茨城大学素粒子論研究室セミナー

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日時：7/11(金) 15:30-

教室：@第 6 講義室

Title: On-shell approach to black hole mergers (and Hawking radiation)

概要

In recent years, there has been significant progress in applying modern scattering amplitude techniques to classical gravitational physics. It has led to state-of-the-art predictions on gravitational waves from binary systems and advanced our understanding of black holes. In this talk, I will propose a program describing classical black hole mergers through on-shell scattering amplitudes. The key idea is to treat black holes as particles, with their mergers viewed as a fusion process in particle physics. Combined with the recent tools of amplitudes, we compute gravitational waveforms from a merger of two Schwarzschild black holes into a Kerr black hole in two complementary limits: all orders in the mass ratio but leading in gravitational coupling, and non-perturbative in the gravitational coupling but to leading order in the mass ratio. The first yields the all-order gravitational spin memory, which has been known only up to sub-subleading order in spin in the classical approach, while the second demonstrates complete equivalence between the amplitude and classical approaches. If time is allowed, I will also discuss the Hawking radiation, showing that its spectrum can be well approximated by a two-body decay of a black hole.

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