

A Quick Update on u -channel Benchmarks

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CALIFORNIA EIC
CONSORTIUM



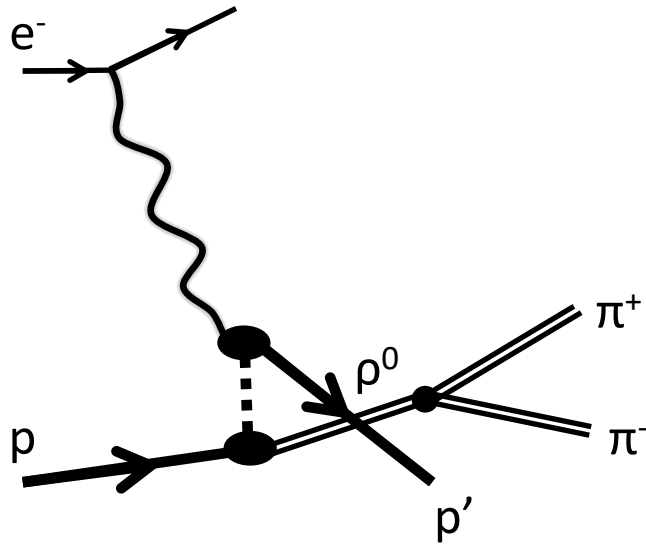
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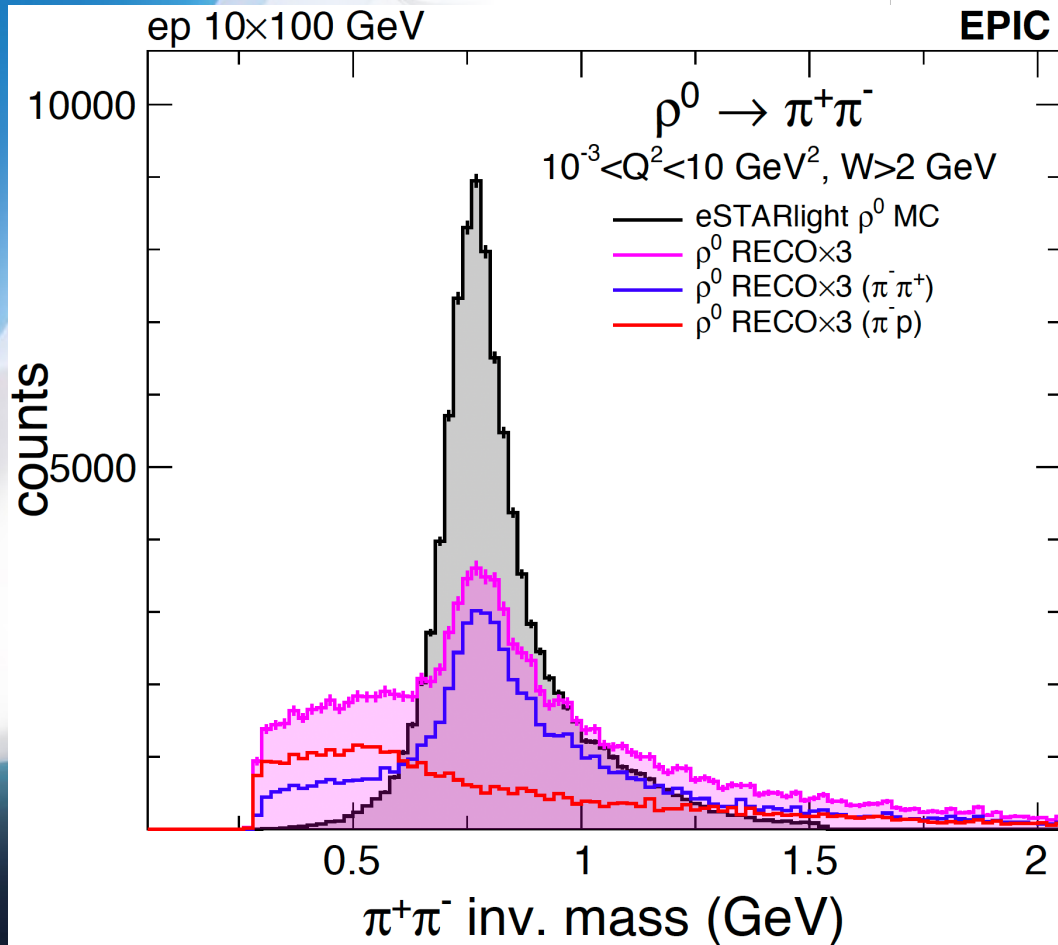


