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On the accuracy of perturbation theory in QCD

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A collaborative effort to determine the Λ -parameter in 3-flavour QCD by the ALPHA collaboration is currently being finalized. The strategy involves 2 finite volume schemes for the coupling, both defined with Schroedinger functional (SF) boundary conditions. I here discuss the scale evolution from an intermediate scale $1/L_0$ of about 4 GeV to scales of $O(100)$ GeV using the traditional SF coupling and a 1-parameter family of close relatives. Our precise continuum extrapolated data allows for stringent tests of perturbation theory, which is then used to extract $L_0 * \Lambda$ with an error below 3 per cent. To quote such a small error with confidence, non-perturbative data is required around $\alpha_s = 0.1$. In particular, we have evidence that the apparent precision reached with data around $\alpha_s = 0.2$ can be misleading.

(cf. related talks by A. Ramos and R. Sommer)

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