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Precision Branching-Ratio Measurement for the Superallowed Fermi β Emitter 18Ne

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The precise studies of nuclear β decays between $I^{\pi} = 0^{+}$ isobaric analogue states provide stringent tests of electroweak interactions. Precision measurements of the ft values for superallowed β Fermi emitters between isospin T = 1 states has provided by far, the most precise value of V_{ud}, the up-down element of the Cabibbo-Kobayashi-Maskawa (CKM) quark mixing matrix. Recent survey on superallowed decay, recommended value of V_{ud} is one standard deviation smaller than its previous value and is due to a new theoretical evaluation of a nucleus independent radiative correction that is universally applied to the ft values. As a result, the top row test of CKM unitarity now violates unity at the 3.3σ level, which has motivated a renewed search for any and all possible trivial sources that may explain this apparent discrepancy.
In this work, we focus on a new measurement of the superallowed branching ratio of ^{18}Ne decay that was deduced from an experiment performed at the GANIL facility in France. To date, the ft value for this decay has not yet been determined precisely enough to be included in the evaluation of V_{ud} and it is perhaps the most interesting case for constraining model dependencies that arise in a second set of theoretical corrections accounting for isospin symmetry breaking effects. A detailed description of the experiment, analysis and preliminary results will be presented.

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Please select: Experiment or Theory

Experiment

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