

Black hole inner horizon instability in semiclassical gravity

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In this talk I will present an overview of the instabilities of black holes which possess a long-lived inner horizon, and the effect these can have on the evolution of the geometry as a whole. On the classical side, I will present a simple exact model of a black hole undergoing the "mass inflation" process, conveying an intuitive understanding of the origin of this instability, and describing in detail the resulting evolution of the geometry. To introduce corrections from the presence of quantum fields, I will begin by showing a simple calculation of backreaction on the outer horizon, recovering the Hawking evaporation effect. I will then present a parallel calculation of backreaction on the inner horizon, showing a tendency for this horizon to expand outward, reducing the size of the trapped region from the inside. Then, I will conclude by analysing a model which incorporates both the classical and semiclassical instabilities of this horizon, and discuss the possible outcomes of the evolution of a generic black hole in the full semiclassical theory.