Update on LUXE GEANT4 Simulation.

Oleksandr Borysov

LUXE S&A Meeting
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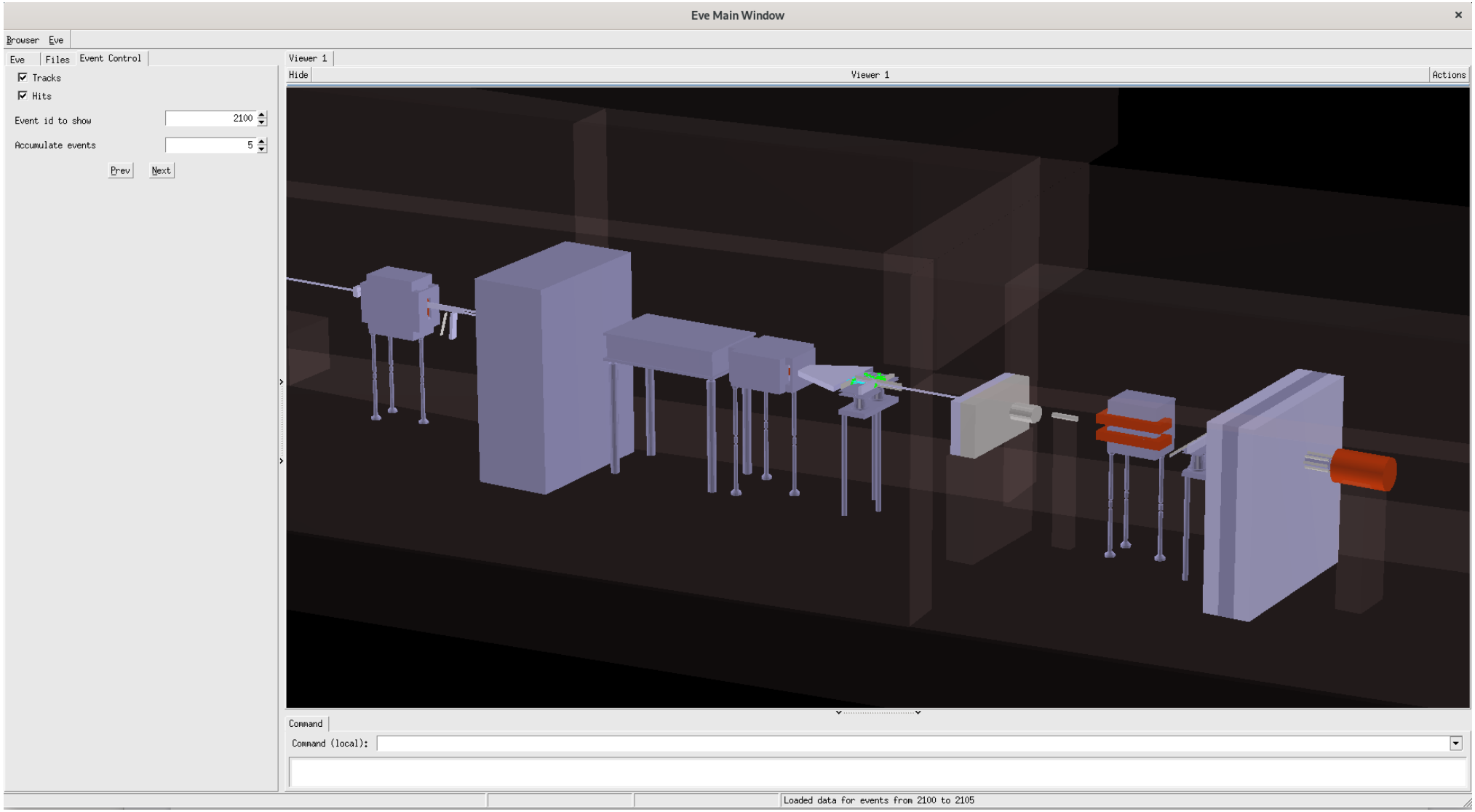
Luxe geometry in event displa

