

Simulation of energetic particle interactions with SphinX PIN detectors using Geant4 platform

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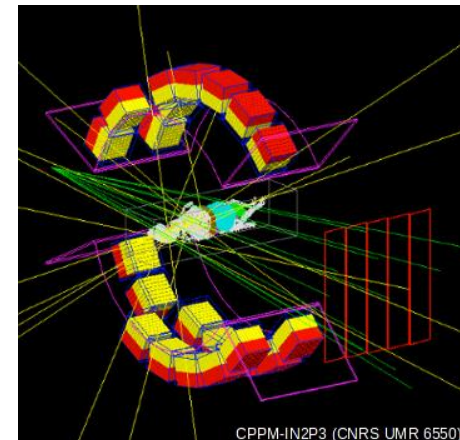
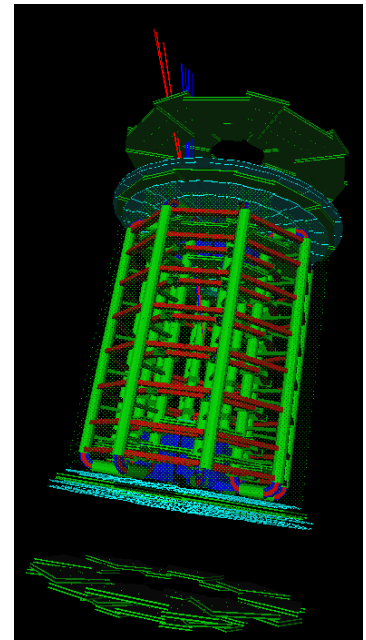
21.11.2012, Wrocław

Conference: Progress on EUV & X-ray spectroscopy and imaging

Session 7: Solar Instrumentation Development (part I)

What is Geant4

- "GEometry ANd Tracking,,
- Simulation of the passage of particles through matter.
- Application:
 - High energy physic: ATLAS
 - Space and radiation
 - Medical: NMR
 - Technology transfer



Sources:

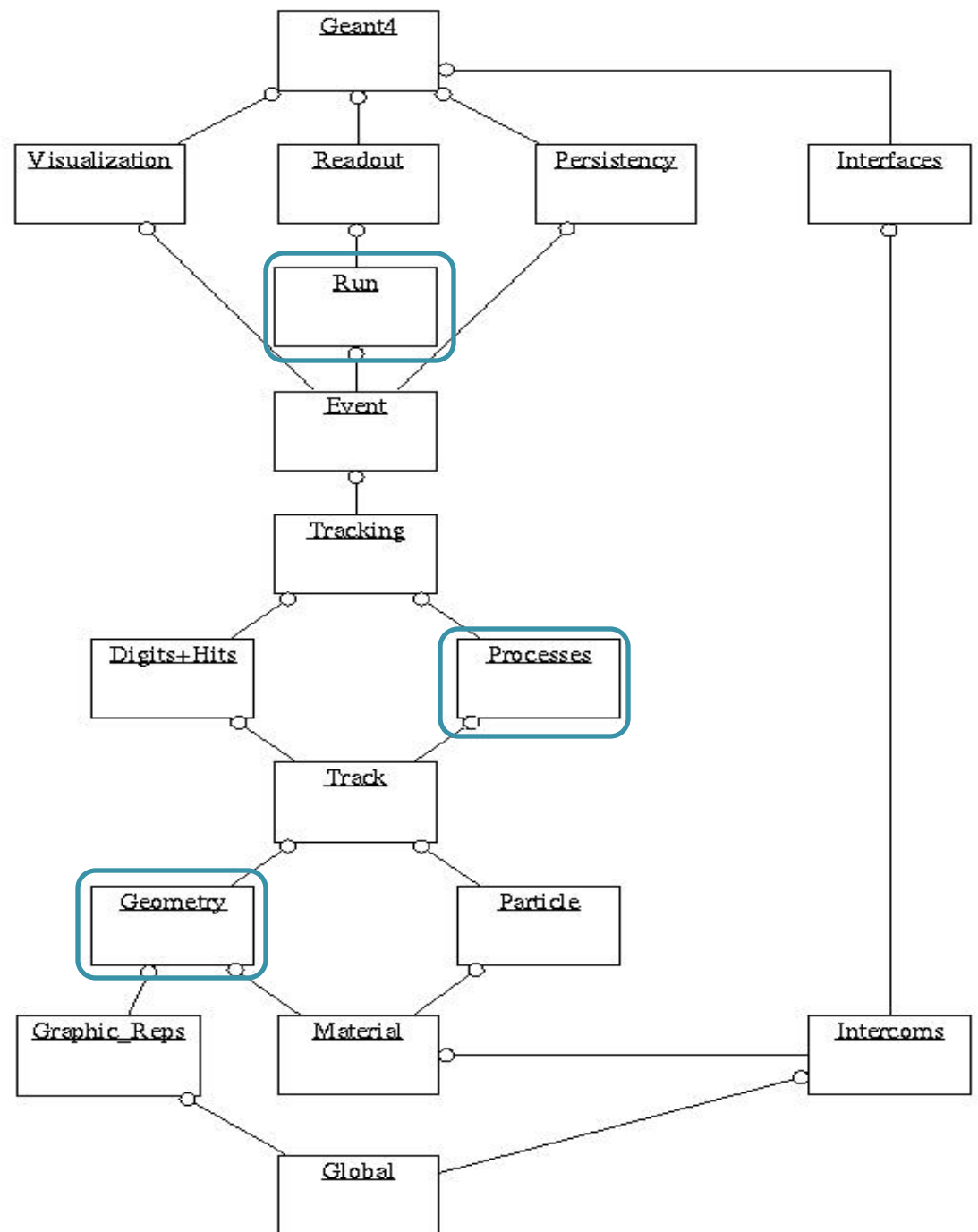
<http://wwwasd.web.cern.ch>

<http://www.opengatecollaboration.org/home>

What is Geant4

- Set of libraries written in full objective C++
- Method: Monte Carlo
- Aspects of simulation:
 - Geometry
 - Material
 - Particles
 - Tracking
 - Physic process
 - Detector response
 - Data storage
 - Visualisation
 - User interface

Structure of Geant4



Preliminary physics list – Livermore Model

- Particles and processes:

- Photons :

