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Precise Branching Ratio Measurement for the β Decay of ^{21}Na
V.E. IACOB, J.C. HARDY, C.A. GAGLIARDI, J. GOODWIN, N. NICA, H.-I. PARK, G. TABACARU, L. TRACHE, R.E. TRIBBLE, Y.J. ZHAI, I.S. TOWNER, Cyclotron Institute, Texas A&M University, College Station, TX 77843 — A recent paper [1] reports a measurement of the $\beta - \nu$ correlation coefficient for the ground-state mirror β^+ transition $^{21}Na(3/2^+) \rightarrow ^{21}Ne(3/2^+)$ of $a_{\beta\nu} = 0.5243(91)$, which is significantly different from the Standard Model prediction of 0.558. However, both these values depend on the transition branching ratio, the currently accepted value of which, 94.97(13) %, is an average over mutually inconsistent measurements (25 to 45 years old!). We set out to improve this value. We used a $28{\cdot}A$ MeV ^{22}Ne beam from the Texas A&M cyclotron to initiate the ^{1}H(^{22}Ne, 2n)^{21}Na reaction. The recoils passed through the MARS recoil separator and, after being degraded, the ^{21}Na ions were implanted as a >99% pure source in the tape of a fast transport system. After a few-second collection time, the beam was turned off and the implanted source moved in 175 ms to a shielded region where it stopped between a plastic scintillator and a HPGe detector that is efficiency calibrated with high precision (0.2% between 50 and 1400 keV [2]). Both β singles and $\beta - \gamma$ coincidences were then recorded for 60s, and the collect/move/detect cycle was repeated to achieve the desired statistical accuracy. Our result for the ground-state branching ratio is 95.27(5)% . [1] N.D. Scielzo *et al.*, Phys. Rev. Lett. **93** 102501 (2004). [2] R.G. Helmer *et al.*, Nucl. Instr. Meth. **A511**, 360 (2003).

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