

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

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A sample enriched in quasielastic scattering events is selected from charged-current  $\nu_\mu$  interactions in iron using the MINOS near detector exposed to a wide-band  $\nu_\mu$  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:  $M_A = 1.23_{-0.09}^{+0.13}(\text{fit})_{-0.15}^{+0.12}(\text{syst.})$  GeV. This measurement probes quasielastic scattering in the nuclear medium of a large ( $A = 56$ ) target nucleus using 123,000 candidate quasielastic  $\nu_\mu\text{Fe}$  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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