KSU Lab RATS

- Arthur: “ESIM”, simulating the PMT output; tube-by-tube customization; pulse shape.
- Tom: RECON; optimizing single vertex; double vertex; line; line+vertex.
- Wesley: fast neutron response; recoil proton signal.
- Dan: software management; event display.
- All: breaking RAT.
- Lots of help from Glenn and Jasmine.

KSU Lab RATS

- Arthur: “ESIM”, simulating the PMT output; tube-by-tube customization; pulse shape.
- Tom: RECON; optimizing single vertex; double vertex; line; line+vertex.
- Wesley: fast neutron response; recoil proton signal.
- Dan: software management; event display.
- All: breaking RAT.
- Lots of help from Glenn and Jasmine.

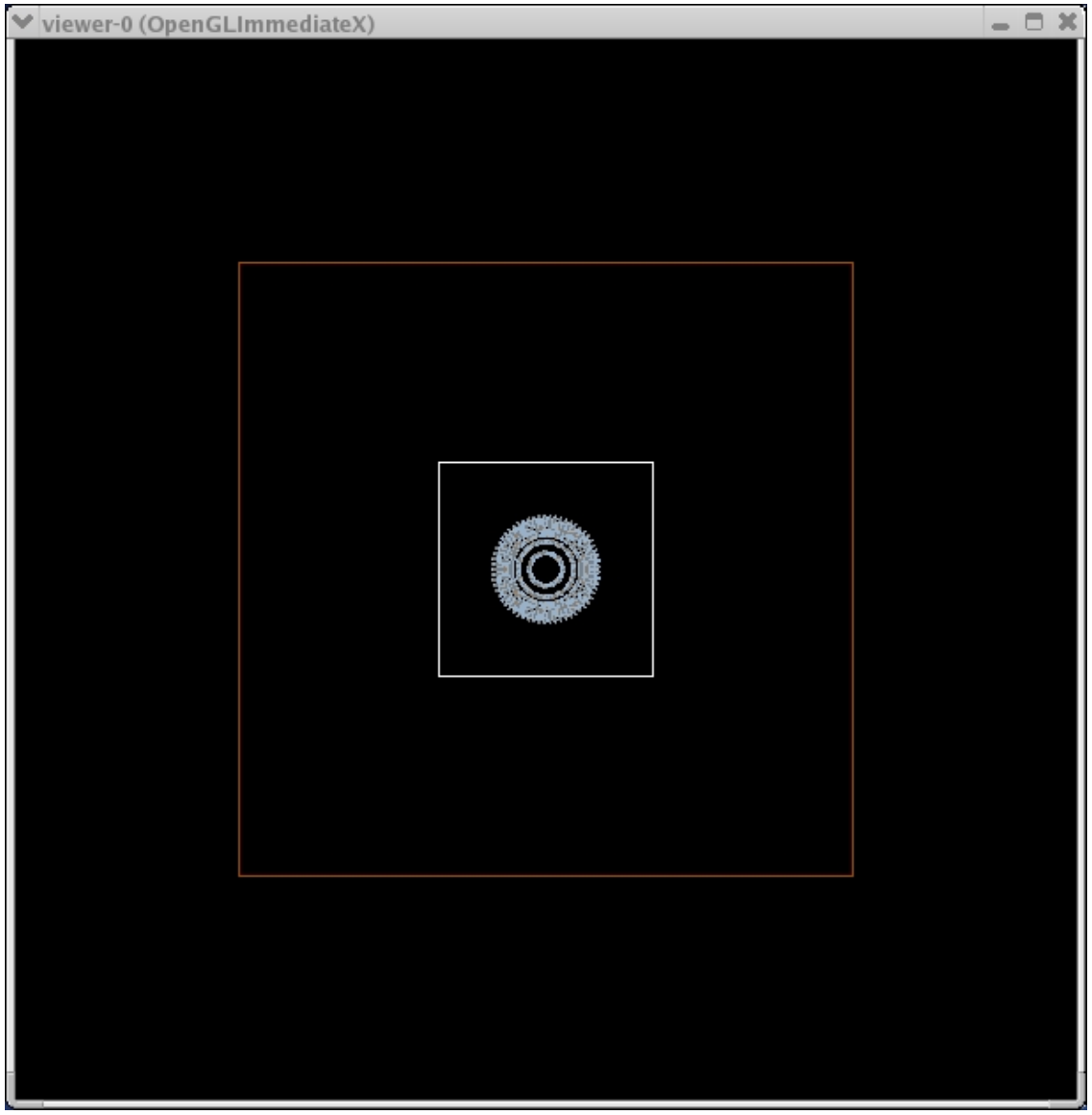
Activities

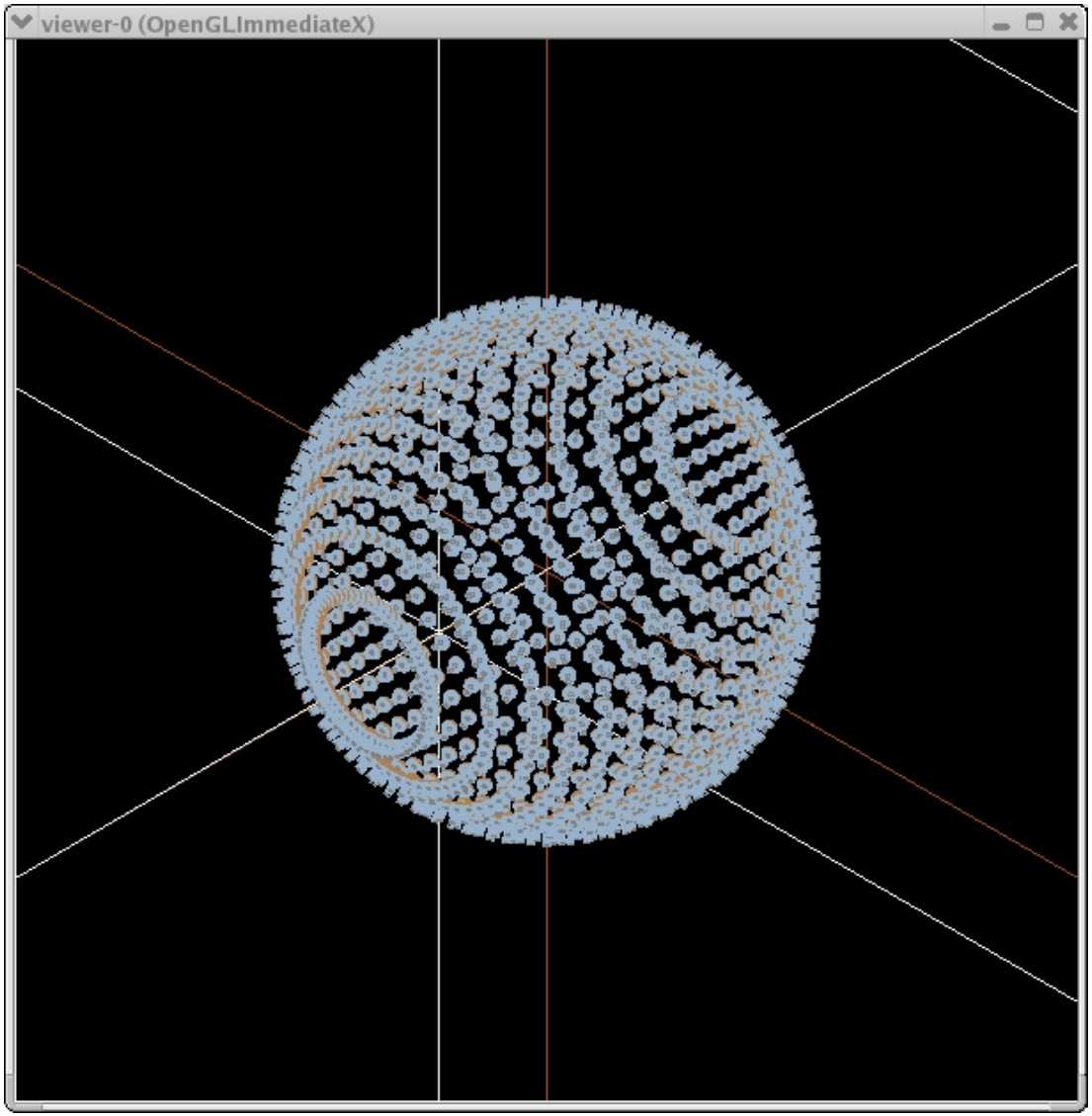
- Weekly meeting with KAMLAND group.
- “Wiki” used as online logbook for students. Feel free to browse (and possibly avoid duplicating our mistakes!):

