Photon flux measurements

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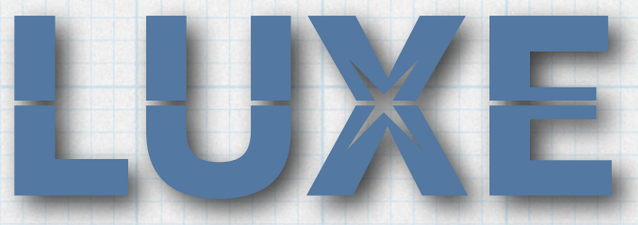
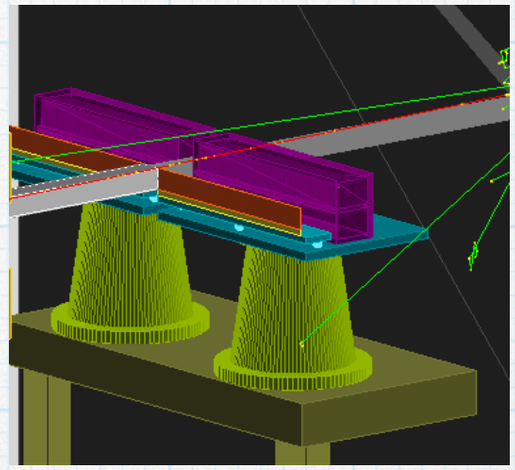
LUXE simulation meeting

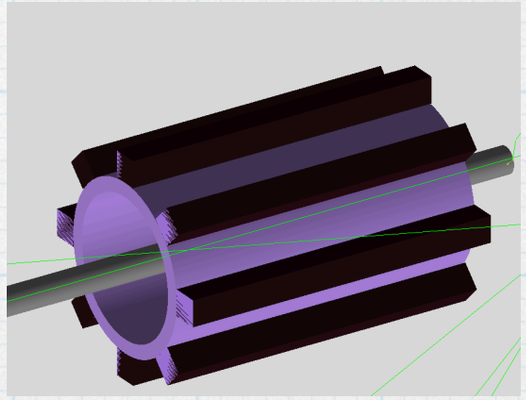


Tasks

To measure total flux of photons above some threshold (~MeV-GeV)



- the technologies:
  a) conversion detector



b) backscattering calorimeter

For the CDR
a) quantify how well a) and b) can measure the flux and above which threshold =>
 show relative resolution on photon flux of the two technologies as function of number of photons

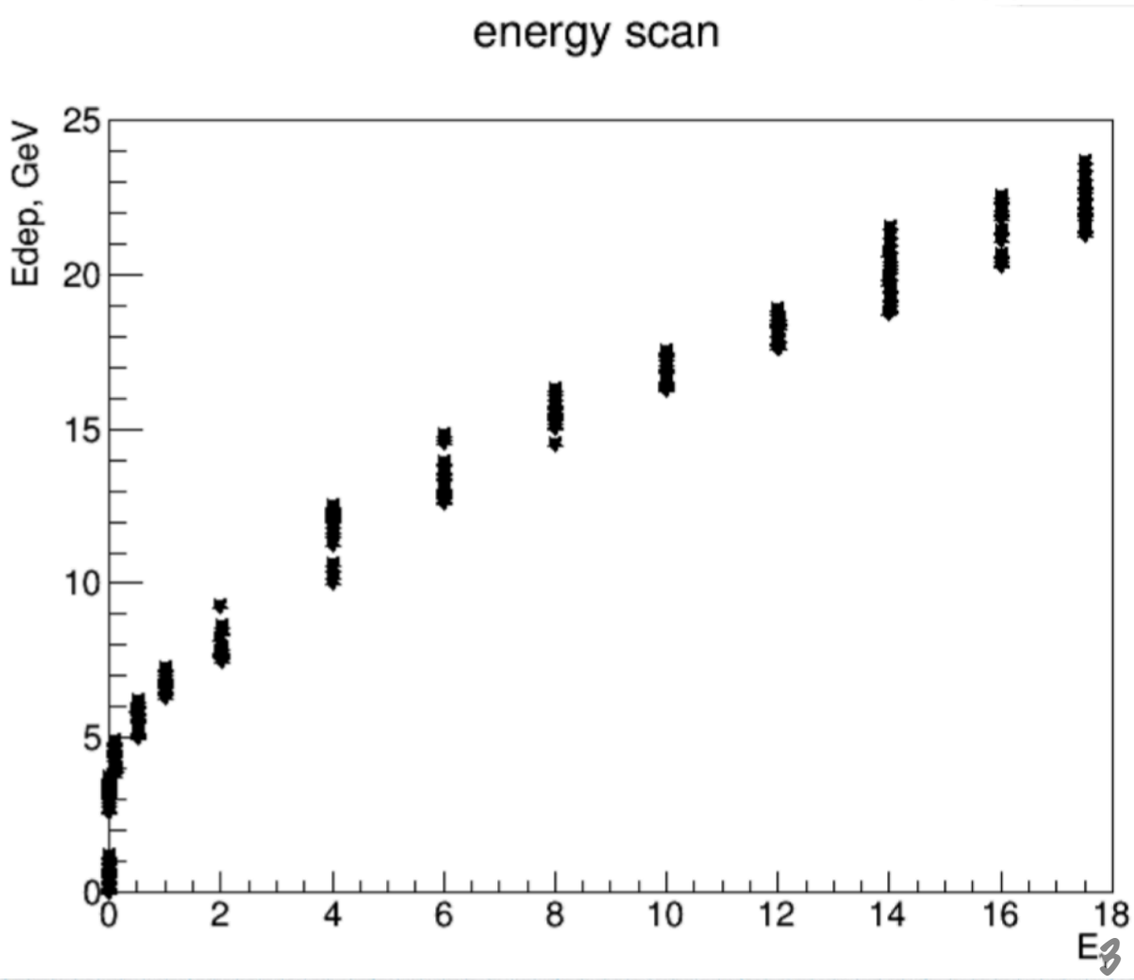
To estimate above which threshold detector is sensitive

