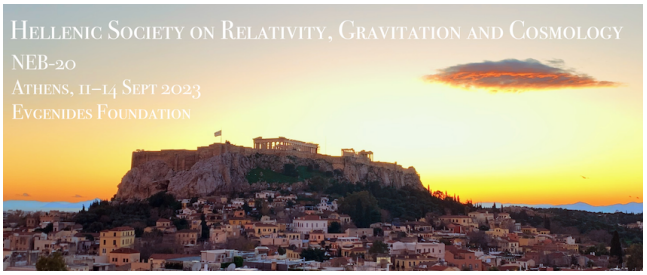

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Testing the speed of gravity with black hole ringdown

Wednesday, 13 September 2023 15:30 (20 minutes)

A nonluminal speed of gravitational waves is a smoking gun signal for the presence of new gravitational physics and hence measurements of this speed can place strong constraints on the theoretical landscape of modified gravity. The ringdown phase of binary black hole mergers, characterised by the so-called quasinormal modes, promises a clean and analytic understanding of deviations from Einstein's gravity. In this talk, I will present new ringdown constraints on the speed of gravitational waves in light of present and upcoming detectors. I will discuss and motivate the theoretical context in which these results are obtained. This involves hairy black holes, where the hair is associated with a new scalar degree of freedom of the Horndeski type. We forecast that from a single supermassive black hole merger, LISA will be able to constrain deviations of the speed of gravity from the speed of light to the 10^{-4} level. While these are weaker than existing constraints (e.g. GW170817), they importantly probe different frequency ranges, which is particularly relevant for dark energy models.

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