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Geant4 based simulations of backgrounds in the CRESST experiment

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The Cryogenic Rare Event Search with Superconducting Thermometers (CRESST) experiment employs scintillating crystals at extremely low temperatures (O(10 mK)) to search for nuclear recoils from hypothetical dark matter (DM) particles. CRESST has achieved thresholds below 100 eV with a wide range of target materials including CaWO₄, LiAlO₂, Al₂O₃, and Si. However, the ability to discriminate between potential DM signals and electromagnetic background is insufficient at these energies. A detailed electromagnetic background model was developed for CRESST and is being continuously adapted to CRESST's current inventory of detector modules. Our approach involves employing ImpCRESST, a Geant4-based simulation tool, to model background interactions and applying a high-dimensional Bayesian likelihood fit of spectral templates generated from the simulation to the measured spectrum. The fit returns the activities of various background sources considered in the simulation. In this talk, we will present the current status of CRESST's background model, including insights from ImpCRESST, and discuss our plans for enhancing the model.

Author: Dr BANIK, Samir (Technische Universität Wien, Atominstitut)Presenter: Dr BANIK, Samir (Technische Universität Wien, Atominstitut)Session Classification: Workshop