

B mesons lifetimes within the HQE

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The heavy quark expansion (HQE) provides a well established framework to compute inclusive decay widths of heavy hadrons in terms of a systematic expansion in inverse powers of the constituent heavy quark mass. By including for the first time the contribution of the Darwin operator, $SU(3)_F$ breaking corrections to the matrix element of dimension-six four-quark operators and the so-called eye-contractions, we update the SM predictions, based on the HQE, of the total widths of the B^+ , B_d , and B_s mesons, as well as of the lifetime ratios $\tau(B^+)/\tau(B_d)$ and $\tau(B_s)/\tau(B_d)$. Overall we find very good agreement with the corresponding experimental determinations, however, the prediction of $\tau(B_s)/\tau(B_d)$ is particularly sensitive to the value of the Darwin parameter and of the size of $SU(3)_F$ breaking in the non-perturbative input, which are so far still poorly constrained, leading to some tension in specific scenarios.

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