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Topological term, QCD anomaly, and the η' chiral soliton lattice in rotating baryonic matter

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We study the ground states of low-density hadronic matter and high-density color-flavor locked color superconducting phase in three-flavor QCD at finite baryon chemical potential under rotation. We find that, in both cases under sufficiently fast rotation, the combination of the rotation-induced topological term for the η' meson and the QCD anomaly leads to an inhomogeneous condensate of the η' meson, known as the chiral soliton lattice (CSL). We find that, when baryon chemical potential is much larger than isospin chemical potential, the critical angular velocity for the realization of the η' CSL is much smaller than that for the π_0 CSL found previously. We also argue that the η' CSL states in flavor-symmetric QCD at low density and high density should be continuously connected, extending the quark-hadron continuity conjecture in the presence of the rotation.

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