

Performance of Standalone Muons in Run 3



Analysis Meeting AG Biebel

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Introduction

- Investigating the reconstruction efficiency and resolution of Standalone (SA) muons in Run 3 (QT study)
- Open Items from [previous presentation](#):
 - Fake Rate
- Today:
 - Fake Rates first results

Datasets and Muon selection

- Samples used for this study:

mc20_13TeV.410470.PhPy8EG_A14_ttbar_hdamp258p75_nonallhad.deriv.DAOD_MUON1.e6337_s3681_r13167_p6380

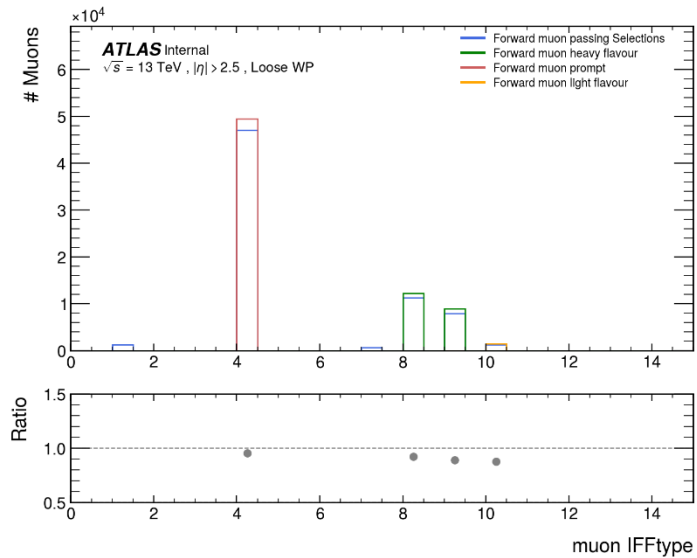
mc23_13p6TeV.601229.PhPy8EG_A14_ttbar_hdamp258p75_SingleLep.recon.AOD.e8514_s4162_r15540

mc23_13p6TeV.601229.PhPy8EG_A14_ttbar_hdamp258p75_SingleLep.recon.AOD.e8514_s4159_r15530

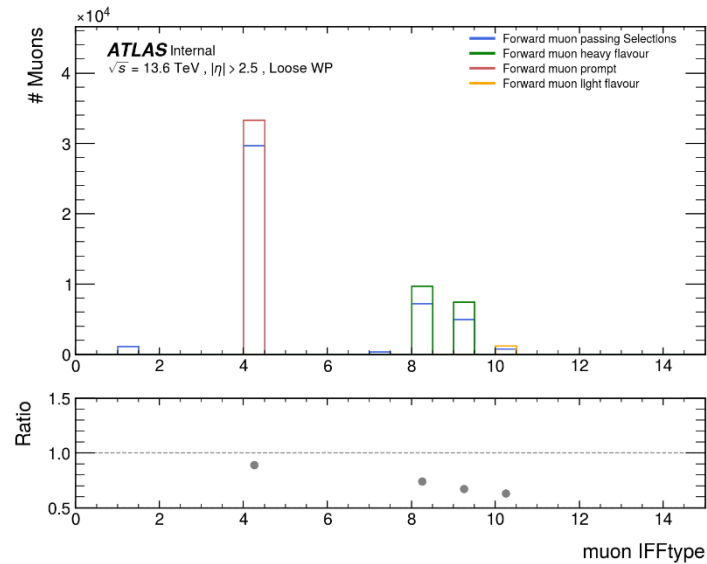
- Analysis done on ntuples produced from these samples with [MuonxAODAnalysis](#)
- Selected Muons (based on [arXiv:2012.00578v2](#)):
 - Forward Muon: $|\eta| > 2.5$ and `nprecisionLayers > 2`
 - Tested Loose and Medium identification WP

