Preliminary Fluka simulations

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Geometry

- Inner membrane : Fe7Cr2Ni steel thickness 0.12cm $\rho = 7.93 g/cm^3$
- Insulation: polyurethane foam, $C_{17}H_{16}N_2O_4$, $\rho = 0.035 g/cm^3$. 40cm in each dimension
- Steel support: Fe7Cr2Ni 1 cm
- 4 PD modules, 60x60 cm, 1.5cm thickness, assumed plastic
- PDS frame G10, 2.5 cm lateral 1.5 cm thick
- Drift distance 21.5 cm
- inner membrane dimension 100 x 389 x 391.3
- active LAr 337 x 299.3
- Ar gas starts 60 cm from bottom
- Three anode planes, G10, 0.32 cm each

More Geometry

- Axis: x is vertical, z is Salève-Jura
- DD generator shielding:
  - 12 cm square internal hole
  - 15 cm Borated (5%) poly on all sides
  - 2.5 cm lead on all sides
  - $\approx$ 10 cm Al support below
- placement
  - on top of the cryo, at z=y=0
  - on the side, x at middle of the drift
- Neutrons
  - 2.5 MeV monoenergetic
  - isotropically emitted
  - at 1 cm above the bottom poly level

Geometry questions

- Anode: material. thickness, transparency
- Anode support: steel? dimensions?
- PD material ...

Geometry sections

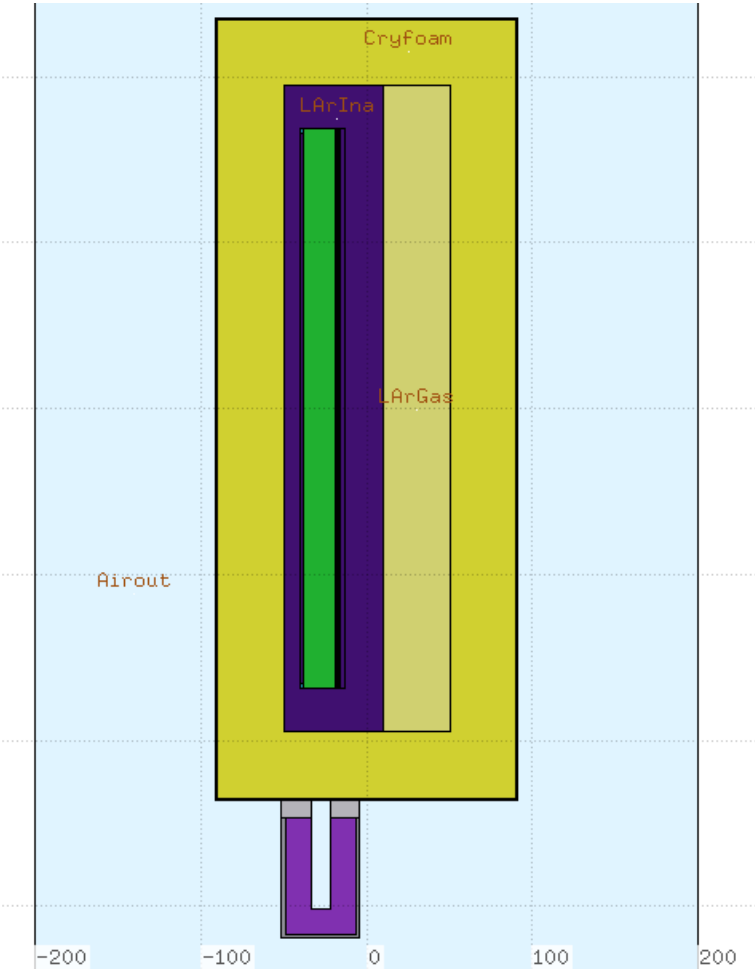
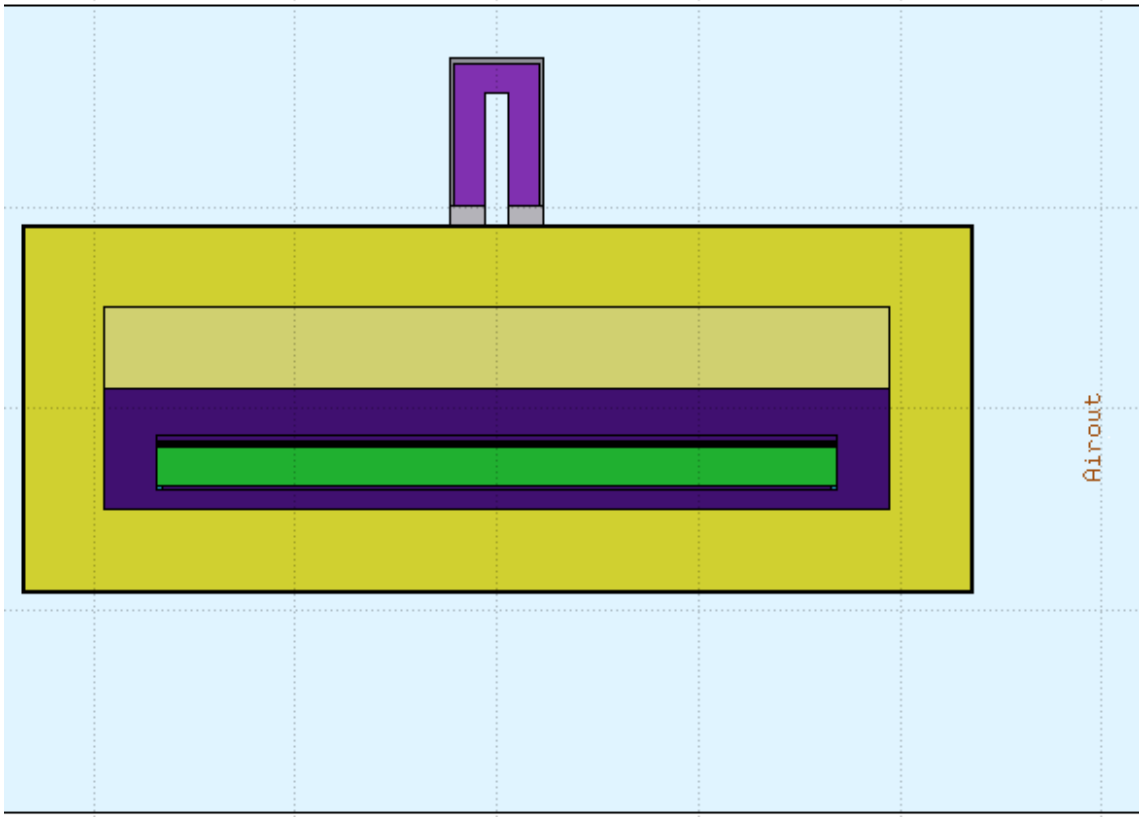


