Contribution ID: **58** Type: **not specified**

Testing General Relativity with gravitational waves higher-order modes

Friday, November 5, 2021 4:05 PM (20 minutes)

Gravitational wave signals from the coalescence of compact objects binaries allow us to test General Relativity in its strong-field regime. The gravitational radiation emitted by these binaries has a multipolar structure, and for systems with high mass ratio and high inclination angles, modes beyond the quadrupolar dominant one are expected to start giving a non-negligible contribution. The improved sensitivity of gravitational-waves detectors yields an increasingly higher chance to detect signals from these systems, and hence to observe higher-order modes. We already had examples of such detections in the last observing run, for events like GW190814 and GW190412. Therefore we need to start taking into consideration higher-order modes in our analyses, including the tests of General Relativity.
We present a new method to probe General Relativity, a test in which we allow for parametrized deviations of the amplitude of higher-order modes from the GR expected values, and we estimate their posteriors with a Bayesian inference analysis. We test our method on simulated binary black holes signals, studying the impact of amplitude deviations on the overall parameter estimation analysis, and we compute Bayes factors differences between the case in which we recover the signal with the GR model or with the non-GR one. Finally, we test our method on the real events GW190412 and GW190814, finding no evidence of deviations from General Relativity.

Primary authors: PUECHER, Anna (Nikhef); ROY, Soumen; KALAGHATGI, Chinmay; SETYAWATI, Yoshinta; BROECK, Chris Van Den

Presenter: PUECHER, Anna (Nikhef)

Session Classification: Parallel 3A