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Taishan Antineutrino Observatory

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Abstract:

Many reactor neutrino experiments observed a ˜6% deficit in the reactor antineutrino flux compare with the prediction. In addition, Daya Bay confirmed a new anomaly "5-MeV bump"in the spectrum shape. These anomalies require an accurate measurement of the reactor antineutrino spectrum.

The high energy resolution measurement will provide an essential reference spectrum to the JUNO experiment. Taishan Antineutrino Observatory(TAO) will have an energy resolution better than $3\%/\sqrt{E}$. It will help to reduce the model dependence for JUNO to determine the mass hierarchy. Except serve to JUNO, TAO will observe the fine structure of reactor neutrino spectrum, to provide a benchmark to nuclear databases.

TAO will use several tons of Gd-LS as target material to detect antineutrinos via inverse beta decay (IBD). SiPM, with photon detection efficiency ˜50%, is used as photon sensor which collects about 4500 photoelectrons at 1MeV energy. The detector including the Gd-LS, container (nylon ball contain, acrylic ball support), SiPM, etc will operate at -50oC to lower the dark noise of SiPM. TAO will be placed at 30m from the reactor core which has a thermal power of 4.6 GW.

This talk will present the simulation of TAO detector and the R&D progress.

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