

# dN/deta Analysis


INTT-J meeting

Nov./1/2023 Misaki Hata (NWU)

# dN/deta analysis

- Now I'm analyzing the data of run20869 (magnet field is turn off)
  - use the first 10k events
  - I checked  $\eta$ , ADC and  $\phi$  distribution.

## INTT statistic



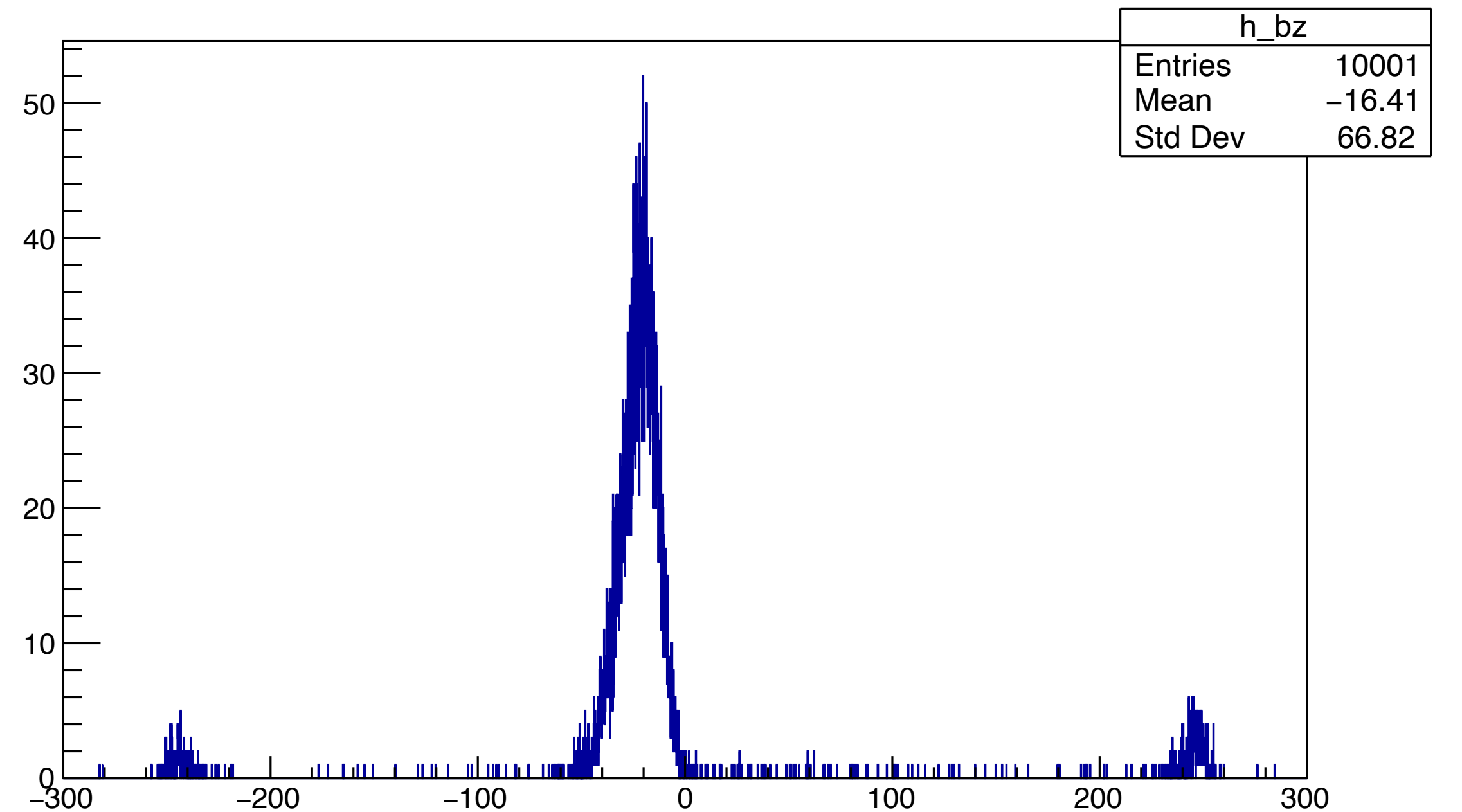
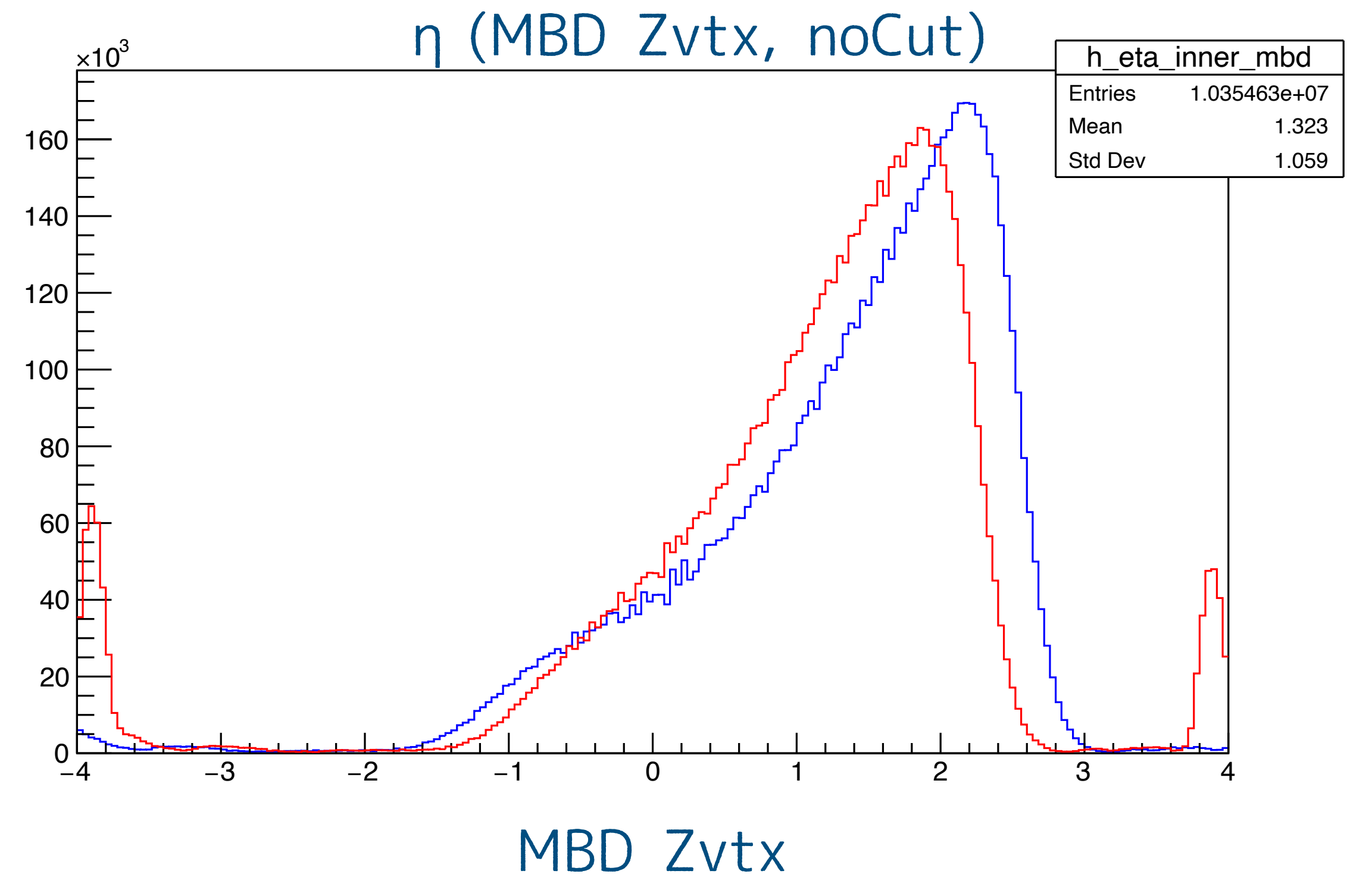
- Zero field data was taken in July 8th
  - > 2M events
    - PHENIX 1st multiplicity paper used 130k events
    - Z vertex shifted by ~ 20cm (edge of INTT)
- We have more B-ON data
  - Can be used for the analysis, but analysis get more (slight) complicated

RunNumber (ZF)	Nevents
20864	417,729
20866	26,404
20867	317,047
20868	288,481
20869	550,123
20878	89,238
20880	171,760
20881	31,736
20883	94,249
20885	357,343
Sum	2,344,110

09/19/2023 dN/deta, C-W. Shih 5

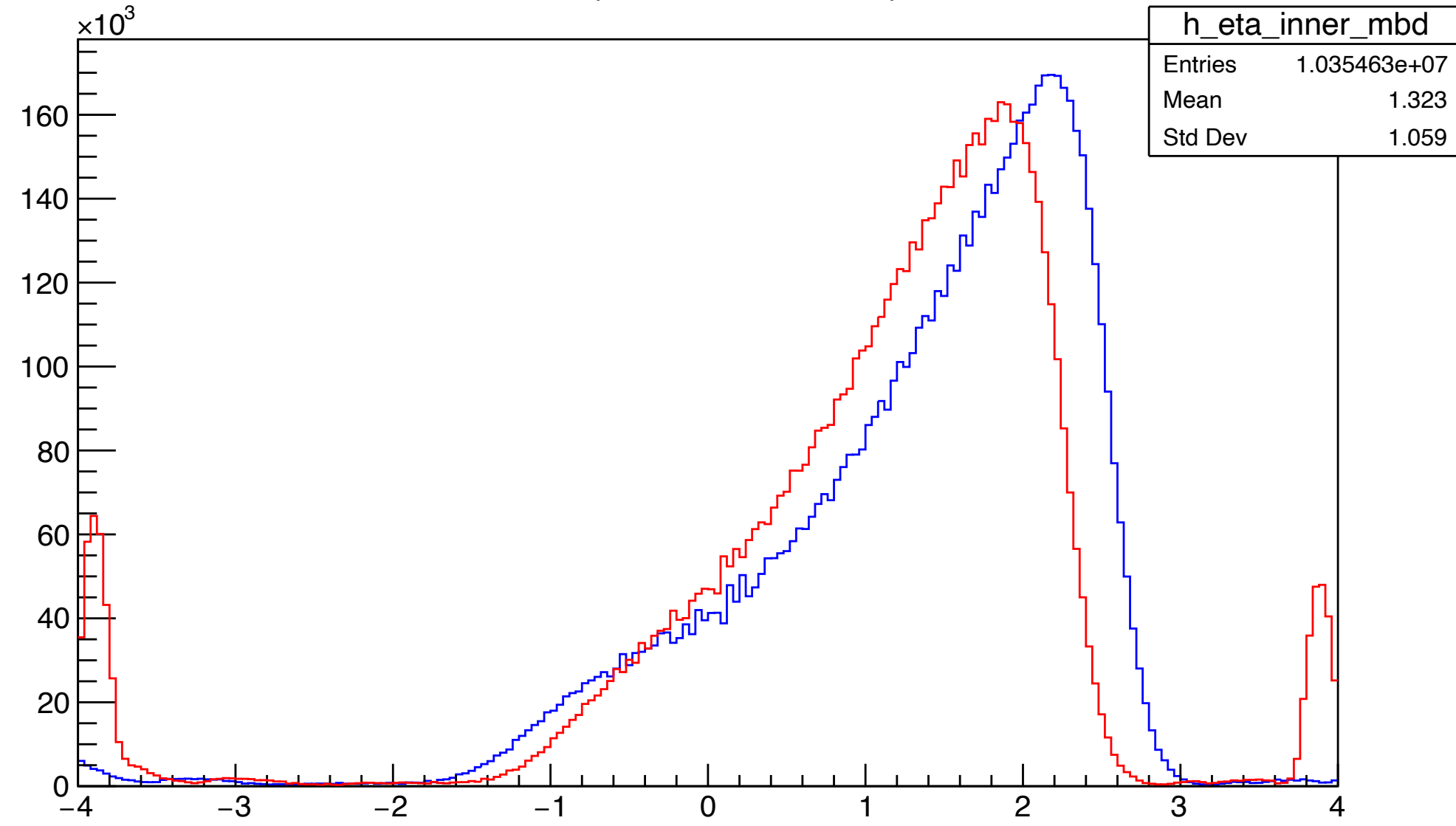
# $\eta$ distribution

- upper figure:  $\eta$  distribution
  - blue : inner barrel
  - red : outer barrel
- lower figure: MBD Zvtx
  - $\rightarrow$ cutting at Zvtx position.