Plots – Fake Rates

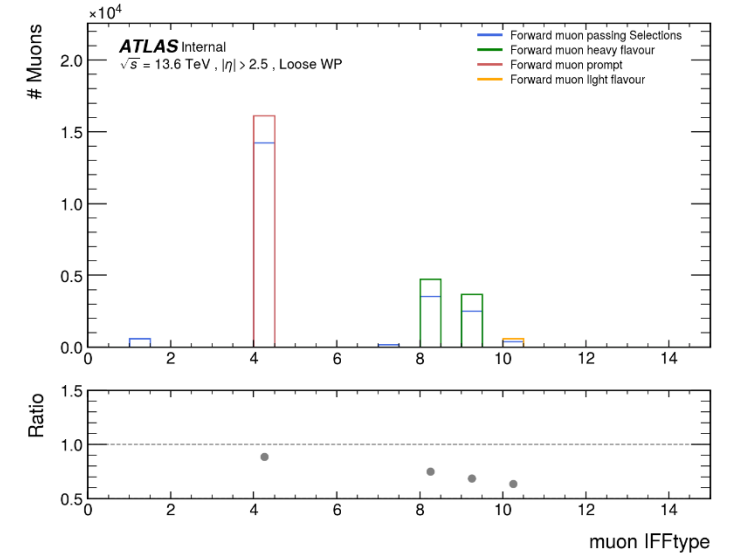
MC 20 a



MC 23 a



MC 23 d



Why is the Rate for Run 2 much better than Run 3 ?

