

PRECISION QUANTUM CHROMODYNAMICS FROM HEAVY QUARK
EXPANSIONS

Abstract

by

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The heavy quark expansion is applied to the semileptonic width of $b \rightarrow c$ and $b \rightarrow u$ transitions along with the moments of various decay distributions in the semileptonic $b \rightarrow c$ transitions. The resulting expressions can be used to improve the precision with which we can extract the values of the CKM matrix elements V_{cb} and V_{ub} from the data. Heavy quark parameters like m_b and [Special characters omitted.] are also obtained with values that are completely consistent with theoretical expectations. The observed agreement between the theoretical predictions of the heavy quark expansion and the experimental data tightly constrain the theoretical uncertainty. The heavy quark expansion can also be applied to the photon energy moments in $B \rightarrow X_s \gamma$. The first two of these moments are directly related to m_b and [Special characters omitted.] . The experimentally imposed cuts on the photon energy spectrum introduce biases into the extracted values of these parameters. Correcting for these biases generates a remarkable agreement with the experimental data