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A novel test of strong field gravity using binary black hole ringdowns

Binary black hole mergers produce a remnant black-hole in a perturbed state. This then relaxes to form a stable Kerr black hole by emitting gravitational waves, which we call as the ringdown. Ringdowns contain imprints of both strong field linear and non-linear dynamics predicted by the general theory of relativity. Traditionally, we have been using ringdown to test strong-field linear dynamics. In this talk, I will introduce a novel idea to test the consistency of the strong-field non-linear gravity dynamics observationally using binary black hole ringdowns. It uses amplitudes and phases of excitation of ringdown and is thus called the amplitude-phase consistency test (APC test). Specifically, I will present a simpler proof-of-concept implementation of this test and summarise effort towards generalising it.

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