



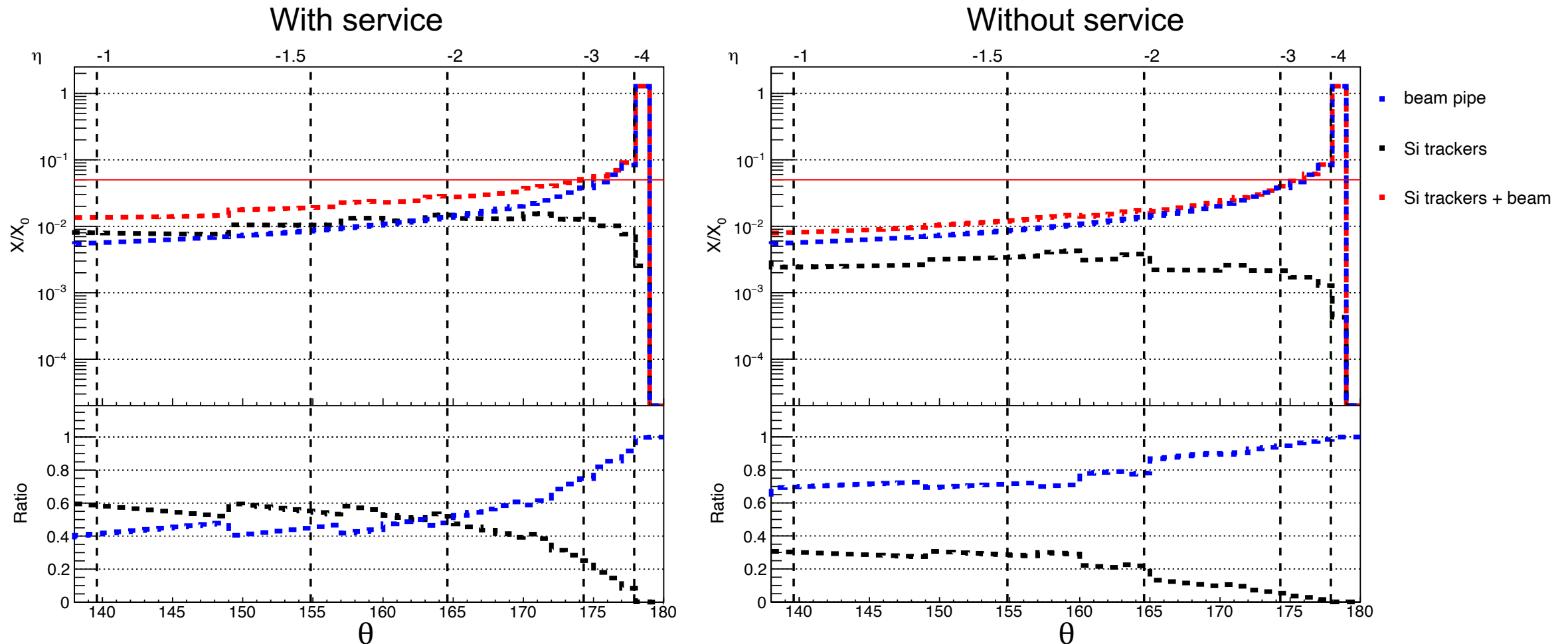
Material Budget and Tracking Efficiency with Different Tracker Designs

