# Progress update on tracking efficiencies

Martin Tat

Heidelberg University

3rd February 2026



UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386

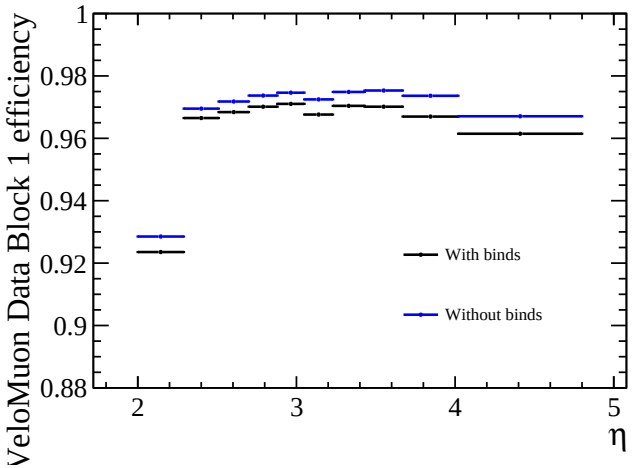
# Recap from last time

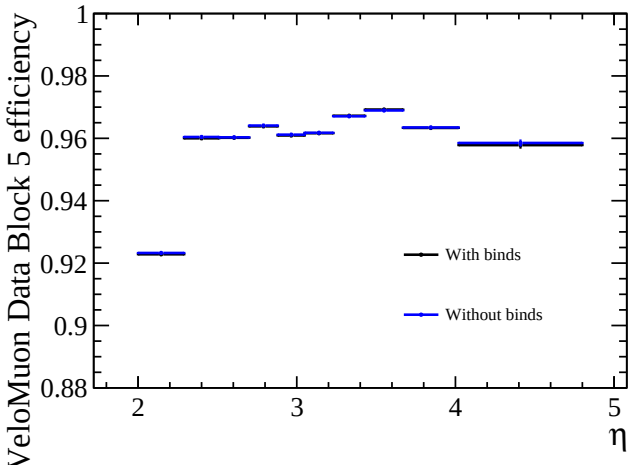
As discussed last time:

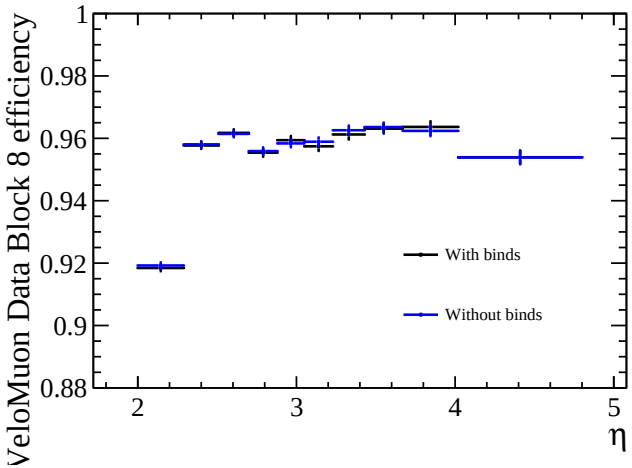
- Improvements to TrackCalib2
  - Relatively easy to produce efficiencies from AP
- AP submitted for blocks 1, 5, 6, 7, 8 for data with correct DD4HEP binds and sprucing decision
  - These are now 99% finished, today I'll show the results
  - Small issue discovered: MuonUT method is broken in block 1, so we'll have to remove the sprucing decision (negligible impact, but method is probably biased anyway)

