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Measurement of neutrino oscillation parameters θ_{13} and Δm^2_{ee} from 1958 days of data at Daya Bay

Since its inception, the Daya Bay reactor neutrino experiment has continued to produce world-leading measurements of the mixing angle θ_{13} and the effective mass splitting Δm^2_{ee}. Electron antineutrinos produced by six nuclear reactors in southern China, totaling 17.4 GW_{th}, are observed by eight identically designed liquid scintillator detectors divided among two near sites and one far site. By measuring the relative antineutrino rates and spectral shapes at the near and far sites, precise determinations are obtained of θ_{13} and Δm^2_{ee}, with a virtually complete cancellation of all systematic uncertainties related to the reactor flux and absolute detection efficiency.

In this poster, we present a summary of Daya Bay's primary oscillation analysis, in which electron antineutrinos are identified via the inverse beta decay (IBD) interaction, with subsequent neutron capture on gadolinium. Beginning with an overview of the physics, we proceed to describe the detector design and experimental layout, followed by calibration, event reconstruction, IBD selection, background subtraction, and, finally, the fitting of the data to the standard three-flavor oscillation model, giving a measurement of $\sin^2 2\theta_{13} = 0.0856 \pm 0.0029$ and $\Delta m^2_{ee} = (2.522^{+0.068}_{-0.070}) \times 10^{-3}$ eV^2.

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