Abstract Submitted
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Development of Gadolinium-Loaded Liquid Scintillators for 1%-Precision Measurement at the Daya Bay Nuclear Reactors of the Neutrino Mixing Angle, θ_{13}[1] R.L. HAHN, M. YEH, A. GARNOV, Chemistry Department, Brookhaven National Laboratory, Upton NY 11973, DAYA BAY COLLABORATION — The Daya Bay collaboration intends to use multiple organic-liquid-scintillator (LS) detectors placed at various distances between 0.3 and 2 km from the Daya Bay-Ling Ao nuclear power reactors to detect antineutrino oscillations and to determine the unknown neutrino-mixing angle, θ_{13}. The nuclear reaction in the LS is inverse β-decay on protons, with the coincidence tag between the emitted prompt positron and the delayed neutron-capture providing a clear signature of the antineutrino capture. The neutron-capture signal is enhanced by loading $\sim$0.1% gadolinium into the liquid scintillator (Gd-LS), because of the 49000-barn (n,γ) cross section of natural abundance Gd and the $\sim$8 MeV of emitted γ rays. The Daya Bay plan is to use eight *identical* antineutrino detectors, each containing 20 tons of Gd-LS. The BNL Nuclear Chemistry Group has developed chemical procedures to synthesize high-purity Gd-LS with long attenuation length (>15 m), high light output ($\sim$95% of pseudocumene), and long-term stability (>1.5 years to date). Groups at IHEP in Beijing, China and JINR in Dubna, Russia are also doing Gd-LS R&D. This paper discusses the properties of Gd-LS.

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