Status update: Cherenkov detector

GEANT4 simulation

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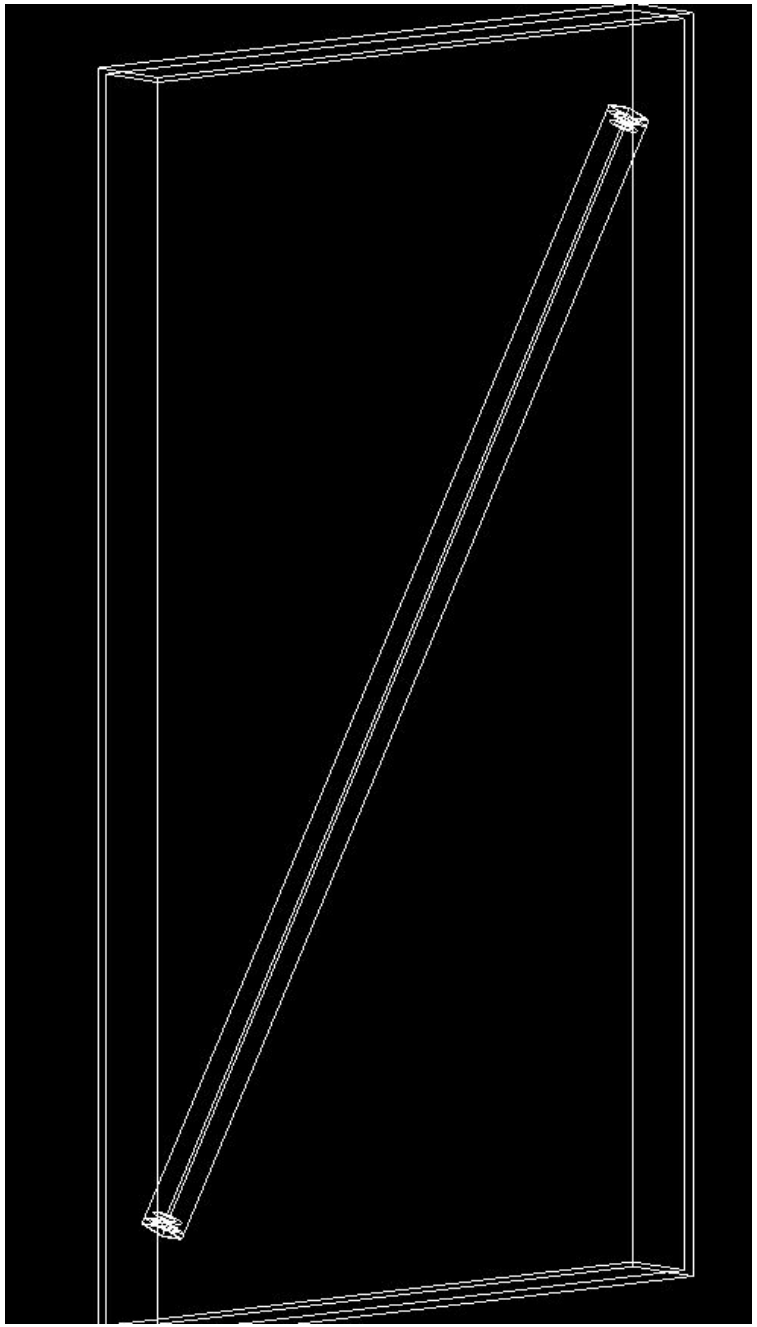
HELMHOLTZ

DESY.

