Geant4 Examples

What you can find to help you get started

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- When you download Geant4 it comes with a lot of exercises to help you get started
  - But there are also many already prepared applications from which you can start
  - **Also consider doing one of the Geant4 tutorials (from main G4 webpage: http://www.geant4.org check the Events and Past Events section!)**

Geant4 examples

- Can be found in:
  - **<geant4-main-directory>/examples**
- Three main "categories":
  - **novice** and **basic** directories: exercises to introduce you to all basic aspects of Geant4, start from exercise number 1 and go to the last one (novice: "historical" group of exercises; "basic" new group of exercises, very similar, but more pedagogic)
  - **extended:** exercises to show specific aspects of the simulation. For example: hadronic example teach you about hadronic simulation; field exercise how to use EM fields and so on. Check this exercises for the things that you need after novice/basic
  - **advanced:** complete applications from "real" world

Advanced applications

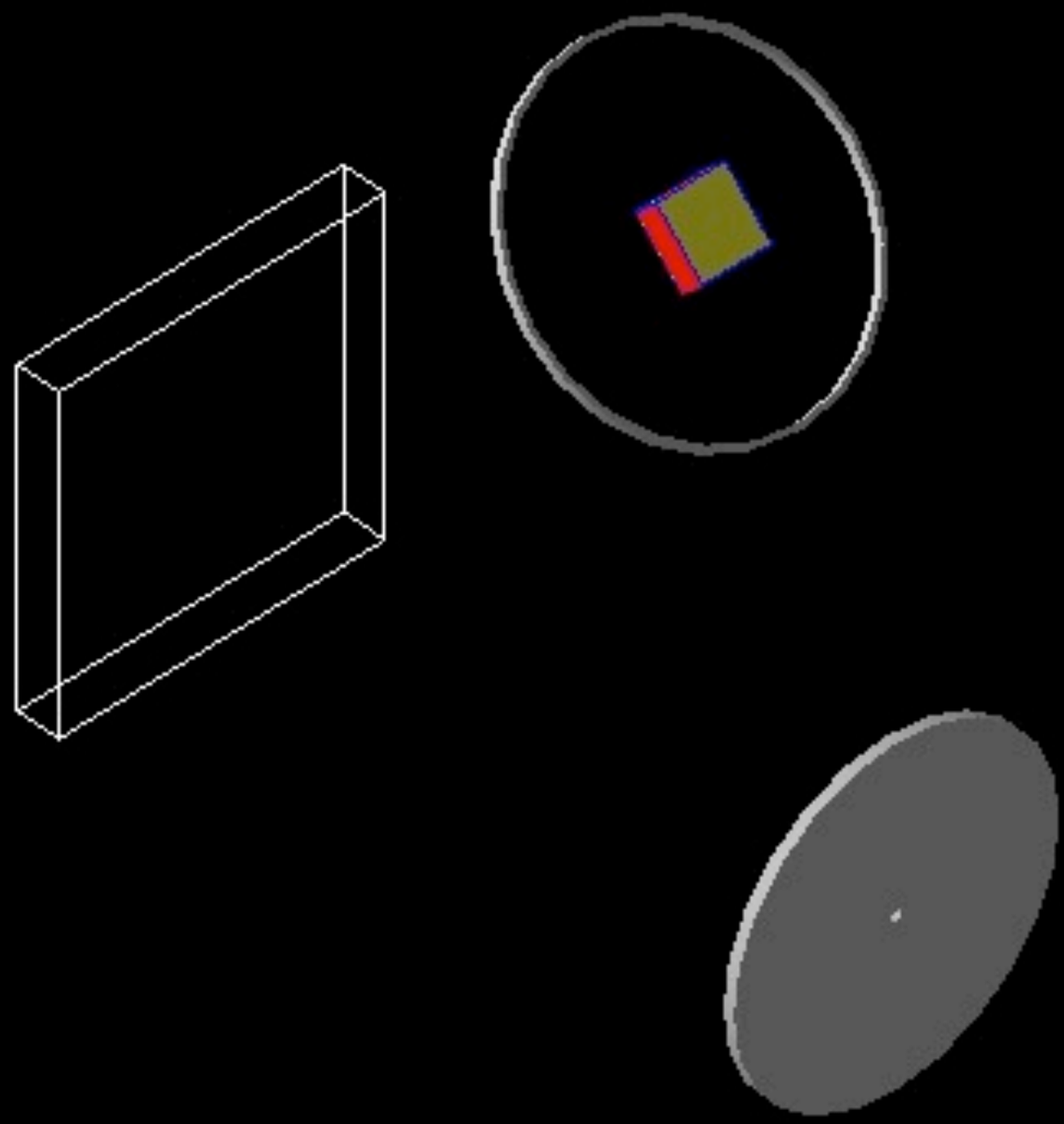
- **ChargeExchangeMC** : experiments in Petersburg Nuclear Physics Institute (PNPI, Russia)
- **air_shower** : ULTRA experiment, to study cosmic air shower
- **amsEcal**: simulation of the AMS calorimeter on the ISS
- **brachyterapy**: simulates the energy deposit in a water phantom by Iridium, Iodium, Leipzig Applicator
- **composite_calorimeter**: CMS calorimeters for test-beam

