

Abstract Submitted
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Geant4 simulations of NIST beam neutron lifetime experiment¹

DANIEL VALETE, BRET CRAWFORD, Gettysburg College, BL2 COLLABORATION COLLABORATION — A free neutron is unstable and its decay is described by the Standard Model as the transformation of a down quark into an up quark through the weak interaction. Precise measurements of the neutron lifetime test the validity of the theory of the weak interaction and provide useful information for the predictions of the theory of Big Bang nucleosynthesis of the primordial helium abundance in the universe and the number of different types of light neutrinos N_ν . The predominant experimental methods for determination of the neutron lifetime are commonly called beam and bottle methods, and the most recent uses of each method do not agree with each other within their stated uncertainties. An improved experiment of the beam technique, which uses magnetic and electric fields to trap and guide the decay protons of a beam of cold neutrons to a detector, is in progress at the National Institute of Standards and Technology, Gaithersburg, MD with a precision goal of 0.1

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