Density Functional Theory for Systems with Competing Interactions

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Density functional theory (DFT) for systems with competing interactions leading to self-assembly into clusters, networks or layers is constructed. The contribution to the grand thermodynamic potential associated with mesoscopic fluctuations is explicitly taken into account. The expression for this contribution is obtained by the methods known from the Brazovskii field theory. Physical interpretation of the fluctuation-contribution to the grand potential is discussed. A simplified theory valid for weakly ordered phases, i.e. for the high -T part of the phase diagram is verified by a comparison with the results of simulations. Simulation results for the short-range attraction long-range repulsion (SALR) interaction potential are presented, with a special focus no the effects of confinement.