

Dynamical Up Quark Mass Generation in QCD-like Theories

Tuesday, 19 August 2025 15:20 (20 minutes)

The possibility that the up quark mass is generated entirely through nonperturbative dynamics offers an elegant solution to the strong CP problem. In this talk, I will present a controlled calculation of the dynamically generated up quark mass in a class of QCD-like theories, based on supersymmetric QCD deformed by anomaly mediated supersymmetry breaking (AMSB). By matching the low-energy chiral Lagrangian of these models to standard QCD chiral perturbation theory at next-to-leading order, we identify the contributions responsible for additive quark mass renormalization. Remarkably, we find that for three flavors and three colors ($F = N = 3$), the dynamical up-quark mass can be of order one in units of the strange quark mass, potentially accounting for the full observed mass. I will discuss the parameter dependence of this effect, its behavior at large N , and the implications for the strong CP problem.

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Session Classification: Parallel session 2