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01-22-2024

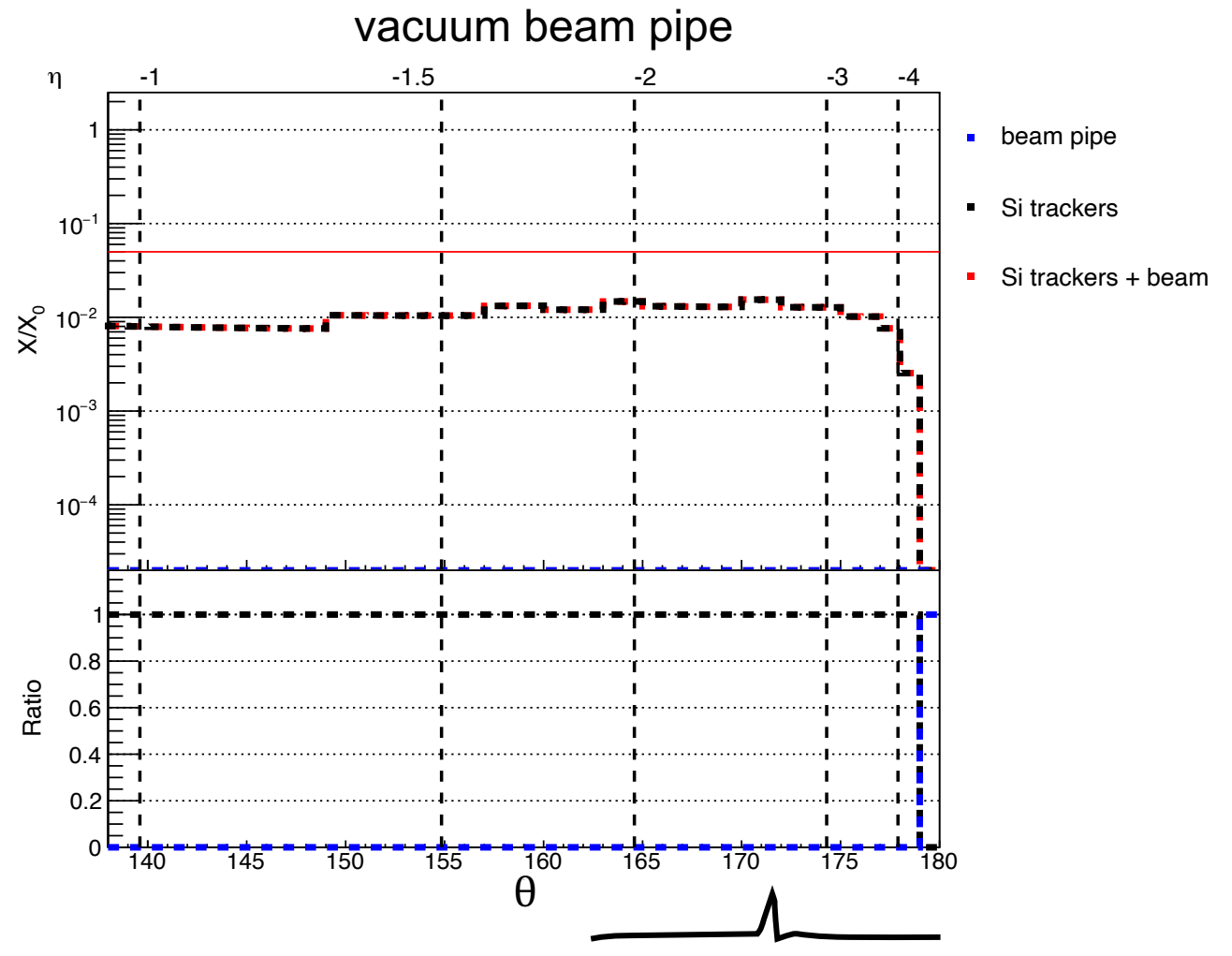
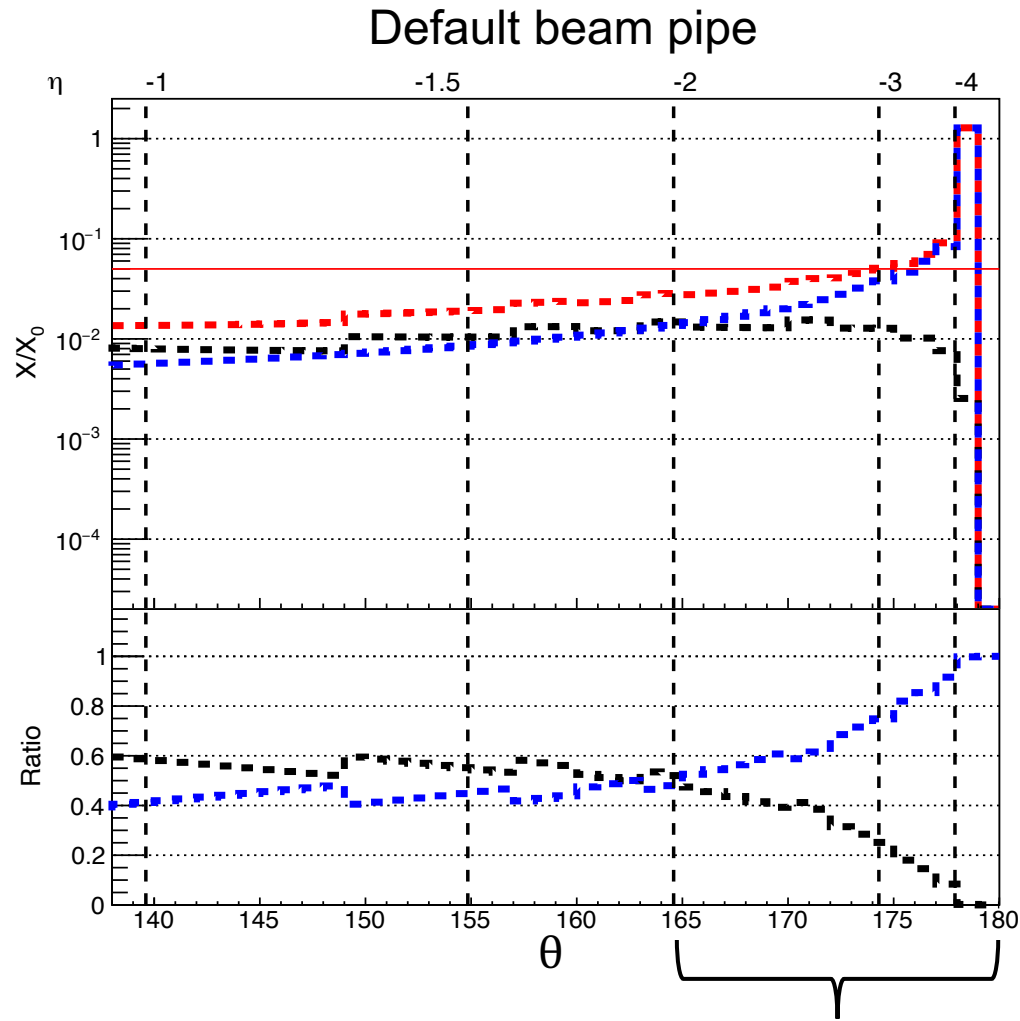


Backward Material Budgets (6 Disks)

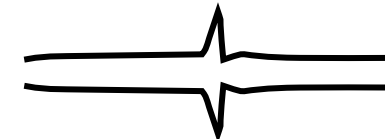


Removing the service parts of the silicon disks reduces the tracker material budget (black line) from $\sim 1\%$ to 0.3%

Backward Material Budgets (6 Disks)

