1 Structure of the observable

In this document we report the relevant formulas for the computation of semi-inclusive deep-inelastic scattering (SIDIS) multiplicities under the assumption that the (negative) virtuality of the Q^2 of the exchanged vector boson is much smaller than the Z mass. This allows us to neglect weak contributions and write the cross section in TMD factorisation as:

$$\frac{d\sigma}{dxdQdzdq_T} = \frac{4\pi\alpha^2 q_T}{zxQ^3} Y_+ H(Q,\mu) \sum_q e_q^2 \int_0^\infty db\, b J_0\left(bq_T\right) \overline{F}_q(x,b;\mu,\zeta_1) \overline{D}_q(z,b;\mu,\zeta_2)\,, \tag{1.1}$$

with:

$$Y_+ = 1 + (1-y)^2 = 1 + \left(1 - \frac{Q^2}{xs}\right)^2\,, \tag{1.2}$$

and where:

$$\overline{F}_i(x,b;\mu,\zeta) = xF_i(x,b;\mu,\zeta) = R_q(\mu_0,\zeta_0 \rightarrow \mu,\zeta;b) \sum_j \int_x^1 dy\, \mathcal{C}_{ij}(y;\mu_0,\zeta_0) \left[\frac{x}{y} f_j\left(\frac{x}{y},\mu_0\right)\right]\,, \tag{1.3}$$

and:

$$\overline{D}_i(z,b;\mu,\zeta) = z^3 D_i(z,b;\mu,\zeta) = R_q(\mu_0,\zeta_0 \rightarrow \mu,\zeta;b) \sum_j \int_z^1 dy\, \left[y^2 \mathbb{C}_{ij}(y;\mu_0,\zeta_0)\right] \left[\frac{z}{y} d_j\left(\frac{z}{y},\mu_0\right)\right]\,, \tag{1.4}$$

are the distributions directly computed by APFEL++.

References