Abstract Submitted
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Validation of the GEANT4 code for simulations of a plastic β-detector and its application to efficiency calibration V.V. GOLOVKO, V.E. IACOB, J.C. HARDY, Cyclotron Institute, Texas A&M University, College Station, TX 77843-3366 — Precise β^+-branching-ratio measurements are required to determine *ft*-values as a part of our program to test the Standard Model via unitarity of the Cabibbo-Kobayashi-Moskava matrix. For the measurements to be useful in this test, their precision must be close to 0.1% [1]. In a branching-ratio measurement, we collect a radioactive species in mylar tape, and then move the tape to a counting station, where the sample is positioned between a scintillator used to detect β-particles, and a HPGe detector for γ-rays. The signals from both detectors are recorded for all events in which there is a $\beta - \gamma$ coincidence. Although we obtain the β branching ratio from the absolute intensity of the coincidence γ rays, the relative efficiency of the β-detector as a function of β energy is crucial to our achieving a precise result since different γ-ray peaks correspond to β-transitions with different end-point energies. We have studied our β-detector response function using Monte Carlo calculations performed by GEANT4 code. Since there are always question about the validity of any particular simulation code, the simulated results were compared to measured β-spectra from various standard β-sources, as well as with Monte Carlo simulated β-response functions obtained with the EGS-code [2]. [1] J. C. Hardy and I. S. Towner. *PRC*, 71(5):055501, 2005. [2] V. E. Iacob, J. C. Hardy, and N. Nica. *BAPS 49*, no 6, p J9 111, 2004.

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