SoLID simulation

Zhiwen Zhao

UVa

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GEMC, written by Maurizio Ungaro, used for CLAS12

GEMC (GEant4 MonteCarlo)

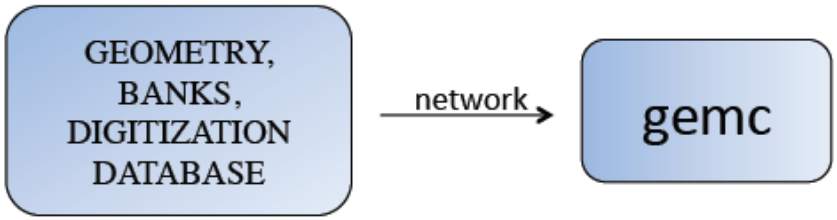
gemc is a C++ program that simulates particles through matter using the geant4 libraries.

GEMC

> Detectors Information are stored at the JLAB mysql server. Configuration changes are immediately available to the users without need to recompile the code

> Hit Process Factory: associate detectors with external digitization routines at run time

> Developers interact with database, do not need to know C++ or Geant4 to build detector and run the simulation



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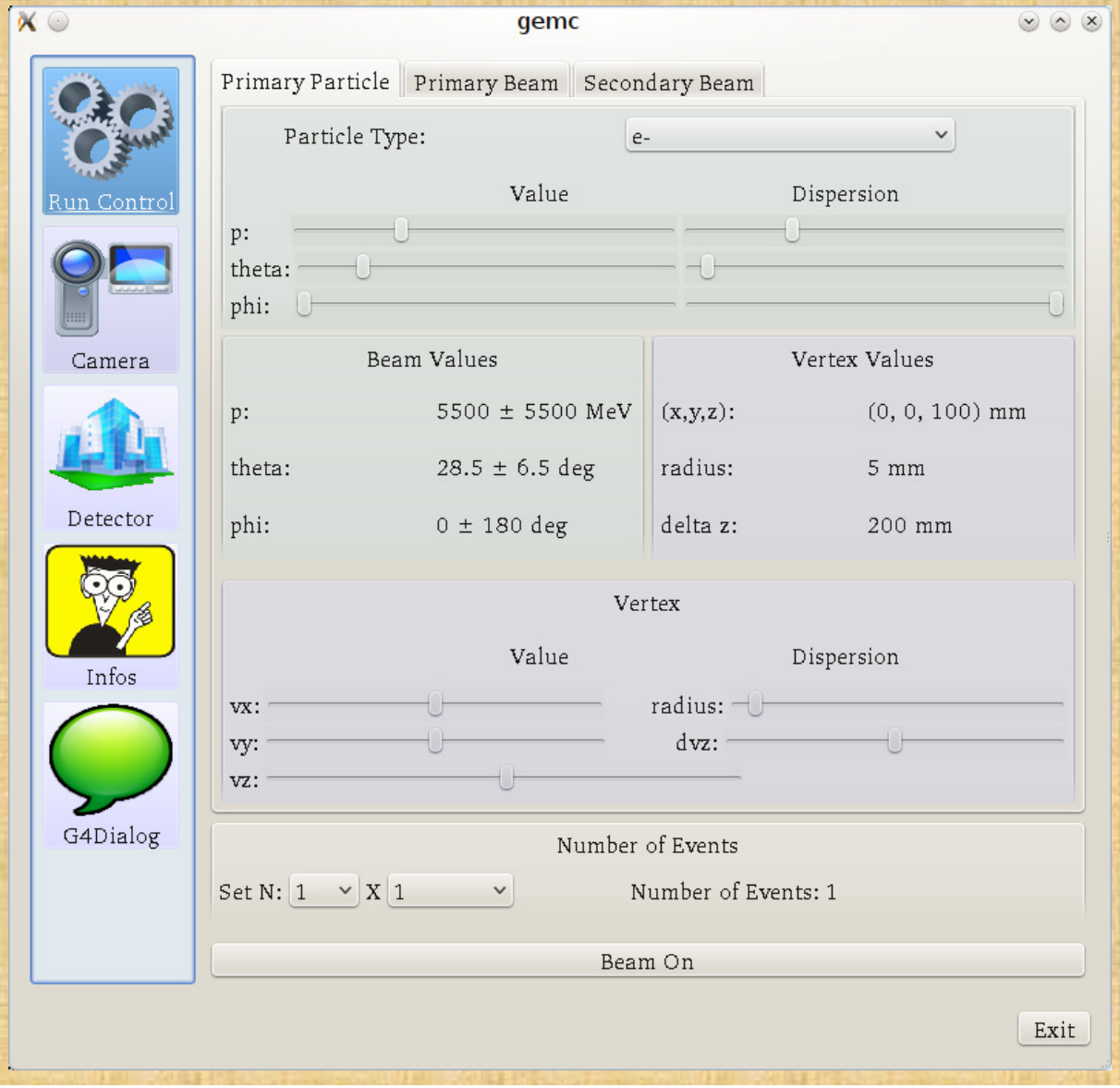
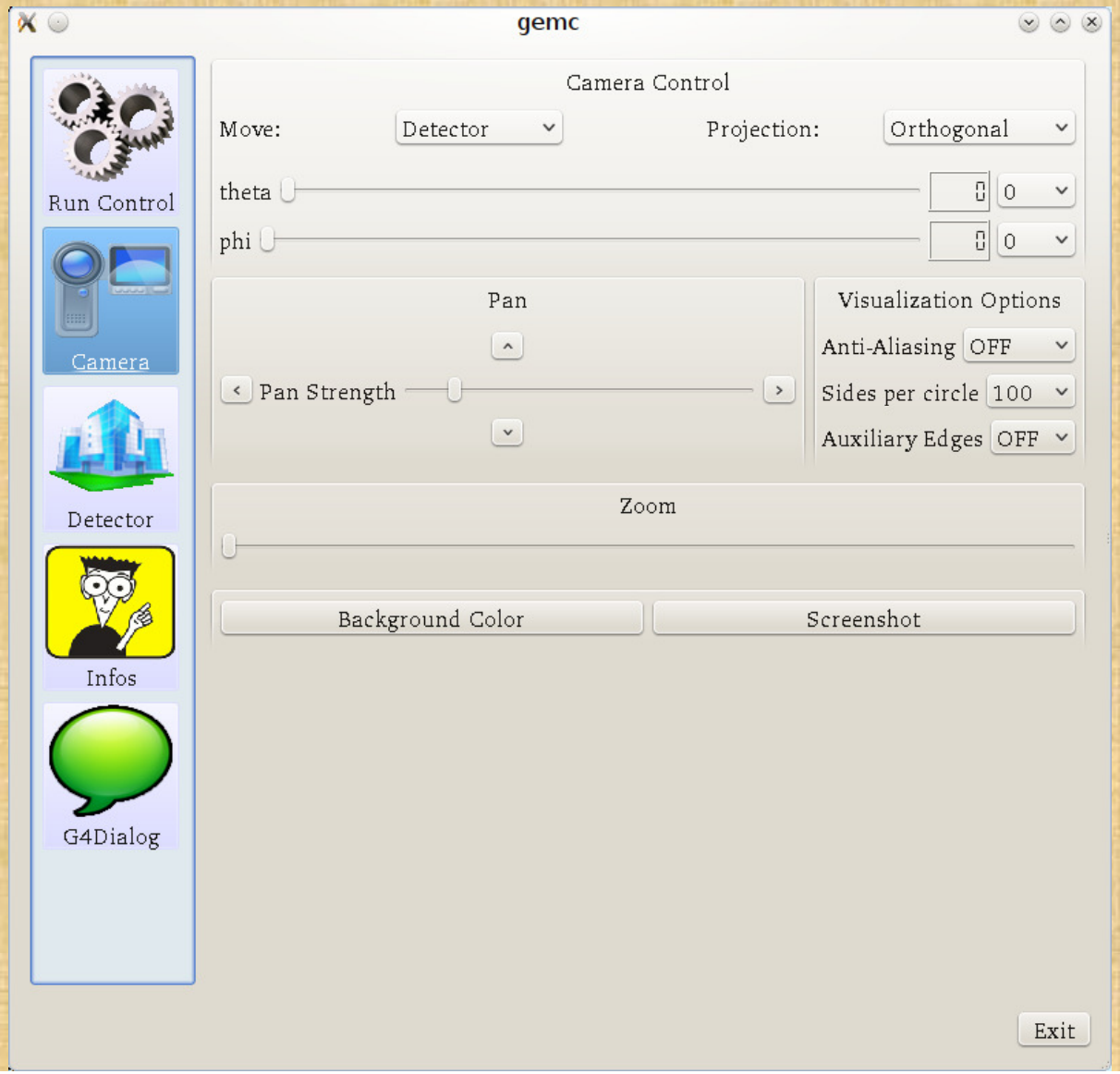
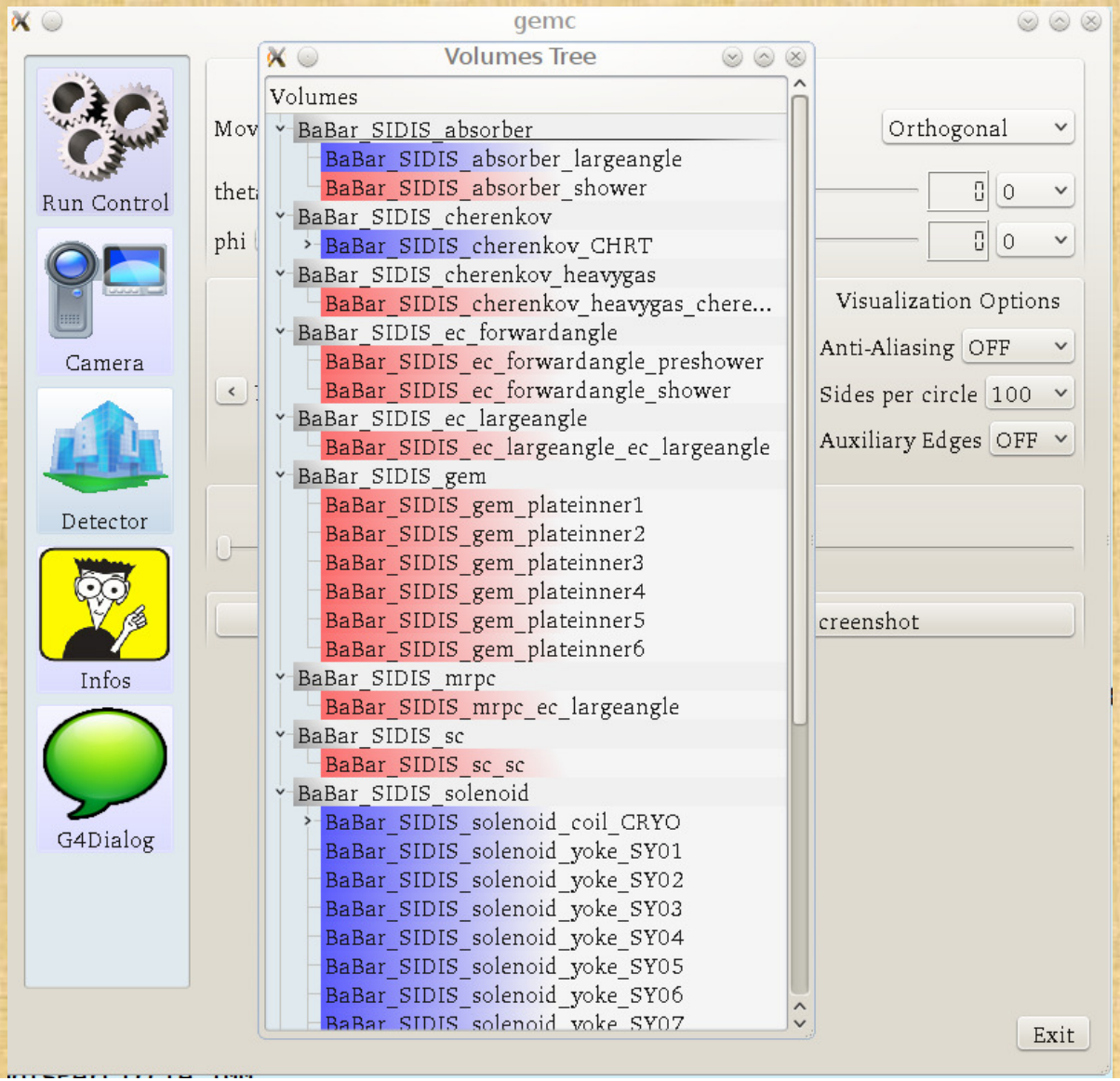
GUI (Run control)



