Abstract ID : 4

High-Precision Determination of Radiative Corrections to Superallowed Nuclear Beta Decays

Content

Superallowed $0^+ \rightarrow 0^+$ transitions in T = 1 nuclei have been a highly effective avenue for determining the Cabibbo-Kobayashi-Maskawa (CKM) matrix element V_{ud} , which imposes powerful constraints on physics beyond the Standard Model (BSM) at low energies. For a long time, the precision of V_{ud} has been limited by uncertainties in radiative corrections, specifically those related to the emission and reabsorption of virtual photons. These uncertainties arise from non-perturbative strong interaction physics at both the hadronic and nuclear levels.

In this talk, I will describe our recent efforts to pin down these corrections by combining dispersive analysis with experimental data, lattice QCD, and nuclear many-body calculations. I will discuss the implications of our new results and provide an outlook for future developments in this area.

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Status: SUBMITTED

Submitted by SENG, Chien Yeah on Saturday, 21 December 2024