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MAGNETO-χ: Sub-GeV Dark Matter Detection using Diamond and Magnetic Sensors

Tuesday 29 August 2023 14:00 (15 minutes)

MAGNETO-χ is developing sub-GeV dark matter detectors using diamond crystals and magnetic athermal phonon sensors. Thanks to enhanced nuclear recoil energies by diamond's low mass carbon nuclei, and low energy threshold of cryogenic magnetic phonon sensors, the MAGNETO-χ detectors could offer high experimental sensitivity to sub-GeV dark matter scatterings. In addition, relatively fast timing resolution of the magnetic phonon sensor (˜100 ns) despite their large sensing area, it offers strong phonon pulse shape discrimination (PSD) capability to separate out unwanted noise or non-nuclear recoil signals in the sub-keV region. This phonon PSD capability could be also useful for understanding the low energy excess problem that low threshold detector community is experiencing with. We present recent development progress of the MAGNETO-χ detectors including development of the magnetic phonon sensor, characterization of various diamond crystals for athermal phonon propagation, and the low energy response down to 60 eV in a context of the low energy EXCESS issue.

Submitted on behalf of a Collaboration?

Yes

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