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Monte Carlo studies of β-detector efficiency with GEANT4 for precise β^+-branching-ratio experiments V.V. GOLOVKO, V.E. IACOB, J.C. HARDY, Cyclotron Institute, Texas A&M University — We previously reported Monte Carlo (MC) studies of the efficiency of a 1-mm-thick plastic detector to few-MeV electrons with various programs: Geant4, EGSnrc and Penelope. The simulated results were also compared with measured data from standard conversion-electron sources: ^{133}Ba, ^{137}Cs and ^{207}Bi. [1] These studies were part of our program to test the Electroweak Standard Model via precise measurements of lifetimes, branching ratios and Q-values of superallowed $0^+ \rightarrow 0^+$ nuclear transitions [2], which in turn yield the value of the up-down quark-mixing element of the Cabibbo-Kobayasshi-Maskawa (CKM) matrix. The MC studies of the β-detector efficiency are important for the measurement of precise β^+-branching-ratios since there is a slight difference in the efficiency of the β-detector for different β-branches. This has an additional affect on the number of observed $\beta-\gamma$ coincidences over and above the well known efficiency of our γ-ray detector. We report here an extension of the comparison between MC calculations and experiment to a ^{60}Co β-source, and a study of the influence of peripheral objects on the β-detector efficiency. [1] V.V. Golovko *et. al.* *BAPS 59*, no 6, p. DH4 83, 2006; *BAPS 52*, no 3, p. C16 53, 2007; *BAPS 52*, no 9, p. EH8 83, 2007. [2] J.C. Hardy and I.S. Towner. *PRC*, 71(5):055501, 2005.

V.V. Golovko
Cyclotron Institute, Texas A&M University

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