JOURNAL CLUB

Brief Summary

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Broadband and Resonant Approaches to Axion Dark Matter Detection

axion, a possible component of cold dark matter

ultralight axion dark matter encounters a static magnetic field, it sources an effective electric current that follows the magnetic field lines and oscillates at the axion Compton frequency

a new experimental design for axion DM detection that targets the mass range $m_a \in [10^{-14}, 10^{-6}]$eV

- axion DM, in the presence of a static magnetic field, produces response electromagnetic fields that oscillate at the axion Compton frequency
- based on either broadband or resonant detection of an oscillating magnetic flux with sensitive magnetometers, sourced by an axion effective current

broadband circuits can have superior sensitivity for lighter axion masses

First Measurement of Neutrino Interactions in MicroBooNE

long-baseline neutrino oscillation experiments will move forwards into a 'precision era'

reduce systematic uncertainties

uncertainties in neutrino-nucleus cross-sections

MicroBooNE offers excellent reconstruction and distinction between final state topologies, giving it the capacity to measure cross-sections of highly specific interaction channels, and thus to probe tensions in existing nuclear models

kinematic distributions, the charged-current inclusive cross-section

automated selection algorithms

move cosmic rays background

key systematics to be assessed in converting future kinematic distributions into differential cross-sections

Precise measurement of the $e^+e^- \to \pi^+\pi^- J/\Psi$ cross section at center-of-mass energies from 3.77 to 4.60 GeV

cross section for the process $e^+e^- \to \pi^+\pi^- J/\Psi$ at center-of-mass energies from 3.77 to 4.60 GeV

J/Ψ candidate is reconstructed with its leptonic decay modes ($\mu+\mu-$ and $e+e-$)

The first resonance is near 4.22 GeV/c2, corresponding to the so-called Y (4260) resonance reported by previous experiments.

The second resonance near 4.32 GeV/c2 has a mass and width comparable to the Y (4360) resonance

assume it is the same resonance as the Y (4360), then observe a new decay channel of Y (4360)$\to \pi^+\pi^- J/\Psi$ for the first time

can not confirm the existence of the Y (4008) resonance, since a continuum term also describes the cross section near 4 GeV equally well.

THANKS