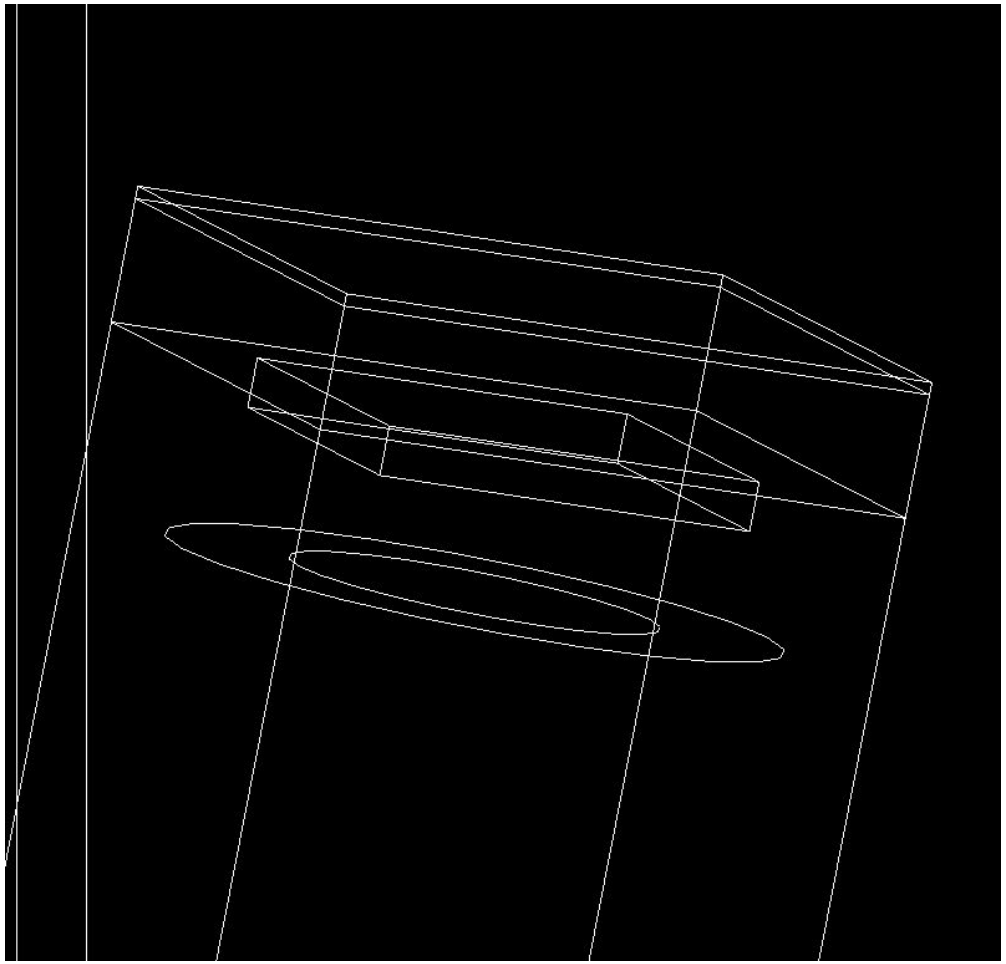
Technical details on the simulation

- Geometry contains aluminium box with “straw units” inside



Technical details on the simulation

- Geometry contains aluminium box with “straw units” inside
- Unit contains a straw and a PCB with a SiPM on each end