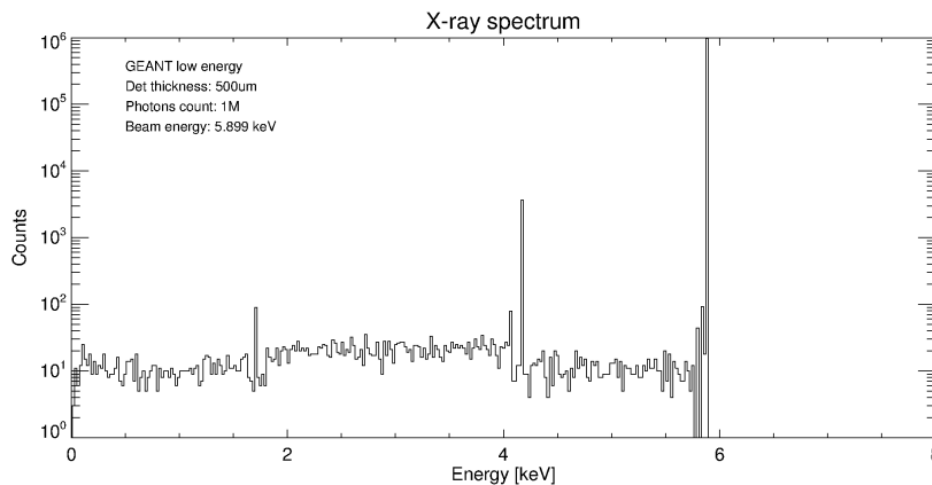
- Photoelectric effect,
- Compton scattering,
- Electron-positron pair production,
- Rayleigh scattering.

- Electrons:

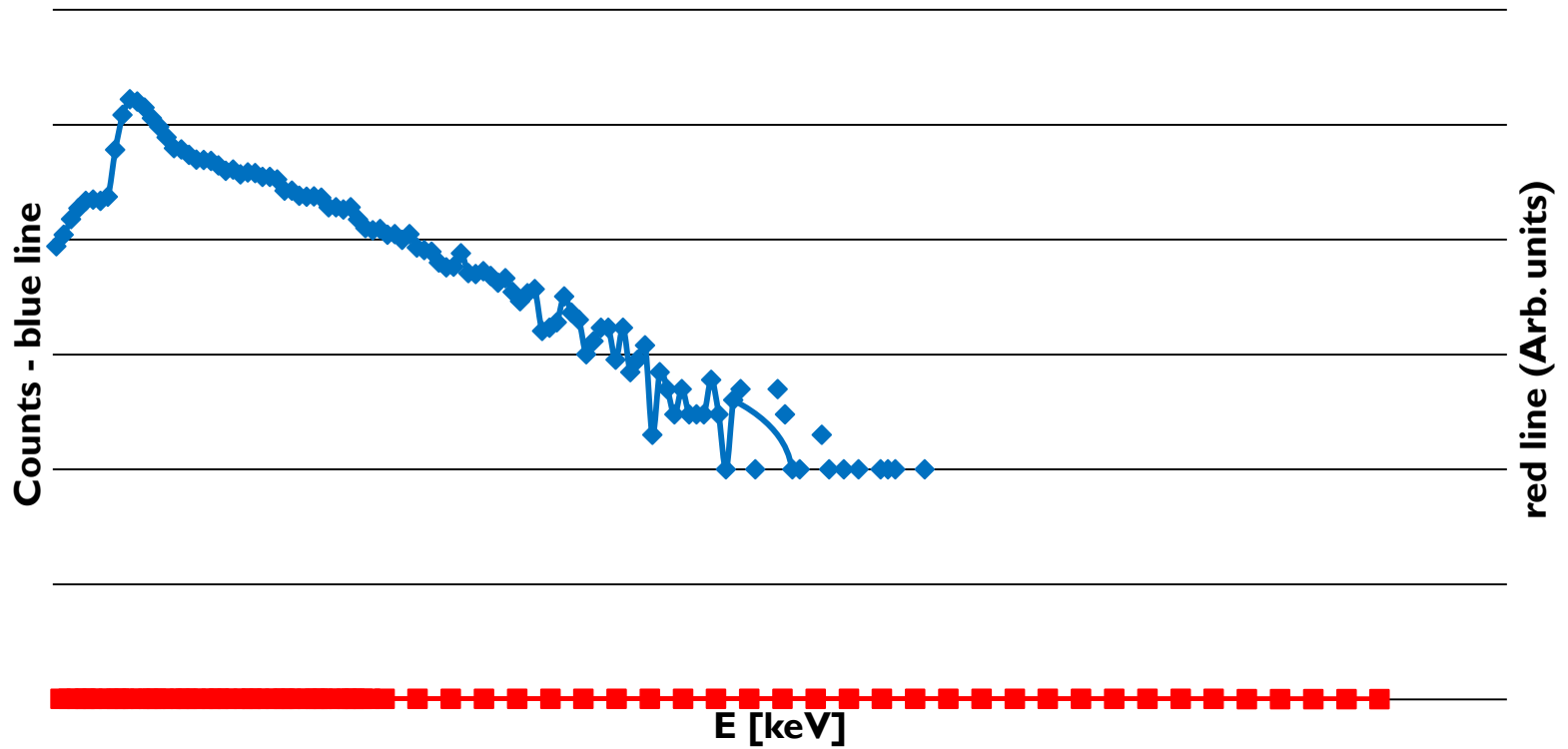
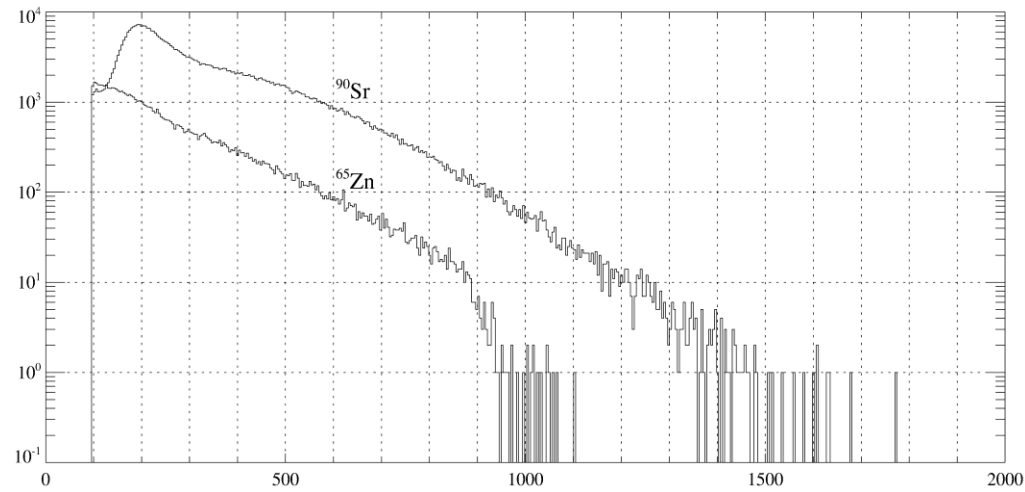
- Multiple Scattering,
- Ionization,
- Bremsstrahlung.

