

APR11-2011-000934

Abstract for an Invited Paper
for the APR11 Meeting of
the American Physical Society

Meson-Meson Interactions from Lattice QCD

ANDRE WALKER-LOUD, Lawrence Berkeley National Laboratory

Chiral symmetry strongly constrains the interactions of pions at low energies, dictating the scattering of pions off other hadrons vanish at threshold in the chiral limit. These properties make pion interactions ideal quantities to study with lattice QCD, in particular, pion self-interactions. I will describe recent lattice computations of $\pi\pi$ scattering, and demonstrate that with the aid of chiral perturbation theory, we can now predict the $I = 2$ scattering length with 1% precision. We can extend this analysis to $SU(3)$ and include K^+K^+ and $K^+\pi^+$ interactions, as well as the quantity f_K/f_π . It has been shown that these four physical processes, share only two linear combinations of counterterms. This fact, combined with the numerical and theoretical cleanliness of these quantities, make them an ideal laboratory to explore the predictions of $SU(3)$ symmetry, including explicit $SU(3)$ symmetry breaking. I will describe local and global chiral $SU(2)$ and $SU(3)$ analyses of the NPLQCD computations of these systems and the resulting physical predictions. Time permitting, I will also briefly review lattice computations of other related quantities, namely multi-meson systems and the determination of the three-pion interaction, meson-baryon scattering, and the scattering of mesons off charmed hadrons.