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Thermalization and entropy production from Glasma-like initial condition in classical Yang-Mills dynamics

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Thermalization process in classical Yang-Mills (CYM) field theory starting from noisy Glasma-like initial conditions is studied by investigating the initial-value sensitivity of trajectories [1].
The Kolmogorov-Sinai (KS) entropy, which gives the entropy production rate in classical chaotic system, is calculated numerically for CYM fields starting from Glasma-like initial conditions with and without fluctuations.
For small random fluctuations we observe initial-value sensitivity of the system,
while no sensitivity is observed without fluctuations.
We analyze the intermediate time Lyapunov spectrum for several time windows and calculate KS entropy defined by the sum of positive Lyapunov exponents.
We find a large number of positive Lyapunov exponents at the early stages of time evolution.
Also for later times their number is a sizeable fraction of the total number of degrees of freedom.
Thus we conclude that for glasma-like initial conditions a significant amount of
entropy is produced by classical gluon field dynamics.

Reference:
[1] H.Iida, T.Kunihiro, B.Muller, A.Ohnishi, A.Schafer and T.T.Takahashi, arXiv:1304.1807 (2013), to appear in Phys. Rev. D.

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