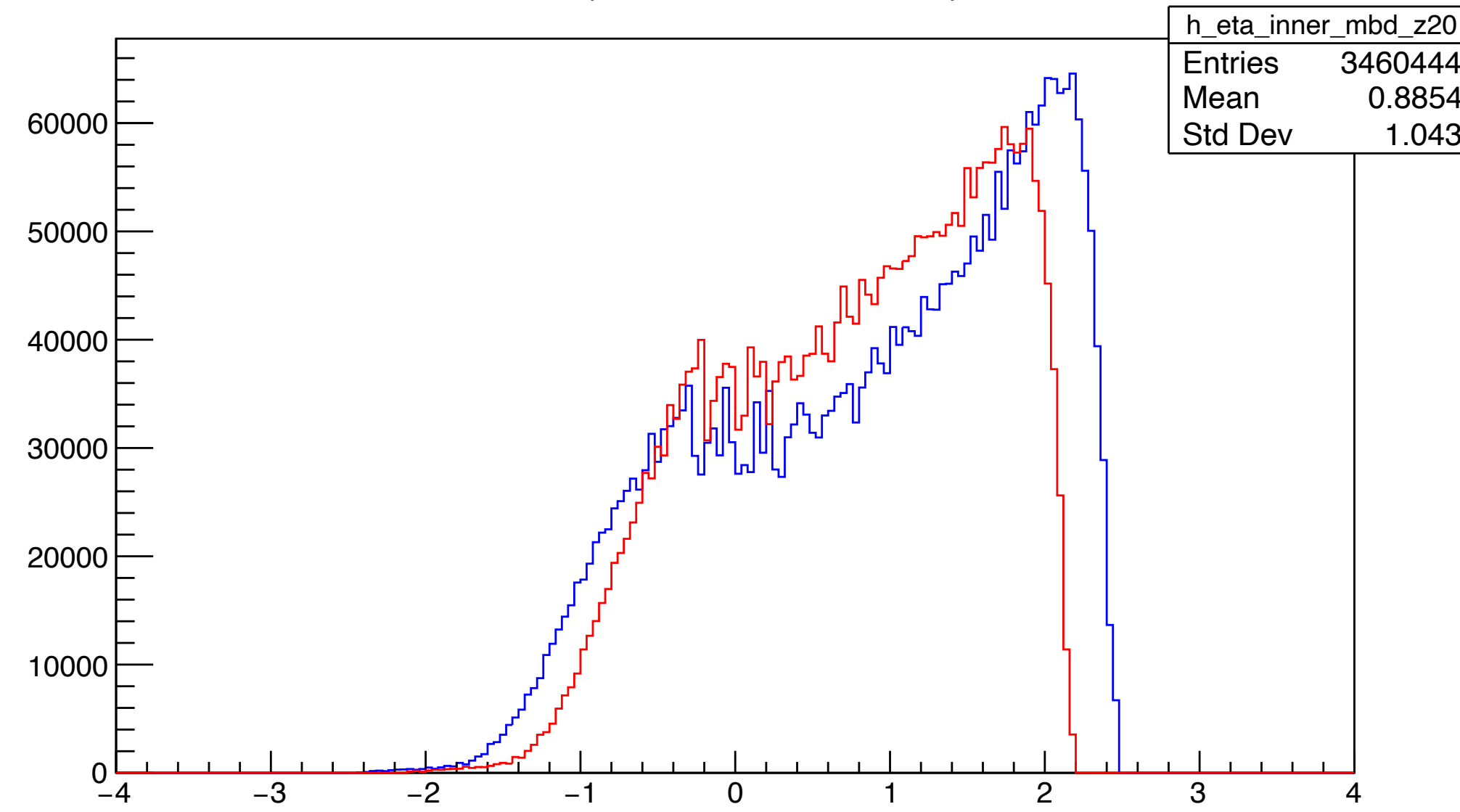


# $\eta$ distribution (cutting Zvtx position)

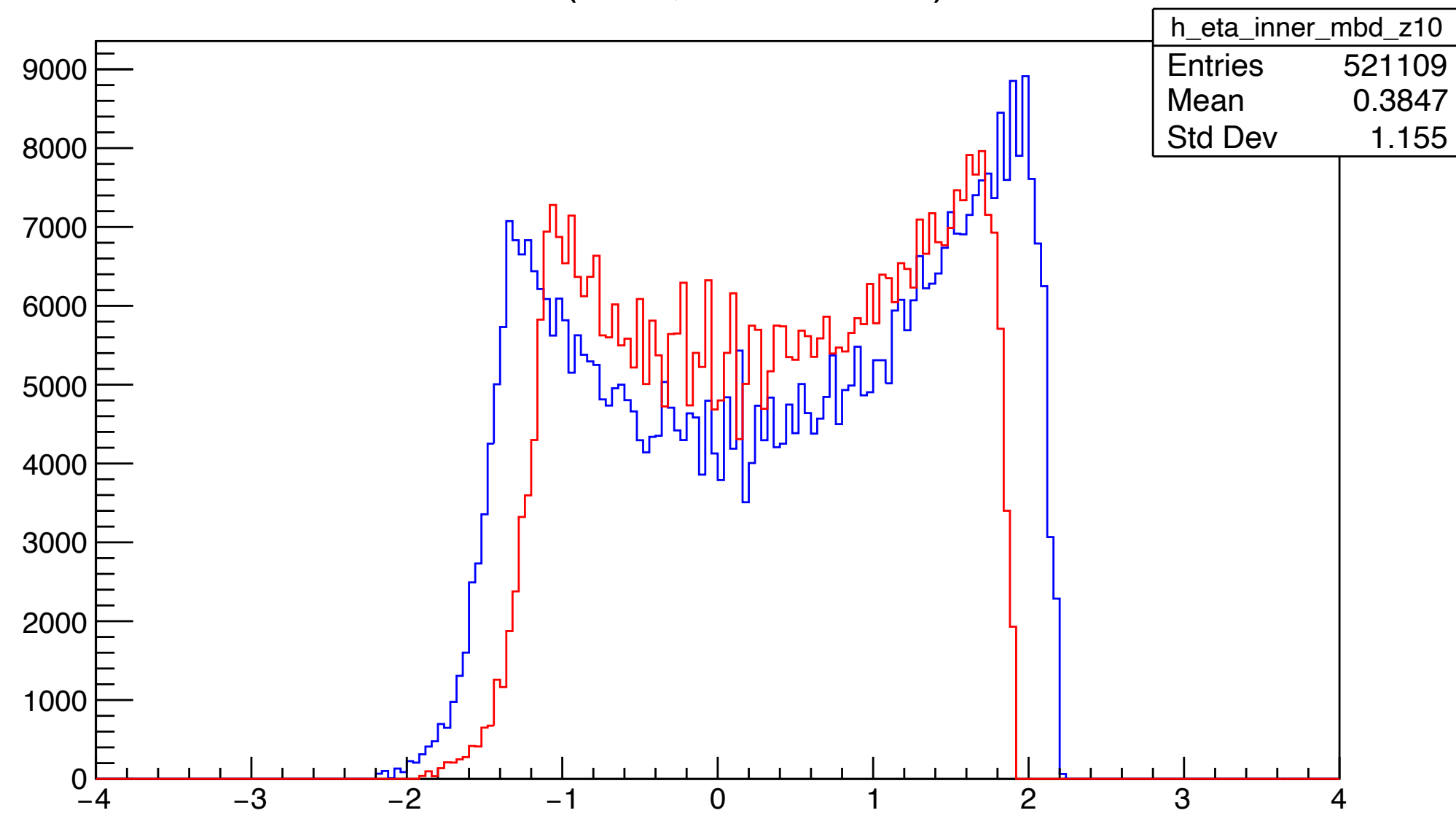
eta (use MBD Z-vtx)



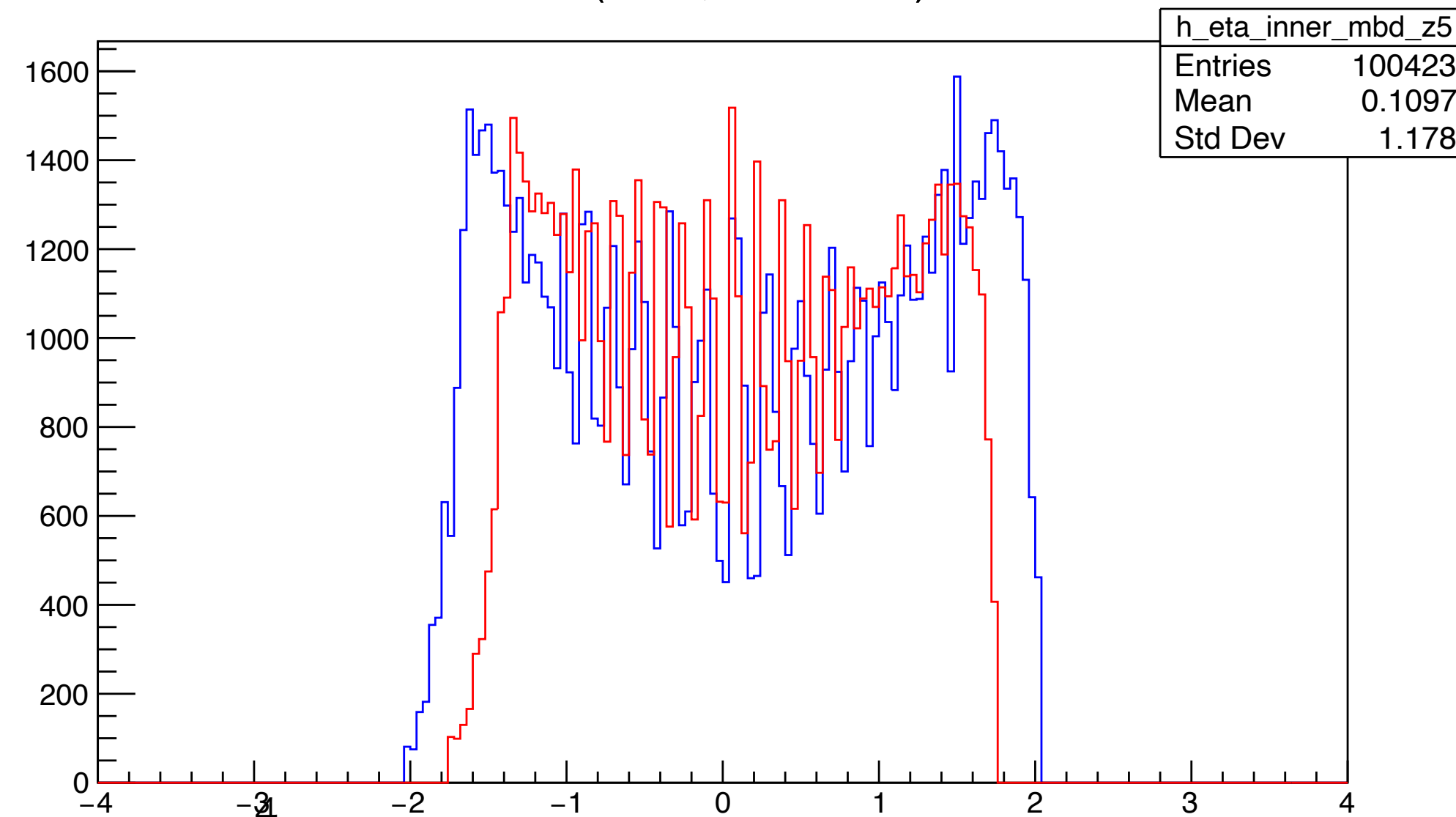
eta (MBD, zvtx=-20~20)



eta (MBD, zvtx=-10~10)

