Contribution ID : **20**                                        Type : **not specified**

# Plasmon mass scale in classical nonequilibrium gauge theory in two and three dimensions

*Thursday, 28 June 2018 17:30 (30)*

The initial stage of a relativistic heavy ion collision is dominated by an overoccupied, strong gluon field, which can be understood in a classical approximation. The physics of equilibration and isotropization of this field is dominated by the plasmon mass scale, which is poorly understood in this very nonequilibrium system. We address this by measuring the plasmon mass scale in two and three dimensional classical Yang-Mills systems numerically. We use three different methods: a Hard Thermal Loop (HTL) expression involving the quasiparticle spectrum constructed from Coulomb gauge field correlators, an effective dispersion relation (DR) and the measurement of oscillations between electric and magnetic energies after introducing a spatially uniform perturbation to the electric field (UE). We find that the HTL and the UE methods are in rough agreement. The DR method agrees with other methods within a factor of two. We also study the dependence on time and occupation number. We observe that a power law dependence sets in in both cases after an occupation number dependent transient time. We find that in both cases our results are insensitive to the infrared cutoff. In three dimensions we find that the UE and HTL measurements can be brought into agreement when we take the ultraviolet cutoff to zero. However, in two dimensions the results obtained using all three methods seem to increase when we take the ultraviolet cutoff to zero. At late times in three spatial dimensions, the square of the plasmon mass seems to scale as $t^{\frac{-2}{7}}$, which is also predicted by kinetic theory analysis and previous research. In two dimensions the square of the plasmon mass seems to decrease as $t^{\frac{-1}{3}}$ according to HTL method measurement.

**Primary author(s) :**   PEURON, Jarkko (University of Jyväskylä)

**Co-author(s) :**   LAPPI, Tuomas (University of Jyväskylä)

**Presenter(s) :**   PEURON, Jarkko (University of Jyväskylä)

**Session Classification :**  Parallel