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**He3 Correleation Function Research for nEDM Experiment at ORNL SNS** ROBERT DIPERT, Arizona State Univ, ROBERT GOLUB, North Carolina State Univ, HAIYAN GAO, Duke Univ, AUSTIN REID, North Carolina State Univ, PINGHAN CHU, Duke Univ — Seeking an upper limit of the Neutron Electric Dipole Moment (nEDM) is a test of CP violation beyond the Standard Model. The present nEDM upper limit is $3\text{x}10^{-26}$ e cm. An experiment to be performed at the Oak Ridge National Lab (ORNL) SNS facility seeks to reach the $10^{-28}$ e cm limit. At ORNL, $^3$He will be used as a comagnetometer, and polarization analyzer and detector. The systematic effects can be explored by measuring the position-position correlation function of $^3$He. We have developed theoretical expressions for the correlation function which differ from previous theories in the ballistic region. We have already measured into this region with $X_3$[He3:He4] molar concentration ratio as low as $10^{-6}$. Limitations were the result of noise in the signal from copper around the cell and insufficient cooling. The apparatus formerly used has been updated to enable the testing of this theory in the transition between the diffuse ($X_3 > 4\text{x}10^{-5}$) and ballistic ($X_3 < 8\text{x}10^{-7}$) regions by removing the mentioned copper, updating cell design and facilitating lower temperatures (≈300mK).

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