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Current status of DMICA: exploring Dark Matter in natural muscovite MICA

Thursday 22 May 2025 11:15 (45 minutes)

In 1995, Snowden-Ifft and colleagues used 500-million-year-old muscovite mica to establish one of the most stringent dark matter cross-section limits, achieving an exposure of 0.08 square millimeters. They etched cleaved mica surfaces to read out nuclear recoil tracks, visible as pits, with atomic force microscopy (AFM), then estimated the recoil energies from pit depths. We are now planning the DMICA experiment to build on this work, covering 800 square centimeters —equivalent to a one-ton-year exposure. This dramatic increase becomes feasible by employing white light interferometry (WLI) instead of AFM to scan the etched mica surfaces. Although WLI offers rapid scanning, it also presents challenges, such as pit depth (and thus recoil energy) underestimation caused by the instrumental transfer function. This presentation will discuss the current status of DMICA, focusing on our deconvolution technique to restore pit depths and on measurements of the mica's vertical etch rate, which is critical for assessing the etched volume and thus the exposure of the experiment.

Do you plan to give the talk in person?

Yes

Primary author: HIROSE, Shigenobu (JAMSTEC)

Presenter: HIROSE, Shigenobu (JAMSTEC)