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Mode stability for extremal Kerr black holes

The Teukolsky master equations are a family of PDEs describing the linear behavior of perturbations of the Kerr black hole family, of which the wave equation is a particular case.

We prove that, for extremal Kerr black holes, the Teukolsky equations admit no exponentially growing modes nor modes on the real axis. While the result was previously known for subextremal spacetimes, we show that the proof for the latter cannot be extended to the extremal case as the nature of the event horizon changes radically in the extremal limit.