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- Geometry contains aluminium box with “straw units” inside
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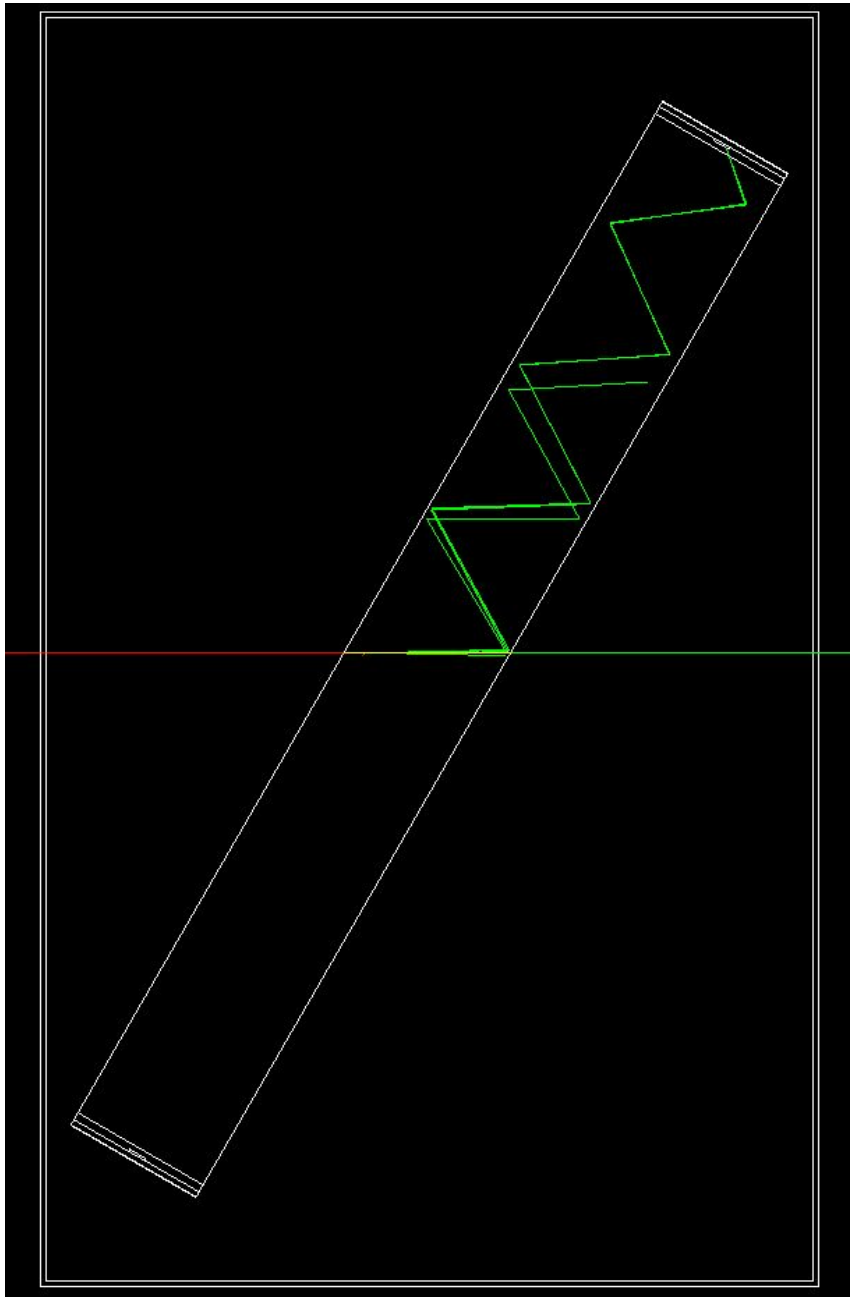
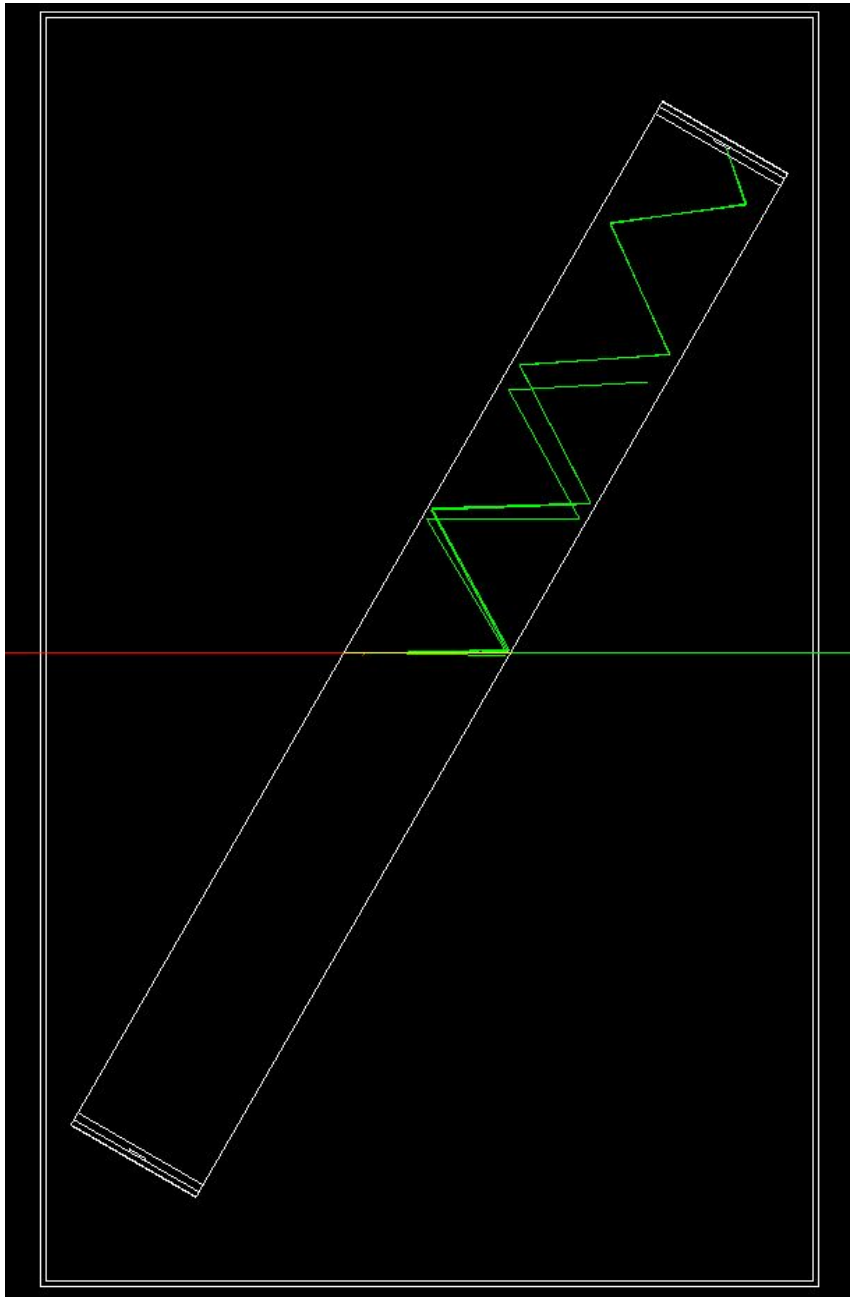
- Simulation build with EM physics and optical photons



