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Phase transition properties of rotating strongly interacting matter in a cylindrical geometry.

We discuss the effect of rotation on the confining and chiral properties of QCD using the linear sigma model coupled to the Polyakov loop in an attempt to resolve discrepancies between the first-principle based numerical and model-based analytical results. Working in a homogeneous approximation, we obtain the phase diagram at finite temperature, baryon density, and angular frequency. We demonstrate that in this model, the critical temperatures of both transitions diminish in response to the increasing rotation, being in contradiction with the first-principle lattice results. We enforce the causality constraint by implementing the spectral boundary conditions and obtain a splitting between the deconfinement and chiral transitions as a boundary effect [1]. We also investigate the Tolman-Ehrenfest law within this consistent framework for the rotating strongly interacting matter in the cylindrical geometry.

[1] "Inhibition of splitting of the chiral and deconfinement transition due to rotation in QCD: the phase diagram of linear sigma model coupled to Polyakov loop". Pracheta Singha, Victor E. Ambrus, Maxim N. Chernodub . e-Print: 2407.07828 [hep-ph] (to be published in Physical Review D).

Category

Theory

Collaboration (if applicable)

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