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QCD phase structure at finite isospin chemical potential and smaller-than-physical quark mass

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Introduction of a nonzero isospin chemical potential in QCD leads to the emergence of a pion condensed phase at sufficiently large μ_I, bounded by a second order transition line. At zero temperature the pion condensate appears at $\mu_I = m_\pi/2$. Recent numerical studies at physical quark masses show that the pion condensation boundary remains vertical up to the meeting point with the chiral crossover line. If this result remains valid when the light quark mass (and the pion mass) goes to zero, then in the chiral limit at temperatures below the chiral transition the pion condensation happens at arbitrary nonzero μ_I. We report on results of a lattice QCD simulation of a 2+1 flavour QCD at nonzero isospin chemical potential, at smaller-than-physical light quark mass, that support this scenario.

Category

Theory

Collaboration (if applicable)

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