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Neutrino fog for dark matter electron scattering

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Abstract: Low-energy neutrinos can be a significant background in the search for dark matter (DM) through direct detection. In this context, we aim to quantify the sub-GeV DM-electron scattering parameter space where the neutrino background overshadows any potential DM signal. Because DM and neutrinos have distinct energy spectra, theoretically, they can be distinguished with substantial exposure. This suggests that neutrinos should not be viewed as a hard floor but as a challenging yet distinguishable background, creating what we refer to as the ‘neutrino fog’. We define the boundary of this ‘neutrino fog’ as the ‘neutrino floor’. Notably, some well-motivated regions of the DM parameter space exist below this ‘neutrino floor’.

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