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Off Shell Gluon Amplitudes in the CHY Formalism

Wednesday 28 June 2023 15:00 (20 minutes)

Cachazo, He, and Yuan (CHY) demonstrated an alternative approach for computing the tree-level S-matrix of pure Yang-Mills theories in arbitrary spacetime dimensions on shell, as a contour integral encircling solutions of the so-called "scattering equations" in their paper "Scattering of Massless Particles in Arbitrary Dimensions." Later, Dolan and Goddard analyzed the scattering equations and identified a set of N-3 Mobius covariant polynomial equations which were equivalent to the original CHY scattering equations used to compute the scattering of N particles. In the same paper, it was shown that any Mobius invariant set of equations must take the form of the scattering polynomials that had been identified. That is, the scattering polynomials used to calculate scattering amplitudes in scalar and Yang-Mills theories are specified solely by their mathematical properties related to the Mobius group; no reference to a Lagrangian is needed for these computations. This talk will focus on attempts to modify the scattering equations to allow for off shell computations, and the issues that arise off shell due to gauge invariance.

Author: STEWART, Alex

Presenter: STEWART, Alex

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