

Contributions of Electromagnetic Interaction to Hadron Masses

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Electromagnetic effects are increasingly relevant to precision hadron spectroscopy, yet their evolution across the light, strange, charm, and bottom sectors remains poorly mapped. We calculate the leading QED corrections to meson and baryon masses using electroquenched photons on nine 2+1-flavor, tadpole-improved clover ensembles at three lattice spacings, with pion masses from 135 to 316 MeV and spatial extents from approximately 2.5 to 6.7 fm. The quark masses are matched in the Dashen scheme, and the results are extrapolated jointly to the physical pion mass, continuum limit, and infinite volume. Resolving each mass shift into quark self-energy and pairwise interaction terms, we find that attractive electromagnetic interactions lower hadron masses, whereas repulsive interactions raise them. Most neutral hadrons receive corrections below 1 MeV, while singly charged states receive corrections of at most about 5 MeV.

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