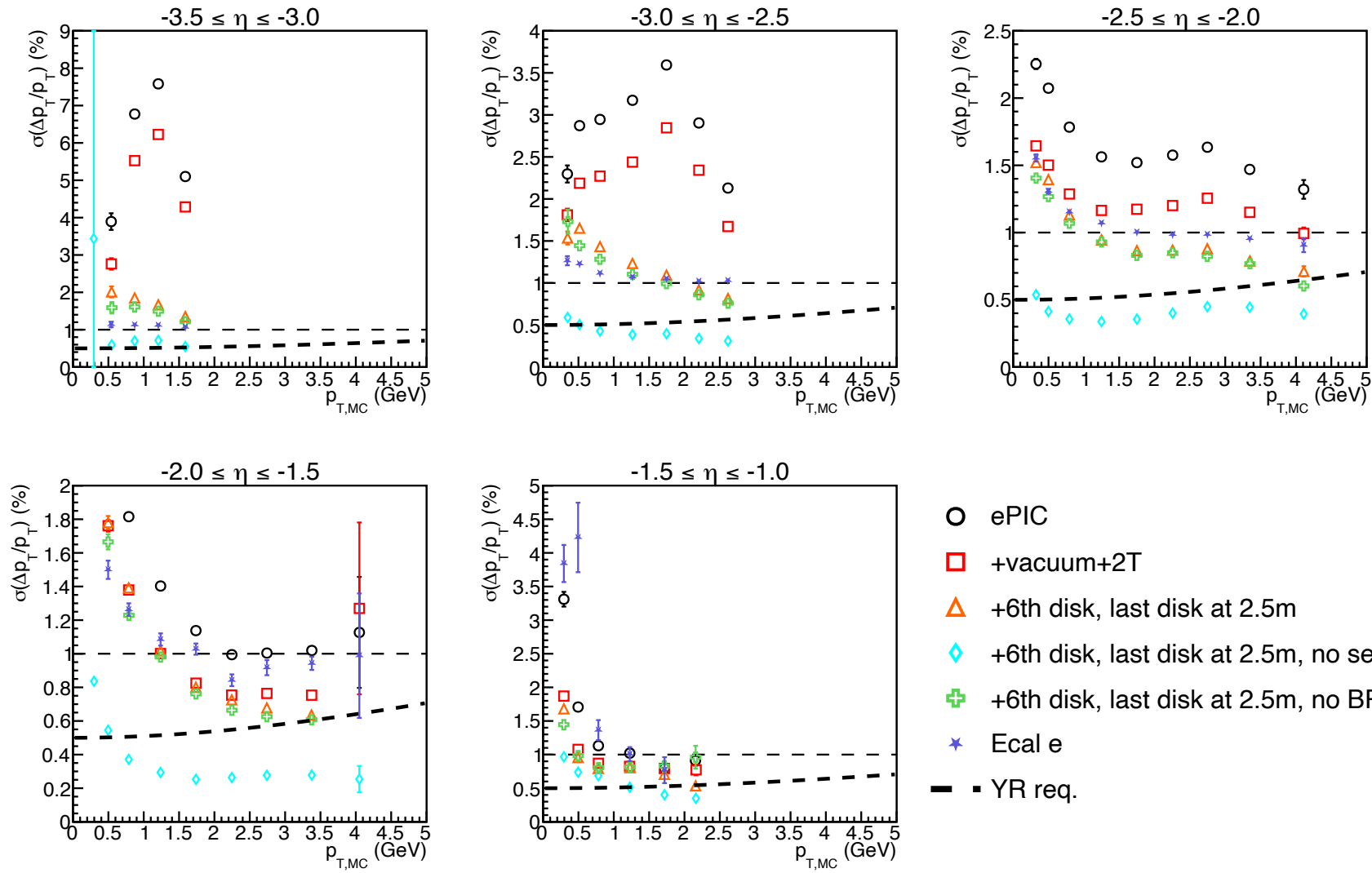


Beam pipe is the major material contributor in $\eta < -2$



Can we create a “window” on the beam pipe?

Backward Electron p_T Resolutions

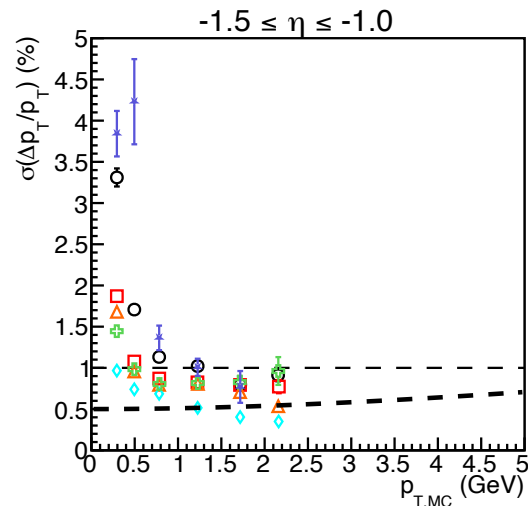
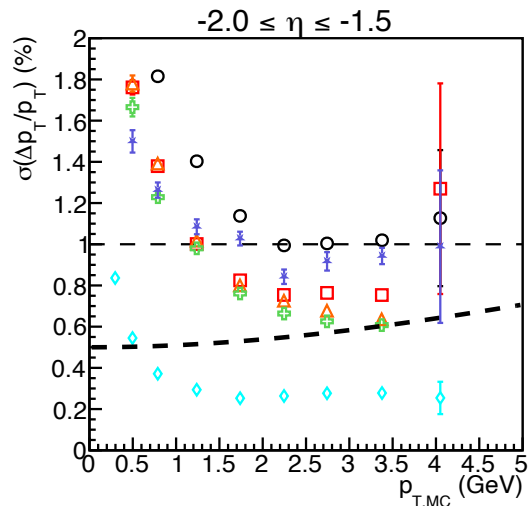
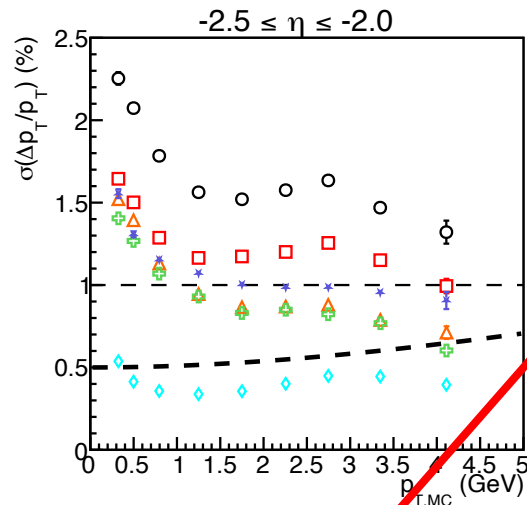
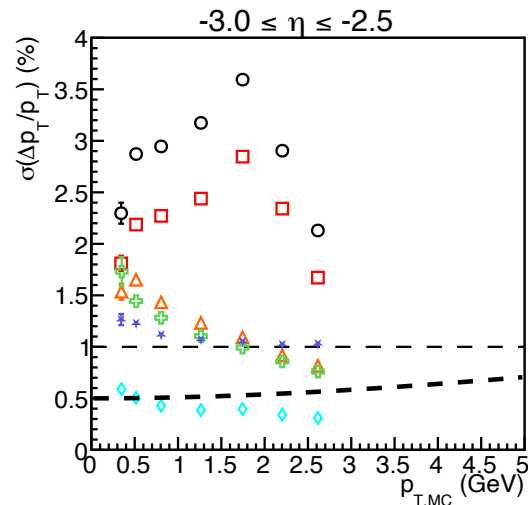
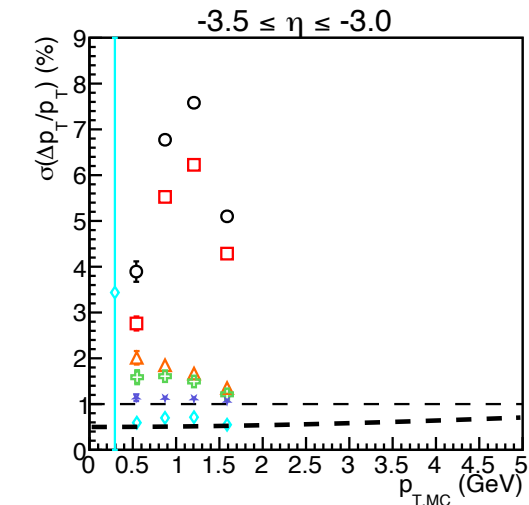


