Abstract Submitted
for the APR21 Meeting of
The American Physical Society

Constraints on the quasi-normal mode frequencies of the LIGO-Virgo signals by making use of a full gravitational-wave model ABHIRUP GHOSH, Max Planck Institute for Gravitational Physics, RICHARD BRITO, Sapienza Universit di Roma, ALESSANDRA BUONANNO, Max Planck Institute for Gravitational Physics — The no-hair conjecture in General Relativity states that the properties of an astrophysical Kerr black hole (BH) are completely described by its mass and spin angular momentum. As a consequence, the complex quasi-normal-mode (QNM) frequencies of a binary black hole (BBH) ringdown can be uniquely determined by the mass and spin of the remnant object. Conversely, independent measurements of QNM frequencies could be a test of the conjecture. Here, we outline a test of the no-hair conjecture by measuring the complex QNM ringdown frequencies using, for the first time, a spinning inspiral-merger-ringdown waveform model. We thus take advantage of the entire signal power and remove dependency on the predicted or estimated start time of the proposed ringdown. We demonstrate the robustness of our test against modified gravitational wave (GW) signals with a ringdown different from a GR prediction, as well as possible noise systematics. Finally, we use our method to analyse properties of the merger remnants for all relevant BBH events observed by LIGO-Virgo to date including, for the first time, events from the first two observing runs. We report the strongest constraints yet, using our method, on the measurements of the frequency and damping time of least-damped QNM.

Abhirup Ghosh
Max Planck Institute for Gravitational Physics

Date submitted: 08 Jan 2021 Electronic form version 1.4