Measurement of Beta-Delayed Gamma Rays in the Decay of ^{32}Cl

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As part of a larger project to determine the *ft*-value for the superallowed β transition from the 0^+, T=2 ground state of ^{32}Ar, the University of Washington authors require a reliable absolute γ-ray efficiency calibration standard for their HPGe detector. The β-delayed γ rays from the decay of ^{32}Cl cover the required range of energies, and since ^{32}Cl is also a daughter product of ^{32}Ar, its γ rays would provide a particularly convenient *in situ* calibration. To determine the ^{32}Cl properties to the required 1% precision, we performed a collaborative experiment on the decay of ^{32}Cl at Texas A&M using MARS, the fast tape-transport system and our well-calibrated HPGe detector [1].

We produced 298-ms ^{32}Cl via the ^{1}H(^{33}S,2n)^{32}Cl reaction at 30*A* MeV on an LN_2-cooled hydrogen gas target. The ejectiles entered the MARS spectrometer where the ^{33}S beam was stopped, and the fully stripped reaction products were spatially separated from one another, leaving a pure ^{32}Cl beam at the extraction slits. This beam then exited the vacuum system though a Kapton window, passed successively through a thin BC-404 scintillator and a stack of aluminum degraders, finally stopping in the aluminized mylar tape of our tape-transport system. Typically, we collected activity for 0.8 s, then moved the tape in 180 ms to a shielded counting location 90 cm away, where we recorded β-γ coincidences for 2 s. This cycle was clock-controlled and was repeated continuously.

The data set is very clean and is currently being analyzed at the Universoty of Washington.

[1] R.G. Helmer, J.C. Hardy, V.E. Iacob, M. Sanchez-Vega, R.G. Neilson and J. Nelson, Nucl. Instrum. Methods Phys. Res. **A511**, 360 (2003); R.G. Helmer, N. Nica, J.C. Hardy and V.E. Iacob, Int. J. Appl. Radiat. Isot., **60**, 173 (2004).