Contribution ID: **12** Type: **not specified**

Inclusive $B \to X_c \ell \bar{\nu}$ to order 1/m^5 and the precision determination of Vcb

Tuesday, October 17, 2023 9:00 AM (30 minutes)

The Heavy Quark Expansion has become the major tool for precision calculations for inclusive heavy hadron decays. The HQE is an expansion in $1/m_b$. Recently, moments of the dilepton spectrum of inclusive $B \to X_c \ell \bar{\nu}$ were used to precisely extract the CKM matrix element V_{cb}. Usually, one assumes that the charm quark is heavy, leading to $\Lambda_{\rm QCD}^n/m_c^n$-contributions. A consistent power counting therefore needs to be set up. Numerically, we find that $m_c^2 \sim m_b \Lambda_{\rm QCD}$. Therefore, m_c^2 should be counted as one power of m_b. Consequently, we need to include $1/m_b^3 \cdot 1/m_c^2$-contributions to complete the existing calculation at $\mathcal{O}(1/m_b^4)$, which we will present here.

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Session Classification: Young Scientists Talks