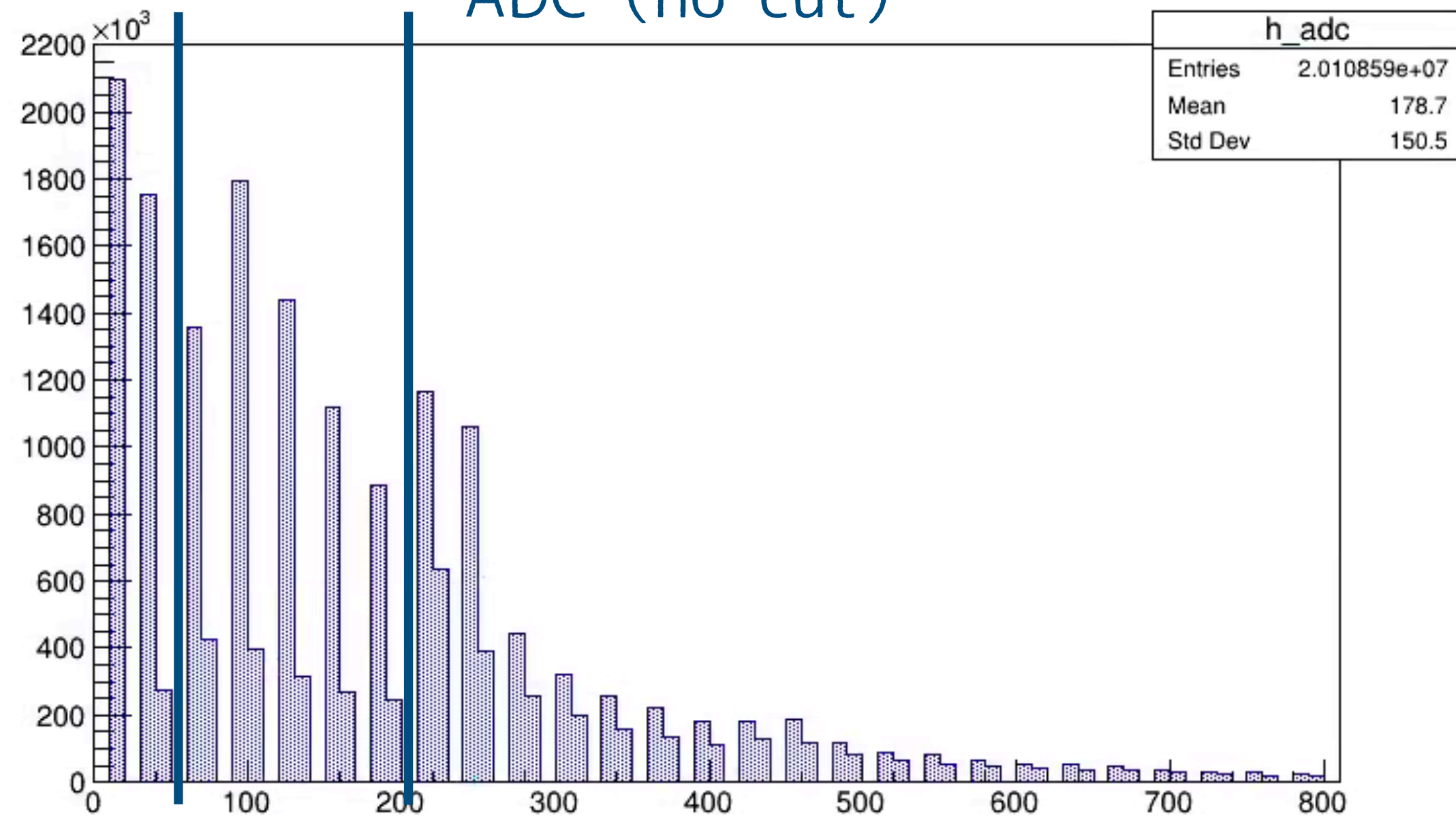


eta (MBD, zvtx=-5~5)

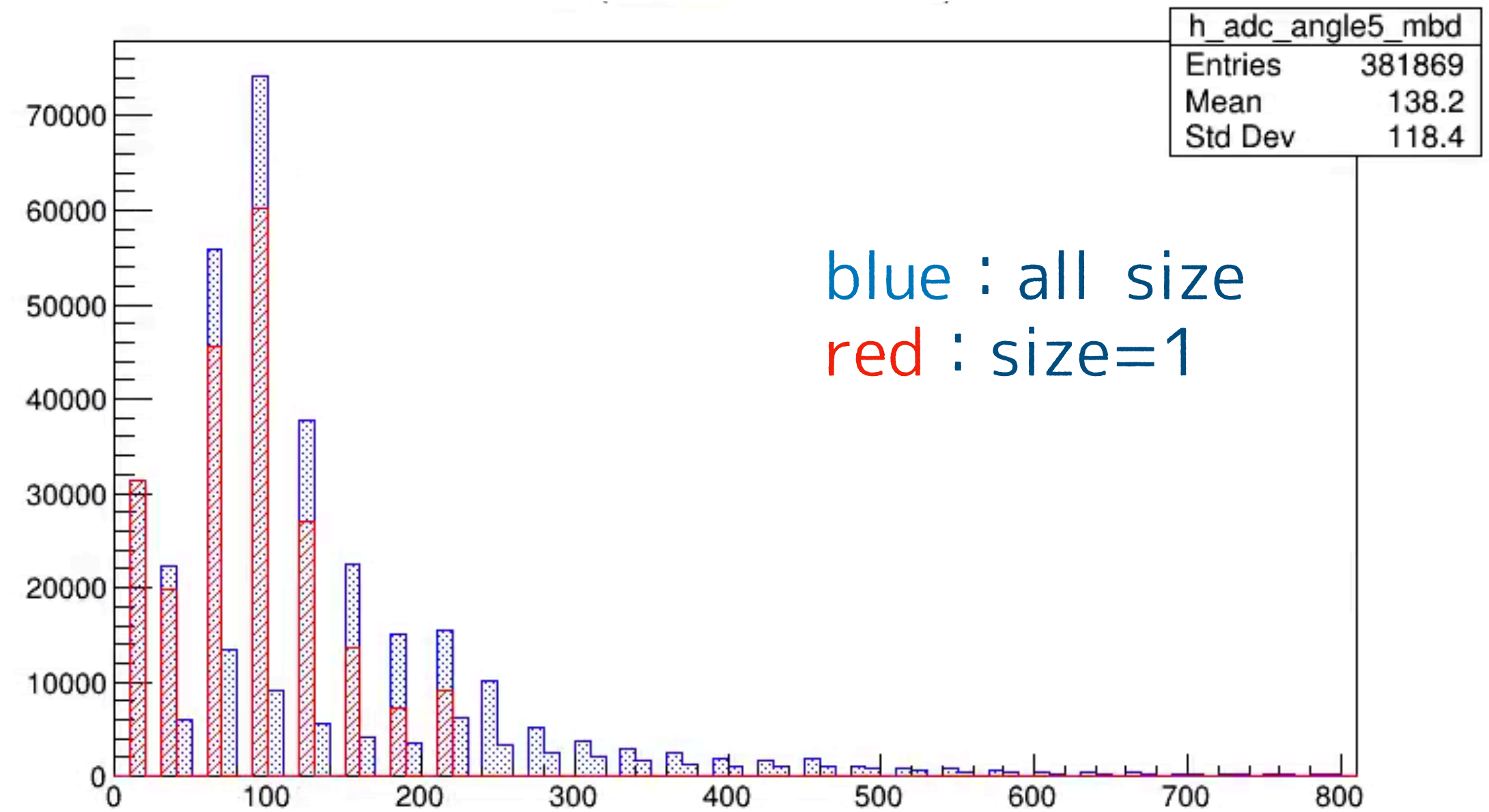


# ADC distribution

ADC (no cut)



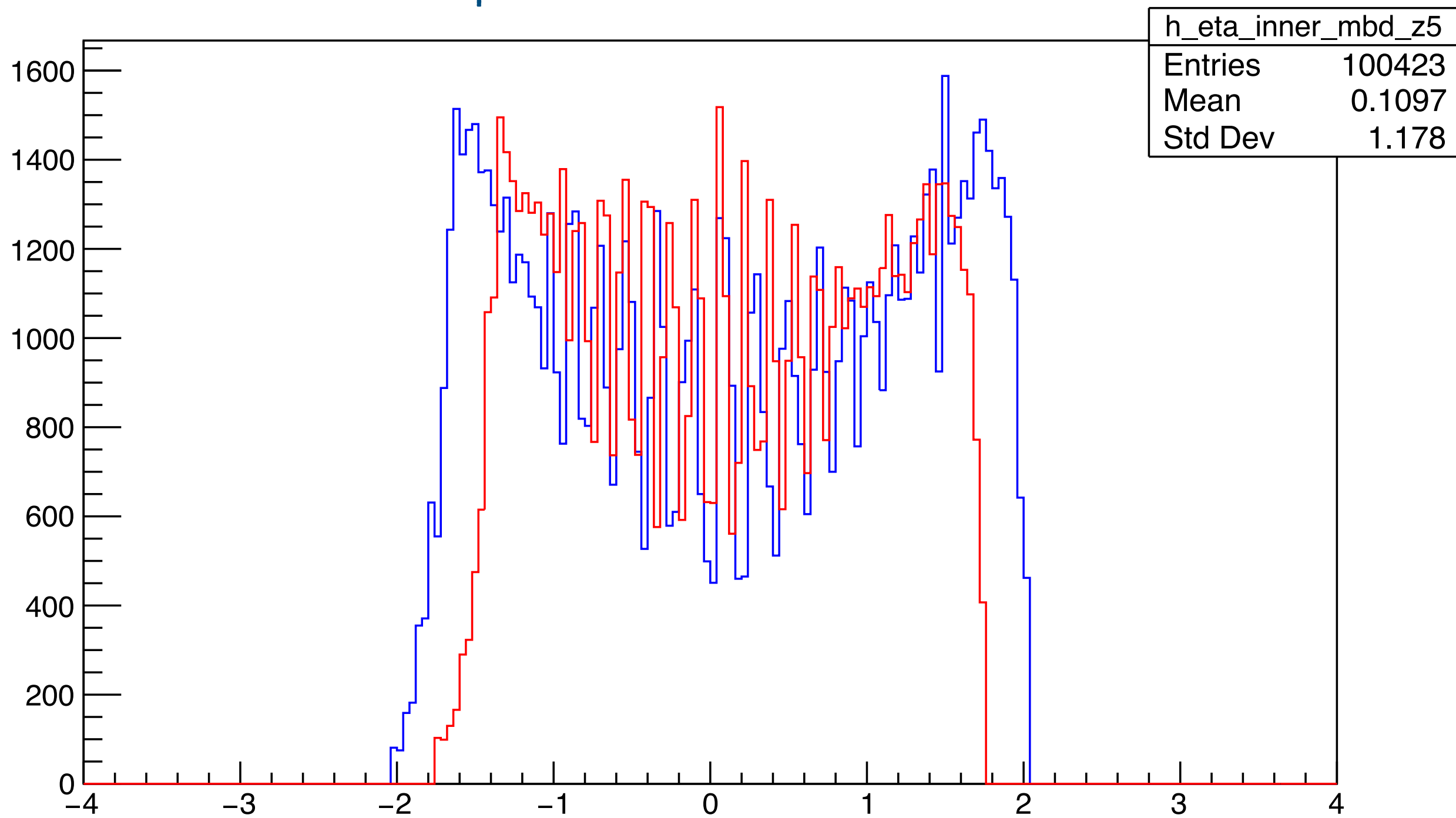
ADC (  $85 < \theta < 95$  )



