Contribution ID: **243**   Type: **talk**

ATLAS pixel cluster splitting using Mixture Density Network

Tuesday 13 July 2021 15:30 (15 minutes)

The high collision energy and luminosity of the LHC allow studying jets and hadronically-decaying tau leptons at extreme energies with the ATLAS detector. These signatures lead to topologies with charged particles, which are reconstructed as tracks with the ATLAS inner detector, at an angular separation smaller than the size of a charge cluster in the ATLAS pixel detector, forming merged pixel clusters. In the presence of these merged clusters, the track reconstruction efficiency is reduced, as hits can no longer be uniquely assigned to individual tracks. Well-defined tracks are very important for many analyses. To partially recover the track reconstruction efficiency loss, a neural network (NN) based approach was adopted in the ATLAS pixel detector in 2011 to split the merged clusters by estimating particle hit multiplicity, hit positions, and associated uncertainties. An improved algorithm based on Mixture Density Networks (MDN) shows promising performance and will be used in the ATLAS inner detector track reconstruction in Run-3. An overview of the MDN algorithm and its performance will be highlighted in this presentation. This talk will also show a performance comparison between the Run-2 NN and Run-3 MDN.

Are you are a member of the APS Division of Particles and Fields?

No

Authors: CHKODROV, Alexander (University of Washington Seattle); CHEN, Boping (Tel Aviv University (IL)); KHODA, Elham E (University of Washington (US)); KACHARIA, Saransh (University of Washington)

Presenters: CHEN, Boping (Tel Aviv University (IL)); KHODA, Elham E (University of Washington (US))

Session Classification: Computation, Machine Learning, and AI

Track Classification: Computation, Machine Learning, and AI