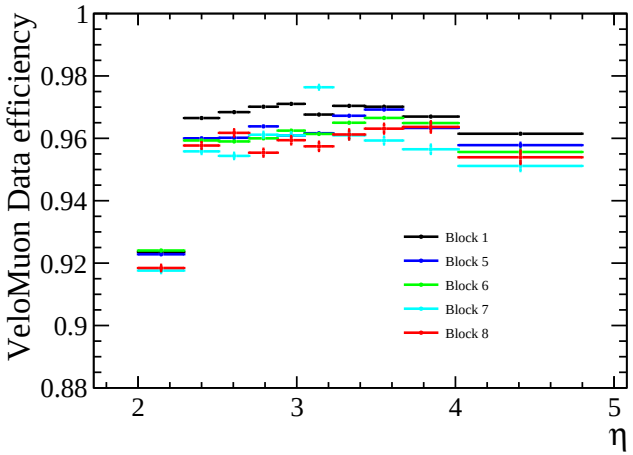
# Efficiency comparisons

## Comparison with and without DD4HEP binds



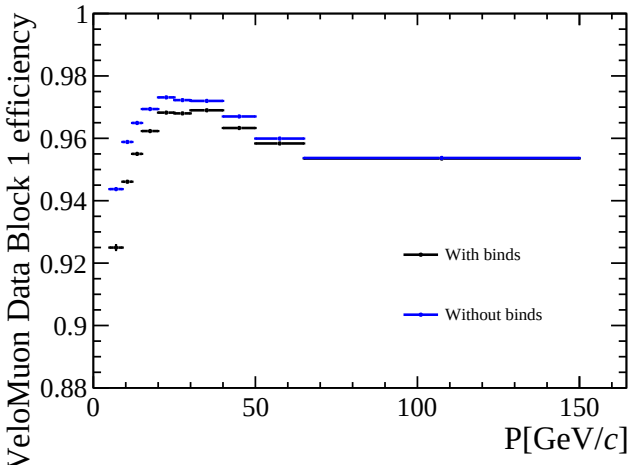



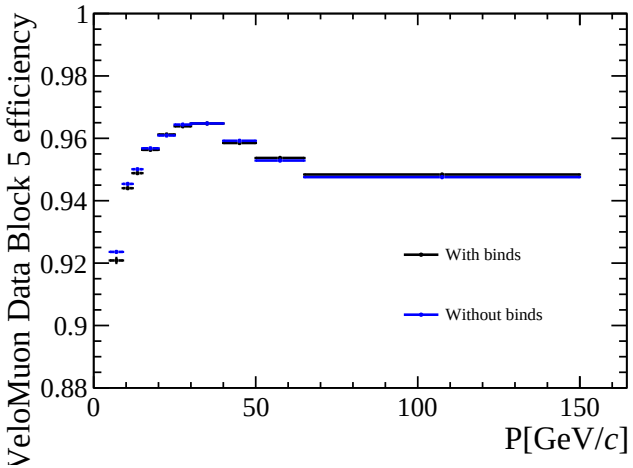



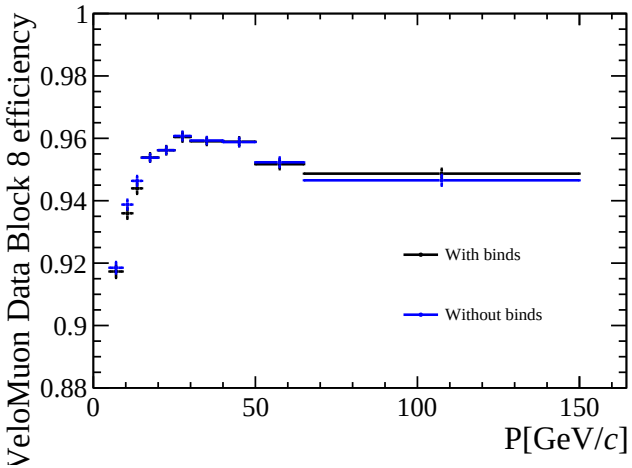

Data VeloMuon track efficiencies in $\eta$

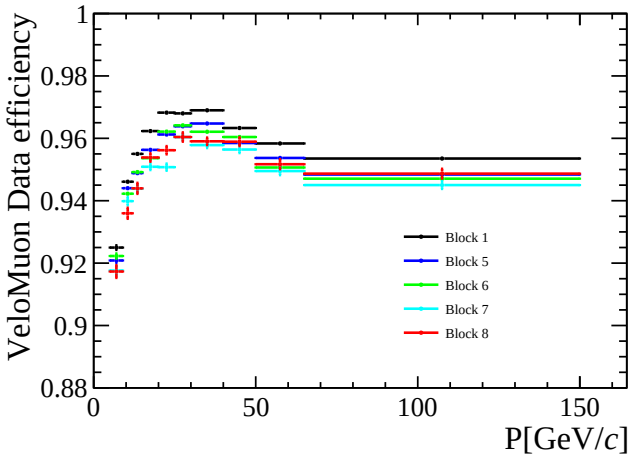
# Efficiency comparisons

## Comparison with and without DD4HEP binds



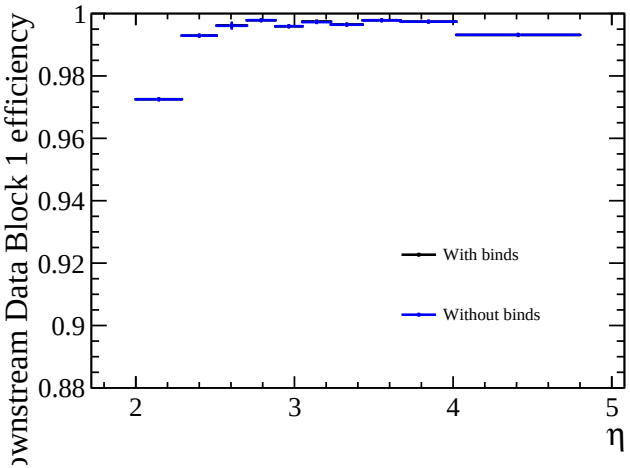



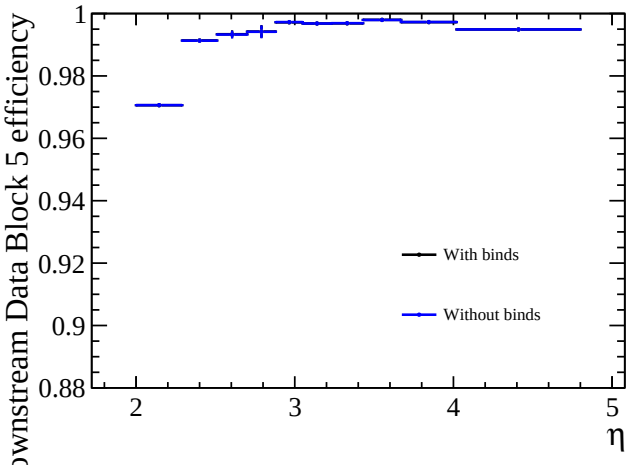



