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Constraints on modified gravity from gravitational wave distance and slip measurements

It has been shown in the literature that detections of gravitational waves (GWs) emitted by binary sources can provide measurements of luminosity distance. The events followed by electromagnetic counterparts are, then, suitable for probing the distance-redshift relation and doing cosmological parameter estimation, as well as investigating modified gravity models. In the context of the Horndeski theories, even when requiring that the speed of propagation is equal to that of light, this GW distance differs from the standard electromagnetic luminosity distance due to the presence of a modified friction in the wave propagation. The very same source of this friction also affects the scalar sector, generating slip, i.e. a difference between the scalar potentials. In this talk I will discuss about how precisely the future-planned interferometer Einstein Telescope will probe such deviations from General Relativity and how such constraints from the tensor sector compare to the ones coming from measurements of the slip or, more generally, to those from the scalar sector, in particular, current CMB data and Euclid forecasts.

Primary author: SANTIAGO DE MATOS, Isabela

Co-authors: Dr BELLINI, Emilio (INFN, National Institute for Nuclear Physics); Prof. ORTIZ CALVÃO, Maurício (Universidade Federal do Rio de Janeiro); Prof. KUNZ, Martin (Université de Genève)

Presenter: SANTIAGO DE MATOS, Isabela

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