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Magnetic catalysis in a confining holographic theory

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Abstract

In this paper, we investigate the instability of the quasi-confining gauge theory D3+D(-1) induced by the simultaneous application of constant electric and magnetic fields. According to the gauge-gravity duality, the decay rate due to the presence of external fields can be calculated using the imaginary part of the DBI action. Since the quarks are confined in the theory under study, the decay rate of the quarks, even the massless ones, is nonzero only if the electric field is greater than a threshold value, which is the critical electric field of the theory. We also observe that the application of a constant magnetic field parallel to (perpendicular to) the electric field direction increases (decreases) the decay rate. On the other hand, the dependence of the critical electric field on the magnetic field shows the magnetic catalysis, i.e., the application of the magnetic field enhances the critical electric field above which the Schwinger effect occurs.

Keywords: Schwinger effect, confinement, gauge-gravity duality, magnetic catalysis

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