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Lattice Quantum Chromodynamics and Chiral Perturbation Theory at Low Energies WILLIAM CHARLES, CHRISTOPHER AUBIN, Fordham University — We explore in detail the results given by unphysical lattice quantum chromodynamics (QCD) simulations with staggered quarks and their relation to staggered chiral perturbation theory (SChPT) at low energies. Analysis of such simulations allows us to examine two phases, depending upon the breaking of specific lattice symmetries: the physical, unbroken phase where the continuum limit of the lattice simulation corresponds to the real world, and a broken phase which has no physical continuum limit. Using previously generated lattice configurations, we numerically measure the mass spectra of pions as a function of the masses of their constituent quarks in order to see if the observed spectra agree with the theoretical predictions given by SChPT. By examining these spectra in the unbroken as well as broken phases we hope to compare the masses of different mesons given by lattice QCD and SChPT to determine whether SChPT is a good effective theory outside of the physical phase. If SChPT is valid then it should correctly predict both physical and unphysical situations at low enough energies.

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