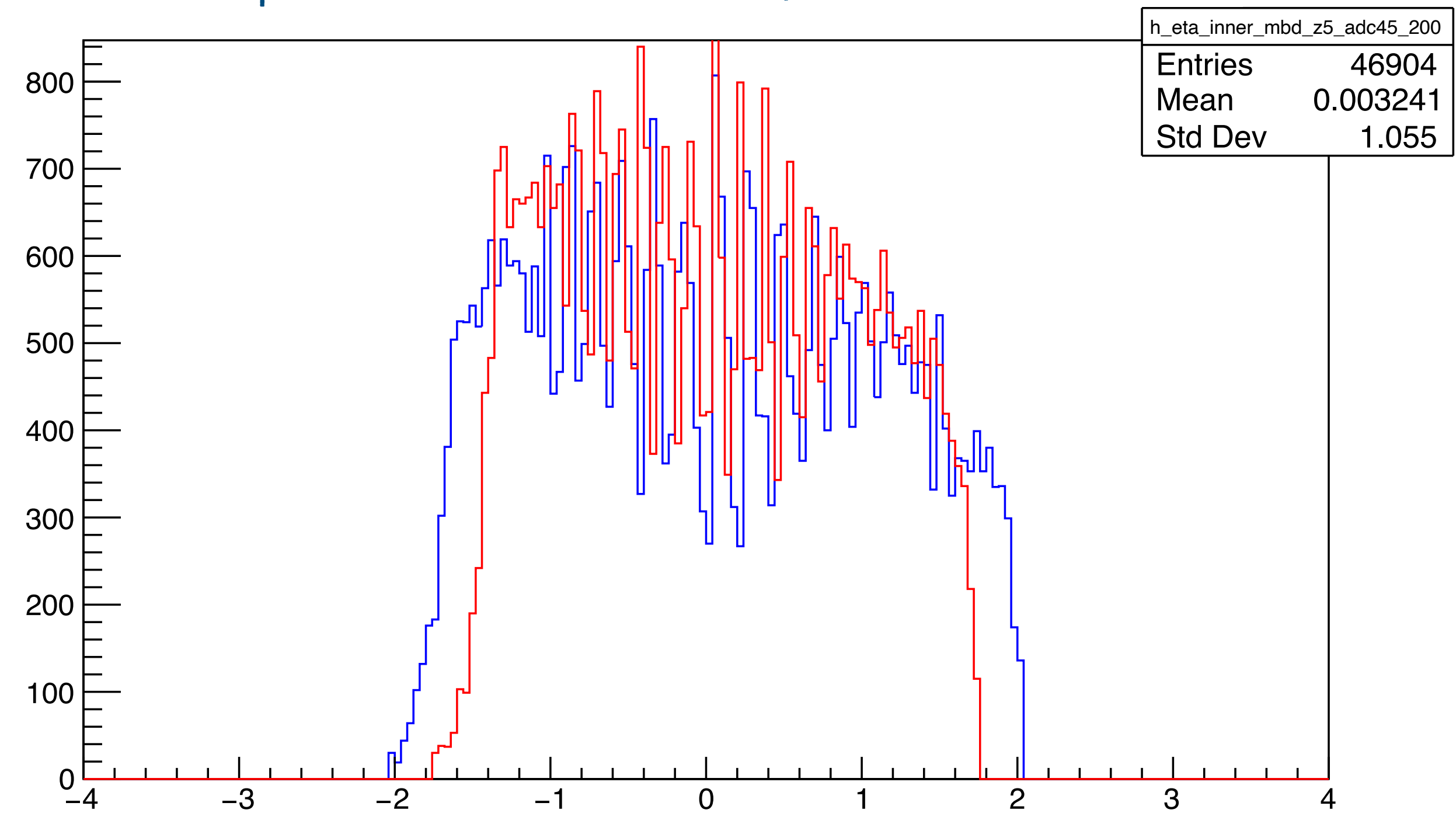
- There are peaks at about ADC=10, 90, 220
- It is thought MIP makes a peak around ADC=80 when  $\theta = 90^\circ$ 
  - $\rightarrow$  cutting at  $45 < \text{ADC} < 200$

# $\eta$ distribution (cutting Zvtx position and ADC)

$\eta$  (Z-vertex= $\pm 5$ cm)



