

High Energy Nuclear Collisions: Theory Review

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High Energy Nuclear Collisions are studied at the Relativistic Heavy Ion Collider (RHIC) and, starting next year, also at the Large Hadron Collider (LHC) to study the formation and properties of quark gluon plasma (QGP). This effort is driven by the prediction that above a certain critical temperature quarks and gluons are deconfined.

For the past ten years of running RHIC has performed marvelously. Data from RHIC has answered many initial questions, but it has also provided new, more challenging problems to understand the nature of quark gluon plasma and the dynamics of heavy ion collisions. In this talk I review some of the basic concepts of high energy nuclear collisions and quark gluon plasma formation. We also discuss some of the novel and open questions that we are faced with. We discuss recent predictions on properties of hot quantum chromodynamics, emerging signatures for the color glass condensate, the fascinating idea of local P and CP violation in QCD, as well as ongoing research on hard probes and electromagnetic signatures.

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