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Non-global Logarithms and the Limits of Fixed Order Perturbation Theory

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Non-global Logarithms (NGLs) encode the soft correlations in a cross-section generated by the partonic cascade of a QCD event. Using a resummed expansion in terms of soft jets, I will show how the dynamical phenomena of the buffer region, a region devoid of soft emissions at the edge of an active jet region, causes the fixed order perturbation theory for the NGL series to have a finite radius of convergence, even for the leading log series. This is in marked contrast to the global sudakov logarithms, illuminating their distinct analytic features. The soft jet expansion suffers no such problem, appropriately resumming the phase-space logarithms that generate the buffer region. Then using the analytic insight developed using the soft jet expansion, I will show how one can revive the fixed order perturbation theory into a uniformly convergent series for all values of the logarithm.

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