

Abstract Submitted
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Detailed Characterization of Copper Guide Polishing Methods for use in UCN Transport RUSSELL MAMMEI, Virginia Tech, UCNA COLLABORATION — The UCNA experiment at Los Alamos National Lab (LANL) employs polarized ultracold neutrons (UCN) to measure the beta-asymmetry in free neutron decay. The 2009 beamline makes use of electro-polished stainless steel and copper guides. In the depolarization region of the experiment, hydrogen-free Diamond-like-Carbon (DLC) coated copper guides are utilized. A target-biased, pulsed laser deposition technique was used to produce an adhered coating on these copper guides with an expected Fermi potential of 240neV. A series of guide tests performed last December indicate that these DLC coated copper guides have very low depolarization per bounce and a higher Fermi potential than bare copper. However, transmission results, for both the coated and uncoated copper guides, suggest that the underlying polish was not optimum. An investigation of the mechanical and electro-polishing processes has been conducted utilizing profilometry and atomic force microscopy. These data have been used to simulate the effects of these polishes on UCN transport and indicate that the final mechanical polish direction can have a big impact. Results of this study will be presented along with its impact on making higher Fermi potential DLC coated copper guides.

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