MTC Geant4 Simulation Status and Tutorial

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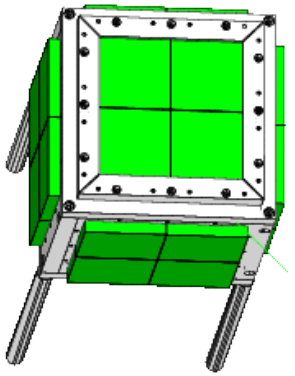
Jan 30, 2013



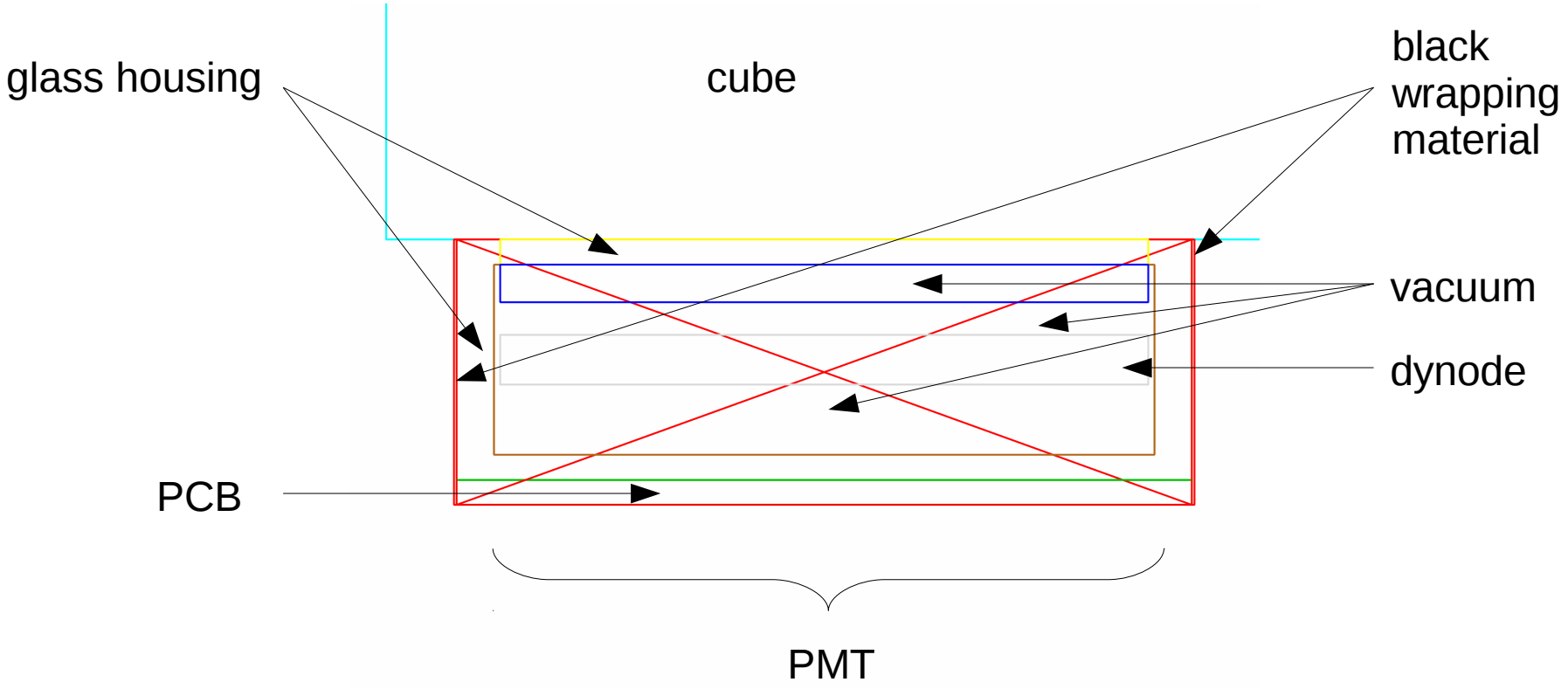
Status

- Scintillator types available:
  - EJ254 doped with any combination of following.

    (enriched / natural) (1% / 2.5% / 5%) (lithium / boron)
- Geometries included:
  - Scintillating cube, 24 PMT modules, support frames/clamps, 4 stand rods.
  - Support frames/clamps and stand rods are imported from CAD files.

Status

- PMT geometry includes:
  - Glass housing, inner vacuum, photocathode, dynode, black wrapping material, rear PCB.



Status

- Scintillation photons:
  - Only fast component with 2.2ns decay time for now.
  - Hits at photocathode is processed using code from D. Motta, Glenn Horton-Smith (KLG4Sim). This accounts for reflection/refraction/absorption at photocathode surface convolved with QE as according to http://hcpl.knu.ac.kr/neutrino/renosim/internal/NIMA539p217-235.pdf
- Cerenkov photons:
  - Default implementation in Geant4 is used.

