

Aspects of perturbation theory with a cosmological constant

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The study of scattering amplitudes in gauge and gravitational theories is intimately related to their perturbation theory around Minkowski space-time. In three and four dimensions, many novel insights into gauge and gravitational scattering amplitudes have been obtained using twistor formulations of their perturbation theory (cf., [1, 2, 3]). These rely – in a precise sense – on the fact that the theory admits a perturbative expansion around an integrable (self-dual) sector in asymptotically flat space-times. We will discuss how the presence of a cosmological constant spoils this perturbative expansion around the integrable sector (and hence the naïve twistor description). This leads us to consider certain modified gauge and gravitational theories in (anti-)de Sitter space which do admit perturbative expansions around the self-dual sector at the expense of parity symmetry. We will comment on the structure of ‘scattering amplitudes’ for these theories in (A)dS₄, how parity invariance is restored in the flat-space limit, and the prospects for describing them with twistor theory.

References

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