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Hydrodynamic attractors, initial state energy and particle production in relativistic nuclear collisions

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We exploit the concept of hydrodynamic attractors to establish a macroscopic description of the early time out-of-equilibrium dynamics of high energy heavy-ion collisions. One direct consequence is a general relation between the initial state energy and the produced particle multiplicities measured in experiments. When combined with an ab initio model of energy deposition, the entropy production during the pre-equilibrium phase naturally explains the universal centrality dependence of the measured charged particle yields in nucleus-nucleus collisions. Further, we estimate the energy density of the far-from-equilibrium initial state and discuss how our results can be used to constrain non-equilibrium properties of the quark-gluon plasma.

Ref: G. Giacalone, A. Mazeliauskas, S. Schlichting, Phys.Rev.Lett. 123 (2019) 26, 262301 [arXiv:1908.02866]

Primary authors: Dr MAZELIAUSKAS, Aleksas (CERN); GIACALONE, Giuliano (Université Paris-Saclay); Prof. SCHLICHTING, Soeren (Universität Bielefeld)

Presenter: Prof. SCHLICHTING, Soeren (Universität Bielefeld)

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