

Second European Physical Society Conference on Gravitation: measuring gravity



Contribution ID: 80

Type: talk

Gravitational wave friction in light of GW170817 and GW190521

Monday, 5 July 2021 14:26 (1 minute)

In this talk I will present results on constraining cosmological parameters and theories of gravity beyond General Relativity (GR) using gravitational waves (GW). Specifically, we use the GW events GW170817 and GW190521, together with their proposed electromagnetic counterparts, and consider models with a time-varying Planck mass, large extra-dimensions, and a phenomenological parametrization covering several beyond-GR theories. In all three cases, this introduces a friction term that effectively modifies the GW luminosity distance. We set constraints on Lambda-CDM and GR deviation parameters using two sets of priors on the Hubble constant and matter energy density. With priors set to the measured Planck's values, the inclusion of GW190521 improves the two GR deviation parameters constraints by a factor ~ 10 . We report a number of space-time dimensions compatible with 4 with a precision of 2.5% (at 95% CL) and an upper limit to the variation of Newton's constant at the epoch of GW170817 of $< 20\%$. With wide priors we find that the constraints on GR deviation parameters are a factor 2 – 6 worse than the ones obtained using the restricted priors.

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Session Classification: Recorded Talks: Experimental Challenges in Gravitational Wave Detection