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On-shell Approaches for Gravitational Wave Physics

Saturday, 27 September 2025 15:00 (30)

The detection of gravitational waves has created a pressing need for high-precision theoretical models for binary systems. In this talk, I will review recent progress in the analytic computation of physical observables for binary black hole and neutron star systems using modern on-shell methods. This research program represents a concerted effort between the fields of quantum field theory and classical general relativity to push the precision frontier of gravitational waveform prediction. We will see how on-shell approaches, which focus directly on gauge-invariant observables, offer significant simplifications over traditional formalisms. I will conclude the talk with an outlook on future developments in this rapidly evolving field, including the growing synergy with QCD effective theories, energy correlators, and various boostrap program.

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