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Evaporation of 2-Dimensional Black Holes

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Violation of unitarity in black hole evaporation has been puzzling physicist since the seminal work of Hawking in the seventies. Although there are hopes for a resolution of the problem in a full theory of quantum gravity, it has eluded us so far. Even less ambitious efforts considering only quantum corrections beyond the external field approximation have proven hard to attack in 4 dimensions. All these obstacles directed researchers to investigate the black hole evaporation problem in simpler 2-dimensional models. In this talk, we will present results on a new investigation of one of these models, the 2-dimensional Callan-Giddings-Harvey-Strominger (CGHS) model. Using a combination of analytical and high precision numerical tools, we are able to resolve CGHS black hole evaporation within the mean field approximation all the way to the point where the black hole area vanishes. Our results confirm some of the assumptions of the standard paradigm, and strongly suggest the recovery of unitarity within the full quantum theory. On the other hand, there are several surprising new results, in particular remarkable universal behavior in the evaporation of initially macroscopic black holes. This suggests that information about the collapsing matter that formed the black hole can not be recovered from the evaporation radiation. Though this separation of the questions of information loss and unitarity is peculiar to the 2-dimensional model, insights into the higher dimensional case can still be garnered.