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Quasi-Elastic Neutrino Reactions on Carbon and Lead Nuclei

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We examine neutral-current quasi-elastic neutrino-nucleus reactions on ^{12}C and ^{208}Pb targets. We use the relativistic mean field theory approach to describe the nuclear dynamics. We compute the cross sections for the scattering of 150-MeV, 500-MeV and 1000-MeV neutrinos on a ^{12}C target and study the effect of the strange-quark content of the nucleon which appears in these reactions via the isoscalar weak current. We compare our results with the data of the MiniBooNE experiment for mineral oil (CH_2). We also calculate the cross section for the quasi-elastic neutron knockout reaction of 20 to 60-MeV neutrinos on a ^{208}Pb target which is relevant to plans to use Lead as a target material in future supernova neutrino detectors.

Primary author: Dr HEDAYATIPOUR, Mohammad (University of Alberta)

Co-author: Prof. DE MONTIGNY, Marc (University of Alberta)

Presenter: Dr HEDAYATIPOUR, Mohammad (University of Alberta)

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