

Universal black hole stability in four dimensions

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ABSTRACT

We show that four-dimensional black holes become stable below certain mass when the Einstein- Hilbert action is supplemented with higher-curvature terms. We prove this to be the case for an infinite family of ghost-free theories involving terms of arbitrarily high order in curvature. The new black holes, which are non-hairy generalizations of Schwarzschild's solution, present a universal thermodynamic behavior for general values of the higher-order couplings. In particular, small black holes have infinite lifetimes. When the evaporation process makes the semiclassical approximation break down (something that occurs after a time which is usually infinite for all practical purposes), the resulting object retains a huge entropy, in stark contrast with Schwarzschild's case.

References

- [1] P. Bueno and P. A. Cano, “Universal black hole stability in four dimensions”, arXiv:1704.02967 [hep-th].