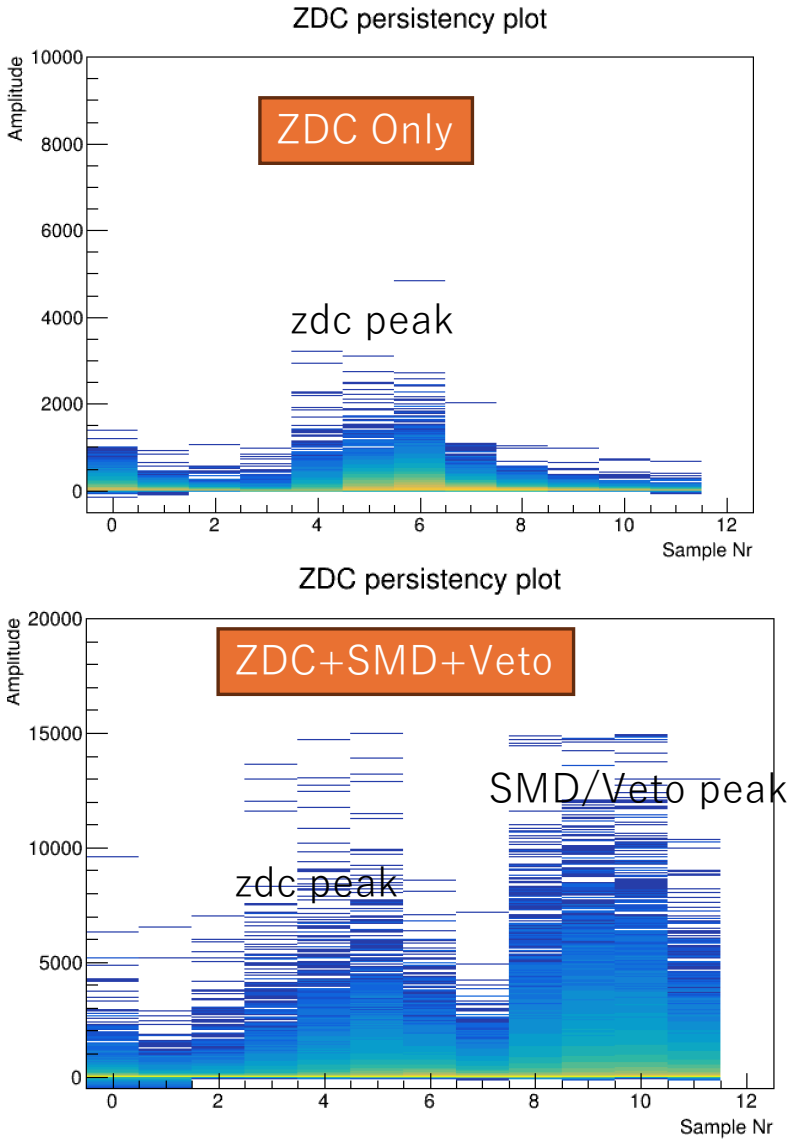
SMD Commissioning

RIKEN/RBRC

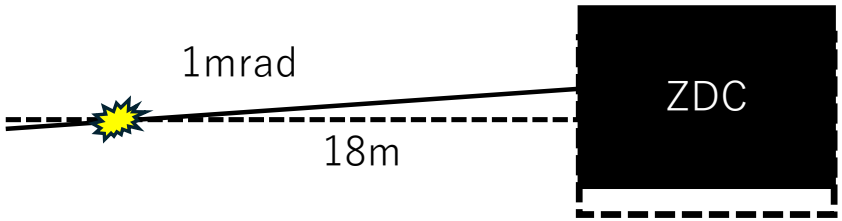
Itaru Nakagawa

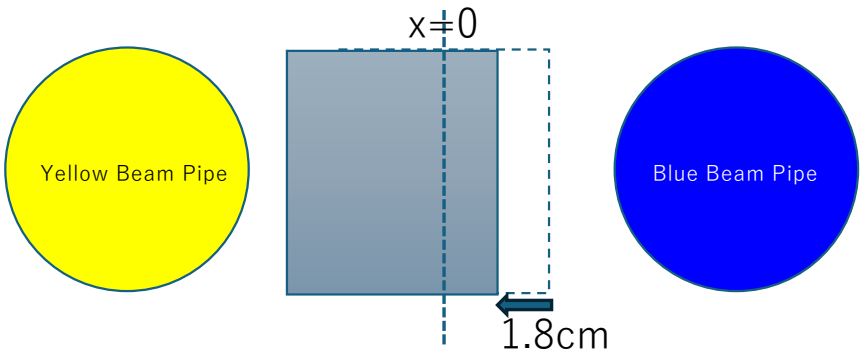
ADC Timing

- John Haggerty confirmed there is 20ns cable delay difference between SMD/Veto and ZDC signals.
- ZDC signal cables are 460 feet while SMD/Veto ones are 520 feet long. This explains 100ns delay of the SMD signal to ADC with respect to the ADC gate.
- The solution to this is to increase the number of wave form sampling from the current 12 to 16.
- This will extend additional 4ticks x 17ns=68ns. This will accommodate whole SDM/veto signal.

