HKD 1926

Kolokvij Grupe za računalne bioznanosti i Sekcije za teorijsku i računalnu kemiju Hrvatskog kemijskog društva

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Utorak 11. 4. 2017.
Predavaonica III krila IRB
14:00-14:45 sati

EFFECTIVE PAIR POTENTIALS AND COLLECTIVE BEHAVIORS OF COLLOIDS IN NEAR-CRITICAL SOLVENTS

If colloidal solute particles are suspended in a solvent close to its critical point, they act as cavities in a fluctuating medium and thereby restrict and modify the fluctuation spectrum in a way which depends on their relative configuration. As a result effective, so-called critical Casimir forces (CCFs) emerge between the colloids. The range and the amplitude of CCFs depend sensitively on the temperature and the composition of the solvent as well as on the boundary conditions of the order parameter of the solvent at the particle surfaces. These remarkable, moreover universal features of the CCFs provide the possibility for an active control over the assembly of colloids. This has triggered a recent surge of experimental and theoretical interest in these phenomena. Overview of current research activities in this area will be presented. Various experiments demonstrate the occurrence of thermally reversible self-assembly or aggregation or even equilibrium phase transitions of colloids in the mixed phase below the lower consolute points of binary solvents. The status of the theoretical description of these phenomena will be discussed, in particular the validity of a description in terms of effective, one-component colloidal systems and the necessity of a full treatment of a ternary solvent-colloid mixture. The perspectives on the directions towards which future research in this field might be directed is suggested.