

# Precision QCD corrections to semileptonic $B$ decays

Wednesday, September 25, 2024 2:00 PM (30 minutes)

In this talk, I will review recent advancements in the calculation of QCD higher-order corrections for semileptonic  $B$  decays. Specifically, I will present the next-to-next-to-leading-order corrections to the  $q^2$  spectrum of the inclusive decay  $B \rightarrow X_c l \bar{\nu}_l$ , which can be utilized to incorporate the recent measurements of  $q^2$  moments by Belle and Belle II into global fits of inclusive semileptonic  $B$  decays. Additionally, I will discuss recent results for the third-order corrections to the total width of  $b \rightarrow ul\bar{\nu}_l$  decays. These corrections are crucial for evaluating the phase-space ratio  $C = |V_{ub}/V_{cb}|^2 \Gamma(B \rightarrow X_c l \bar{\nu}_l) / \Gamma(B \rightarrow X_u l \bar{\nu}_l)$ , which appears as normalization factor in the branching ratios of  $B$  decays mediated by  $b \rightarrow s$  transitions, such as  $B \rightarrow X_s \gamma$  and  $B \rightarrow X_s l^+ l^-$ .

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