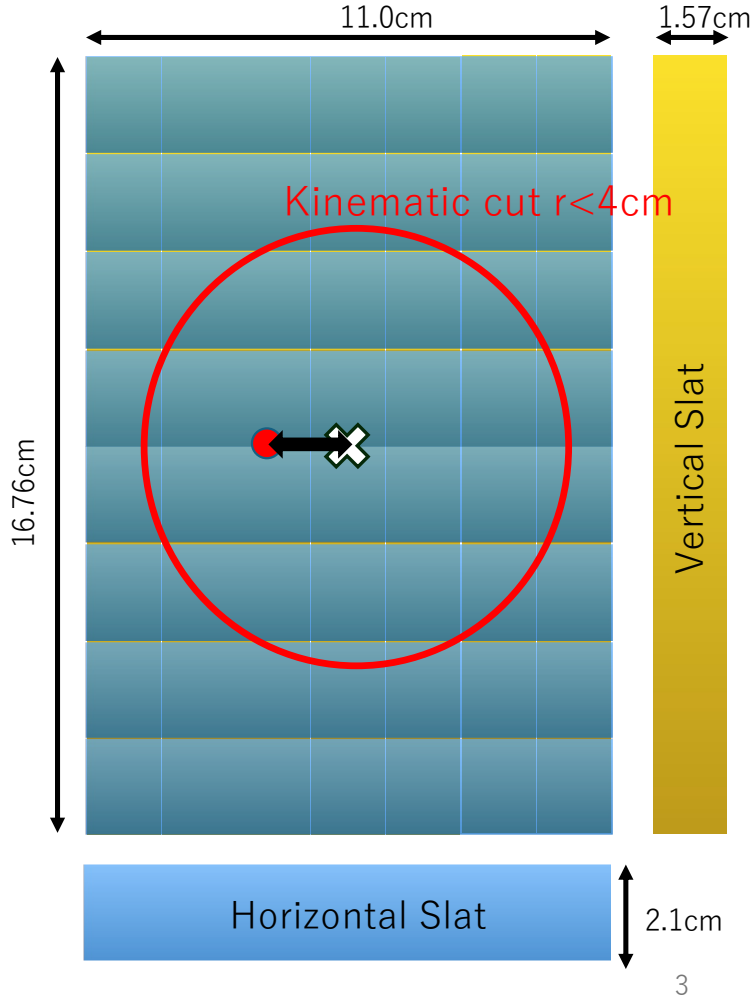


Beam Angle Dependence of Horizontal Neutron Beam Center

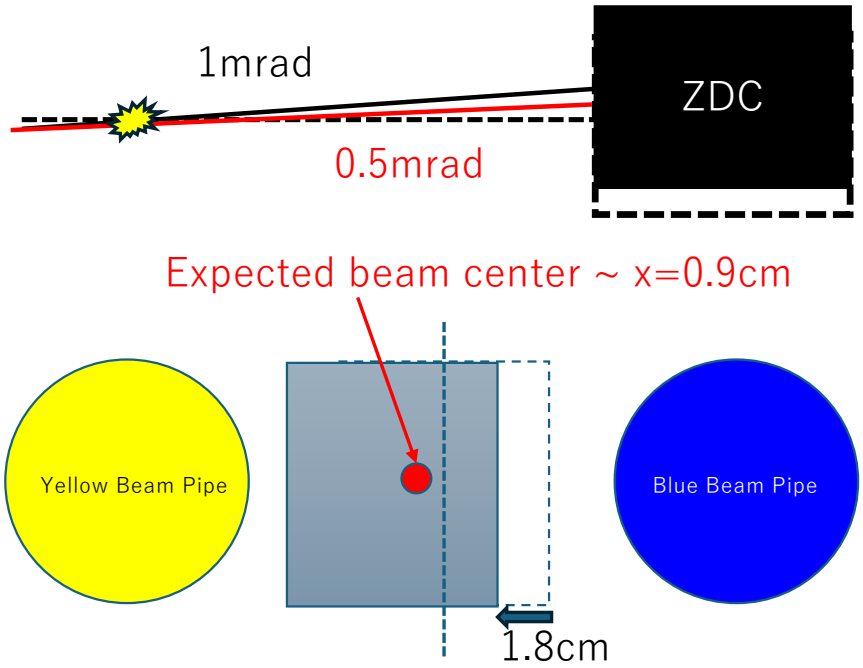


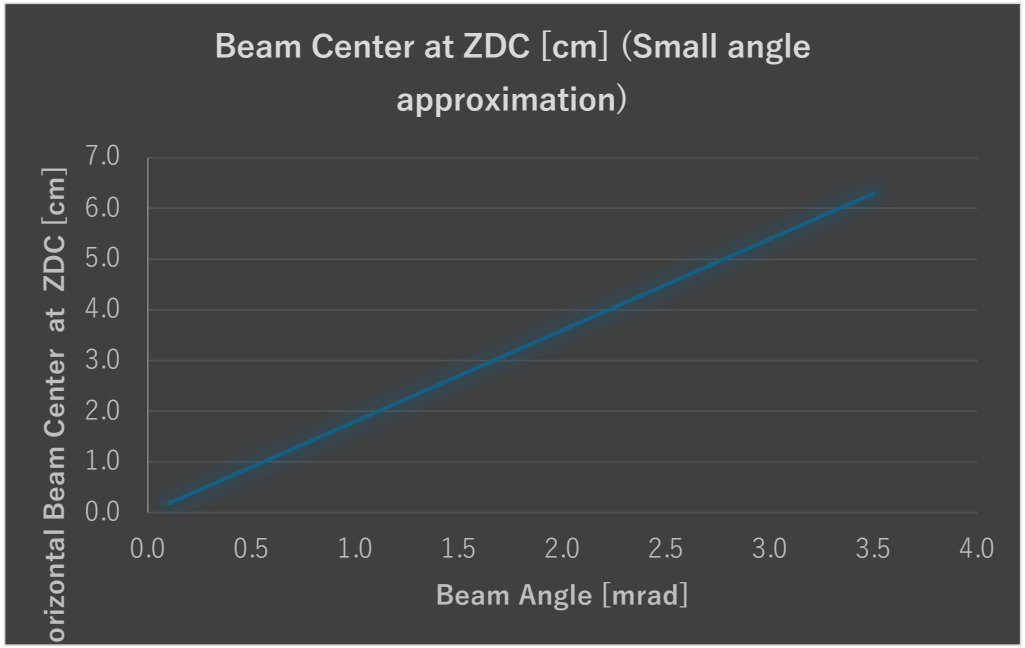


