

LAr+Xe: Geant4 Simulation Status and Future Plan Discussion

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Status: Geant4 Geometry

- Alexis' cylindrical design is implemented in Geant4
- Teflon material is defined
- Chamber is submerged in liquid Argon
- PMT is approximated by Fused Silica window and an Aluminum Photo-cathode

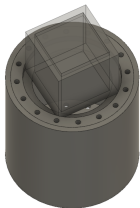


Figure: Alexis Solis' Chamber Design

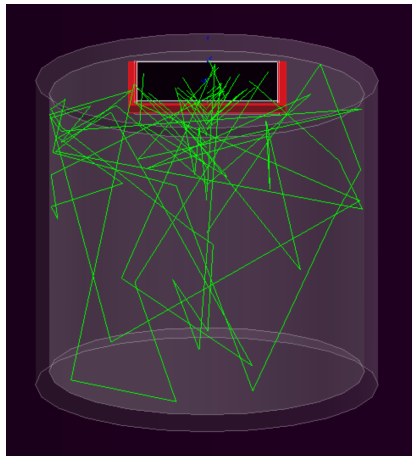


Figure: Cerenkov photons from μ^+ , only photons that hit photo-cathode are shown.

Status: Geant4 Physics

- Geant4 readily models energy deposition in LAr+Xe mixtures, Teflon, and the PMT window.
- Can simulate Xe-127 decay and alphas from the Am-241 source
- Has basic scintillation (from LXe example)
 - Simple rise-time, exponential decay model
 - Single wavelength
 - Light-yield (photons/MeV) chosen arbitrarily
- Teflon surface can be a diffuse or specular reflector with roughness.

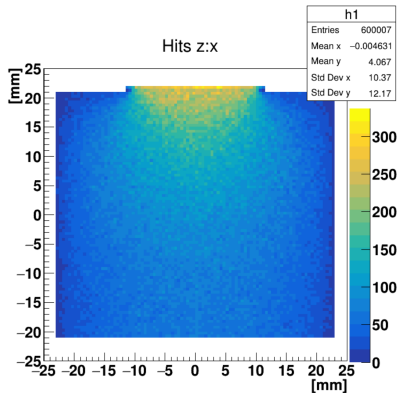


Figure: Volume source distribution xz hit projection

Next Steps Discussion

What do we want to use the simulation for?
Some potential areas it can be used:

- Determine the active LAr volume in the detector chamber. (accounting for the edge effects and flow holes).
- Further implement the known scintillation and photon propagation physics.
- Further study the detector geometry parameters.
- Anything else?

Classes are back in session at UCSB, likely won't have as much time as before due to increased course-load.

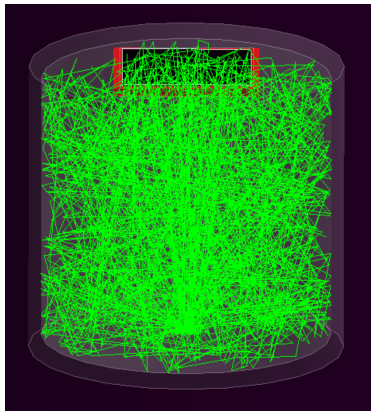


Figure: 60 keV gamma, only photons that hit photocathode are shown.