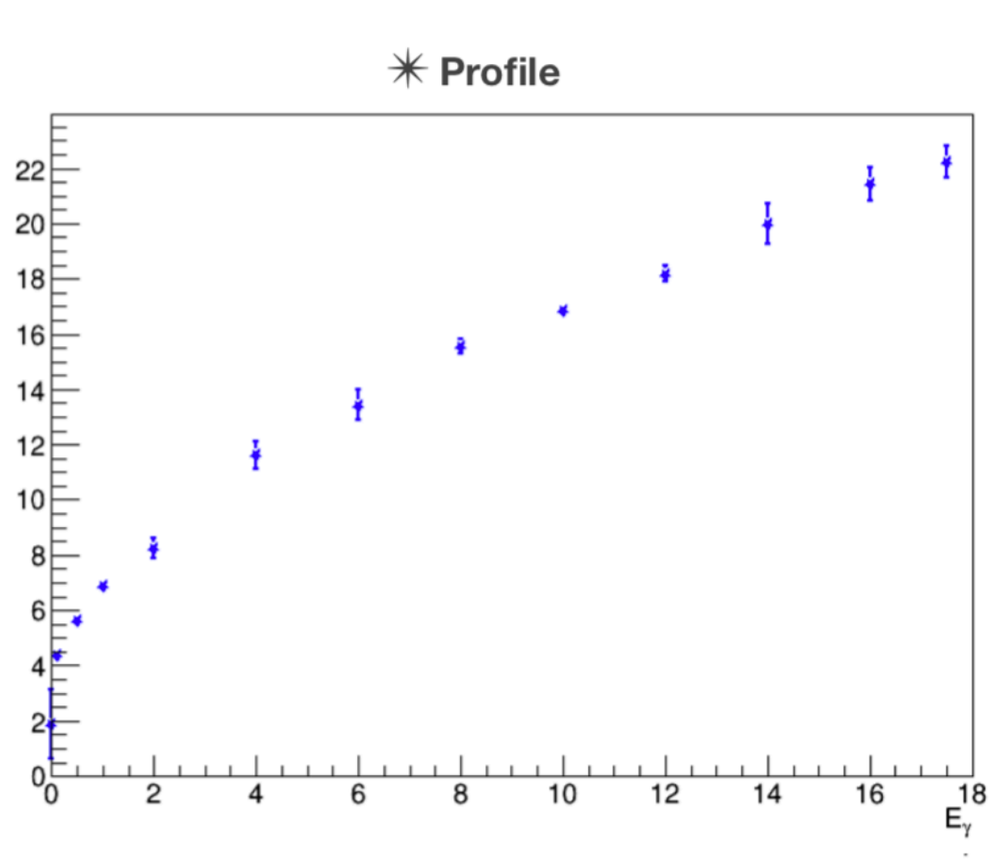
backscattering calorimeter with 48 blocks, running now for the configuration with 8 blocks

