NWS18-2018-000058

Abstract for an Invited Paper
for the NWS18 Meeting of
the American Physical Society

The Search for Neutron EDM at TRIUMF

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A new ultra cold neutron (UCN) facility is under development with a flagship experiment of measuring the neutrons electric dipole moment (EDM) with a precision of 10^{-27} e-cm. Construction of the main apparatus is taking place at TRIUMF, with collaborators from Japan and Canada. To measure the nEDM, a magnetic resonance experiment on polarized neutrons is performed, where the uncertainty is limited by how well the magnetic field and its gradient are known. Previous nEDM experiments relied on in-situ measurements of the magnetic field using a Ramsey fringe measurement of the spin precession of ^{199}Hg (cohabiting with the neutrons). UCN will introduce a dual co-magnetometer with cohabiting ^{129}Xe and ^{199}Hg for measuring precise magnetic fields within a neutron storage cell. By simultaneously incorporating two atomic species we can deduce both the magnitude and gradient of the magnetic fields, thereby lowering the systematic uncertainties in the nEDM measurement. ^{129}Xe was chosen for several reasons including its negligible interaction with the neutrons and ^{199}Hg. Measuring the magnetic field using polarized ^{129}Xe involves first spin-selectively exciting a two-photon transition -ground 5p6(1S0) state to the excited $5p^5(^2P_{3/2})6p$ state at 252 nm- and then measuring the via fluorescence decay. In my talk I will first present an overview of the Neutron EDM project (both the motivation and the production of UCN at TRIUMF). Following this review, I will discuss my contributing work on the ^{129}Xe co-magnetometer including the analysis of the two-photon excitation spectrum, and our current progress on the measurements of precession of polarized Xe atoms.