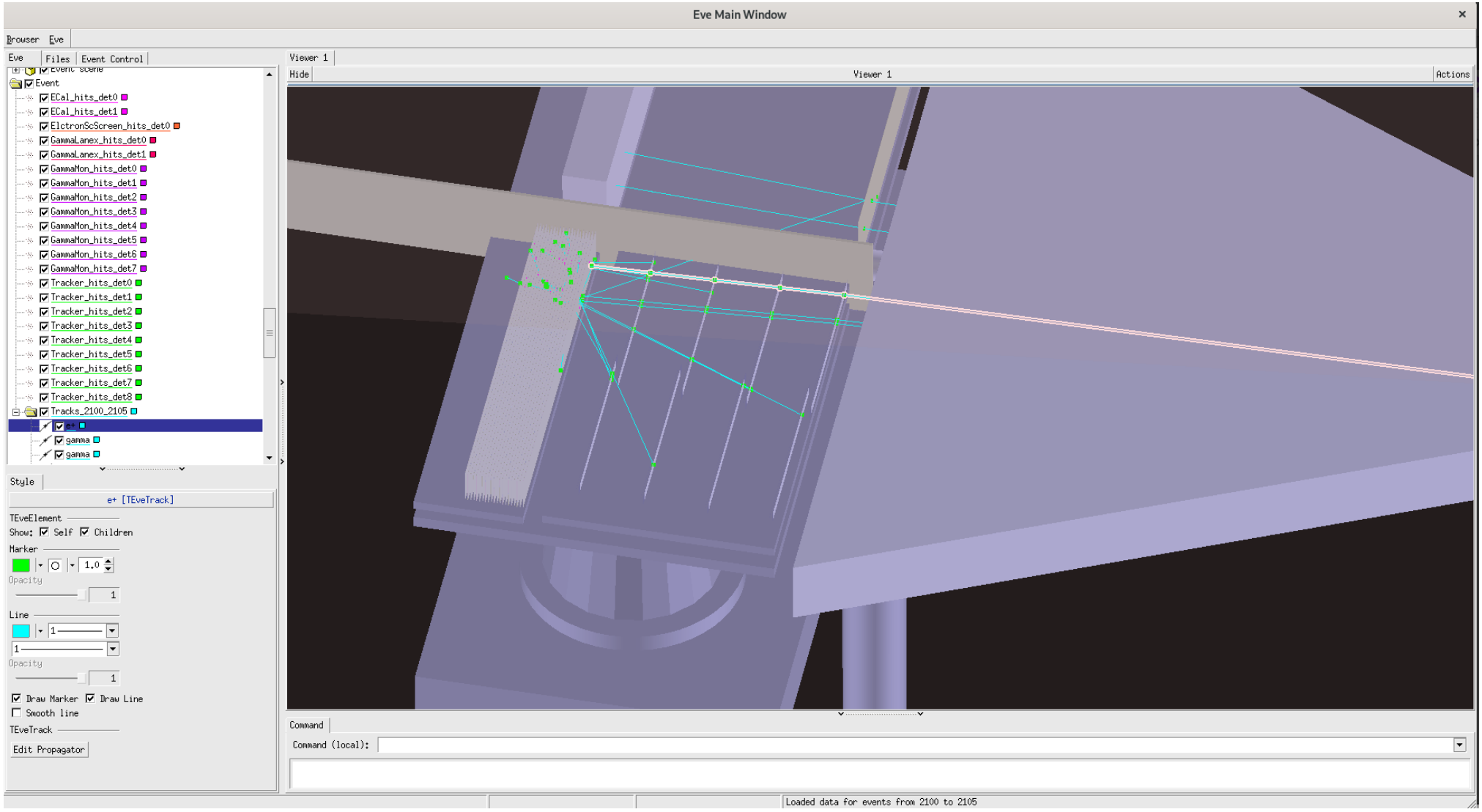
- ROOT Eve;
- LUXE GDML;
- Simulation root file (Tracks and Hits trees).



Event display with hits and tracks

Combined hits and tracks of events 2100-2105

w0_3000nm_vc_al_window/luxe_hics_signal_165gev_3000nm_jeti40_cv12_em0_alw_1mu_cut_tv4_hv1_1.root



Event display

Requirements:

- Root installed with EVE (it seems to be a default option)
- Implemented as a single macro file (not the best approach but good for simplicity to test)
- Luxe GDML geometry file supplied as first parameter;
- Simulation output root file (Hits and Tracks tree are used);

Extensions:

- Extend to display Trajectories tree and energy deposits from HIts with transformation from local to global reference frames as in DetSettings.
- Tune propagation class which displays particle trajectories.
- Add to git.