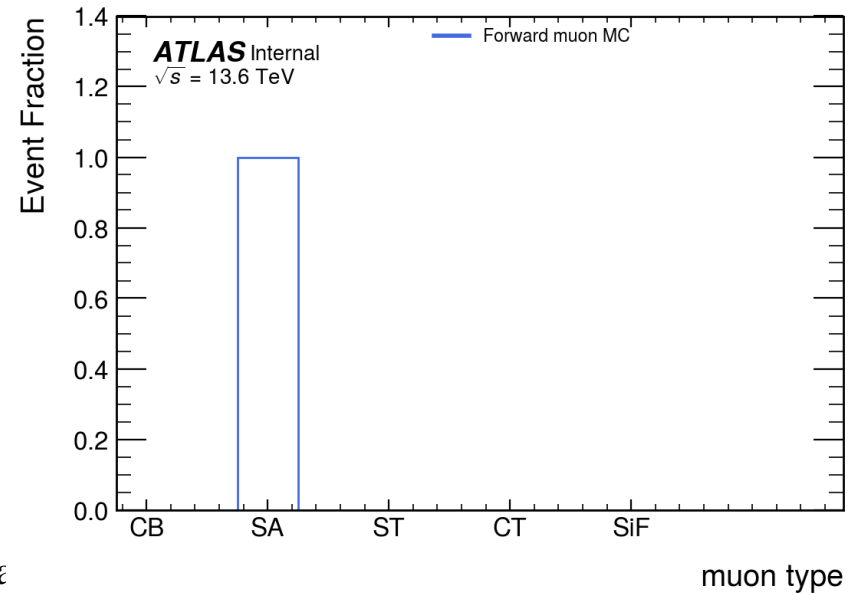
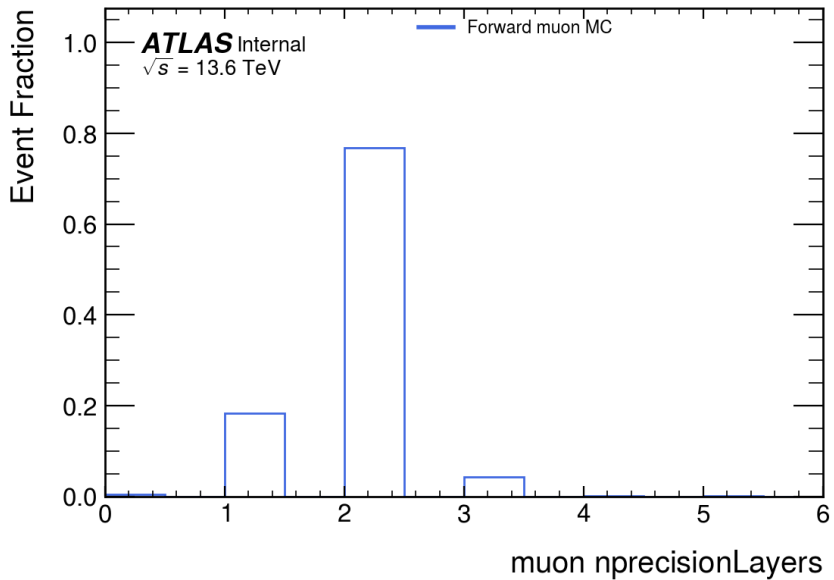
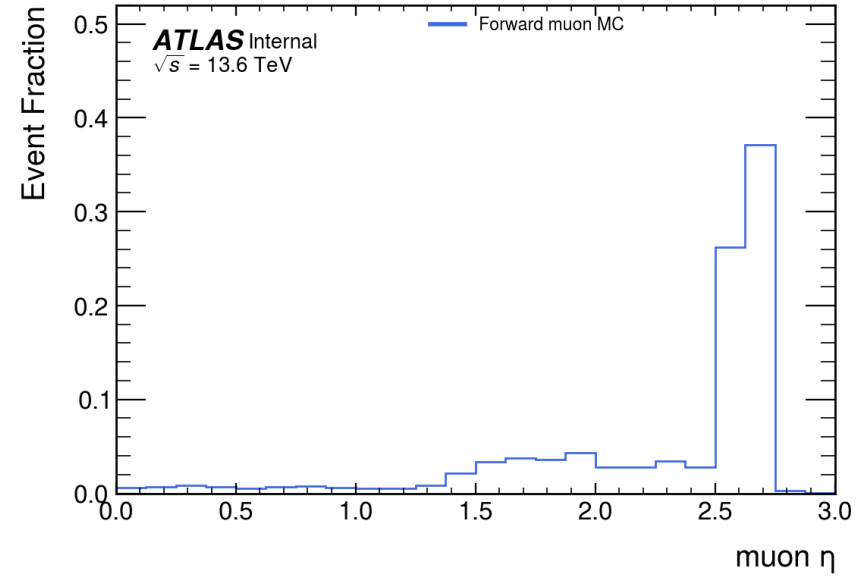
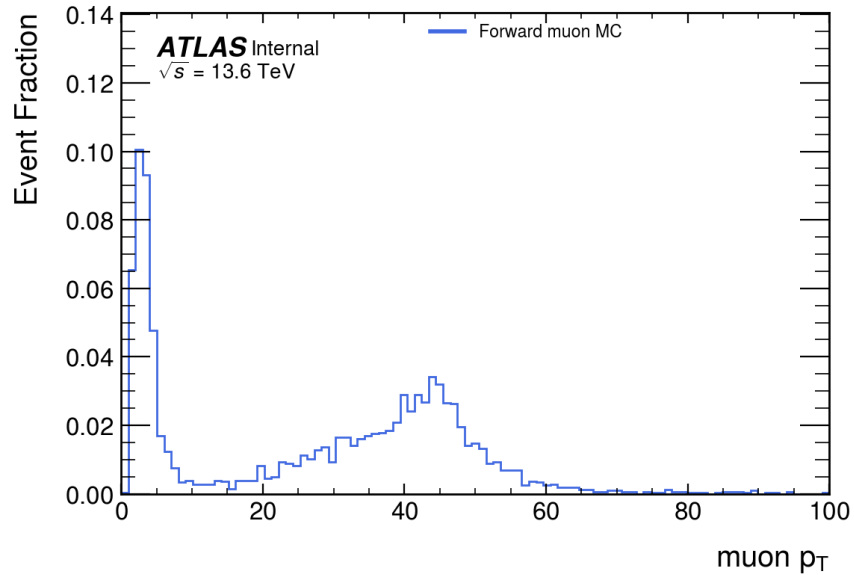
Conclusion

- Started using MuonxAOD to produce the investigated ntuples
- Most distributions overlap for Data23 and MC23c
- nprecisionLayers fixed
- New mass cut implemented
- Identification WP's investigated
- Fake Rate tested for different selections

- Open Questions:
 - Why do the rates look better for Run 2 compared to Run 3?
 - Is it useful to investigate a sample for mc23c aswell?

