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Toward Testing Strong Gravity: Higher Post-Newtonian Corrections in Tidal Response

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The tidal response of compact objects reflects the underlying gravitational theory and leaves imprints on the gravitational waveforms emitted during the inspiral phase of binary coalescences. High-precision modeling that includes higher-order post-Newtonian effects is essential to test gravity in a strong regime through constraints on such tidal responses. In this talk, I present a formulation of the corrections from dynamical tidal response based on the Mano–Suzuki–Takasugi (MST) solutions for metric perturbations in the exterior of the object, combined with the framework of worldline effective field theory. A key feature of this formulation is that it does not rely on the detailed internal structure of the object or the specific degrees of freedom in modified gravity theories. Furthermore, time permitting, I will also discuss the outlook for waveform modeling and nonlinear tidal responses.

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