Electrons for Neutrinos at Jefferson Lab

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Current and future neutrino facilities, including MicroBooNE, MINERvA, DUNE and T2K, rely on reconstructing the incident neutrino beam properties (energy and flux) from the measurement of reaction products from neutrino-nucleus interactions in their detectors. The extraction of physics quantities from these experiments, such as neutrino oscillation parameters, depends on good neutrino energy reconstruction which is highly sensitive to nuclear physics which is currently poorly constrained.

The Electrons for Neutrinos project (e4nu) at the Thomas Jefferson National Accelerator Facility (JLab) uses wide phase space exclusive electron scattering data from past and future experiments on nuclear targets with the CLAS and CLAS12 detector systems to obtain a comprehensive understanding of the interaction of leptons with matter. Data from JLab provides us with the tools needed to constrain the available theoretical tools that are crucial in modelling the neutrino-nucleus interaction, and thus play a key role in the precise determination of the physics observables from neutrino-nucleus interactions measured at neutrino experimental facilities.

We will discuss prospects for future e4nu experiments as part of the CLAS12 experimental program, using CLAS data and event generator descriptions of the A(e,e'p pi) reaction on various nuclear targets as a benchmark for the development of analysis tools that will allow all relevant CLAS and CLAS12 datasets to be analysed in a common framework.