ID de Contribution: **29** Type: **Non spécifié**

Identification of highly Lorentz-boosted Higgs bosons decaying to ττ jets in the ATLAS experiment

lundi 1 décembre 2025 11:15 (25 minutes)

The Higgs boson pair production (HH) takes center stage in the LHC physics program. Vector Boson Fusion (VBF), the second largest production mode of HH, represents a probe to the Higgs boson doublet structure in the Standard Model and to physics beyond it. Studying HH via VBF is particularly interesting in the boosted topology which is sensitive to anomalous couplings of two Higgs bosons to two vector bosons. However, the low VBF HH cross section, of the order of fb, makes it a very challenging process to analyze that requires high-performance reconstruction and identification techniques to collect as many signal events as possible. In this quest, state-of-the-art machine learning tools brought significant improvements in jet flavour-tagging. To identify boosted $H \to b\bar{b}$ and $H \to c\bar{c}$ decays, reconstructed as single large-radius jets, the GN2X model was developed in ATLAS, based on transformer's features that capture deep correlations between the components of the jet. $H \to \tau^-\tau^+$ events (especially fully-hadronic di-tau decays) also show up as jets in the detector which led to a natural extension of the existing method, called GN2XTau (now GN3X for the latest generation). The performance achieved for the rejection of the main backgrounds is expected to enable an efficient study of highly-boosted $H \to \tau^-\tau^+$ signatures such as those existing in VBF boosted HH production where this method is planned to be applied in future analyses, particularly in one of the most sensitive HH channels, HH $\to b\bar{b}\tau^-\tau^+$.

Auteur: COMBES, Inès (Université Paris-Saclay (IJCLab))

Orateur: COMBES, Inès (Université Paris-Saclay (IJCLab))

Classification de Session: Standard Model

Classification de thématique: Standard Model