- Positrons:

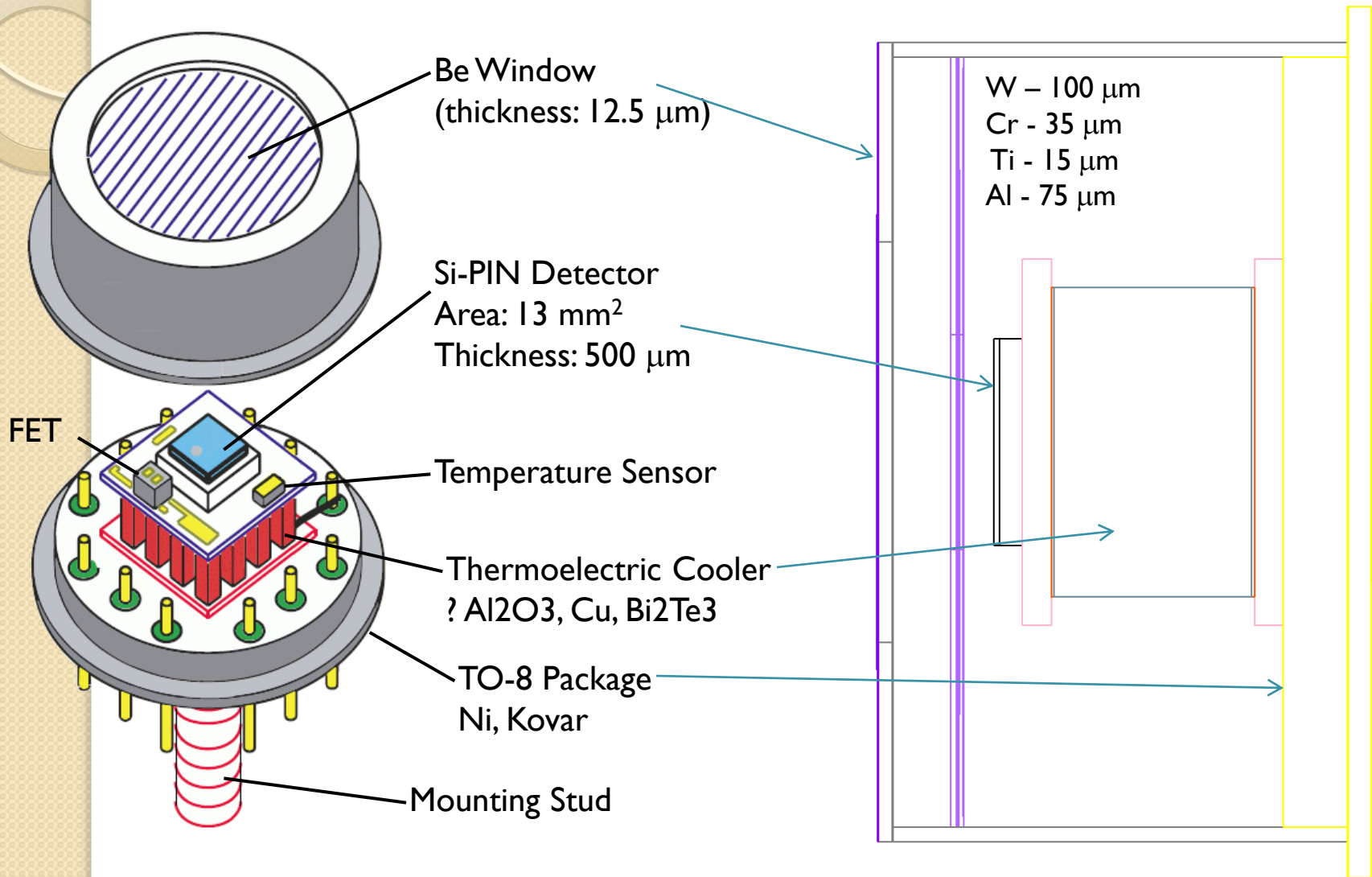
- Multiple Scattering,
- Ionisation,
- Bremsstrahlung,
- Anihilation of pair electron-positron.