Tutorial

- MTCG4Sim is now using CMake to compile code
- Prerequisite installs for importing CAD geometries
  - The Visualization and Computer Graphics Library (VCG)
  - cadmesh (CAD file interface for Geant4)
- Prerequisite for using ROOT
  - the usual ROOT installation

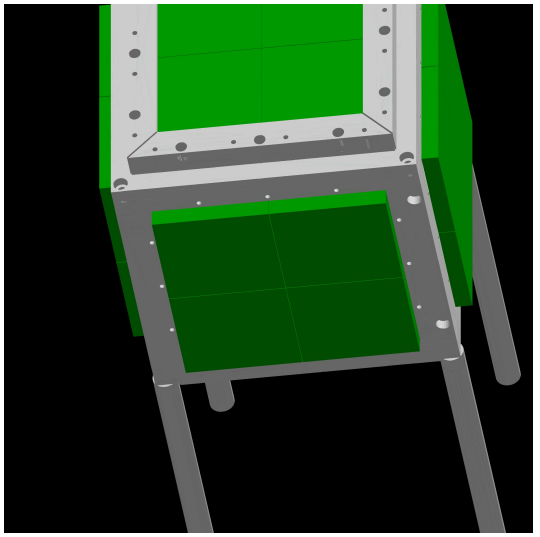
Tutorial

- MTCG4Sim has two inputs and two outputs
  - Input macro files:
    - vis.mac – control visualization settings
      (e.g. particle track color, etc...)
    - run.mac – control simulation settings
      (e.g. type of scintillator to use, etc...)
  - Output text files:
    - File1 – all steps of all particles for all events of given run
    - File2 – PMT ID / anode # / hit time of photoelectrons for all events in run

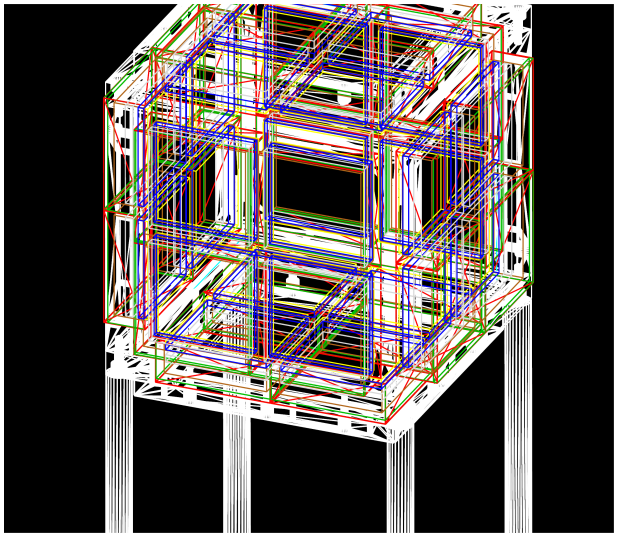
Tutorial

- 3 Visualization tools

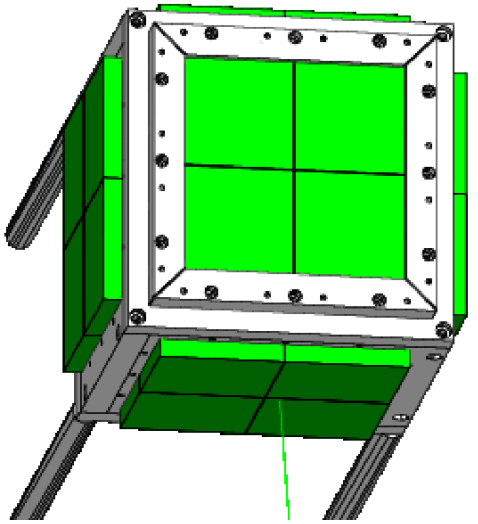
Open GL (quick)



HepRApp (versatile & easy to use)



DAWN (pretty)



- Tutorials at
  http://geant4.slac.stanford.edu/Presentations/vis/G4OpenGLTutorial/G4OpenGLTutorial.html

Tutorial

- Steps to compile and run MTCG4Sim
  - Have prerequisites installed (following versions were tested):

    Geant4(9.6), VCG(4041), cadmesh(0.7), ROOT(5.34.01)
  - Download trunk version of program (let it be inside folder called “trunk”)
  - And follow this:

```
mich@michpc2:~/test$ ls
trunk
mich@michpc2:~/test$ mkdir trunk-build
mich@michpc2:~/test$ cd trunk-build/
mich@michpc2:~/test/trunk-build$ cmake ../trunk
mich@michpc2:~/test/trunk-build$ make
mich@michpc2:~/test/trunk-build$ ./mtc vis.mac run.mac
```