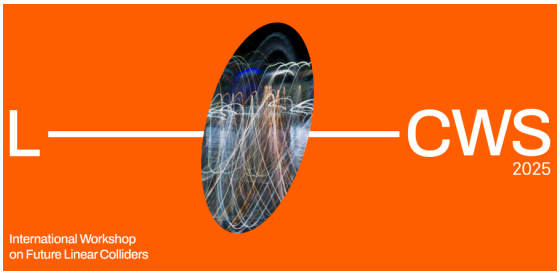

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Flavor tagging at Belle II

Wednesday 22 October 2025 13:00 (15 minutes)

We report on a new flavor tagging algorithm developed to determine the quark-flavor content of bottom mesons at Belle II. Our new end-to-end algorithm, TFlat, uses transformer blocks to predict the flavor of neutral mesons produced in decays. It improves previous algorithms by using the information from all charged and neutral final-state particles. In contrast to previous algorithms, TFlat only employs low level features from tracks and neutral clusters like their momentum in the center of mass frame and particle identification information. The algorithm then learns a contextualized representation needed to predict the flavor of the tag side B meson. We validate and evaluate the performance of the algorithms using hadronic decays with flavor-specific final states reconstructed in simulated data. We measure the total effective tagging efficiency to be $\epsilon_{\text{eff}} = 43.4 \pm 0.07$ for TFlat and $\epsilon_{\text{eff}} = 38.4 \pm 0.07$ for the current graph neural network based flavor tagger.

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