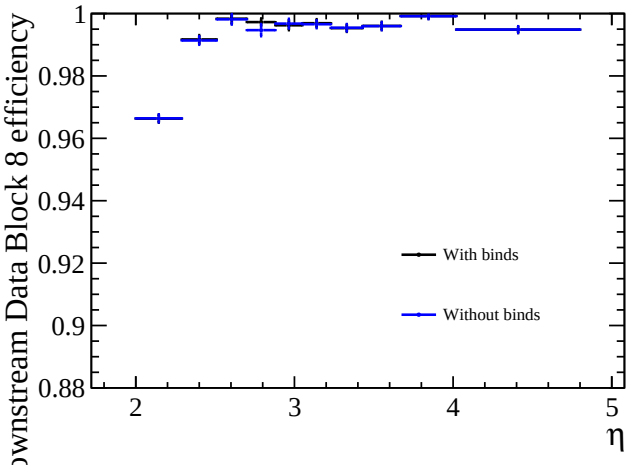

Data VeloMuon track efficiencies in $p$

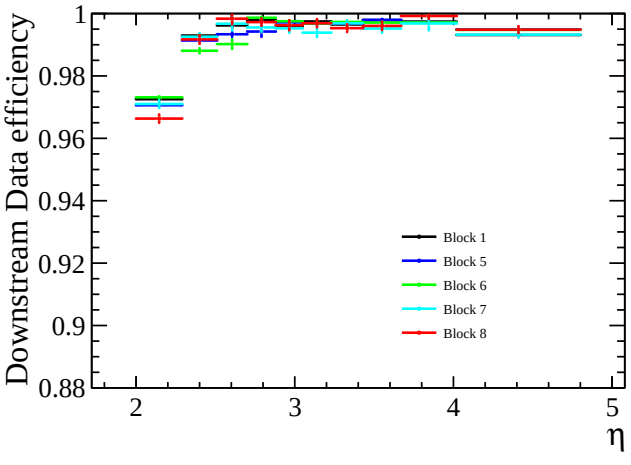
# Efficiency comparisons

## Comparison with and without DD4HEP binds



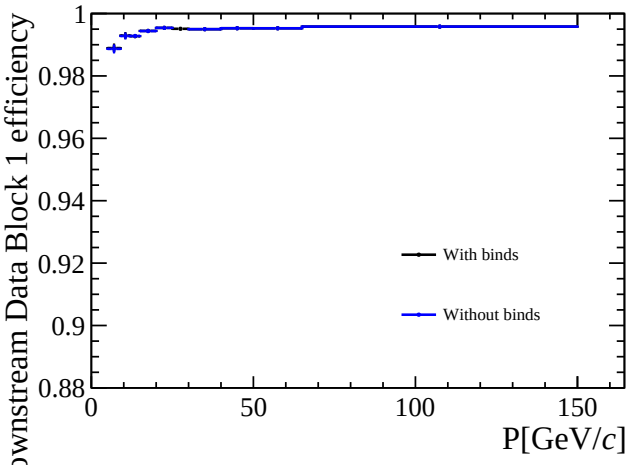



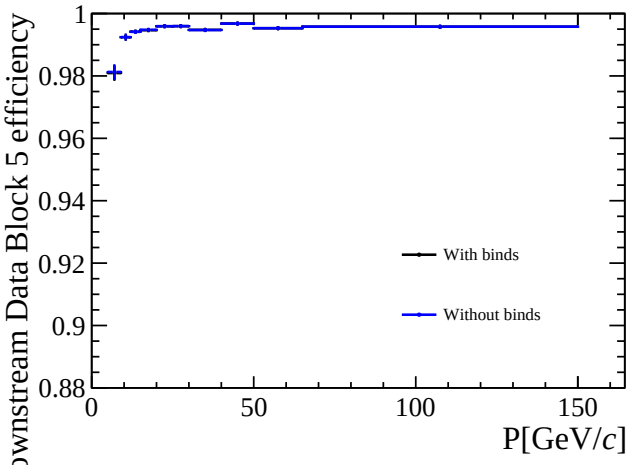



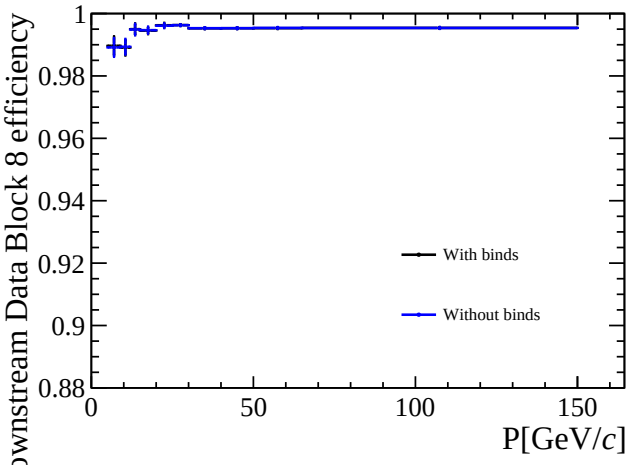

Data Downstream track efficiencies in $\eta$

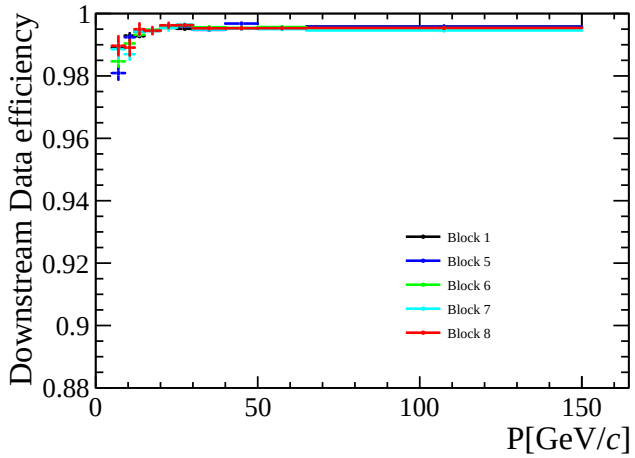
# Efficiency comparisons

## Comparison with and without DD4HEP binds



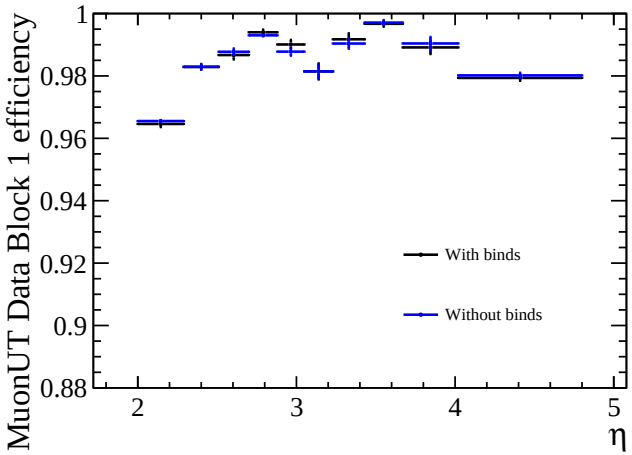