RECAP: u -channel $\rho^0 \rightarrow \pi^+\pi^-$ in B0



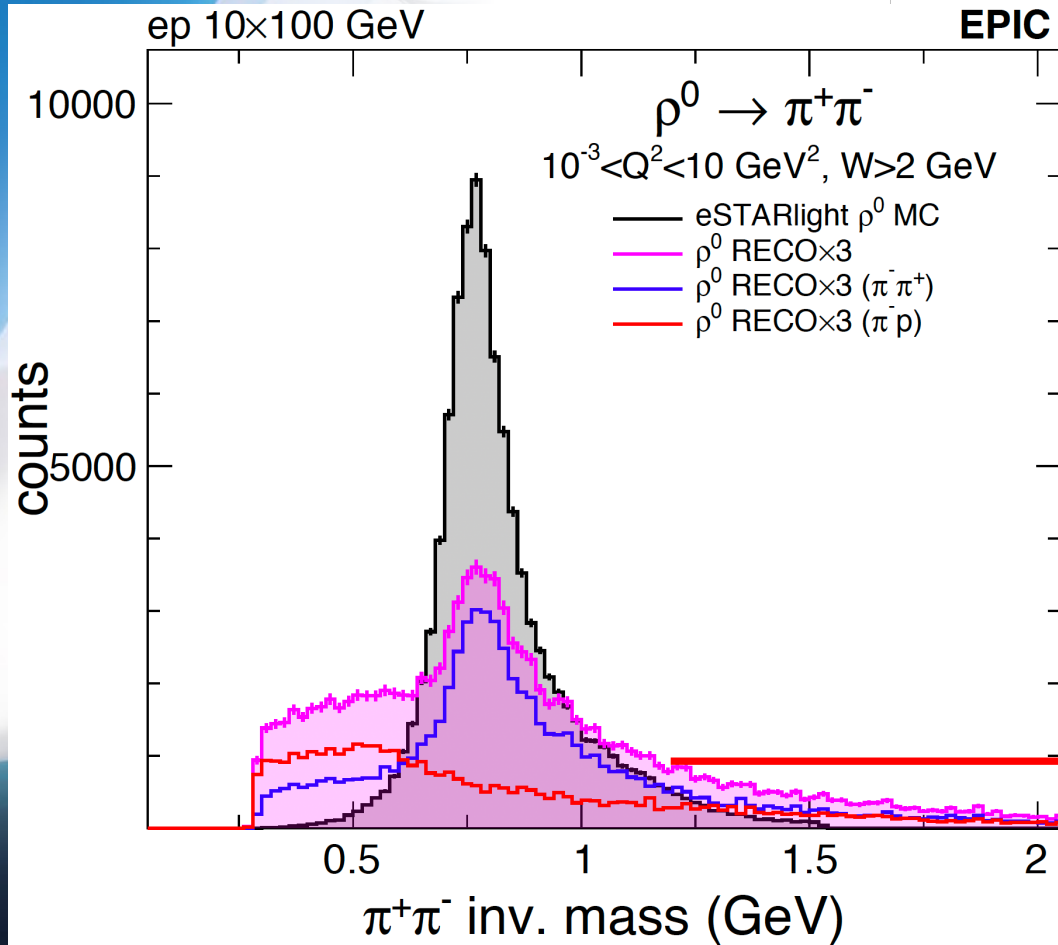
- We developed model for backward ρ production
- Edited eSTARlight to produce this channel
- Made event samples for the simulation campaigns
- These samples are now run in each campaign and can be found on S3:
 - [eictest/EPIC/RECO/24.03.1/epic_craterlake/EXCLUSIVE/UCHANNEL_RHO/10x100](#)
- These charged pions land in the B0

