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Marc Casals - Effects of quantum fields inside black holes

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All black holes in the Universe are believed to be rotating. This poses interesting questions, since rotating black hole solutions of Einstein's equations of General Relativity possess a so-called Cauchy horizon in their interior, which threatens the predictability of Einstein's theory. This then begs the question of whether such inner Cauchy horizons are still present after taking into consideration effects from neighbouring classical matter and quantum fields (which correspond to Hawking radiation in the black hole exterior). It is generally found that effects on Cauchy horizons from quantum fields are in fact dominant over those from classical matter. In this talk, we will review some results on the stability of Cauchy horizons of black holes and we will present recent results on effects due to a quantum field on the Cauchy horizon of a rotating (Kerr) black hole. In particular, we will show that the (renormalized) fluxes from a quantum scalar field generically diverge on the Cauchy horizon of a Kerr black hole that is evaporating via the emission of Hawking radiation.

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