Gamma Monitor using backscatters

Borysova Maryna (KINR)

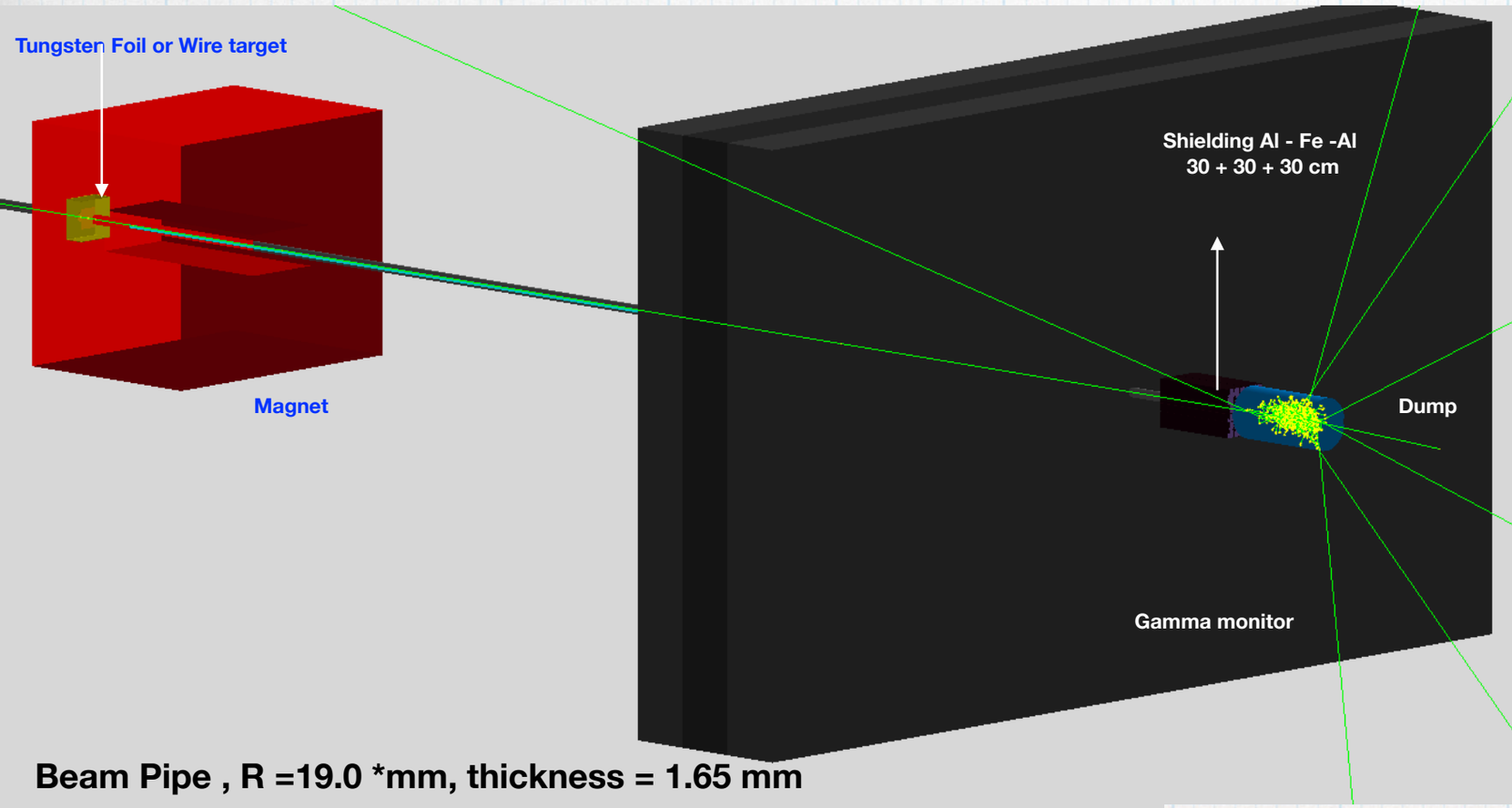
LUXE technical meeting

DESY Hamburg

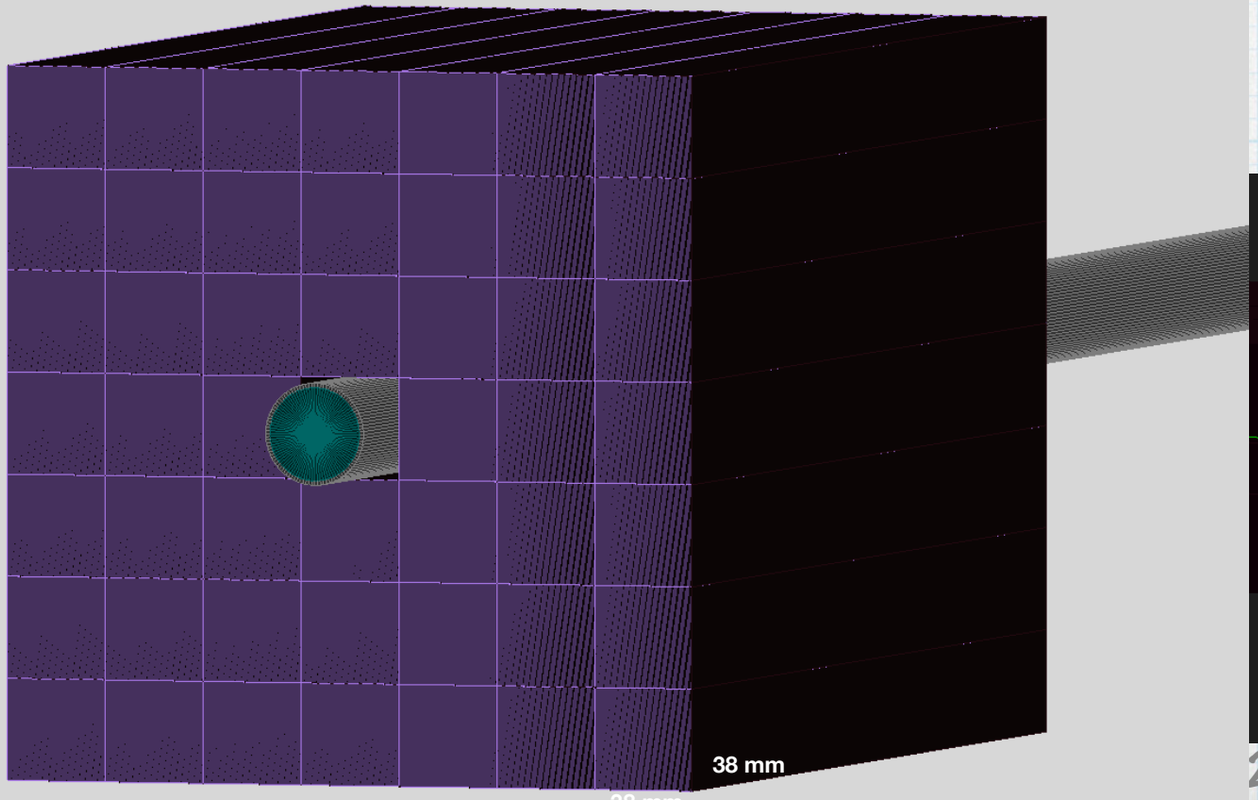
7/05/20

LUXE

