Abstract Submitted
for the APR20 Meeting of
The American Physical Society

CEvNS for Nuclear Security[1] MAITLAND BOWEN, Univ of Michigan - Ann Arbor, PATRICK HUBER, Virginia Tech — Coherent elastic neutrino-nucleus scattering, CEνNS, was observed for the first time in 2017 after forty years of experimentation, with neutrino energies about 10 times larger than those of reactor neutrinos. Here we assume that neutrinos from reactors and other MeV-sources eventually will be detected using CEνNS. CEνNS is attractive for applications in nuclear security since it may allow for significantly reduced detector masses, as well as detection of neutrinos from breeding reactions and spent nuclear fuel. On the other hand, inverse beta decay (IBD) has been routinely used for decades for the detection of reactor neutrinos. Therefore, it appears timely to compare the potential of CEνNS and IBD. We will use neutrino fluxes measured from reactors and their cross sections to compute the energy spectra of neutrinos from ^{235}U, ^{238}U, ^{239}Pu, and ^{241}Pu, and determine and compare neutrino detection event counts using either IBD or CEνNS. This characterization will inform future detector choices and is directly applicable to various neutrino sources, including reactor neutrinos, spent fuel neutrinos, and geoneutrinos. The result is potentially useful in monitoring spent nuclear fuel and reactors in support of nuclear nonproliferation safeguards.

[1]The work of MB was supported by the National Science Foundation REU grant number 1757087. The work of PH was supported by the US Department of Energy Office of Science under award number DE-SC00018327.

Maitland Bowen
Univ of Michigan - Ann Arbor

Date submitted: 09 Jan 2020 Electronic form version 1.4