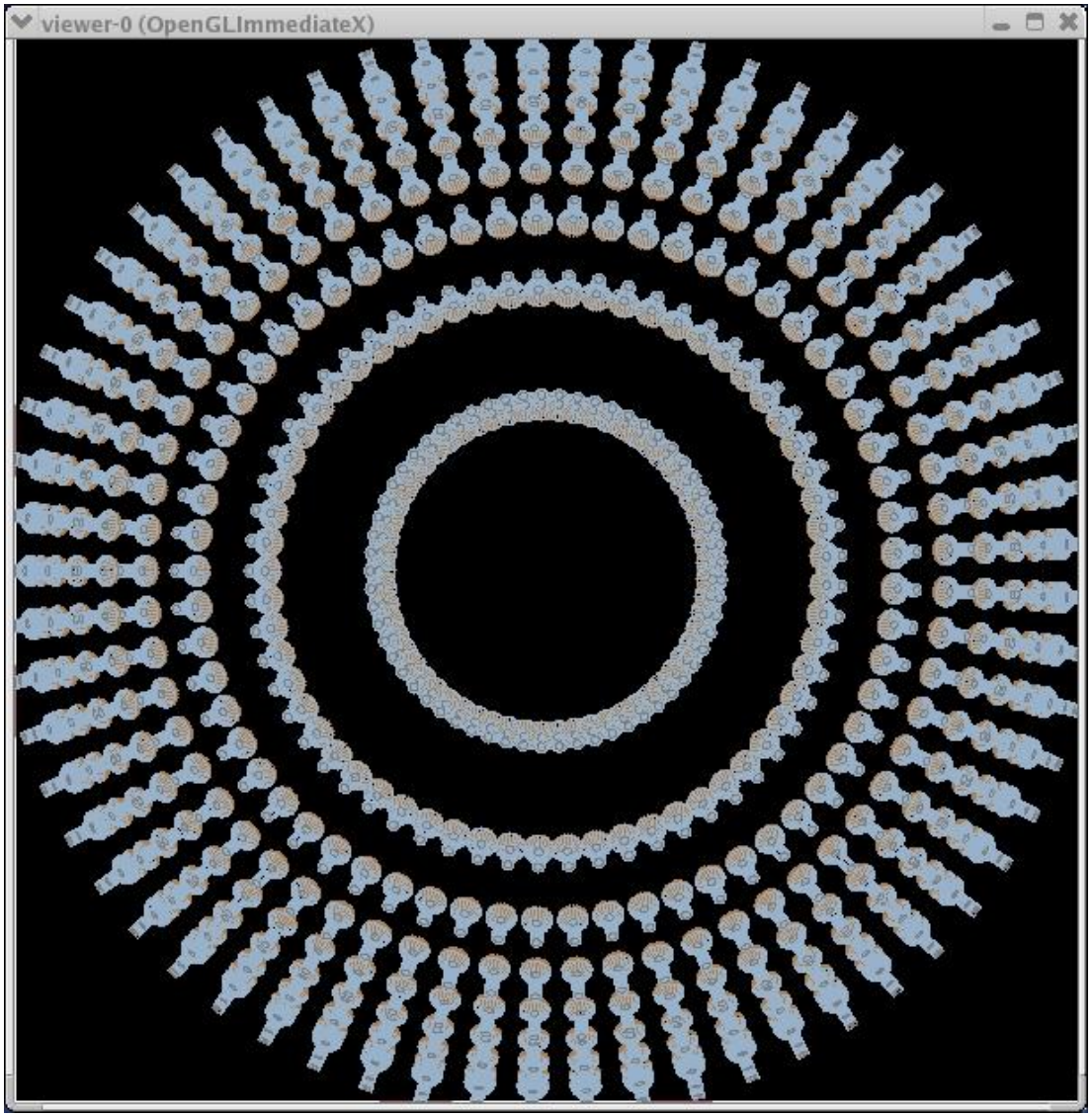
http://neutrino.phys.ksu.edu/cgi-bin/BWKSUwiki