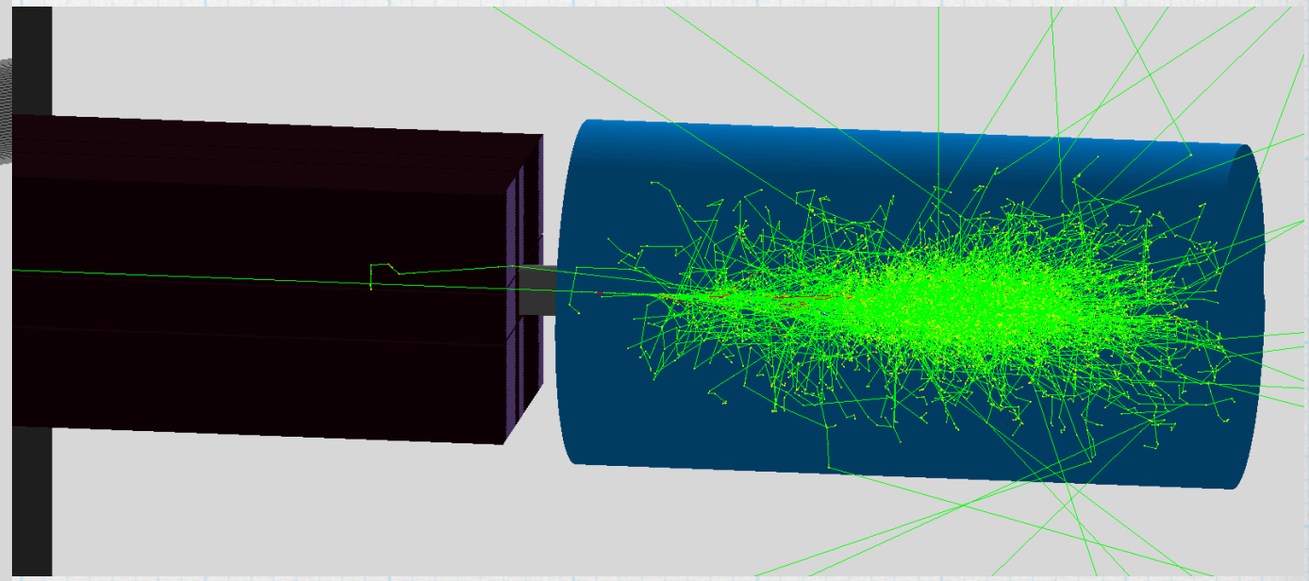
Gamma Monitor



- The implementation of FDS in Luxe geometry with the LG Gamma Monitor made of new LG blocks in front of Al-Cu Dump,
- LG w/ measures 3.8 × 3.8 cm^2, length is 45 cm
