Contribution ID: **89** Type: **not specified**

Refining the sensitivity of new physics searches with ancient minerals

Tuesday 8 July 2025 14:30 (20 minutes)

Paleodetection has been proposed as a competitive method for detecting dark matter and other new physics interactions, complementing conventional direct detection experiments. In this work, we utilise \trim simulations to improve the modelling of track length distributions. Our findings suggest that previous studies have overestimated the number of tracks caused by weakly interacting particles, and that the lowest observable dark matter mass should be higher than previously predicted. These differences are mainly attributed to the fact that (a) the recoil energy-track length relation is not one-to-one, (b) at low recoil energies, a substantial fraction of recoils do not yield any tracks, and (c) at high energies, electronic stopping becomes dominant, resulting in a track length barrier at $\sim$ 200 nm. In addition to WIMPs, we also modelled tracks from generalised coherent elastic neutrino nucleus scattering (CEνNS) via new light mediators and estimated the projected sensitivity for these interactions.

Authors: VINCENT, Aaron (Queen's University); FUNG, Audrey; Prof. BALOGH, Levente (Queen's University); Prof. LEYBOURNE, Matthew (Queen's University); Mr LUCAS, Thalles (Queen's University)

Presenter: FUNG, Audrey

Session Classification: Parallel 1