GUI (Camera)


gemc
Run Control
Camera
Detector
Infos
G4Dialog
Camera Control
Move:
Detector
Projection:
Orthogonal
theta
0
phi
0
Pan
Pan Strength
Visualization Options
Anti-Aliasing
OFF
Sides per circle
100
Auxiliary Edges
OFF
Zoom
Background Color
Screenshot
Exit

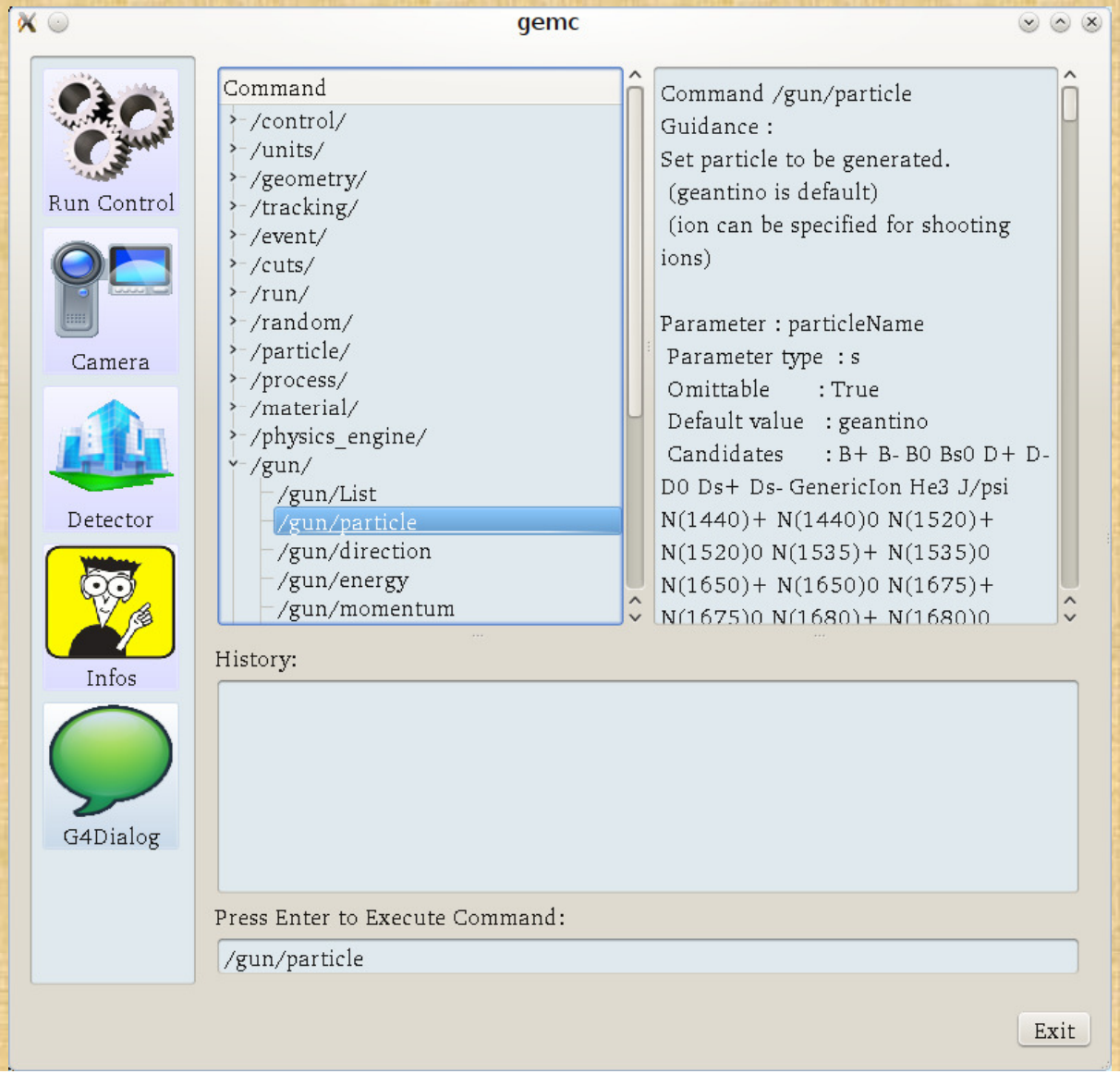
GUI (Detector)



GUI (Info)


gemc
Run Control
Camera
Detector
Infos
G4Dialog
About
Particle Colors
LUND format
LUND Format
The LUND format is used to describe one event.It is part of the JetSet and Pythia packages from CERN (the full manual can be found at http://home.thep.lu.se/~torbjorn/pythia/lutp0613man2.pdf)
COLUMN
QUANTITY
1 Number of particles
2 Number of target nucleons
3 Number of target protons
4 Target Polarization
5 Beam Polarization
6 x
7 y
8 W
COLUMN
QUANTITY
1 index
2 charge
3 type
4 particle id
5 parent id
6 daughter
7 p_x
8 p_y
9 p_z
Exit

GUI (G4Dialog)