- **dnaphysics**: showing G4 extension for DNA damage
- **gammaray_telescope**: gamma ray telescope in space environment
- **hadrontherapy**: simulation of INFN-LNS (Italy) beam line for hadron therapy
- **human_phantom**: simulation of human phantom models from MIRD and ORNL models
- **iort_therapy**: simulation of Intra-Operative Radio-Therapy (IORT) technique
- **lar_calorimeter**: simulation the Forward Liquid Argon Calorimeter (FCAL) of the ATLAS Detector

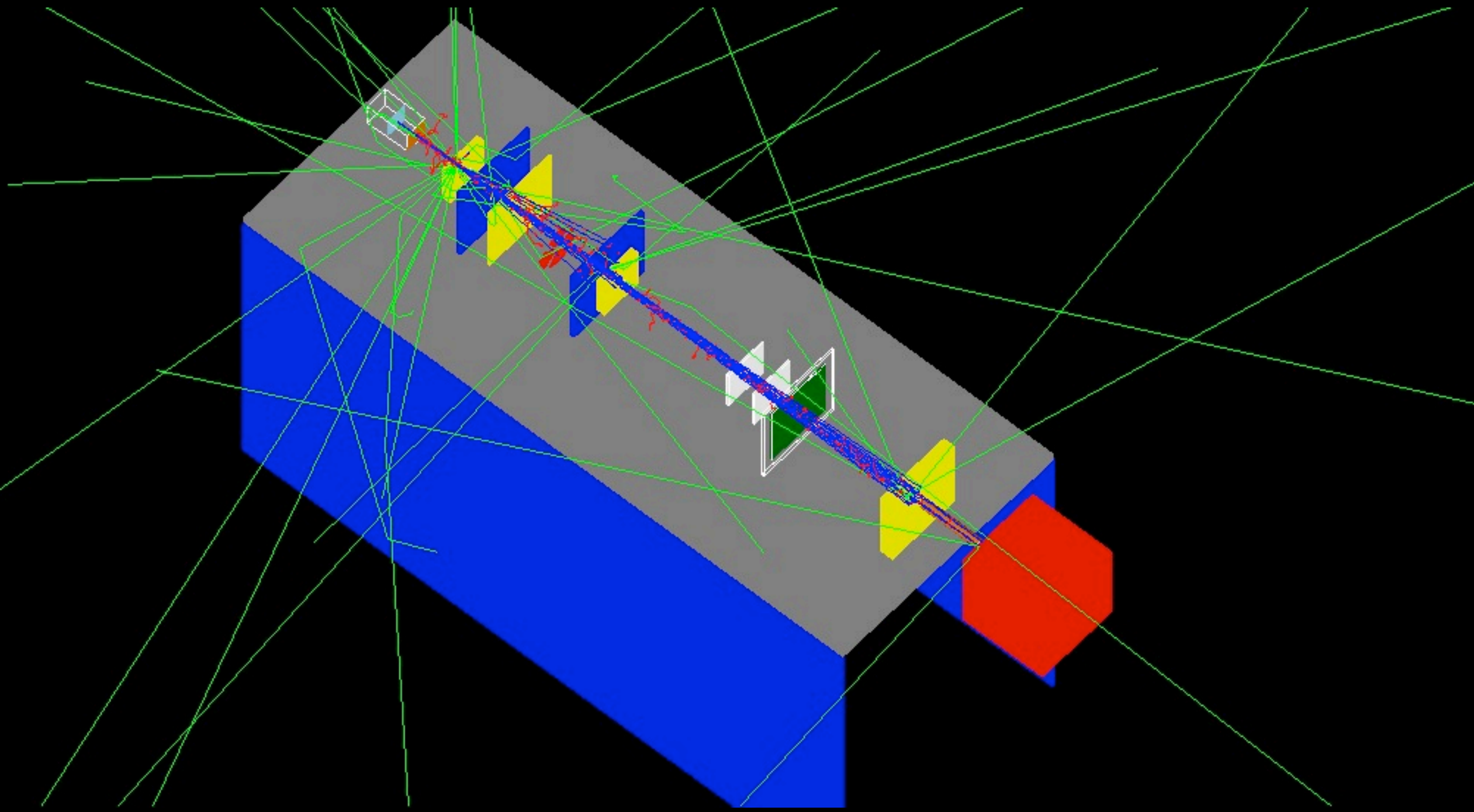
- **medical_linac**: typical structure of a medical linear accelerator for Intensity Modulated Radiation Therapy (IMRT)
- **microbeam**: simulation of the cellular irradiation beam line installed on the AIFIRA electrostatic accelerator facility located at CENBG, Bordeaux-Gradignan, France
- **microdosimetry**: Simulation of the track of a 5 MeV proton in liquid water, dose calculation for DNA models
- **nanobeam**: Simulation of the beam optics of the nanobeam line installed on the AIFIRA electrostatic accelerator facility located at CENBG, Bordeaux-Gradignan, France

