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Pion Condensates in an Anti-parallel Electromagnetic Environment at Finite Temperatures

We investigate the response of the QCD ground state at finite temperatures to an anti-parallel electric and magnetic field. Due to the electromagnetic triangle anomaly, both neutral and charged pion condensations are created in the presence of non-vanishing ($E \cdot B$).

In the frame of the proper-time Schwinger formalism, we addressed the oscillation obstacle because of the electric field by transforming the integrand into the Bessel function. Apparently convergent results are exhibited for the chiral symmetry breaking and its associated restore temperature as a function of the strength of fields, described by the Nambu–Jona-Lasinio model.

To mimic the effect of chiral anomaly, we thus introduce a chiral chemical potential for comparing. We find out that only a charged pion condensate is produced within non-zero μ_5, which slightly differs with the above electromagnetic environment.

Preferred Track

New Theoretical Developments

Collaboration

Not applicable

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