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The Evolution of the Orbitals Fundamental Frequencies in Non-integrable Systems[1] ALEJANDRO CARDENAS-AVENDANO, University of Illinois at Urbana-Champaign - Fundacion Universitaria Konrad Lorenz, NICOLAS YUNES, University of Illinois at Urbana-Champaign — While the test particle's geodesic motion around a Kerr black hole is fully integrable, it may not be in modified theories of gravity. What are the observational consequences of observing an EMRI system that is not integrable through gravitational waves? In this talk, I will show how a truncated integrable system leads to chaotic behavior imprinted in the motion's fundamental frequencies' temporal evolution, and discuss its detectability with the future space-based detector LISA. To show how chaos affects the gravitational waves emitted, we have systematically analyzed the Fourier transform of approximate gravitational waveforms computed in the semi-relativistic approximation, augmented with gravitational wave dissipation, on a slowly-rotating Kerr background. Since signatures of chaotic dynamics in gravitational waves have been suggested to test general relativity in the strong field, if these effects are not correctly modeled and understood, they may undermine present proposals to verify the no-hair theorem's assumptions.

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