Energy dependence of deposited energy in Gamma monitor

20 Runs* 100000 photons with mono energies: 1,2,4,6,8,10,12,14,16 and 17.5 GeV

Added lower energies 0.0001, 0.1, 0.5 GeV



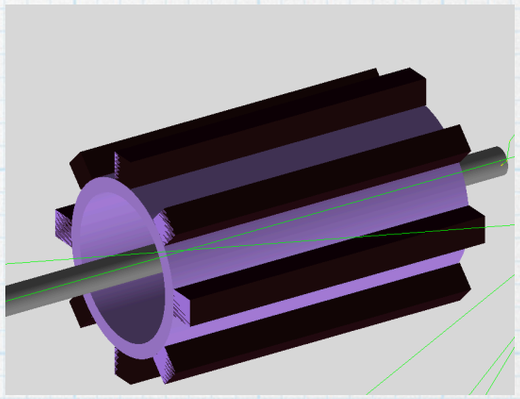


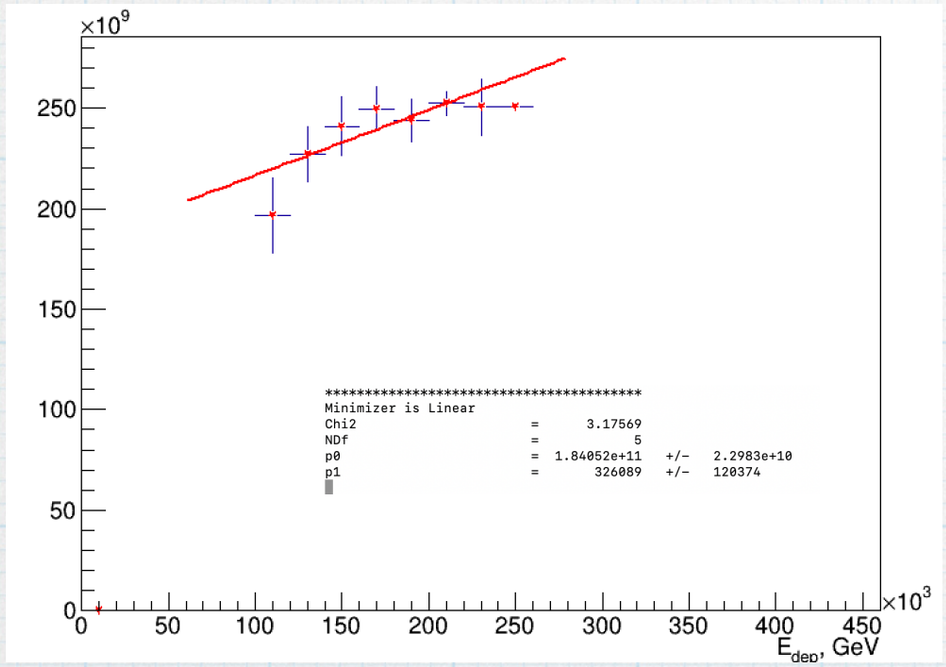
To estimate relative resolution on photon flux

