

# Implement NN Pixel Clustering in ATLAS Inner Detector Trigger for b-jet Signature

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**Abstract:** This study has finished the implementation of NN pixel Clustering algorithm of Athena release 22 in the ATLAS Inner Detector Trigger analysis framework for the b-jet signature. An improvement in the tracking efficiency is observed in release 22 offline tracking. The study also helps to improve the tracking efficiency by modifying the truth level tracking information.

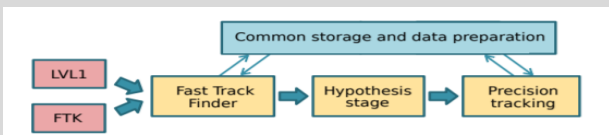
## Introduction

### Fast Track Finder(FTF)

Seeded with spacepoint triplets and runs combinatorial track (Kalman Filter)  
Trigger-specific algorithms for seeding and track fit

### Precision Tracking (PT)

Reuse PatRec from FTF to seed ambiguity solver directly



Layout of the inner detector tracking trigger in Run 2

## Optimization

Ambiguity\_Processor: SimpleAmbiguityProcessorTools->DenseEnvironmentsAmbiguityProcessorTool

InDetTrigAmbiTrackSelectionTool: 'doPixelSplitting': True

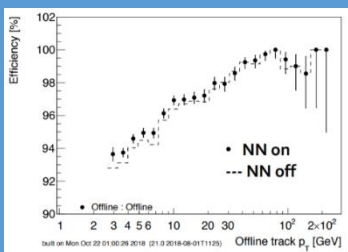
AmbiguityScoreProcessorTool: SplitProbTools:  
NnPixelClusterSplitProbTool/TrigNnPixelClusterSplitProbTool

TrigNnPixelClusterSplitProbTool: NnClusterizationFactory:  
NnClusterizationFactory/TrigNnClusterizationFactory

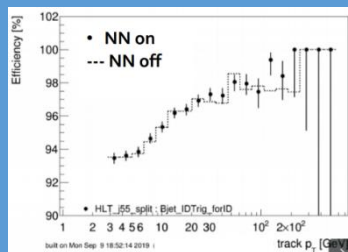
TrigNnClusterizationFactory: useTTrainedNetworks: True

Using new configurations for bjet signature

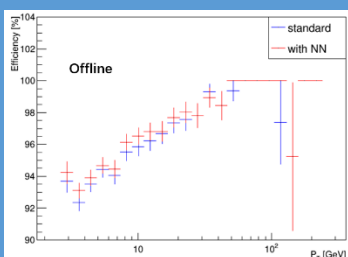
## Before Optimization



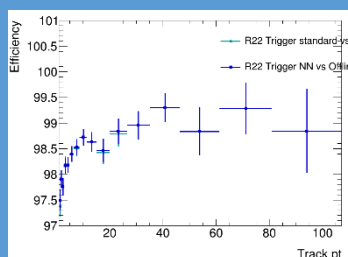
Release 21 Offline



Release 21 Online

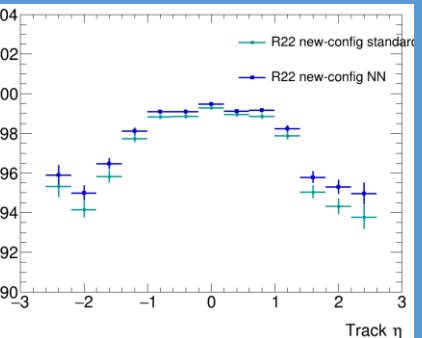
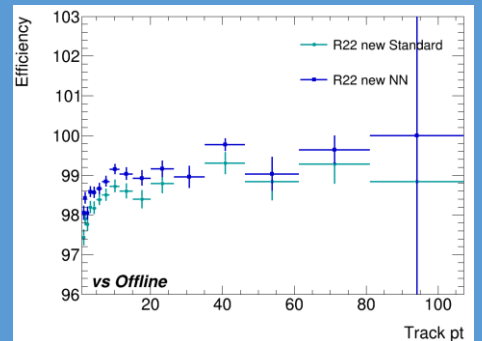


Release 21 Offline



Release 22 Online

## After Optimization



Release 22 Online

## Summary

Improvement in tracking efficiency in jet pt and eta is observed in MC testing samples.

Need to testify the improvements of NN with data-reprocessing with NN on

## Acknowledgement

This study is supervised by Katherine Pachal who offered great help. Mark Sutton has also provided with technical advises to this project.