- **purging_magnet**: simulation of electrons traveling through a 3D magnetic field
- **radioprotection**: valuate the dose in astronauts, in vehicle concepts and Moon surface habitat configurations
- **underground_physics**: an example of a underground dark matter experiment
- **xray_fluorescence**: simulation of X-ray fluorescence setups
- **xray_telescope**: based on the work to simulate the XMM-Newton and Chandra satellites

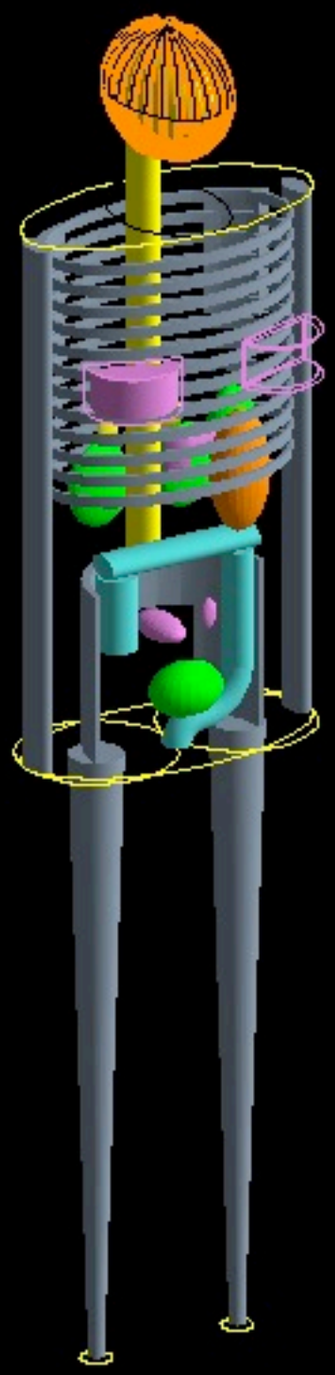
xray_fluorescence



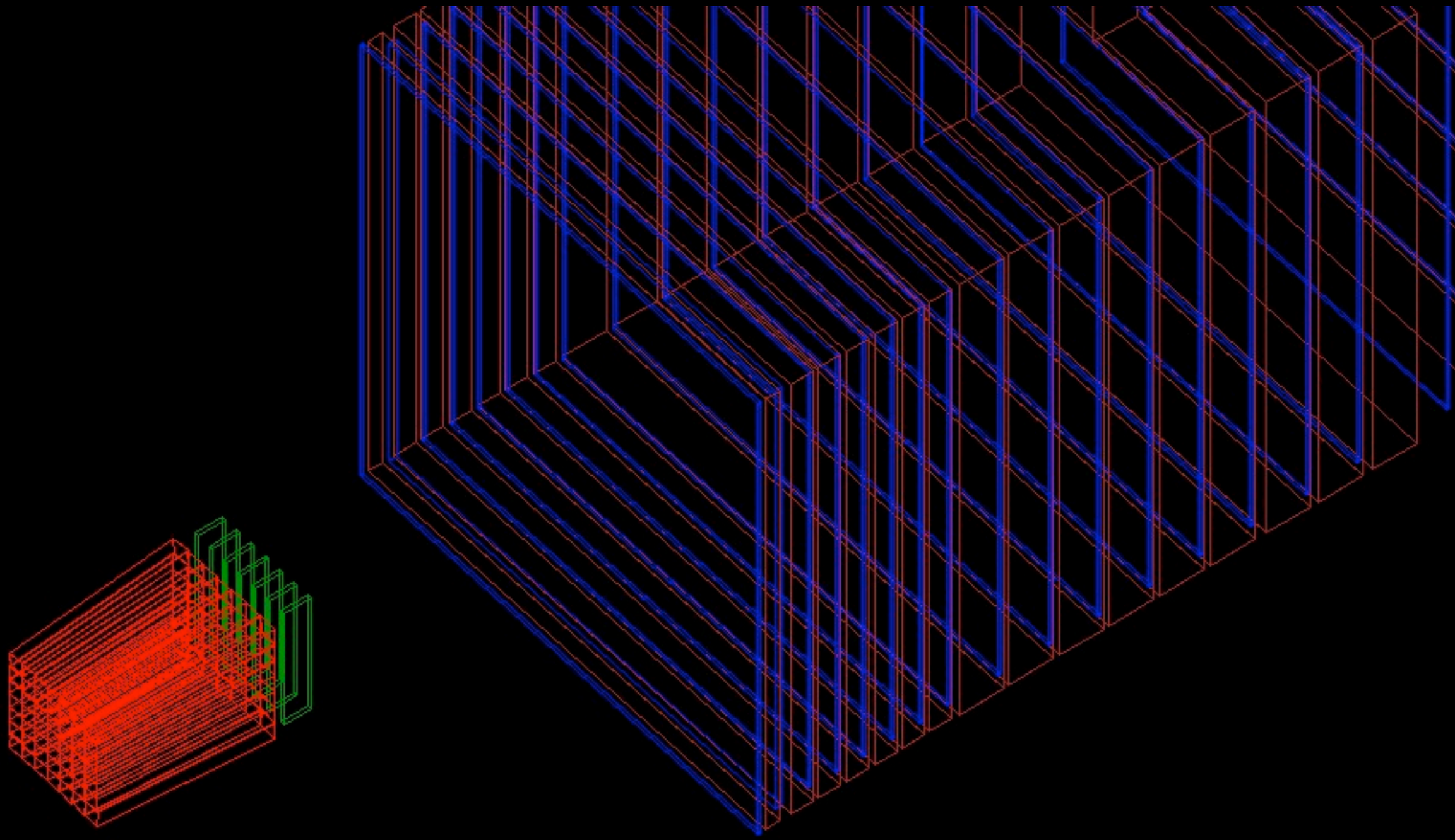
