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The Nonlinear Stability of Kerr and Kerr–Newman Black Holes

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Kerr and Kerr–Newman black holes are asymptotically flat stationary solutions of the Einstein and Einstein–Maxwell equations exhibiting horizons, trapping, and subtle dispersive dynamics. I will survey recent progress on their nonlinear stability, focusing on the proof of the full nonlinear stability of the slowly rotating Kerr family as solutions of the vacuum Einstein equations, obtained in a series of works by Klainerman, Szeftel, Shen and myself, and briefly discuss how the presence of an electromagnetic field and charge modifies the dynamics in the Kerr–Newman setting. These results build on the pioneering contributions of Sergiu Klainerman to the analysis of nonlinear wave equations and the global dynamics of the Einstein equations.

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