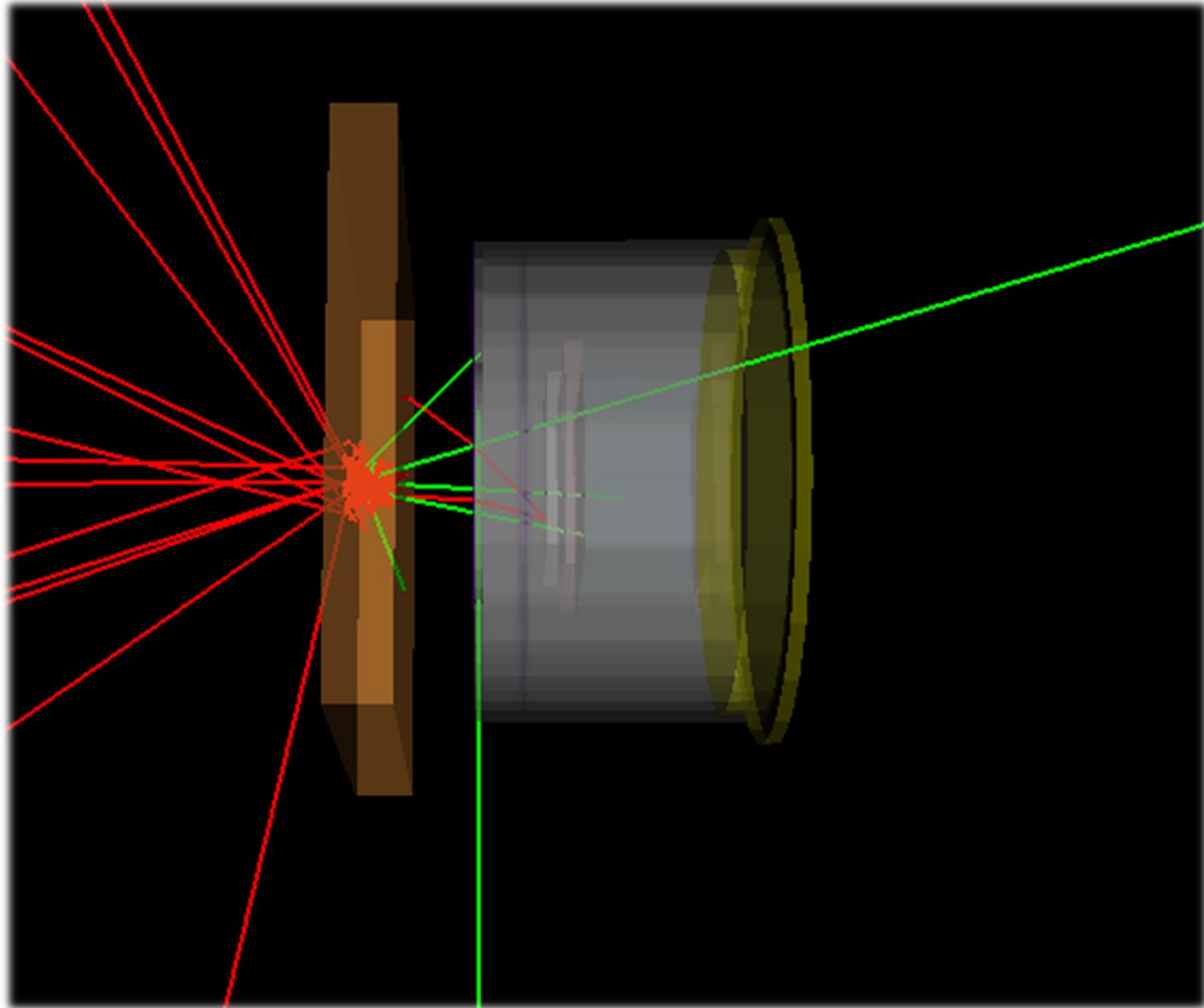
Simulation of Sr^{90} source



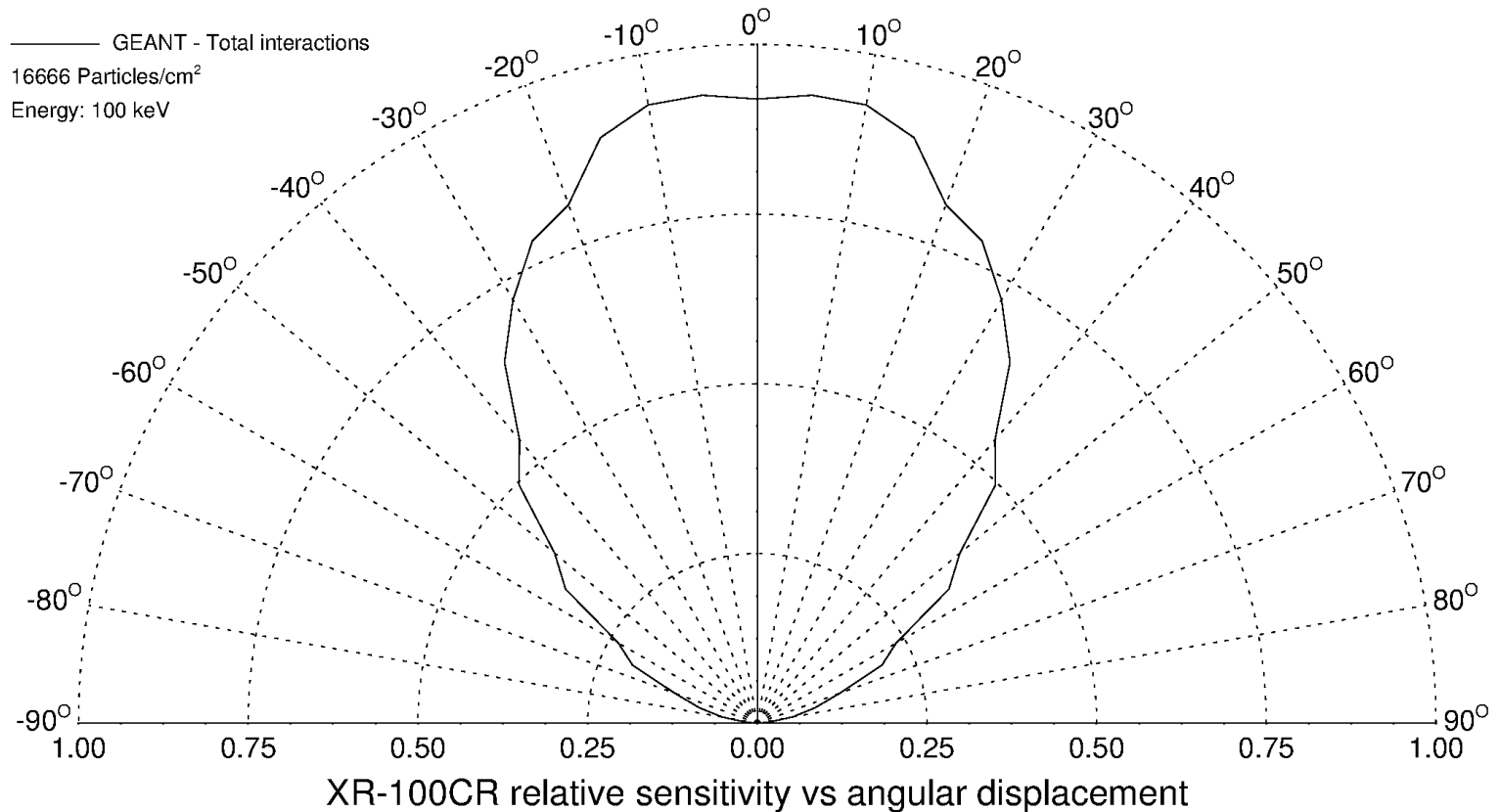
Detector



Test with Al shield

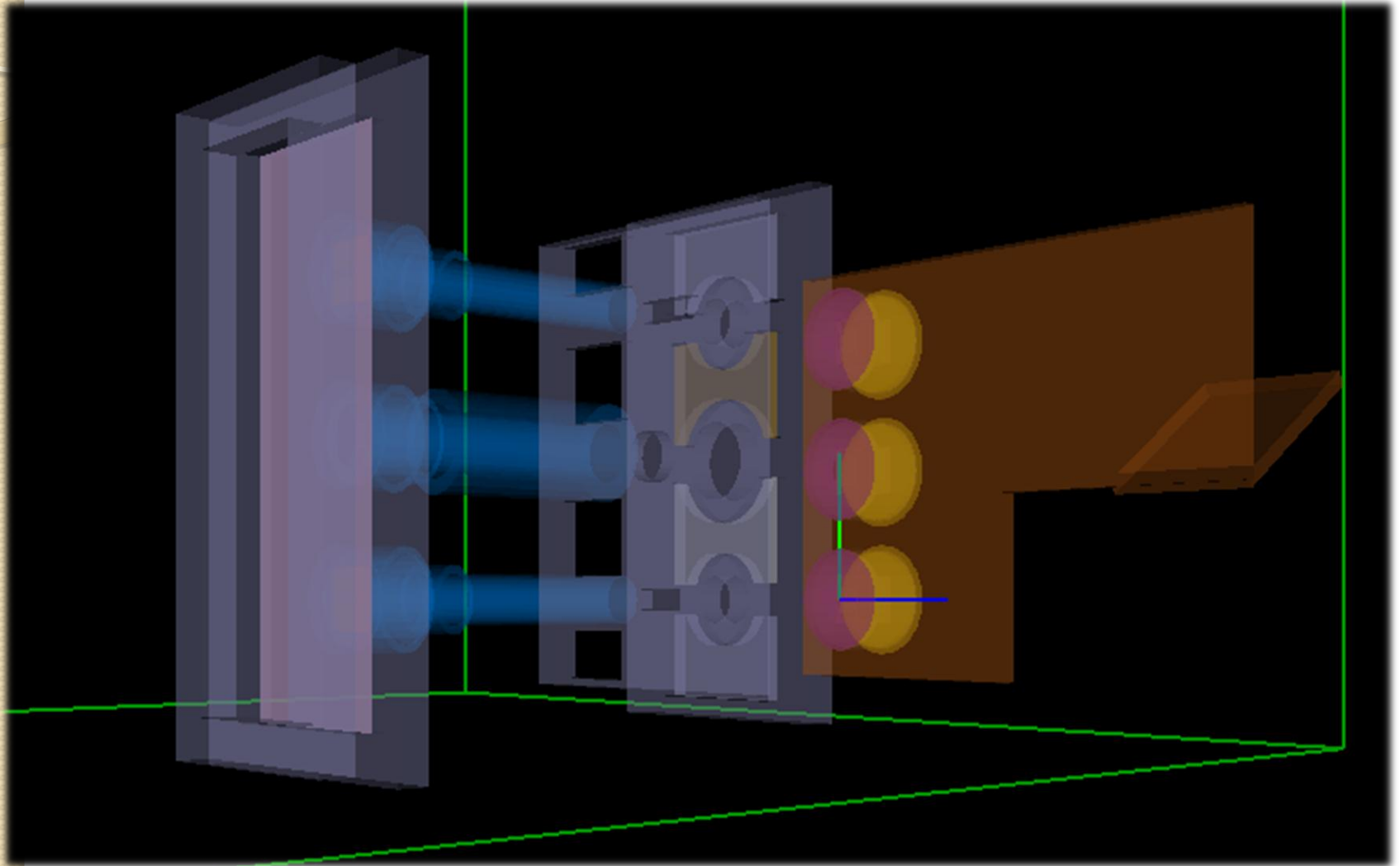


