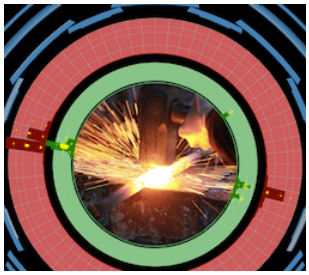

Contribution ID: **24** Type: **parallel talk**

Sensitivity to Z-prime, neutrino magnetic moment, and oscillation with a sterile fourth generation neutrino from ultra-low threshold neutrino-nucleus coherent scattering.

Monday 9 May 2016 16:45 (15 minutes)

Coherent elastic neutrino-nucleus scattering (CE□NS) is a long-standing prediction of the Standard Model. The possibility exists that new ultra-low energy threshold Si and Ge detectors will soon be able to observe the CE□NS process with large statistics, potentially opening a new mode for probing neutrino physics and astrophysics beyond the Standard Model. This presentation will adopt the context of a specific and contemporary reactor-based experimental proposal (MI□ER Collaboration), developed in cooperation with the Nuclear Science Center at Texas A&M University, referencing available technology based upon economical and scalable detector arrays. For expected exposures, sensitivity to the Z-prime mass is on the order of several TeV, and is complementary to the LHC search with low mass detectors in the near term. This technology is also able to provide sensitivity to the neutrino magnetic moment, at a level that surpasses terrestrial limits, and is competitive with more stringent astrophysical bounds. Leveraging a short meter-order experimental baseline and mobile reactor core, sensitivity is also available to first/fourth neutrino oscillation with a mass gap $\Delta m^2 \sim 1\ \mathrm{eV}^2$ at an amplitude $\sin^2 2\theta \sim 10^{-2}$, or $\Delta m^2 \sim\ 0.1\ \mathrm{eV}^2$ at unit amplitude. The combination of Si and Ge detectors facilitates discrimination between classes of models of new physics, and works together with variation of the propagation length to suppress leading correlated systematic uncertainties.

Summary

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