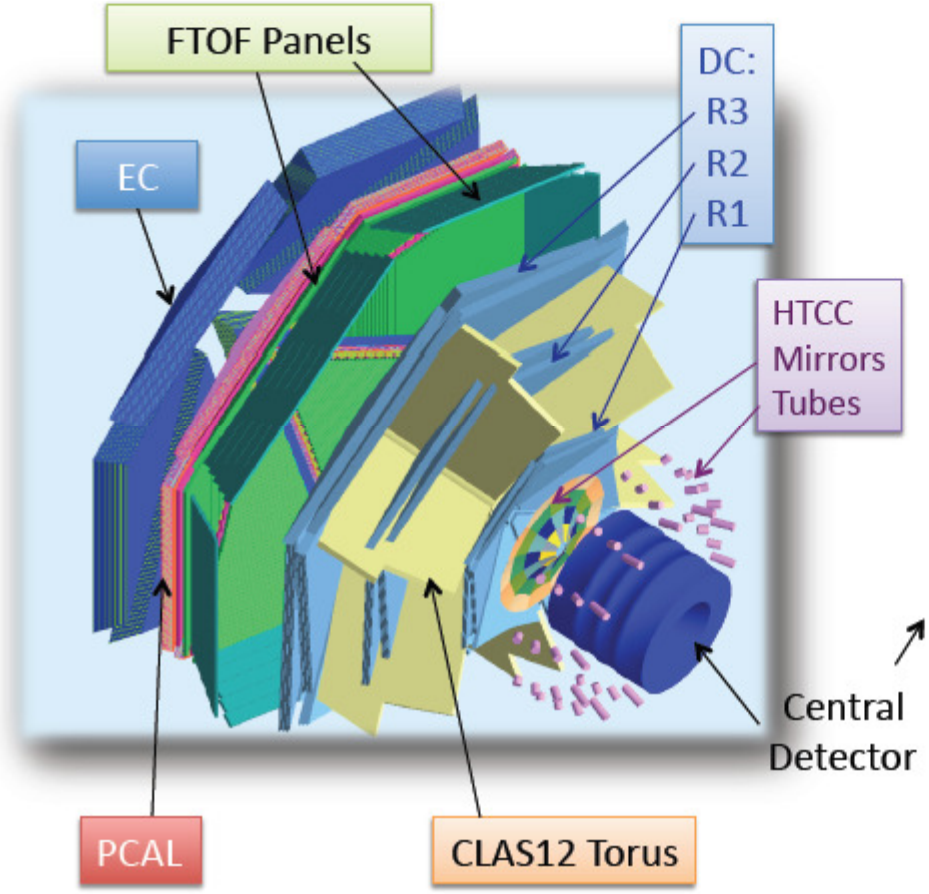


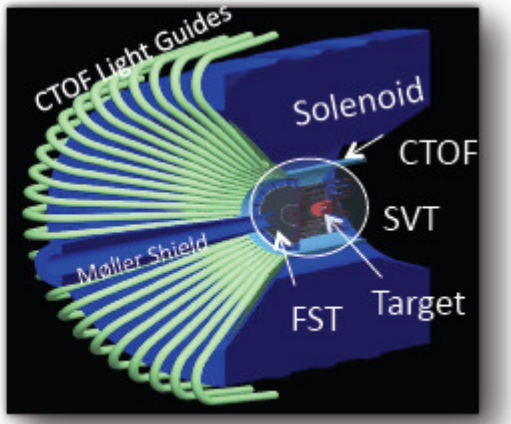
Command Line Options

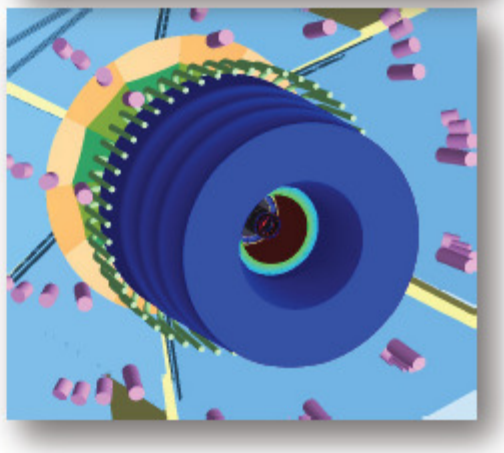
Various GEMC Options:

- Control
- General
- Generator
- Luminosity
- Mysql
- Output
- Physics
- Verbosity

