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**Comparison of various Monte Carlo for response-function studies of a plastic  $\beta$ -detector used in precise  $\beta^+$ -branching-ratios experiments**

V.V. GOLOVKO, V.E. IACOB, J.C. HARDY, Cyclotron Institute, TexasA&M University, College Station, TX 77843, USA, D. MELCONIAN, University of Washington — In order to test the Conserved Vector Current hypothesis of the Standard Model, precise determination of the branching ratios for superallowed  $\beta$  transitions is needed [1]. For this purpose, we are using an experimental setup in which one of the main components is a plastic scintillator, and a knowledge of the Response Function (RF) of this scintillator to  $\beta$  particles as a function of energy is important. In previous works we compared a Monte Carlo (MC) simulated RF with experiment for  $\beta$ -particles from standard  $\beta$ -sources as well as from “on-line” measurements [2]. However, we found that various MC programs predict slightly different results. To investigate this, we created the simplified configurations for the MC programs and studied the RF of a plastic disk to monoenergetic positrons with different energies from a point-like source in the air. We concentrated on an intercomparison between the MC results from physics models of various codes: Geant4, Penelope and EGSsrc. For energies between 0.1 MeV to 20 MeV, we see 2% relative differences in the efficiency calculations from different programs. [1] J.C. Hardy and I.S. Towner. *PRC*, 71(5):055501, 2005. [2] V.V. Golovko *et. al.* *BAPS 59*, no 6, p. DH4 83, 2006; *BAPS 52*, no 3, p. C16 53, 2007.

V.V. Golovko  
Cyclotron Institute, TexasA&M University, College Station, TX 77843, USA

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