PID requirement of dRICH

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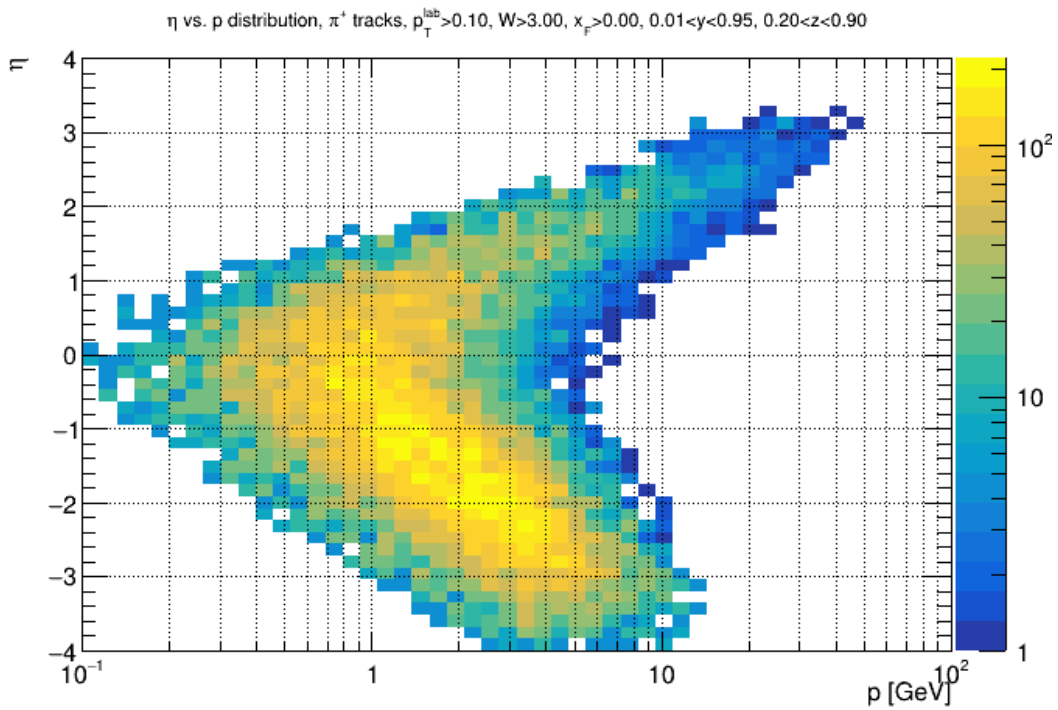
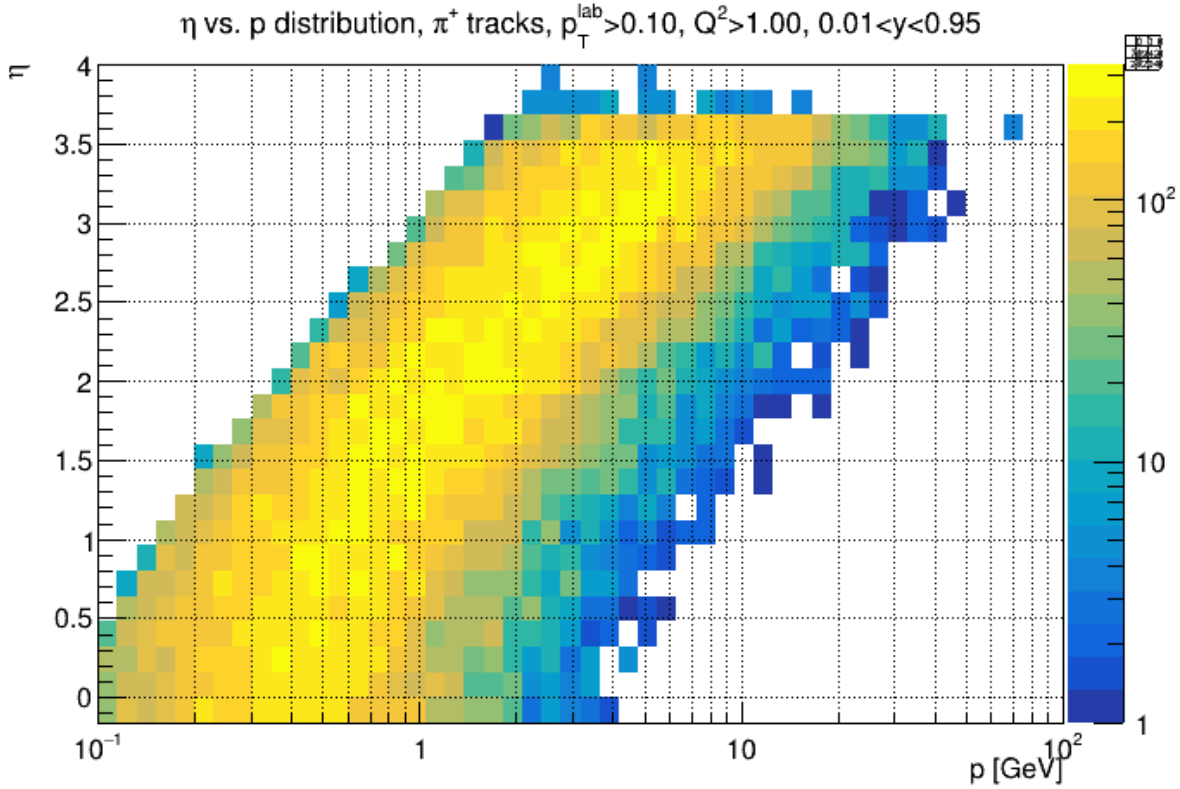
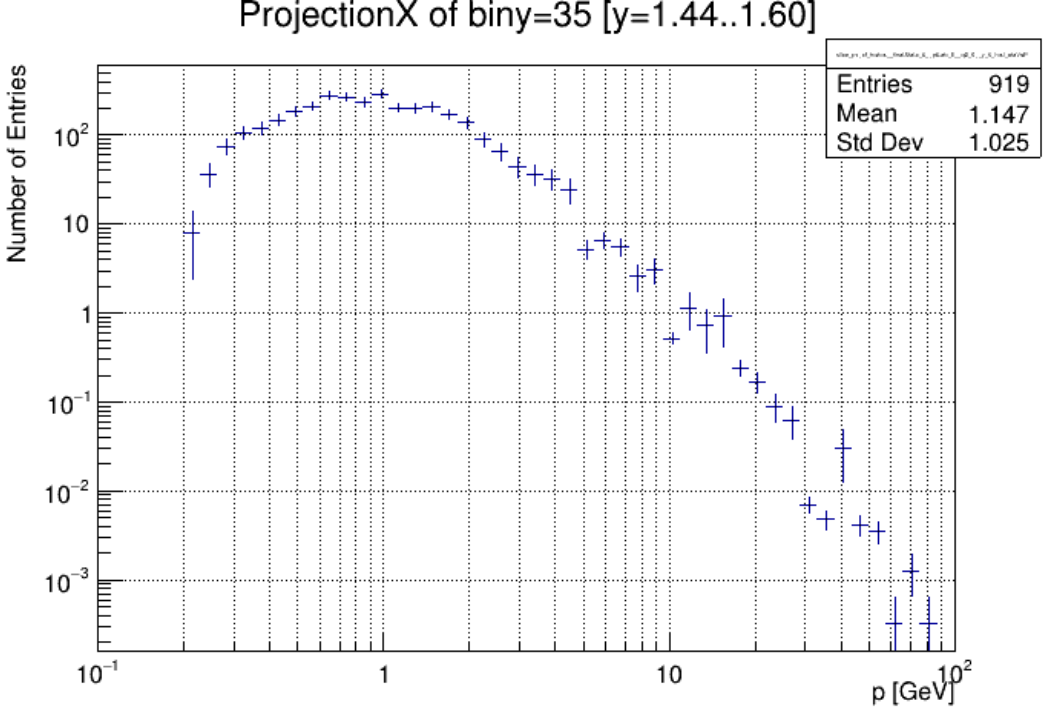
Kinematics