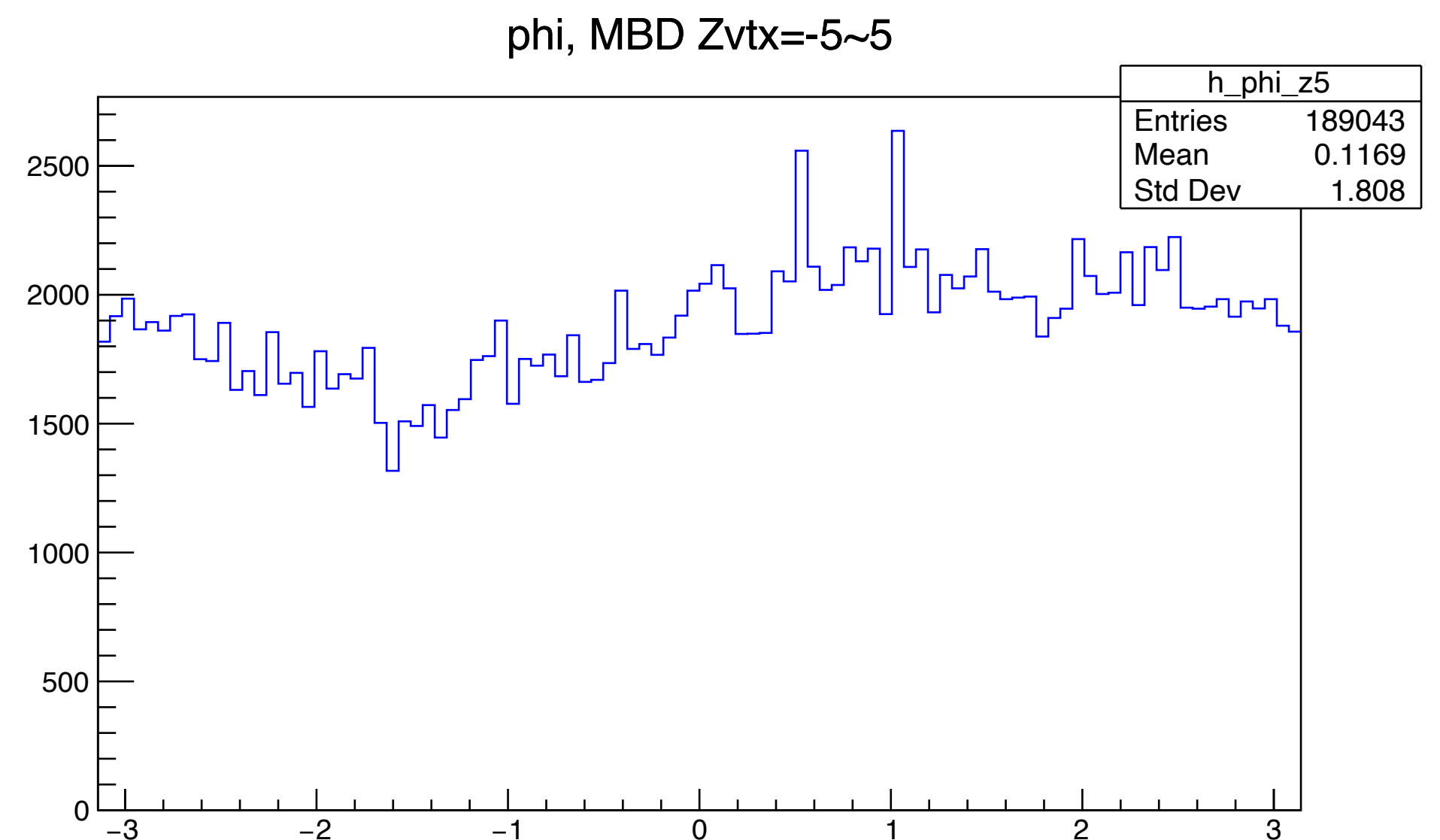
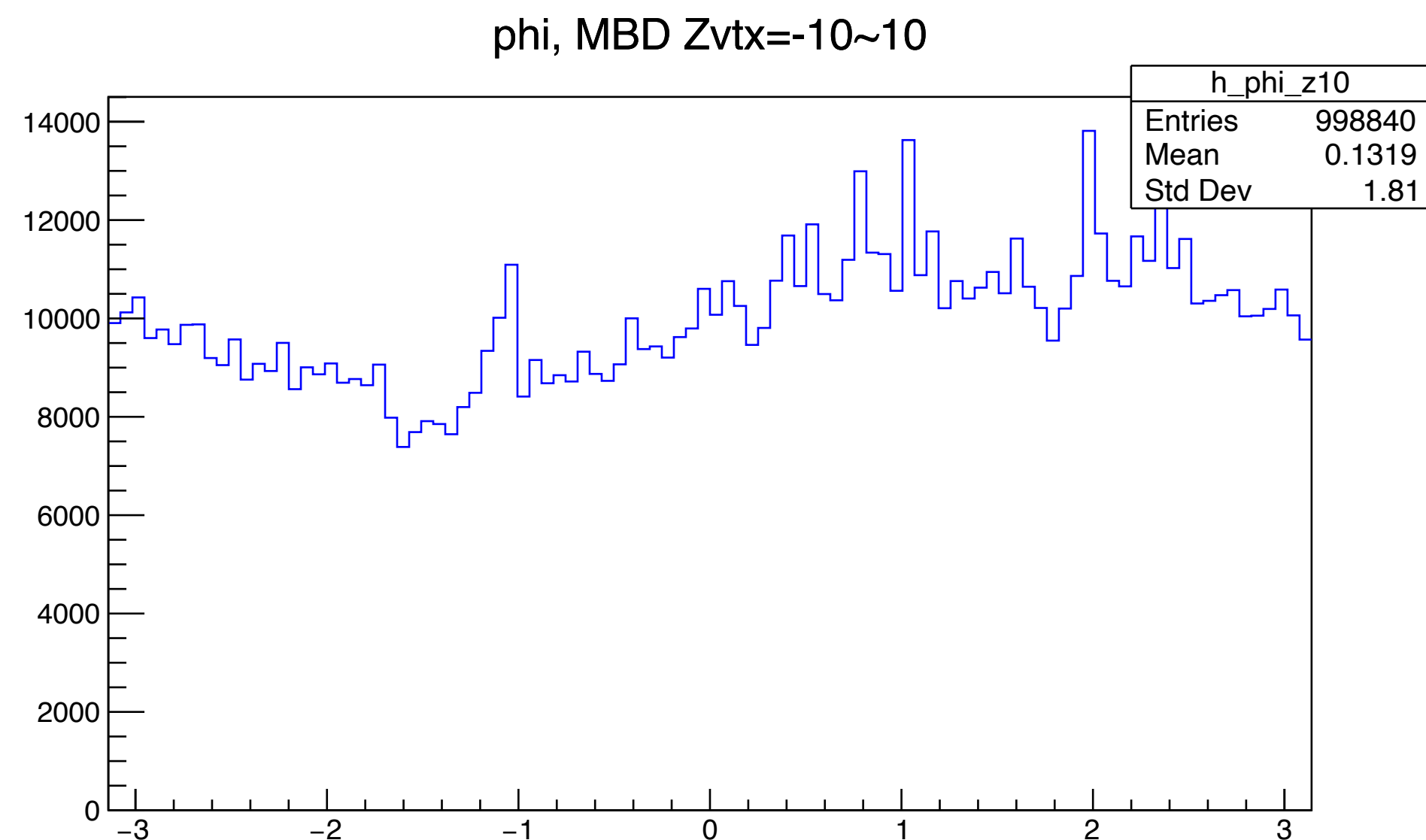
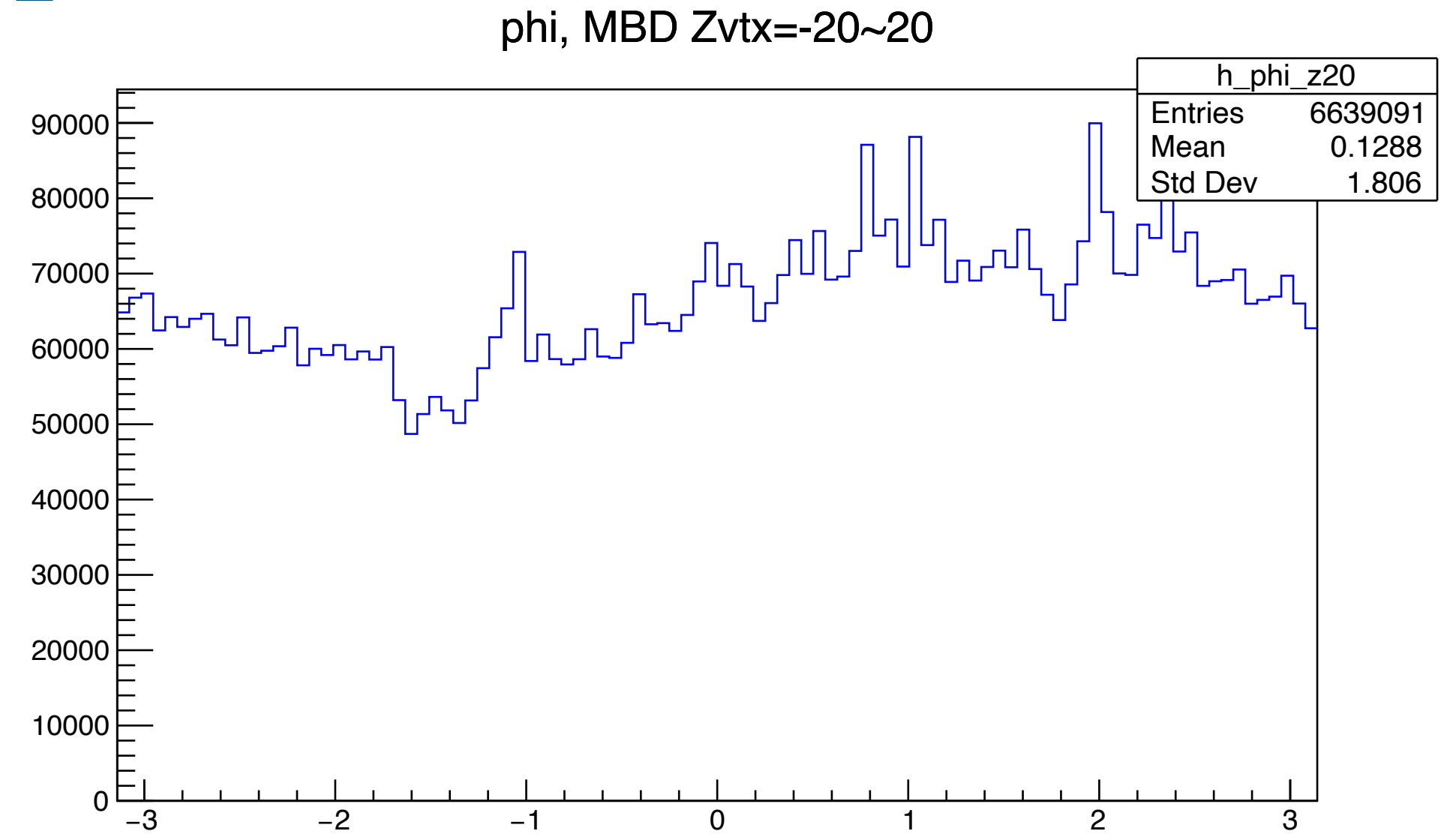
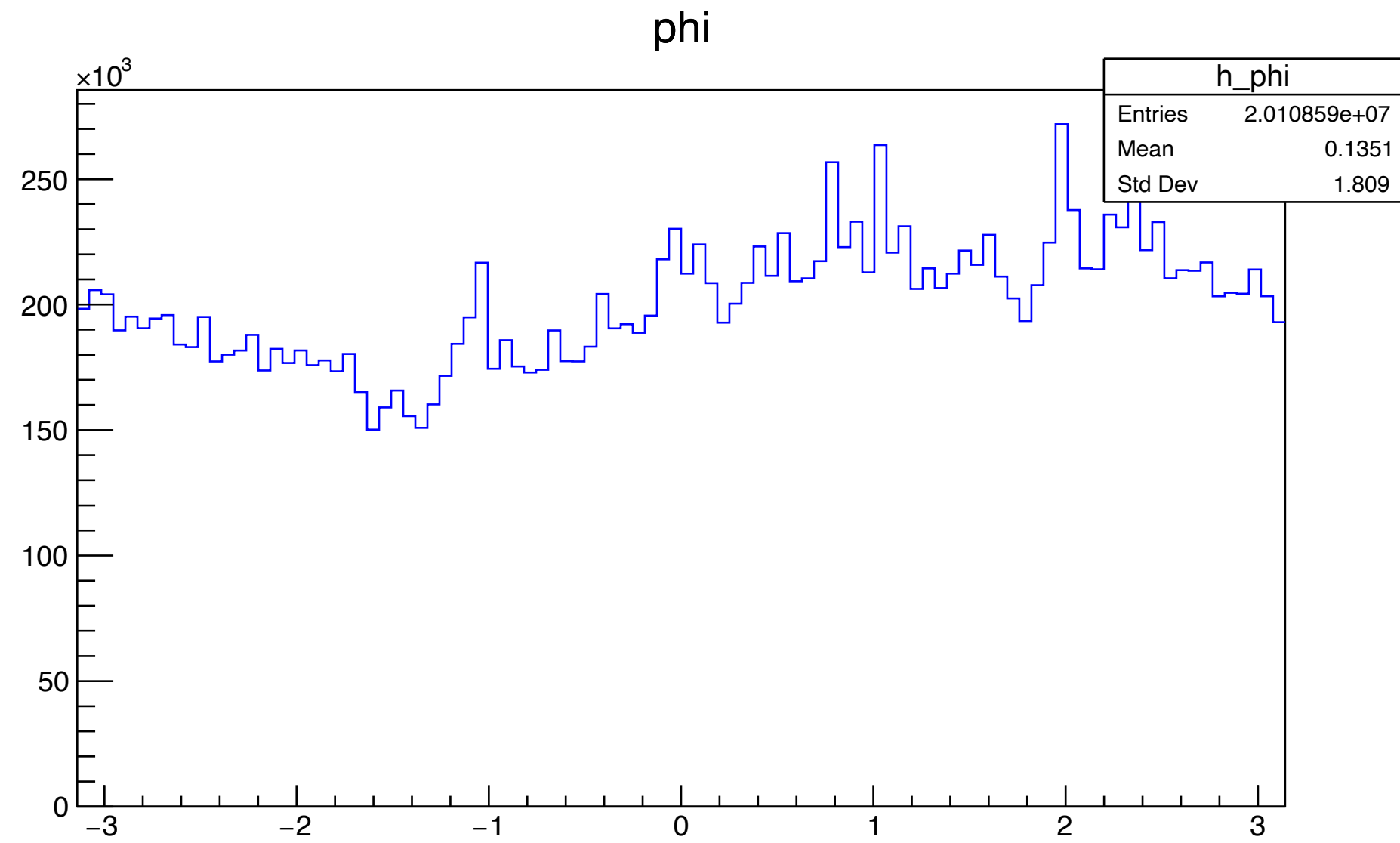
$\eta$  (Z-vertex= $\pm 5$ cm,  $45 < \text{ADC} < 200$ )



→ cutting too much?

I'll try to change ADC cutting range.

phi
left top: no cut, right top:  $Z_{vtx}=\pm 20\text{cm}$ ,  
left bottom:  $Z_{vtx}=\pm 10\text{cm}$ , right bottom:  $Z_{vtx}=\pm 5\text{cm}$

