

Superaligned beta decay studies at TRIUMF - nuclear structure and fundamental symmetries.

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Precision measurement of the β -decay half-life, Q-value, and branching ratios between nuclear analog states of $J = 0$ and $T = 1$ can provide critical and fundamental tests of the electroweak interaction. Programs have been initiated at TRIUMF/ISAC to measure the half-lives, branching ratios, and Q_{EC} values for odd-odd, $T_z = 0$, β -decaying nuclei with $A > 60$. These data are particularly relevant to the tests of the electroweak interaction because they can provide a critical test of the calculated nuclear structure-dependent corrections. These corrections are predicted to be much larger for heavier nuclei.

With the development of a number of different ion sources (e.g. surface, negative, FEBIAD, ECR, and laser) and with the ability to handle proton beam intensities of up to 100 μ A, the ISAC radioactive beam facility is ideally suited to the study of these superallowed Fermi β -decays. In addition, specialized equipment has been constructed to do these measurements. Branching ratios and lifetimes are measured in the 8π gamma array which has been augmented with two plastic scintillator arrays (SCEPTAR), and a five element LN₂ cooled Si(Li) array (PACES) for spectroscopy on gammas, betas, and conversion electrons respectively. Also incorporated with these systems is a moving tape collector (MTC). A super-fast tape system on a separate beam-line (GPS) is used for very short lifetime measurements. Mass measurements will be made at the TRIUMF ion trap facility (TITAN).

In regard to $A > 60$ isotopes, measurements on the superallowed β -decay of ^{62}Ga and ^{74}Rb will be described. Other measurements involving lighter superallowed β -decaying isotopes will be presented; and possible future measurements will be discussed.