- Removing the service parts on the silicon disks improves the p_T resolutions
- Changing the beam pipe materials to vacuum gives minimal changes in the resolutions

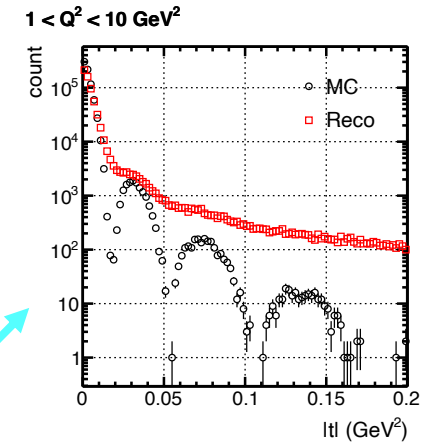
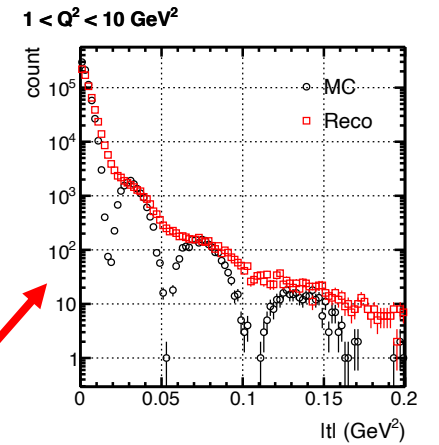
- ePIC
- +vacuum+2T
- △ +6th disk, last disk at 2.5m
- ◇ +6th disk, last disk at 2.5m, no service
- ⊕ +6th disk, last disk at 2.5m, no BP
- ☆ Ecal e
- YR req.

} Removed bk MPGD, pfRICH And Emcal

Backward Electron p_T Resolutions



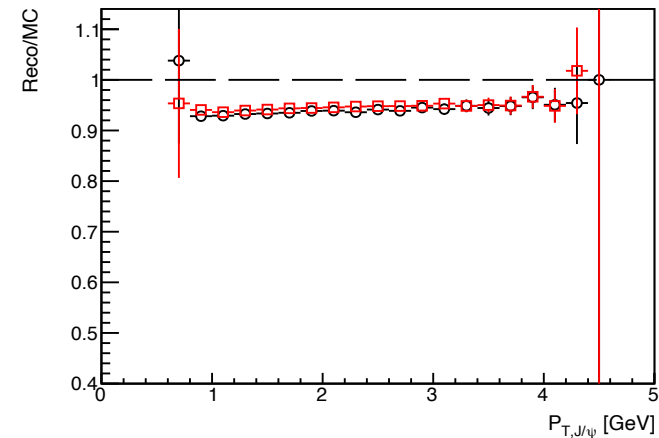
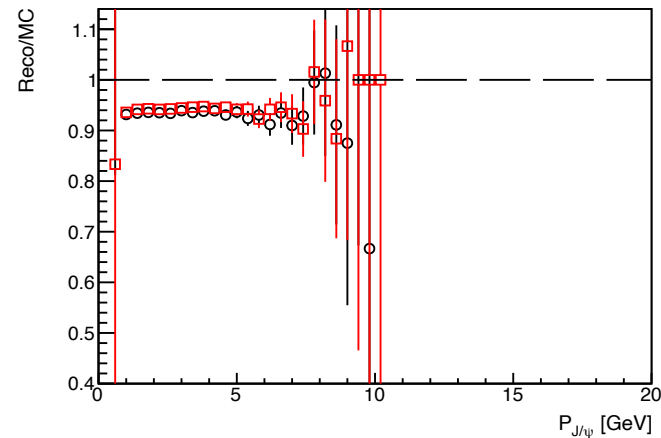
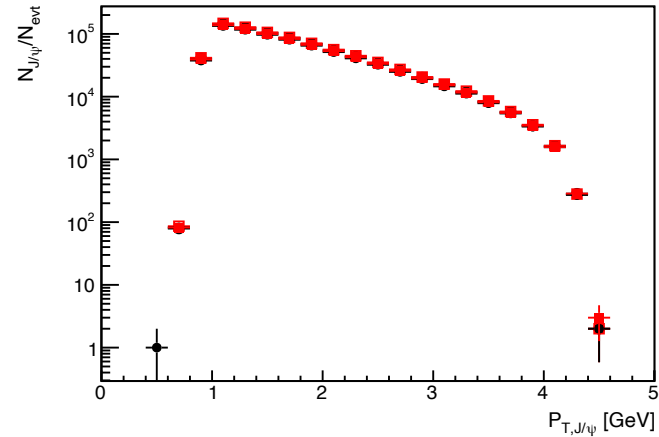
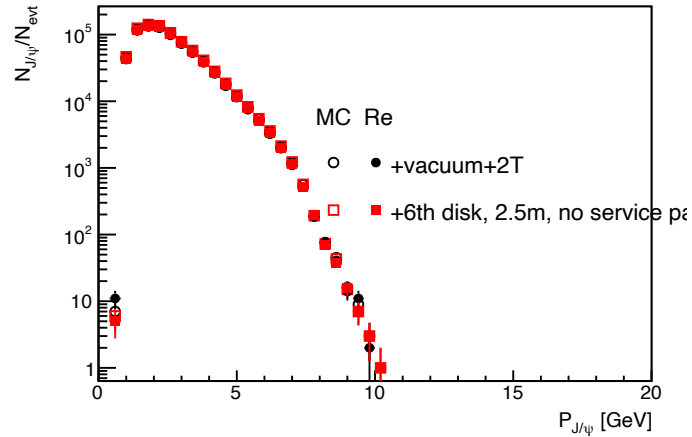
- ePIC
- +vacuum+2T
- △ +6th disk, last disk at 2.5m
- ◇ +6th disk, last disk at 2.5m, no service
- ⊕ +6th disk, last disk at 2.5m, no BP
- ☆ Ecal e
- YR req.