ZDC was moved to 1.8cm toward outer side of the ring.



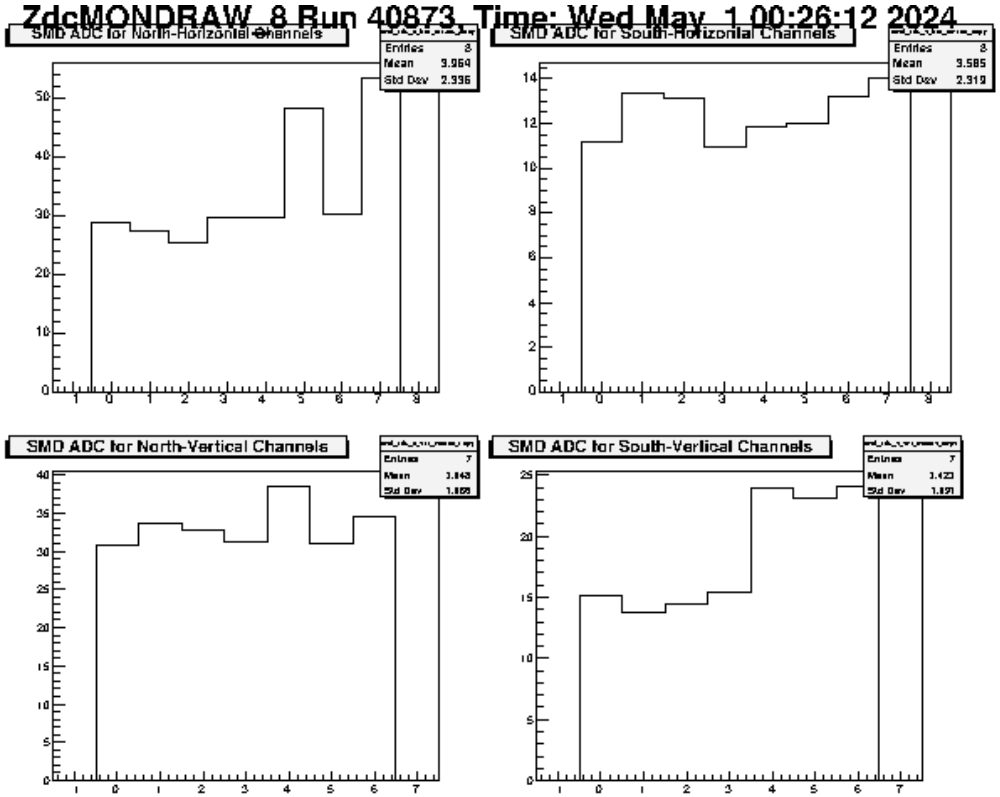
Beam Angle Dependence of Horizontal Neutron Beam Center





