

Abstract Submitted  
for the APR07 Meeting of  
The American Physical Society

**On vacuum polarization and plasma oscillations** GREGORY VERESHCHAGIN, REMO RUFFINI, SHE-SHENG XUE, ICRANet and Dipartimento di Fisica - Università di Roma “La Sapienza” — Vacuum polarization in a strong electric field results in electron-positron pair creation. We study collective effects in the pair plasma emerged in this way, including vacuum polarization itself, back-reaction of the plasma on initial electric field and plasma oscillations. With this goal we consider energy conservation and electromagnetic field equations, comparing these to the traditional Vlasov-Boltzmann treatment. We conclude that under certain conditions plasma oscillations may occur in a weak electric field. We present single equation describing these oscillations in the weak field limit. Time and length scales of oscillations are discussed.

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Date submitted: 15 Jan 2007

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