

Pion Physics in Two Flavor Strong Coupling Lattice QED

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Abstract: We consider the lattice field theory involving two flavors of staggered quarks which interact with $U(1)$ gauge fields in the strong coupling limit. For massless quarks this theory has an $SU(2) \times SU(2) \times U(1)$ symmetry. We show explicitly how pions emerge through the phenomena of confinement in this theory. We also show how one can incorporate the physics of the anomaly in this theory. Thus, our approach is a good pedagogical tool to explain how pions arise in real QCD. Another advantage of our approach is that we can easily design efficient cluster algorithms to compute a variety of quantities close to the chiral limit, thus allowing us to understand the low energy physics in a QCD-like setting from first principles.