Example:

/nfs/dust/ilc/user/oborysov/runjlx/macro/eve

```
root -l lxeve_geom_tree_gui.C'("lxgeomdump_hics_91c0c7ee_nc_dump_no_incerts.gdml",
                               "luxe_hics_signal_165gev_3000nm_jeti40_cv12_em0_alw_1mu_cut_tv4_hv1_1.root")'
```

Simulation model development

https://confluence.desy.de/display/LS/LUXE+GEANT4+required+changes

	Item	Description	Dependency	Priority	Commit
5	Reduce shielding	Consider smaller size of the shielding and change material to concrete.	Study	M	
6	Swap alpide sensor with a flexible board	This corresponds to the real stave design.		L	
7	Consider some kind of coverage for the ECal	This might protect sensitive volume of the calorimeter from the photons hitting it from top, bottom and sides.		H	70cdfb7d
8	Adapt MC reader to the change in header of the out files	The header of the out files has been changed.		H	48d22e1b
9	There are warnings on duplicated names of the materials	z.B. Epoxy		M	
10	Provide an output of weight and density of all volumes	This might help to check if all volumes in simulation use correct material, and help in absorbed dose calculation.		M	56861e7
11	Copy primary particle to the Tracks tree	It would be very convenient for MC		H	ebfb5580
12	Interaction chamber with internal components	Current version does not fit the building	3D CAD	M	
13	Magnets	All magnets need to be changed	Model choice		
14	Realistic magnetic field		✔		
15	Beam dumps	Coordinate present models with XFEL and update as needed	XEFL		
16	Target containers	Vacuum containers for the targets (bremsstrahlung and gamma spectrometer)	3D CAD		
17	Gamma spectrometer mechanical design	Support for the LANEX screens, position, camara positions	3D CAD		
18	Cherenkov detector	Update the model to match recent detector design. Light production.			
19	Tracking detector services	Cooling, kapton cables, connectors, etc	3D CAD		
20	ECal updated casing and electronics		3D CAD		
21	CALICE ECal for electrons	Import existing model from xml	✔		
22	Beam profiler	Detector design (sensors, PCB, motors), and support	✔		

