## Magnificent CEvNS 2025



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## CYGNUS and laying the groundwork for the directional detection of CEvNS

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The directions of low energy nuclear recoils open windows into previously unprobed areas of physics. Specifically, directional detection of coherent elastic neutrino nucleus scattering (CEvNS) would probe for new, beyond-the-standard-model (BSM) gauge bosons involved in that interaction as well as provide a tool for distinguishing between dark matter and neutrino scattering. Currently the only detectors capable of time-resolved directional recoil detection are gaseous time projection chambers (TPCs). The CYGNUS collaboration develops gaseous time projection chambers (TPCs) with low energy thresholds and higher active volumes in pursuit of probing dark matter and neutrino physics. Our group at the University of Hawaii intends to demonstrate the first directional detection of CEvNS to date, at the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL). This talk presents recent developments towards scaling our TPCs up to active volumes of order [[1m]] ^3, which is necessary for both directional CEvNS measurements and for dark matter searches. We present preliminary projections for our planned directional CEvNS measurement, and the first steps towards optimizing the gas mixture for that measurement.

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