

XVth Quark Confinement and the Hadron Spectrum



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Possible scenario of dynamical chiral symmetry breaking in the instanton liquid

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We examine a pattern of dynamical chiral symmetry breaking making use of the vacuum energy density as a function of the quark condensate. We compute the vacuum energy density and the quark condensate in the interacting instanton liquid model (IILM) with three-flavor quarks. These computations are performed by using a numerical simulation of the canonical IILM, i.e., the number of instantons and anti-instantons are fixed. We find that chiral symmetry is broken in the $U(1)_A$ anomaly assisted way in the IILM with three-flavor dynamical quarks. Comparing the full and the quenched IILM calculations, we also find the instanton-quark interaction included in the IILM plays a crucial role for the chiral symmetry breaking.

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