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Open-Source Simulation of Semiconductor Detectors

Tuesday 1 October 2024 10:00 (30 minutes)

SolidStateDetectors.jl is a novel open-source software solution used to simulate the behavior of solid state detectors, e.g. germanium and silicon detectors. The package calculates the electric fields and weighting potentials, as well as the charge drift in the detectors and detector output signals.

Users can define arbitrary detector geometries via simple configuration files using constructive solid geometry (CSG). Detectors may also be segmented/pixelized and have more than two electrical contacts. The environment of the detector can be included in the geometry and the field calculation to simulate the effect of nearby objects on the field in detectors with large passivated surfaces.

SolidStateDetectors.jl features fully multi-threaded high-performance 3D field calculation in both cylindrical and Cartesian coordinates. Recent feature additions include simulation of the charge-cloud self-interactions, automatic detector capacitance calculation, GPU-support for accelerated field calculations, and an extension to the Julia wrapper Geant4.jl, which allows for the simulation of realistic event distributions.

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