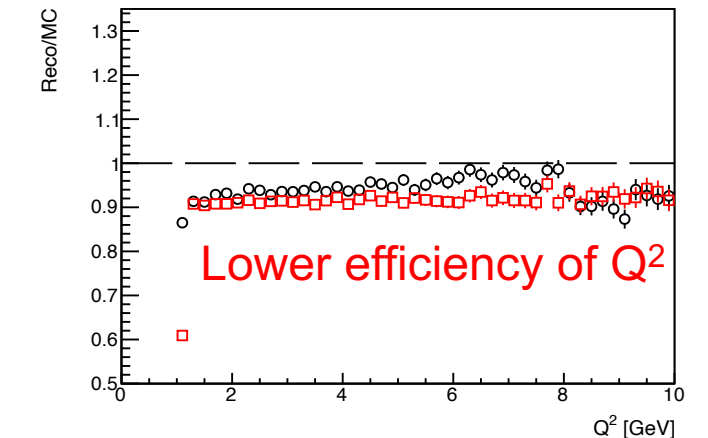
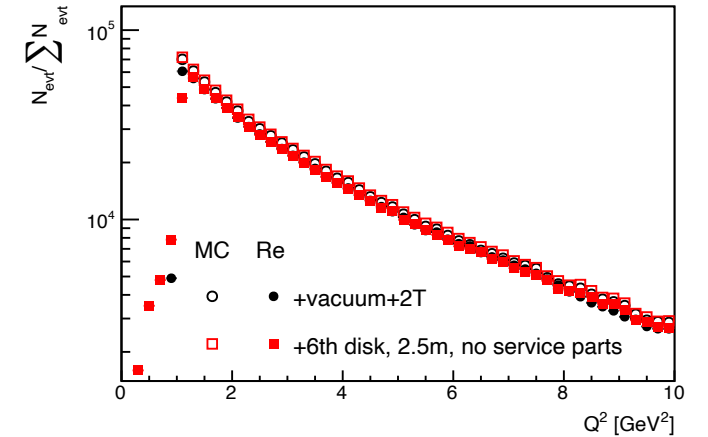
Removed bk MPGD, pfRICH
And Emcal

