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High precision analytical description for beta spectroscopy probing (Beyond) Standard Model physics.

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Precise knowledge of the nuclear beta spectrum shape forms a sensitive instrument in the pursuit of Beyond Standard Model (BSM) physics. It opens up possibilities for scalar and tensor current searches and allows for a study of nuclear structure dependent effects through the weak magnetism interaction [N. Severijns et al. Rev. Mod. Phys. 78, 991 (2006)]. The latter is a contamination of the strong interaction, and forms an essential component in the analysis of the reactor antineutrino anomaly [P. Huber PRC 84, 024617 (2011)]. In the correct analysis of the latter, all sizeable corrections to the beta spectrum shape enter - including atomic effects. Theoretical work has been performed to analytically describe all known correction factors to the beta spectrum shape to below the per mille level, including aforementioned atomic and molecular effects [L. Hayen, to be published]. This allows for a significantly improved spectrum conversion in the reactor antineutrino anomaly, and the most precise extraction of (B)SM physics from the beta spectrum shape to date.

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