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NLO QCD corrections to inclusive $b \rightarrow c\ell\bar{\nu}$ decay spectrum up to $1/m_b^3$

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We present analytical results for higher order corrections to the decay spectrum of inclusive semileptonic heavy hadron weak decays using the heavy quark expansion (HQE). We describe the analytical computation of the spectrum of the leptonic invariant mass for $B \rightarrow X_c \ell \bar{\nu}$ up to terms of order $1/m_b^3$ within the HQE at next-to-leading order (NLO) in α_s . The full dependence of the differential rate on the mass of the final-state quark is taken into account. We discuss the implications of our results for the precision determination of the CKM matrix element $|V_{cb}|$.

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