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”Phase Space Diagram for the Cauchy Horizon (In)Stability of Regular Black Holes”

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Regular black hole solutions typically come with an outer event horizon and an inner Cauchy horizon. In the case of the Reissner-Nordstrom geometry, the analysis based on the Ori model shows that the Cauchy horizon in unstable against perturbations, because of the mass-inflation effect. However, when such analysis is applied to regular black hole solutions, a richer picture emerges. We present the first global study on the fate of the perturbed spacetime at the Cauchy horizon, depicting the phase space related to the dynamical system which describes the perturbation itself. In particular, we analyze the stability of a new regular black hole solution obtained from a model of asymptotically safe gravitational collapse [Phys.Rev.Lett. 132 (2024) 3, 031401], which has the peculiarity of having a logarithmic mass function.

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