

Abstract Submitted  
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**Purification of  $^4\text{He}$  through Differential Evaporation**<sup>1</sup> F. DUBOSE, D.G. HAASE, P.R. HUFFMAN, NC State University — The neutron electric dipole moment (nEDM) experiment, to be housed at the Spallation Neutron Source at Oak Ridge National Laboratories, will probe for a dipole moment at the level of  $10^{-28}$  e cm. As part of the measurement process, neutrons precess in an environment of isotopically pure helium, doped with polarized  $^3\text{He}$ . After this  $^3\text{He}$  depolarizes it must be removed. We are developing an evaporative purification technique for this removal, lowering the concentration of  $^3\text{He}$  in  $^4\text{He}$  from  $10^{-8}$  to  $10^{-10}$ , at an operating temperature of 300 – 350 mK. Because the vapor pressure of  $^3\text{He}$  is enhanced at temperatures below 500mK,  $^3\text{He}$  atoms can be preferentially removed from the solution. The purifier requires a large liquid surface area, while minimizing superfluid film flow. The evaporated atoms are adsorbed on activated charcoal. We have built a device to measure  $^3\text{He}/^4\text{He}$  ratios using a leak detector mass spectrometer and a residual gas analyzer.

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