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Precise Half Life Measurement for the Superallowed β^+ Emitter ^{34}Ar V.E. IACOB, J.C. HARDY, C.A. GAGLIARDI, V.E. MAYES, N. NICA, G. TABACARU, L. TRACHE, R.E. TRIBBLE, Cyclotron Institute, Texas A&M University, College Station, TX 77843 — The half-life of the superallowed β^+ emitter ^{34}Ar was measured as part of our program to test the Standard Model via the unitarity of the CKM matrix, which requires 0.1% precision or better. A 25·A MeV ^{35}Cl beam from the Texas A&M cyclotron initiated the ^{1}H(^{35}Cl, pn)^{34}Ar reaction, with recoils then passing through the MARS recoil separator. After being degraded, ^{34}Ar ions were implanted as a 99.7% pure source in the tape of a fast transport system. After a short collect time (0.7s or 1.0s), the beam was turned off and the implanted source moved in 175 ms to the center of a shielded 4π proportional gas counter. Decay positrons were then multi-scaled for 12 s. The cycle was repeated until more than half a billion combined ^{34}Ar and ^{34}Cl decay events had been recorded. Critical detection parameters were changed periodically to expose any possible systematic effects; none were found. The extraction of a precise half-life for ^{34}Ar presents a special challenge as its daughter ^{34}Cl is itself β^+ unstable with a half-life only 1.8-times longer. This results in an observed spectrum that is almost indistinguishable from pure ^{34}Cl decay. A special method was developed to extract a precise half-life for the shorter-lived component in such a decay curve. Our preliminary result for the half-life of ^{34}Ar is 843.8(7) ms.

[X] Prefer Oral Session
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