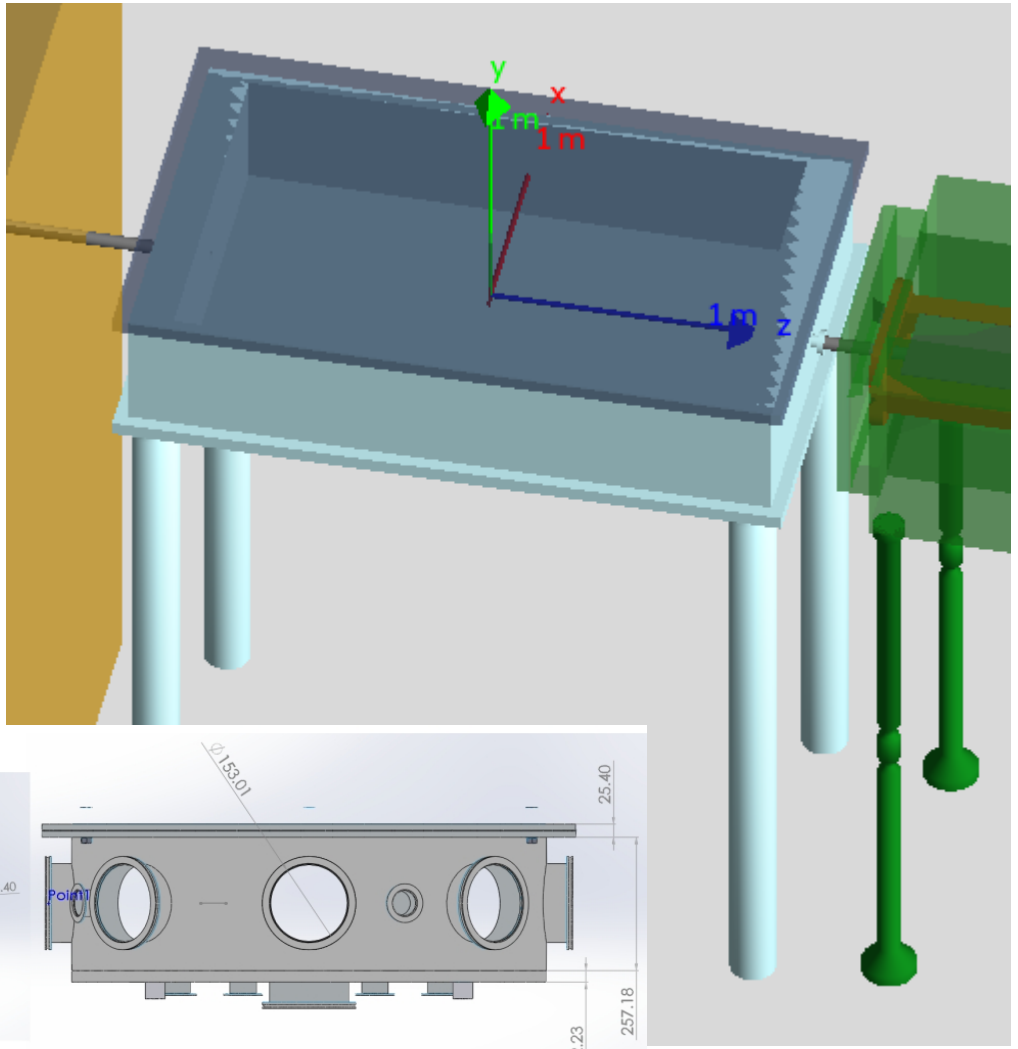
Sergej slides 31.05

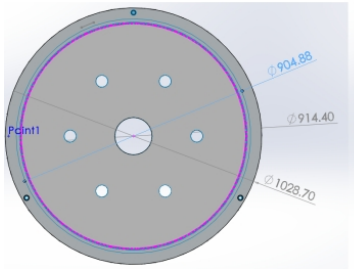
Backup

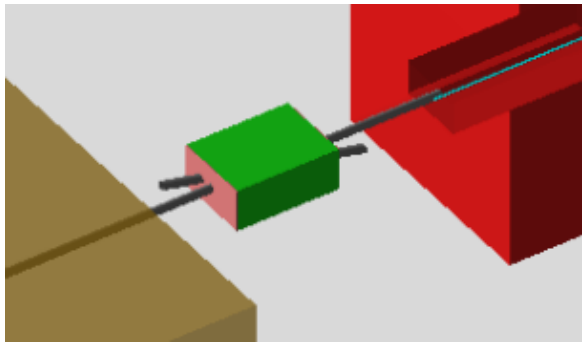
Interaction chamber

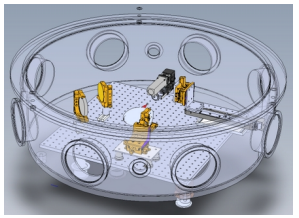
- There were several implementations, 2 based on 3D CAD;
- There is no internal content in G4;
- Calibration wire target can be easily installed (Ishay email);

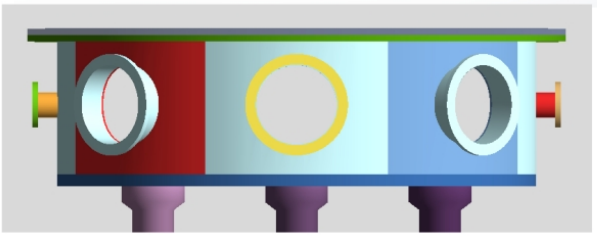
- New design expected;
- internal content;
- Laser pipes;
- Beam pipe interface (colimator?, shielding?);
- Calibration wire target.





