

Pushing the Heavy Quark Expansion for $b \rightarrow c\ell\bar{\nu}$ to higher order in $1/m_b$

Friday 19 July 2024 09:00 (15 minutes)

The Heavy Quark Expansion (HQE) has become the major tool to perform precision calculations for inclusive heavy hadron decays. With this method, V_{cb} has been extracted with percent-level precision from moments of $B \rightarrow X_c\ell\bar{\nu}$. The HQE is an expansion in $1/m_b$ and introduces nonperturbative HQE matrix elements which can be extracted from data.

To further increase the theoretical precision, we recently pushed the expansion to $1/m_b^5$. We focused on reparametrization invariant (RPI) observables, which depend on a reduced set of HQE parameters. Specifically, at $1/m_b^5$, “intrinsic charm” (IC) contributions proportional to $1/(m_b^3 m_c^3)$ enter, which are numerically expected to be sizeable.

I will show how the $1/m_b^5$ contribute to the q^2 moments of $B \rightarrow X_c\ell\bar{\nu}$ decays. We found that the total $1/m_b^5$ contributions may not be as sizeable as expected. I will discuss how this may impact a future inclusive V_{cb} determination.

Alternate track

I read the instructions above

Yes

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