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Radiative corrections to inverse beta decay at low energies

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We compute electromagnetic radiative corrections in the inverse beta decay at reactor antineutrino energies within the heavy baryon chiral perturbation theory, provide the most accurate cross-section predictions for this process, present a complete error budget, and investigate impact on the energy reconstruction at JUNO. For the first time, we consistently include quantum electrodynamics, chromodynamics, and electroweak contributions and present the positron energy spectrum accounting for radiative corrections. Additionally, we include contributions from virtual pions to inverse beta decay and quantify the relation between the experimental value of the nucleon axial-vector charge and its evaluations within the lattice quantum chromodynamics.

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