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A low-threshold diamond cryogenic detector for sub-GeV Dark Matter searches

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Recently the sub-GeV dark matter (DM) mass region has started to be probed. To explore this region, detectors with a low energy threshold are required. Recent developments in the production of diamond crystals allow for high-quality large-mass diamonds that can be used as DM detectors. Thanks to their superior cryogenic properties, diamond detectors can reach an energy threshold in the eV range. In this contribution the realization of the first low-threshold cryogenic detector that uses diamond as an absorber for astroparticle physics applications will be reported. Two diamond samples instrumented with a W-TES have been tested, showing transitions at about 25 mK. The performance of the diamond detectors will be presented highlighting the best performing one, reaching an energy threshold of 16.8 eV. Finally, the dark matter results that could be achieved with this measurement will be shown.

Submitted on behalf of a Collaboration?

Yes

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