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## Searching for Neutrino-Induced Neutron Production at the Spallation Neutron Source (SNS) on Lead Target

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The COHERENT Collaboration is an experimental effort to measure coherent elastic neutrino-nucleus scattering (CEvNS). The Spallation Neutron Source provides an intense source of neutrinos from decay-at-rest pions, which makes the measurement of this standard model predicted process possible. COHERENT seeks to make an unambiguous measurement by using a variety of low-threshold detectors capable of measuring the low energy nuclear recoils resulting from CEvNS interactions. Neutrinos are weakly interacting. Consequently we must seek to reduce and understand our backgrounds as well as possible to make this measurement, for which the collaboration has auxiliary detectors for the purpose of measuring these backgrounds. An irreducible background we face is the inelastic neutrino-induced production of neutrons within our detectors, which will share the time-structure of CEvNS signal. The cross-section for these neutrino-induced neutrons (NINs) can be quite significant for large nuclei such as Lead, an element commonly used in shielding. However, the value of this cross-section as calculated by theoretical models differs by as much as 30 %. We currently have a 980 kg deployment of lead in the SNS basement equipped with liquid scintillator cells for the detection of NINs 20 meters from the SNS target. We use a Geant4 model of the detector assembly to simulate expected signals of this interaction and the energetic (~400 MeV) “fast” background neutrons produced during the spallation of the SNS target which appear in our detectors in small numbers in time with the beam spill.

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