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Precision measurements in superallowed 0+ ⟶ 0+ β decays at GANIL and upcoming opportunities

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Corrected transition rates ($\mathcal{F}t^{0^+\to0^+}$ values) of superallowed $0^+ \to 0^+$ beta decays have served as a benchmark for validating the conserved vector current (CVC) hypothesis in weak interactions. They now provide the most precise value of V_{ud}, the dominant top-row element of the Cabibbo-Kobayashi-Maskawa (CKM) quark mixing matrix. By imposing stringent constrains on the CKM unitarity, these decays enable probing physics beyond the Standard Model in the electroweak sector. Recent reevaluation of the superallowed $t^{0+\to0+}$ values have resulted in a value of V_{ud} that challenges the unitarity of the CKM matrix.

In this presentation, I will briefly discuss this current situation and the experimental program at GANIL, which aims to constrain isospin symmetry-breaking (ISB) corrections. Together with radiative corrections, this allows to extract nuclear medium-independent $\mathcal{F}t^{0^+\to0^+}$ values from the experimentally measured transition rates ($ft^{0^+\to0^+}$). In this context, I will also present preliminary results for the SA emitters ^{18}Ne and ^{30}S. Finally, I will highlight the opportunities available for high-precision measurements of these SA observables at DESIR and S^3-LEB, the upcoming low-energy radioactive ion beam facilities at GANIL.

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