

Spectrum of initial fluctuations in the little bang

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We discuss an ab initio computation of the initial spectrum of fluctuations in the pre-equilibrium Glasma formed in heavy ion collisions [1]. Our result resums to all loop orders the leading unstable quantum fluctuations at early times. We showed explicitly previously for a scalar field theory [2] that averaging over the analogous spectrum of initial fluctuations leads to hydrodynamic behavior. The computation can now be carried out for QCD and we outline the algorithm for doing so. In addition to providing a mechanism for early thermalization, our result for the small fluctuation spectrum also enables one to compute a) key features of jet modification at early times and b) sphaleron transition rates in the Glasma. An understanding of the latter is crucial for the charge separation mechanism in the Chiral Magnetic Effect. We relate our weak coupling albeit non-perturbative results to strong coupling approaches to thermalization.

References:

- [1] K. Dusling, F. Gelis and R. Venugopalan, manuscript in preparation.
- [2] K. Dusling, T. Epelbaum, F. Gelis and R. Venugopalan, Nucl. Phys. A850:69 (2011).

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