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Exploring external field related phenomena in full lattice QCD

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I will summarize the effort of our group to explore new phenomena showing up in external electromagnetic fields in full QCD on the lattice. In particular, I will discuss our effort of studying anomalous transport phenomena such as the chiral separation effect (CSE) as well as the modification of the topological susceptibility in external electromagnetic fields. The latter can be used to extract the contribution of the strong interactions to the axion-photon coupling from first principles. Furthermore, as a proxy for more realistic settings with respect to off-central heavy-ion collisions, we investigate the effects of spatially varying external magnetic fields on the chiral condensate and the Polyakov loop.

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