RECAP: u -channel $\rho^0 \rightarrow \pi^+\pi^-$ in B0

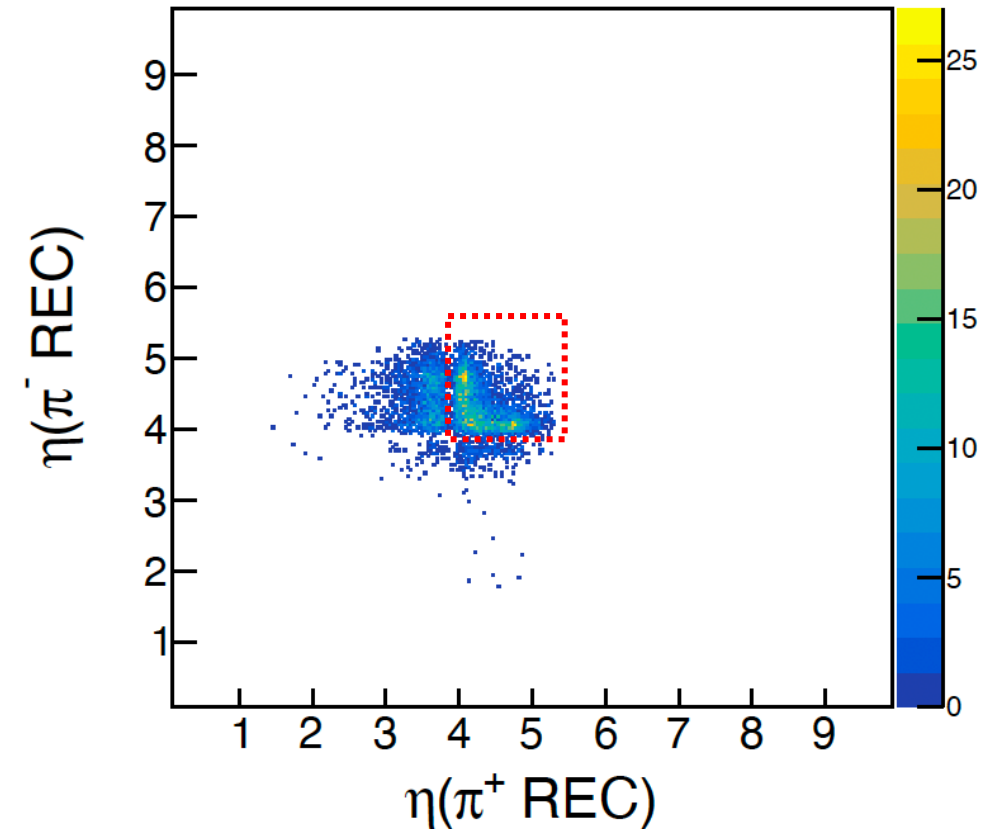


- We can use ρ reconstruction resolution to benchmark B0 performance

