

The energy response model of the Daya Bay electron antineutrino detectors

The Daya Bay experiment has provided the most precise measurement of the $\sin^2 2\theta_{13}$ and $|\Delta m_{ee}^2|$ via a relative comparison of reactor antineutrino rates and energy spectra detected at scintillator detectors placed at different baselines. A precise measurement of the absolute neutrino flux and spectrum was also performed. Both analyses require a precise modeling of the detector energy response to describe the relationship between the true energy of the incident particles and the reconstructed energy. The nonlinear response in the Daya Bay detectors comes from two main factors. The scintillator response is non-linear primarily due to quenching of charged particles and contribution from Cerenkov radiation. Additional energy non-linearity arises from the interaction of the scintillation light time profile and the charge collection of the readout electronics. This talk presents the energy response modeling using various calibration sources as well as a dedicated measurement of the electronics non-linearity.

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