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Primordial fluctuations and anisotropic flow in heavy-ion collisions

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I present a first-principles description of the system created in relativistic heavy-ion collisions, whose primordial density fluctuations and anisotropy I evaluate in the color glass condensate (CGC) framework of high-energy QCD. Relating the primordial anisotropy of the system to the observed final-state anisotropic flow through a simple linear scaling, I achieve an excellent description of both RHIC and LHC data. I obtain, thus, a viable theory of anisotropic flow in which v_n coefficients are given by simple analytical expressions that depend on well-defined physical quantities.

This description implies a fundamental paradigm shift in our understanding of fluctuations in heavy-ion collisions. Indeed, density fluctuations in the CGC framework originate solely from QCD interactions, and do not require any knowledge about the positions of nucleons in the nuclear wavefunctions. Therefore, the standard Glauber modeling of nuclear collisions, along with all the related concepts of participant nucleons, binary collisions, etc., can (and should) be abandoned.

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