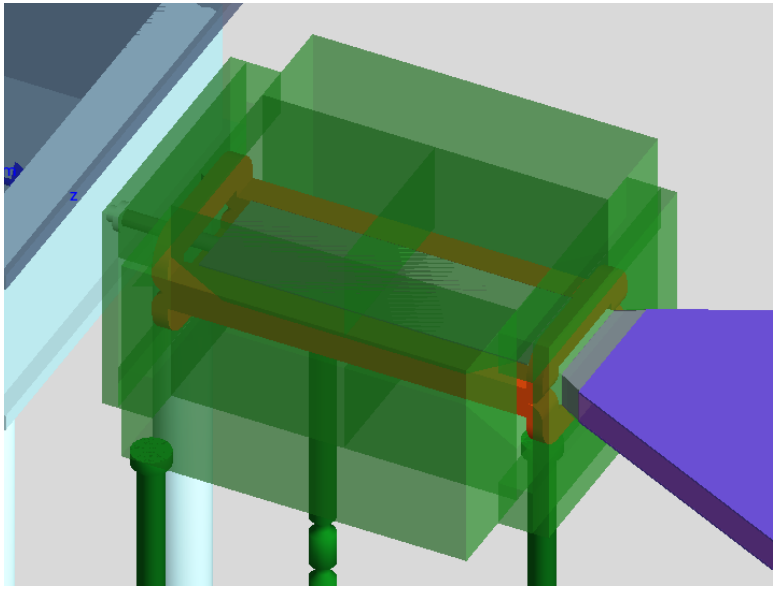


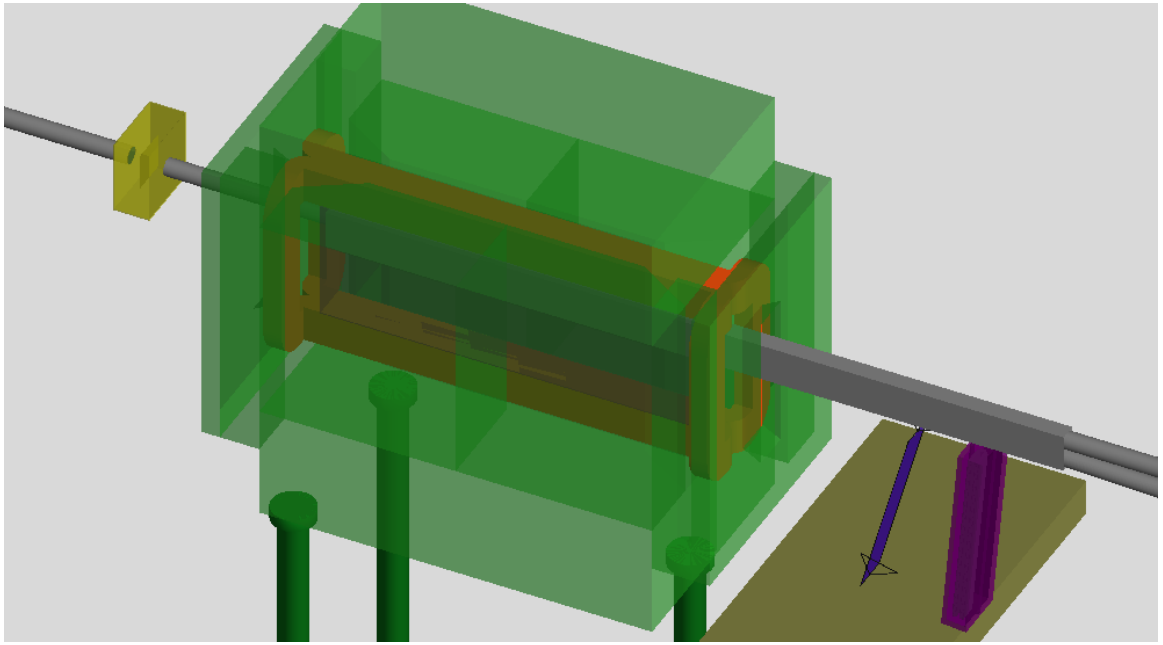




Magnets

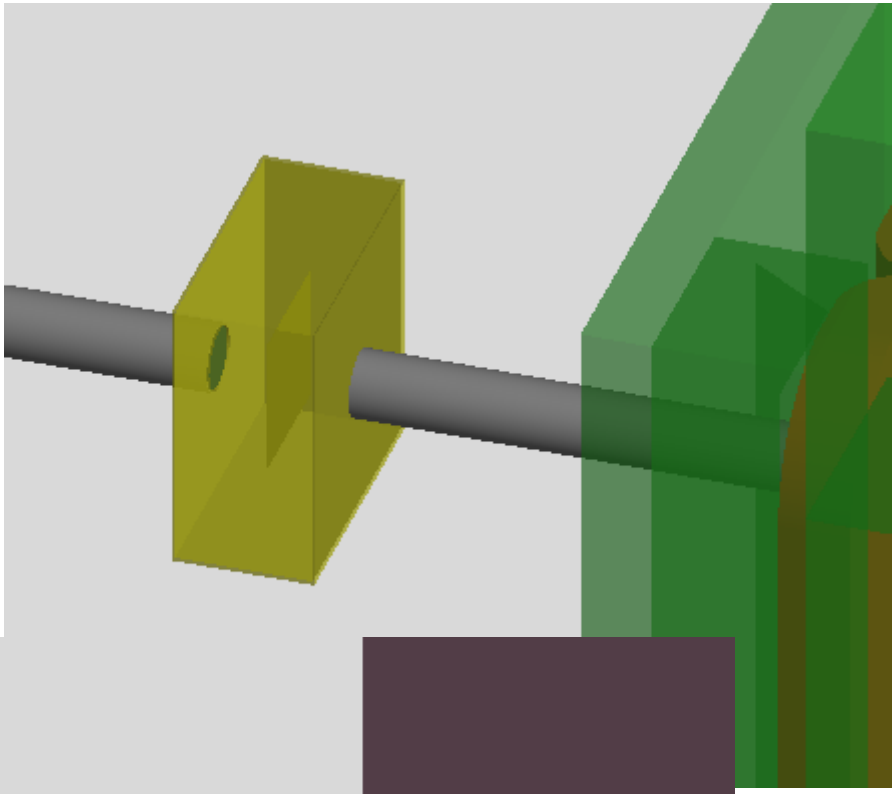
- New magnet model;
- Magnetic field based on measurements or approximation;
- Related hardware:
  - vacuum chambers
  - Beam pipes
  - support