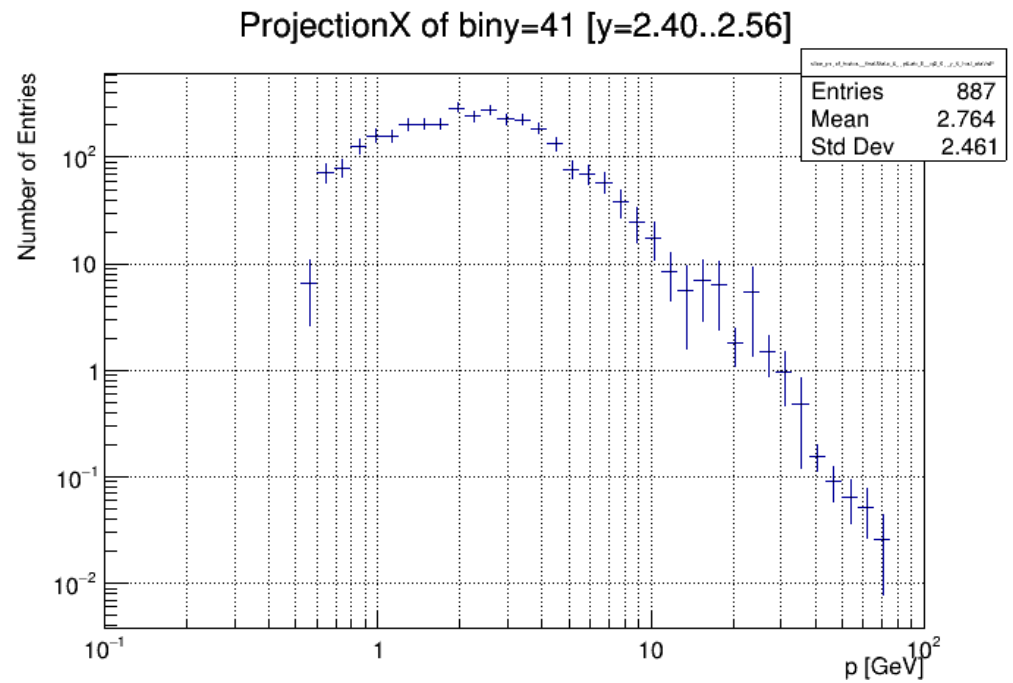


In EPIC arches we took pions produced in SIDIS like event.Nevertheless, we have at least one physics case with working requirement.

