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Potential to discover new physics with CEvNS detectors at the Second Target Station of the Spallation Neutron Source

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Oak Ridge National Laboratory has begun a decade-long upgrade to its Spallation Neutron Source (SNS) accelerator which will double the beam power and commission a second target station for neutron production. This machine will also produce a world-leading source of 0-53 MeV neutrinos produced as a byproduct of neutron production. The COHERENT collaboration has already exploited neutrinos at the SNS to make the first detection of coherent elastic neutrino nucleus scattering (CEvNS) and the strongest constraint yet placed on dark matter particles with masses near 25 MeV. In this talk, we will focus on opportunities for further advances in fundamental physics at the second target station. Of interest, we will cover future constraints of BSM neutrino interactions, limits on sterile neutrinos and exotic oscillations, and searches for dark matter. These large detectors will also allow for a measurement of the weak mixing angle at low Q2 and measurement of the weak charge radius of target nuclei. We will also discuss future measurements of inelastic neutrino scattering on nuclei relevant for other neutrino experiments within the field but whose cross sections are currently poorly understood.

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