

Abstract Submitted
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Neutron Transport Simulations for NIST Neutron Lifetime Experiment¹ FANGCHEN LI, Gettysburg College, BL2 COLLABORATION COLLABORATION — Neutrons in stable nuclei can exist forever; a free neutron lasts for about 15 minutes on average before it beta decays to a proton, an electron, and an antineutrino. Precision measurements of the neutron lifetime test the validity of weak interaction theory and provide input into the theory of the evolution of light elements in the early universe. There are two predominant ways of measuring the neutron lifetime: the bottle method and the beam method. The bottle method measures decays of ultracold neutrons that are stored in a bottle. The beam method measures decay protons in a beam of cold neutrons of known flux. An improved beam experiment is being prepared at the National Institute of Science and Technology (Gaithersburg, MD) with the goal of reducing statistical and systematic uncertainties to the level of 1 s. The purpose of my studies was to develop computer simulations of neutron transport to determine the beam collimation and study the neutron distribution's effect on systematic effects for the experiment, such as the solid angle of the neutron flux monitor. The motivation for the experiment and the results of this work will be presented.

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