

Quark mass correction to chiral separation effect and pseudoscalar condensate

Summary

We derived an analytic structure of the quark mass correction to chiral separation effect (CSE) in small mass regime. We confirmed this structure by a D3/D7 holographic model study in a finite density, finite magnetic field background. The quark mass correction to CSE can be related to correlators of pseudo-scalar condensate, quark number density and quark condensate in static limit. We found scaling relations of these correlators with spatial momentum in the small momentum regime. They characterize medium responses to electric field, inhomogeneous quark mass and chiral shift. Beyond the small momentum regime, we found existence of normalizable mode, which possibly leads to formation of spiral phase. The normalizable mode exists beyond a critical magnetic field, whose magnitude decreases with quark chemical potential.

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