The CS Kernel for dynamical z_{max}

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The CS Kernel

The CSS factorisation formula:

$$\frac{d\sigma}{dQ^2 dy dq_T^2} = \frac{2\pi}{9}\frac{\alpha_{\rm em}^2(Q)}{sQ^2}|C_V(Q,\mu_Q)|^2 \int_0^\infty db b J_0(bq_T) \times \sum_q e_q^2 f_{q,h_1}(x_1, b; \mu_Q, Q^2) f_{\bar{q},h_2}(x_2, b; \mu_Q, Q^2), \quad (1)$$

The CS Kernel is defined as

$$\frac{df_{q,h}(x,b;\mu,\zeta)}{d\ln\zeta} = -\mathcal{D}(b,\mu) f_{q,h}(x,b;\mu,\zeta)$$

The CS Kernel from ratios

$$\mathcal{D}(b,\mu_0) = \frac{\ln\left(\frac{\Sigma_1}{\Sigma_2}\right) - \ln Z(Q_1,Q_2) - 2\Delta_R(Q_1,Q_2;\mu_0)}{4\ln(Q_2/Q_1)} - 1$$

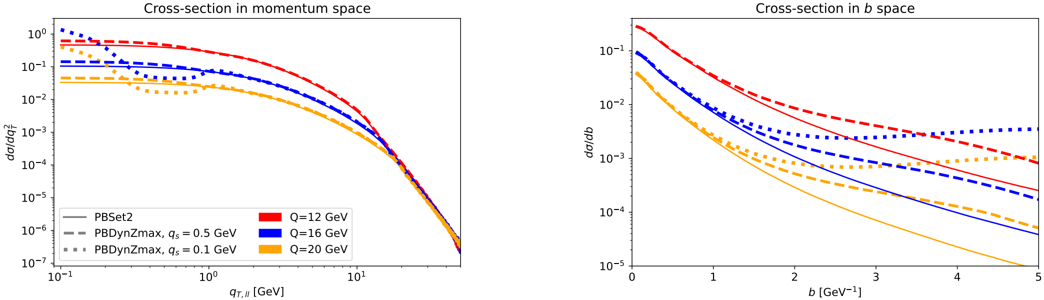
where Σ is the Hankel transformation of the cross-section:

$$\Sigma(s,y,Q,b) = \int_0^\infty dq_T\, q_T J_0(q_T b) \frac{d\sigma}{dQ^2 dy dq_T^2}.$$

and

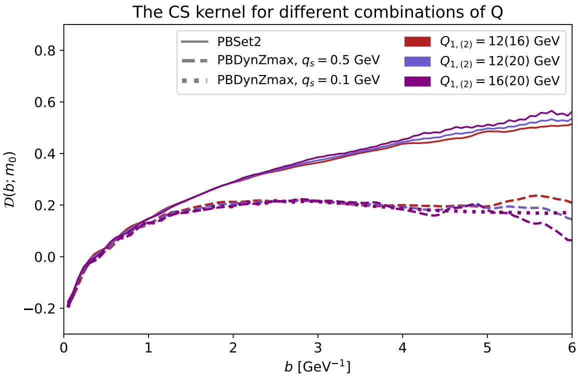
$$\Delta_R(Q_1,Q_2;\mu_0) = \int_{\mu_{Q_2}}^{\mu_{Q_1}} \frac{d\mu}{\mu}\gamma_F(\mu,Q_1) - 2\ln\left(\frac{Q_1}{Q_2}\right)\int_{\mu_0}^{\mu_{Q_2}} \frac{d\mu}{\mu}\Gamma_{\text{cusp}}(\mu) \quad Z(Q_1,Q_2) = \frac{\alpha_{\text{em}}^2(Q_1)|C_V(Q_1,\mu_{Q_1})|^2}{\alpha_{\text{em}}^2(Q_2)|C_V(Q_2,\mu_{Q_2})|^2}$$

The DY cross section: PBSet2 vs Dynamical z_{max}



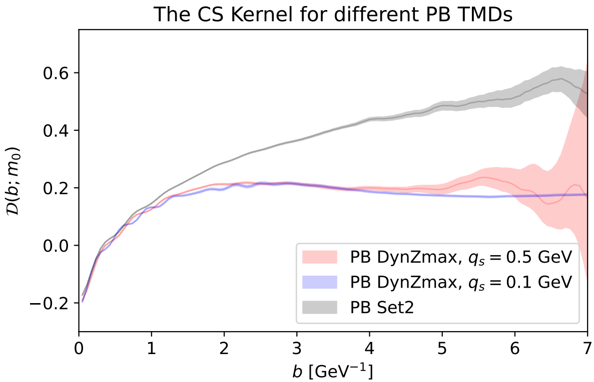
- The three calculations agree at large q_T (small b). The effect of the different TMDs comes at low q_T (large b)
- Dynamical Z max TMDs do not allow emissions with $q < q_0 = 1$ GeV $\rightarrow$ It creates a valley between q_0 and q_s in momentum space (a peak in b space for $b > 1$ GeV^{-1})

The CS kernel in CASCADE: PBSet2 vs Dynamical z_{max}



- All three TMDs and the different combinations agree at small b (pert. calculation)

The CS kernel in CASCADE: Flat behaviour at large b



- The dependence on b of the CS Kernel comes from emissions $q_0 < 1$ GeV
- We can observe that there is no dependence on the intrinsic k_T
- The CS Kernel extracted from PB DynZmax are consant at a value of $D \sim 0.2$

Conclusions

- We have extracted the CS Kernel for dynamical z max TMDs with $q_0 = 1$ GeV, which does not allow emissions below q_0
- The perturbative calculations ($b < 1$ GeV^{-1}) agree between the different TMDs
- The CS Kernel for dynamical z max TMDs saturate at $D \sim 0.2$, no dependence on b for $b > 1$ GeV^{-1}
- The flat behaviour arises from the fact that at low q_T the distribution is the same for different values of Q
- Could we derive an uncertainty using a variation of q_0 (q_{cut}) for dynamical z max (PBSet2) TMDs?

The End