Объединенный институт ядерных исследований
ЛАБОРАТОРИЯ ТЕОРЕТИЧЕСКОЙ ФИЗИКИ
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Семинар
"ТЕОРИЯ АДРОННОГО ВЕЩЕСТВА ПРИ ЭКСТРЕМАЛЬНЫХ УСЛОВИЯХ"

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Non-equilibrium Dynamics of the Chiral/Deconfinement Phase Transition

Observable signals of possible QCD phase transitions are strongly influenced by the rapid non-equilibrium dynamics during a heavy-ion collision. In order to realistically estimate these effects we have developed a non-equilibrium chiral fluid dynamics model, where the quark-antiquark fluid is dynamically coupled to the order-parameter fields. The model takes into account dissipation and fluctuation effects stemming from the interaction between the fluid and the fields. The actual calculations are done within the linear sigma model with constituent quarks, coupled to the Polyakov loop. The dynamical trajectories of the fluid elements on the T-μ plane are studied for different types of the phase transition. The effects of supercooling and reheating are clearly observed in the case of a first-order phase transition. In this case we see the formation of domains in net-baryon density due to spinodal decomposition. They should lead to an enhancement of higher harmonics in azimuthal distributions of net-baryons. It is also demonstrated that long-wavelength fluctuations near the critical point show a strong enhancement only in a quasi-static system, but they are suppressed in the case of a fast expansion.