RECAP: u -channel $\rho^0 \rightarrow \pi^+\pi^-$ in B0

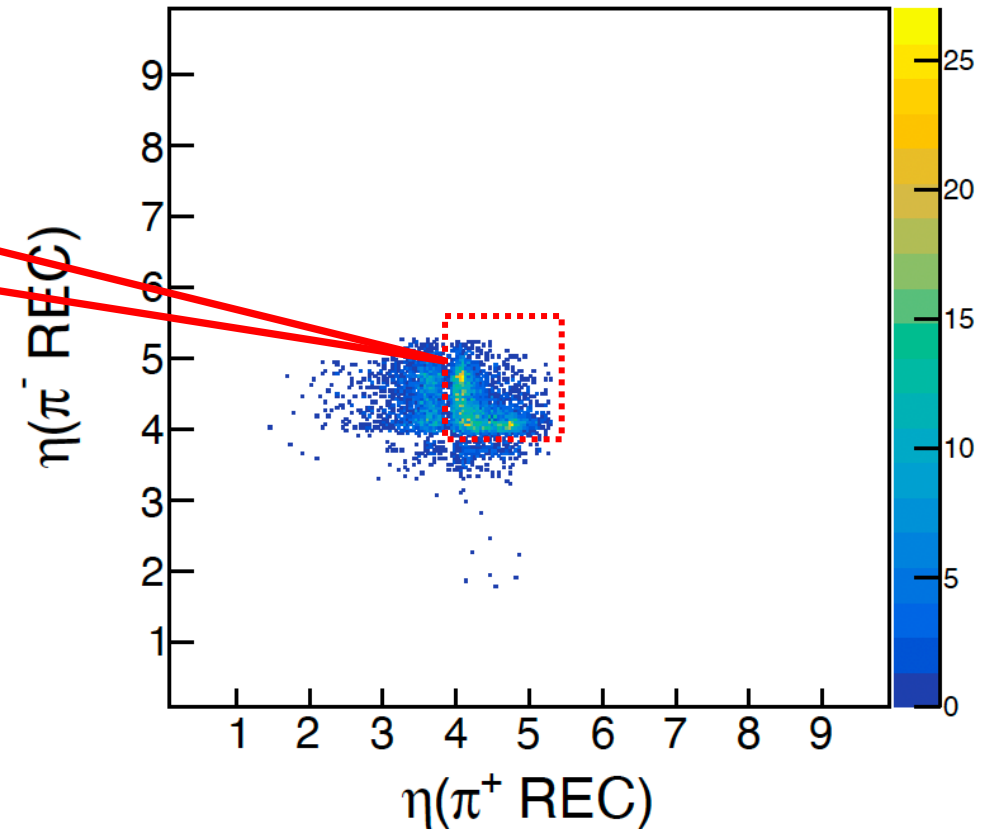
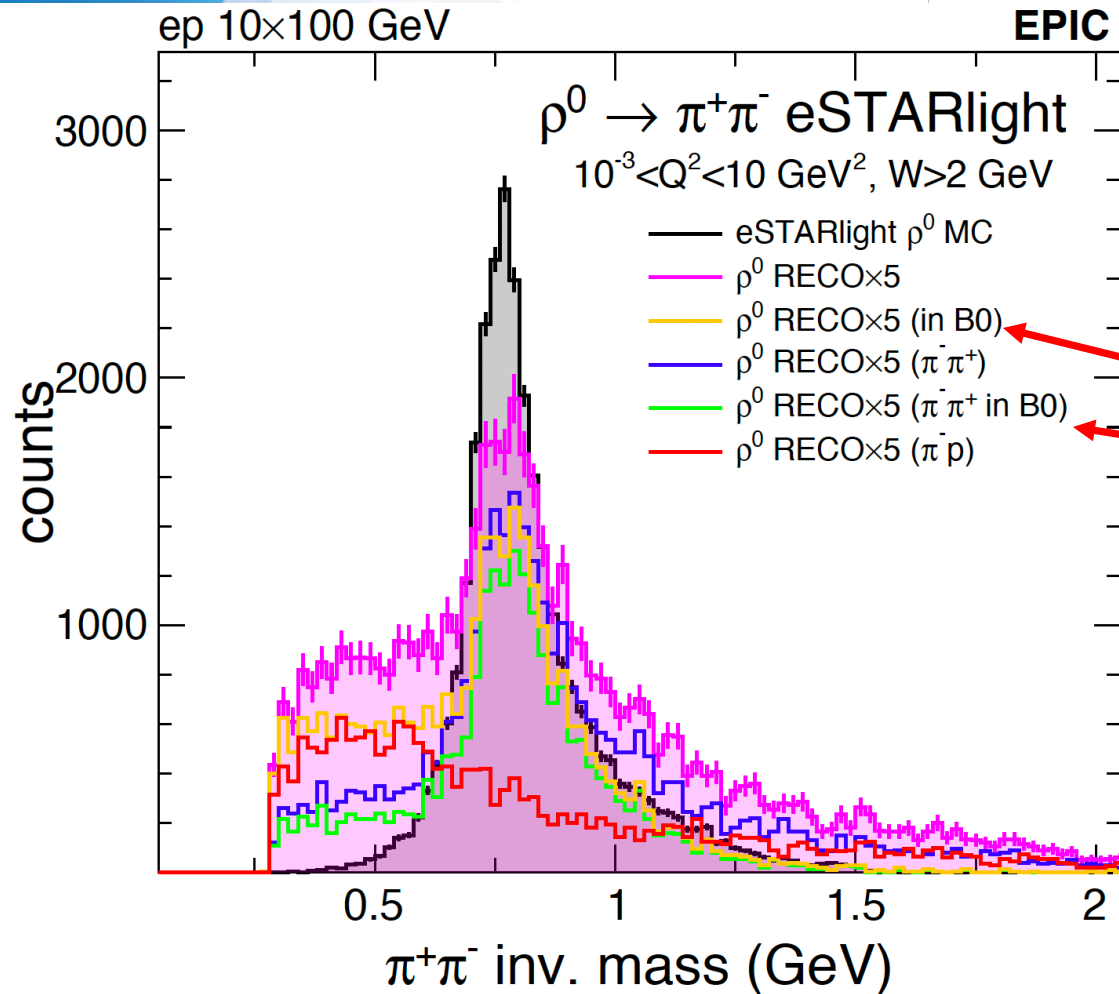


