Detecting Non-Standard Neutrino Interactions from Solar Neutrinos in Low Threshold Dark Matter detectors

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As low-threshold dark matter detectors advance in development, they will become sensitive to recoils from solar neutrinos which opens up the possibility to explore neutrino properties. We predict the enhancement of the event rate of solar neutrino scattering due to Non-Standard interactions (NSIs) in low-threshold DM detectors, particularly Skipper-CCDs. We consider five categories of interactions: the neutrino magnetic moment as well as interactions mediated by four types of mediators (scalar, pseudoscalar, vector, and axial-vector), and consider coupling these mediators to either quarks or electrons. Using these predictions, we place constraints on the mass and couplings of each mediator and the neutrino magnetic moment from current low-threshold detectors like SENSEI, Edelweiss, and Super CDMS, as well as projections from future experiments such as DAMIC-M and Oscura.

Authors: SCHWEMBERGER, Thomas (University of Oregon); YU, Tien-Tien (University of Oregon (US))

Presenter: SCHWEMBERGER, Thomas (University of Oregon)

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