Constraints on higher-order curvature corrections using gravitational-wave observations

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Gravitational-wave observations of coalescing binary systems allow us to perform novel tests of the strong-field regime of gravity. Using data from the Gravitational Wave Open Science Center of the LIGO Scientific and Virgo collaborations, we place the first constraints on an effective-field-theory extension of General Relativity whose action contains higher-order curvature corrections. We construct gravitational-wave templates that reproduce the inspiral behavior in this modified theory of gravity, and use Bayesian-selection methods to constrain this theory with respect to General Relativity. We focus on the two lowest-mass binary black-hole events observed to date—GW151226 and GW170608—and describe a general strategy for improving constraints as more observations become available in the future.