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First Results on ^{17}O Enrichment of $CaWO_4$ Crystals for Spin-dependent DM search with CRESST

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The CRESST (Cryogenic Rare Event Search with Superconducting Thermometers) experiment aims to directly detect dark matter (DM) particles via their elastic scattering off target nuclei in scintillating $CaWO_4$ crystals. One of the stable oxygen isotopes, ^{17}O, has a nuclear spin of 5/2. Therefore, $CaWO_4$ crystals can be used for spin-independent and spin-dependent DM searches. Due to its low natural abundance of 0.038%, a ^{17}O enrichment of the $CaWO_4$ crystals will significantly increase the sensitivity of CRESST to spin-dependent DM interactions.
The $CaWO_4$ crystals used in CRESST have been grown in-house at the Technische Universität München (TUM) for many years, and have a lower level of radioactive impurities than any commercially available crystals. Based on the experience in crystal growth at TUM, a process for the enrichment of $CaWO_4$ with ^{17}O was developed. Two $CaWO_4$ crystals were enriched and their ^{17}O content was measured by nuclear magnetic resonance spectroscopy at the Universität Leipzig. This contribution presents the concept and first results of the ^{17}O enrichment and sensitivity predictions for the spin-dependent DM search with enriched $CaWO_4$ crystals in CRESST.

Submitted on behalf of a Collaboration?

Yes

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