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Quantum nucleation and macroscopic quantum tunneling in cold-atom boson-fermion mixtures DMITRY SOLENOV, DMITRY MOZYRSKY, Theoretical Division, Los Alamos National Laboratory — We present the results on kinetics of phase separation transition in boson-fermion cold atom mixtures. The parameters at which the transition is governed by quantum nucleation mechanism are identified. We demonstrate that for low fermion-boson mass ratio the density dependence of quantum nucleation transition rate is experimentally observable. The crossover to macroscopic quantum tunneling regime is analyzed. Based on a microscopic description of interacting cold atom boson-fermion mixtures we derive an effective action for the critical droplet and obtain an asymptotic expression for the nucleation rate in the vicinity of the phase transition and near the spinodal instability of the mixed phase. We show that dissipation due to excitations in fermion subsystem play a dominant role close to the transition point.

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