

Unveiling neutrino interactions with new electron scattering data

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Future long-baseline neutrino experiments seek unprecedented precision in measuring oscillation parameters. Achieving this requires accurate characterization of incoming neutrino energy, reliant on robust nuclear and cross-section models embedded in event generators. External data plays a crucial role in constructing these models. The distinctive characteristics of electron scattering data provide the most accurate inputs, thanks to high statistics and a well-known monochromatic beam, offering a complementary picture since electrons and neutrino share the vector part of their interaction with the nuclear, which has the same nuclear effects.

Most of the data available is inclusive and limited to specific targets, energies and angles. The Electrons for Neutrinos collaboration (e4ν) exploits data from two large acceptance spectrometers, CLAS6 and CLAS12. They employ 1-11 GeV beams with targets ranging from hydrogen and deuterium through carbon and argon to lead.

In this talk, we unveil new inclusive cross-sections on argon at all angles from 10 to 35, semi-inclusive ($e, e'\pi$) cross sections on deuterium and exclusive carbon pion-production and two-nucleon knockout cross sections. This new data, covering a wide range of energies, targets, angles, and final state topologies, will uniquely constrain event generators.

Poster prize

Given name

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Collaboration (if any)

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