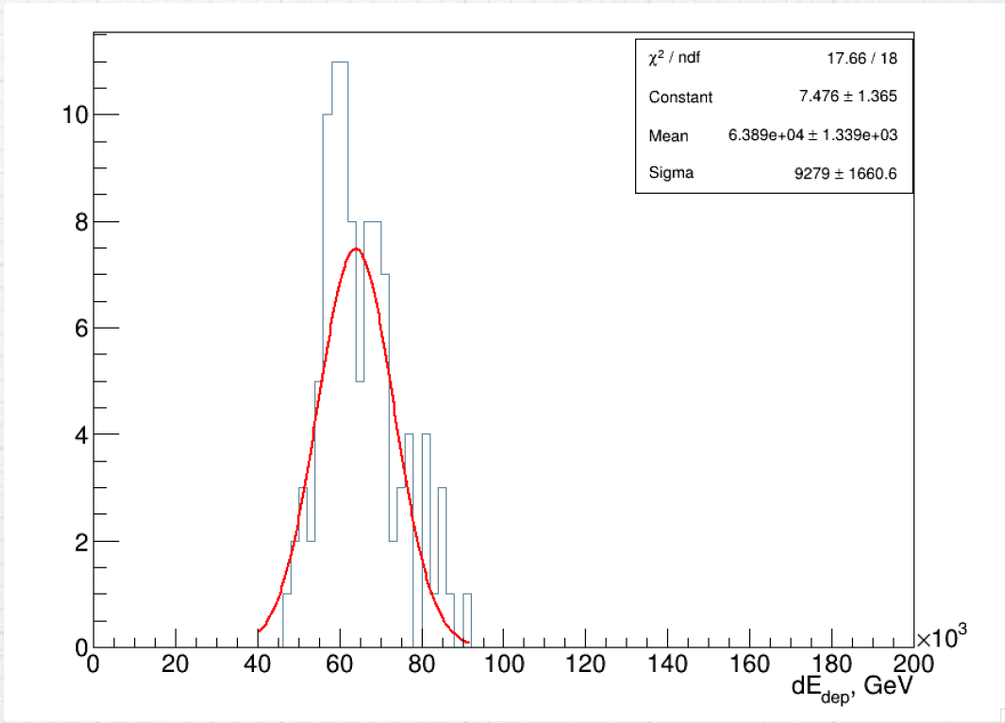
N(E) number of photons

$$\Delta N = \frac{\partial N}{\partial E}\Delta E \quad \Rightarrow \quad \frac{\Delta N}{N} = \frac{1}{N}\frac{\partial N}{\partial E}\Delta E$$