Angular sensitivity to electrons of detector



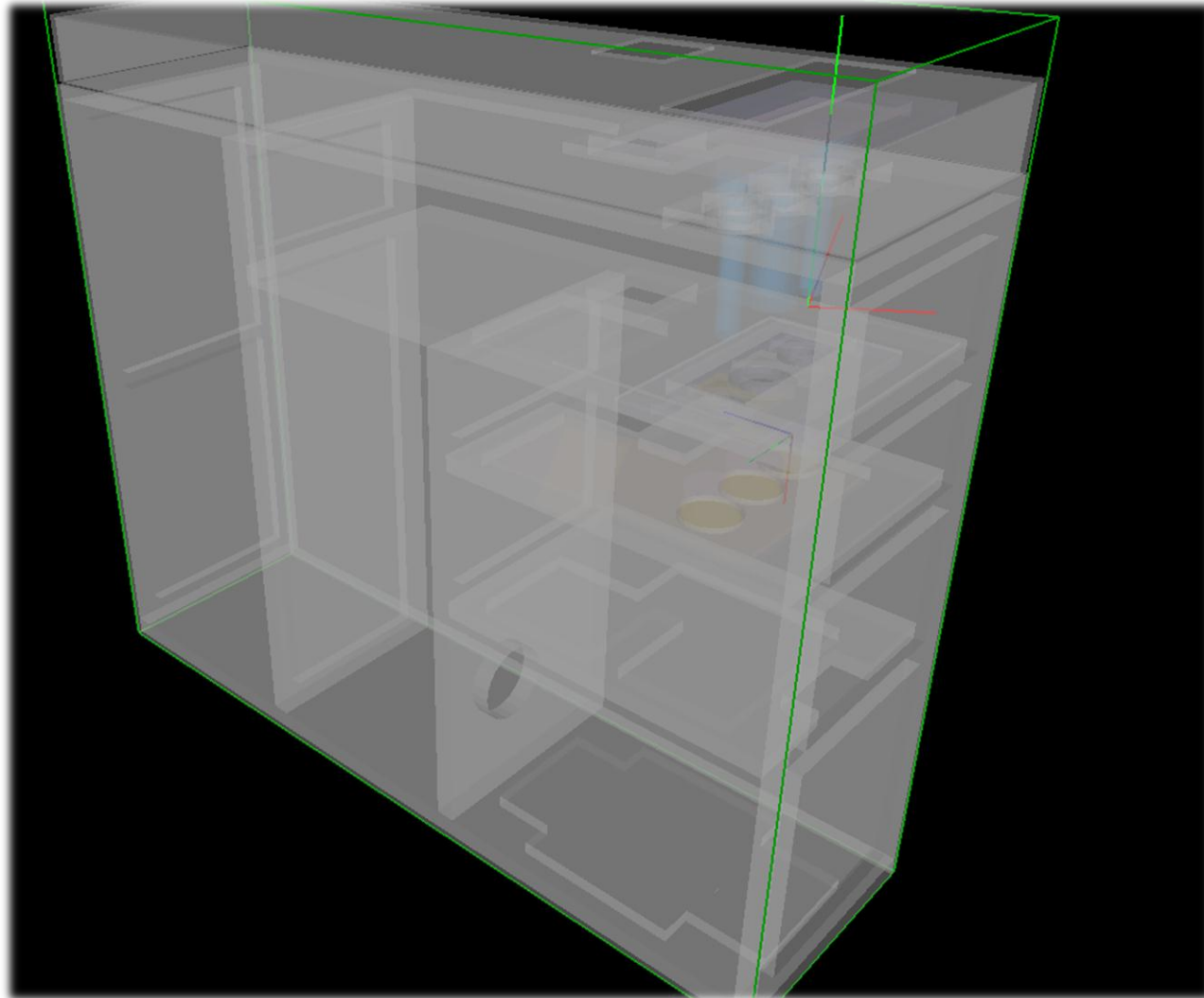
- Uniform spatial distribution covering the entire detector.

