



Contribution ID: 5

Tür: **Belirtilmemiş**

Particle Analysis with Classification-based Machine Learning Approach

15 Ekim 2023 Pazar 16:35 (25 dakika)

Machine learning (ML) models have become significant tools in various scientific disciplines, enabling researchers to derive valuable insights from complex and large datasets. Particle physics experiments generate vast amounts of data, requiring complicated analysis techniques for understanding elementary particles and their interactions. Classification-based ML techniques can effectively unravel intricate patterns and relationships within particle collisions. In this study, the significance of classification algorithms in the context of particle analysis will be presented. The immense potential of the classification-based ML approach in enhancing particle analysis will be demonstrated by the determination of W bosons in proton-proton collisions at $\sqrt{s}=7$ TeV collected by CMS at the LHC. The ability of the classification approach to accurately identify and categorize the vector bosons based on their characteristic features will be discussed. This study underlines the impact of ML classification algorithms in particle physics which enhance the high-energy physics analysis.

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