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Neutrino constraints on inelastic dark matter captured in the Sun

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We study the possibility for large volume underground neutrino experiments to detect the neutrino flux from captured inelastic dark matter in the Sun. The neutrino spectrum has two components: a mono-energetic “spike” from pion and kaon decays at rest and a broad-spectrum “shoulder” from prompt primary meson decays. We focus on detecting the shoulder neutrinos from annihilation of hadrophilic inelastic dark matter with masses in the range 4-100 GeV. We find the region of parameter space that these neutrino experiments are more sensitive to than the direct-detection experiments. For dark matter annihilation to heavy-quarks, the projected sensitivity of DUNE is weaker than current (future) Super (Hyper) Kamiokande experiments, while for the light-quark channel, only the spike is observable and DUNE will be the most sensitive experiment.

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