Abstract Submitted
for the SES08 Meeting of
The American Physical Society

**$^3$He Relaxation Time Measurements at ∼400mK for the neutron electric dipole moment (nEDM) experiment**[1] QIANG YE, HAIYAN GAO, Duke University, ROBERT GOLUB, NC State University, DIPANGKAR DUTTA, Mississippi State University, PAUL HUFFMAN, FRANKLIN DUBOSE, NC State University, NEDM COLLABORATION — In the new nEDM experiment planned to be carried out at the SNS, the measurement cell will be made of dTPB-dPS (wavelength shifting material) coated acrylic and filled with superfluid $^4$He. NMR technique will be used to measure the neutron precession frequency by comparing with that of the polarized $^3$He using the spin-dependent nuclear reaction: $\vec{n}+{}^3\vec{H}e \rightarrow p+t+764$ keV. The polarized $^3$He will be used as a comagnetometer to monitor the B field *in situ* during the experiment. Understanding the relaxation mechanism of polarized $^3$He under the experimental conditions and maintaining $^3$He polarization is crucial. Following our earlier study of the $^3$He relaxation time in a dTPB-dPS coated cylindrical acrylic cell at a temperature of 1.9K in the presence of superfluid $^4$He with a magnetic holding field of 21 G, similar measurements at ∼400 mK (the proposed nEDM experimental temperature) have been carried out using a dilution refrigerator in TUNL at ∼7 G. Preliminary results will be presented.

[1]This work is supported in part by the U.S. Department of Energy under contract number DE-FG02-03ER41231.

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Date submitted: 13 Aug 2008 Electronic form version 1.4