Beam Dispersion Problem Solved (?)

Increased maxStep → Decreased number of transportation steps:

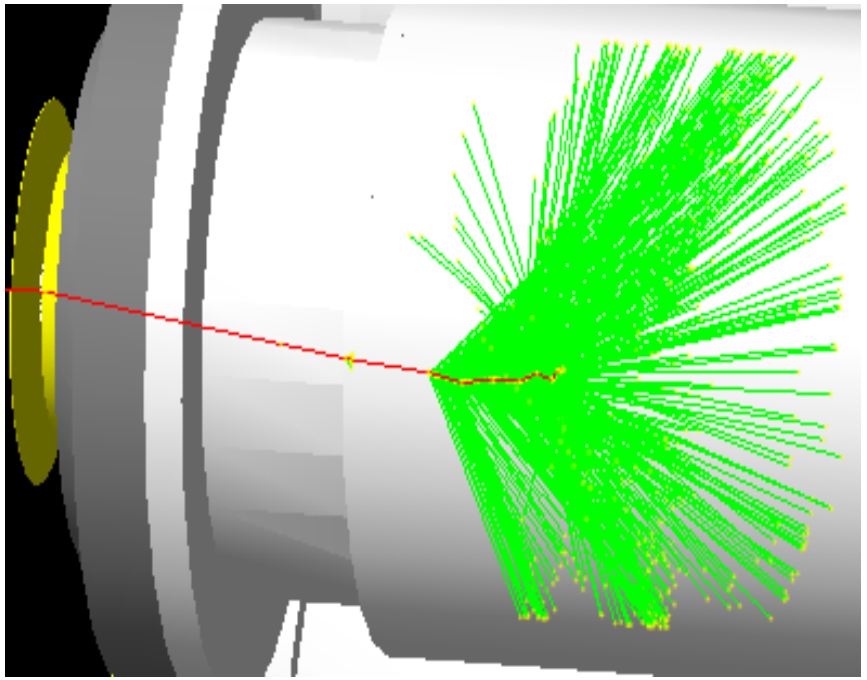
```
G4double maxStep = 0.5*HalfWorldLength;
stepLimit = new G4UserLimits(maxStep);
logicWorld->SetUserLimits(stepLimit);
```

This lead to smaller beam dispersion (larger % on-target)

3 MeV: 34% → 47%
5 MeV: 65% → 77%
8 MeV: 88% → 93%

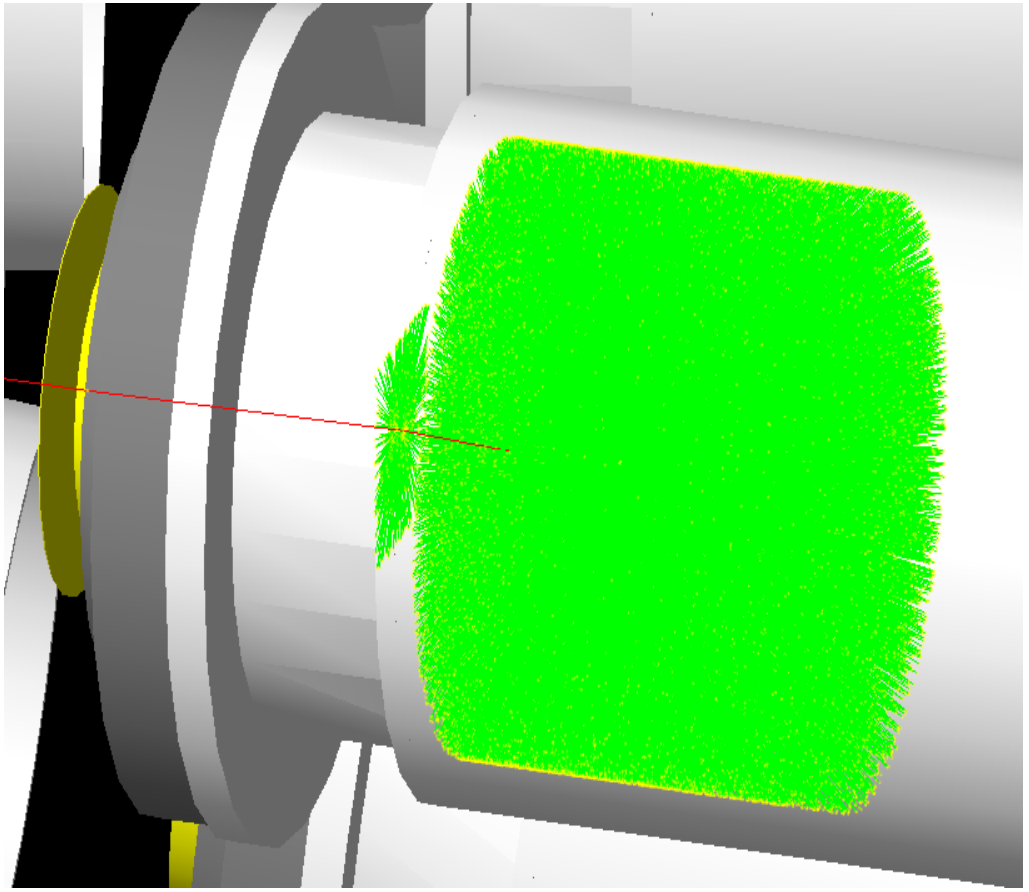
Not sure if this is physical.

Included Cerenkov Radiation



- Does not conserve energy (electron energy unchanged by emitting photons)
- # of photons emitted per step currently arbitrary (I need to figure out the physics)
- Spectrum is accurate according to standard formula.
- Currently just absorbed at boundaries (No reflection/refraction)

Included Scintillation Process



- Also non-conservative.
- Absorbed at boundaries.
- Massively expensive.
- Physics is accurate according to manufacturer specs.

Decision

Do I:

- Absorb all photons hitting the surface with a fudge factor in the analysis representing the actual optics at the surfaces (fastest, unphysical, almost done currently).
- Model reflection/refraction and only count photons going to the proper face (slow-ish & more realistic).
- Build a realistic PMT (and lightguide for dE) and count photo-electrons (possible, but unfamiliar territory for me).