- ξ = 2.0



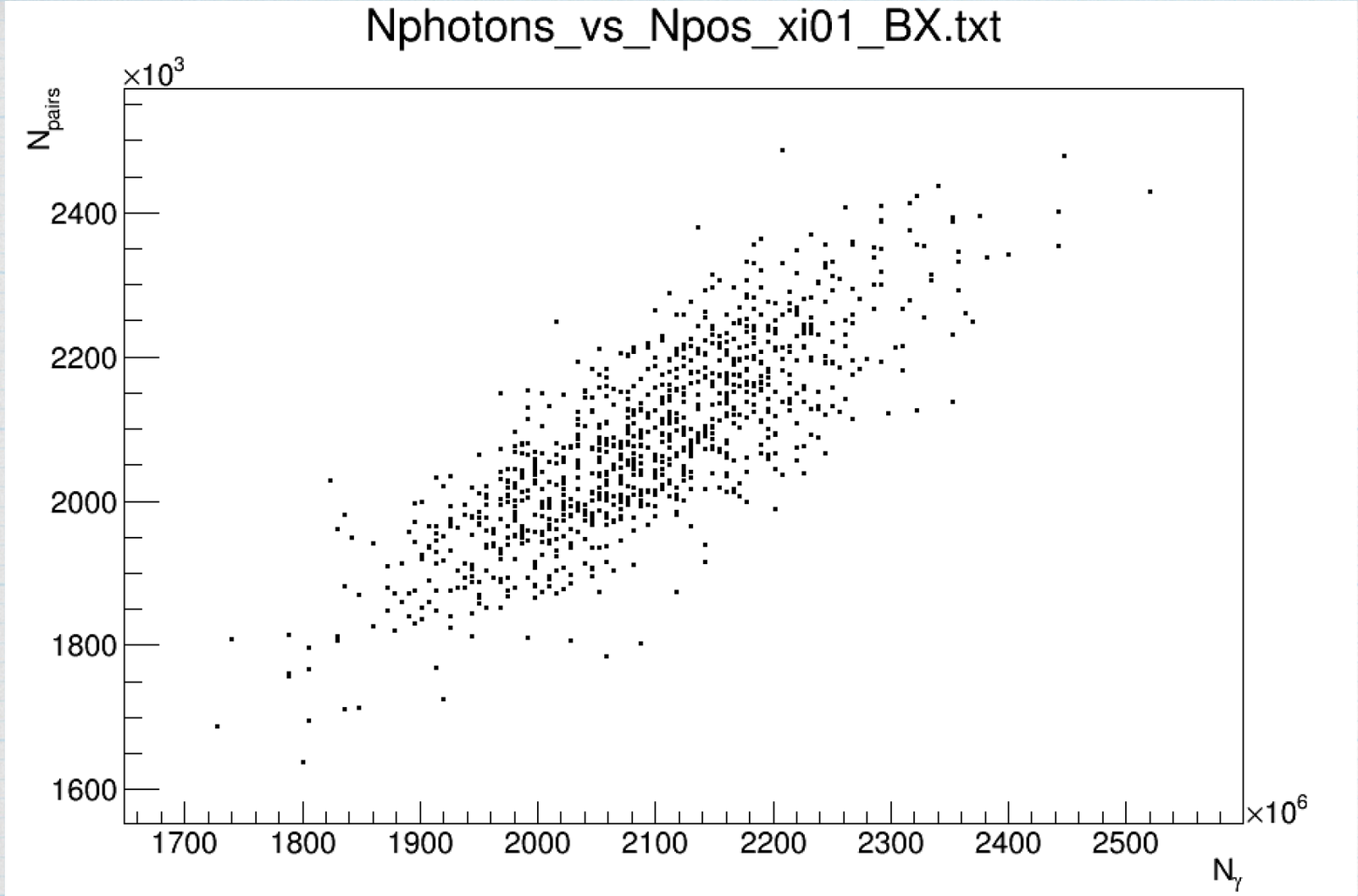




$\xi = 2.0 : \Delta N/N = 9.3*10^3*3.3*10^5/4.3*10^{10} = 7.1*10^{-2}$

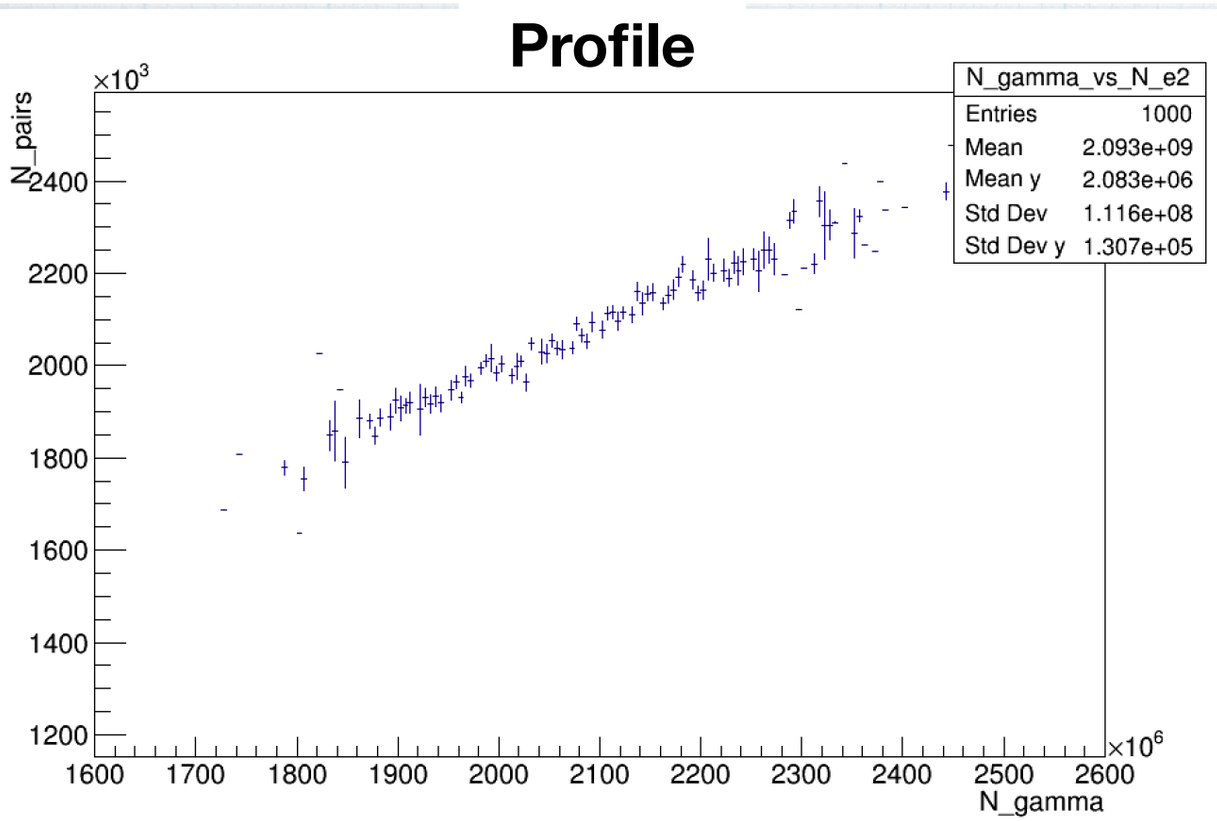
$\xi = 2.6 : \Delta N/N = 3.3*10^4*3.3*10^5/2.5*10^{11} = 4.4*10^{-2}$