- We can use ρ reconstruction resolution to benchmark B0 performance
- Now focus in on both π in B0

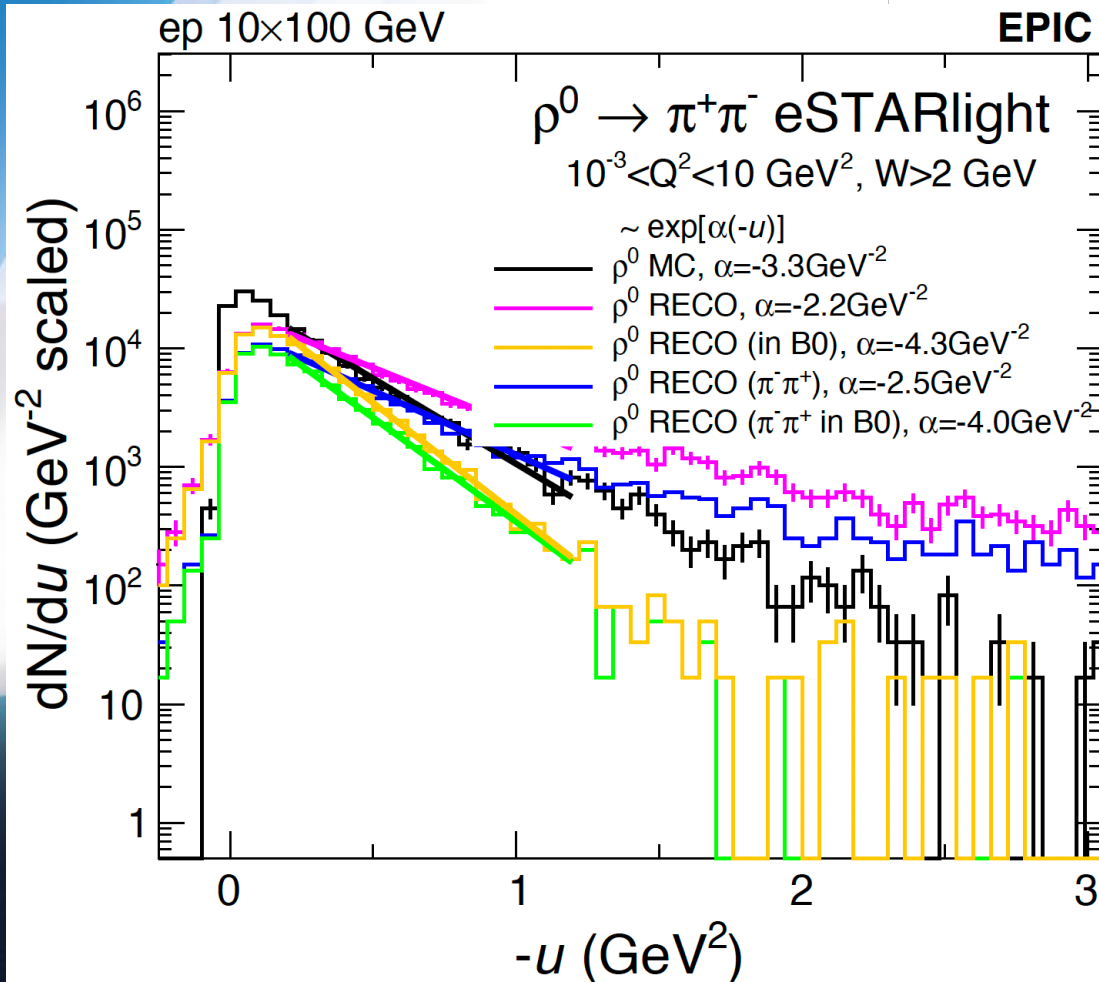


RECAP: u -channel $\rho^0 \rightarrow \pi^+\pi^-$ in B0

- Requiring both π in B0 suppressed long high-mass tail
- Low-mass tail remains

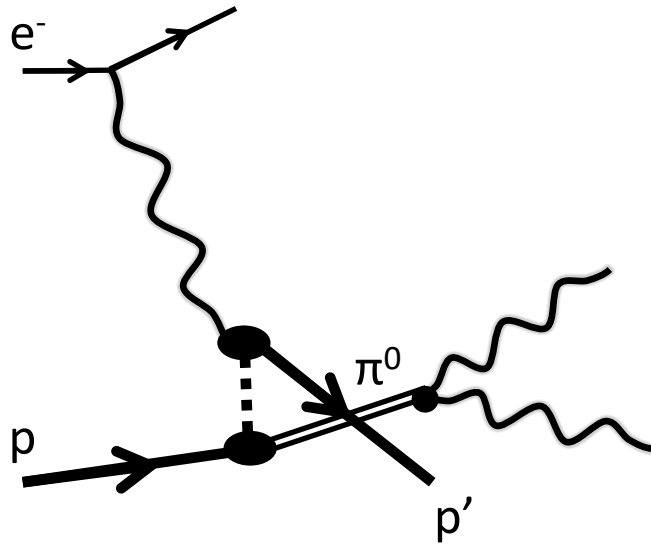


RECAP: u -channel $\rho^0 \rightarrow \pi^+\pi^-$ in B0



- We want to be able to resolve the slope of the counts vs. Mandelstam u
- We can check the reconstruction in these various cases
- I need to check exclusivity cuts next
- Still exploring how to best condense this information

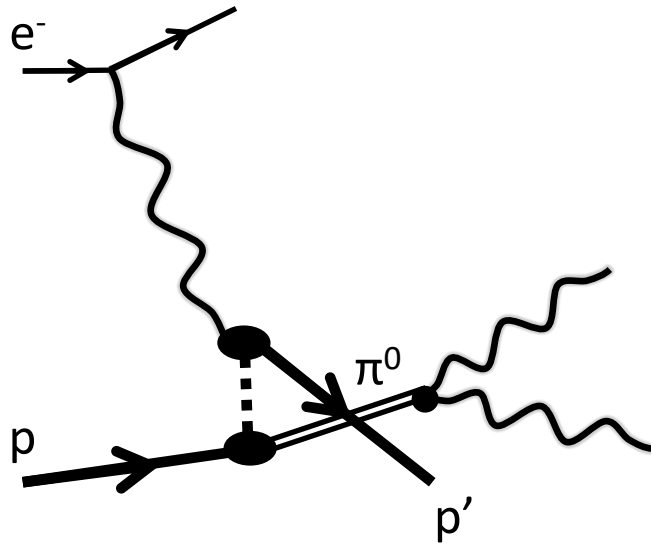
RECAP: Backward π^0 s in ZDC



- I previously described how we developed a model of the u -channel cross section at EIC kinematics
- Edited eSTARlight to produce this channel
- Made event samples for the simulation campaigns
- These samples are now run in each campaign and can be found on S3:
 - [eic-test/EPIC/RECO/23.12.0/epic_craterlake/EXCLUSIVE/UCHANNEL_PI0/18x275](https://eic-test.epic.craterlake.gov/exclusive/uchannel_pi0/18x275)
- But no clustering yet!