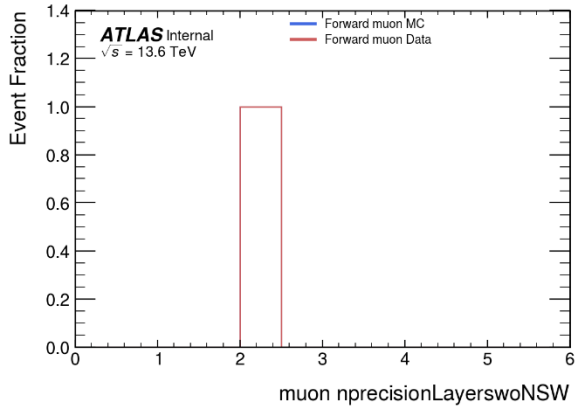
BackUp

Additional Plots – SA Muon Type

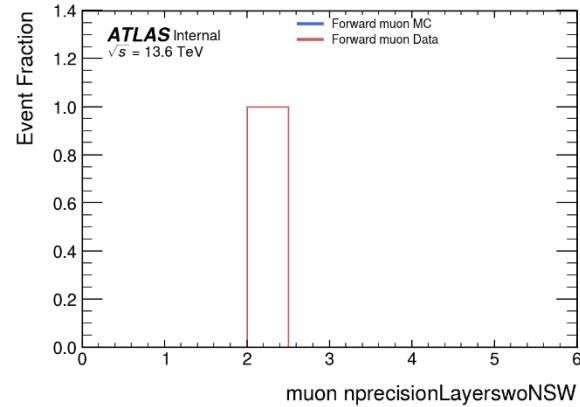


Additional Plots – Test Eta Range

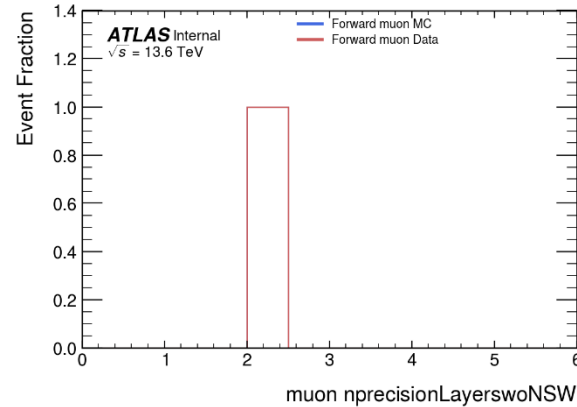
$|\eta| \geq 2.4$



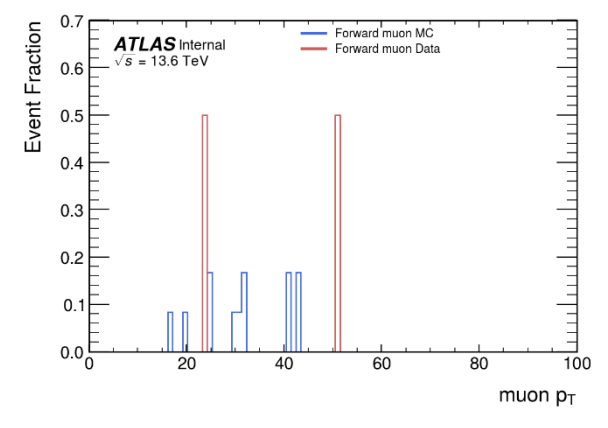
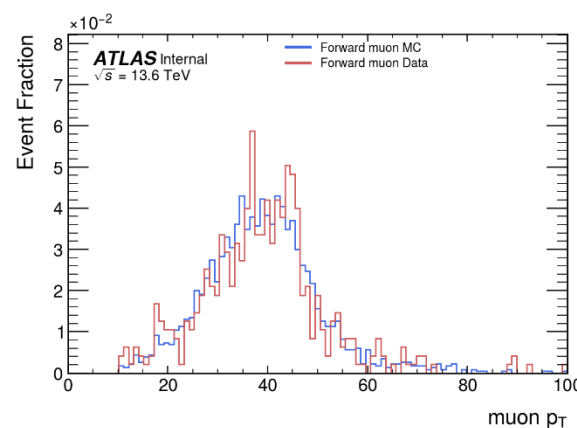
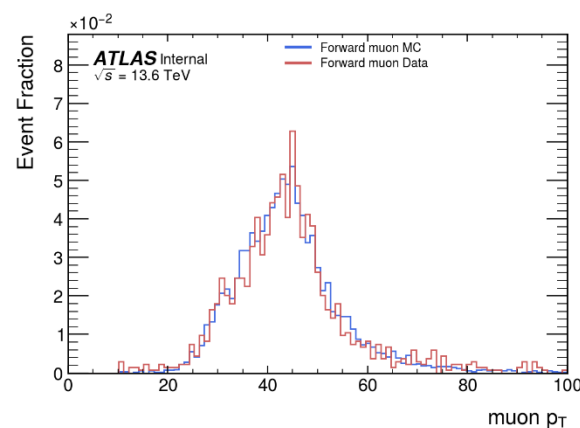
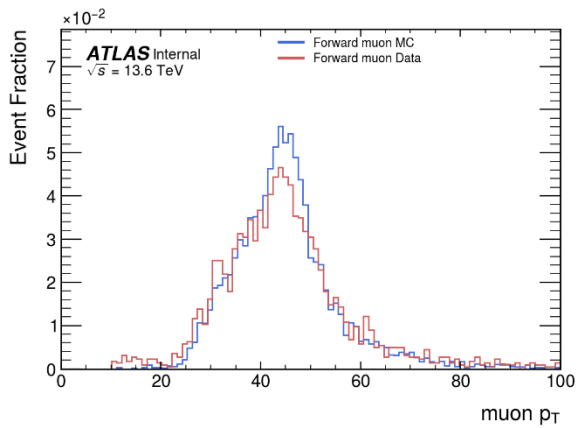
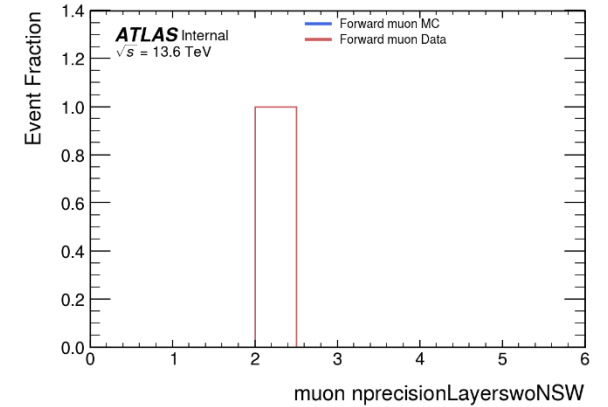
$|\eta| \geq 2.5$



$|\eta| \geq 2.6$



$|\eta| \geq 2.7$



Datasets and Muon selection

- Samples used for this study:
data23_13p6TeV.00451094.physics_Main.merge.AOD.r14858_p5785
data23_13p6TeV.00452163.physics_Main.merge.AOD.r14858_p5785
mc23_13p6TeV.601190.PhPy8EG_AZNLO_Zmumu.recon.AOD.e8514_s4159_r14799
- Analysis done on ntuples produced from these samples with [MuonxAODAnalysis](#)
- Selected Muons (based on [arXiv:2012.00578v2](#)):
 - Central Muon: $p_T > 25 \text{ GeV}$ and $|\eta| < 2.5$
 - Forward Muon: $p_T > 10 \text{ GeV}$, $|\eta| > 2.5$ and $n_{\text{precisionLayers}} > 2$

Previous Presentations

- [July 10th 2024](#)
- [July 24th 2024](#)