

Integration of European IAr Simulation into 2km G4 Code

By T.J. Corona

G4T2K Background

- **E**uropean liquid argon simulation was written by Anselmo Meregaglia (and others?)
- It is called **G4T2K** and also includes a separate reconstruction program
- I am integrating this code into the **Geant4 2km** simulation, replacing the previous liquid argon simulation

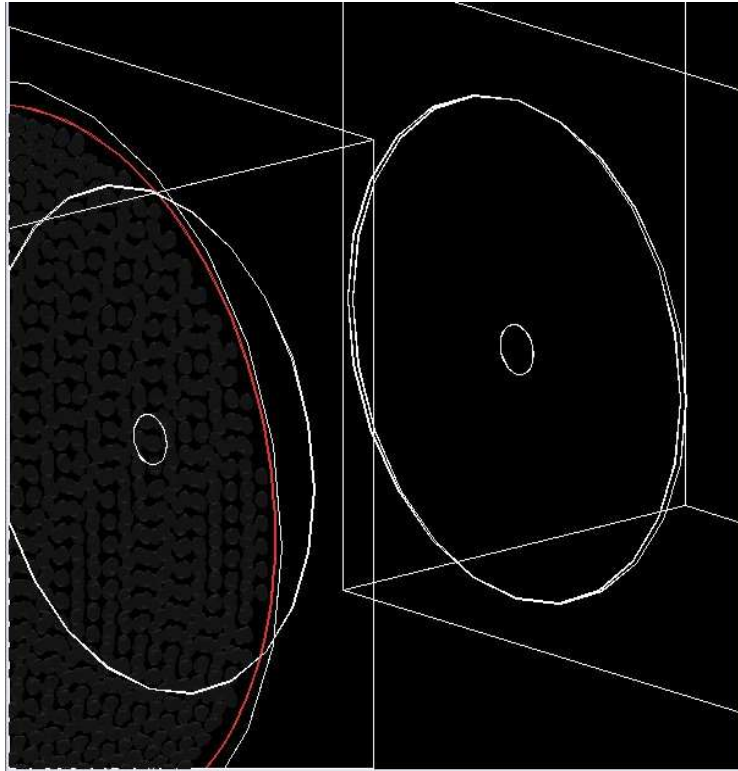
G4T2K Code

- **The G4T2K code is organized differently from the 2km code**
 - **Hits are written out in SteppingAction**
 - **no sensitive detectors**
 - **vectors instead of hits collections**
 - **information recorded that cannot (yet) be accessed using sensitive detectors**
 - **Materials properties & Geometry defined in DetectorConstruction**
 - **Different layout for PhysicsList**

Geometry Updates

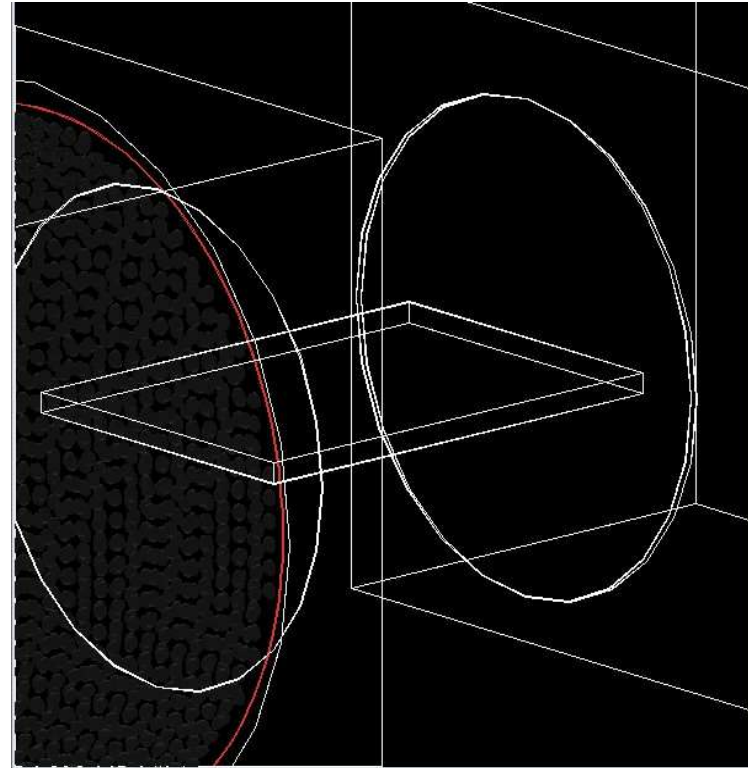
- **2km now has T2K geometry and options**
 - **Elliptical tube geometry**
 - **Refined materials properties**
 - **functions for physics processes within IAr**
 - **more accurate description of stainless steel dewars**
 - **Run-time inner geometry options**
 - **30 & 60 cm radius cylinders, parallel plates, no inner geometry**
 - **electric field distortion toggle (for cylinders)**

IAr Inner Geometry Options



30 cm Cylinder Configuration

30 cm cylinder of ice



Parallel Planes Configuration

Cathode Planes

By default no inner geometry is set.

Work in Progress:

Organizing Hits

- **Hits triggered using 1 sensitive detector**
- **Hits organized to contain:**
 - **the two intersecting wires that read the hit**
 - **time of hit**
 - **energy and type of particle**
 - **position, energy and type of parent particle (as the wires detect secondary particles)**

To Do:

Process Hits for G4T2K Digitizer (FullReco)

- **S**teps to maintain the format of the 2km code and still use FullReco:
 - Hits collected as previously described
 - Hits converted to wire information in IArDigitizer
 - Wire information further converted to FullReco format in standalone Root program

Conclusion & Plans

- **T2k IAr Geometry is fully operational in 2km simulation**
- **Creation of hits currently underway**
- **General layout for processing of hits with digitizer planned**
- **Estimated time for hits so we can do physics analysis ~ 1 week**
- **Digitized info with full reconstruction ~ 2 weeks**