Chapter 1

Conclusions

We have performed a QCD analysis on hadronic τ decays to determine a value of α_s at the m_τ^2 scale without including DV. We have excluded DV to contrast the previous analysis of Boito et al.[**Boito2011a**, **Boito2012**, **Boito2014**], which stated the necessity of incorporating a model describing DV. To argument we employed a new set of analytic weights to probe the suppression of DV.

We compared seven selected fits of different weights with single, double and triple pinching. All fits gave similar values for the strong coupling and the dimension six and eight OPE contributions. The conclusion we take are that DV are sufficiently suppressed in the framework of FOPT in the V+A channel, even for single pinched weights. To extract precise values of the strong coupling no additional model is needed to account for DV as has been used by Boito et al.

For the kinematic weight and the weights carrying a monomial term x we performed fits using both, the BS and the FOPT approach. The fitted parameters of both frameworks show great compatibility. The fact that both frameworks yield similar results argues in favour of FOPT, as CIPT would give different values for the fitting parameters. Consequently we discourage the usage of CIPT and favour the usage FOPT and further underline the opinion of Beneke et al. [**Beneke2008**] in the debate of FOPT vs CIPT.

The final value for the strong coupling we obtained at the m_τ^2 scale is given by

$$\alpha_s(m_\tau^2) = 0.3261(51). \tag{1.0.1}$$

Running this value to the m_Z scale yields

$$\alpha_s(m_Z^2) = 0.1194(50), \tag{1.0.2}$$

which is comparable to the world average value of $\alpha_s(M_Z^2) = 0.1181(11)$ taken from the [**PDG2018**]. For the dimension six and eight OPE contributions we extracted values of

$$\rho^{(6)} = -0.68 \pm 0.20 \tag{1.0.3}$$

$$\rho^{(8)} = -0.80 \pm 0.38. \tag{1.0.4}$$