Event displays

- Part of Geant4 functionality, with geometries inherited from GLG4SIM.
- Easy to enable in RAT.
- OpenGL: “Photographic” quality, but static and 2D.
- Wired(3 or 4): Dynamic “wireframe” views, 3D. Works well with JAS3 (from Tony Johnson, SLAC). Build your Geant4 with ZLIB to make smaller “binary heprep”.


viewer-0 (OpenGLImmediateX)

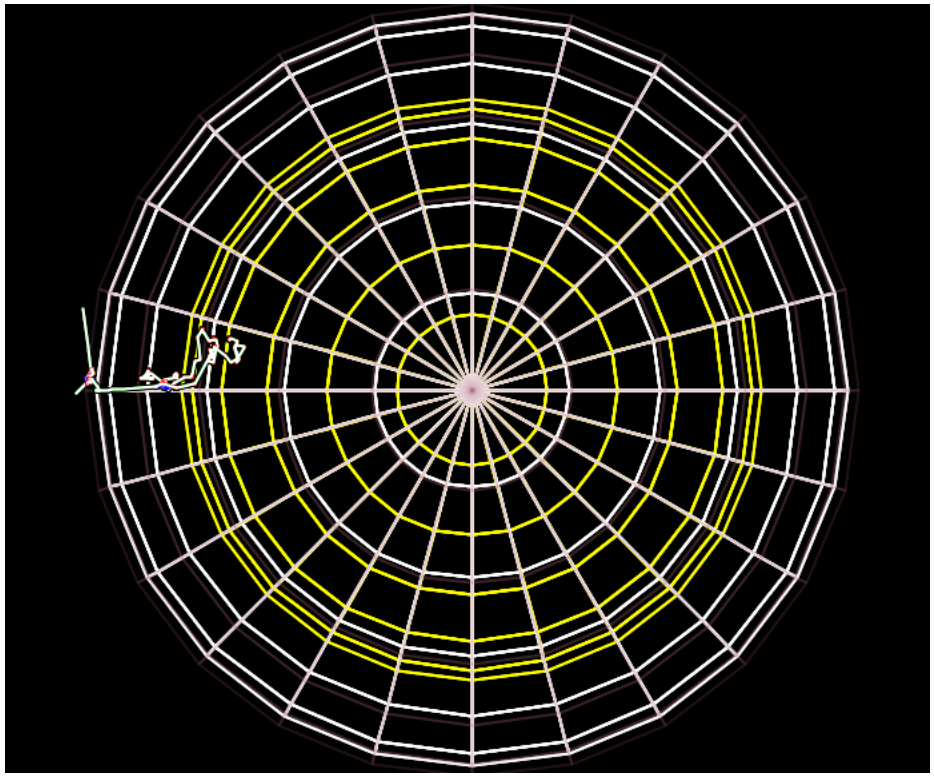

viewer-0 (OpenGLImmediateX)


viewer-0 (OpenGLImmediateX)

