

EGU23-7363, updated on 21 Apr 2024

<https://doi.org/10.5194/egusphere-egu23-7363>

EGU General Assembly 2023

© Author(s) 2024. This work is distributed under the Creative Commons Attribution 4.0 License.



On modeling of silicon detector for space applications using Geant4

Mikhail Rashev

Max-Planck Institute for Solar System Research, Planets, Göttingen, Germany (rashev@mps.mpg.de)

Silicon detectors are widely used for analyses of particles/radiation in space. They show a good response for a wide spectrum of different particles. Via construction of an appropriate shielding, one can select and analyze only a single sort of particles/their energy and suppress detection of particles of all other kinds. It is difficult to find a good solution for shielding only experimentally. A modeling software such as Geant4 allows us to find a solution for the shielding. This software calculates interaction of particles with shielding or detector and the resulting energy deposition.

The current work is based on modeling of aluminum shielding of the RAPID/IES instrument on board of four Cluster spacecrafts. Since 2000 Cluster mission encounters the Earth's radiation belts and measures energetic electrons among other particles, waves and electromagnetic fields. Accurate modeling using Geant4 allows us to filter unwanted particles out of the result and possibly remove some artifacts in space.

The Geant4 code calculates an attenuation of radiation. Preliminary this software does not calculate electrical signal. There is, however, a possibility to extend the code and add other functionalities. We are exploring possibilities to include signal processing in the Geant4 code for the detector, analog and digital processing units.