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Theoretical models of neutrino-nucleus cross sections

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In the present and future accelerator-based neutrino oscillation experiments nuclear targets (such as C, O, Ar and Fe) are involved. Hence the knowledge of neutrino-nucleus scattering is very important. In particular it is crucial for the determination of the neutrino energy which enters the expression of the oscillation probability, since this energy is reconstructed from the final states of the neutrino-nucleus reaction.

The status of the different theoretical approaches treating the open channels in the few-GeV region, i.e. the quasielastic, the pion production and the multinucleon emission, is reviewed. Special emphasis will be devoted to the multinucleon emission channel, which turned to be crucial to explain the unexpected behavior of the charged current quasielastic measurement performed by MiniBooNE. Up to last year, this channel was not included in the generators used for the analyses of the neutrino cross sections and oscillations experiments. The theoretical and experimental interest towards these multinucleon excitations continues to increase.

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