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Search for Low Mass Dark Matter Particles with the CRESST Experiment

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It has been suggested by several astronomical observations that dark matter contributes 27 % to the overall energy density of our universe but no particle candidates have been observed yet. The CRESST experiment aims to directly detect dark matter particle elastically scattering off nuclei. The CRESST-II detector modules are based on CaWO4 crystals which are operated at mK temperatures. The nuclear recoil energy thresholds for the CRESST-II detectors Lise and TUM40 are 0.3 keV and 0.6 keV, respectively. Such low energy thresholds make CRESST ideally suited for the detection of low-mass dark matter particles. Further increase in sensitivity is expected with CRESST-III detectors aiming at a threshold of 0.1 keV. In this talk, we will present our results on the search for the dark matter obtained with the detector modules Lise and TUM40 of CRESST-II. An analysis conducted on the search for dark photons as dark matter candidates will be presented. We will discuss the status of CRESST-III Phase 1 which started taking data last year. In addition to the low threshold, radio purity of the crystals is another important factor for the detection of dark matter particles. To acquire a detailed understanding of the backgrounds measured by the detectors, a Geant4 simulation of the electromagnetic backgrounds was carried out for the TUM40 detector module. The simulation includes backgrounds coming both from inside the crystal and from outside. The information taken from the background simulation will be vital for the second phase of the CRESST-III experiment.

Experimental Collaboration

CRESST

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