Interior of the SphinX



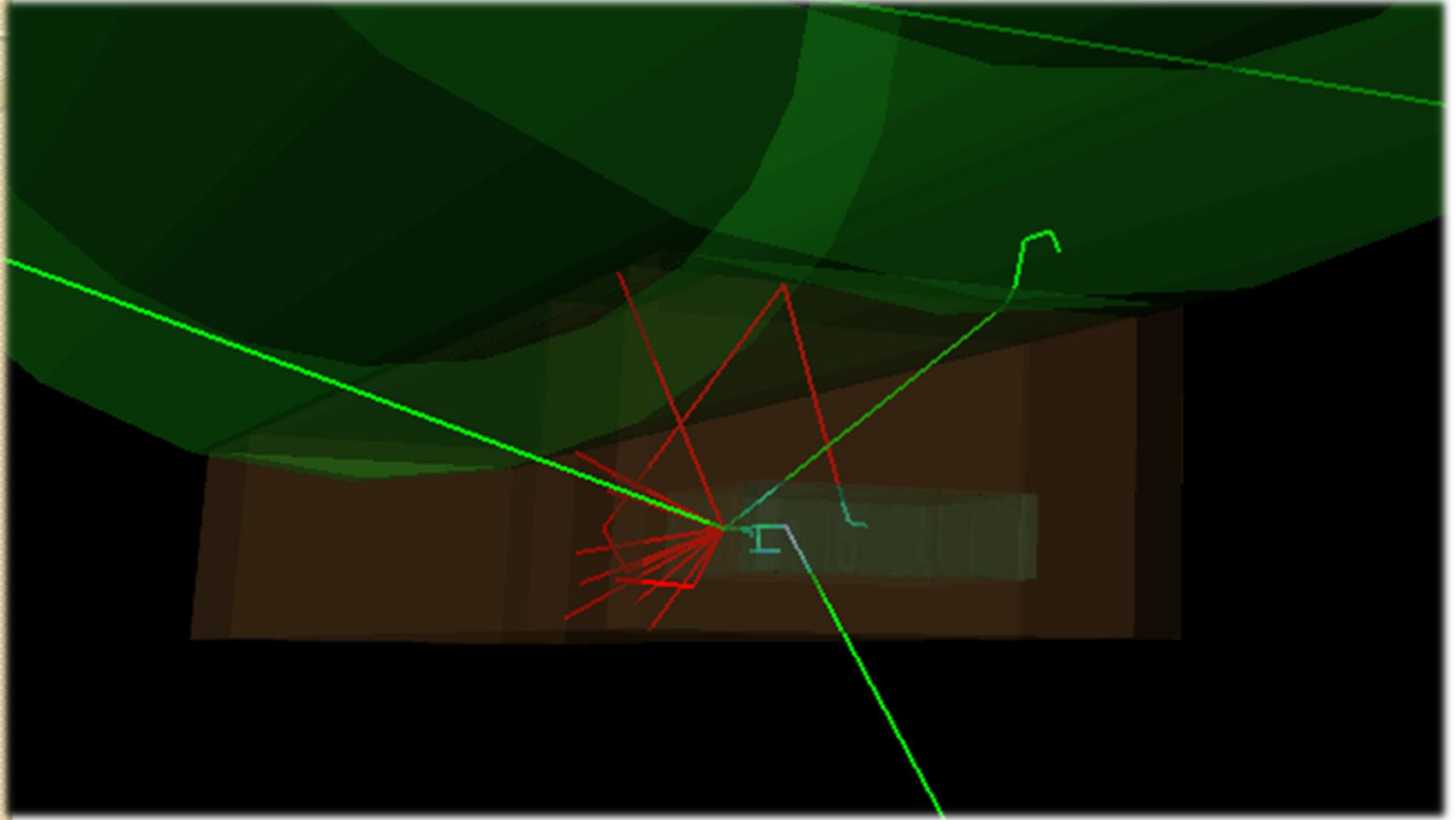
Visualisation of SphinX interior

SphinX



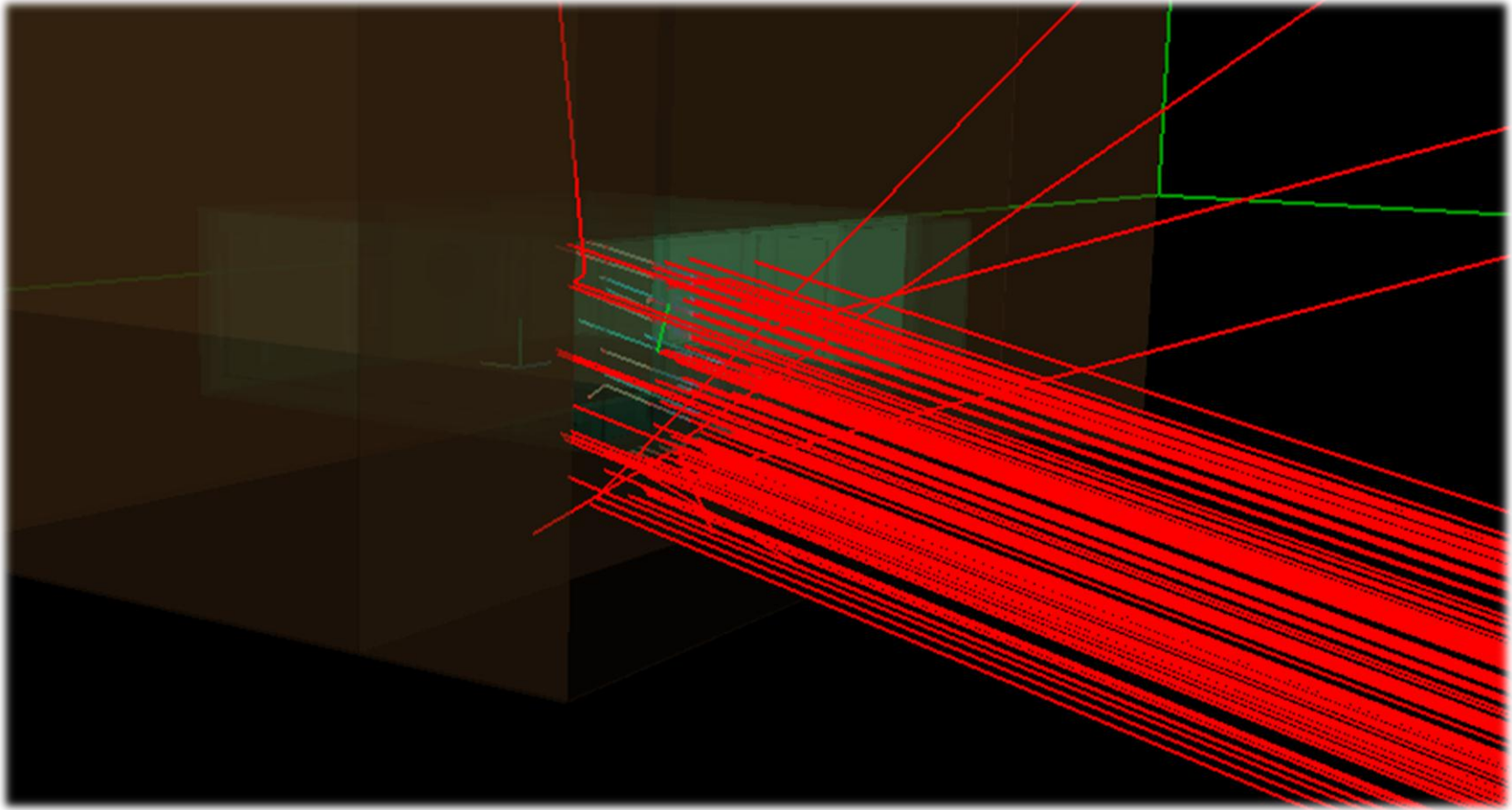
Visualisation of model SphinX

Visualisation

