

A “dictionary” to test GR with GW: from observations to theory

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GR, while one of the most successful and well-tested theories to date, is expected to receive corrections at high energies—through higher-curvature terms, additional degrees of freedom, or both. Given the vast landscape of possible extensions, how can we test them in a systematic way?

In this talk, I will present a general framework for interpreting deviations in gravitational wave data, focusing on the inspiral regime probed by LIGO.

The key idea is that genuine beyond-GR effects exhibit characteristic mass scalings, determined by the curvature order and field content of the underlying theory. Using techniques from Post-Newtonian Effective Field Theory (PN-EFT), we construct a dictionary between such corrections and their imprint on the waveform. This allows broad classes of higher-curvature modifications to be identified or constrained directly from data, without relying on specific models.

The talk will be based on arXiv:2507.17143.

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