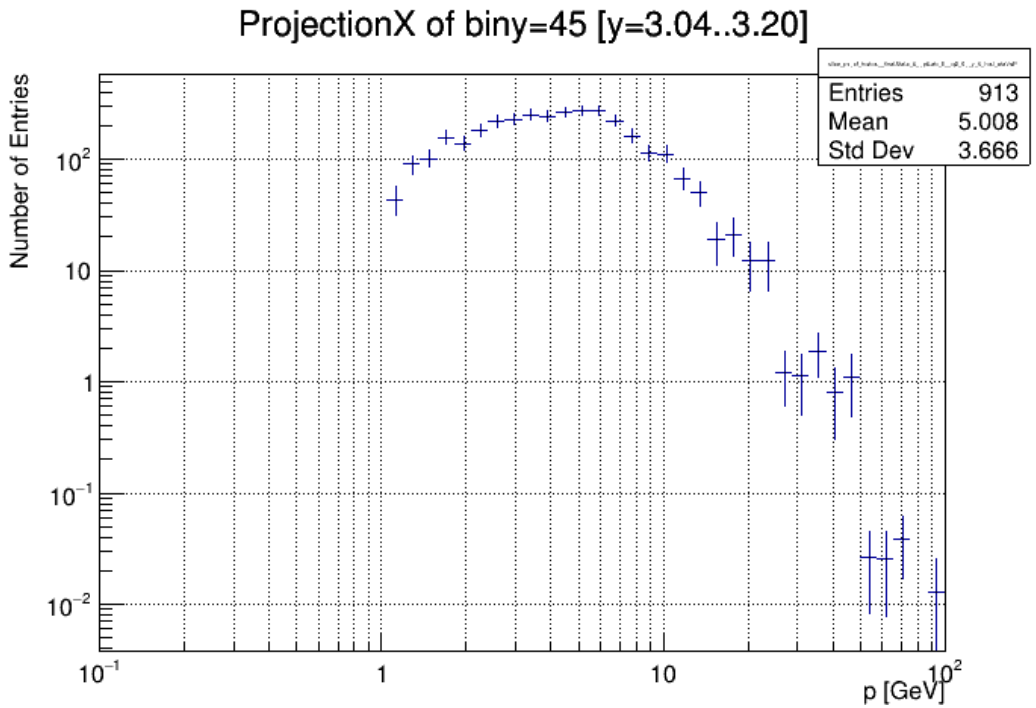


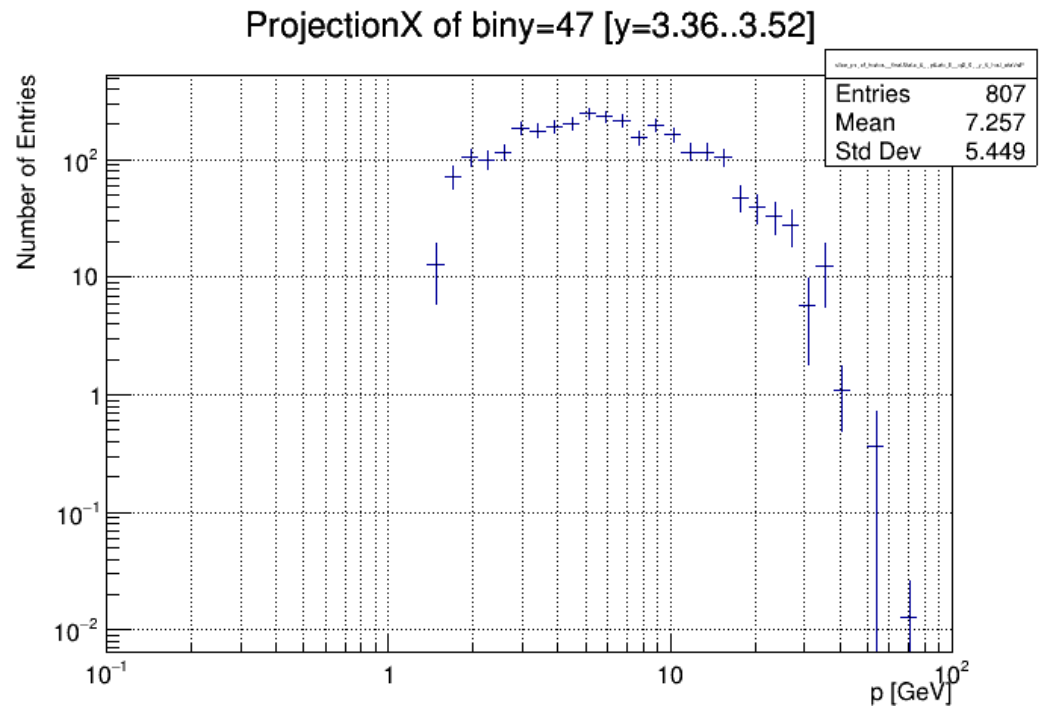
Coverage of positive pions in ePIC arches. (18X275). Minimalist cut!