Current Status for CLAS12







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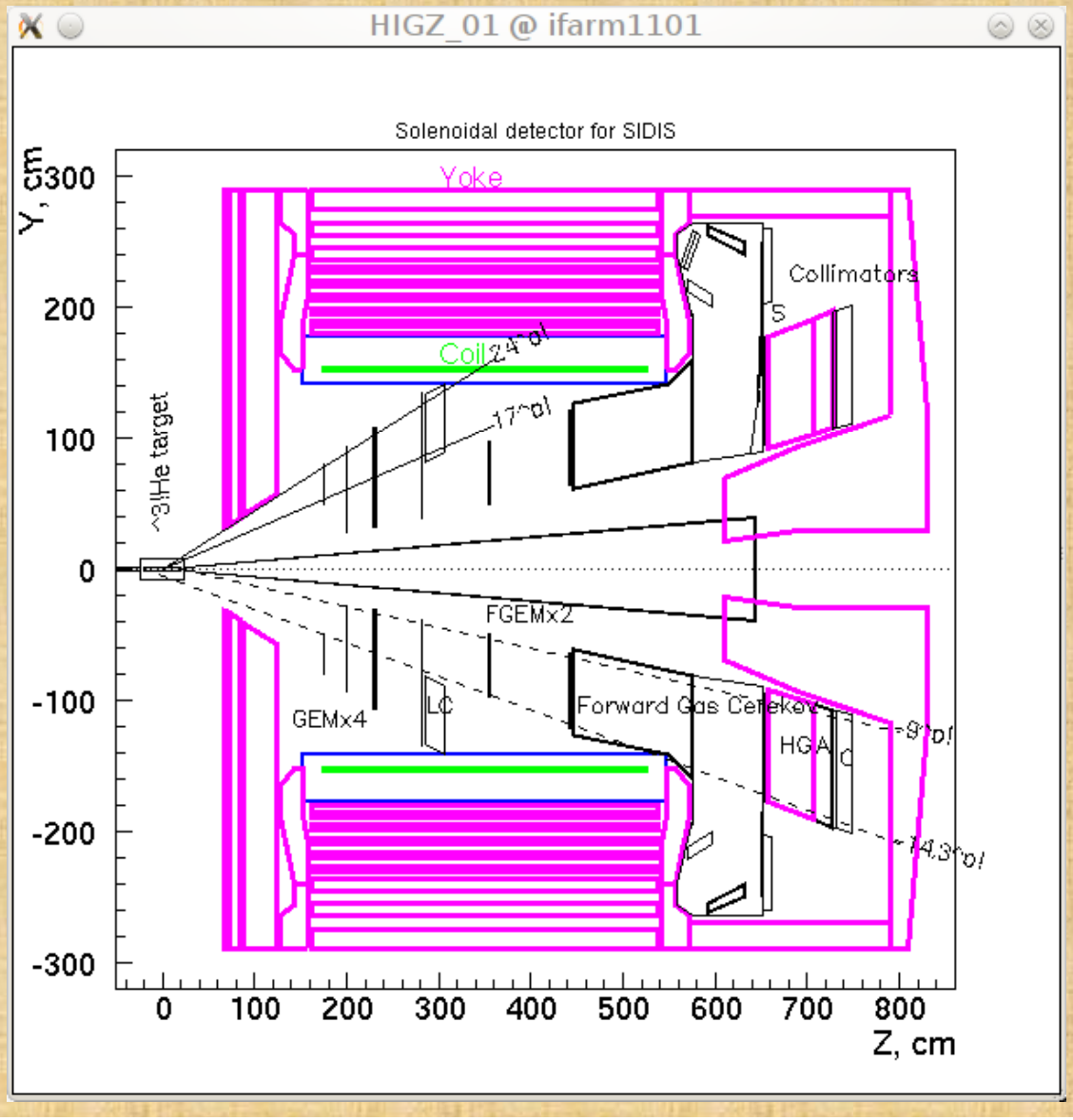
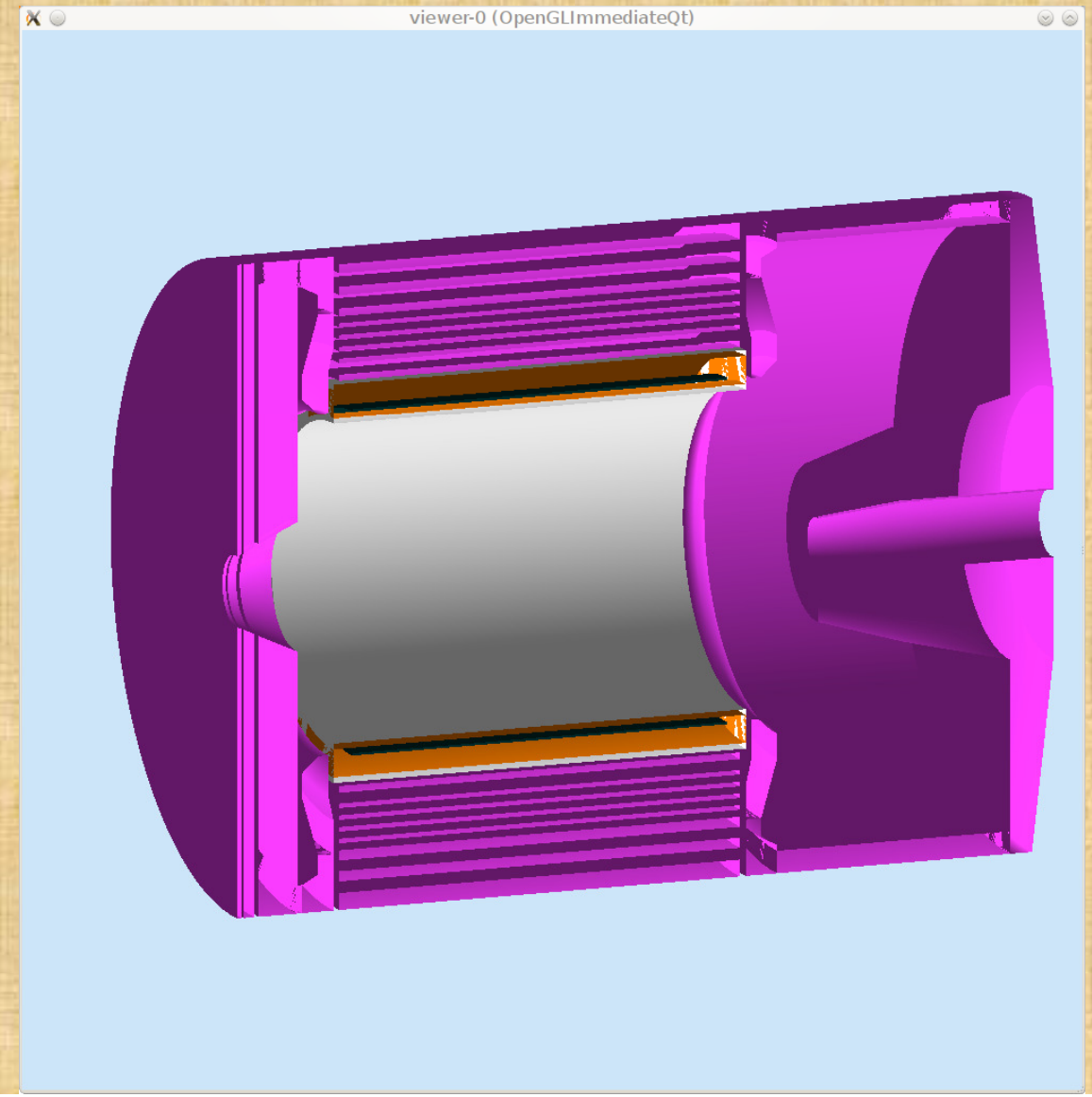
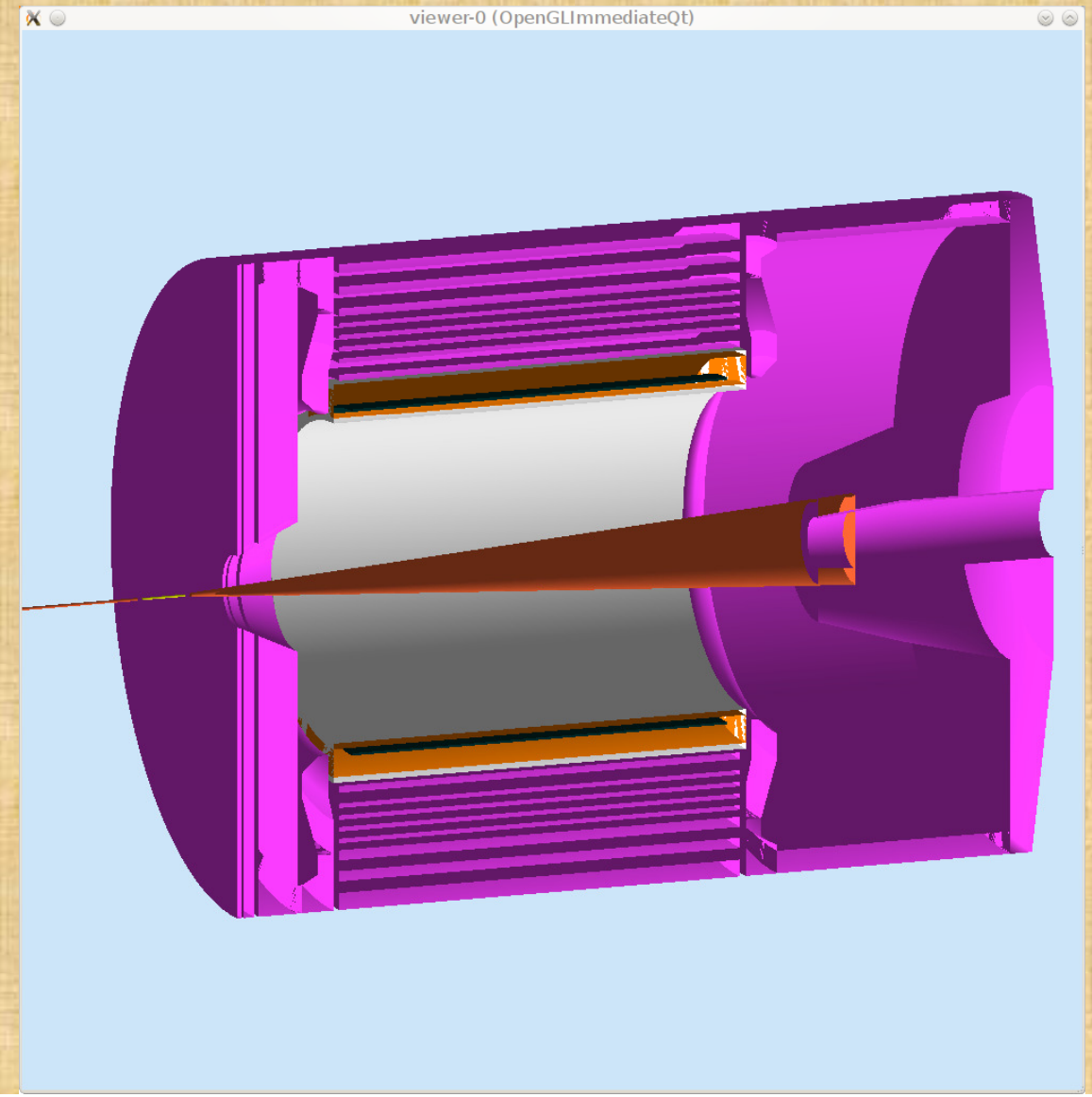
SoLID for SIDIS with BaBar Magnet