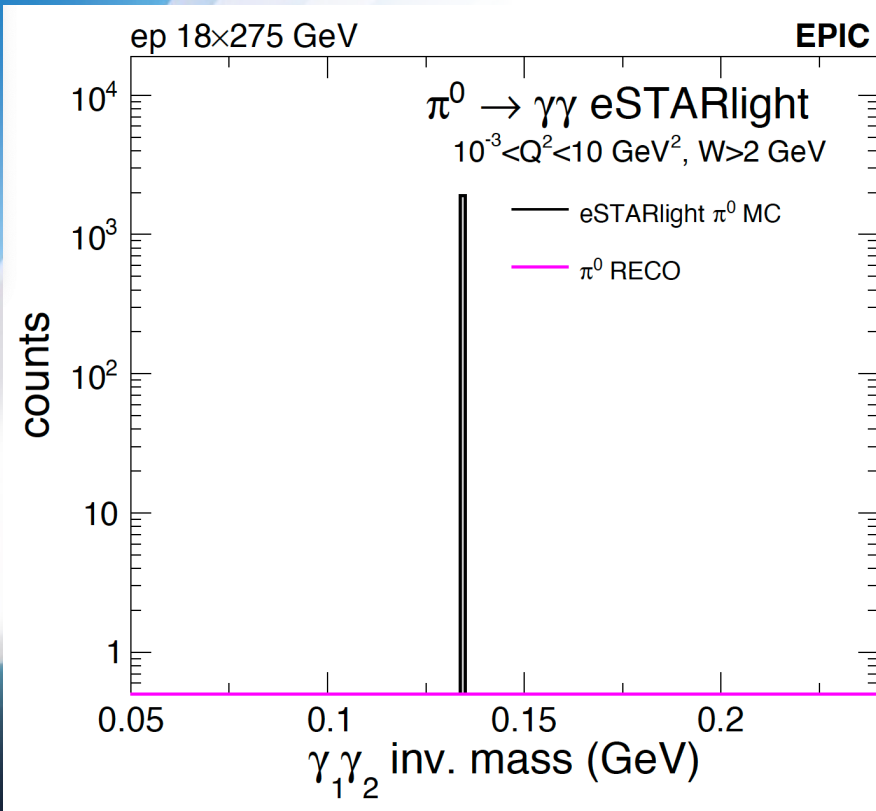
Backward π^0 s in ZDC

- New samples (with clustering!) on S3:
 - [eictest/EPIC/RECO/24.03.1/epic_craterlake/EXCLUSIVE/UCHANNEL_PI0/18x275](#)



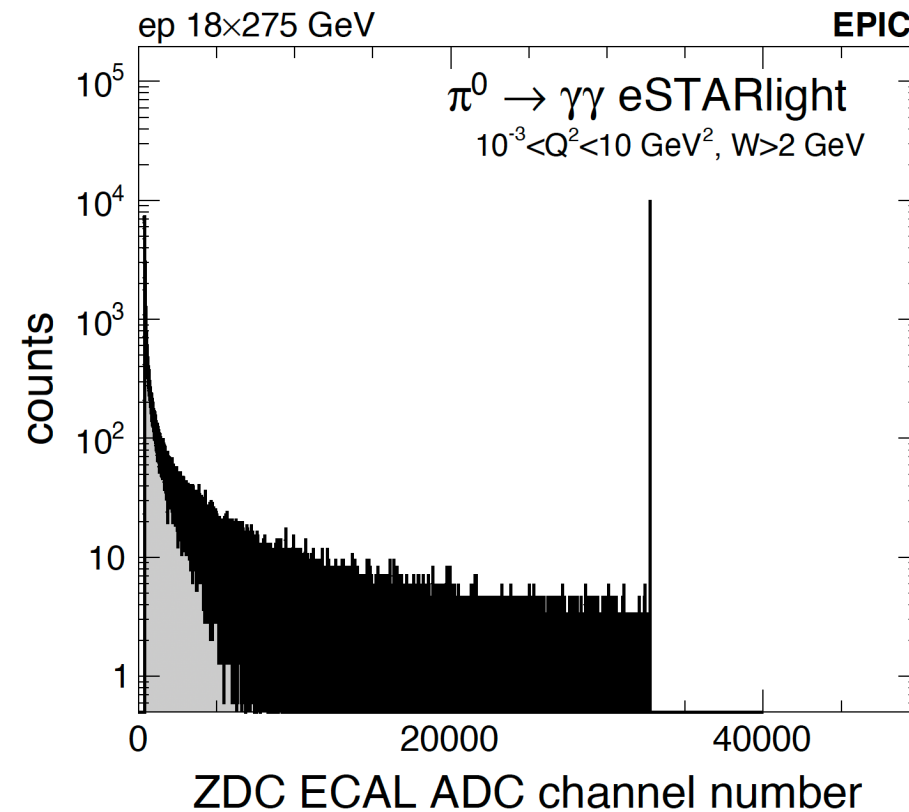
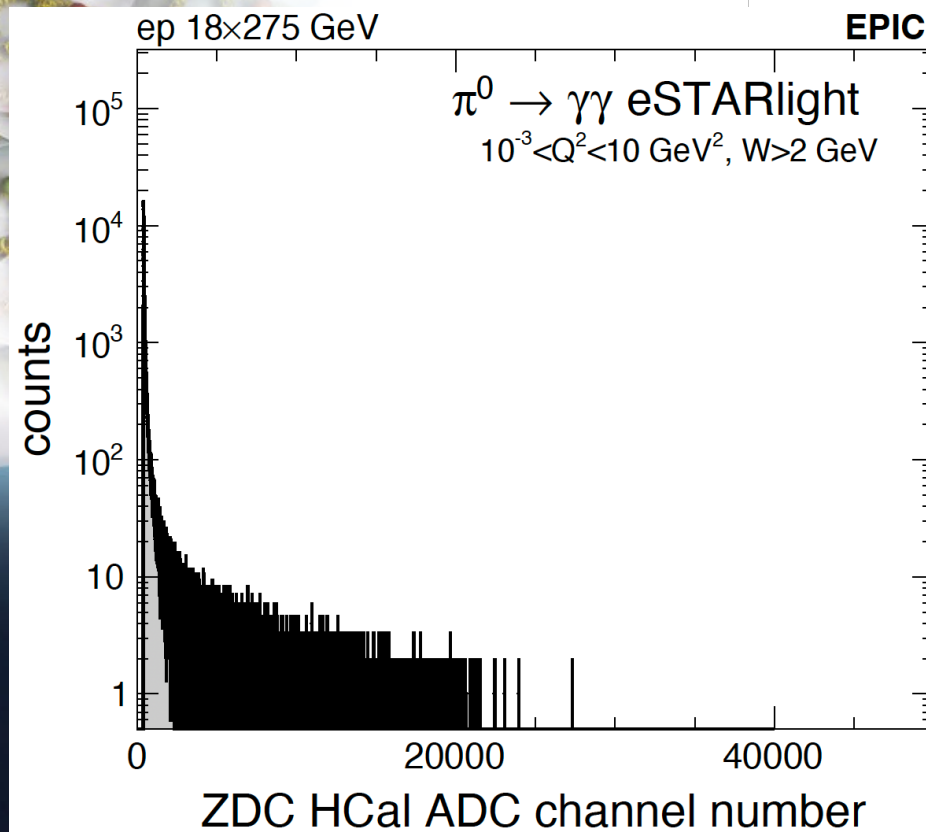
Backward π^0 s in ZDC