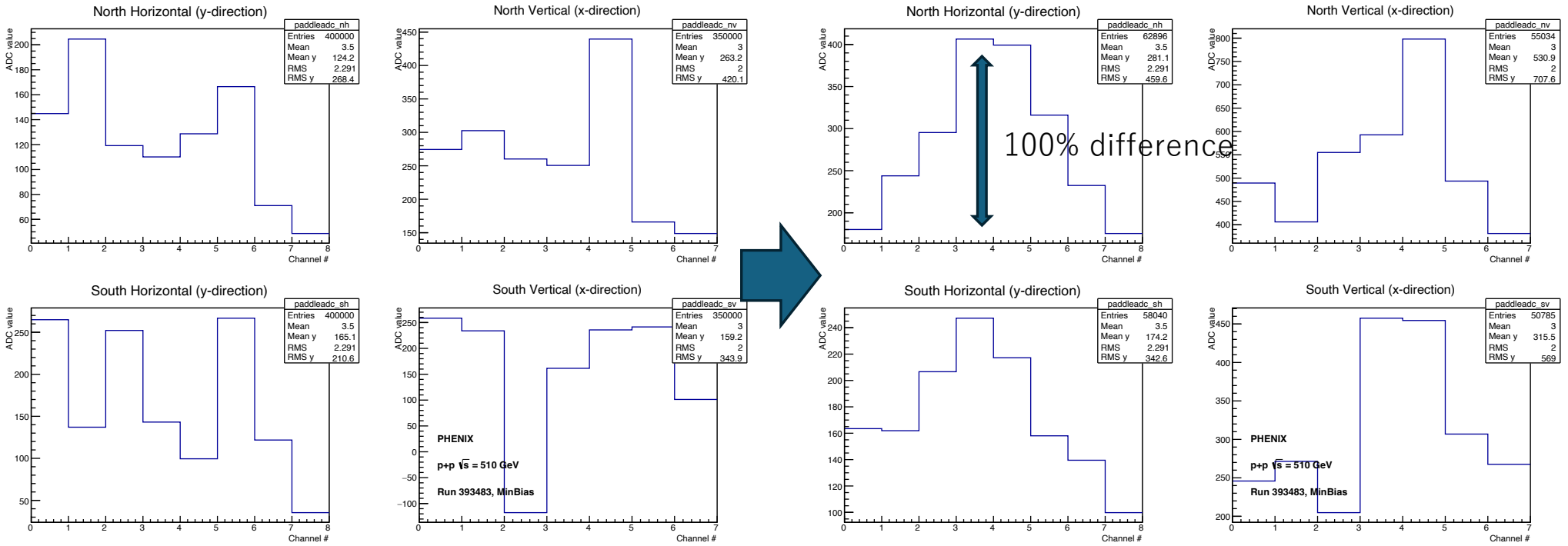
Data taking so far was all with 1mrad opening angle

ADC weighted hit channel distribution



- Expecting somewhat enhanced entries around the center (0.9cm to the side though) with opening angle of 1mrad.
- So far no indication of any enhanced entry around center in any of 4 distributions.

