

Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

GPU parallelization of spin-tracking simulations for the SNS nEDM experiment¹ MICHAEL KLINE, Transylvania University, DAVID MATH-
EWS, University of Kentucky, LEAH BROUSSARD, Oak Ridge National Labora-
tory, SNS NEDM COLLABORATION — The neutron’s electric dipole moment
(nEDM) is measured in the Spallation Neutron Source (SNS) nEDM experiment
by detecting the spin-dependent capture events of polarized ^3He and ultracold neu-
trons in a measurement cell with parallel magnetic and electric fields. Simulations
tracking particles’ spin have been performed to better understand the systematic
effects present in the experiment. However, spin-tracking on CPUs can be slow and
computationally expensive. An additional constraint is maintaining high accuracy
for long durations with accumulating rounding errors. GPU parallelization can be
used to track many particles simultaneously and improve solver efficiency. We will
present an overview of the approach and its advantages and limitations, as well as
preliminary results of systematic studies from our simulation to track the spin of
particles in the measurement cell.

¹This work was supported in part by the U.S. Department of Energy, Office of
Science, Office of Workforce Development for Teachers and Scientists (WDTS) un-
der the Science Undergraduate Laboratory Internship program, and by the U.S.
Department of Energy, Office of Nuclear Physics under contract number DE-AC05-
00OR2272.

Michael Kline
Transylvania University

Date submitted: 30 Jun 2020

Electronic form version 1.4