Singular Coefficients of NS Splitting Functions

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$A\left(\alpha_s\right) = \sum_n \left(\frac{\alpha_s}{\pi}\right)^n A^{(n)}$ related to

- Sudakov resummation

  Korchemsky, Marchesini (1993); Laenen, Sterman, Vogelsang (2001).

- Renormalization of Wilson (eikonal) line vertex $\Gamma^{(\mathrm{eik})}$

  Polyakov (1979); Aref'eva (1980); Gervais, Neveu (1980); Dotsenko, Vergeles (1980); Brandt, Neri, Sato (1981); Korchemsky, Radyushkin (1987).

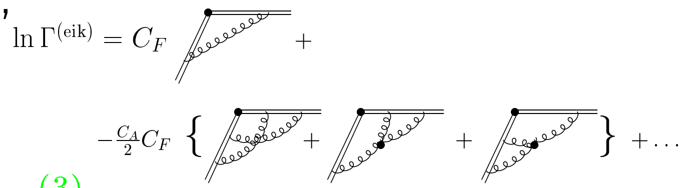
$$\mu \frac{d}{d\mu} \ln \Gamma^{(\mathrm{eik})} = \int_0^\infty \frac{dk^+}{k^+} A\left(\alpha_s(\mu^2)\right) \qquad \text{in dimensional reg.} \tag{1}$$

Exponentiation of eikonal cross sections $\rightarrow$ "webs"

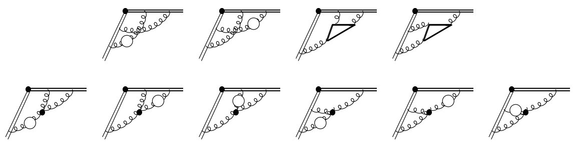
$\surd$ dramatically fewer diagrams

Sterman (1981); Gatheral (1983).

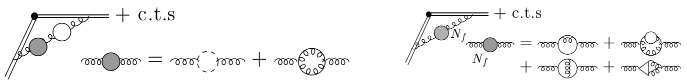
Schematically,



For example, $A^{(3)}_{N_f}$ from



$+$ counterterms $+$



$+$ c. c.

$$= \left(-\frac{11}{54} C_A C_F T_R \frac{1}{\varepsilon^3} + \left[\left(\frac{167}{324} - \frac{\pi^2}{108}\right) C_A + \frac{1}{12} C_F\right] C_F T_R \frac{1}{\varepsilon^2} + \frac{1}{3}\frac{1}{\varepsilon} A^{(3)}_{N_f}\right) N_f \int_0^\infty \frac{dk^+}{k^+}. \tag{2}$$

CFB, in preparation (2002).