WIRED display

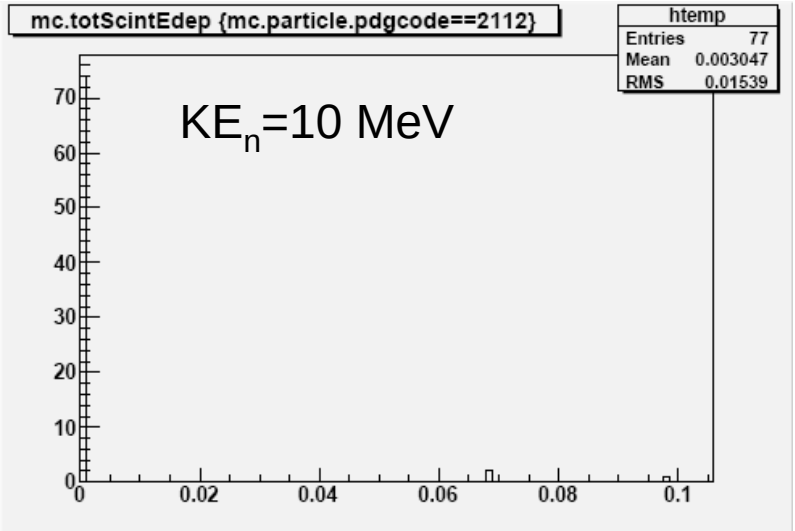
- Prefer WIRED4 because of compressed file format.
- Needs JAS3, but installation is faculty-proof (one step beyond idiot-proof).
- Can download your graphics to PC, etc.
- JAS3 could be a terrific analysis platform, but would need some custom module development.

First look at fast protons

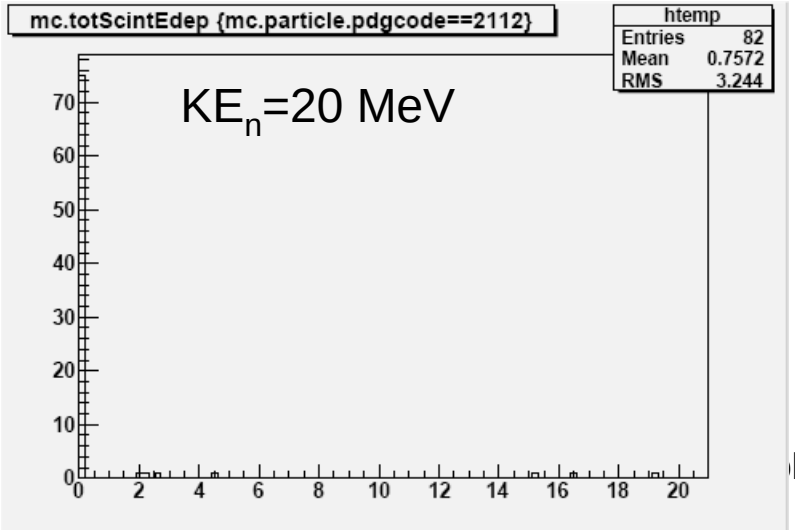


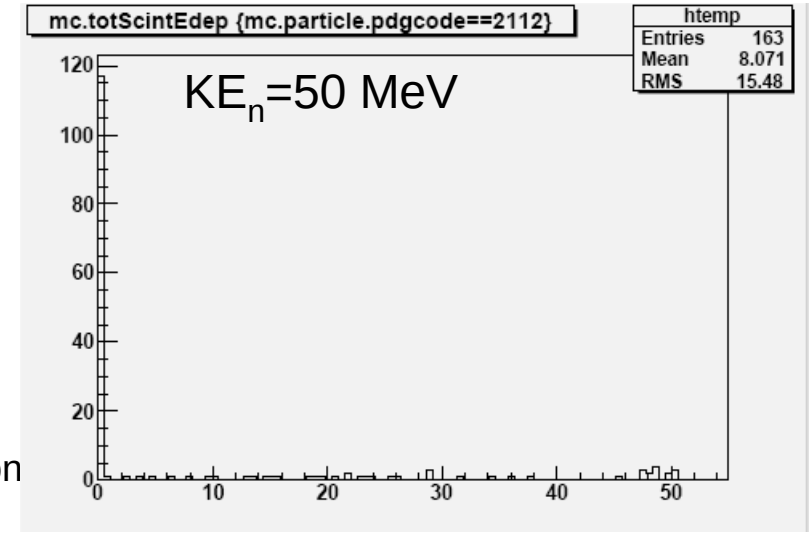
- Shoot neutrons in from the outer radius across the buffer and directed at the center.
- See how much scintillator light is produced for different energies from both proton recoils and γ rays.

