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Neutron Background Characterization for a Coherent Neutrino-Nucleus Scattering experiment at SNS MARK GERLING, Sandia National Laboratories — Coherent Neutrino Nucleus Scattering (CNNS) is a theoretical well-grounded, but as-yet unverified process. The Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL) may provide an optimal platform for detection of CNNS, possibly with existing detector technology. A proto-collaboration of groups from several institutions has come together to investigate this option and propose an experiment for the first-time observation of CNNS. Currently, the largest risk to such an experiment comes from an unknown background of beam-induced high-energy neutrons that penetrate the existing SNS concrete shielding. We have deployed a neutron scatter camera at the SNS during beam operation and performed preliminary measurements of the neutron backgrounds at a promising experimental location. In order to measure neutrons as high as 100 MeV, we needed to make modifications to the neutron scatter camera and expand its capabilities beyond its standard operating range of 1-14MeV. We have identified sources of high-energy neutrons and continue to investigate other possible locations that may allow a successful CNNS experiment to go forward. The imaging capabilities of the neutron scatter camera will allow more optimal shielding designs that take into account neutron flux anisotropies at the selected experiment locations.

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