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QCD–Gravity Duality and Discrete BFKL Evolution in Multi-Regge Kinematics

We present a novel approach to computing duality relations between Quantum Chromodynamics (QCD) and gravity in the Multi-Regge Kinematics (MRK) limit. This framework leverages Mathematica-based tools—FeynArts, FeynCalc, and FeynGrav—with a new implementation that integrates FeynGrav into FeynArts, enabling significantly faster generation of gravity diagrams. We outline the procedure through which duality relations naturally emerge, focusing on the conceptual structure rather than technical detail. Within the same MRK framework, we also present recent results on a discretized formulation of the BFKL equation. By constructing recursion relations, we describe the evolution of the gluon Green function and establish a connection with the Knizhnik–Zamolodchikov equation. This approach reveals the appearance of Harmonic Polylogarithms and leads to a direct link with anomalous dimension coefficients, which we successfully recover within our formalism.

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