Reconstructed J/ψ and Q^2

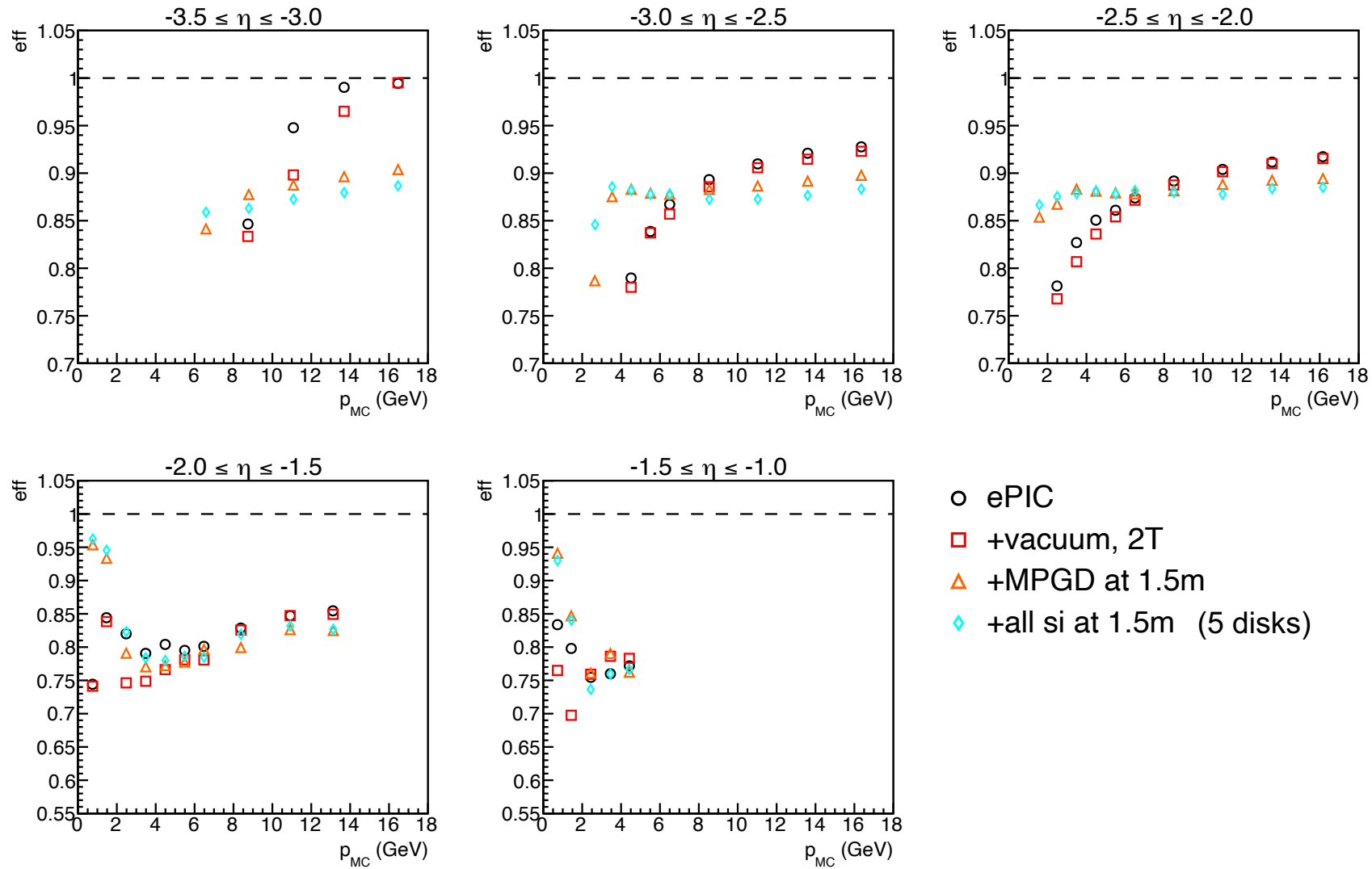
Reconstructed J/ψ momentum



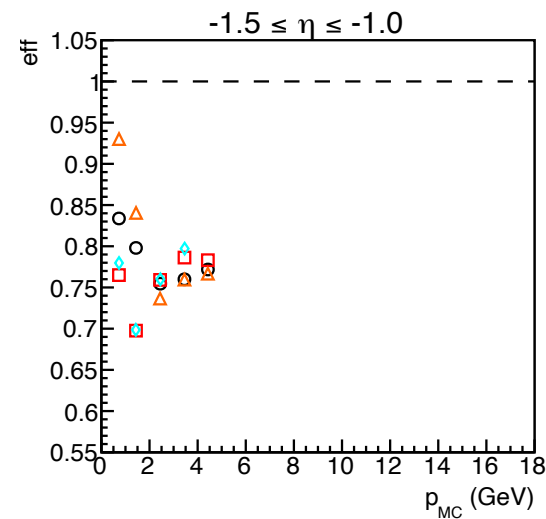
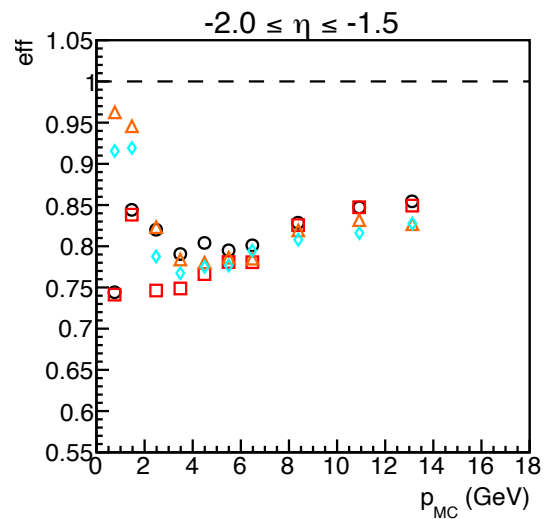
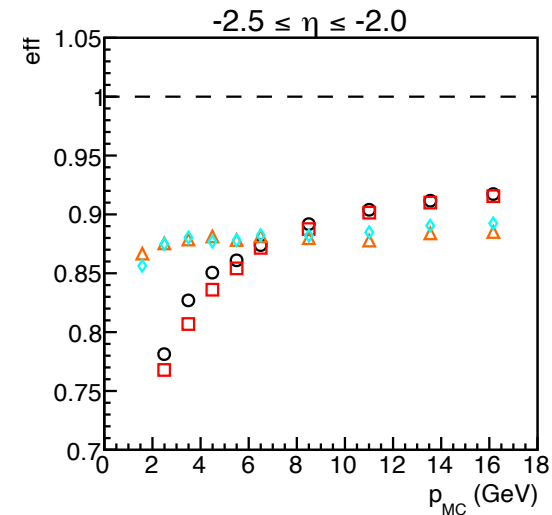
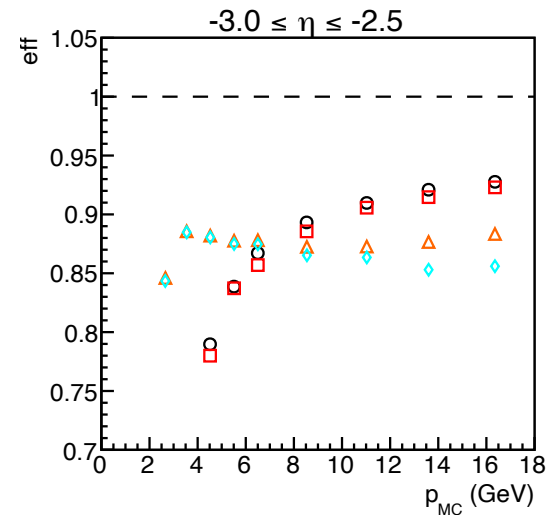
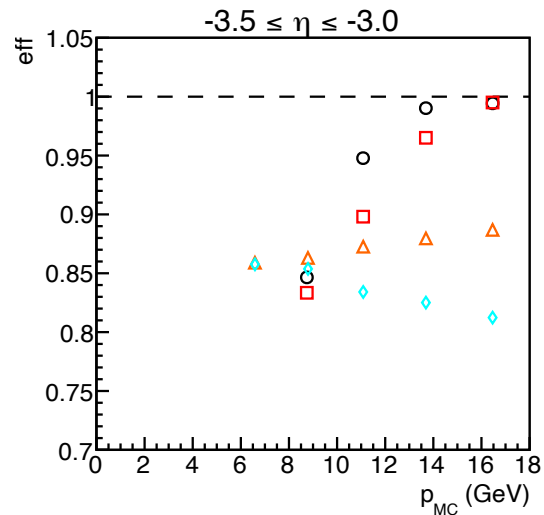
Reconstructed Q^2



