Gravitational Scattering via Twistor Theory

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Scattering amplitudes are among the most natural–and important–observables of any field theory in an asymptotically flat space-time, including any theory of quantum gravity. Recently, gravitational scattering amplitudes have been shown to posess remarkably compact expressions which are un-expected from the perspective of traditional Lagrangian-based perturbation theory (c.f., [1]). We will discuss how some of these formulae arise from working with an action principal not on space-time, but rather in *twistor space*, an auxiliary complex three-manifold [2]. This narrative exploits an on-shell equivalence between conformal gravity and general relativity in asymptotically de Sitter manifolds [3], and also leads to new expressions for analogues of scattering amplitudes in space-times with a positive cosmological constant.

References
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