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Spatially oscillating correlations in strongly-interacting four-fermion model with generalized PT-symmetry

Friday 13 September 2024 16:00 (30 minutes)

In this talk, I present the phase diagram of a (2+1)-dimensional four-fermion model at finite temperature and chemical potential, which is invariant under a chiral symmetry transformation as well as a generalized PT-symmetry transformation. Besides the ordinary phase with chiral symmetry breaking, a regime is observed where mesonic two-point correlation functions feature spatial oscillations, but are still exponentially damped. The role of the P-symmetry and the T-symmetry is played by charge conjugation and complex conjugation, respectively. This generalized PT-symmetry is also present in QCD at non-vanishing baryon chemical potential, for which the observed regime, recently termed a quantum pion liquid, could be a relevant scenario. The oscillatory behavior is generated by mixing between scalar and vector condensates. Moreover, I find that inhomogeneous condensates are disfavored against homogeneous ones, akin to previous findings. If possible in the time available, I will also present evidence that the quantum pion liquid (without translational symmstry breaking) is favored over an inhomogeneous phase (with translational symmetry breaking) when including bosonic quantum fluctuations in lattice Monte Carlo simulations.

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