Abstract Submitted
for the SES20 Meeting of
The American Physical Society

A Cryogenic Apparatus for Measuring Depolarization of Ultracold Neutrons[1] RIFET MUSEDINOVIC, North Carolina State University, TAUFIQUE HASSAN, TAKEYASU ITO, Los Alamos National Laboratory, EMMA JEWETT, North Carolina State University, KENT LEUNG, Duke University, MARK MAKELA, CHRISTOPHER O'SHAUGHNESSY, Los Alamos National Laboratory, HASSAN POLANI, Dream Stem Program at NCCU, ALBERT YOUNG, North Carolina State University — Ultracold neutrons (UCN) are utilized in a variety of sensitive experiments to probe for physics beyond the Standard Model, including investigating the neutron electric dipole moment and high precision measurements of beta decay. These experiments frequently revolve around the storage of completely polarized UCN by trapping them in material and magnetic bottles. Often storage times of a minute or longer are required to obtain the optimal sensitivity. This makes even extremely small depolarization rates crucial to measure and motivates careful testing of UCN guide materials for their depolarization properties. A cryogenic apparatus capable of studying UCN depolarization as a function of temperature and magnetic field is presented. Neutrons from the UCN source at LANSCE Area B are directed into a 6 T magnet used for polarizing UCN entering the experiment and trapping the spin-flipped UCN. The UCN then propagate through the guide system fabricated from polished copper which minimizes UCN depolarization on route to the liquid helium Cryostat where our sample lies. The apparatus is designed to run at temperatures as low as 6 K, with superconducting coils providing a maximum ambient field of 0.05 T.

[1]NSF 1914133 and DOE DE-FG02-ER41042

Rifet Musedinovic
North Carolina State University

Date submitted: 19 Oct 2020 Electronic form version 1.4