- Wrapped with Aluminium foil of 0.016 mm (typical household foil; no account for air)



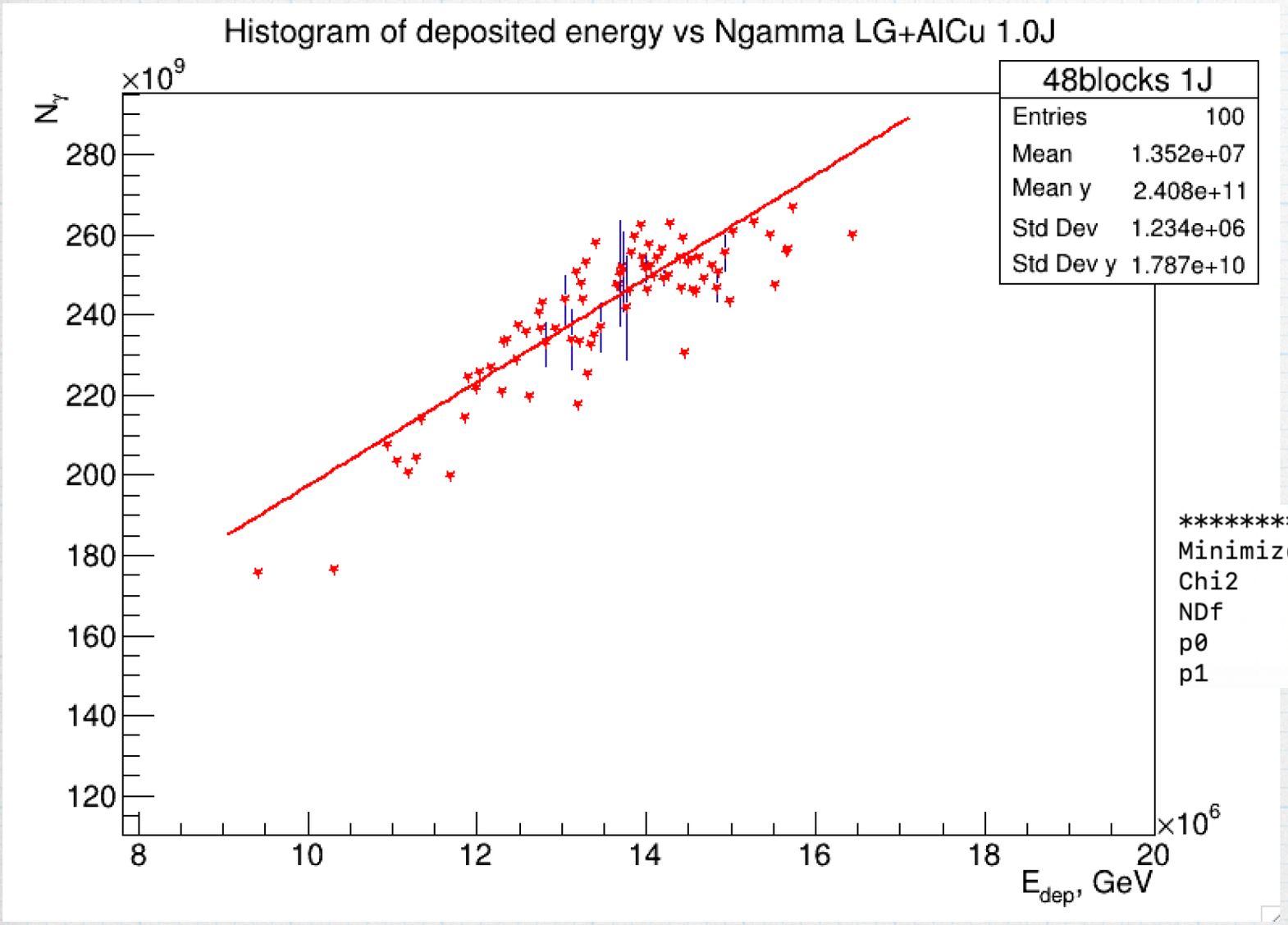
- Distance between Monitor and Dump 2 cm