- New samples (with clustering!) on S3:
 - [eictest/EPIC/RECO/24.03.1/epic_craterlake/EXCLUSIVE/UCHANNEL_PI0/18x275](#)
- First attempt: Take invariant mass of ZDC Ecal cluster pairs
- No luck yet! Spoke with Barak earlier this week



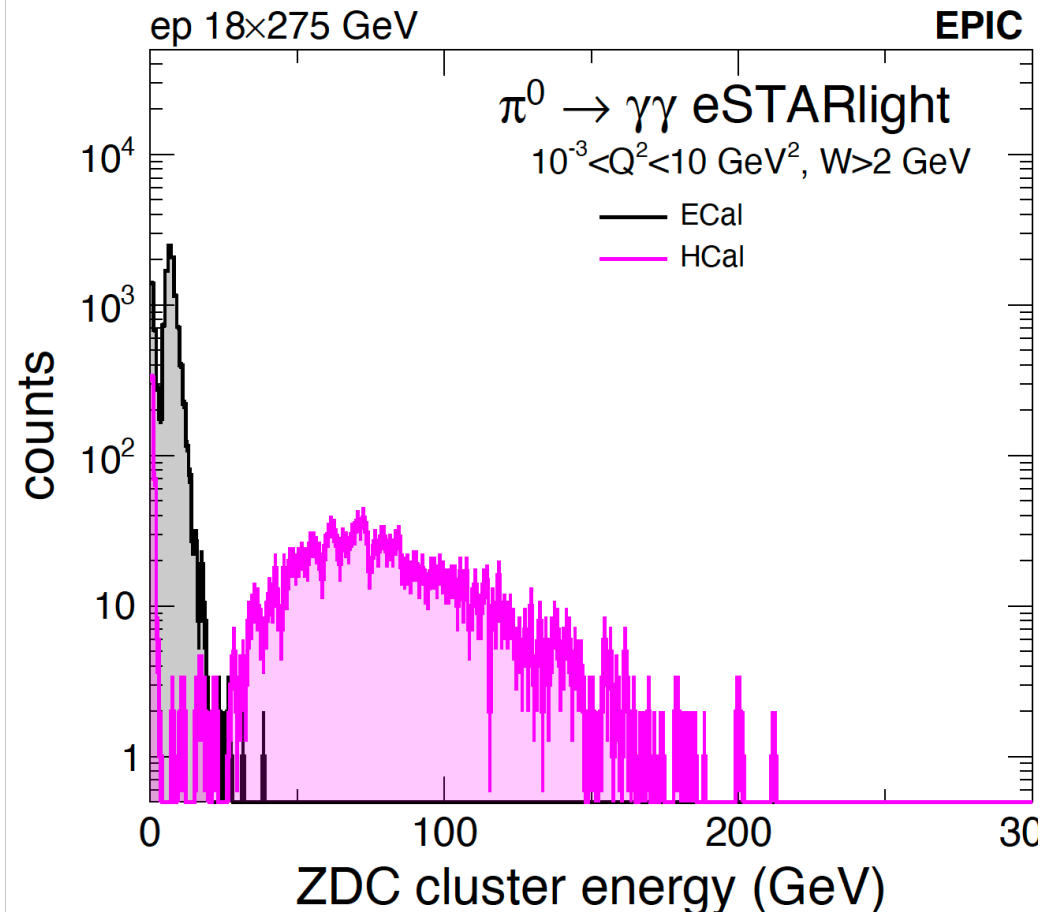
Backward π^0 s in ZDC

- Barak said he observed saturation in ZDC ECal ADC channel number
- I see this too. HCal looks fine. Fixing may improve reconstruction