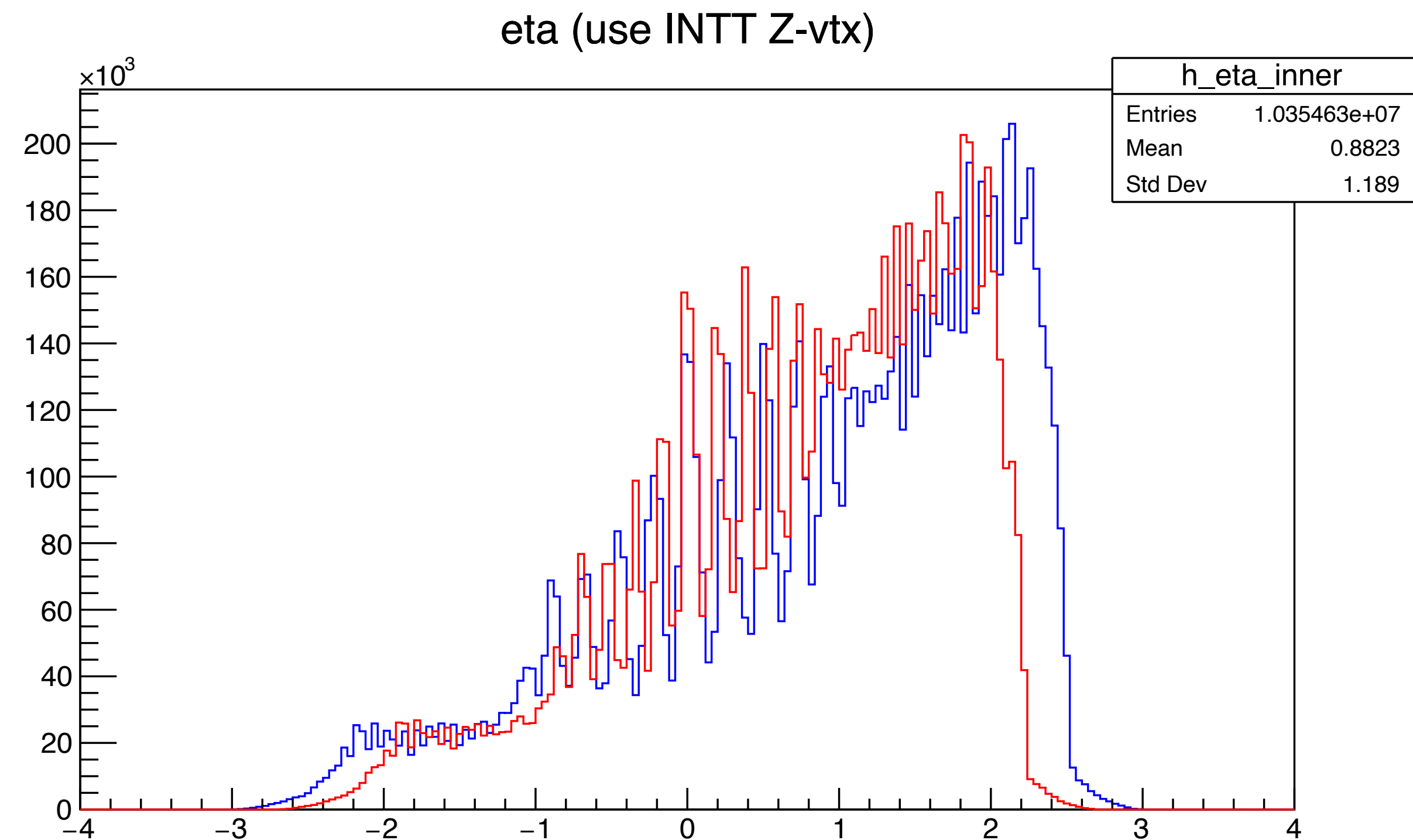
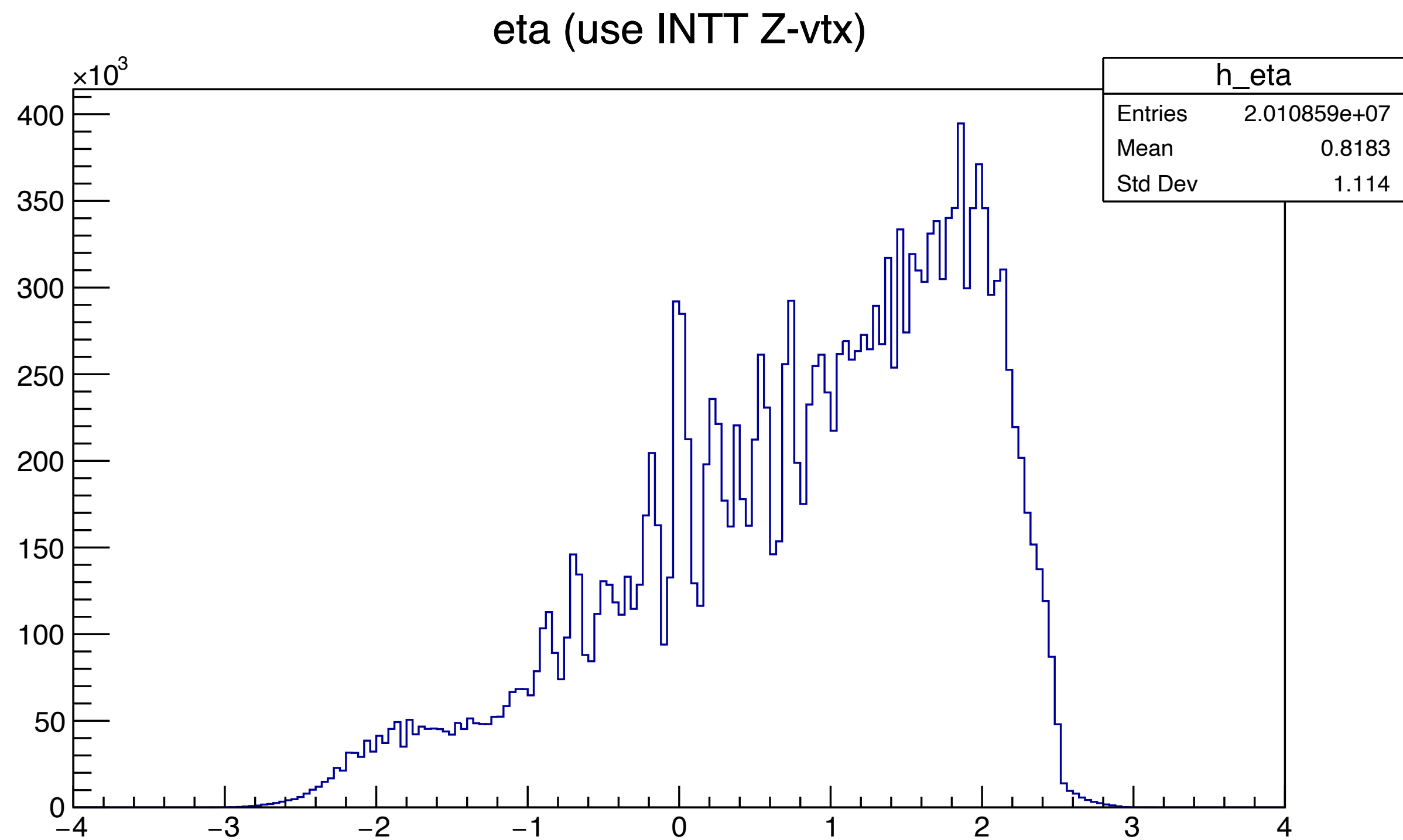


backup

eta distribution (use INTT Zvxt)

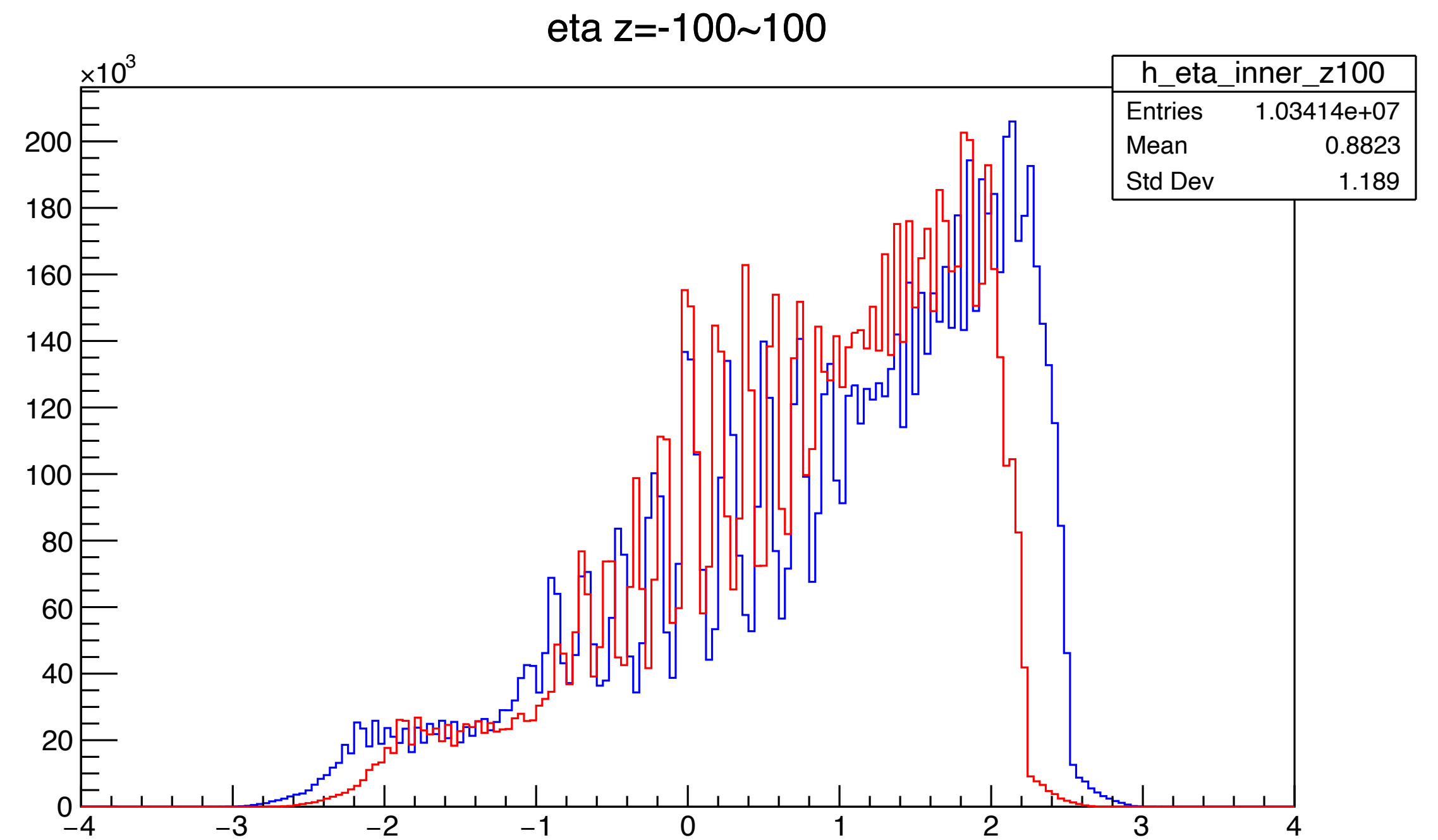
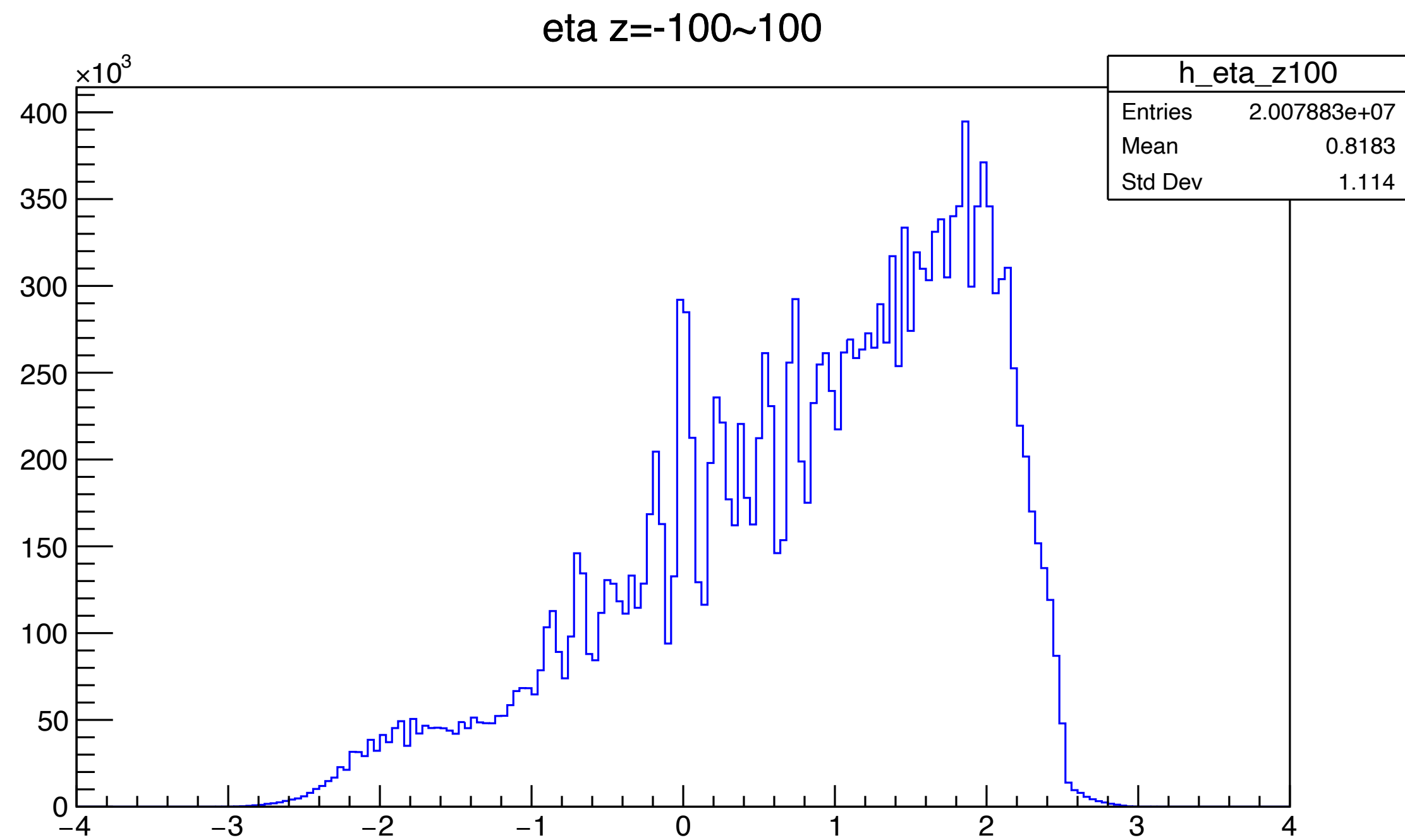
# eta (no cut)

