Field Observations at the Daya Bay Reactor-Neutrino Experiment Site

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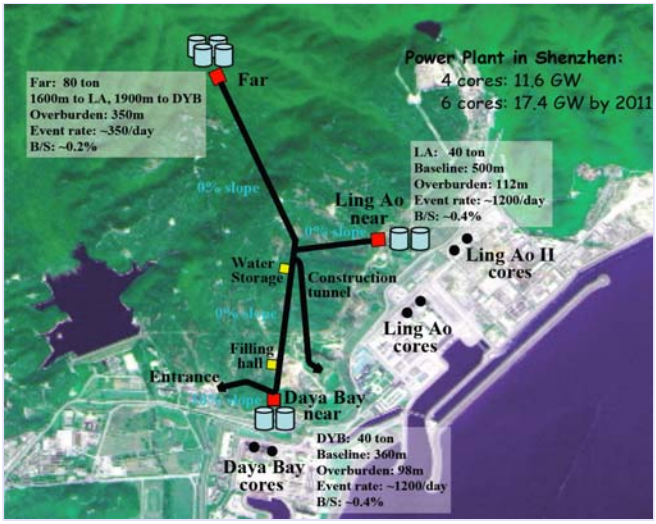
The Daya Bay Collaboration

A reactor-neutrino experiment, Daya Bay, has been proposed to determine the least-known neutrino mixing angle θ_{13} using electron antineutrinos produced at the Daya Bay nuclear power complex in China. Daya Bay is an international collaboration with institutions from China, the United States, the Czech Republic, Hong Kong, Russia, and Taiwan. The experiment will use eight identical 20-t detectors deployed at three different locations optimized for monitoring the antineutrinos rates from the six reactors and for detecting any rate deficit and spectral distortion near the first oscillation maximum. The detector construction begins in 2008. The experiment will begin collecting data in 2010. By comparing the detected signals at the three locations, with three years of data, a sensitivity in $\sin^2(2\theta_{13})$ of better than 0.01 is expected.



The overburden of the underground experimental halls, connected with tunnels ranging from 98 to 350 meters (about 250 to 900 meters-water-equivalent) so that the cosmogenic background is small compared to the number of observed antineutrino events. Civil construction of tunnels and experimental facilities started in 2007. Field observations of site survey, exploratory hole drilling, ground breaking, and portal excavation are presented. Recovered cores demonstrated the fractured but relatively intact condition of the granite bodies below the weathered zones. The portals are in fair to good condition, and appeared ready for continuing excavation operations. The tunnels were designed to be located below localized weathered zones and could intercept at a few mapped faults below surface depressions and a stream bed with potential groundwater inflows. The field observations were among factors considered in tunnel design and excavation contingency.