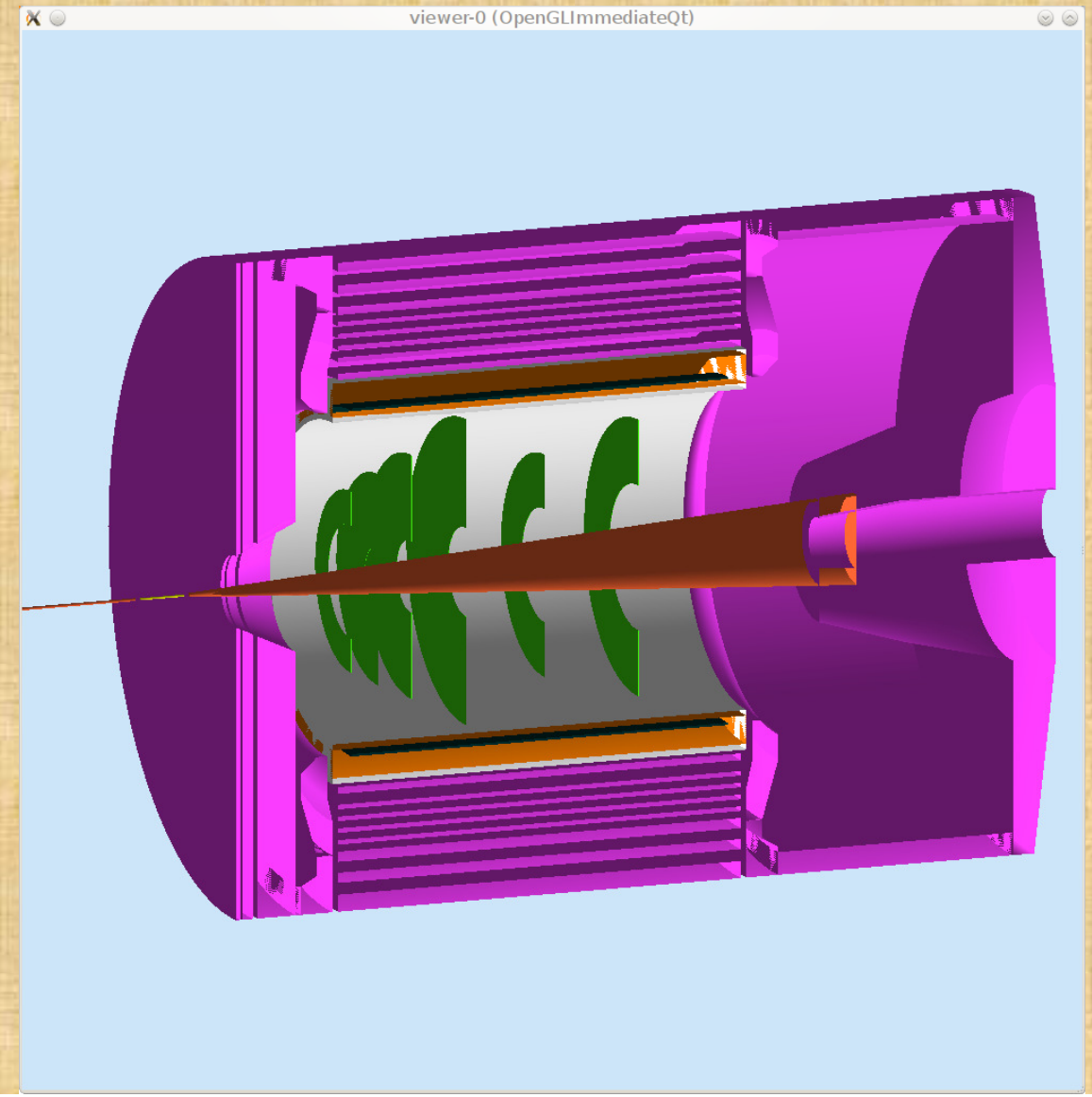
Magnet/coil/yoke



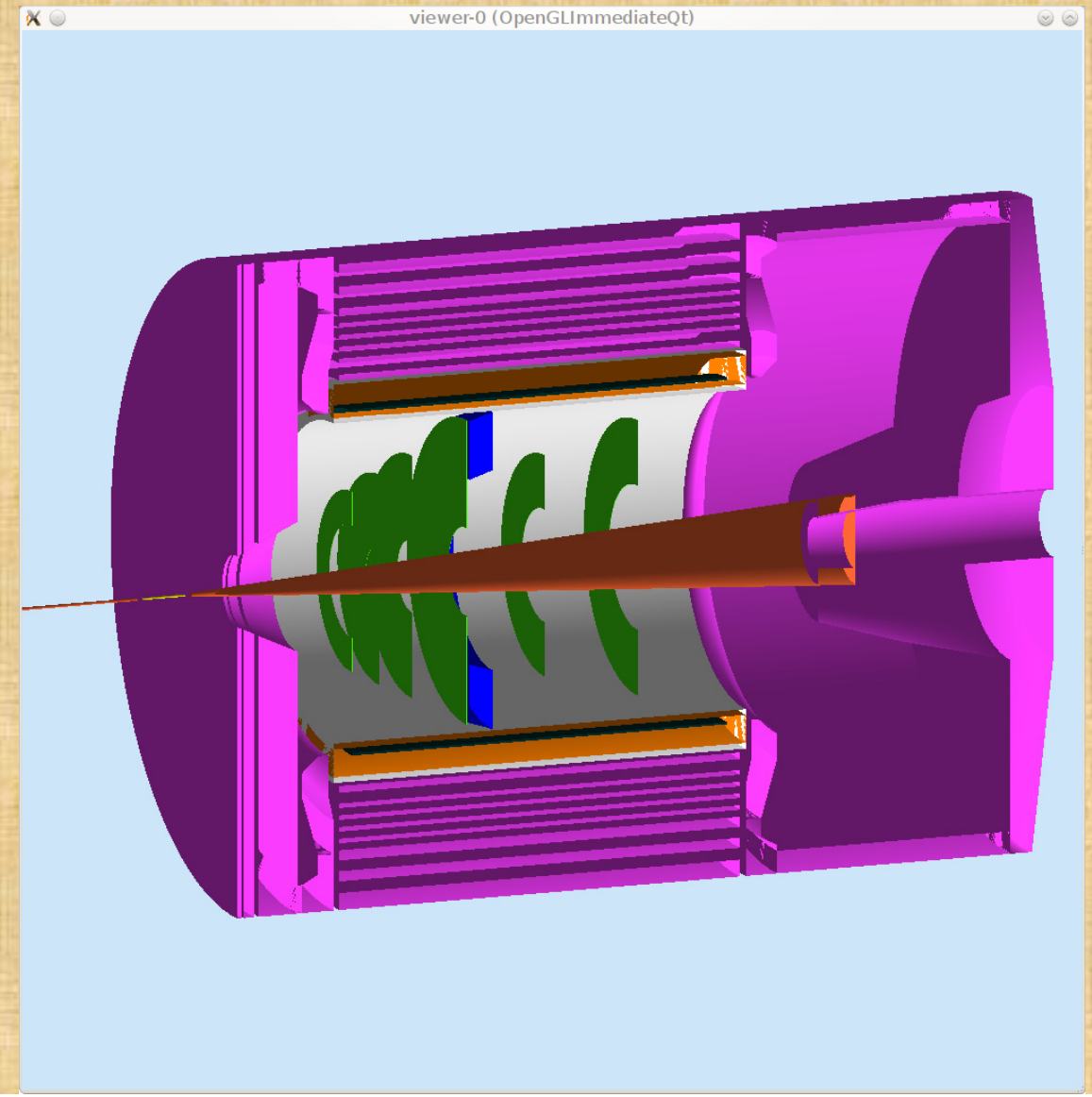
Target/Beam line



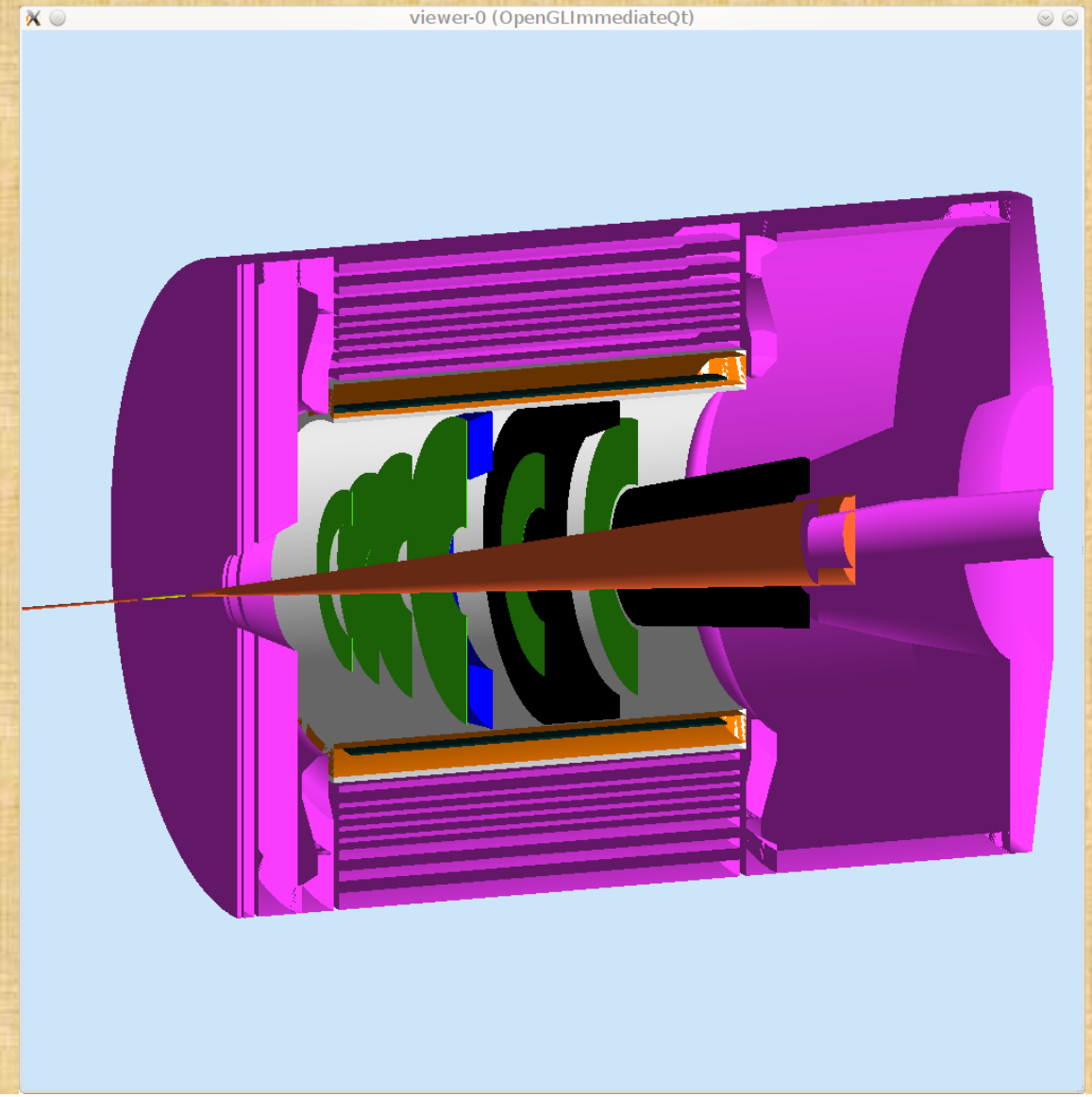
GEM



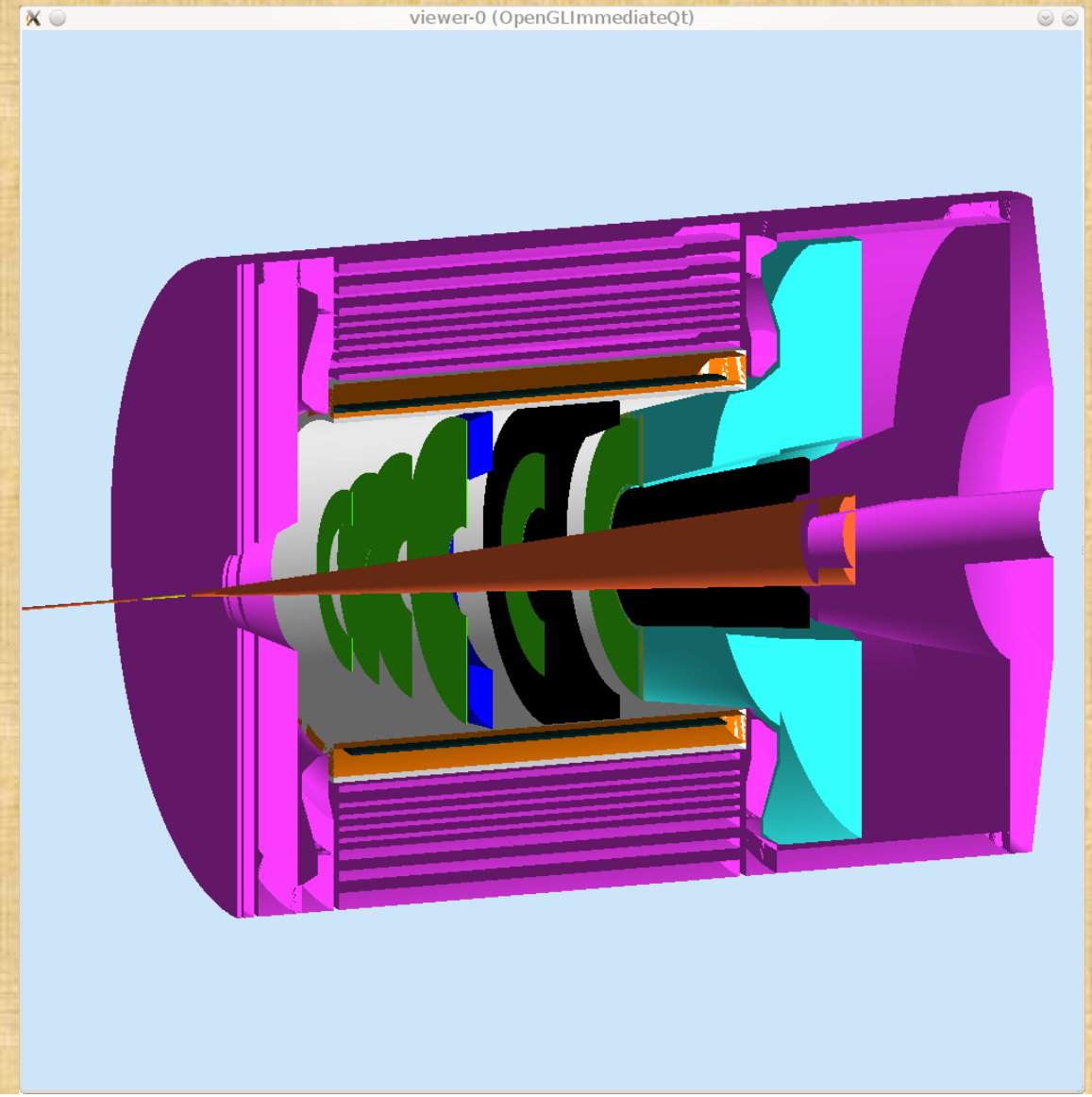
EC, large angle



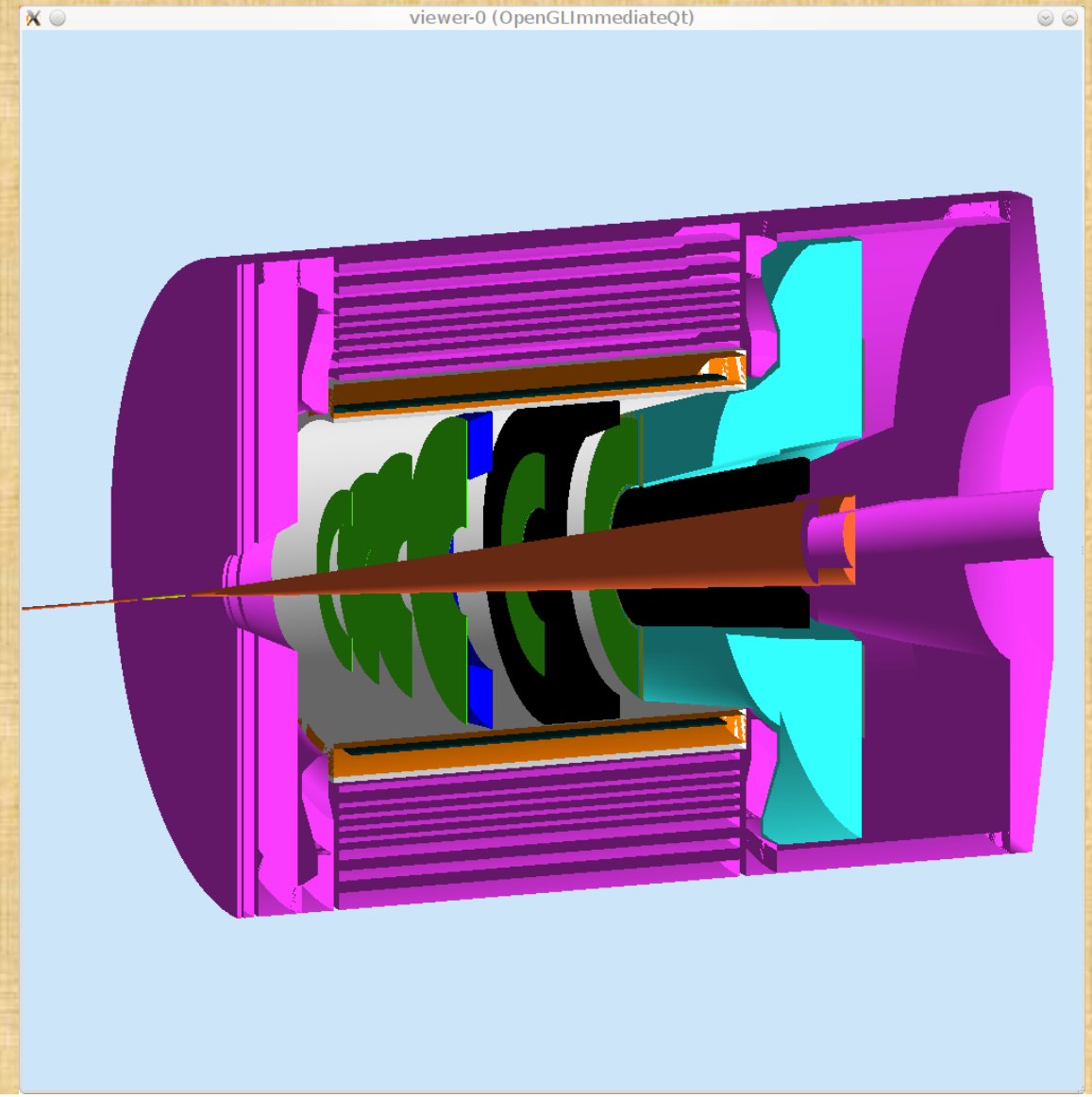
Collimator



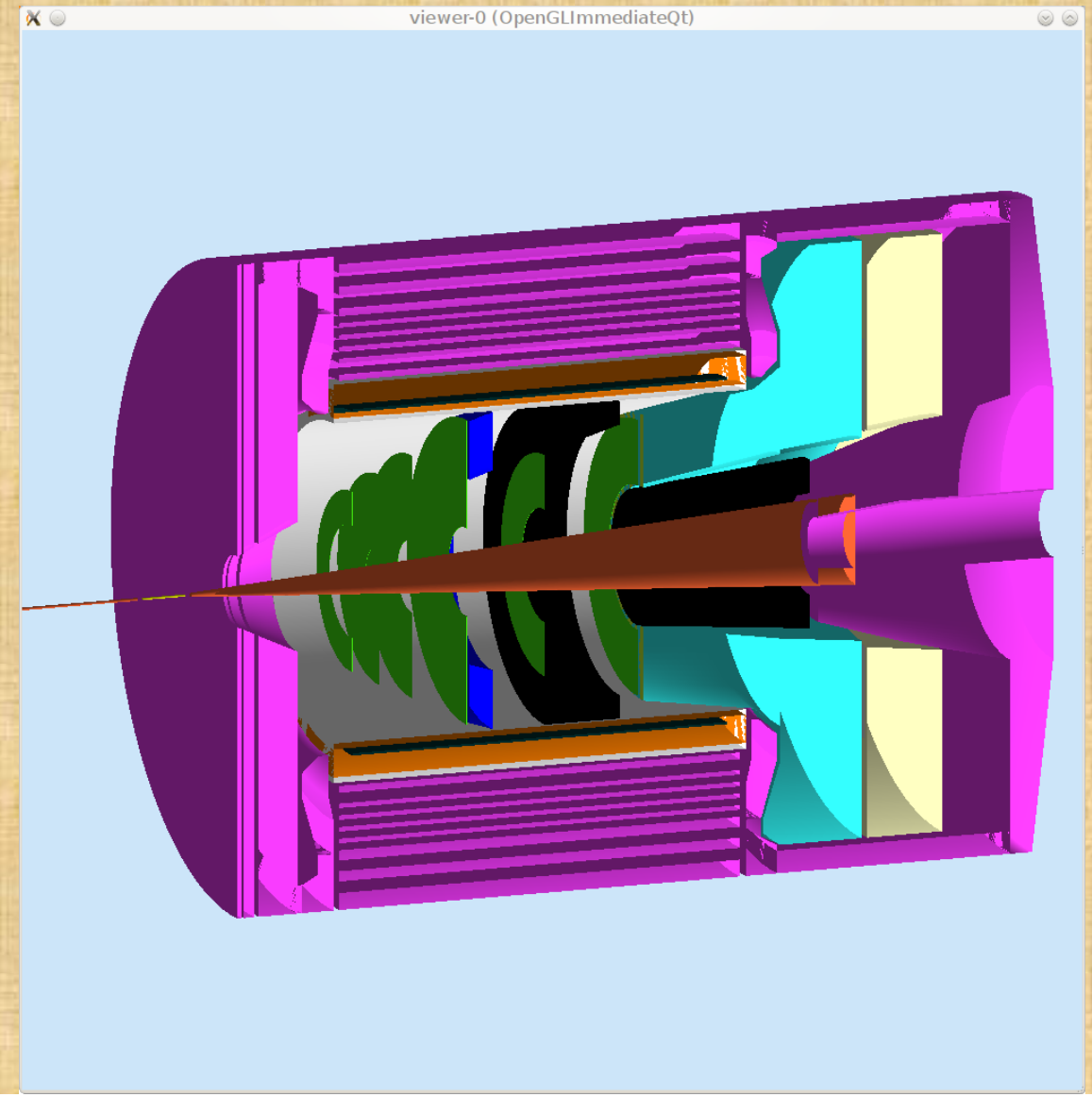
Cherenkov, light gas



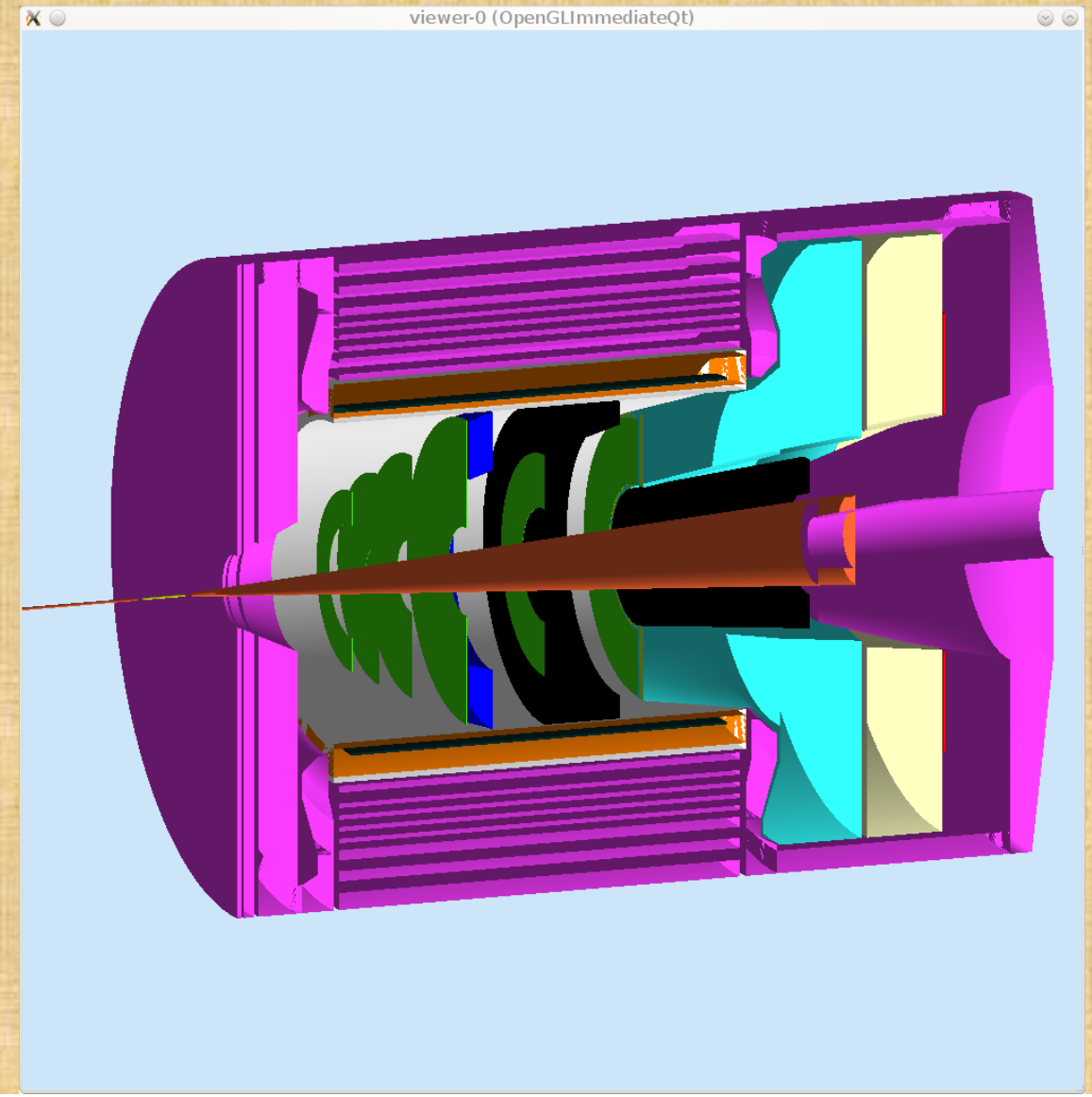
Scintillator



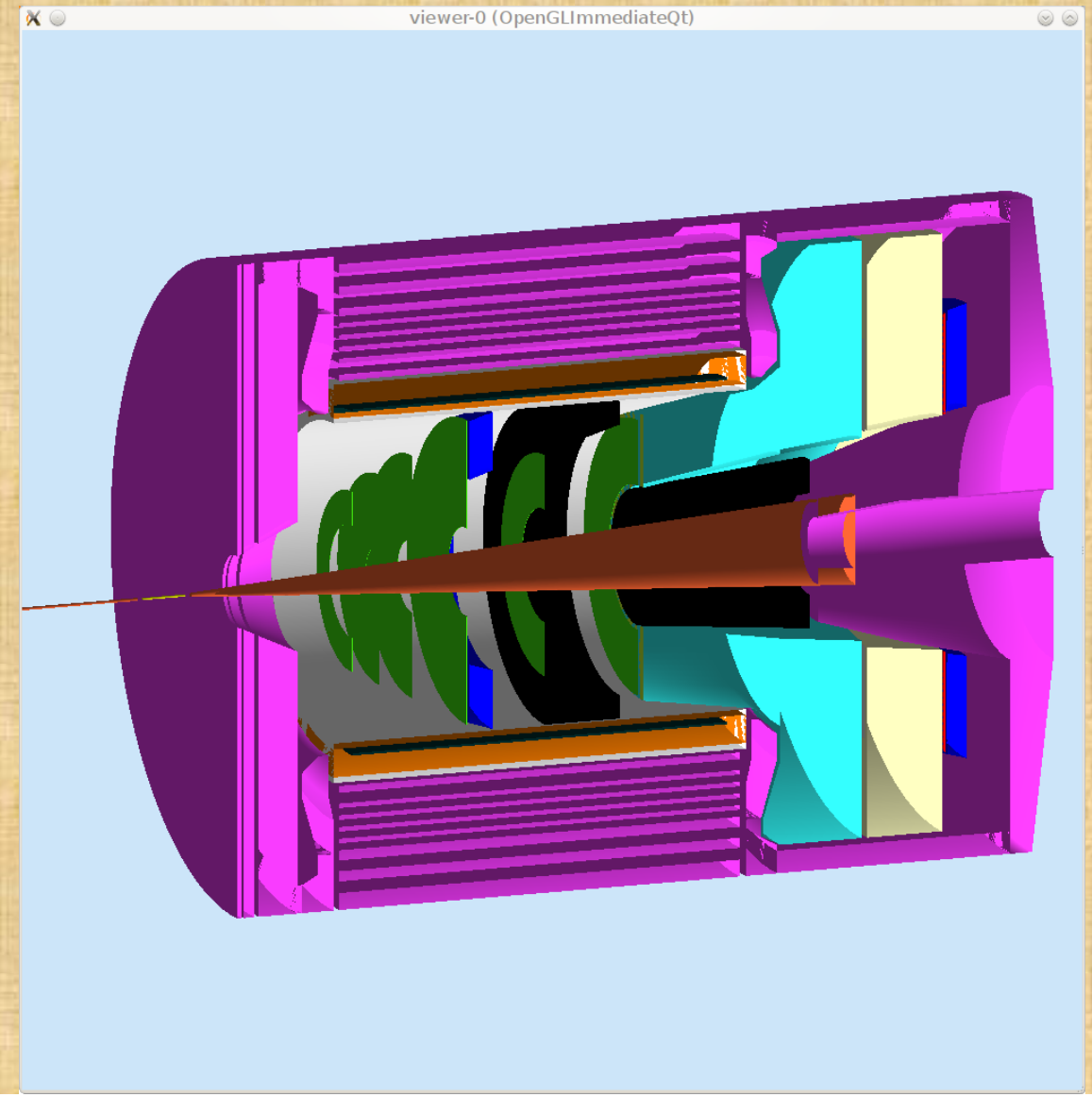
Cherenkov, heavy gas



MRPC



EC, forward angle



kinematics for BaBar SIDIS

Comparing to geant3 sim

