Exploring the Chiral Regime of QCD in the Interacting Instanton Liquid Model

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In non perturbative QCD the way quarks interact with gluons depends dramatically on the value of the quark mass. In particular, in the light quark mass regime, we expect correlations to be strongly influenced by dynamics associated to chiral symmetry breaking. We use The IILM as a tool to investigate such quark mass dependence and to study microscopic dynamical mechanisms which drive the transition into the chiral regime of QCD. To ensure the validity of the model we first verify that the dependence on the quark mass for several observables calculated in the IILM agrees well with the predictions of chiral perturbation theory. We then show that a quark mass m*≈80 MeV emerging naturally from the model specifies the mass scale above which the fermion determinant is suppressed, the zero modes becomes subdominant, and the density of quasi-zero modes become independent of the quark mass.