Field-theoretic study on colloidal interaction in solutions of adsorbing homopolymers WEI LI, KRIS DELANEY, GLENN FREDRICKSON, Univ of California - Santa Barbara — Using self-consistent field theory, we study the free polymer induced (FPI) interaction between colloidal particles in a homopolymer solution. In the colloid limit, the Derjaguin approximation can be applied to relate the potential of mean force between two spherical objects to that between two parallel plates. A field-theoretic model is formulated in the grand canonical ensemble to compute the potential of mean force for the system consisting of two solid plates with polymer solution confined in between. The relationship between polymer-colloid affinity and FPI interaction is investigated through simulations. Three distinct regimes, including depletion interaction, steric repulsion and bridging interaction, are identified. A transition through these interaction regimes with increasing polymer-colloid affinity is shown as a consequence of competing entropic and enthalpic effects. We also study the impact of varying the degree of polymerization of the homopolymer, the solvent quality and the polymer concentration on the FPI interaction.

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