Contribution ID: **51** Type: **not specified**

Luminosity studies with Pixel Cluster Counting at the ATLAS experiment

An accurate luminosity measurement is essential for the ATLAS physics programme at the LHC. Luminosity quantifies the total number of proton-proton interactions in a dataset and by measuring it physicists are able to evaluate probabilities of interesting processes and predict background rates. ATLAS subdetectors sensitive to the number of particles produced in proton interactions are used to design algorithms for measurements of the luminosity.
In this project, we will study the performance of the Pixel Cluster Counting (PCC) algorithm, which counts the clusters generated in the ATLAS Pixel detector by the charged particles produced in a collision. The student will learn how to process ATLAS Run-3 data and extract information on pixel clusters using the software tools of the Athena framework. Pixel data will be then analysed to optimise the selection of primary clusters suppressing the associated backgrounds from material effects and noisy pixels. Additional studies of the PCC linearity with the luminosity and comparisons with alternative algorithms will also be investigated.
In this context, the student will learn how to perform a data analysis using Python libraries such as NumPy, Pandas, and SciPy within the framework of Jupyter Notebooks.

Group

FH - ATLAS

Project Category

B1. Physics Data Analysis and Performance (software-oriented)

Special Qualifications

Basic knowledge of Python and C++ programming

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