PHENIX Case (from Run13 500GeV)



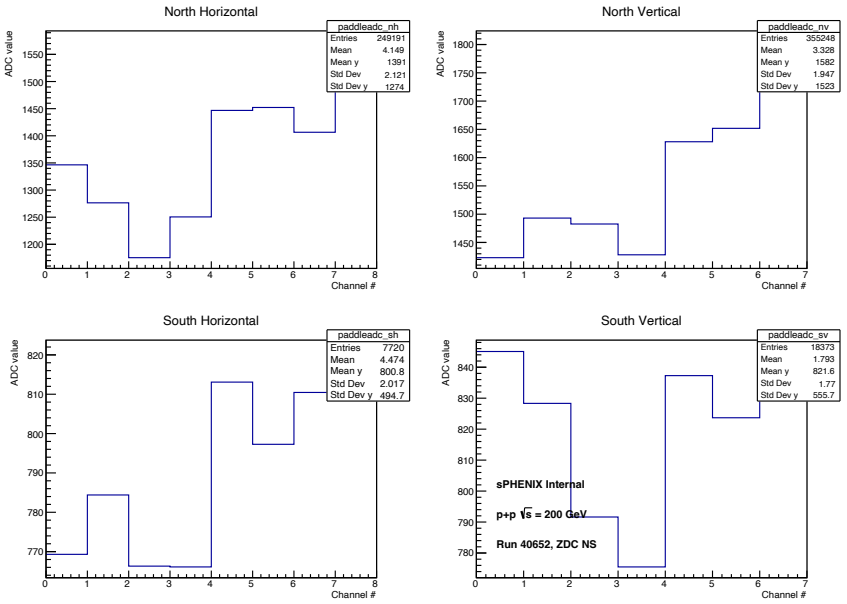
No ZDC ADC cut

With ZDC ADC > 600 Cut

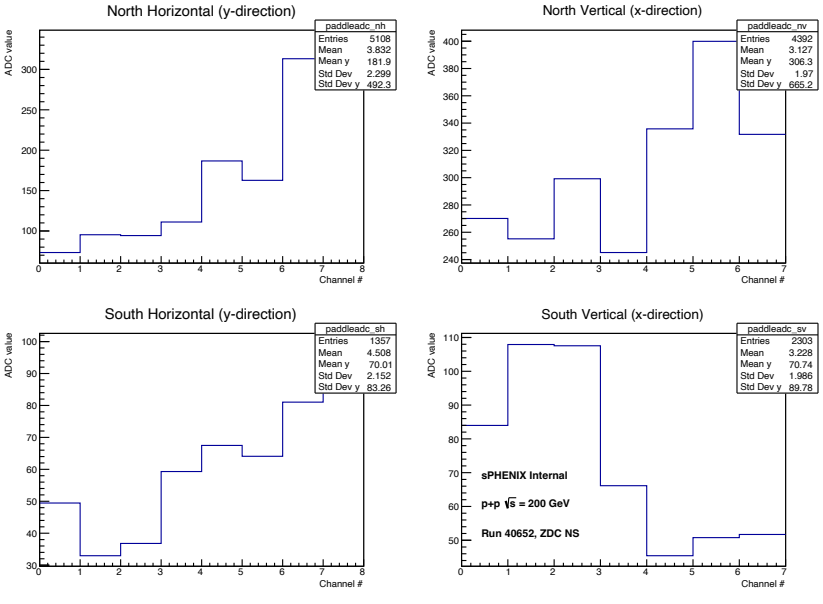
Thanks to Devon for the study from Run13 PHENIX SMD data. Applying ZDC ADC cut does help to see the distributions peaking around center.

