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Status of the MARLEY event generator for low-energy neutrinos
STEVEN GARDINER, Fermilab — Monte Carlo event generators are a key tool in the interpretation of data collected by high-energy and nuclear physics experiments. To date, the development of event generators for the neutrino physics community has primarily focused on the high energy regime (several hundreds of MeV and above) of interest for accelerator experiments. Despite their successes in modeling neutrino-nucleus interactions at high energies, the standard generators used by accelerator neutrino experiments typically rely on model approximations that become inappropriate for low energy neutrinos produced by the Sun, by supernovae, and by terrestrial sources. Examples of such approximations include the use of a relativistic Fermi gas (RFG) model of the nucleus (which neglects discrete level structure and giant resonance excitations) and the simulation of hadronic final-state interactions via a semi-classical cascade (which may neglect low-energy de-excitation processes like γ-ray emission). To overcome these limitations, the MARLEY event generator seeks to provide a more realistic physics treatment in simulations of low-energy neutrino scattering on complex nuclei. This talk presents recent improvements to the physics modeling and simulation capabilities of MARLEY.

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