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Constraining Lorentz violations using gravitational wave observations

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Local Lorentz invariance is a cornerstone of general relativity (GR). The direct detection of gravitational waves (GWs) enables unique tests for possible violations of Lorentz invariance in the gravitational sector. Propagation effects of GWs in Lorentz violating theories of gravity lead to modified dispersion relations and dephasing of GWs with respect to the GR waveform. These may be measured or constrained through GW observations of compact binary mergers with second-generation detectors such as Advanced LIGO. We present a Bayesian parameter estimation pipeline to perform such studies, and using simulated data we quantify the prospects of future GW observations to constrain possible Lorentz invariance violations.

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