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Understanding the Quark-gluon Plasma via String Theory

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Collisions of high-energy gold nuclei at the Relativistic Heavy Ion Collider (RHIC) in Brookhaven National Laboratory create exploding droplets of quark-gluon plasma, the stuff which filled the universe microseconds after the Big Bang. The quark- gluon plasma at RHIC exhibits many surprising properties: it is close to an ideal liquid and it strongly attenuates the high energy quarks trying to plow through it. So far calculations in QCD have not been able to explain these properties satisfactorily, but interesting insight has been gained by using techniques from string theory. In the last ten years string theory has revealed a surprising and deep connection between quantum gravity and non-Abelian gauge theories similar to QCD. Such a connection enables one to answer difficult questions in some strongly coupled gauge theories by simple calculations of classical gravity. I will discuss some examples where these string theory techniques have been used to shed light on existing data from RHIC and to make one prediction that can be tested by experiments in the near future.