General spin Compton amplitudes for Kerr black holes

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Classical observables for Kerr black hole dynamics can be constructed from scattering amplitudes. Elegant three-point spin-s amplitudes exist for Kerr black holes, however constructing the corresponding four-point Compton amplitudes is an open problem. In this talk, I will discuss the origin of the Kerr three-point amplitudes from a higher-spin theory perspective. Guided by higher-spin constraints and classical-limit analysis, I will propose quantum and classical tree-level Compton amplitudes relevant for Kerr to all orders in spin. I will also comment on upcoming results for scattering observables that require the classical Compton amplitude as input.