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Novel Constraints on Un-Modeled Physics in LIGO's First and Second Observing Runs BRUCE EDELMAN, Univ of Oregon — We present a flexible model to describe the effects of generic deviations of observed gravitational wave (GW) signals from model waveforms in the LIGO and Virgo gravitational wave detectors. With the detection of 11 gravitational wave events during LIGO's first and second observing runs, we are able to constrain possible deviations from our modeled waveforms and general relativity. In this paper we present our model that describes the deviations generically as interpolated spline functions in frequency space for the amplitude and phase deviations. We then choose to validate our model on two phenomenological, astrophysically motivated departures in waveforms, for both the high mass Binary Black Hole (BBH) mergers and low mass Binary Neutron Star / Neutron Star-Black Hole(BNS / NSBH) merger regimes. We find the model is capable of recovering the deviations we simulated to a great detail. We then analyze the entire GWTC-1 catalog of events with our model and find that there is no significant posterior support that there are departures present from the modeled template waveforms.

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