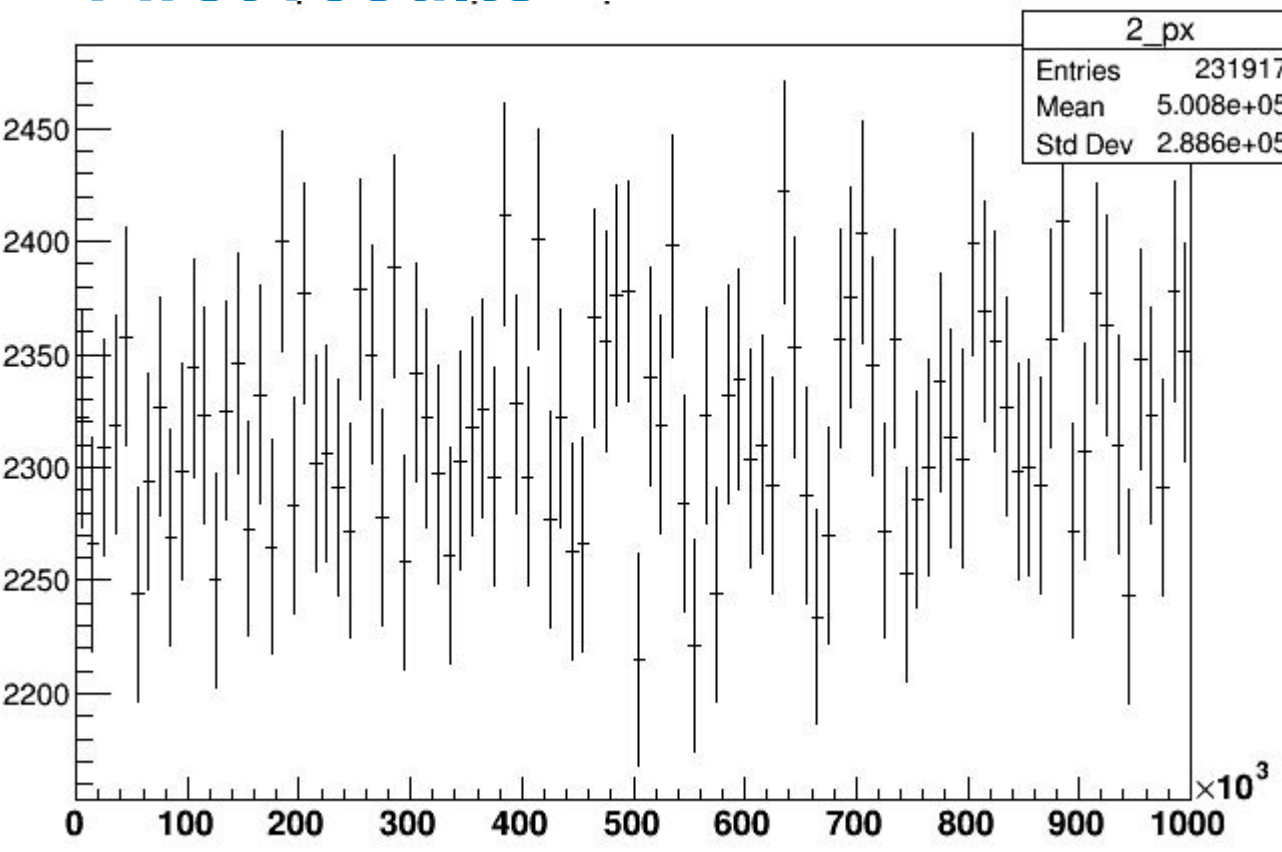
Technical details on the simulation

- Geometry contains aluminium box with “straw units” inside
- Unit contains a straw and a PCB with a SiPM on each end
- Simulation build with EM physics and optical photons
