

## HIGH-PRECISION HALF-LIFE AND BRANCHING RATIO MEASUREMENTS FOR SUPERALLOWED FERMI $\beta^+$ EMITTERS AT THE TRIUMF-ISAC FACILITY

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High precision measurements of the  $ft$  values for superallowed Fermi  $\beta$  transitions between  $J^\pi = 0^+$  isobaric analogue states allow for stringent tests of the electroweak interaction described by the Standard Model. These transitions provide an experimental probe of the Conserved-Vector-Current hypothesis, the most precise determination of the up-down ( $V_{ud}$ ) element of the Cabibbo-Kobayashi-Maskawa quark-mixing matrix, and set stringent limits on the existence of scalar currents in the weak interaction.

An extensive program at TRIUMF's Isotope Separator and Accelerator (ISAC) facility of superallowed branching-ratio and half-life measurements has covered the full range of the superallowed emitters, from the lightest case,  $^{10}\text{C}$ , to the heaviest case for which precision data are currently available,  $^{74}\text{Rb}$ . These experiments have been performed using a  $4\pi$  continuous-flow gas proportional  $\beta$  counter and the  $8\pi$   $\gamma$ -ray spectrometer, an array of 20 Compton-suppressed high-purity germanium detectors.

In this presentation, recent highlights from the superallowed Fermi  $\beta$  decay program at TRIUMF will be discussed. These include high-precision half-life measurements for all three of the lightest superallowed emitters,  $^{10}\text{C}$ ,  $^{14}\text{O}$ , and  $^{18}\text{Ne}$ , with the greatest sensitivity to a potential weak scalar current contribution. In particular, the  $^{10}\text{C}$  half-life has recently been measured at TRIUMF to

be  $T_{1/2} = 19.3009 \pm 0.0017$  s, the most precise superallowed half-life measurement reported to date and the first to ever achieve a relative precision below  $10^{-4}$ . A fit to the world superallowed data now yields  $C_S/C_V = 0.0009 \pm 0.0011$  for the ratio of weak scalar to vector couplings to left-handed neutrinos. A high-precision branching-ratio measurement for the heavy superallowed emitter  $^{74}\text{Rb}$  with the  $8\pi$  spectrometer, and initial results from a superallowed branching-ratio measurement for  $^{62}\text{Ga}$  with the new high-efficiency GRIFFIN gamma-ray spectrometer will also be discussed.