## 18th International Workshop on Top Quark Physics (TOP2025)



Contribution ID: 2

Type: Poster

## Top decay width at NNNLO in QCD

We present the first analytic results of next-to-next-to-next-to-leading-order (N3LO) QCD corrections to the top-quark decay width. We focus on the dominant leading color contribution, which includes light-quark loops. At next-to-next-to-leading order (NNLO), this dominant contribution accounts for 95% of the total correction. By utilizing the optical theorem, the N3LO corrections are related to the imaginary parts of the four-loop self-energy Feynman diagrams, which are calculated with differential equations. The results are expressed in terms of harmonic polylogarithms, enabling fast and accurate evaluation. The third-order QCD corrections decrease the leading-order decay width by 0.667%, and the scale uncertainty is reduced by half compared to the NNLO result. The most precise prediction for the top-quark width is now 1.321 GeV for mt= 172.69 GeV.

## Field

Pheno

Authors: Prof. LI, Hai Tao (Shandong University); Prof. WANG, Jian (Shandong University)Presenter: Prof. WANG, Jian (Shandong University)