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Identifying merged tracks in Dense Environments using multivariate analysis

Tracking in high density environments, particularly in high energy jets, plays an important role in many physics analyses at the LHC. In such environments, it is possible that two highly collinear particles contribute to the same hits as they travel through the ATLAS pixel detector and semiconductor tracker. If the two particles are sufficiently collinear, it is possible that only a single track candidate will be created, denominated a "merged track", leading to a decrease in tracking efficiency. This study details a novel technique based on multivariate analysis to classify reconstructed tracks as merged. An application of this new method is the recovery of the number of reconstructed tracks in high transverse momentum three-pronged tau decays, leading to an increased tau reconstruction efficiency. The technique is also applied to simulated boosted jets for validation.

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Track Classification: 3: Advanced usage of tracks