

# Advanced Clustering and Tracking Algorithms in the Pixel Detector

The pattern recognition algorithms currently in use by the ATLAS experiment utilize only a fraction of the information produced by the inner detector that could be useful in reconstructing tracks with the highest purity and efficiency. In particular, the cell geometry and excellent charge calibration of the pixel detector provide extra constraints on the correct association of clusters of pixel hits with track candidates that are completely ignored by current tracking algorithms.

The goal of this project is to investigate the use of detailed information about the charge distributions within pixel clusters to provide improved and more flexible pattern recognition for charged particles in ATLAS. The first task is the study of correlations between the attributes of tracks and the characteristics of the hits they produce in the pixel detector using readily available datasets.

This project builds on previous work; the SLAC group has been actively participating in an effort within ATLAS to use detailed cluster information to improve estimates of hit positions in dense environments. This project would continue this work with the "ATLAS Pixel Clusterization Task Force" and would give a student the opportunity to participate in and report results to regular meetings of this group.

Please contact [Tim Nelson](#) for more information regarding this project.