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Geant4 simulations of surface contaminations and roughness and their influence on low energy background spectra

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CRESST is an experiment for the direct detection of dark matter, situated at Laboratori Nazionali del Gran Sasso (LNGS) in Italy. It is capable of detecting nuclear recoils down to 10 eV with an impressive sensitivity in the sub-GeV mass region. This is achieved by using cryogenic scintillation crystals as target materials. However, in this low energy region it can be challenging to distinguish between dark matter interactions and electromagnetic background. Various background components are considered via simulations with ImpCRESST, a Geant4 based simulation code, which is continuously adapted to the setup of CRESST. At the current state default Geant4 and therefor the CRESST background model only considers a flat detector surface, but surface roughness in combination with surface contamination is of particular interest. Because of nuclides decaying inside the crystal in the vicinity of the surface, it is possible that only a share of the energy is placed inside the detector. As a result, higher energy events can leak into the lower energy range and may affect the simulated background. This contribution presents a newly developed extension of ImpCRESST for simulation of surface contamination with radiogenic elements in combination with a simulated surface roughness of the detector. The implementation of the particle generator, the ”actual”rough surface and different development obstacles and insights are discussed and first results using this module in ImpCRESST are shown.

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