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Joint Determination of Reactor Antineutrino Spectra from 235U and 239Pu Fission using the Daya Bay and PROSPECT Experiments

The poster presents a joint determination of the reactor antineutrino spectra resulting from the fission of 235 U and 239 Pu by combining the Daya Bay and PROSPECT experiments. In the Daya Bay experiment, the antineutrinos were generated by six low enriched uranium (LEU) nuclear commercial reactors with 2.9 GW thermal power each and detected by eight antineutrino detectors deployed in two near and one far underground experimental halls. In the PROSPECT experiment, the antineutrinos were generated by an 85 MW thermal power high enriched uranium (HEU) research reactor and detected by a 4-ton ⁶Li-loaded liquid scintillator (LiLS) detector. The compatibility of the measured prompt energy spectra from both experiments are first evaluated with a dedicated method. With a joint analysis of both experiments' data, the precision of the derived ²³⁵U spectrum is improved beyond that individually observed by either experiment, and the degeneracy between derived ²³⁵U and ²³⁹Pu spectra is reduced below that from Daya Bay alone. Finally, the antineutrino energy spectrum of ²³⁵U is unfolded with the Wiener-SVD method, providing a more precise data-based prediction for other reactor antineutrino experiments. This is the first combined measurement from experiments based on LEU and HEU reactors.

Collaboration / Activity

Daya Bay&PROSPECT Collaboratio

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