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The B^+ - B^0_d Lifetime Difference At NNLO

Monday, July 21, 2025 3:00 PM (20 minutes)

We study the QCD corrections to the spectator effects in the lifetimes of weakly decaying heavy hadrons containing a bottom quark in the framework of the Heavy Quark Expansion (HQE). These effects come from the contribution of dimension-6 four-quark effective operators which, despite being $\frac{1}{m_b^3}$ suppressed, receive a phase-space enhancement. In our work, we neglect the light-quark masses and keep only the charm-quark mass, together with the bottom quark mass. The resulting masters integrals are then expressed in terms of an expansion in $x = \frac{m_c}{m_b}$. We present the state-of-the-art of our calculation of the Next-to-Next-to-Leading-Order Wilson coefficients that are obtained by matching the weak Hamiltonian with $\Delta B = 1$ operators onto an effective $\Delta B = 0$ Hamiltonian.

Author: MORETTI, Francesco (TTP)

Presenter: MORETTI, Francesco (TTP)

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