Search for θ_{13} at the Daya Bay Neutrino Experiment

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April 25, 2008

Abstract

Neutrino flavor oscillation induced by neutrino mass eigenstate mixing has become the most plausible explanation of the results of solar, atmospheric, long-baseline and reactor neutrino experiments. Despite these results in recent years, we still know very little about the third angle, θ_{13}, in the $PMNS$ neutrino mixing matrix. The current best upper limit is $\sin^2 2\theta_{13} < 0.17$ at 90% C.L. The Daya Bay reactor neutrino experiment in China is designed to reach a sensitivity of 0.01 at 90% C.L. in $\sin^2 2\theta_{13}$, independent of the Dirac CP phase value. It has the highest designed sensitivity among the current reactor neutrino experiments under construction. Determining the value of $\sin^2 2\theta_{13}$ to 0.01 sensitivity level independent of the Dirac CP phase is important for the planning of the next generation of appearance neutrino oscillation experiments for exploring CP symmetry. The Daya Bay experiment will start taking data with the first two near detectors at the end of 2009. Data taking with the full complement of eight detectors will start in 2010. In this talk, we present the design, simulation and current status of the Daya Bay neutrino experiment.