Contribution ID: **140** Type: **not specified**

Study of muon neutrino quasielastic scattering on iron using the MINOS near detector

Friday 29 August 2014 14:25 (25 minutes)

A sample enriched in quasielastic scattering events is selected from charged-current ν_μ interactions in iron using the MINOS near detector exposed to a wide-band ν_μ beam with peak flux at 3 GeV. Contributions from non-quasielastic backgrounds are evaluated using four independent kinematic sideband samples. The shapes of data distributions in four-momentum transfer, Q^2, are compared to expectations from a conventional Monte Carlo treatment of neutrino reactions within a nuclear medium modeled as a relativistic Fermi gas. Inclusion of a data-driven suppression of baryon resonance production at low Q^2 into the neutrino-nucleus simulation yields good agreement over the sidebands and a good description of the Q^2 distribution of the quasielastic-enhanced sample. By fitting the shape of the latter distribution using the dipole axial-vector form factor of the neutron,the effective value of the axial-vector mass is obtained: $M_A = 1.23^{+0.13}_{-0.09}(fit)^{+0.12}_{-0.15}$(syst.) GeV. This measurement probes quasielastic scattering in the nuclear medium of a large (A = 56) target nucleus using 123,000 candidate quasielastic ν_μFe interactions of energies $1 < E_\nu < 8$ GeV.

WG3: Accelerator Physics (Yes/No)

No

WG2: Neutrino Scattering Physics (Yes/No)

Yes

WG4: Muon Physics (Yes/No)

No

WG1: Neutrino Oscillation Physics (Yes/No)

No

Type of presentation

Oral presentation

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Session Classification: WG2: Neutrino Scattering Physics