Contribution ID: **94** Type: **talk**

The calculation of inelastic neutrino-nucleus scattering

Wednesday 14 July 2021 16:45 (15 minutes)

We study inelastic neutrino-nucleus scattering. Primarily we target ^{40}Ar,^{133}Cs, and ^{127}I nuclei. Nuclear shell model provides clear understanding of nuclei. In practice we use Bigstick, which is based on nuclear shell model, to generate the numerical results of the nuclear structure. We also include spin-independent and spin-dependent neutrino-nucleus currents based on chiral effective field theory (EFT) in our calculation. Hence the scattering amplitude then can be expressed as the linear combination of the nuclear response functions given by chiral EFT. In the study there are two scattering processes we have considered, charged lepton-nucleus ($\nu + N \rightarrow l^- + N^*$) and neutrino-nucleus ($\nu + N \rightarrow \nu + N^*$). We predict the number of photon production cross-sections from the inelastic scattering. We also calculate the light dark matter-nucleus inelastic scattering cross-section and the event rate.

Are you are a member of the APS Division of Particles and Fields?

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Session Classification: Neutrinos

Track Classification: Neutrino Physics