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Beyond GR tests with Einstein Telescope

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Gravitational waves from compact binary coalescences (CBCs) have become a robust and powerful tool for testing General Relativity (GR), in fact, to date, the LIGO-Virgo-KAGRA collaboration has provided significant consistency tests of GR.
In this talk, I will present forecasts for the precision with which GR can be tested using third-generation interferometers, such as the Einstein Telescope. The anticipated large number of detected sources makes full Bayesian analyses computationally infeasible. To address this, I employ the newly released GWJulia code, which enables studies of large CBC populations using the Fisher information formalism.
Using this framework, I explore the constraints that the Einstein Telescope could place on post-Newtonian (PN) coefficients within a hierarchical Bayesian approach. In addition, I will discuss the number of events required to identify deviations from GR at various PN orders and under different detector configurations.

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