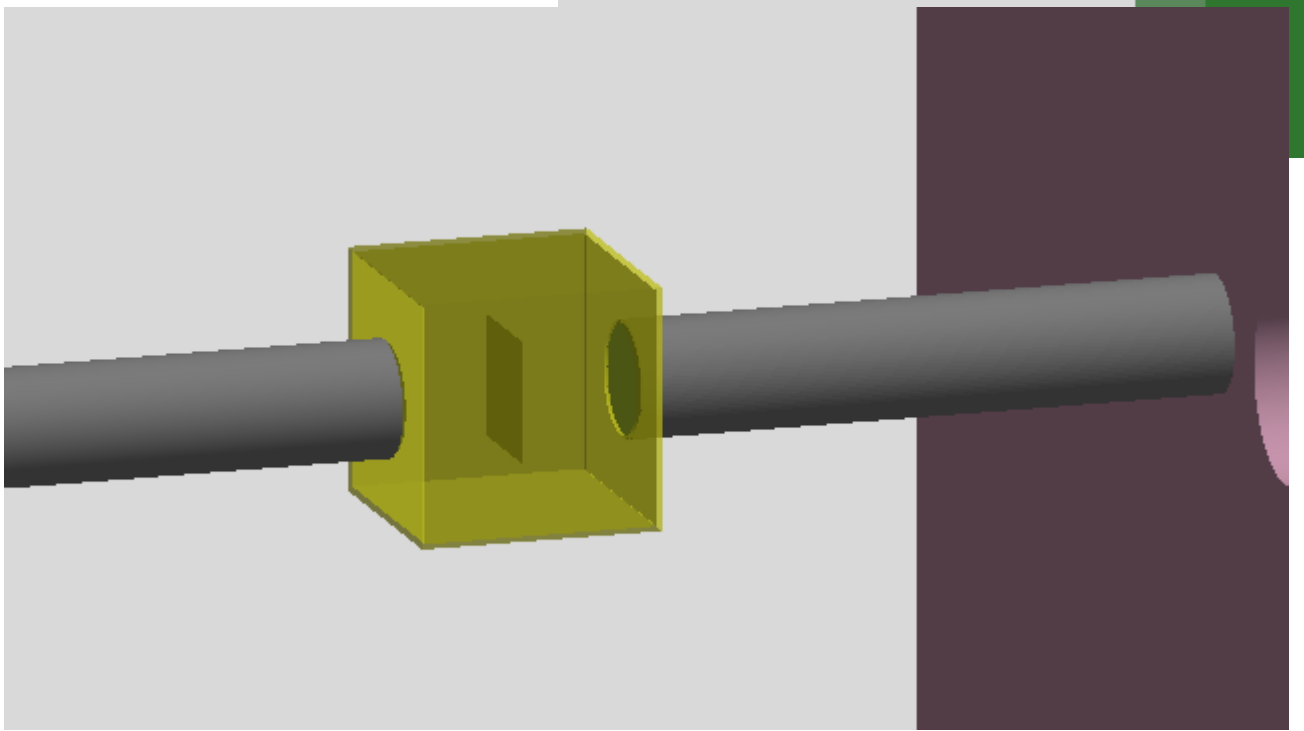




Target containers

- Container design
- Beam pipe interface
- Target mounting (move?, rotation?)