Proton recoils

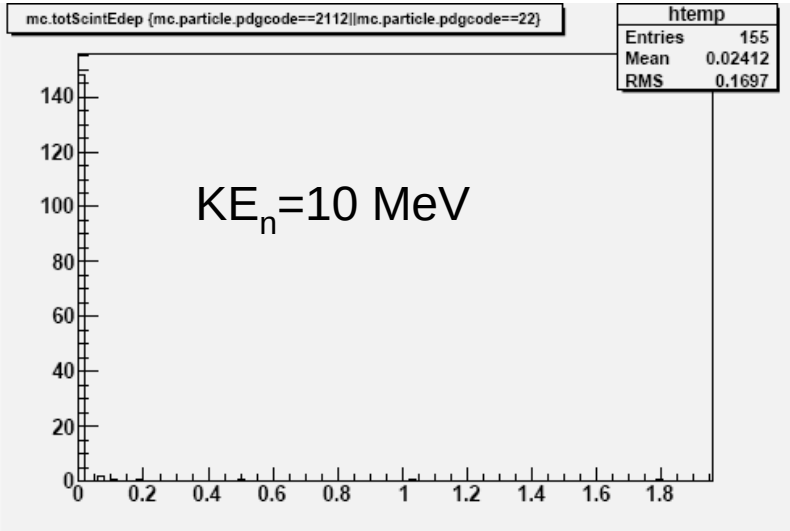


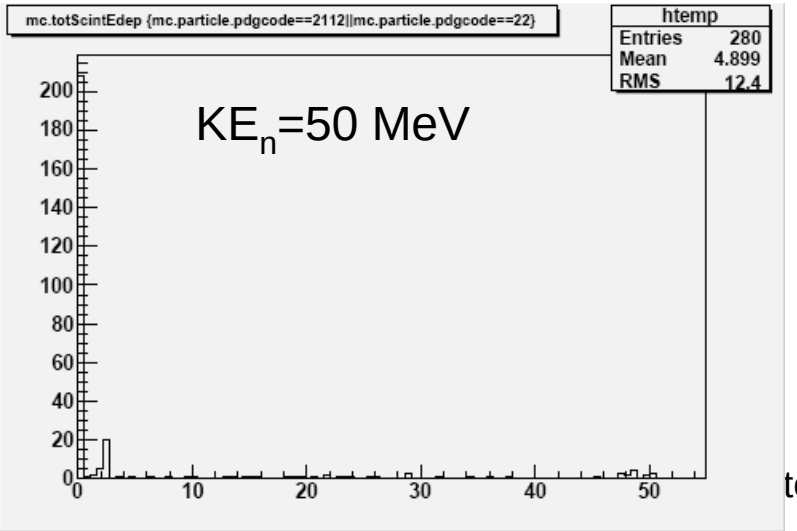
- For KE$_n$<~10 MeV, neutrons are stopped in absorber and recoil protons in fiducial have low KE and so quench.
- For higher energies, neutrons make it through and proton signals in the IBD e+ window emerge.
- Very early look (No Gd yet).





Scintillator energy from n *and* γ





- For KE$_n$ <~ 10 MeV, γs from H capture in buffer are also attenuated.
- For higher energies, a γ signal from H capture in the fiducial becomes apparent (reminder: no Gd capture in this run).

Summary

- Good start at KSU with undergrads towards producing useful simulation.
- Demonstration that RAT can be deployed without (too much) need of special experts.
- Situation rapidly improving.