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Measuring Tau Identification Efficiency in $t\bar{t}$ Events Using the ATLAS Detector

Monday 7 April 2025 19:40 (20 minutes)

This poster presents a study on the tau (τ) identification efficiency in $t\bar{t} \to \ell\tau_{\text{had}}\nu\bar{\nu}b\bar{b}$ events, using 29 fb^{-1} of proton-proton collision data at $\sqrt{s} = 13.6$ TeV, recorded by the ATLAS detector during LHC Run-3. A tag-and-probe method is applied to measure the efficiency of the RNN-based tau-ID algorithm, focusing on hadronically decaying tau leptons (τ_{had}) in events enriched with top quark-antiquark pairs.

Key distributions, such as transverse momentum (p_T) and pseudorapidity (η) of τ_{had}, along with RNN scores, are analyzed to evaluate the algorithm's performance. Scale factors for τ-ID are extracted through simultaneous fitting, incorporating systematic uncertainties and nuisance parameters. The results provide insight into tau-ID performance in a challenging $t\bar{t}$ environment, offering valuable contributions to precision modeling of tau decay processes in the ATLAS experiment.

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