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Probing Beyond the Standard Model with Beta Decay and Electron Capture

Nuclear beta decay and electron capture allow us to probe the Standard Model (SM) and search for new physics in competitive and complementary ways to the LHC. In particular, beta decay can be extremely sensitive to exotic scalar and tensor currents at the TeV scale through precision measurements. This sensitivity shows up most clearly in the Fierz interference term, b_F, which is linearly dependent on these exotic currents. Electron capture and beta-+ decay show an opposite dependence to b_F but probe the same nuclear matrix element, such that their ratio becomes a very sensitive probe to new physics with reduced nuclear structure contributions. The remaining nucleus-sensitive corrections depend on the shape factor, C, for both. The latter can be expressed as a combination of form factors, which will contain the nuclear structure information and the convolution of the lepton wave functions. We will report on the calculation of these residual nuclear structure corrections using the Behrens-Bühring formalism and shell model calculations.

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