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Black Hole Binary Dynamics and Radiation from Classical and Quantum Gravitational Scattering

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Gravitational wave signals from coalescing binary black holes are detected, and analyzed, by using large banks of template waveforms. The construction of these templates makes an essential use of the analytical knowledge of the motion and radiation of gravitationally interacting binary systems. A new angle of attack on gravitational dynamics consists of considering (classical or quantum) scattering states. Modern quantum amplitude techniques have recently given interesting novel results concerning both the dynamics and the gravitational wave emission of scattering black holes. These results are reaching a level where subtle conceptual issues arise (quantum-classical transition, radiative effects versus conservative dynamics, zero-frequency gravitons, epsilon/epsilon effects, ...).

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