left: All, right: blue->inner barrel, red->outer barrel



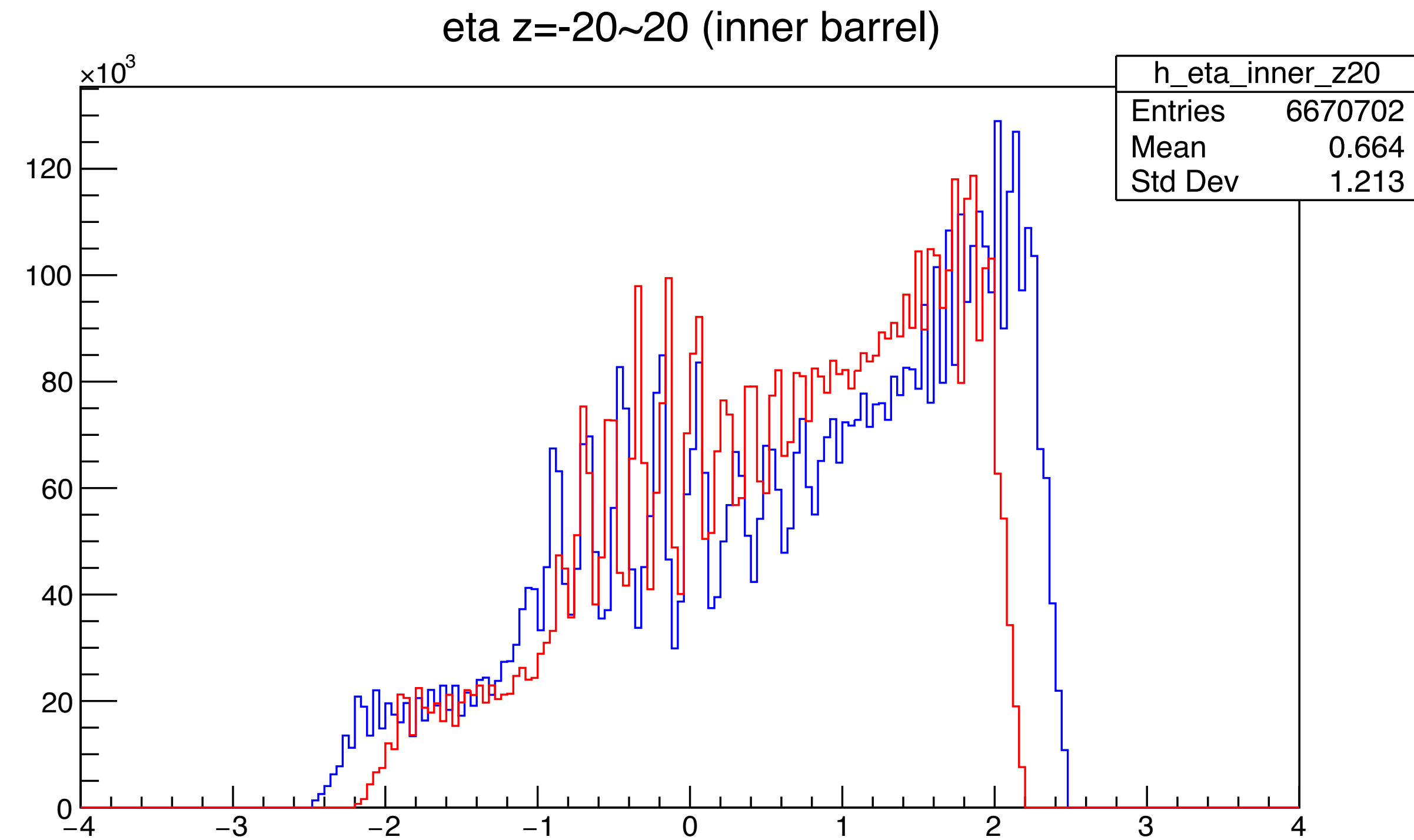
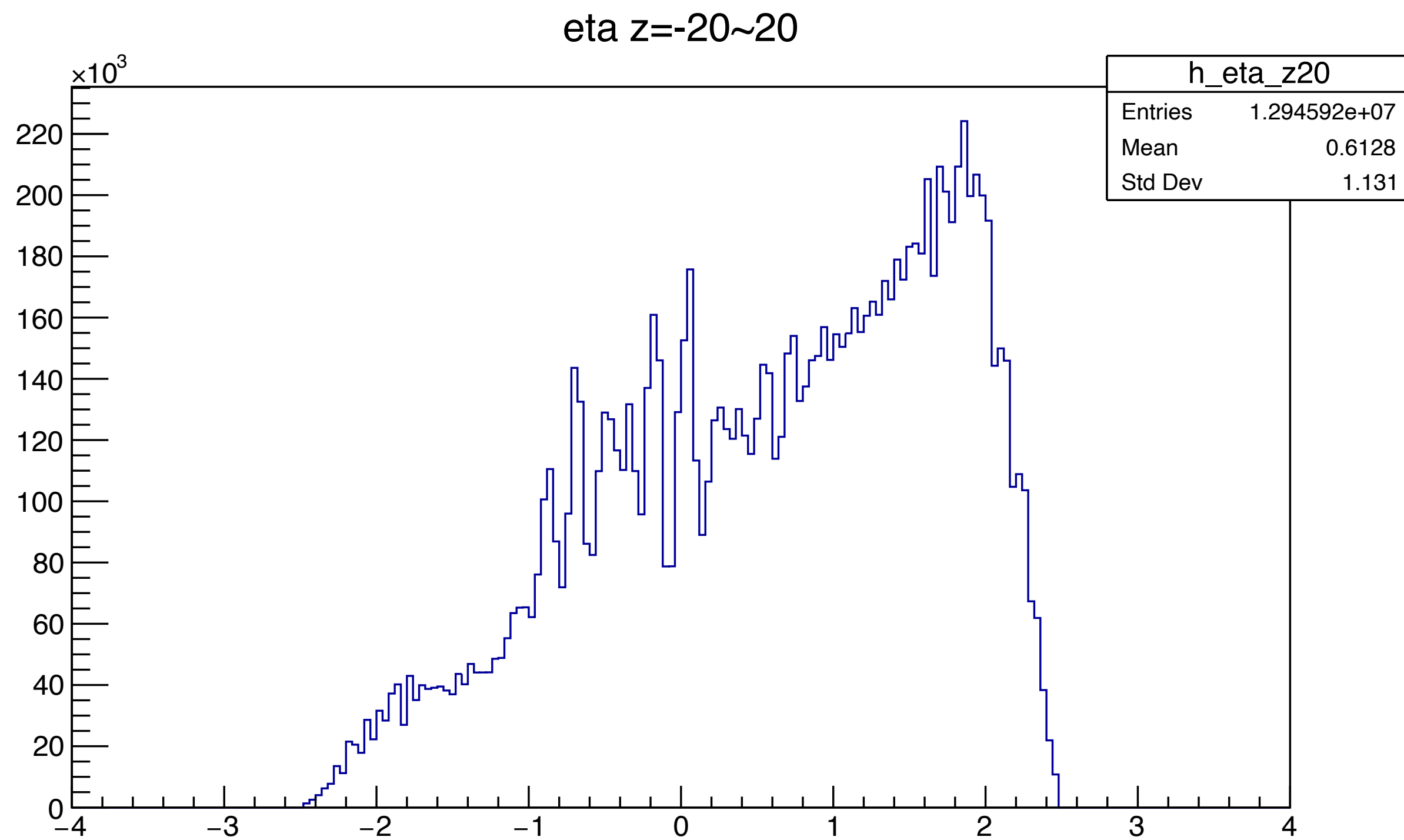
# eta ( $Z_{vtx}=\pm 100\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel



# eta ( $Z_{vtx}=\pm 20\text{cm}$ )

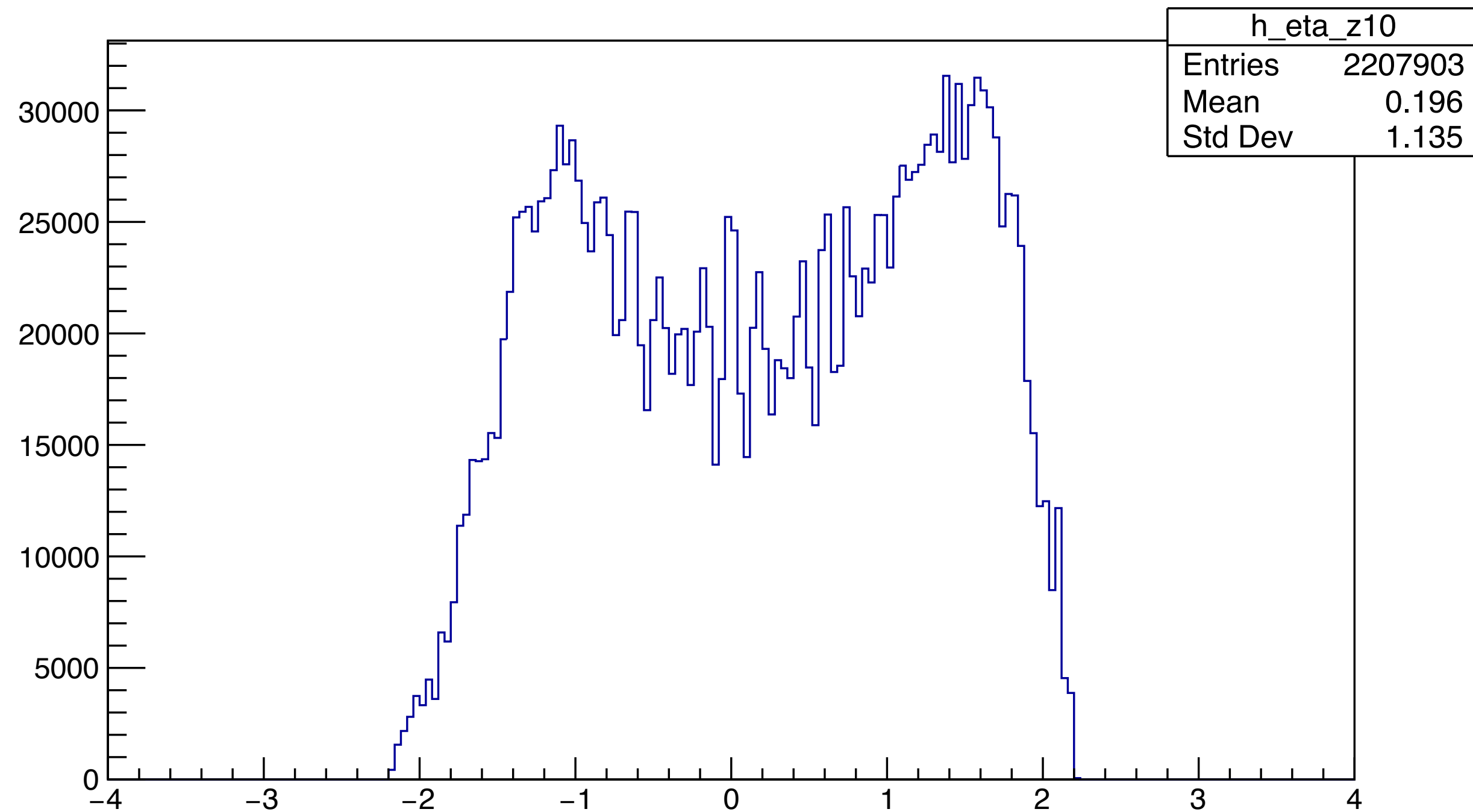
left: All, right: blue->inner barrel, red->outer barrel



