



Contribution ID: 400

Type: **Parallel contribution**

Strongly-Coupled Quarks and Colorful Black Holes

Friday 12 August 2011 10:50 (20 minutes)

We use gauge-gravity duality to study the behavior of strongly-coupled quarks moving on a black hole background. The supergravity background consists of a six-dimensional Schwarzschild-black string AdS soliton, for which the bulk horizon is a string that extends from the AdS boundary down to an infra-red floor. By going to higher energy scales, the regime of validity of the classical supergravity background can be extended closer to the singularity than might be naively expected from the four-dimensional perspective. Small black holes created by the Large Hadron Collider could typically carry color charges inherited from their parton progenitors. Then the dynamics of a quark moving close to the black hole depend on the curved spacetime geometry as well as the strong interaction between the quark and the color-charged black hole. We also consider how the characteristics of interactions between quarks, such as the quark-antiquark screening length, are altered by the presence of the black hole. We also present a supergravity background which generalizes the Schwarzschild-black string AdS soliton.

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Session Classification: Field and String Theory

Track Classification: Field and String Theory