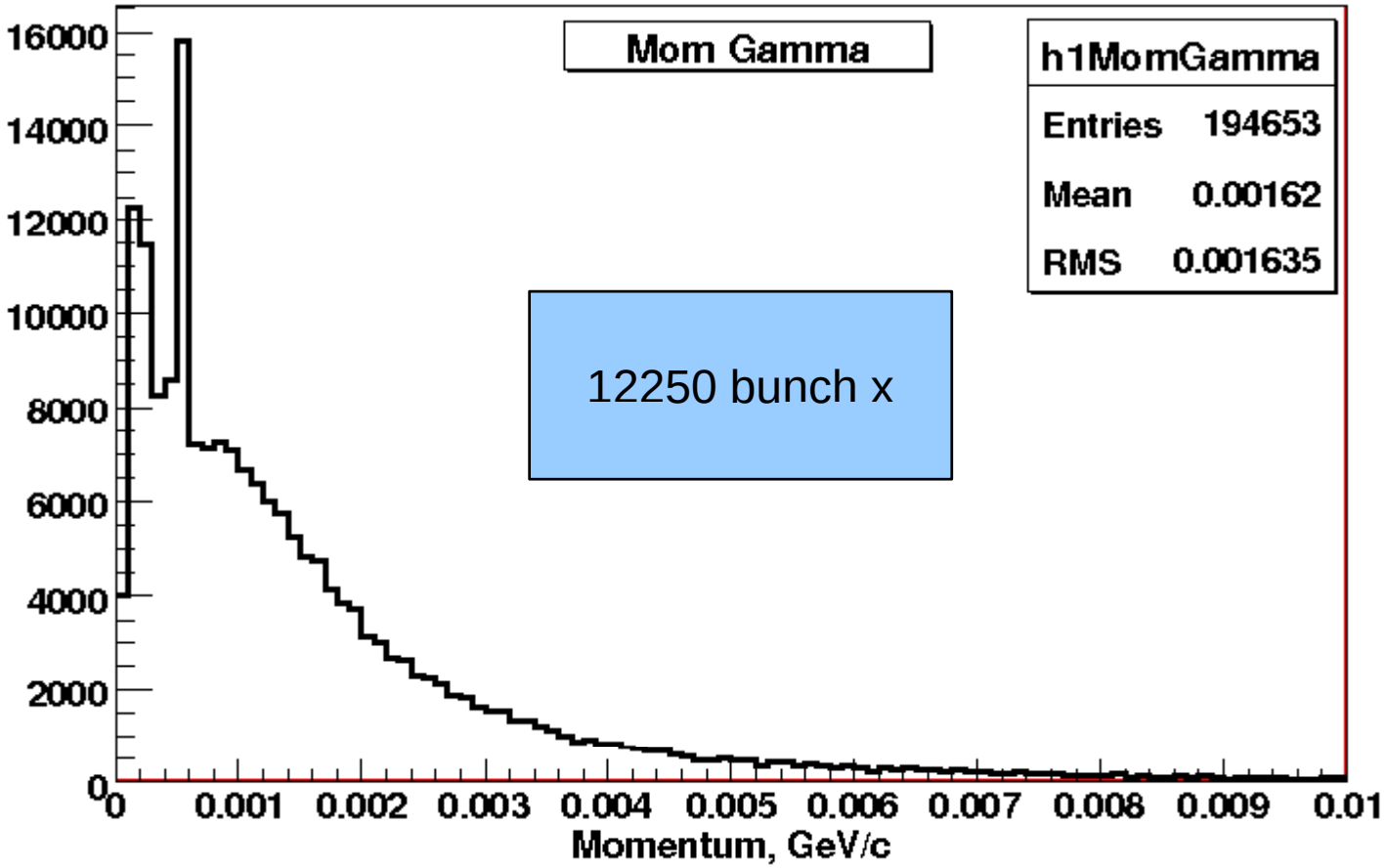
Main sources of background

In forward region:

Gammas	– 87%
Neutrons	– 10%
Electrons,positrons	– 3%
Protons	< 0.1%

(using inputs from Bruno)

