

Integrability in the Dynamics of Binary Black Holes

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The scientific exploitation of gravitational wave observations depends strongly on the models of the signals that we use for their detection, mainly for binary black holes. These models, known as waveform models, are obtained from Einstein's equations (or their equivalent in alternative theories of gravity). The way of obtaining them is via different perturbative schemes and/or numerical relativity, which involve complex computations. Nevertheless, the shape of the waveform of a binary black hole appears to be both simple and universal. In this sense, it has been argued that the dynamics should admit a separation into "fast and slow" degrees of freedom, such that the latter are described by an integrable system of equations, accounting for the simplicity and universality of the waveform. In this talk, I will describe the efforts in this direction and how integrability can play a crucial role in this important problem.

Orateur: SOPUERTA, Carlos (ICE-CSIC, IEEC)