Parameterizations

We have fitted FF to new data from SLD, DELPHI, OPAL, ALEPH and TPC. For the user's convenience, we have obtained simple parameterizations of the x and Q^2 dependence of our FF. As usual, we introduce the scaling variable

$$\bar{s} = \ln \frac{\ln (Q^2/\Lambda^2)}{\ln (Q_0^2/\Lambda^2)}. \tag{1}$$

For Λ we use the $\overline{\rm MS}$ value appropriate to $N_f = 5$ flavours, since the parameterization would not benefit from the incorporation of discontinuities in $\bar{s}$. $\Lambda_{\overline{\rm MS}}^{(5)}$ is determined from our fit to be 88 MeV (213 MeV) in LO (NLO). We use three different values for Q_0, namely

$$Q_0 \quad = \quad \begin{cases} \sqrt{2}\ \text{GeV}, & \text{if} \quad a = u, d, s, g \\ m(\eta_c) = 2.9788\ \text{GeV}, & \text{if} \quad a = c \\ m(\Upsilon) = 9.46037\ \text{GeV}, & \text{if} \quad a = b \end{cases} . \tag{2}$$

This leads to three different definitions of $\bar{s}$. For definiteness, we use the symbol $\bar{s}_c$ for charm and $\bar{s}_b$ for bottom along with $\bar{s}$ for the residual partons.

We parameterize our FF by simple functions in x with coefficients which we write as polynomials in $\bar{s}$, $\bar{s}_c$, and $\bar{s}_b$. We find that the template

$$D(x, Q^2) = N x^\alpha (1 - x)^\beta (1 + \gamma/x) \tag{3}$$

is sufficiently flexible. For $\bar{s} = \bar{s}_c = \bar{s}_b = 0$, the parameterizations agree with the respective ansätze we used in our fits. The charm and bottom parameterizations must be put to zero by hand for $\bar{s}_c < 0$ and $\bar{s}_b < 0$, respectively. The resulting parameterizations correctly describe the AP evolution up to 5% for $Q_0 \leq Q \leq 100$ GeV and $0.1 \leq x \leq 0.8$. Deviations in excess of 5% may occur outisde these regions.