

Abstract Submitted  
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**Investigation of Removal of  $^3\text{He}$  from Liquid  $^4\text{He}$  Solution for the Neutron Electric Dipole Moment Measurement**<sup>1</sup> DAVID G. HAASE, ROBERT GOLUB, PAUL R. HUFFMAN, North Carolina State University and Triangle Universities Nuclear Laboratory — The measurement cycle for the proposed experiment to measure the neutron electric dipole moment at the SNS includes the injection and removal of polarized  $^3\text{He}$ , which is used as a comagnetometer in the same 15 liters of superfluid  $^4\text{He}$  which trap the ultracold neutrons. A critical part of the process is the removal of  $^3\text{He}$  atoms at the end of data collection, reducing the  $^3\text{He}$  concentration from  $10^{-10}$  to  $10^{-12}$  in a period of 100-200 seconds. It is proposed to accomplish the task via diffusion of the  $^3\text{He}$  from the target cell to an evaporator which preferentially removes  $^3\text{He}$  vapor. The efficiency of the process is strongly sensitive to the temperature dependent diffusion rate and vapor pressure of  $^3\text{He}$  as well as the superfluid film flow in  $^4\text{He}$ . We describe the design of this process and initial results from a prototype evaporator implemented at NC State University.

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