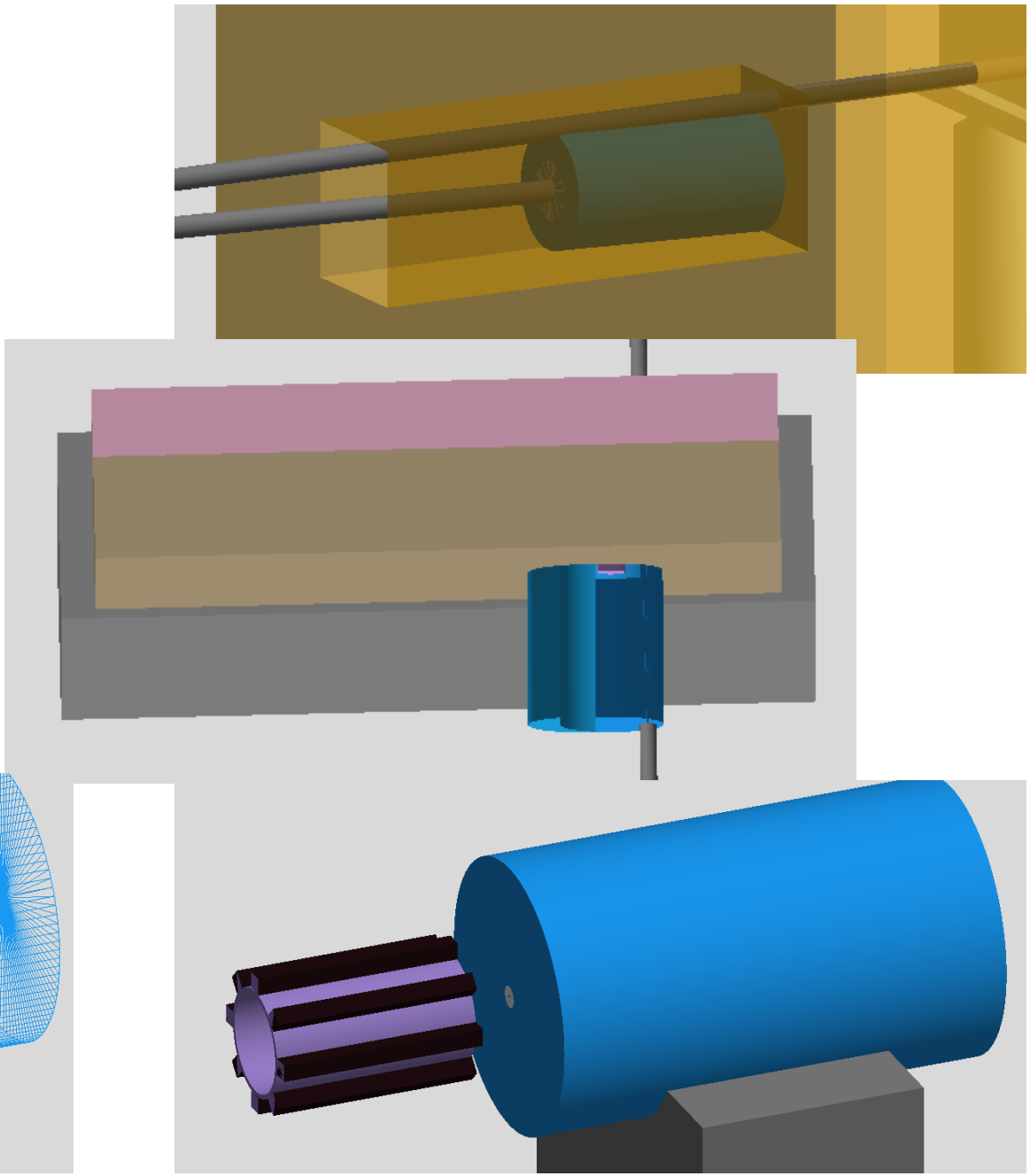


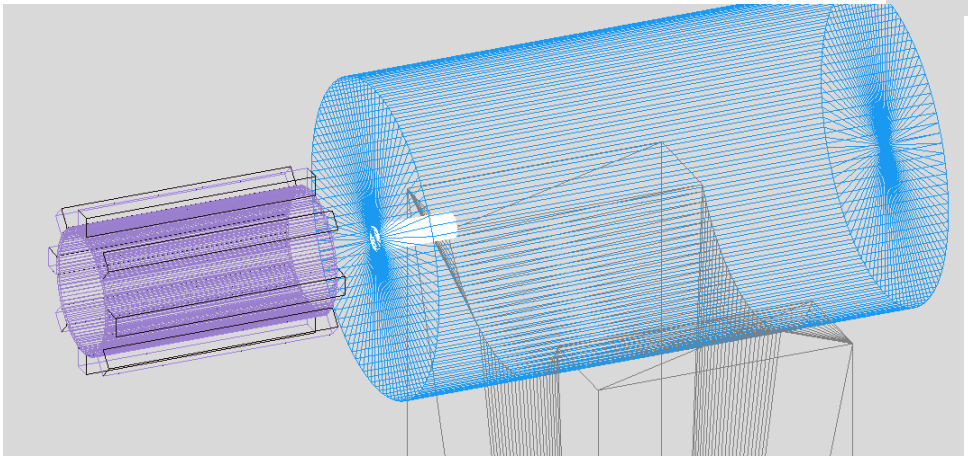


Beam dump

Source of background

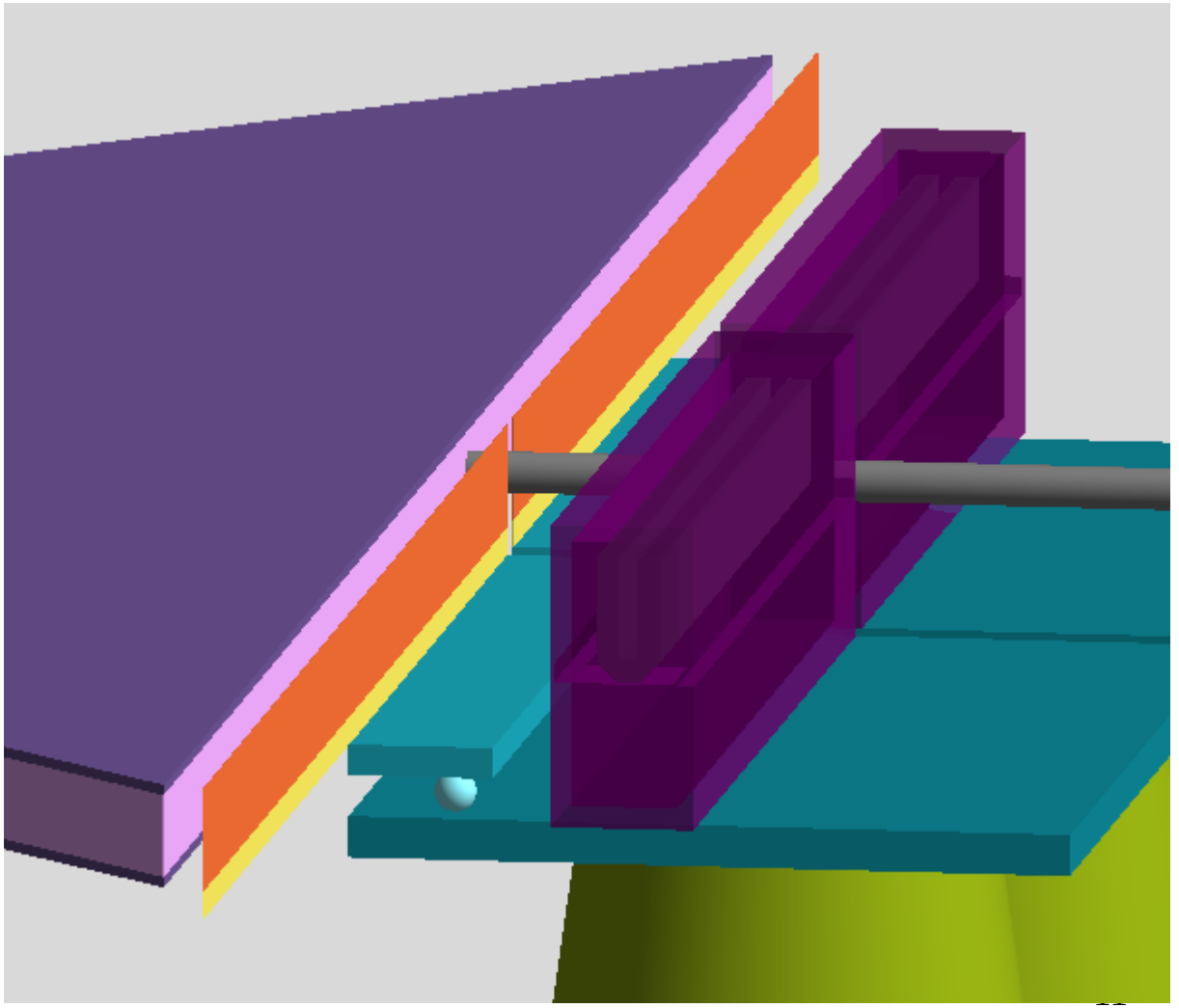
- G4 implementation is optimized for detector performance;
- Are there safety requirements to consider?





Gamma spectrometer detector

- Exact geometry;
- Supports;
- Camera position;



Cherenkov detector

- Update design
- Signal generation