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Search for sub-GeV/c² dark matter with CRESST-III

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Dark Matter (DM) is one of the most puzzling mysteries of modern physics. Albeit various astronomical observations confirm its existence, no unambiguous theory of DM exists. CRESST-III is one of the leading experiments searching for a hypothetical DM particle candidate.

The CRESST-III experiment searches for direct interactions of dark matter with ordinary matter at the Laboratori Nazionali del Gran Sasso (LNGS) in Italy. The main event signature would be a nuclear recoil inside one of the scintillating target crystals. Operating the crystals as cryogenic calorimeters at $\mathcal{O}(10 \text{ mK})$ provides in addition a phonon signal as a measure of the deposited energy. The simultaneous readout of both a scintillation light and a phonon signal is used to actively discriminate backgrounds.

CRESST-III focuses on the sub-GeV/c² mass region where the sensitivity is driven by the threshold. With a CaWO₄ crystal of 24g as target an unprecedented low threshold of 30.1eV for nuclear recoils was obtained in the first data taking campaign of CRESST-III from 2016-2018.

In this contribution, we briefly motivate the existence of DM and review the current landscape. Afterwards we will introduce CRESST, focusing on the requirements to maintain sensitivity in the sub-GeV/ c^2 mass region. We will discuss the latest results of CRESST-III on spin-dependent and spin-independent interactions. Finally, we will give an outlook to future stages of CRESST.

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