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Testing the no-hair theorem with astrophysical black holes

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The Kerr spacetime of spinning black holes is one of the most intriguing predictions of Einstein's theory of general relativity. The special role this spacetime plays in the theory of gravity is encapsulated in the no-hair theorem, which states that the Kerr metric is the only realistic black-hole solution of the vacuum field equations. Recent and anticipated advances in the observations of black holes throughout the electromagnetic spectrum have secured our understanding of their basic properties while opening up new opportunities for devising tests of the Kerr metric. In this talk, I will show how imaging and dynamical observations of accreting black-holes with current and future instruments will lead to the first direct test of the no-hair theorem with an astrophysical object. I will also discuss the current state of the Event Horizon Telescope, which will obtain, in the near future, the first horizon-scale image of the black hole in the center of the Milky Way.