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Dark matter searches with cryogenic detectors

In the past decades, numerous experiments have emerged to unveil the nature of dark matter (DM), one of the most discussed open questions in modern particle physics. Direct detection experiments aim to measure scattering of relic DM particles off a target material. Cryogenic solid-state detectors equipped with transition edge sensors have proved to compete very well in the quest for sensitivity to low-mass DM particles, and provide unique properties for particle discrimination. HEPHY's rare event search group participates in two experiments using named technology, we introduce both in our talk:

The CRESST-III experiment, located in the Laboratori Nazionali del Gran Sasso (LNGS) provides some of the strongest upper limits on sub-GeV DM achieved today. In recent measurements, an excess signal was discovered below recoil energies of 200 eV. Similar signals were observed by multiple other experiments, however, a DM origin is unlikely. We discuss details and further plans in our talk.

The COSINUS experiment is specialized to verify the DAMA 13.7 σ DM signal claim, a mysterious result obtained from detectors with NaI targets, featuring the annual modulation expected from DM particles in the milky way. The tension of these results with many other measurements has motivated a set of new experiments to use NaI as target material. Among these experiments, COSINUS is the only one with the unique features provided by cryogenic detectors. The experiment is commissioned and currently being constructed at the LNGS. First data and results are expected in 2023/24.

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