

## Tight constraints on Einstein-dilation-Gauss-Bonnet gravity from GW190412 and GW190814

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Gravitational-wave (GW) data can be used to test general relativity in the highly nonlinear and strong field regime. Modified gravity theories such as Einstein-dilation-Gauss-Bonnet and dynamical Chern-Simons can be tested with the additional GW signals detected in the first half of the third observing run of Advanced LIGO/Virgo. Specifically, we analyze gravitational-wave data of GW190412 and GW190814 to place constraints on the parameters of these two theories. Our results indicate that dynamical Chern-Simons gravity remains unconstrained. For Einstein-dilation-Gauss-Bonnet gravity, we find  $\sqrt{\alpha_{\text{EdGB}}} \leq 0.40$  km when considering GW190814 data, assuming it is a black hole binary. Such a constraint is improved by a factor of approximately 10 in comparison to that set by the first Gravitational-Wave Transient Catalog events.

**Primary authors:** Dr WANG, Hai-Tian (Peking University); HAN, Ming-Zhe; LI, Peng-Cheng; TANG, Shao-Peng; FAN, Yi-Zhong

**Presenter:** Dr WANG, Hai-Tian (Peking University)