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[colloquium] Testing the No-Hair Theorem and the Area Theorem with LIGO

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One of the key results of general relativity is that an astrophysical black hole in equilibrium is uniquely described by just two parameters, its mass and spin. This is called the No-Hair Theorem, a result that is not true in alternative theories of gravity. For many years, people have speculated about testing the theorem using gravitational waves from merging black holes. However, the consensus has been that this test will require the sensitivity of next-generation detectors. I will show that this consensus is wrong for a surprising reason, and report a test with data from GW150914, the first LIGO gravitational wave detection. An extension of the test confirms Hawking's Area Theorem at the 97% limit.

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