- Variables are:
  - Number of straws, rows of straws
  - For each straw: Angle, inner & outer diameter, length and material (stainless steel, aluminium)

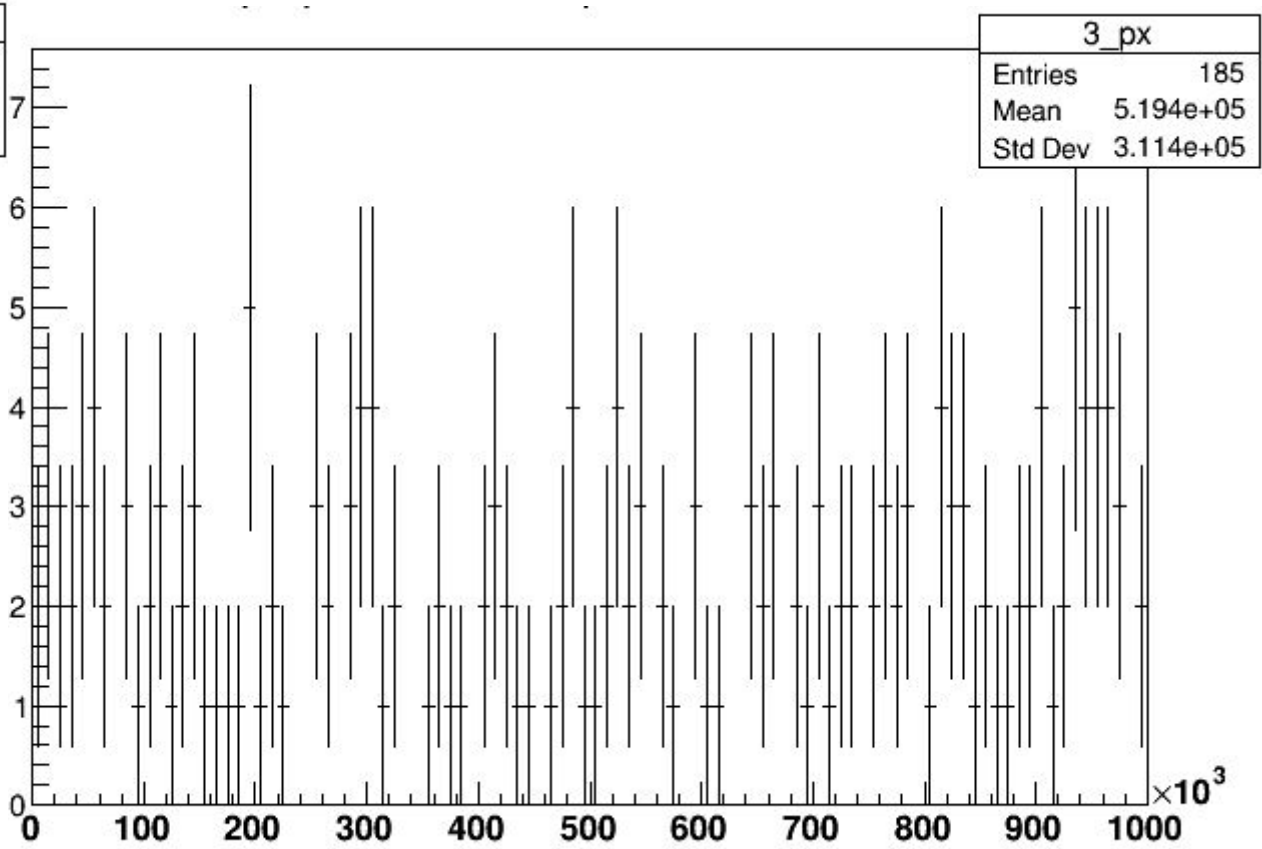
    -> Set via default values or by reading from file



