

Optimisation of isolation WPs in Run3

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Outline

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Qualification task

Title: Optimisation of isolation WPs in Run3

Description

- Distinguish muons from prompt sources from non-prompt and fake ones.
- Improve robustness against higher pile-up while maintaining good performance for prompt muon selection.
- explore possible dependencies on event topology such as $Z \rightarrow \mu\mu$ and $t\bar{t}$ events.

OTP task ID: 532774 sub-task ID: 556633.

Proposed beginning of qualification: 01/02/2026

<https://its.cern.ch/jira/browse/ATLASMCP-295>



Introduction

In this presentation, I worked on subsection 8.3, "Studies on jet modelling uncertainty: Powheg+Pythia vs. Powheg+Herwig vs. Sherpa," from the documentation: [here](#)

Variables

- We measure the isolation efficiency of muons from $Z \rightarrow \mu^+ \mu^-$ decays as a function of the average number of interactions per crossing ($\langle \mu \rangle$).
- **Working points:** Loose, Tight, PFlowLoose, PFlowTight.



Technical details

- Software: AnalysisBase,25.2.89
- ROOT Version: 6.36.04
- MC23d, tag:r15530, DAOD_MUON1 format, DSID: 601190.
- Data23, Run number: 455975, Stream: physics_Main, Period: 2023 G.
- Package:fastMuonChecker
- Generator:Pythia ,Sherpa



Isolation efficiency for interactions muons satisfying the Tight isolation criteria

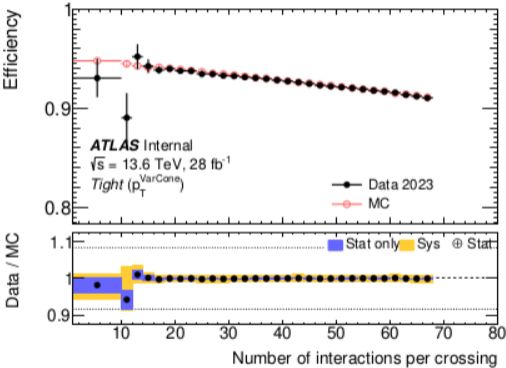


Figure: Original plot

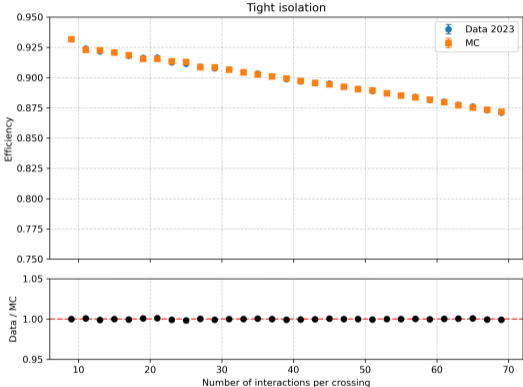


Figure: Reproduced plot



```
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://se-goegrid.gwdg.de//pnfs/gwdg.de/data/atlas/atlasdatadisk/rucio/data23_13p6TeV/ae/73/DAOD_MUON1.46744774._000172.pool.root.1
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://xrootd.aglt2.org//pnfs/aglt2.org/atlasdatadisk/rucio/data23_13p6TeV/ae/73/DAOD_MUON1.46744774._000172.pool.root.1
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://se-goegrid.gwdg.de//pnfs/gwdg.de/data/atlas/atlasdatadisk/rucio/data23_13p6TeV/b7/0b/DAOD_MUON1.46744774._000173.pool.root.1
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://xrootd.aglt2.org//pnfs/aglt2.org/atlasdatadisk/rucio/data23_13p6TeV/b7/0b/DAOD_MUON1.46744774._000173.pool.root.1
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://se-goegrid.gwdg.de//pnfs/gwdg.de/data/atlas/atlasdatadisk/rucio/data23_13p6TeV/86/de/DAOD_MUON1.46744774._000174.pool.root.1
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://xrootd.aglt2.org//pnfs/aglt2.org/atlasdatadisk/rucio/data23_13p6TeV/86/de/DAOD_MUON1.46744774._000174.pool.root.1
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Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://se-goegrid.gwdg.de//pnfs/gwdg.de/data/atlas/atlasdatadisk/rucio/data23_13p6TeV/f1/e3/DAOD_MUON1.46744774._000176.pool.root.1
Error in <TChain::LoadTree>: Cannot find tree with name fastTree in file root://xrootd.aglt2.org//pnfs/aglt2.org/atlasdatadisk/rucio/data23_13p6TeV/f1/e3/DAOD_MUON1.46744774._000176.pool.root.1
```



Back Up



Instructions to reproduce the results

```
setupATLAS  
voms-proxy-init -voms atlas  
lsetup pyAMI panda rucio  
asetup AnalysisBase,25.2.89
```