ADC weighted hit channel distribution

sPHENIX Run#40652



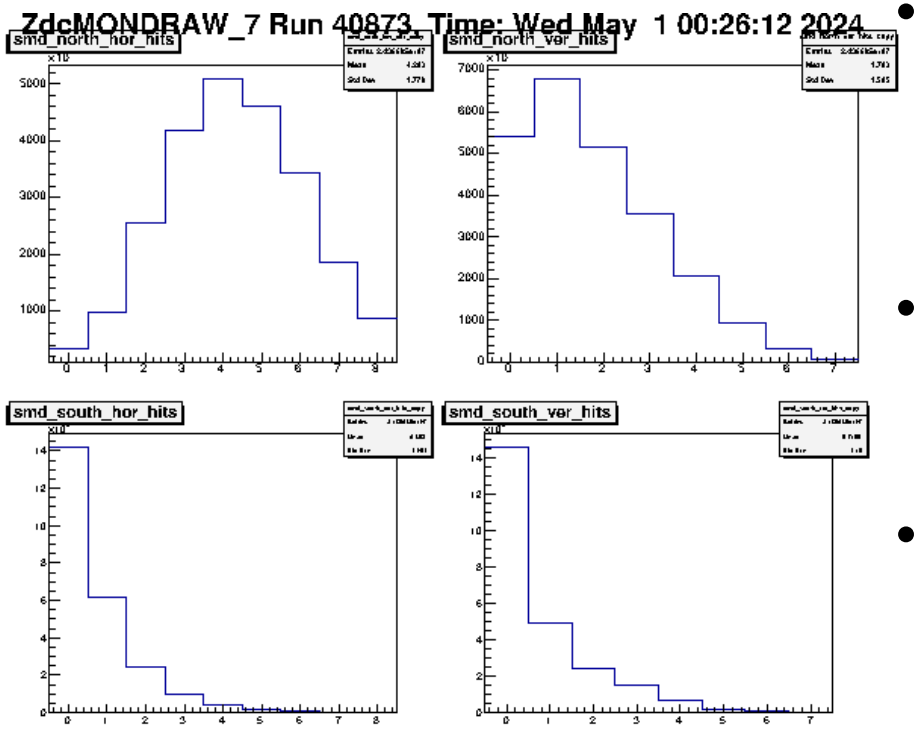
No ZDC ADC cut



With ZDC ADC Cut

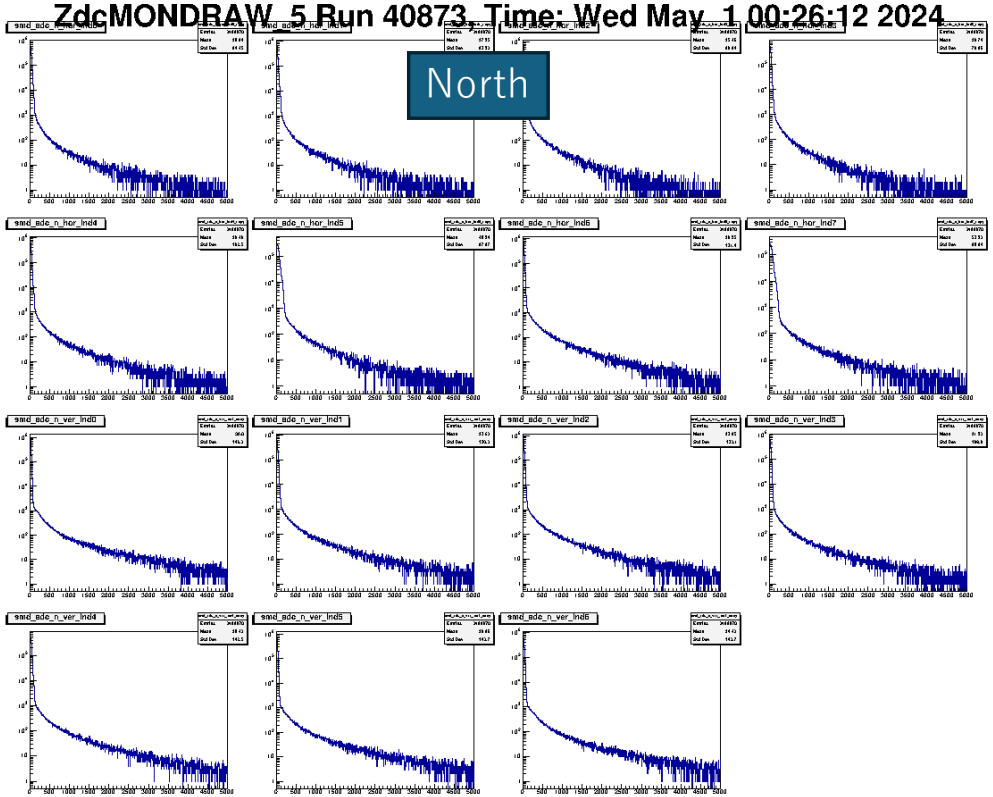
Still no peak around the center even with ZDC ADC cut.