Figure: Top view with DD gun on the side

Figure: Side view with DD gun on the top

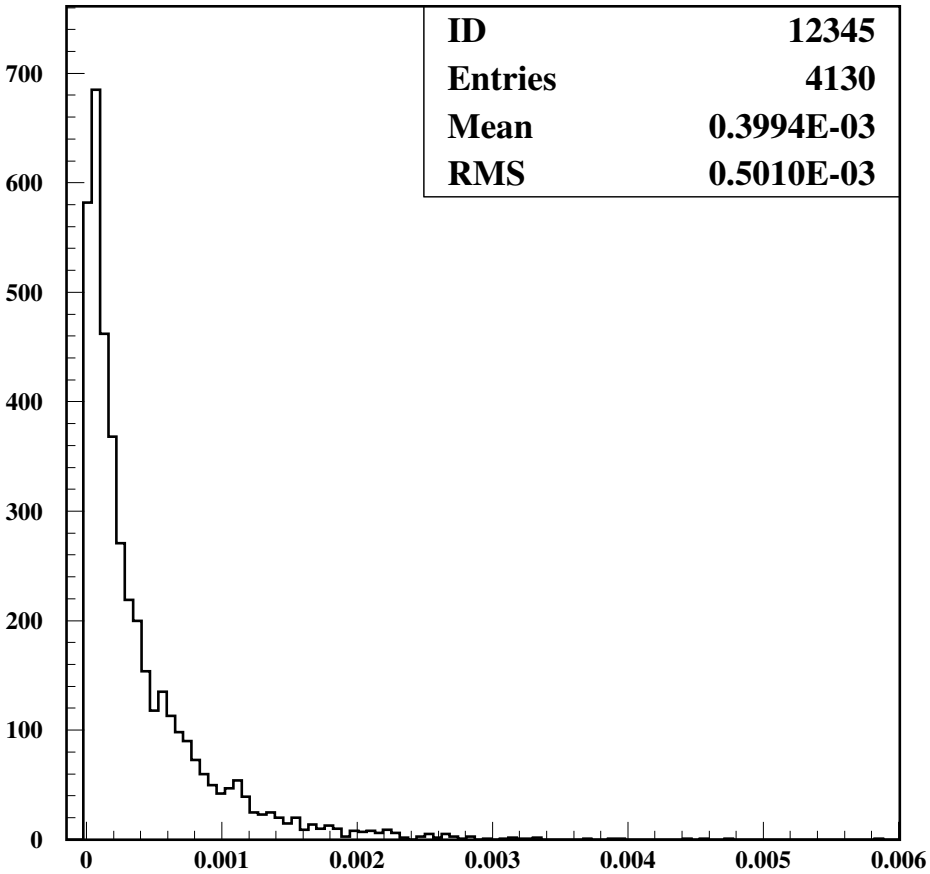


Capture rate and time

Capture rate

On Top 0.0009 captures/neutron

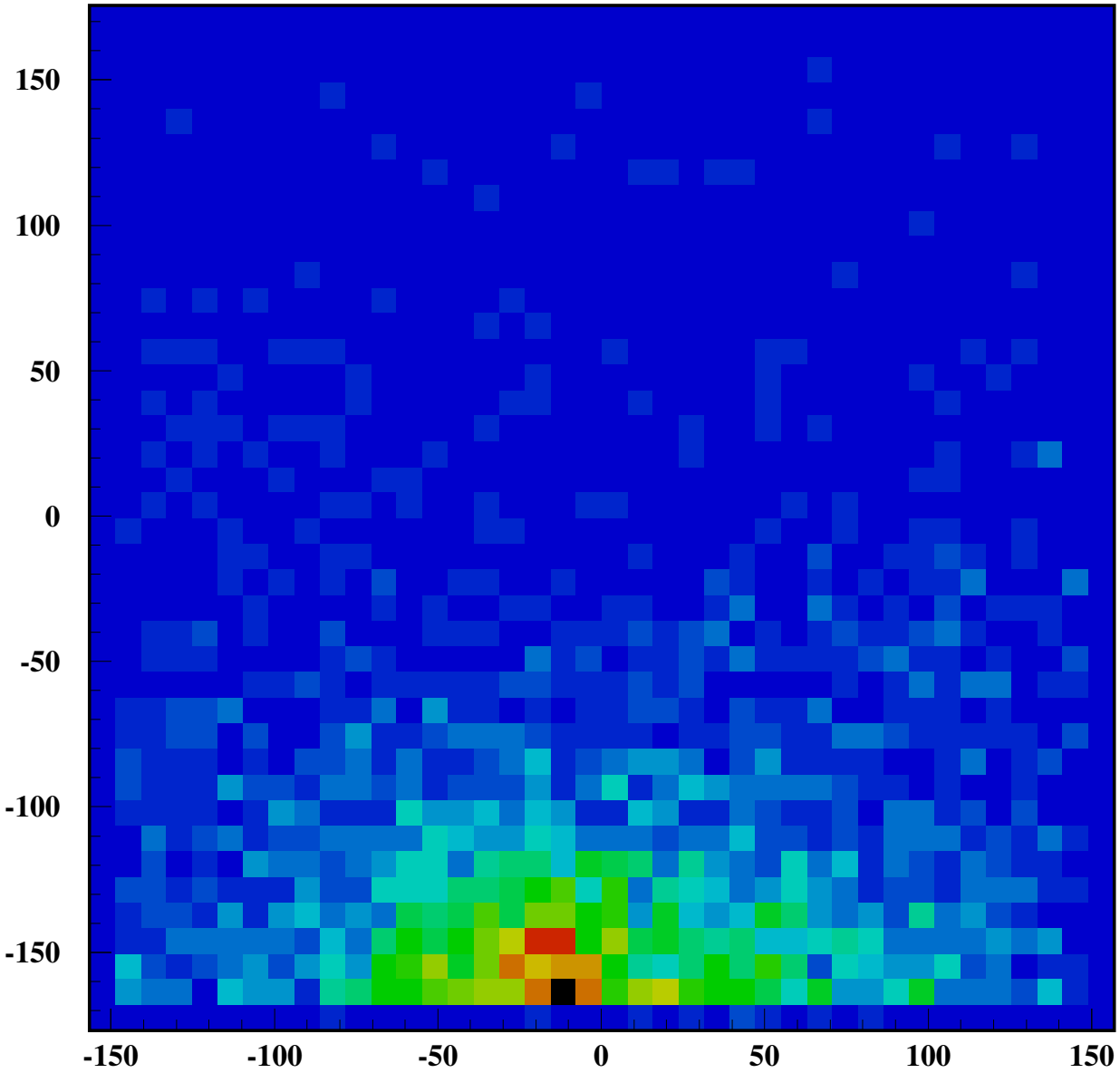
Side 0.0008 captures/neutron



Time distribution(seconds) of neutron captures in the active LAr volume. For a DD gun on the side

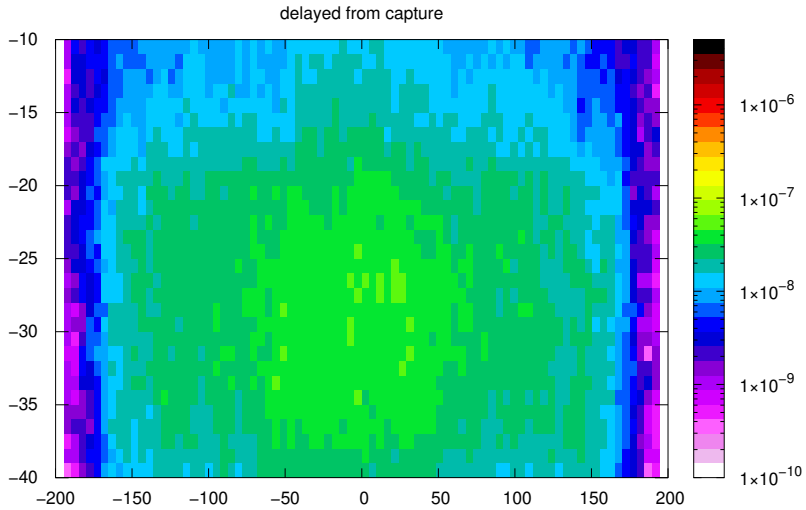
Average: 0.4 milliseconds

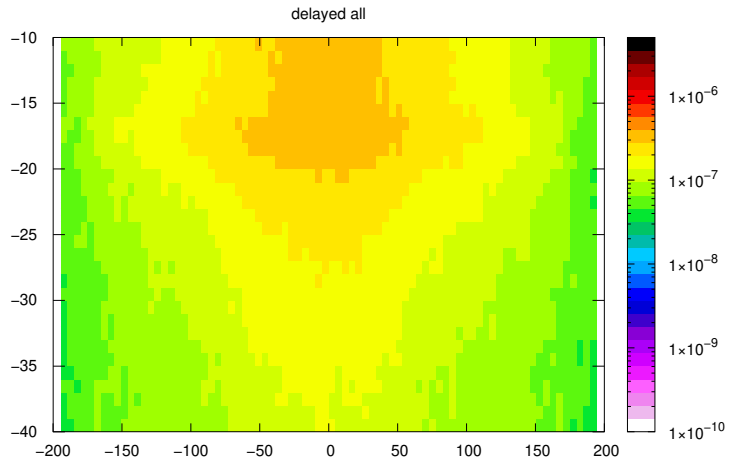
space distribution



Y vs Z distribution of captures in LAr active volume. Note the z asymmetry, probably due to the presence of a plastic Phoron Detector unit in that position

photon map





X vs Y map of photons (photons/cm^3) for a DD gon on the top, in the time period in between DD bursts. Left: photons from captures in the LAr TPC. Right: all photons. Color scale is the same. Warning: no threshold/cut/selection on photons.

ToDo

- Understand differences wrt G4
- Dump moe detiled description of the events and devise some cuts / handles to identify captures and discriminate backgrounds
- maybe look also at $^{3}6$Ar? small percentage but high energy photons