Abstract Submitted
for the HAW14 Meeting of
The American Physical Society

Vacuum instability in AdS/CFT: Schwinger effect and Euler-Heisenberg Lagrangian of Supersymmetric QCD TAKASHI OKA, The University of Tokyo, AKIHIKO SONODA, Osaka University, KOJI HASHIMOTO, Osaka University, RIKEN — To reveal the Schwinger effect for quarks, i.e., pair creation process of quarks and antiquarks, we derive the vacuum decay rate in strong external fields. Magnetic fields, in addition to the electric fields, are considered [1]. This is done through the gravity dual, where we obtain the full Euler-Heisenberg Lagrangian of N=2 supersymmetric QCD. First, in zero magnetic fields, we find that the decay rate given by the imaginary part of the effective Lagrangian becomes nonzero above a critical electric field set by the confining force between quarks. Second, in finite magnetic fields, we find that the creation rate becomes substantially large. This indicates the relevance of magnetic instability in the QGP formation at RHIC/LHC. Then, the time-dependent response of the system in a strong electric field is solved non-perturbatively, and we observe a universal thermalization at a shortest timescale "Planckian thermalization time." Stronger electric fields accelerate the thermalization, and for a realistic value of the electric field in RHIC experiment, we obtain 1 [fm/c], which is consistent with the believed timescale.

[1] K. Hashimoto, T. Oka, JHEP 10, 116 (2013), K. Hashimoto, A. Sonoda, T. Oka, to be published in JHEP.

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Date submitted: 19 Jun 2014 Electronic form version 1.4