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Vacuum instability in holography

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We analyze vacuum instability of strongly coupled gauge theories in a constant electric field using AdS/CFT correspondence. The model is the $N = 2$ 1-flavor supersymmetric large N_c QCD in the strong 't Hooft coupling limit. We calculate the Euler-Heisenberg effective Lagrangian $L(E)$, which encodes the nonlinear response and the quantum decay rate of the vacuum in a background electric field E , from the complex D-brane action in AdS/CFT. We find that the decay rate given by $\text{Im}L(E)$ becomes nonzero above a critical electric field set by the confining force between quarks. A large E expansion of $\text{Im}L(E)$ is found to coincide with that of the Schwinger effects in QED, replacing its electron mass by the confining force.

Summary

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