

Abstract Submitted  
for the APR07 Meeting of  
The American Physical Society

**Use of the GEANT4 code in precise measurements of  $\beta^+$ -branching-ratios** V.V. GOLOVKO, V.E. IACOB, J.C. HARDY, Cyclotron Institute, Texas A&M University, College Station, TX 77843-3366, USA — In order to determine the vector coupling constant and to test the unitarity of the Cabibbo-Kobayashi-Maskawa matrix one has to make precise measurements of nuclear masses,  $\beta$ -branching ratios and halfives [1]. The measurements of halfives and branching ratios are performed in a simple, but very precise counting station at our institute. A typical “on-line” branching ratio experiment consists of collection of the accelerator-produced radioactive nuclei with a tape transport station that rapidly moves the collected sample to a location between a scintillator detector and a well-calibrated high-volume HPGe  $\gamma$ -detector. Data are collected with a PC station for all  $\beta$ - $\gamma$  coincident events. In order to completely understand all systematic effects contributing to the branching ratio measurements one must determine the relative efficiency of the scintillator as a function of  $\beta$ -particle energy, because the various  $\gamma$ -ray peaks correspond to  $\beta$ -transitions with different end-point energies and their observed relative intensities will be affected by the slight differences in  $\beta$  detection efficiency. Previous work [2] has reported a response function of  $\beta$ -particles from standard open  $\beta$ -sources. Here we present a comparison with measurements obtained in the “on-line” geometry configuration. [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.

V.V. Golovko  
Cyclotron Institute, Texas A&M University,  
College Station, TX 77843-3366, USA

Date submitted: 10 Jan 2007

Electronic form version 1.4