

# Towards a new multipolar description of gravitational waves from binary black holes

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Since Einstein's quadrupole formalism, multipolar analysis has played a central role in gravitational wave theory. In particular, gravitational waves from compact sources are ubiquitously represented using spin weighted spherical harmonic multipoles. But despite their ubiquity, there is reason to suspect that a more general perspective may point the way to new physical insights. In this talk I will review the recent developments in gravitational wave signal models for binary black hole systems. A key limitation of many such models is that they do not account for the more natural "spheroidal" harmonic nature of the post-merger signal. In this regard, I will briefly discuss recent work at the interface of BH perturbation theory, and numerical relativity which uses spheroidal harmonic information from NR simulations to model the late post-merger for spinning but non-precessing binary black hole systems. Lastly, I will introduce recent work which proposes the spheroidal harmonics as a potentially more appropriate basis for all of inspiral, merger and ringdown.