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Precise Predictions for Semi-leptonic Heavy-to-light Decays

We present the first complete $\mathcal{O}(\alpha_s^2)$ and $\mathcal{O}(\alpha_s^3)$ perturbative QCD corrections to all Heavy-to-light structure functions underlying the triple-differential semi-leptonic decay rates of heavy quarks. In particular, we presented the so-far most accurate theoretical predictions for the Top and Bottom quark semi-leptonic decay widths, including the currently known electroweak corrections, the error of which meets the request by current and future lepton colliders. Other than the cutting-edge precision results, theoretically novel observations and fresh insights are made regarding heavy-quark masses and decays.

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