Physics Colloquium

Tuesday, October 10th at 3:30 pm in SC 234

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Representing the MINER Project

Searching for new physics with coherent neutrino scattering

Coherent elastic neutrino-nucleus scattering (CENNS) is a long-standing prediction of the Standard Model, which has just been experimentally observed for the first time during the last year. A main historical obstacle to observation of this process has been that a very small amount of energy is deposited into the recoil of the nucleus, and sufficiently sensitive detectors for the observation of CENNS from a reactor source are just now becoming a practical reality. This presentation will adopt the context of a contemporary reactor-based experimental proposal (MINER Collaboration), developed in cooperation with the Nuclear Science Center at Texas A&M University, and referencing technology based upon economical and scalable germanium and silicon detector arrays. If the CENNS process is observed with large statistics, it will present a new laboratory for testing theories of new particles and interactions beyond the Standard Model that are connected to the neutrino sector, for example a heavy *Z*-prime, the neutrino magnetic moment, and new very light vector, axial, or scalar mediators. Leveraging a short meter-order experimental baseline and mobile reactor core, sensitivity is also available to first/fourth neutrino oscillation with eV scale mass gap. The combination of Si and Ge detectors facilitates discrimination between classes of models of new physics, and can work together with variation of the propagation length to suppress correlated systematic uncertainties.

Refreshments at 3:00 pm in SC 103