Uncertainties Estimation

N(E) number of photons

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



for $\xi = 2.6$

$N \sim 2.5 * 10^{11}$

$\partial N/\partial E$

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******************************************
Minimizer is Linear
Chi2                      =      49.2879
NDf                       =           13
p0                        =  6.79976e+10   +/-   3.97264e+09
p1                        =      12940.5   +/-   282.483
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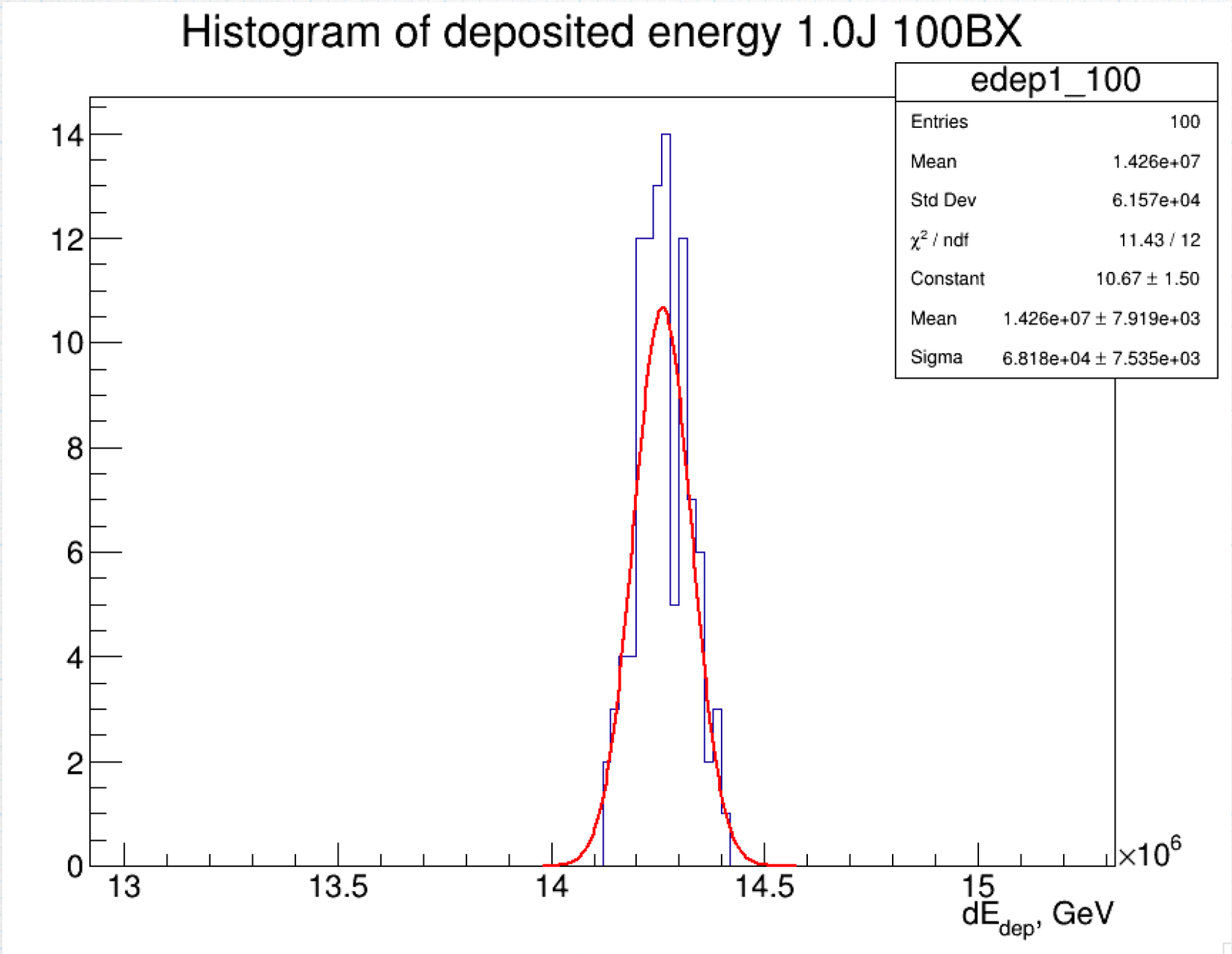
ΔE, for ξ =2.6



