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Dynamical Hawking radiation and holographic thermalization

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Holography provides a powerful tool to study non-equilibrium dynamics in strongly coupled quantum field theories, mapping challenging D dimensional quantum dynamics on to semi-classical gravity in D+1 dimensions. One interesting quantum field theory process to study is the creation and thermalization of a D = 4 strongly coupled quark-gluon plasma. Heavy ion collisions at RHIC and the LHC suggest that quark-gluon plasma can be created and thermalize in a time as short as 1 fm/c, the time it takes for light to traverse the diameter of a proton. Understanding the dynamics responsible for such rapid thermalization is a challenge using traditional perturbative field theory. Via holography, the creation of a quark-gluon plasma maps into the process of gravitational collapse and black brane formation. The thermalization of the quark-gluon plasma maps into the relaxation of the black brane geometry and thermalization of its Hawking radiation. I will describe new techniques for studying holographic thermalization and present results for thermalization times and mechanisms.