

Abstract Submitted  
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**Implementing a Uranium Fission Insert at the LANL Ultracold Neutron Source** RICHARD MCDONALD, East Tennessee State University — The spallation ultracold neutron source at the Los Alamos Neutron Science Center produces ultracold neutrons (UCNs) with a kinetic energy below 340 neV. Ultracold neutrons are subject to different systematic effects than their cold neutron (0.025 eV) counterparts. This low-energy state of neutrons can be stored and transported to experiments in the laboratory. These observations are critical in answering fundamental queries in physics such as the nature of dark matter and matter/anti-matter asymmetry in the universe. At the moment these experiments are statistically limited, as the current UCN source produces an unpolarized storable density of 180 UCN/cc. Adding a 20% lightly enriched uranium insert to induce nuclear fission reactions has the potential to increase the production of UCNs anywhere from a factor of 2-8. We will present the results of an optimization of the uranium insert geometry to enhance UCN production while ensuring it remains subcritical and heating contributions are manageable through the use of the Monte-Carlo Neutron Particle code (MCNP6).

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