Contribution ID: **70** Type: **not specified**

Non-Planar Two-Loop Amplitudes for Five-Parton Scattering

Monday 15 April 2024 12:00 (30 minutes)

I present the recent calculation of the two-loop amplitudes required to obtain next-to-next-to-leading order predictions for three-jet production at the Large Hadron Collider. This calculation is performed in full color, that is including contributions from non-planar Feynman diagrams. I review the method of numerical generalized unitarity and the integrand decomposition technique employed to generate finite-field samples of the amplitude. I will then focus on the analytic reconstruction of the coefficient functions from said numerical samples. A novel algorithm, based on the correlation of codimension-one residues, helps tame the complexity of the calculation. Rescalings of the gluon amplitude, inspired by supersymmetry Ward identities, facilitate the computation of the quark amplitudes. I touch upon various interdisciplinary aspects of the computation, including elements of number theory, computational algebraic geometry, constraint programming, memoization, and GPU acceleration.

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Session Classification: Plenary 1