

Perturbative heavy quark contributions to the anomalous magnetic moment of the muon

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We discuss a method for calculating the heavy quark vacuum polarisation contribution to the muon anomalous magnetic moment, a_μ , using perturbative QCD up to $\mathcal{O}(\alpha_s^3)$. This approach is independent of e^+e^- cross-section data allowing a fully theoretical evaluation of these contributions. This method confirms an existing result at lower orders in α_s and we state a new explicit analytic formula which includes terms up to $\mathcal{O}(\alpha_s^3)$. Numerically the charm quark contribution to a_μ is found to be $a_\mu^c = (14.5 \pm 0.2) \times 10^{-10}$ and the bottom contribution is $a_\mu^b = (0.302 \pm 0.002) \times 10^{-10}$. Our uncertainty estimates include both parametric uncertainties, arising from \hat{m}_q and $\alpha_s(\hat{m}_q)$, and theoretical uncertainties in the perturbative expansion. Comparison is then made between these results and those from alternative approaches such as, lattice QCD, or based on a dispersion relation and cross-section data.

What is your topic?

Anomalous Magnetic Moment of the muon

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