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RHIC and the Quark-Gluon Plasma – from qualitative discovery to quantitative characterization

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Heavy ion collisions at the Relativistic Heavy Ion Collider (RHIC) produce an extremely hot and dense, but shortlived state of thermalized, strongly interacting matter, the quark-gluon plasma. The discoveries of strong anisotropic collective flow in the soft particle sector, strong suppression of high-pt particles and of jet-like correlations in the hard sector, and of a quark-coalescence pattern for hadron production at intermediate transverse momenta have provided compelling qualitative evidence for the formation of thermalized partonic matter which evolves like an almost perfect liquid, without constraints from color confinement, that is strongly coupled and extremely opaque to hard colored probes, and that reacts collectively to the energy deposited by such probes. I will describe the second stage of RHIC experiments and theoretical developments that aim to turn these qualitative discoveries into quantitative statements about the properties (initial temperature, shear and bulk viscosity, jet quenching parameter, etc.) of the Quark-Gluon Plasma, pointing out similarities and complementarities to the impending heavy-ion program at the LHC.

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