

A Ton-Scale LAr CEvNS Detector at ORNL

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Coherent elastic neutrino-nucleus scattering (CEvNS) was detected on liquid argon (LAr) using the CENNS-10 detector at Oak Ridge National Laboratory in 2021. Ongoing research is focused on developing a ton-scale LAr detector that can measure CEvNS with greater precision, including sensitivity to charge-current neutrino interactions and an increased detection rate twenty times greater than that of the CENNS-10. The COH-Ar-750 detector is currently being designed with photomultiplier tubes for light collection, but we are exploring the incorporation of silicon photomultipliers to reduce the energy threshold and increase the detector's dynamic range. Additionally, an updated liquefier design is being tested. Simulation work and related results will be presented, along with physics cases for the use of underground argon (UAr) and xenon-doping to enhance sensitivity to non-standard neutrino interactions and beyond the Standard Model physics. CEvNS is a key area of research in the field of neutrino physics, and detection of this process has the potential to provide valuable insights into the properties of neutrinos and the broader field of particle physics.

Author: JOHNSON, Bo (Indiana University)

Presenter: JOHNSON, Bo (Indiana University)

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