

Low-Energy Neutrino Interactions in the LZ Experiment

Thursday, May 12, 2022 3:20 PM (20 minutes)

The LUX-ZEPLIN (LZ) experiment is sensitive not only to dark matter Weakly Interacting Massive Particle (WIMP) interactions, but also to those of low-energy neutrinos. In particular, 8B (Boron-8) solar neutrinos from natural nuclear fusion processes in our Sun should lead to dozens of events above threshold over the lifetime of LZ, appearing in the same region of event-type parameter space as a low-mass (few-GeV/c²) WIMP would. While this background will impact the sensitivity of LZ in that particular WIMP mass range, it is also a boon for neutrino physics. In this talk we will discuss how LZ will be able to see Coherent Elastic Neutrino-Nucleus Scattering (CEvNS), recently first observed by COHERENT using neutrinos generated by the Spallation Neutron Source at Oak Ridge National Laboratory, but in this case using 8B solar neutrinos. Potentially, LZ may be able to determine if deviations exist from the Standard Model CEvNS cross-section, and separately perform tests of the solar model. At the same time, the use of 8B neutrinos should allow for fresh studies of the uncertainties in the light and charge yields from low-energy nuclear recoils, of critical importance to detection of WIMPs, at any mass. Lastly, neutrinos from other sources such as Core-Collapse Supernovae (CCSNs) should also be detectable within LZ, in an energy regime orders of magnitude lower than for instance in DUNE, allowing for complementary measurements.

Primary author: SZYDAGIS, Matthew (UAlbany SUNY)

Presenter: SZYDAGIS, Matthew (UAlbany SUNY)

Session Classification: Supernova & Solar Neutrinos - Parallel

Track Classification: Supernova & Solar Neutrinos