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Exploring Nuclear Beta Decay Through Nuclear Lattice Effective Field Theory

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We report the first exploratory study on nuclear β-decay through nuclear lattice effective field theory, including ^{3}H and ^{6}He β-decays. We employ nuclear forces and nuclear one-body and two-body axial currents consistently derived from chiral effective field theory to calculate the Gamow-Teller matrix element(GTME). We first combine the GTME of ^{3}H β-decay together with ^{3}H's binding energy to fix the low-energy constants c_D and c_E in the three-body nuclear force. We then carry out Monte Carlo calculation to predict the GTME of ^{6}He β-decay. New techniques are developed to make the calculation reliable and efficient. The result shows good agreement with the experiment.

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