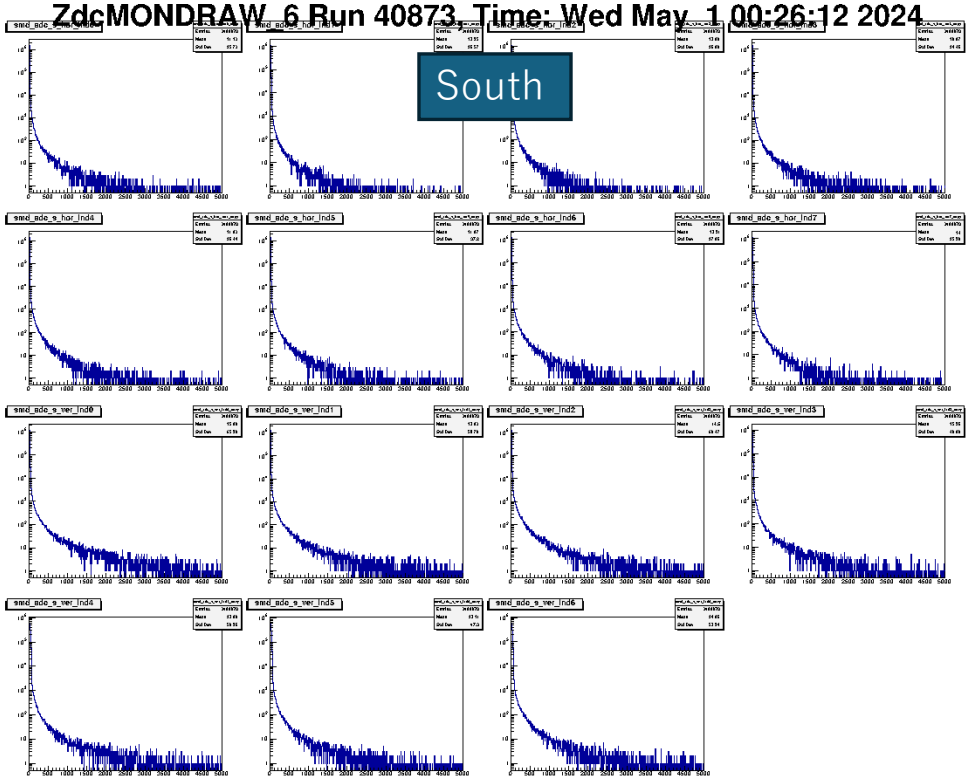
Number of hit paddle distribution



- The number of hit paddle distribution seem to be reasonable in North, horizontal.
- North vertical may need little more tweak in the pedestal threshould?
- South needs more investigation.

