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New Tool to Detect Inhomogeneous Chiral Symmetry Breaking

The structure of the QCD phase diagram is a fundamental question in nuclear and particle physics. Recent works suggest the possibility of inhomogeneous phases, where key properties of quark matter such as the chiral condensate or number density adopt periodic spatial patterns. Although progress has been made in studying these phases within QCD-inspired models, direct analysis in full QCD remains challenging. In the past few years, we have adapted the standard technique of stability analysis to be used in QCD via Dyson-Schwinger equations [PRD 108 (2023) 11, 114019], [PRD 110 (2024) 7, 074014]. However, in this talk, I will introduce a completely new method for stability analysis, which is based on an extension of the concept of chiral susceptibility to encompass inhomogeneous phases [arXiv:2411.02285]. As opposed to previous approaches, this method does not depend on any external input, providing a more conclusive analysis. I will demonstrate how this technique reproduces established results from the NJL model and present findings for QCD under a simple truncation.

Category

Theory

Collaboration (if applicable)

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