Crystalline Chiral Condensates and their fluctuations in a generalized Ginzburg-Lanrau approach

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We study inhomogeneous chiral condensates in the vicinity of the critical points in the QCD phase diagram. We use a generalized Ginzburg-Landau (GL) approach to analyze the various inhomogeneous structure in the isospin symmetric quark matter, and confirm that the inhomogeneous condensate with the 1-dimensional solitonic modulation is most favored, as found in the previous works. We then introduce fluctuations of the order parameter to the GL potential, and obtain the effective Lagrangian for the Nambu-Goldstobe boson fields with asymmetric dispersion relations. We discuss stability of the crystalline structure against quantum/thermal fluctuations in the chiral limit. We also study the case with the finite current quark mass.