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**Finite pulse effects on fermion pair creation from strong electric fields** HIDETOSHI TAYA, Department of Physics, The University of Tokyo, Hongo 7-3-1, Bunkyo-ku, Tokyo 113-0033, Japan, HIROTSUGU FUJII, Institute of Physics, University of Tokyo, Komaba 3-8-1, Tokyo 153-8902, Japan, KAZUNORI ITAKURA, Theory Center, IPNS, High Energy Accelerator Research Organization (KEK), Tsukuba, Oho 1-1, Ibaraki 305-0801, Japan — In the early stage of heavy ion collisions, there appear extraordinarily strong (color) EM fields. In the presence of such strong fields, we encounter essentially new phenomena that are not observed in the vacuum: Among those is fermion pair creation from the vacuum. In this talk, we consider fermion pair creation from the vacuum in a strong electric field with finite duration. Employing the Sauter-type pulsed electric field with height  $E_0$  and width  $\tau$ , we demonstrate explicitly the interplay between the non-perturbative and perturbative aspects of the pair creation in a strong field with finite duration. We identify that two dimensionless parameters  $\nu = |gE_0|\tau^2$  and  $\gamma = |gE_0|\tau/m$  characterize the importance of multiple interactions with the field and the transition from the perturbative to the non-perturbative regime. We also show that the pair creation is enhanced compared to Schwinger's formula when the field strength is relativity weak  $|gE_0|/m^2 < 1$  and the pulse duration is relatively short  $m\tau < 1$ , and reveal that the enhancement is predominantly described by the lowest order perturbation with a single photon. We also discuss some recent developments and applications. Ref: H. Taya et al., arXiv:1405.6182, to appear in PRD.

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