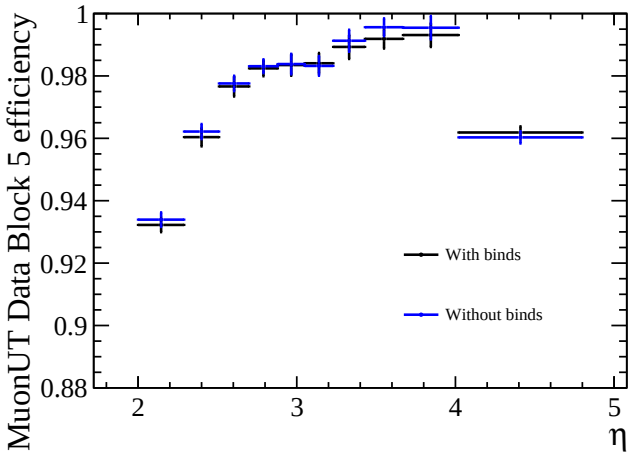



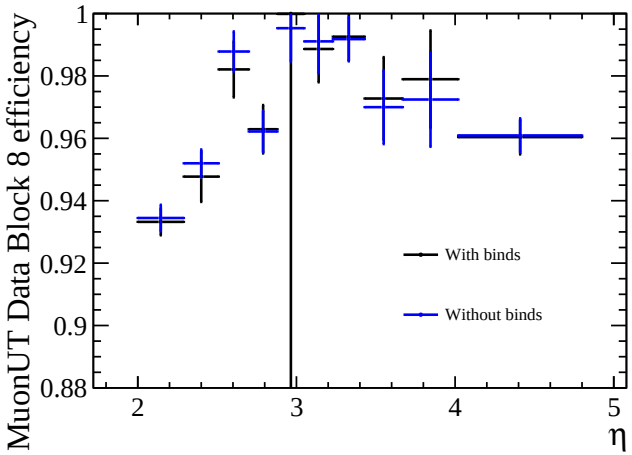

Data Downstream track efficiencies in $p$

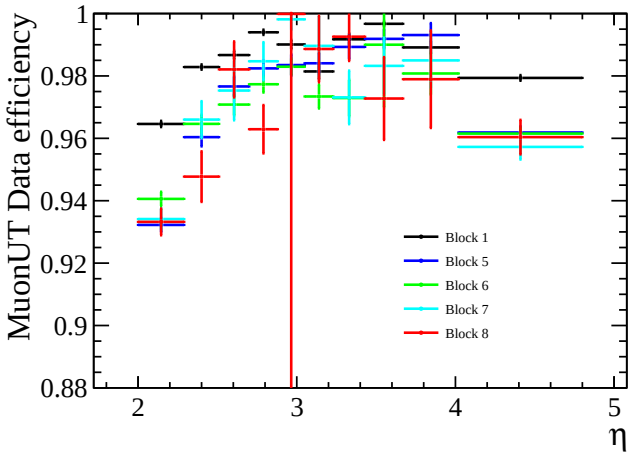
# Efficiency comparisons

## Comparison with and without DD4HEP binds



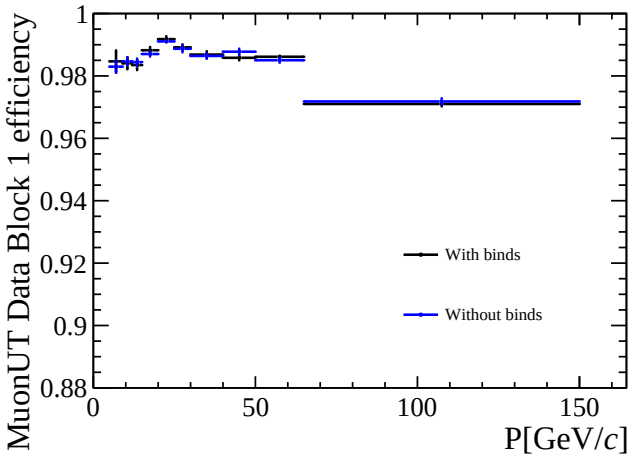



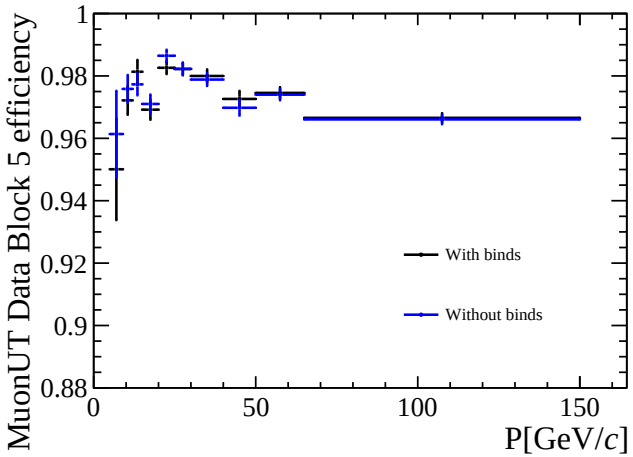



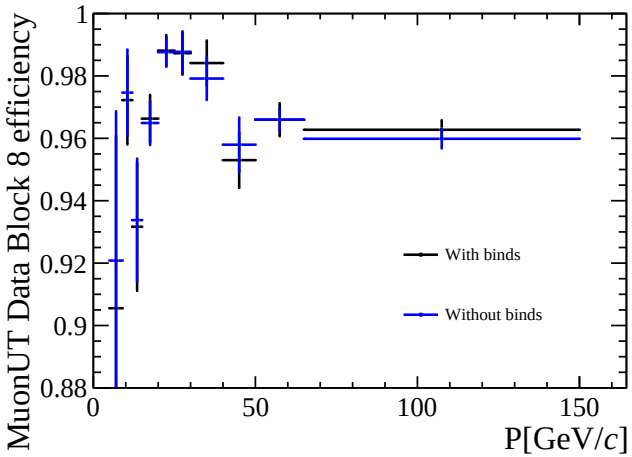

Data MuonUT track efficiencies in $\eta$

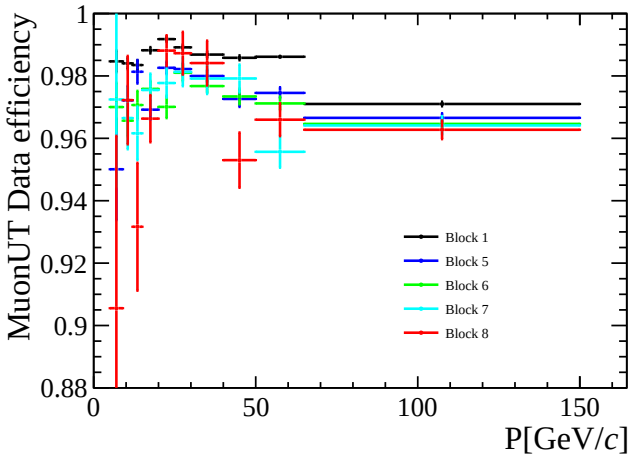