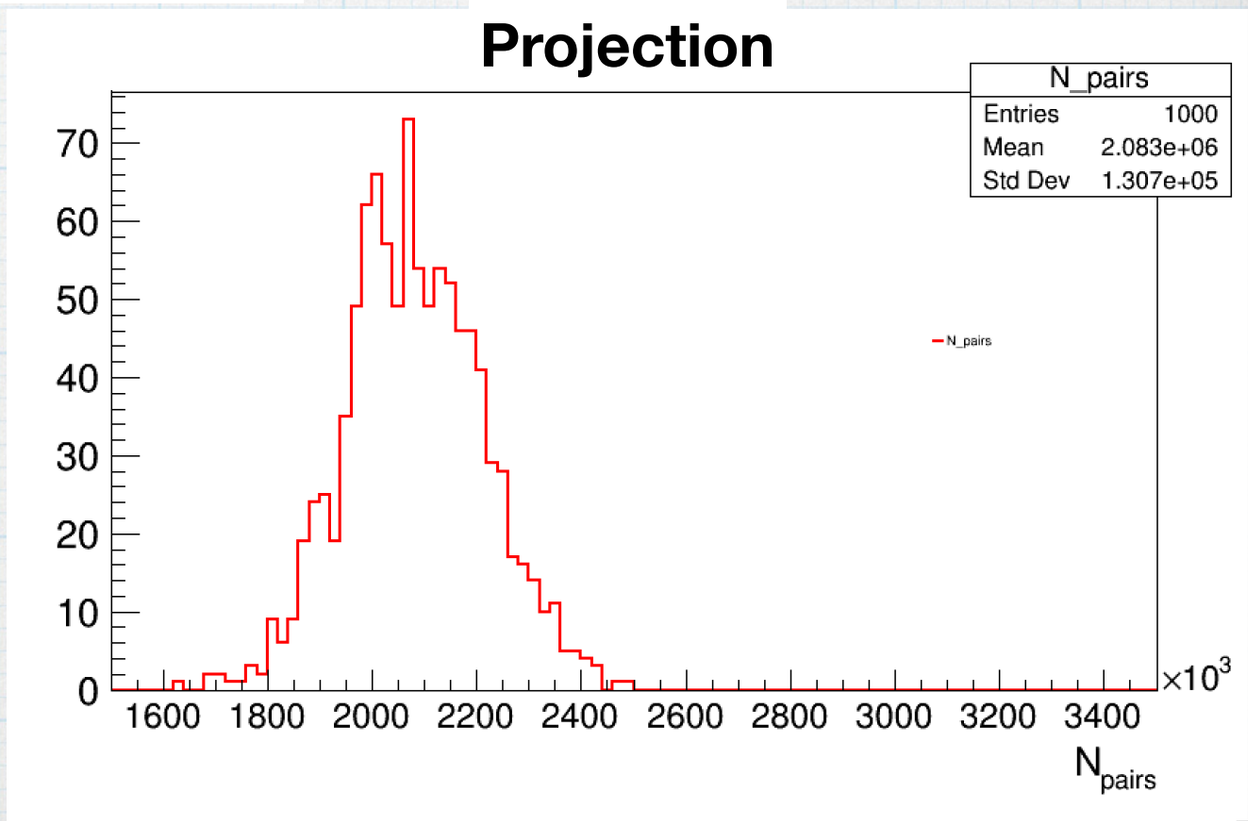
the uncertainty on number of measured photons will be ~ 3.5 *10^{-3} - 7.1 *10^{-2}.



To estimate relative resolution on photon flux:

number of pairs vs number of photons per BX for xi=0.8 (0.1 J)





Summary

* To estimate relative resolution on photon flux of the two technologies as function of number of photons for new MC and updated G4 setup

Back up