

$$d\sigma(p\bar{p} \rightarrow D^* X) = \sum_{i,j,k} \int dx_1 dx_2 dz f_i^p(x_1) f_j^{\bar{p}}(x_2) \times \\ d\hat{\sigma}(ij \rightarrow kX) D_k^{D^*}(z) + \mathcal{O}(\alpha_s^{n+1}, (\frac{\Lambda}{Q})^p)$$

Q: hard scale, $p = 1, 2$

- $d\hat{\sigma}(\mu_F, \mu'_F, \alpha_s(\mu_R), \frac{m_h}{p_T})$: hard scattering cross sections free of long-distance physics $\rightarrow m_h$ kept
- PDFs $f_i^p(x_1, \mu_F), f_j^{\bar{p}}(x_2, \mu_F)$: $i, j = g, q, c$ [$q = u, d, s$]
- FFs $D_k^{D^*}(z, \mu'_F)$: $k = g, q, c$

\Rightarrow need short distance coefficients including heavy quark masses