# Efficiency comparisons

## Comparison with and without DD4HEP binds



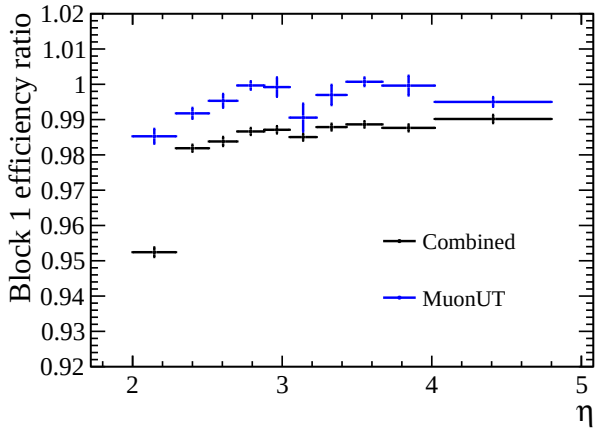



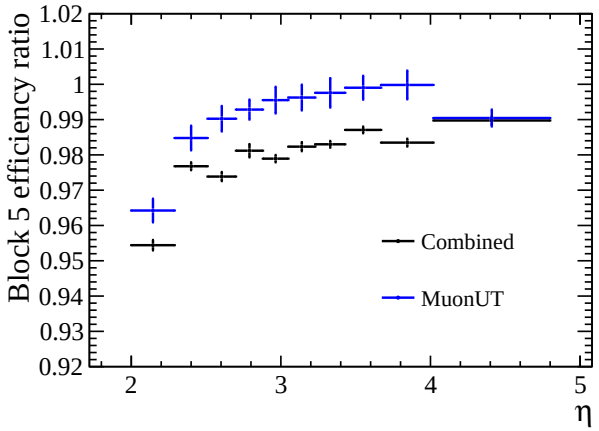



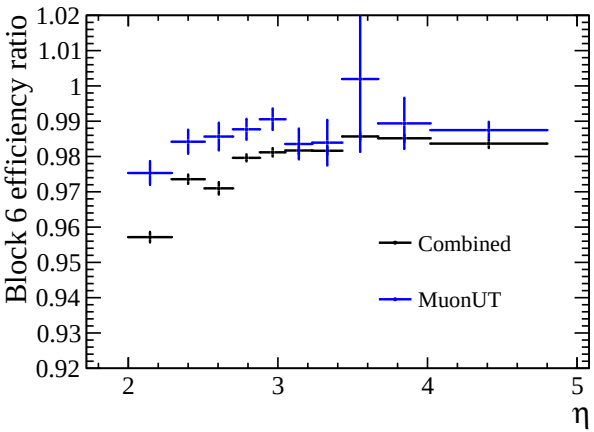

Data MuonUT track efficiencies in $p$

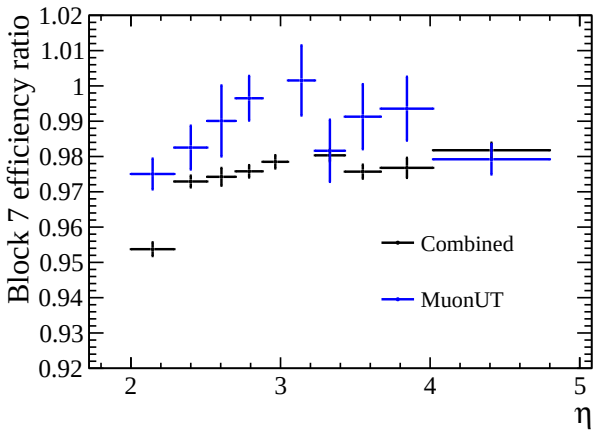
# Tracking efficiency data/MC ratio

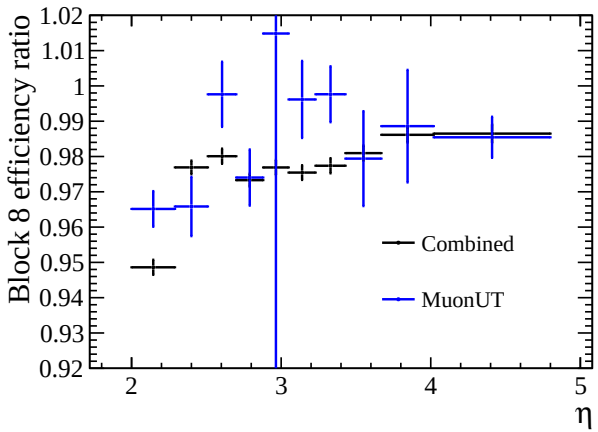
## Data/MC ratio



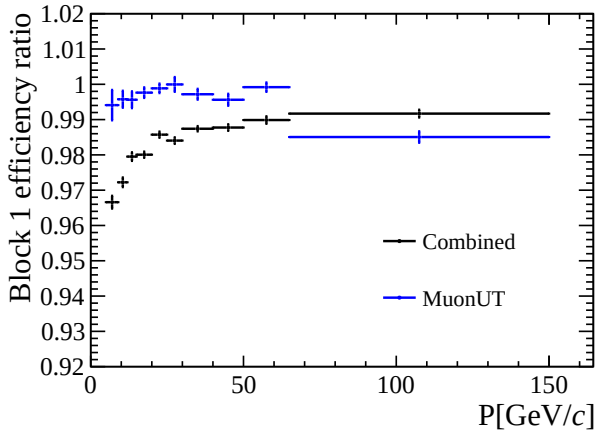



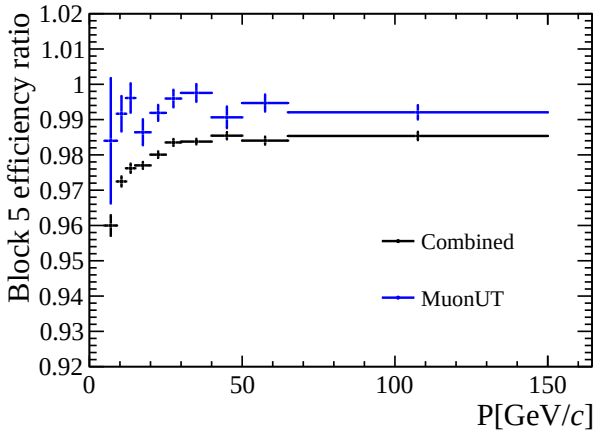



