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Machine Learning Methods for Solar Neutrino Classification

Thursday, 4 August 2022 15:04 (22 minutes)

Super-Kamiokande has observed boron-8 solar neutrino recoil electrons at kinetic energies as low as 3.49 MeV to study neutrino flavor conversion within the sun. At SK-observable energies, these conversions are dominated by the Mikheyev–Smirnov–Wolfenstein effect. An upturn in the electron survival probability in which vacuum neutrino oscillations become dominant is predicted to occur at lower energies, but radioactive background increases exponentially with decreasing energy. New machine learning approaches provide substantial background reduction in the 2.49 MeV - 3.49 MeV energy region such that statistical extraction of solar neutrino interactions becomes feasible. An overview of machine learning methods in use for water Cherenkov detectors including convolutional neural networks trained on event display images and boosted decision trees trained on reconstructed variables will be presented followed by solar angle distributions of events selected for this analysis.

Attendance type

In-person presentation

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