

Review of COHERENT experiments

Thursday 27 October 2022 09:20 (25 minutes)

The COHERENT collaboration made the first measurement of coherent elastic neutrino nucleus scattering (CEvNS) in 2017 using a low-background, 14.6-kg CsI[Na] detector at the Spallation Neutron Source (SNS). We have also measured CEvNS using a 24-kg argon scintillation calorimeter. These measurements are part of a multi-target campaign to measure CEvNS on four nuclei, Na, Ar, Ge, and Cs/I, to test the standard model cross section, predicted to scale like the square of the neutron number. We will show current progress in deployment of new COHERENT detectors, including those that will study CEvNS on Na and Ge.

With first-light discovery of CEvNS accomplished, COHERENT is now transitioning to precision measurements of CEvNS and other low-energy neutrino scattering processes. This precision era will facilitate strong probes for searches for beyond-the-standard-model (BSM) physics. We discuss recent, full-dataset results from our CsI[Na] detector which achieved a 16% measurement of the CEvNS cross section through an improved understanding of the detector response and a doubling of detector exposure relative to the initial measurement. These data have already placed leading limits on neutrino-quark non-standard interactions and accelerator-produced dark matter. In this talk, new searches for BSM physics will be presented based on this dataset.

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Session Classification: Coherent Neutrino Scattering