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Energy/Geometry Dependence of Relativistic Heavy-Ion Collisions

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One of the main goals of heavy ion physics is to identify a change in intensive parameters (equilibrium or transport) of the system formed in heavy ion collisions which can be associated with the onset of deconfinement and appearance of partons as dynamical degrees of freedom. Because of the complexity of heavy ion collisions, such an unambiguous identification for a given energy and system size is at best extremely difficult. This goal, however, can be achieved if different energies, system sizes (both nucleus size and centrality), rapidities, momenta etc. are scanned across a wide range of parameters, and the results probed for scaling violations. In this talk, we will describe the current status and prospects of this search. We will show that both soft and hard observables seem to follow surprisingly simple scaling laws over a wide range of energies and geometries, simpler in fact than what can be naively expected. While explaining these scaling patterns might prove a challenge for the models widely used to describe these observables, the existence of the scaling itself suggests several promising experimental avenues to clarify its origin and search for deviations.