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Constraints on the amplitude of gravitational wave echoes from black hole ring-down using minimal assumptions.

Wednesday 23 August 2023 08:50 (20 minutes)

The current catalog of gravitational waves (GWs) from binary black hole (BBH) mergers allows to conduct refined tests to probe the validity of the general relativity (GR) theory against alternative predictions. It has been proposed that black holes (BHs) may have exotic characteristics making them different from GR BH. Such exotic compact objects (ECOs) would radiate repeated GW pulses of widely uncertain morphology (echoes) in the post-merger phase whose detection would also help to infer the fundamental properties of ECOs.

I will present a method for detecting echoes and inferring their main observables if any, which is agnostic to the properties of these GW pulses. The methodology is implemented on a dedicated version of coherent Wave-Burst (cWB), an unmodelled GW transient search algorithm, developed in the LIGO Scientific Collaboration (LSC) and Virgo Collaboration, widely used on LIGO-Virgo-KAGRA data.

We will discuss the results from the loudest BBH detections in LIGO-Virgo open data (O1, O2, and O3). In particular, we will present the first quantitative upper limits on the amplitude of echo-like signals.

Collaboration / Activity

Virgo collaboration, cWB

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