Momentum spectrum of the gammas entering fTOF envelop



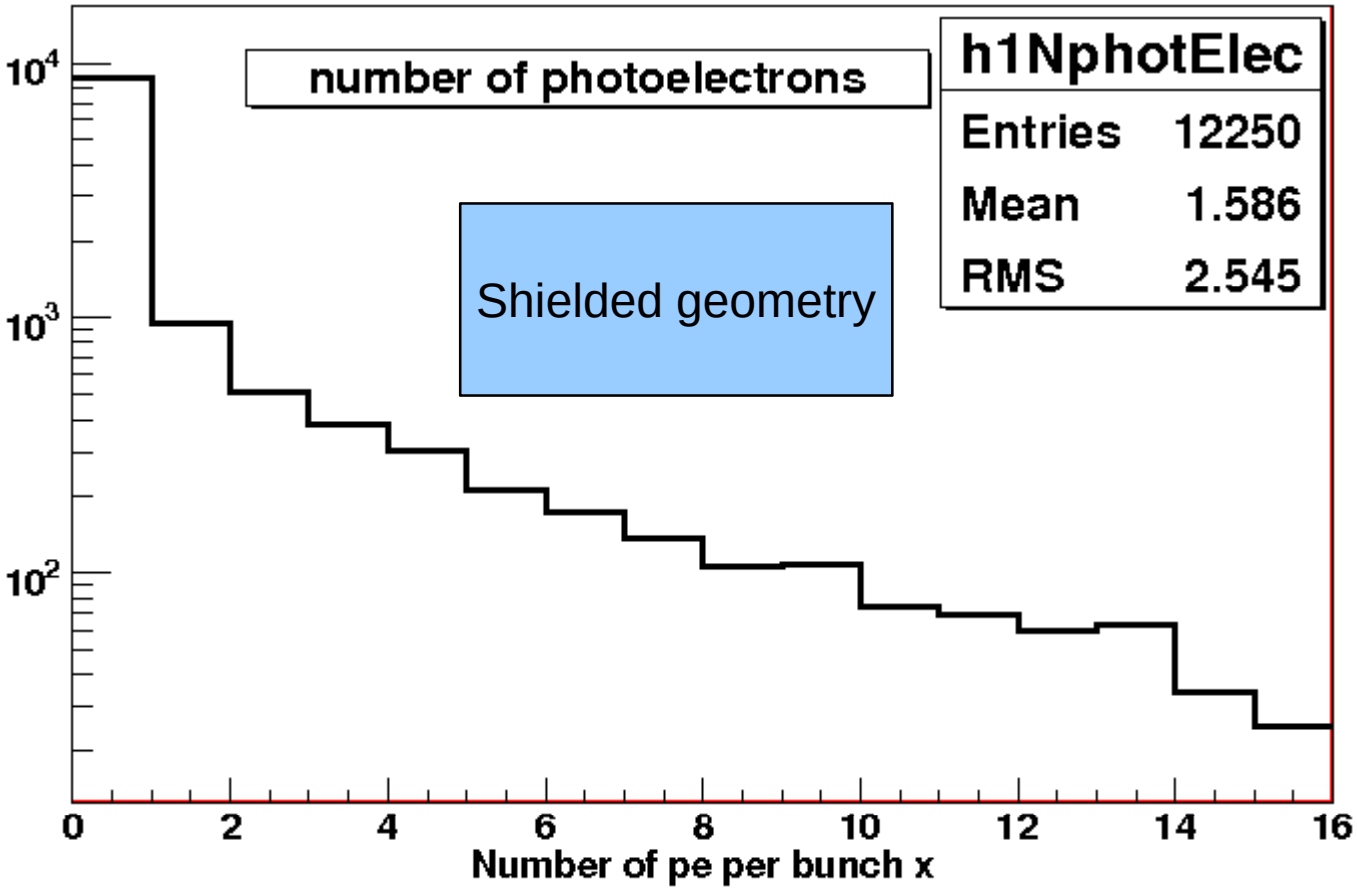
~16 gammas with momentum 1.6MeV entering the fTOF envelop region per bunch x

Estimating the number of photo electrons: method 1

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

sin^2 (Theta_Cherenkov) = 1 - 1/(n^2beta^2)

L – given by Bruno
No = 26 (assume same performances as in BaBar)
n = 1.47
beta – given by Bruno