hadron_therapy



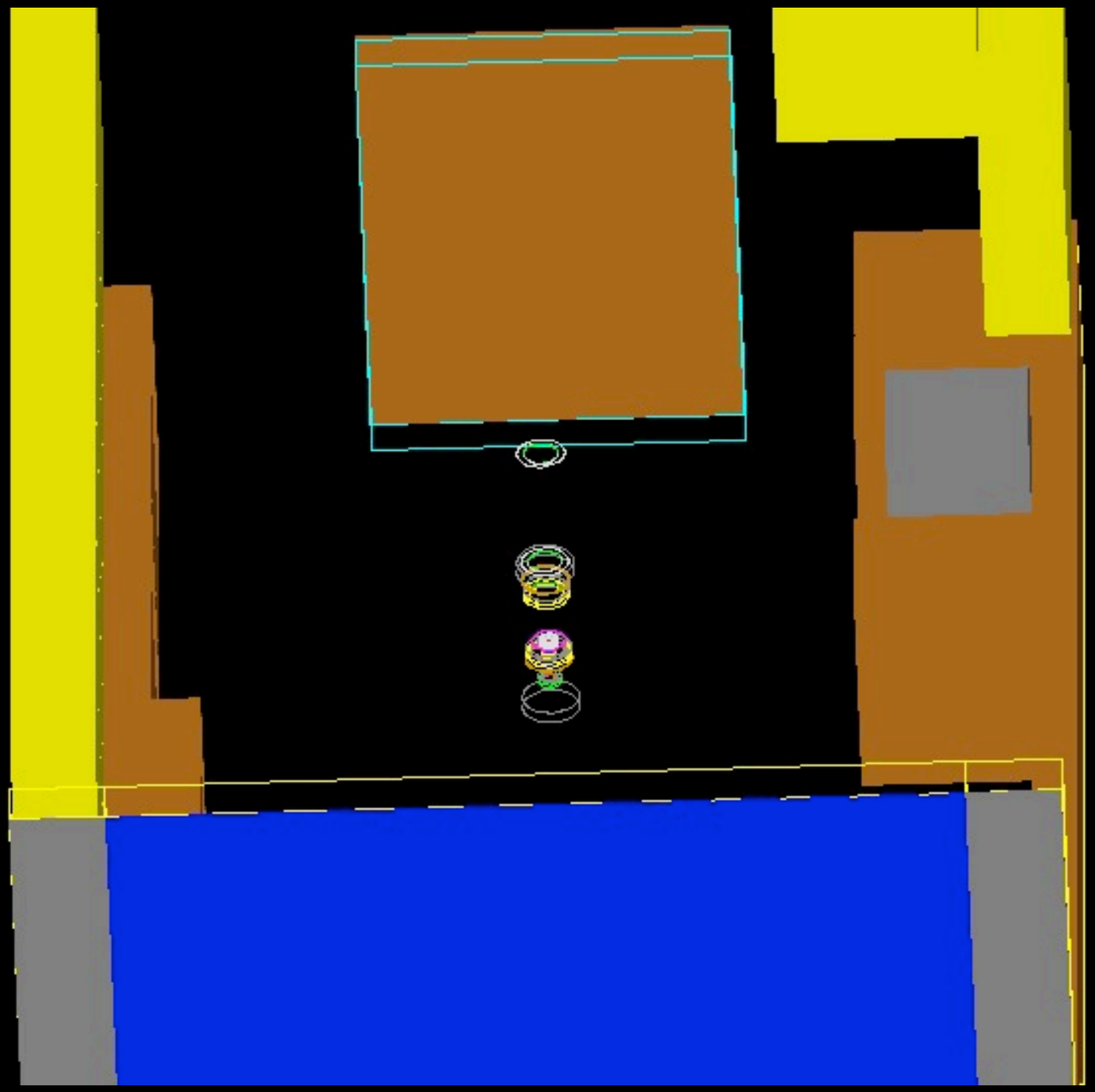
human_phantom



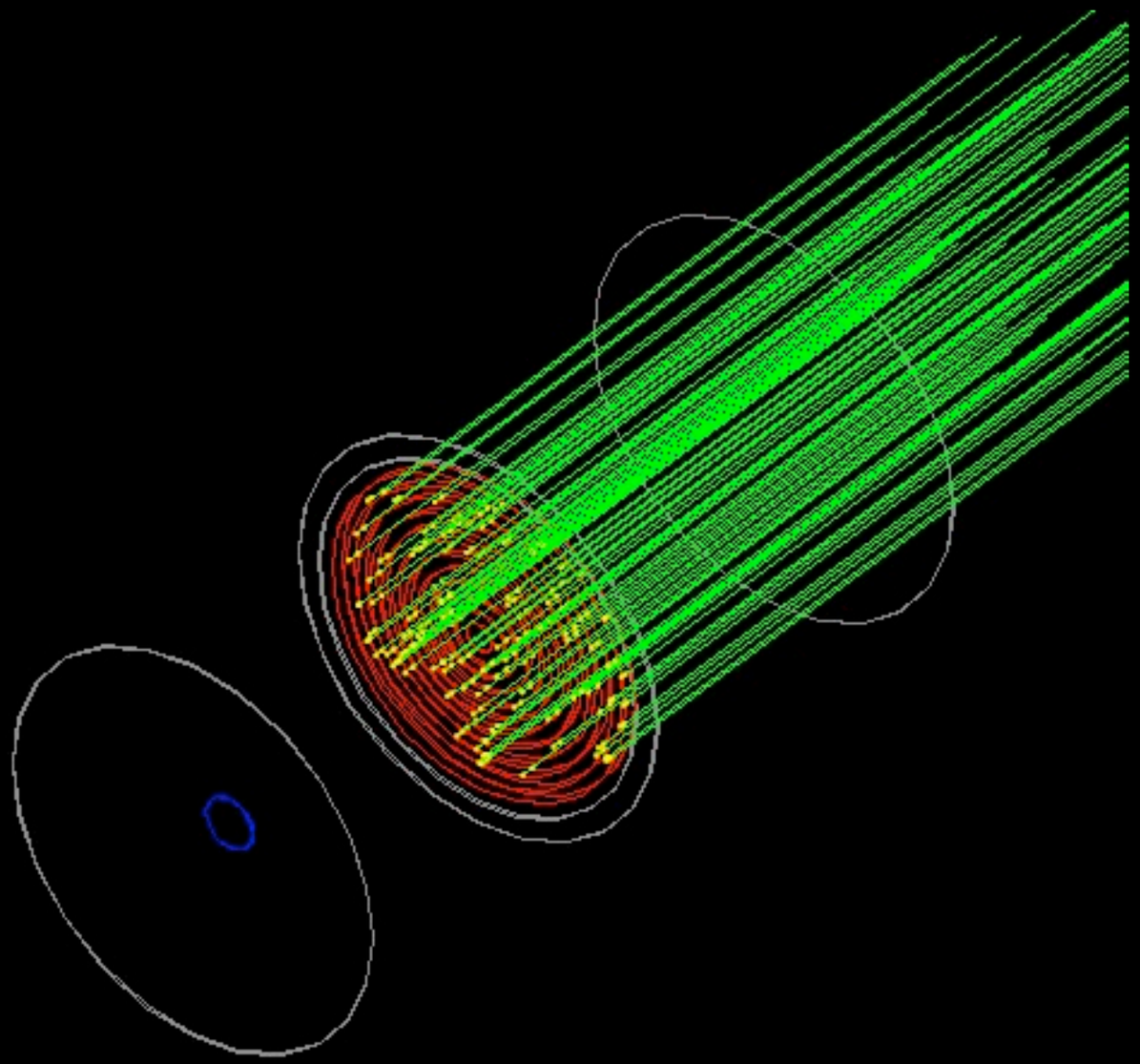
CMS test-beam: composite_calorimeter



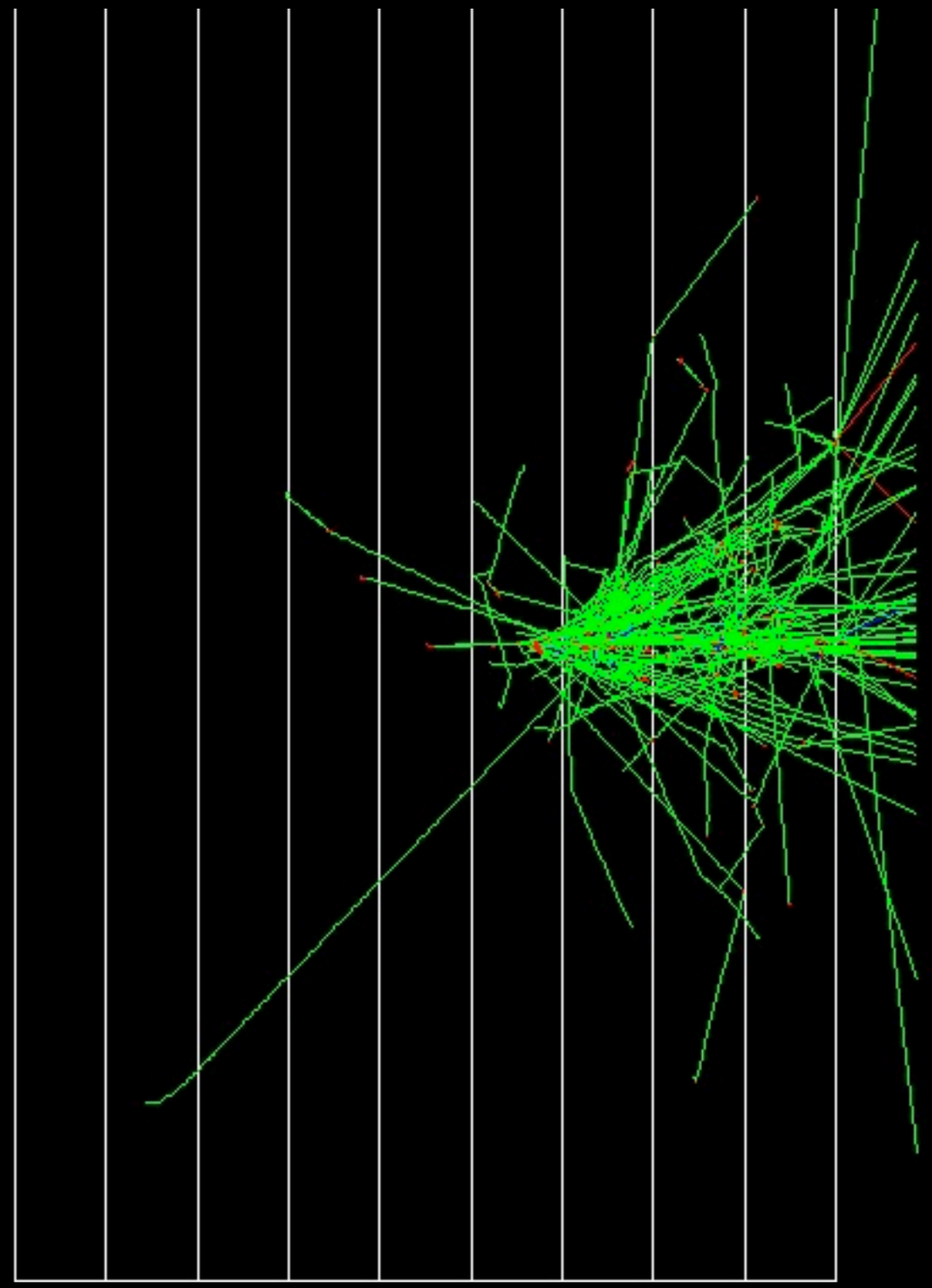
underground_physics



air_shower



amsEcal



External Applications

- These are two examples of applications build by other groups (i.e. **we are not responsible for them**) for specific use-cases:
  - Gate: **PET, medical imaging:** http://www.opengatecollaboration.org
  - G4BeamLine: **accelerator design**: http://www.muonsinc.com/muons3/G4beamline
  - SLIC: **HEP detector design** for linear collider: http://www.lcsim.org/software/slic/
  - GRAS: **radiation analysis** studies in space environment: http://space-env.esa.int/index.php/geant4-radiation-analysis-for-space.html