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Vud determination from light nuclide mirror transitions

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Thanks to extensive experimental efforts that led to a precise determination of important super-allowed pure Fermi transition experimental quantities, we now have a very precise value for Vud that leads to a stringent test of the CKM matrix unitarity. Despite this achievement, measurements in other less precise systems remain relevant as conflicting results could uncover unknown systematic effects or even new physics. One such system is the super-allowed mixed transition, which can also help refine the same theoretical corrections used for pure Fermi transitions and hence improve the accuracy of Vud. However, as a corrected Ft-value determination from these systems requires the more challenging determination of the Fermi Gamow-Teller mixing ratio, only five transitions, spreading from 19Ne to 37Ar, are currently fully characterized. There are several ongoing efforts to determine the mixing ratios for medium-mass nuclei. Measuring transitions in lighter nuclei, such as 17F, 15O, 13N and 11C pose new challenges as their longer half-lives, ranging from 1 to 22 minutes, conflict with the time constraints present at the large radioactive ion beam facilities where these nuclei are typically produced. We will present a proposed ion trapping experiment to measure these transitions at the TWINSOL facility of the University of Notre Dame where time constraints are less stringent.

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