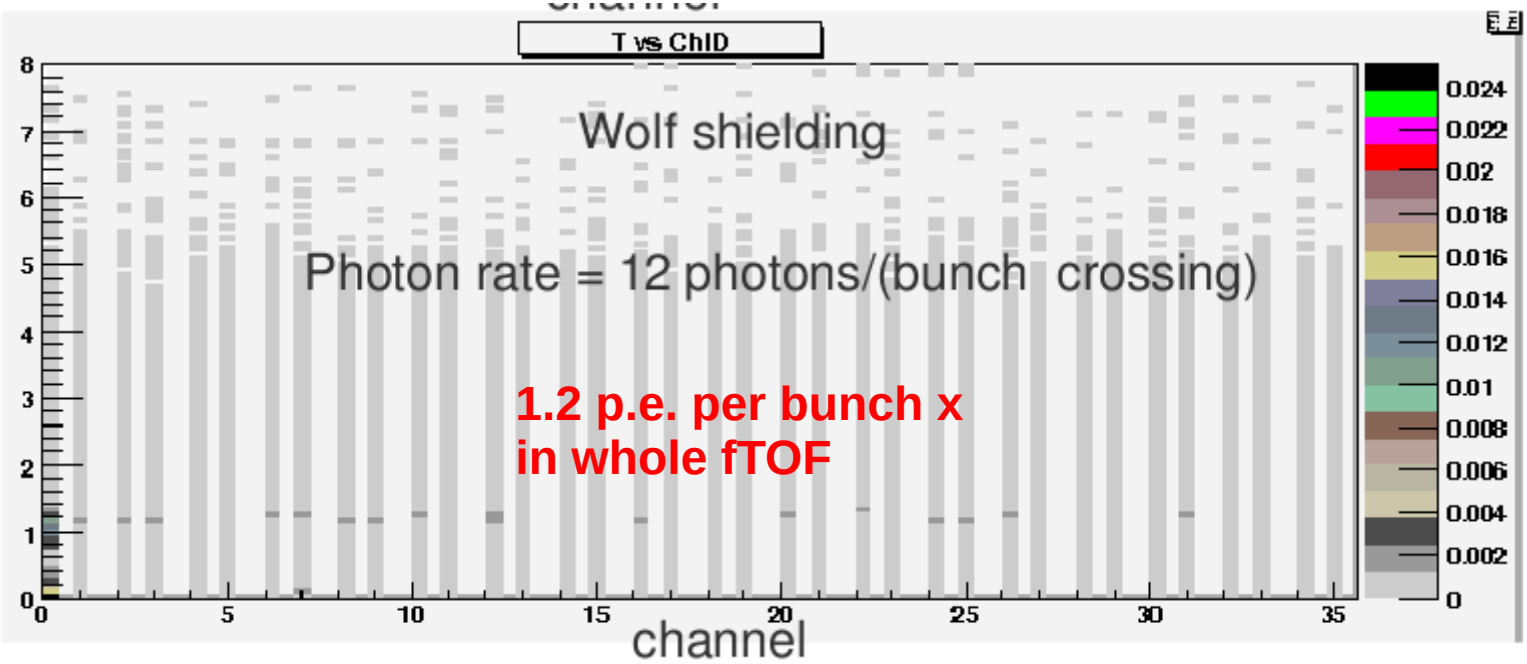


Gammas, electrons, positrons are taken into account.

1.6 p.e. per bunch x in whole fTOF

Estimating the number of photo electrons: method 2

We can use output from Bruno as input in standalone simulation of the fTOF



http://agenda.infn.it/getFile.py/access?contribId=124&sessionId=19&resId=0&materialId=slides&confId=2026

Both methods give approximately the same number of p.e.

Estimation of the rate and collected charge of the PMTs

→ 209 MHz – bunch x frequency → 1 year = $2.0 * 10^7$ s

→ 12 sectors

→ 14 PMTs → Surface of one channel = 1.1 cm^2
PMT gain = 10^6

→ 4 channel/PMT

→ Using 1.5 p.e. / event as input for the equations below

Rate =
1.5(p.e.) * 209MHz/(14(PMTs) 12(sectors) 4(channels))
= **470 kHz / channel**

Charge =
1.5(p.e.) * 209MHz * 10^6(gain) * 2.0 * 10^7(sec in year) * 1.6 *10^{-19}(electron charge)/(14(PMTs) 12(sectors) 4(channels) 1.1cm^2)
= **1.4 C / (cm^2 year)**