



Contribution ID: 111

Type: not specified

## Looking for the transition from classical fields to the Boltzmann equation in perturbation theory

*Wednesday, 20 September 2017 09:30 (30 minutes)*

In this talk I present our recent work on studying nucleus-nucleus collisions in perturbation theory. Classical field approximation has been broadly used to study the early stages of heavy ion collisions. Extrapolating the classical field dynamics to late times does not give the expected pressure isotropization. Including vacuum fluctuations into the classical field approach may lead to isotropization, but the resulting formalism appears to be non-renormalizable. An alternative approach is to use the Boltzmann equation at later times when the classical field theory may break down. Whether and how such a transition from classical fields to the Boltzmann equation occurs has not been explicitly shown in the literature. We use a perturbative approach in the Schwinger-Keldysh formalism to study this issue by including a single-rescattering correction to the classical fields. Specifically, we calculate the two-point Green function and the energy-momentum tensor due to a single  $2 \rightarrow 2$  scattering process involving two classical fields in the scalar  $\phi^4$  theory. We compare our exact diagrammatic results for these quantities to those in kinetic theory to conclude whether a transition from classical fields to the Boltzmann equation occurs or not.

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**Session Classification:** Thermalization / Hydrodynamization / PLENARY