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Precise Half Life Measurement of ^{10}C V.E. IACOB, V. GOLOVKO, J. GOODWIN, J.C. HARDY, N. NICA, H.I. PARK, L. TRACHE, R.E. TRIBBLE, Cyclotron Institute, Texas A&M University — We have measured the half-life of ^{10}C as part of our program to test the unitarity of the Cabibbo-Kobayashi-Maskawa (CKM) matrix *via* $0^+ \rightarrow 0^+$superallowed β transitions. The ^{10}C half-life has been measured twice before, with precisions of 0.10% and 0.08%. With our current techniques, we expect to be able to improve that precision by a factor of two. To obtain ^{10}C, we used a ^{11}B primary beam at $23A$ MeV to bombard a cryogenic hydrogen target. From the reaction products, a high purity ^{10}C beam of $18.5A$ MeV was produced by the MARS spectrograph. The beam was then extracted in air, passed through a 0.3-mm-thick BC-404 plastic scintillator and a set of Al degraders, which had been adjusted so that the ^{10}C nuclei stopped in the center of the 76-μm-thick aluminized-mylar tape of our fast tape-transport system. We collected ^{10}C nuclei for 10, 15 or 20 s; then the beam was switched off and the activity was moved in less than 0.2 s to the center of a 4π proportional counter, located in a well shielded region. The observed decays were then multi-scaled over a 400 s time span. To ensure an unbiased result, we split the experiment into several runs, each differing from the others in its discriminator threshold, detector bias or dominant dead-time setting. The analysis of these separate runs showed no systematic bias with these parameters. Our preliminary result is $t_{1/2}(^{10}\mathrm{C}) = 19.313(10)$ s, a result with 0.05% precision.

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