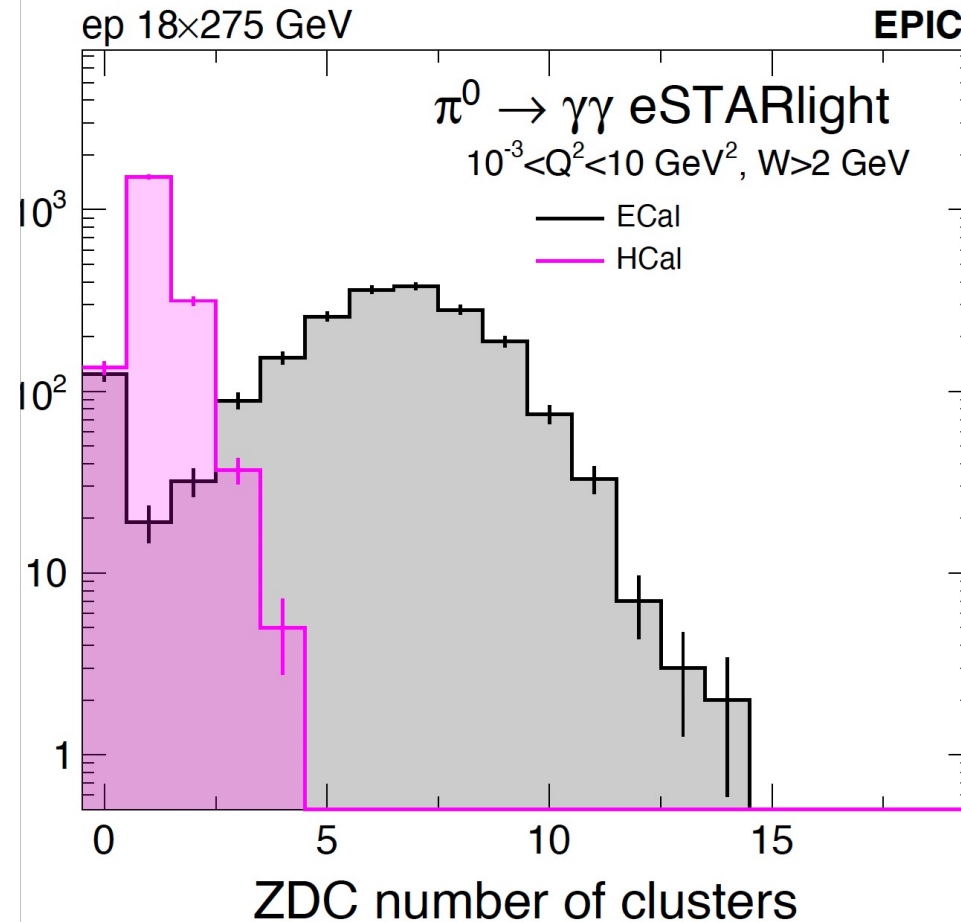
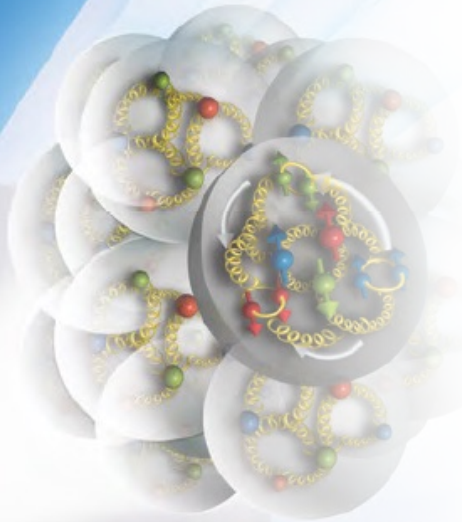
Backward π^0 s in ZDC

- Majority of energy is deposited in ZDC HCal
- I may need to associate HCal and ECal clusters and sum the energies to estimate the true photon energy
- Any ideas?



Backward π^0 s in ZDC

- We would expect and prefer two clusters in each ZDC ECal and ZDC HCal
- HCal sees peak at 1, ECal has peaks at 0 and 7



Conclusions

- New simulation samples available for u-channel π^0 and ρ available on S3
- ρ reconstruction works, and I am exploring the most informative plots and cuts for the benchmarks
- π^0 reconstruction in the ZDC doesn't work yet (on my end), and there are several things to explore
 - ECal ADC saturation
 - energy sharing between HCal and Ecal
 - cluster association between ECal and Hcal
 - cluster shape differences between π^0 and single γ



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Thank you for your attention!

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