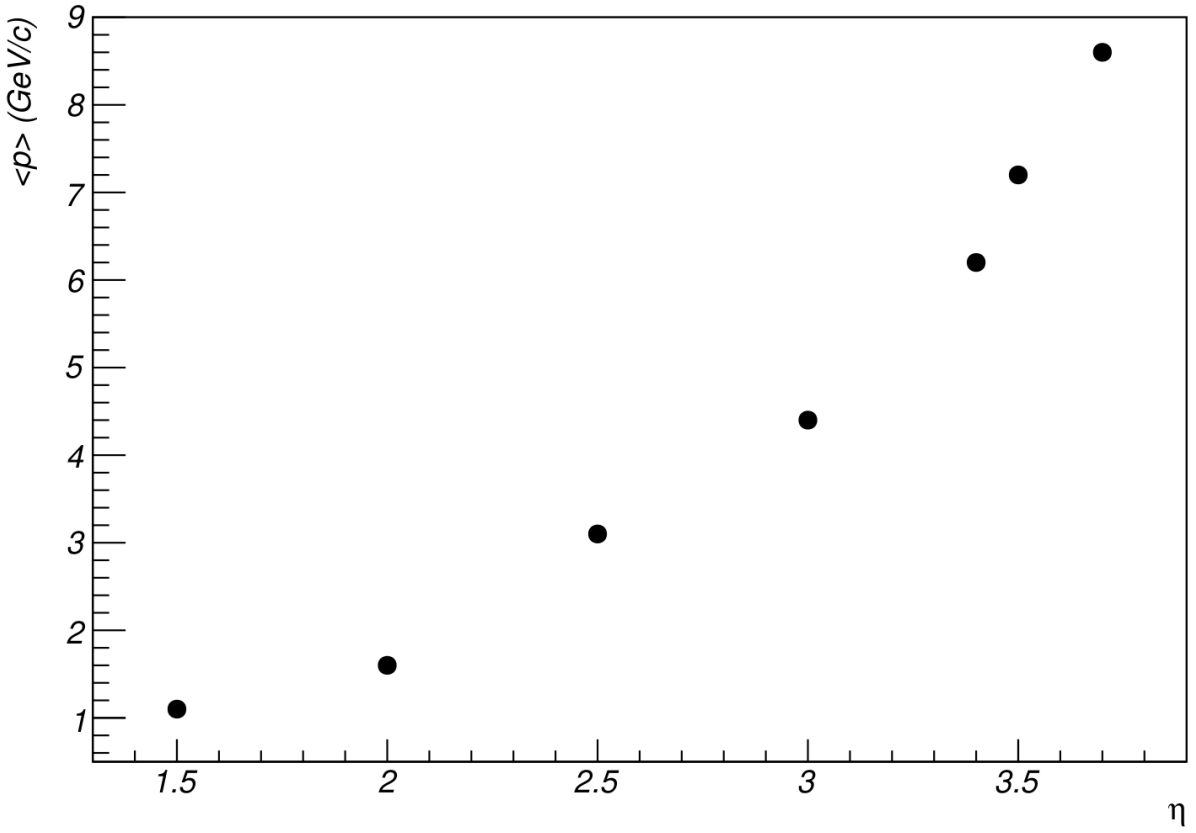


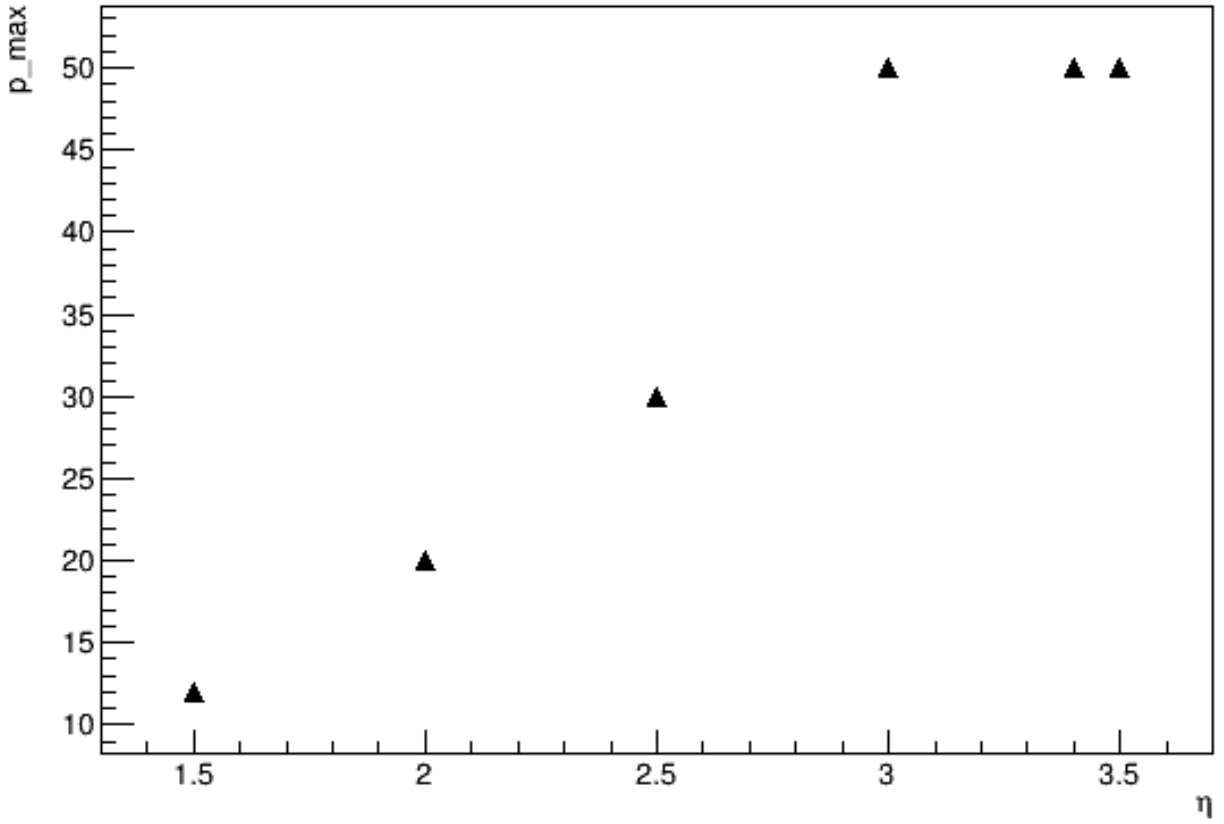
P_max varies highly w/ eta





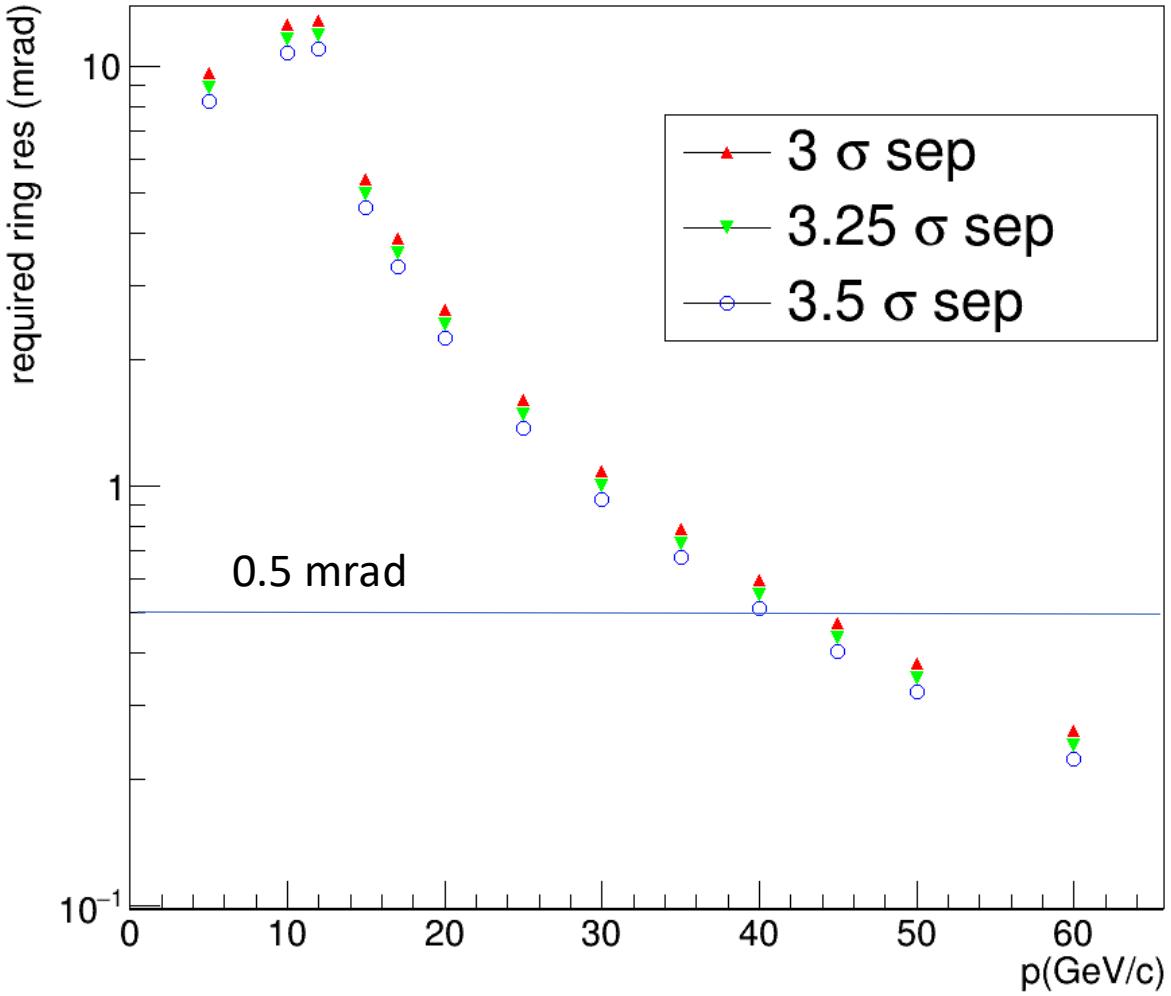
eta-p dependency (pmax w/ grain of salt)



