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Resummation of Super-Leading Logarithms

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Jet cross sections at high-energy colliders exhibit intricate patterns of logarithmically enhanced higher-order corrections. In particular, so-called nonglobal logarithms emerge from soft radiation emitted off energetic partons inside jets. While this is a single-logarithmic effect at lepton colliders, at hadron colliders phase factors in the amplitudes lead to double-logarithmic corrections starting at four-loop order. This effect was discovered a long time ago, but not much is known about the higher-order behavior of these terms and their process dependence. We derive, for the first time, the all-order structure of these "super-leading logarithms" for generic 2⟶l scattering processes at hadron colliders and resum them in closed form.

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