Electron Efficiency



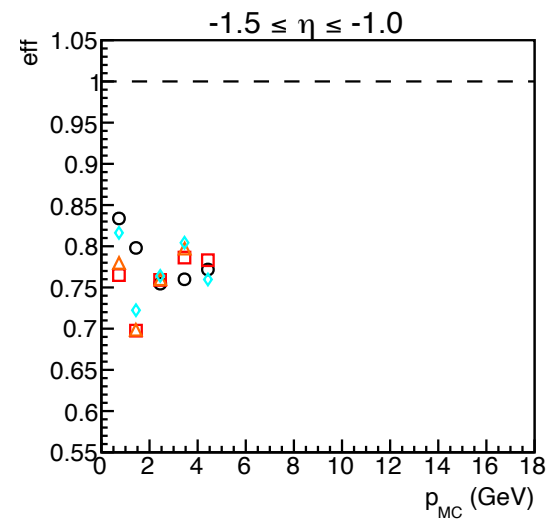
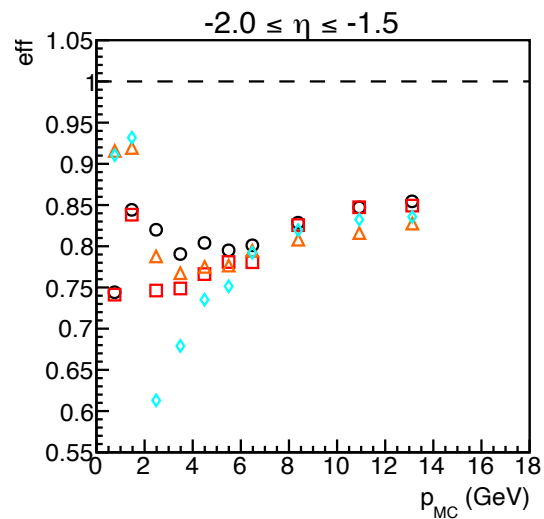
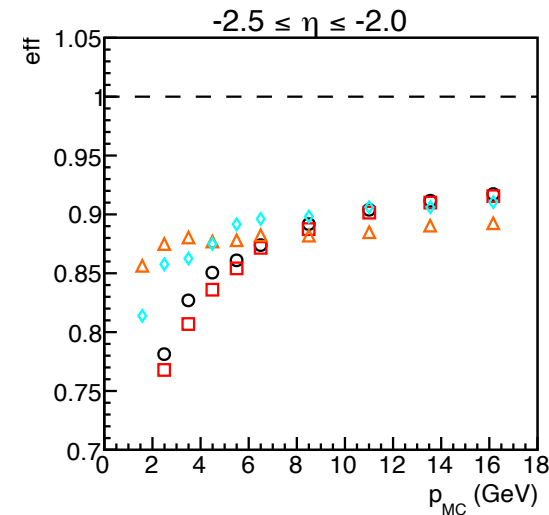
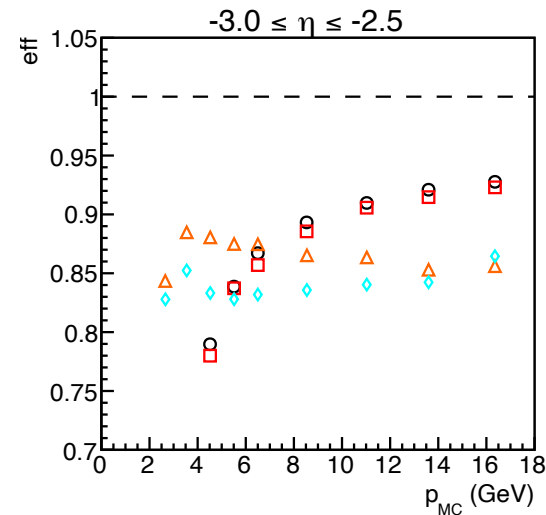
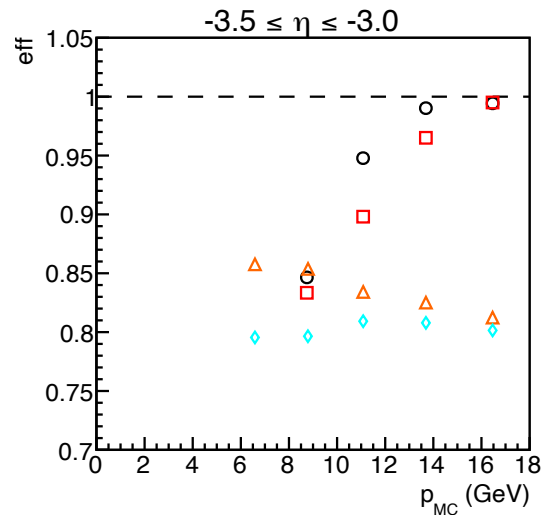
Electron Efficiency



- ePIC
- +vacuum, 2T
- △ +all si at 1.5m (5 disks)
- ◇ +6th disk, last disk at 2.5m

Better efficiency at low momentum,
but worsen at high momentum?