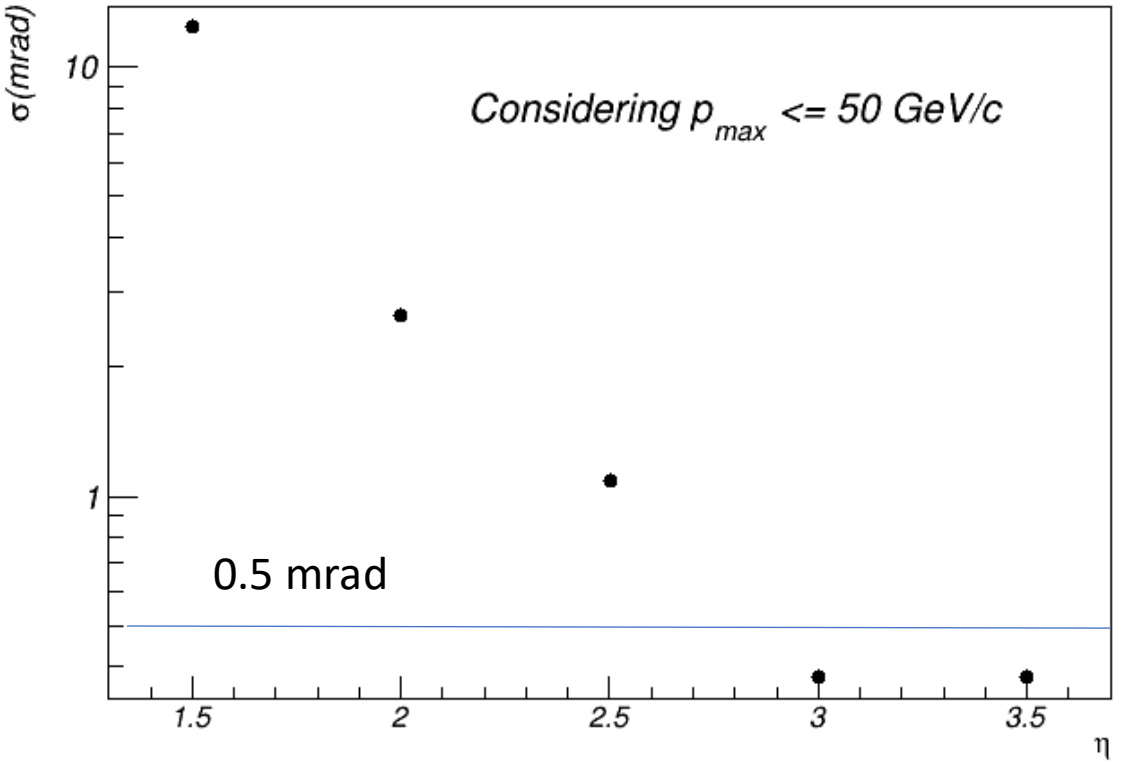


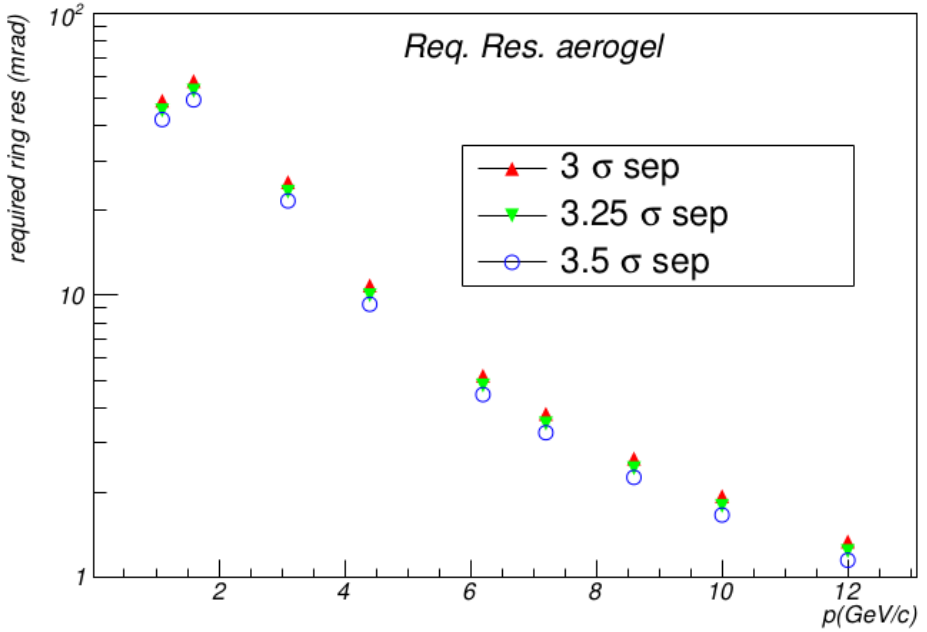
Lower eta does not have many high p tracks gives us space to breathe.

Resolution requirements



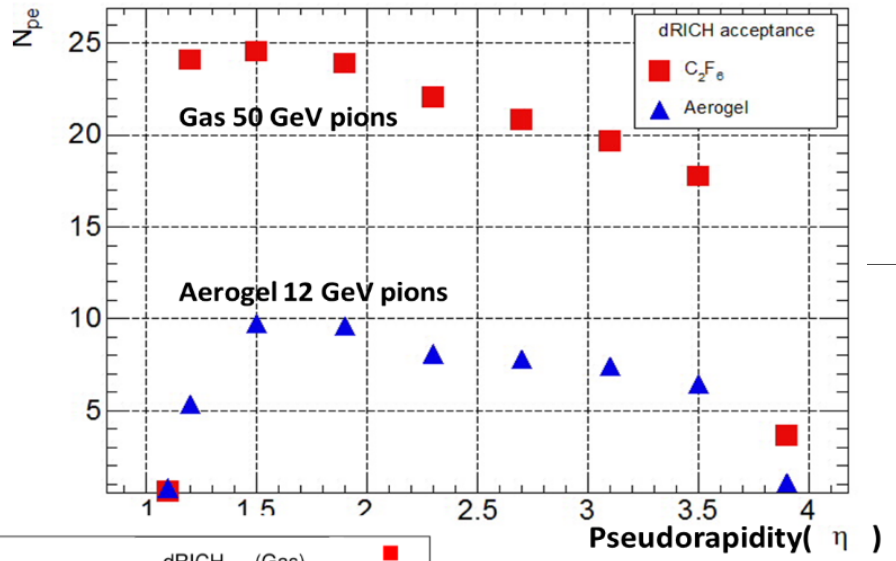
Required resolution has eta dependence.
Given the momentum distribution is different in different eta regions.