SMD ADC Distributions

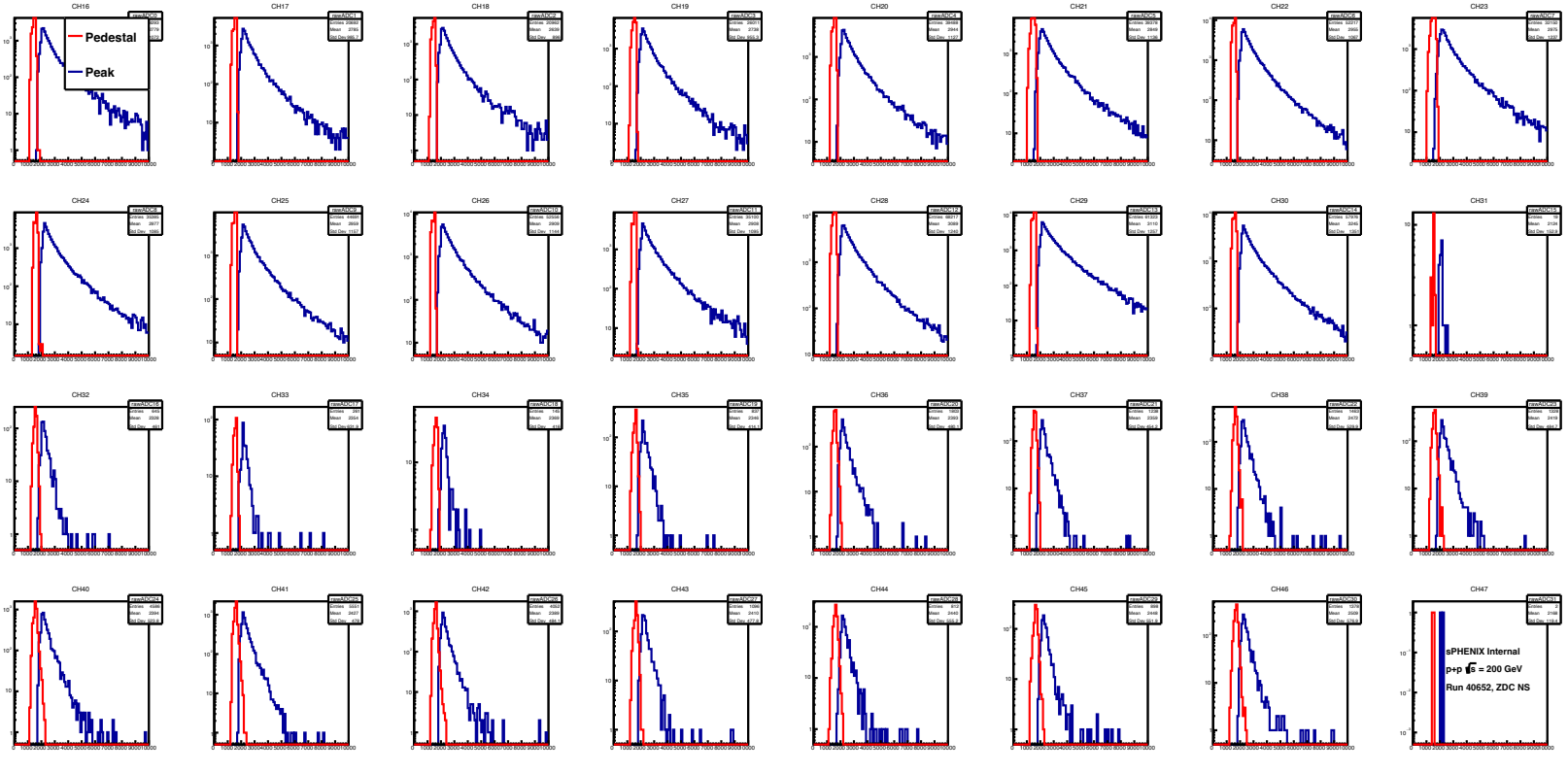




The ADC distribution indicates South ADC is a bit lower than the North. Itaru will try to balance the ADC values between both arms by tweaking HV.

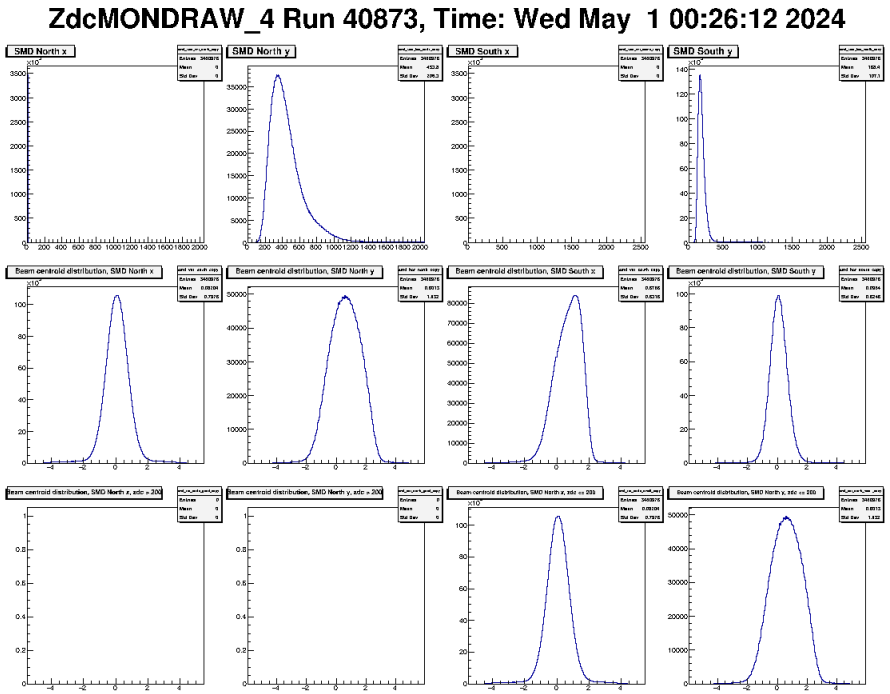
SMD Pedestal Determination

Plot by Devon



South gain may be poorer compared to North. Increasing HV in South may be help to improve the number of hit paddle distribution?

Reconstructed x,y distribution



- The reconstructed x,y distribitons are too narrow.
- They suppose to spread out within the fiducial volume (-4< r < 4cm)
- Need detailed check on
  - Trigger selection. Should process only ZDCNS coincidence to make the case as simple as possible.
  - Apply ZDC1(+ZDC2) ADC cut to secure shower into SMD.
  - Double/triple check cablings (Itaru)