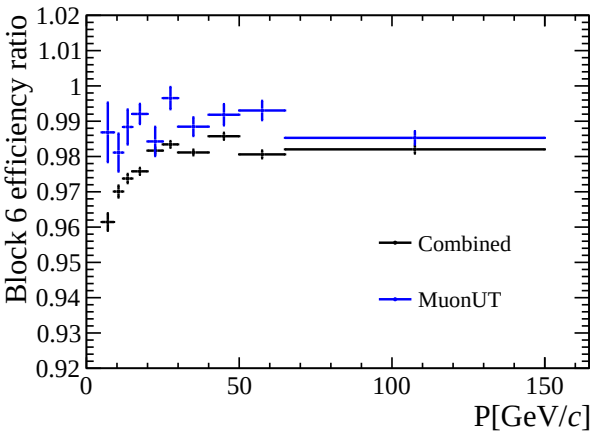

Data/MC ratio for Combined/MuonUT track efficiencies in $\eta$

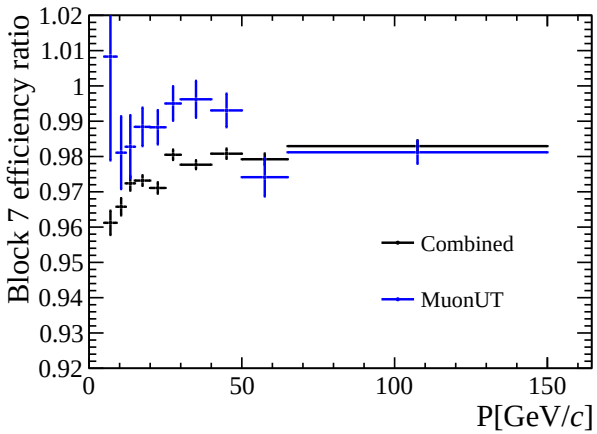
# Tracking efficiency data/MC ratio

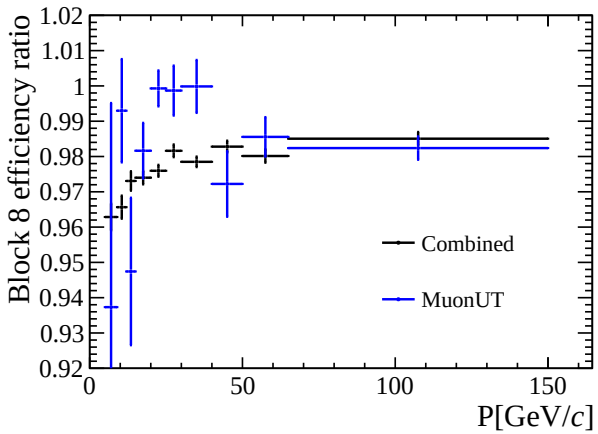
## Data/MC ratio




Data/MC ratio for Combined/MuonUT track efficiencies in $p$

# To do list from last time

1. AP for blocks 1, 5, 6, 7, 8 of 2024 data
   - Done
2. We should run over block 2 as well
   - MC request delayed because of liason change, request not approved yet...
3. MC for block 1b
   - MC request was stuck for 1 month, but with more poking Gloria approved and it's in production now
4. 2025 pre-TS data
   - MC is ready, need to create AP over data/MC
5. 2024 *pp* reference run
   - MC is ready, need to create AP over data/MC
6. Tidy up AP
   - Low priority for now

# Summary and next steps

1. Proceed with calculating efficiencies for:
   - 2024 blocks 2, 1 (1a and 1b), 5, 6, 7, 8
   - 2024 *pp* ref
   - 2025 pre-TS
2. Determine an optimised 2D binning scheme and provide $\mu^+$, $\mu^-$, $\mu^\pm$ tracking efficiencies
   - Question: We need larger MC samples, can we get PPG approval for a large MC request?
   - Can take Combined vs MuonUT discrepancy as systematic, but this requires some thinking because some blocks are biased or have insufficient statistics
   - Need to include other systematics as well, but don't expect these to be leading
3. Find time to look into Combined/MuonUT discrepancies...