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84 - On the Neutrino Floor for the Next Generation of Liquid Noble Dark Matter Experiments

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As dark matter detectors grow larger and more efficient, neutrinos from the sun and other cosmological sources become a significant background. If predictions hold true, the next generation of detectors is set to reach the neutrino floor. The neutrino floor typically shown was computed specifically for an ideal Xenon scintillator detector, using a Maxwellian speed distribution for the dark matter in the Milky Way. Although this represents a good estimation, it is of insufficient precision when good predictions for specific experiments are needed. In this work, the objective is two-fold. We first study the impact of detector properties on the neutrino floor. We then show how uncertainties on neutrino fluxes and on the distribution of dark matter in our vicinity impacts predictions.

We first computed the neutrino floor for currently proposed future Xenon TPC and Argon single-phase dark matter detectors. We include the impact of neutrino-electron scattering and show that Argon detectors have a significantly lower neutrino floor for higher dark matter particle masses. We also computed the impact of a potential anisotropy in the dark matter distribution and show that it has a negligible impact on the interpretation of future experimental results. We finally discuss how a more precise knowledge of neutrino fluxes on earth could potentially push the neutrino floor limit lower.

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