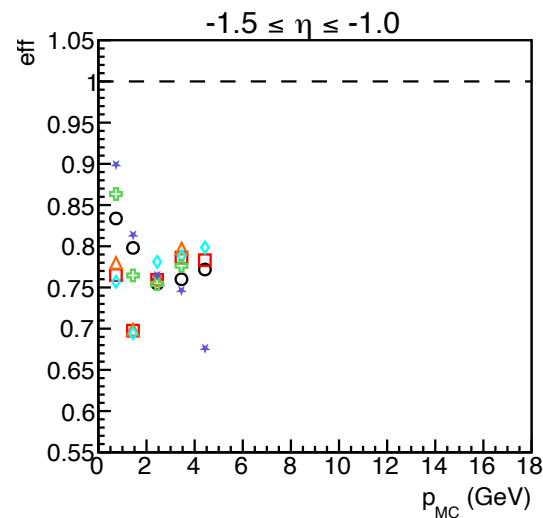
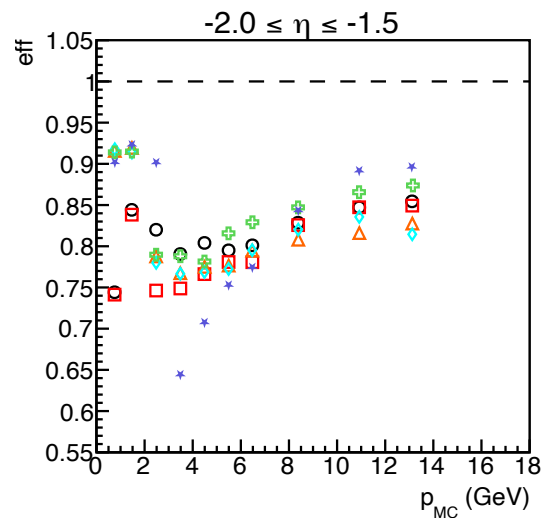
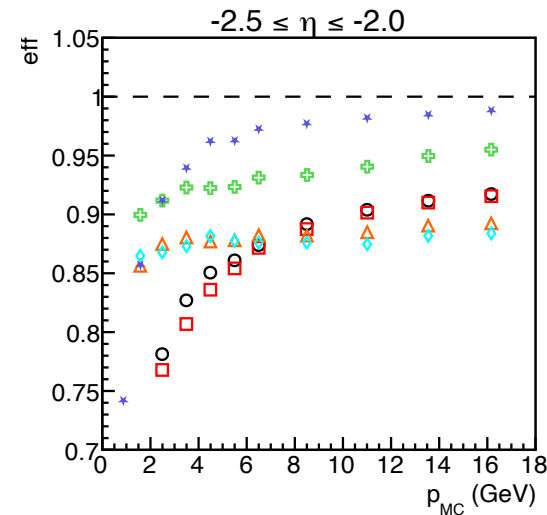
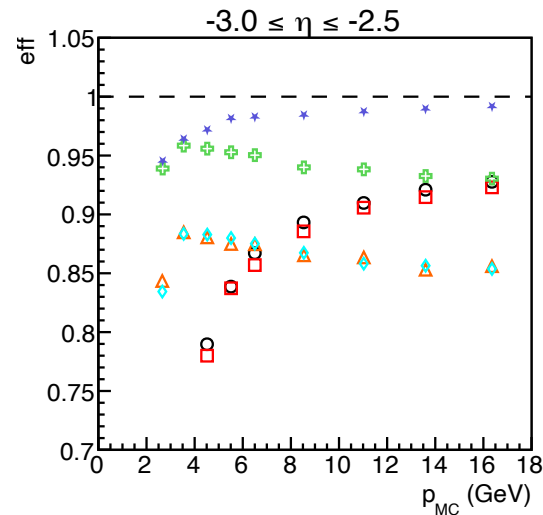
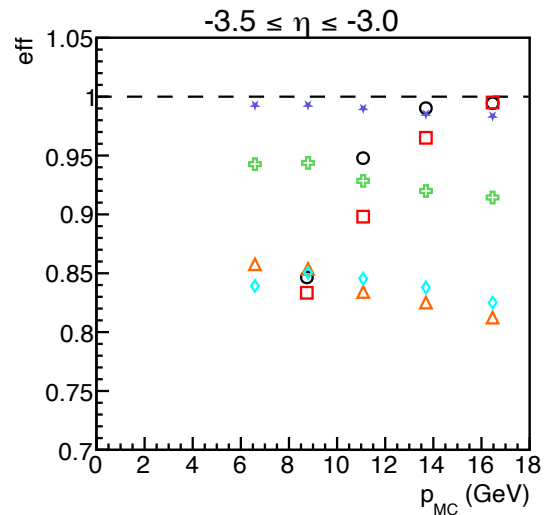
Electron Efficiency



- ePIC
- +vacuum, 2T
- △ +6th disk, last disk at 2.5m
- ◇ +6th disk, last disk at 2.5m, no serv

Worse efficiency without service parts?

Electron Efficiency



- ePIC
 - +vacuum, 2T
 - △ +6th disk, last disk at 2.5m
 - ◇ +7th disk, last disk at 2.5m
 - ⊕ +8th disk, last disk at 2.5m
 - ☆ +12th disk, last disk at 2.5m
- } include service parts

More disks improve efficiency

Summary

- Removing the service parts on the silicon disks improves the p_T resolutions
- No significant changes in p_T resolutions when reducing the material budget of the beam pipe
 - Asked about the beam pipe in Mattermost
- Electron efficiency reduces with a longer detector, but improves with more disks
 - Tried to look at the number of hits. I found events with more than 1 hit per disk without secondary particles.

Back Up

ePIC Backward Tracking Setup

- Magnetic field of 1.7T
- World volume: air
- 5 silicon disks
 - Silicon thickness of 40um
 - Support/service using aluminum (t=150um) and carbon fiber (t=120um)
 - Grid size: 20um x 20um
- MPGD
 - Grid size: 150x150um
 - z=110cm