First results



Number of absorbed opt. Photons (10k events per bin)

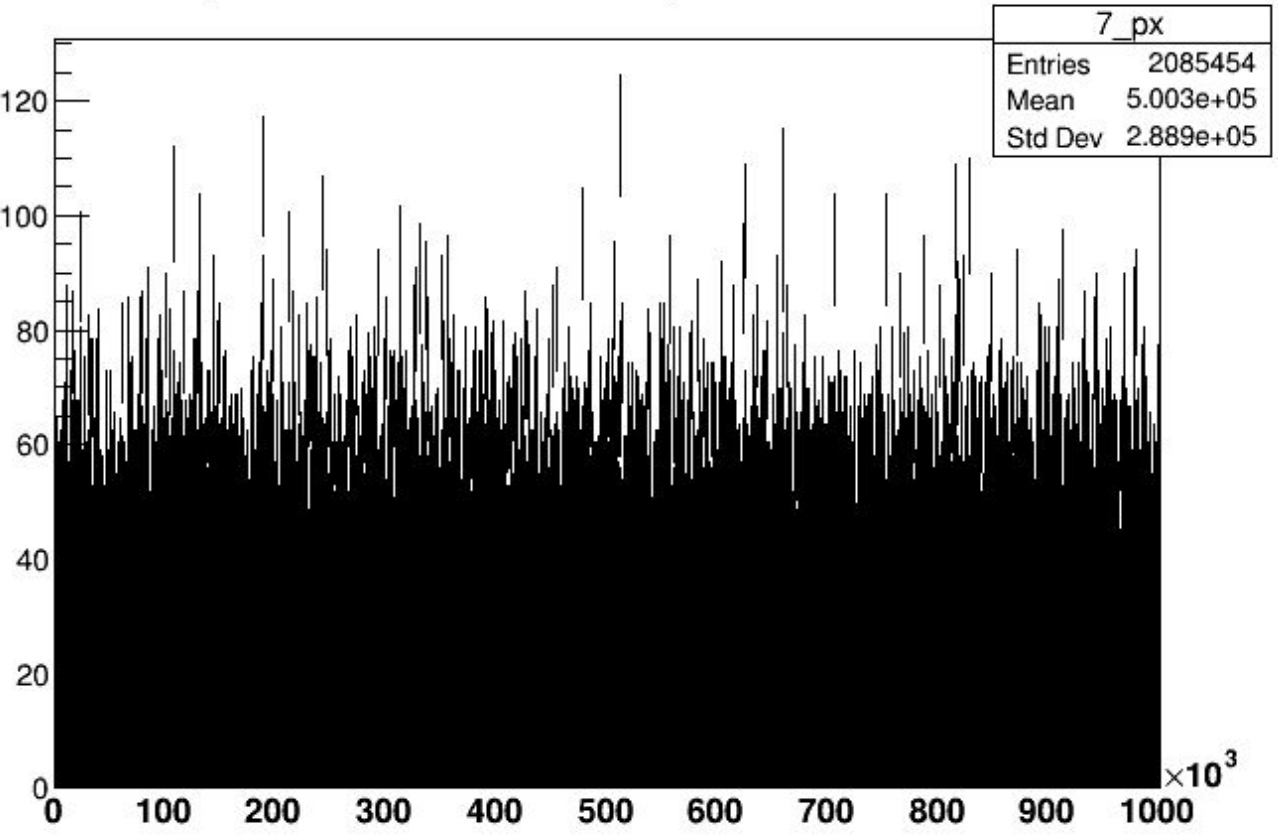


Number of detected opt. Photons (10k events per bin)

