

## **Merger-ringdown test – A novel test of GR using a machine learning implementation**

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The gravitational waves emitted during the coalescence of binary black holes are an excellent probe to test the behaviour of strong gravity. We propose a new test called the merger-ringdown consistency test' that focuses on probing the imprints of the dynamics in strong-gravity around the black-holes during the plunge-merger and ringdown phase. We demonstrate the feasibility of our test on a simulated population of events using a deep learning framework, setting a precedence for performing precision tests of gravity with neural networks. Additionally, testing consistency of QNM amplitudes and phases in the ringdown to GR predictions provide a complimentary null-test to the traditional black hole spectroscopy.

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