Contribution ID: **607** Type: **Parallel**

Joint measurement of the reactor antineutrino spectrum and investigation of the light sterile neutrino sector with STEREO, PROSPECT and Daya Bay

Wednesday 9 July 2025 10:10 (20 minutes)

Over the past decades, anomalies in short-baseline neutrino oscillation experiments triggered rich experimental programs to investigate the existence of light sterile neutrinos as a primary explanation. Amongst these, the so-called reactor antineutrino anomaly has played a major role since 2011. It consisted in an alleged deficit of electron antineutrinos emitted by nuclear reactors and observed at short baseline from the source. These antineutrinos originate from the beta decay of fission products of either uranium 235 in case of research nuclear cores Highly-Enriched in Uranium 235 (HEU), or isotopes of uranium and plutonium for commercial nuclear cores Lowly-Enriched in Uranium 235 (LEU).
STEREO and PROSPECT are prominent experiments that were able to provide world-leading precision measurements of the antineutrino spectrum emitted by HEU reactors, while putting stringent constraints on the existence of an eV-scale sterile neutrino by operating at a baseline of a few to ten meters from the reactor. On the other hand, the Daya Bay experiment measured with an outstanding precision the spectrum emitted by LEU reactors, while constraining the oscillation parameters of a sub-eV-scale sterile neutrino, due to operating at longer baselines from a few hundred of meters to the kilometer scale.
In this talk, we present the status of the analysis stemming from a cross-collaboration between these three experiments, in view of improving their constraints in the parameter space of the light sterile neutrino sector, and providing benchmark measurements for the reactor antineutrino spectrum.

Secondary track

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Session Classification: T03

Track Classification: T03 - Neutrino Physics