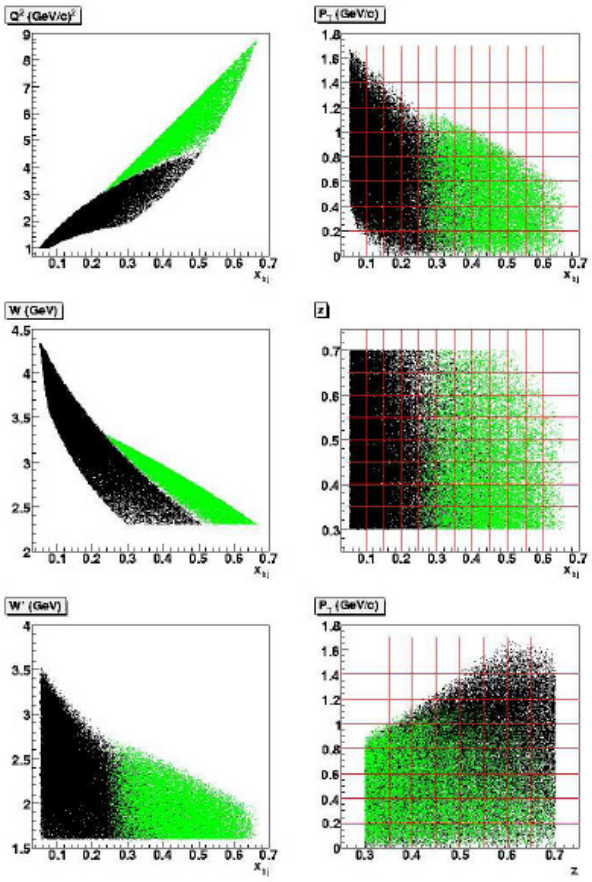


Figure 19: Kinematic coverage for the solenoid detector with a 11 GeV electron beam. The black points show the coverage for the forward angle detector and the green points show the coverage for the large angle detector.

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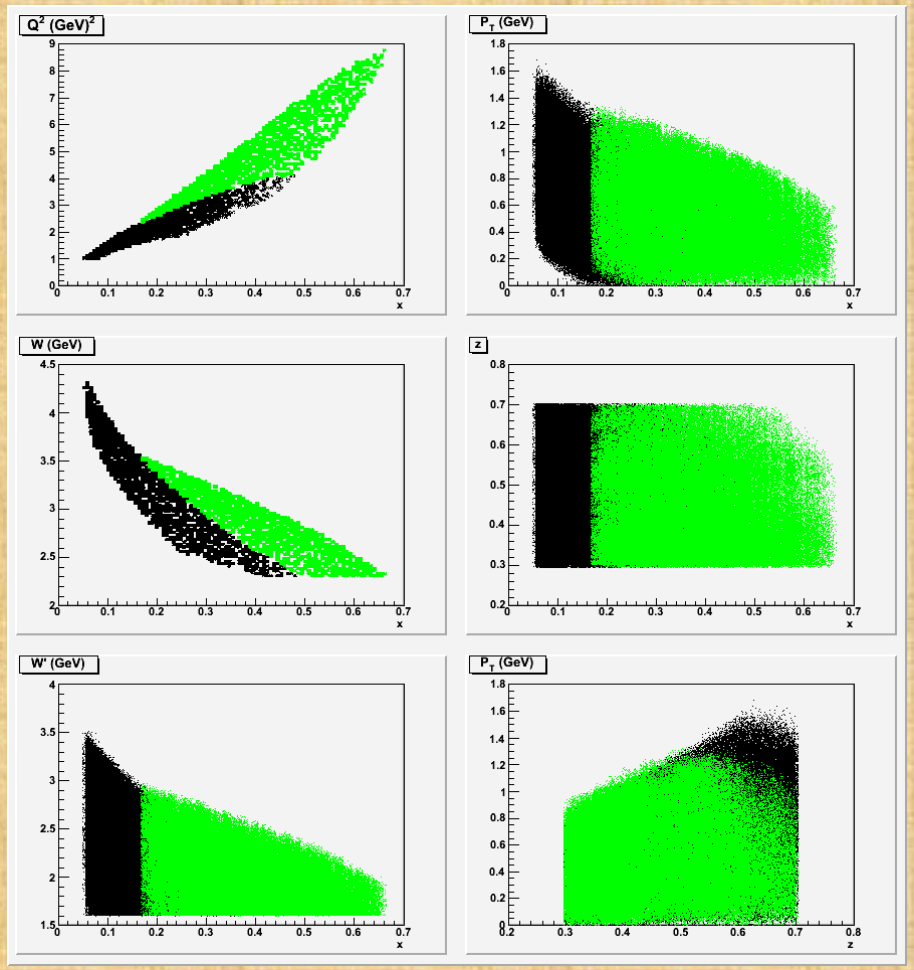

The Wiki

Solid sim geant4

Contents [hide]

Advantage

- Central outside location of geometry/sensitivity/field/digitization
- Customized hit processing for various detectors
- ***Unifed indvidual detector simulation and the whole SoLID simulation***

The Things Completed

- Various magnet coil, yoke, detector geometry generated.
- Various field maps generated and converted to GEMC format
- “soliddb.jlab.org” database set up
- PVDIS generator with output converted to LUND format
- Simple detector hit response

The Work Ongoing

- Cherenkov and EC are in standalone packages due to historical reasons, need to be implemented into GEMC.
- PVDIS baffle design
- GEM and tracking
- SC and MRPC response
- SIDIS event generator.
- Better root output support
- Study acceptance, kinematics and resolution for various configuration
- Rate estimation and low energy background.
- Unified SoLID simulation

Is it ready?

- The framework is ready.
- Need to compare to geant3, dedicate persons to do it for SIDIS and PVDIS, may complete in a month or two.
- Individual detectors, it's better for developer to estimate time.

Thanks

- Maurizio Ungaro
- Paul Reimer
- Seamus Riordan
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- Simona Malace
- Eugene Chudakov
- Xin Qian
- Zhiwen Zhao