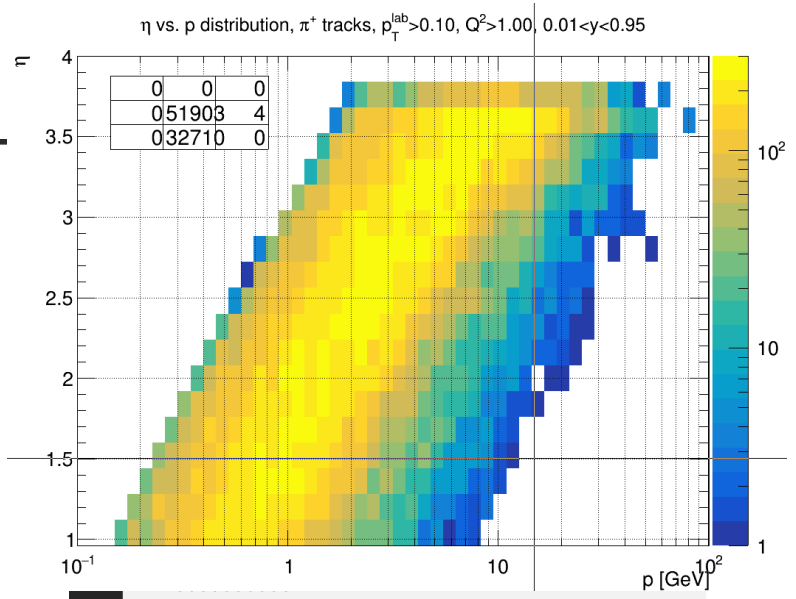


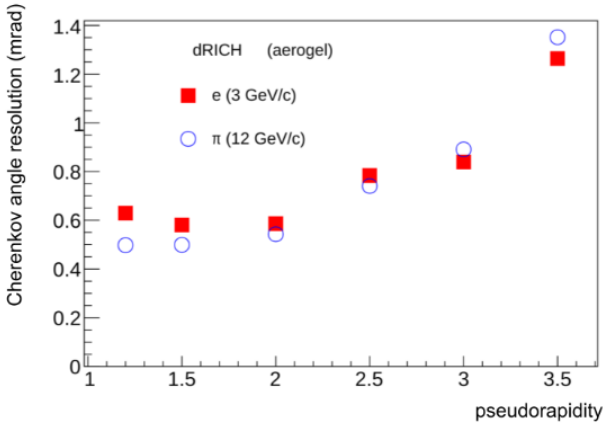


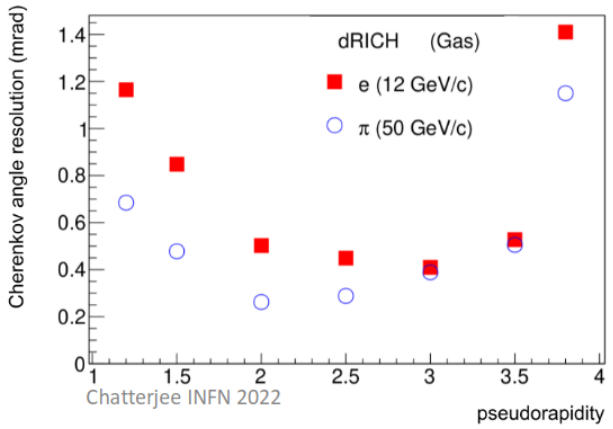
Observed Resolution (Recall Athena)

dRICH acceptance and resolution as a function of pseudo-rapidity



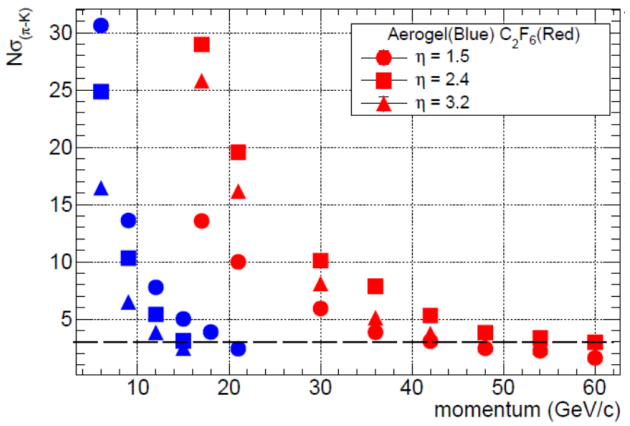






YR requirement: acceptance for the dRICH is 1.0 ≤ η ≤ 3.5. These reference numbers were taken as a guidance for the ATHENA design.