- ~25% probability that cherenkov photon is produced
- Number of reflections in range from 0 to ~70

- ~200 photons reach the upper SiPM sensor
- Number of reflections when detected ~60

First results



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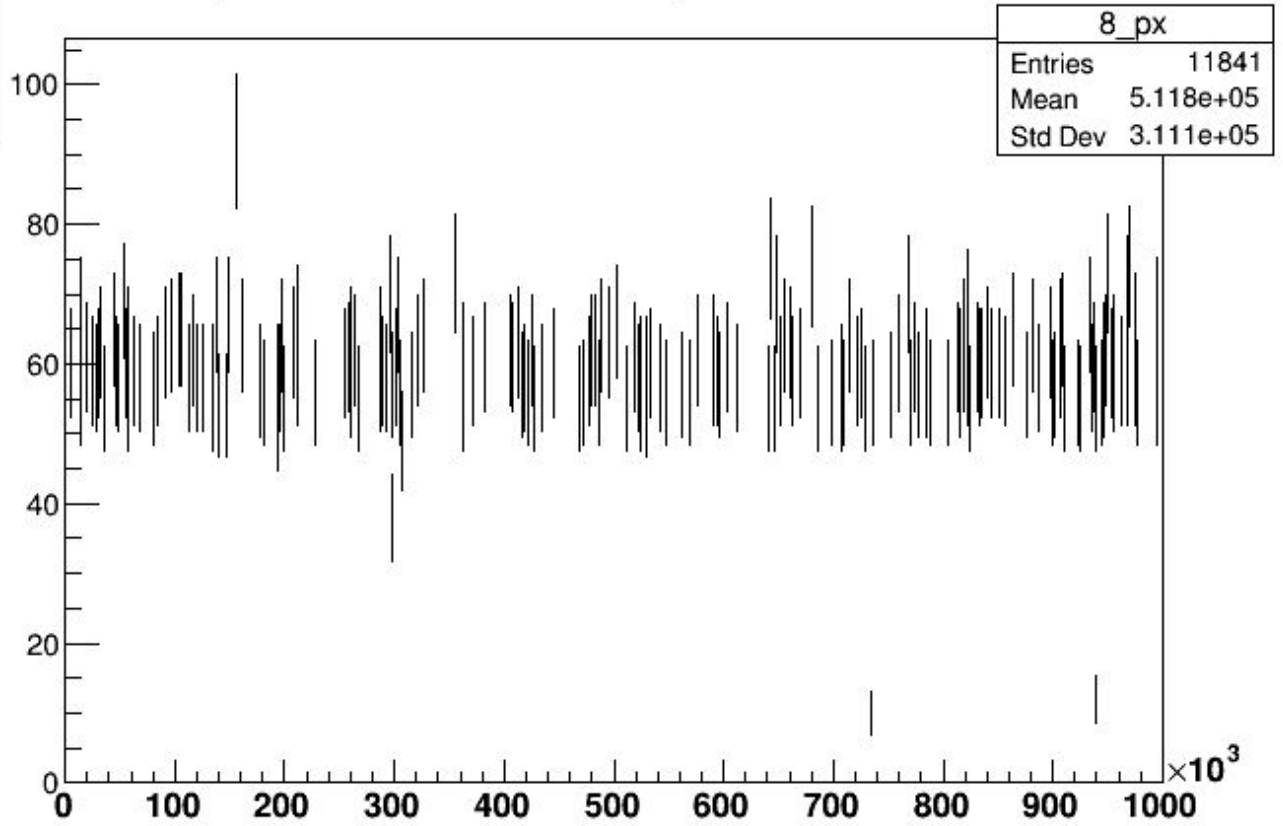

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Open questions

- When straw has a 0° angle, no optical photons are detected in top or bottom of straw in 1M events

  => Higher statistics needed?

- Relation between straw parameters and number of detected photons?

- Relation between beam energy, bunch size and number of detected photons?

- Are the optical parameters realistic?

  => Comparison to measurements?