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Machine Learning Techniques for selecting Forward Electrons $(2.5 < \eta < 3.2)$ with the ATLAS High Level Trigger

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The ATLAS detector at CERN measures proton proton collisions at the Large Hadron Collider (LHC) which allows us to test the limits of the Standard Model (SM) of particles physics. Forward moving electrons produced at these collisions are promising candidates for finding physics beyond the SM. However, the ATLAS detector is not construed to measure forward leptons with pseudorapidity η of more than 2.5 with high precision. The ATLAS performance for forward leptons can be improved by enhancing the trigger system. This system selects events of interest in order to not overwhelm the data storage with the information of around 1.7 billion collisions per second. First studies using the Neural Ringer algorithm for selecting forward electrons with $2.5 < \eta < 3.2$ show promising results. The Neural Ringer using machine learning to analyse detector information to distinguish electromagnetic from hadronic signatures, is being presented. Additionally, its performance on simulated ATLAS Monte Carlo samples in improving the high level trigger for forward electrons will be shown.

Experiment context, if any

The ATLAS experiment.

References

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Significance

This presentation covers the performance evaluation of the NeuralRinger algorithm in selecting electrons in more forward regions (|eta|>2.5) than online electrons are currently triggered within the ATLAS experiment at LHC. A special focus will be laid on the machine learning aspects used for it and not on some general performance of the ATLAS electron trigger.

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