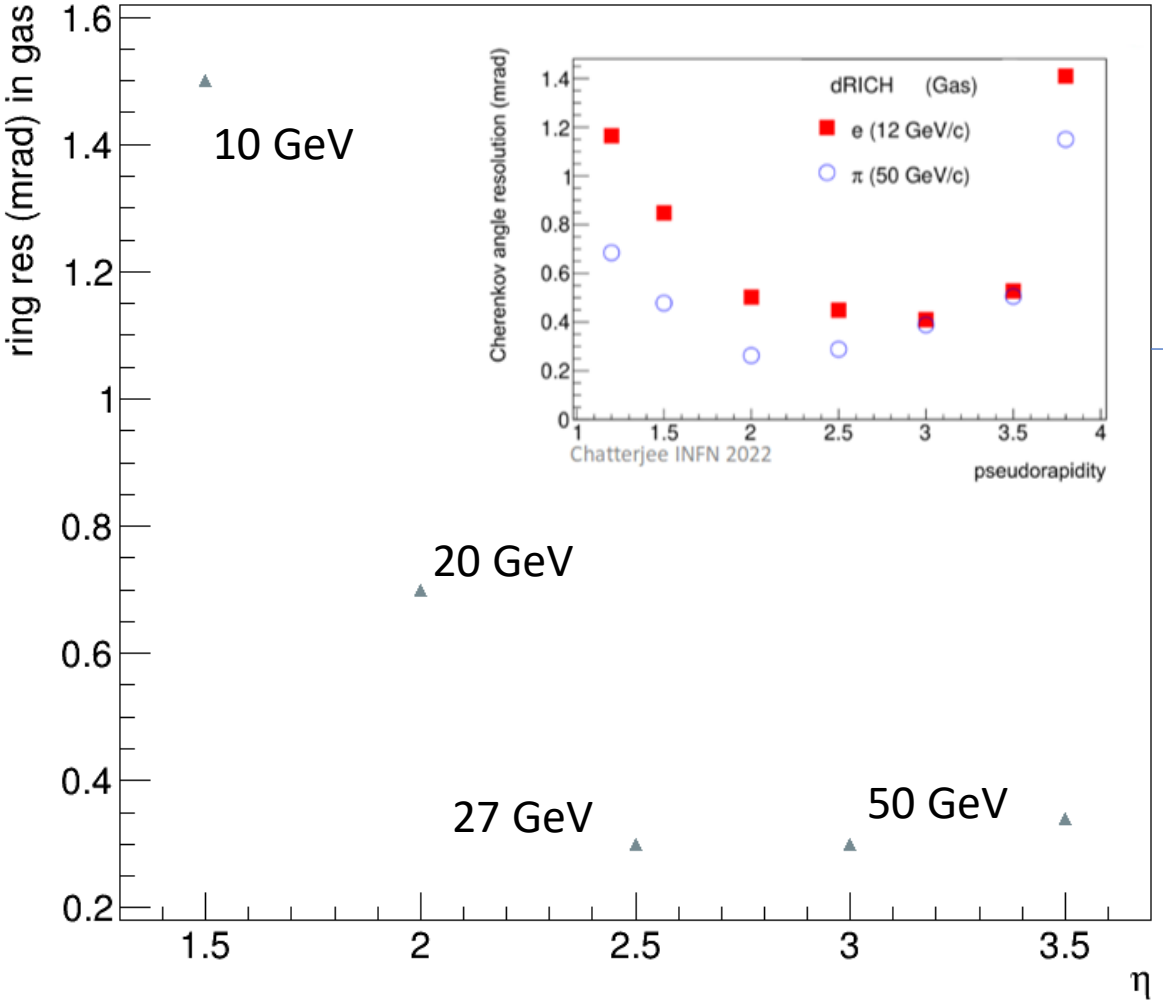
Nσ Separation



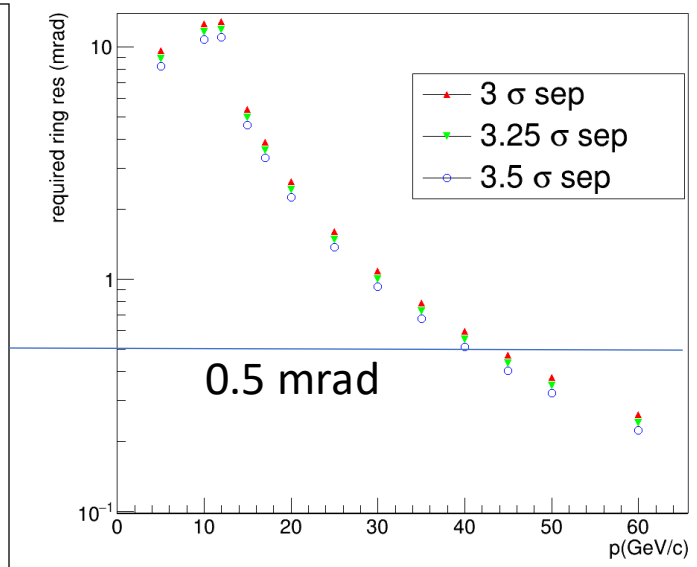
Observed Resolution (couple of comments)

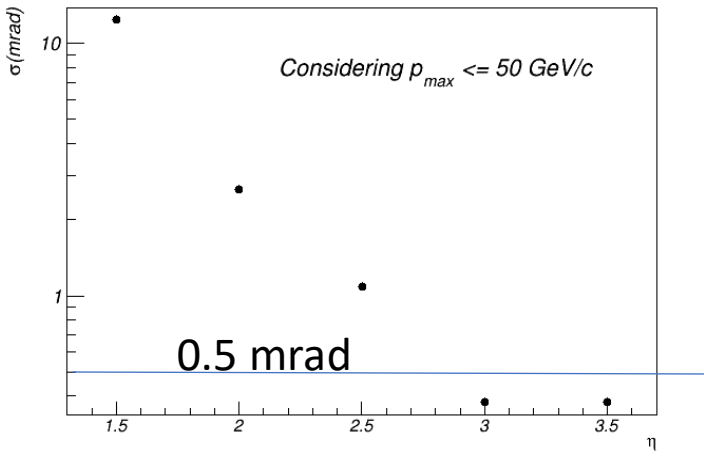
- The full chain is working only for particle shot at fixed momentum, eta, phi values.
- We have estimated in 4 eta values fixed momentum, eta and phi values. These resolutions are to be taken at this level bit as a guidance. As the photons are only illuminating certain regions.
- Once we can feed in hepmc files with continuous eta, phi distribution even though single particle, the values are more reliable. This will not depend much on the region of the sensor. We can have a more concrete statement.

