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Chiral soliton lattice in dense matter under rotation

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We study the anomaly-induced effects of dense matter under rotation. We show that the chiral perturbation theory under rotation has the topological term that accounts for the chiral vortical effect. We find that, due to the presence of this new term, the ground state of QCD under rotation is the chiral soliton lattice (CSL) of the neutral pion or η' meson. This state is a periodic array of topological solitons which spontaneously breaks parity and continuous translational symmetries. In particular, at high density, the CSL of the η' meson is energetically more favorable than the color-flavor locked color superconducting phase and its critical angular velocity is proportional to the QCD anomaly in the flavor symmetric case.

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