

# Measurement of $\bar{\nu}e$ -e- Scattering Cross-Section and Constraints on New Physics with a CsI(Tl) Crystal Array at the Kuo-Sheng Reactor Laboratory

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The  $\bar{\nu}e$ -e- elastic scattering cross-section was measured with a CsI(Tl) scintillating crystal array having a total mass of 187 kg. The detector was exposed to an average reactor neutrino flux of  $6.4 \times 10^{12}$  cm<sup>-2</sup>s<sup>-1</sup> at the Kuo-Sheng Nuclear Power Station in Taiwan.

The experimental design, conceptual merits, detector hardware, data analysis and background understanding of the experiment will be discussed. We will present final results with 29882/7369 kg-days of Reactor ON/OFF data, on the cross-section and the standard electroweak parameters  $\sin^2\theta_W$  and  $(g_V, g_A)$  measurements, the test on charged-current neutral-neutral interference, as well as limits on neutrino magnetic moments and charge radius squared [1].

We will also present constraints on non-standard interactions (NSI) of neutrino and Unparticle Physics (UP) in  $\bar{\nu}e$ -e- interaction channel [2] based on this data set as well as our previous data sets with ULE-HP Ge detectors which were used for the measurements of neutrino magnetic moment [3] and Dark Matter, WIMP searches [4].

[1] "Measurement of Neutrino-Electron Scattering Cross-Section with a CsI(Tl) Scintillating Crystal Detector Array at the Kuo-Sheng Nuclear Power Reactor", M. Deniz et al., Phys. Rev. D 81, 072001 (2010).

[2] "Constraints on nonstandard neutrino interactions and unparticle physics with  $\bar{\nu}e$ -e- scattering at the Kuo-Sheng nuclear power reactor", M. Deniz et al., Phys. Rev. D 82, 033004 (2010).

[3] "New limits on spin-independent and spin independent couplings of low-mass WIMP dark matter with a germanium detector at a threshold of 200 eV", S.T. Lin et al., Phys. Rev. D 79, 061101(R) (2009).

[4] "Search of Neutrino Magnetic Moments with a High-Purity Germanium Detector at the Kuo-Sheng Nuclear Power Station", H. T. Wong et al., Phys. Rev. D 75, 012001 (2007).

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