One BX was sent 100 times

=> $\Delta E = 6.8 * 10^4$

$N = 2.5 * 10^{11}$

$\partial N / \partial E = 12940$

$$\frac{\Delta N}{N} = \frac{1}{N}\frac{\partial N}{\partial E}\Delta E = 6.8*10^4 * 1.3 * 10^4 / 2.5 * 10^{11} = 3.5 * 10^{-3}$$

Outlook

- **Gamma monitor studies:**

The uncertainties estimation on number of photons for 48 LG blocks

✶48 TF1(GAMS) blocks

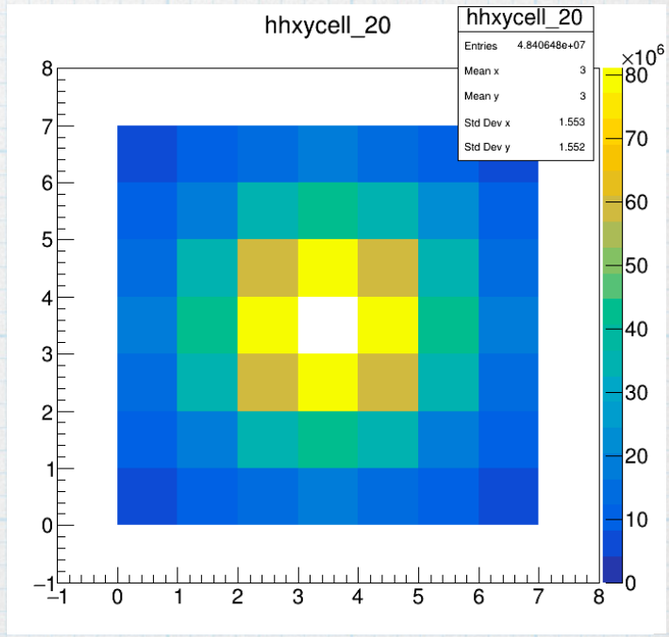
✶At high laser intensities (1J) for the blocks that closely surround the beam pipe the uncertainty on number of measured photons will be ~ 3.5 *10^{-3}

✶To do:

✓To estimate uncertainties for other (0.6, 0.35, 0.2, 0.1, 0.01J) laser intensities (running)

✓To estimate uncertainties for one LG block

✓To estimate uncertainties for each of the three layers



Back up