Obtained resolution



Comparison : expectation



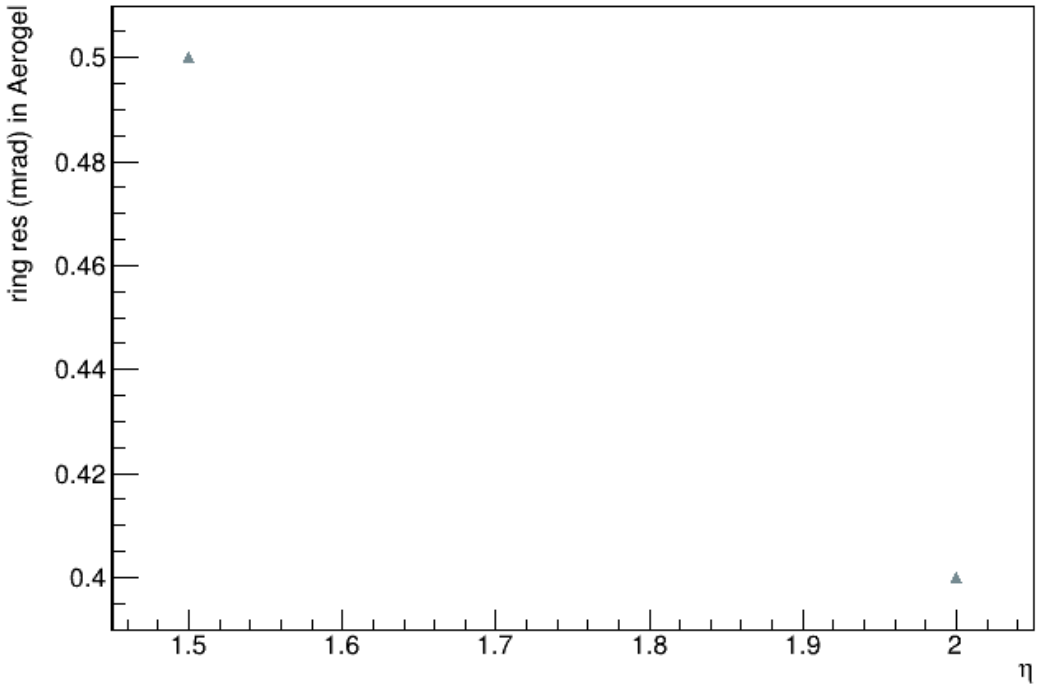


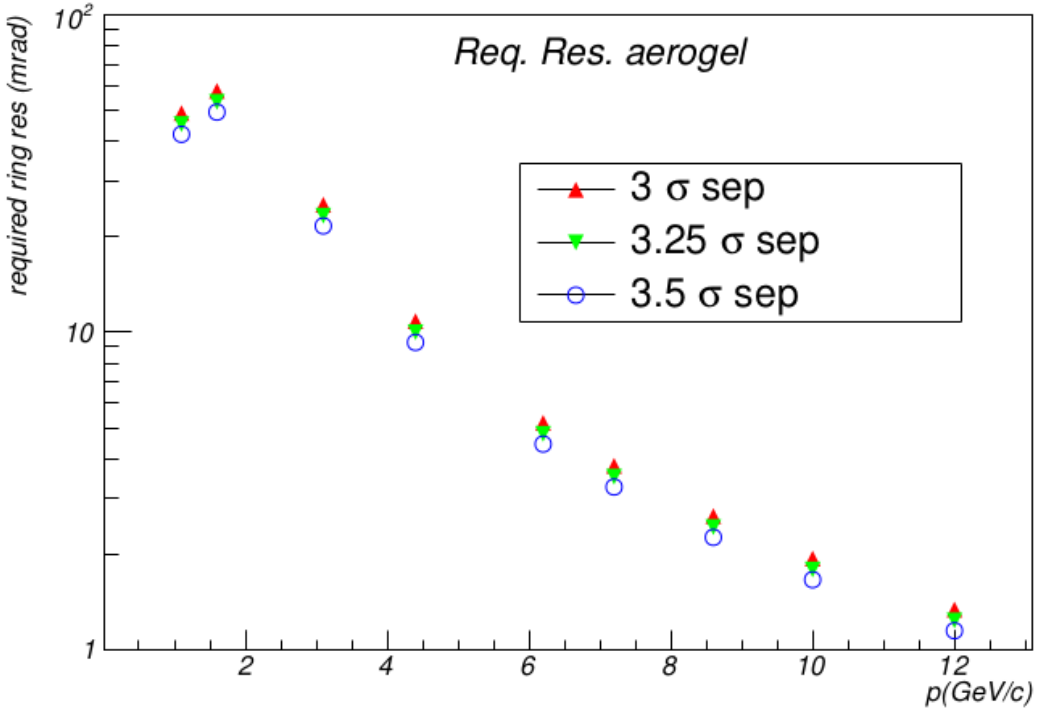
Worsen situation than ATHENA!

--> In lower etas.

--> **Apparently still can work**!!

Aerogel obtained resolution

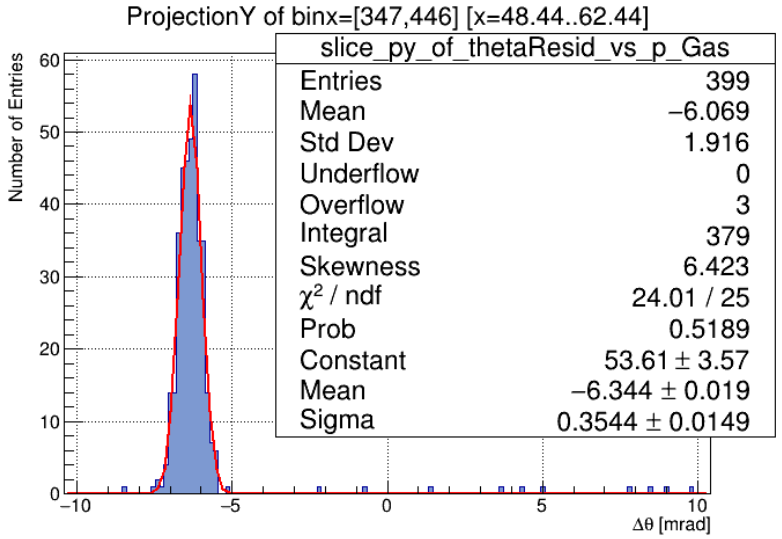




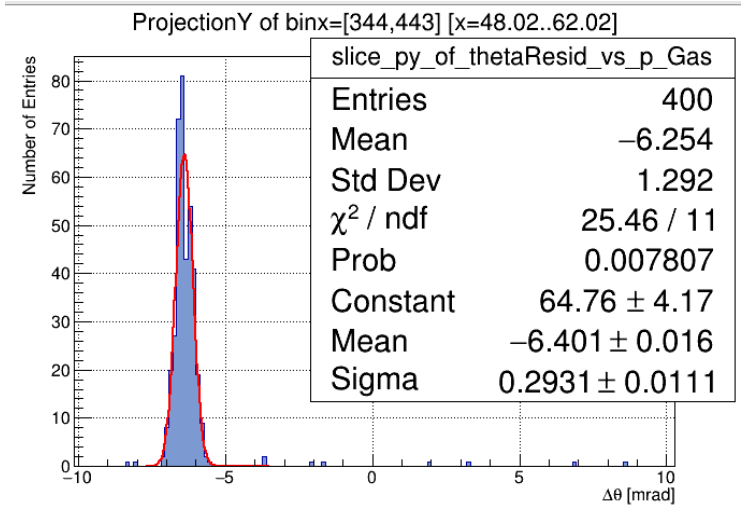
Aerogel can provide the required performance !!

Further observations and open questions

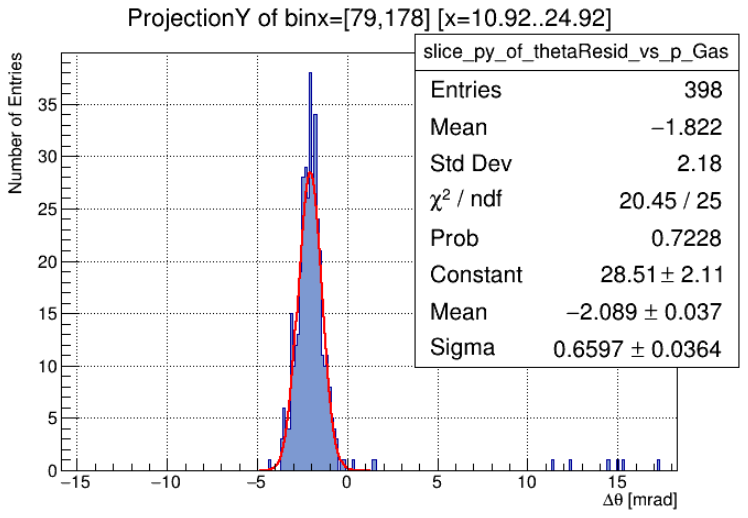
1. Gas angles at higher eta are systematically smaller than expected. The offset is even up to 6 mrad!! Algorithm has to be cross-checked. In juggler the values were centered around 0 but around eta 3.0 we obtained similar ring resolution. Should be our next priority??
2. A long tail is present in case of reconstructed angle. This is not clear. The tail is present in only one direction.
3. Aerogel will play critical role in high eta PID. Can we live with 7 photons with 40 cm ring? Shall we try thicker aerogel? Last time I changed 4cm to 6cm I gained 2 <photons> (7.5-->10) w/o losing ring resolution.
4. The "sensitivity" of the sensor placement? --> To be studies this week (reporting next week!)



eta -> 3.5



eta -> 3.0



eta -> 2.0