

Production and Decay of Top Quarks at Lepton Colliders at N3LO in QCD

Thursday, 16 November 2023 14:20 (20 minutes)

In this talk we will discuss the recent processes in the calculation of the high-order perturbative corrections to the semi-inclusive production and decay of top quarks at lepton colliders at N3LO in QCD. In particular, the talk will be focusing on the first high-precision calculation of the complete QCD corrections to the top-quark decay width Γ_t , W -helicity fractions and semi-inclusive distributions to the third order in the strong coupling constant α_s . We find, in particular, that the pure $\mathcal{O}(\alpha_s^3)$ correction decreases Γ_t by 0.8% of the previous $\mathcal{O}(\alpha_s^2)$ result, exceeding considerably the error estimated by the usual scale-variation prescription. With this critical piece of correction included, we arrive at the to-date most precise theoretical prediction which meets the envisaged precision request by future hadron and lepton colliders.

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