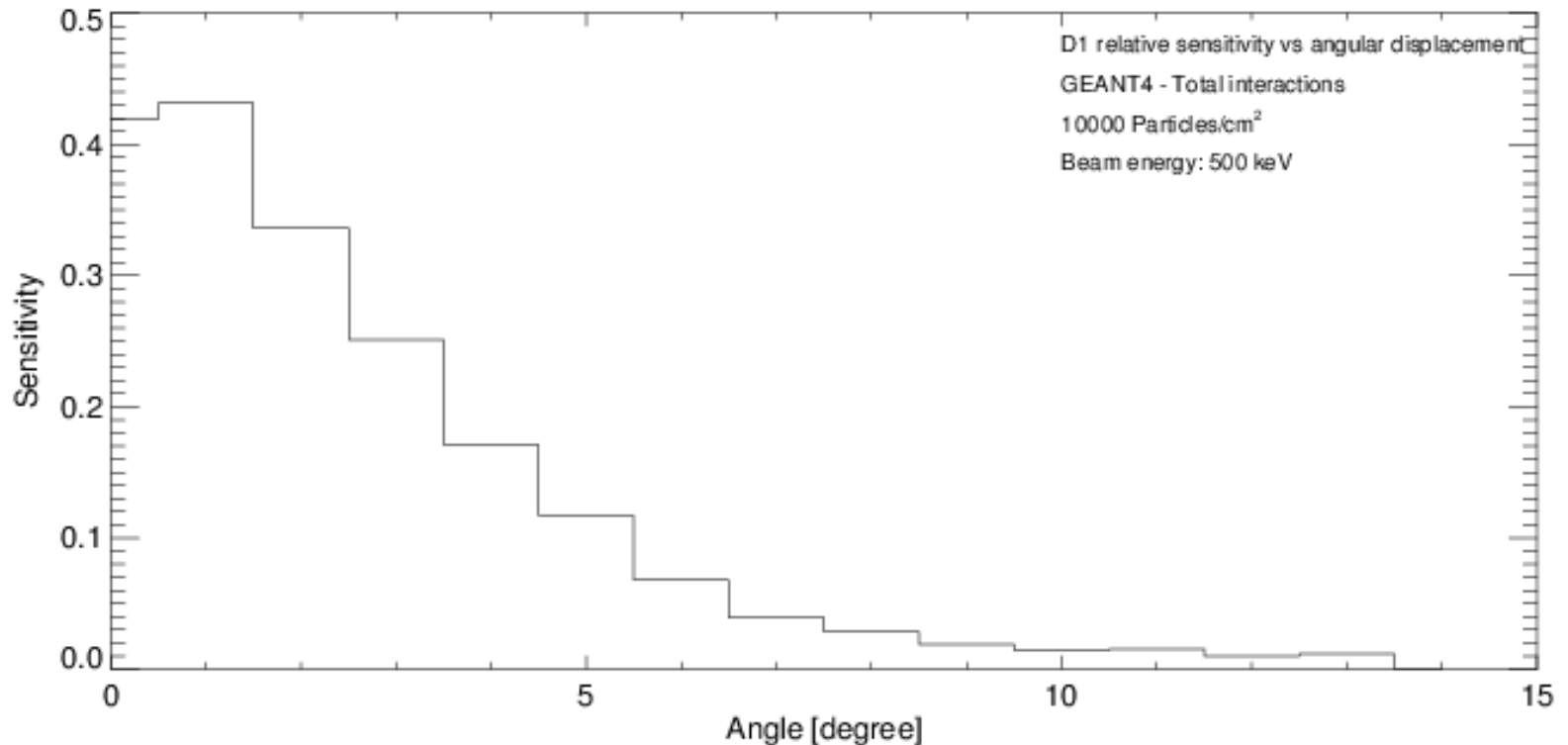


Visualisation of model SphinX inside TESIS with CORONAS-PHOTON

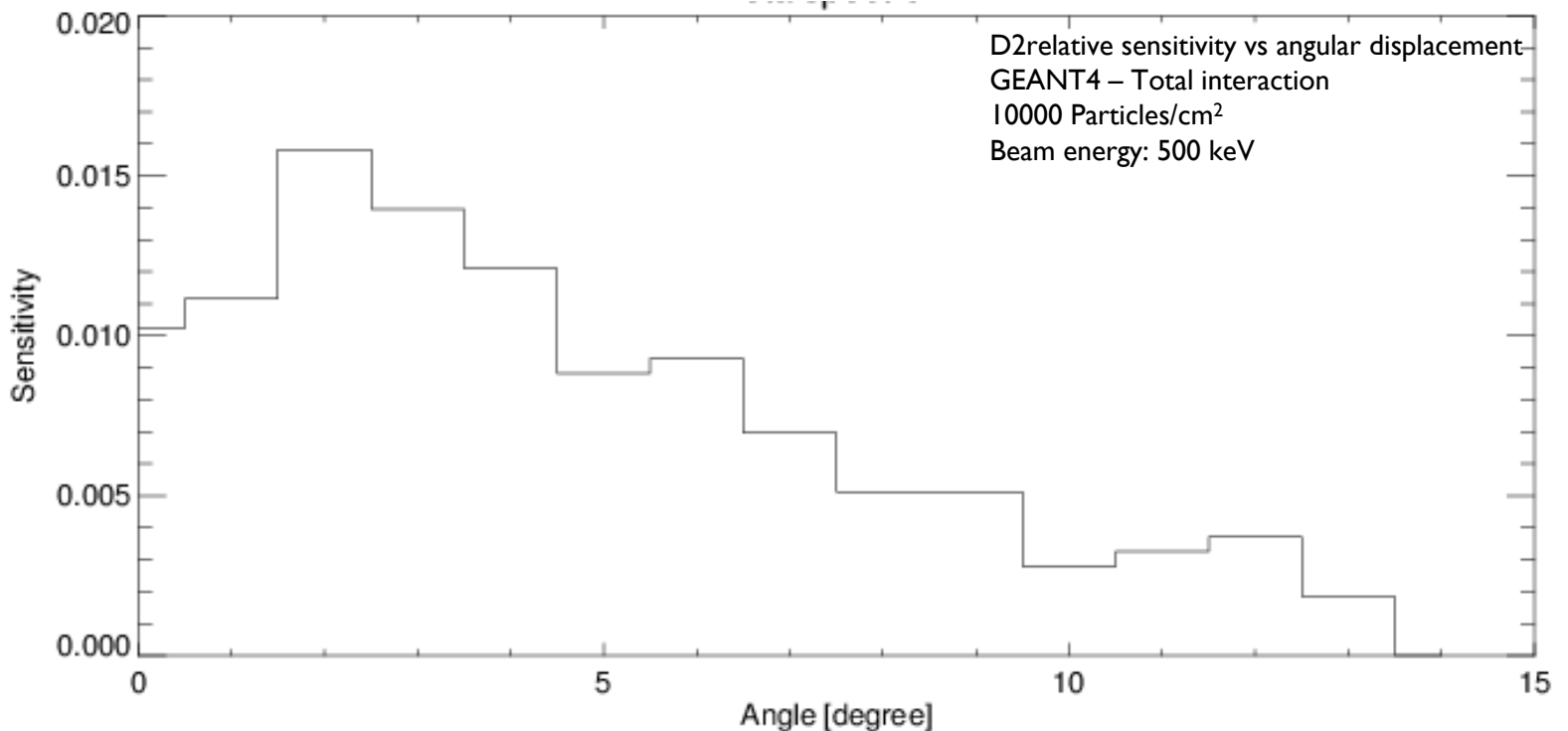
Visualisation of performed simulation



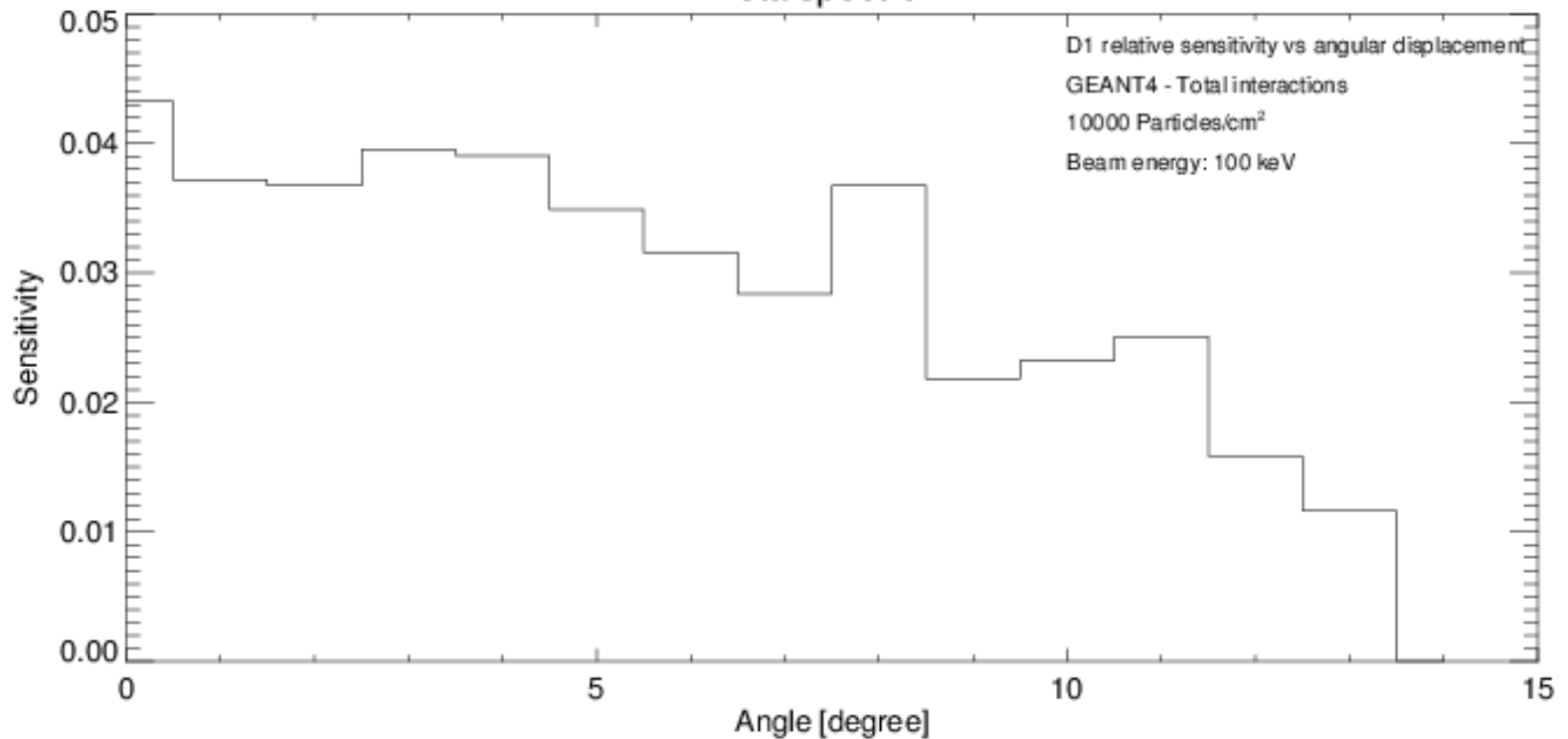
Angular sensitivity on 500 keV electrons for Sphinx D1



Angular sensitivity on 500 keV electrons for Sphinx D2



Angular sensitivity on 100 keV electrons for Sphinx D1





THANK YOU