

# Theory Seminar

Friday, November 19, 2010 2:10 PM 705 Pupin Hall

## BFKL approach and MHV amplitudes

The main objective of the talk is the application of the Balitsky-Fadin-Kuraev-Lipatov (BFKL) approach to the study of the maximally helicity violating scattering amplitudes in the Regge limit. The all-loop ansatz for multi-leg MHV amplitudes proposed by Bern, Dixon and Smirnov (BDS) is violated at two loops for six-gluon amplitude due to the presence of the Mandelstam (Regge) cuts, which are described in Yang-Mills theories by the BFKL equation. The BDS violating term in the multi-Regge kinematics was calculated by Bartels, Lipatov and Sabio Vera (BLS) using the solution to the octet BFKL equation. The BDS ansatz differs from the full MHV amplitude by a multiplicative function, called the remainder function. The remainder function for six-point MHV amplitude at two loops was calculated from null polygonal Wilson Loops by Drummond, Henn, Korchemsky and Sokatchev, then it was expressed in terms of the Goncharov polylogarithms by Del Duca, Duhr and Smirnov and finally greatly simplified by Goncharov, Spradlin, Vergu and Volovich (GSVV). We analyze the GSVV expression and perform an analytic continuation to the region where the BDS violating term was found by Bartels, Lipatov and Sabio Vera. The GSVV expression after the analytic continuation reproduces the BLS result and is in agreement with general properties of the scattering amplitudes. Using the GSVV formula we obtain the next-to-leading impact factor one needs in the BFKL approach. We also calculate the three loop leading logarithmic contribution to the remainder function of the six-gluon MHV amplitude. The final part of the talk is devoted to the interplay of the Regge and collinear limits in the context of the recent paper of Alday, Gaiotto, Maldacena, Sever and Vieira on the Operator Product Expansion for polygonal null Wilson Loops.

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