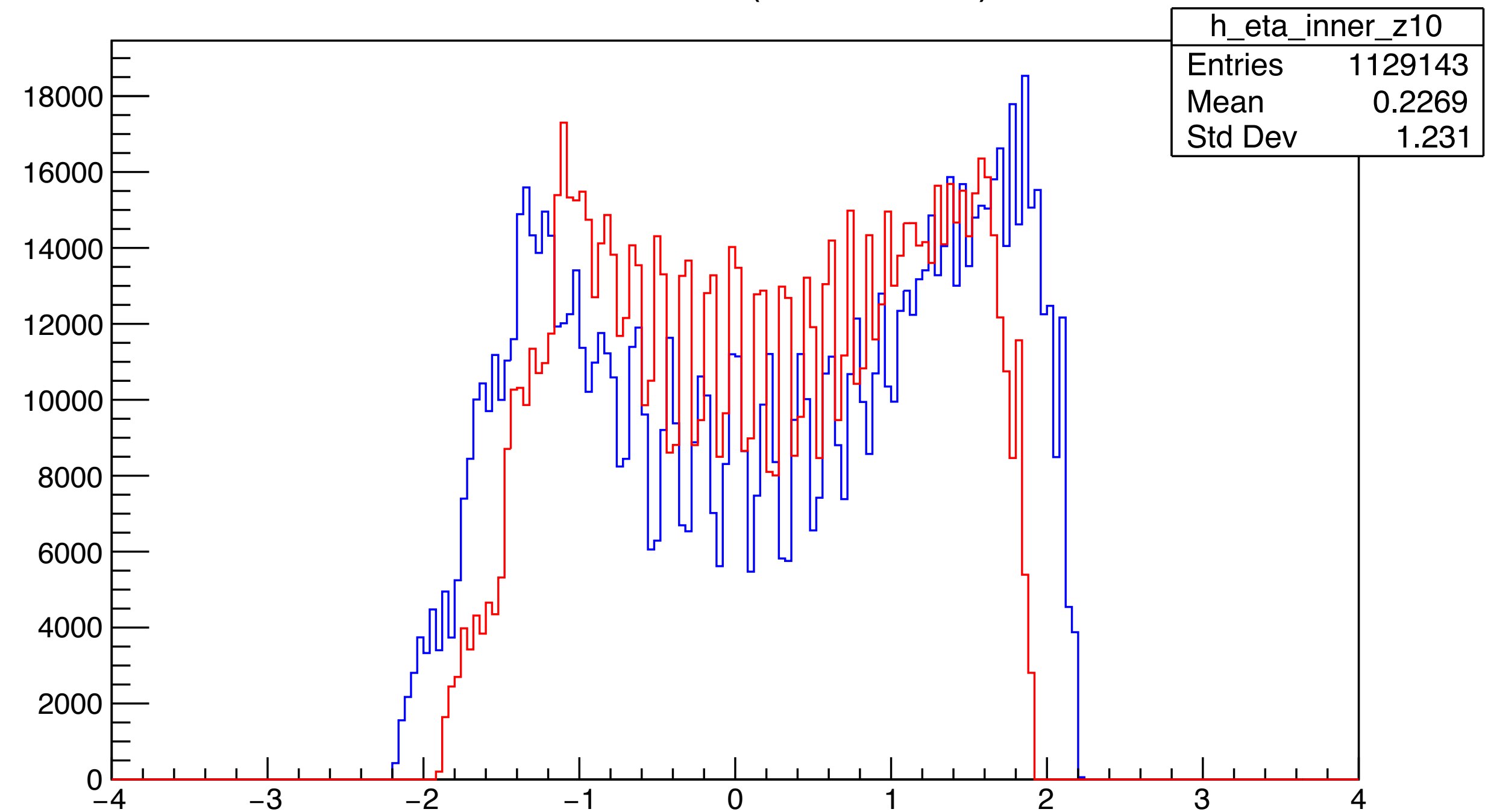
# eta ( $Z_{vtx}=\pm 10\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel

eta z=-10~10



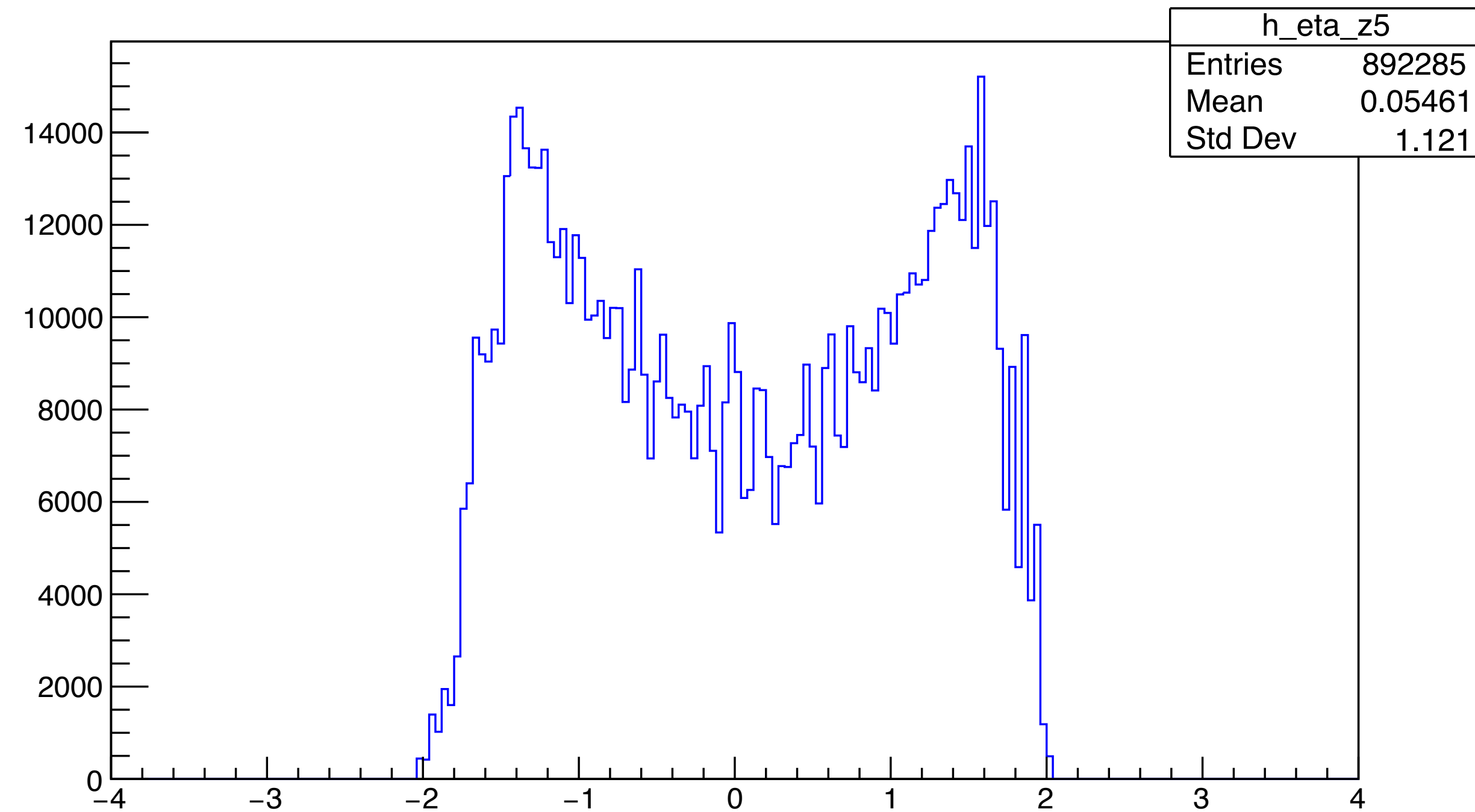
eta z=-10~10 (inner barrel)



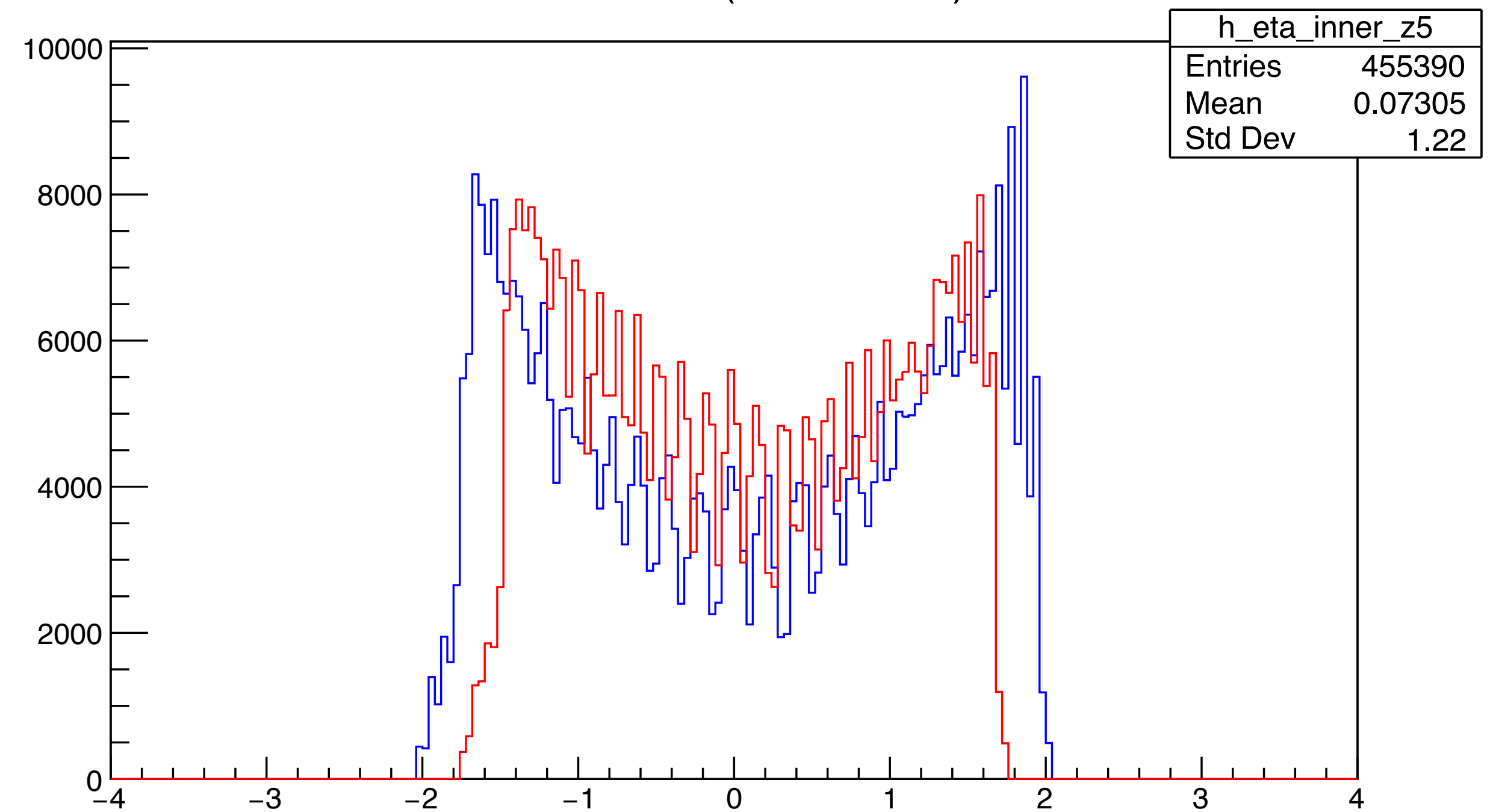
# eta ( $Z_{vtx}=\pm 5\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel

eta z=-5~5

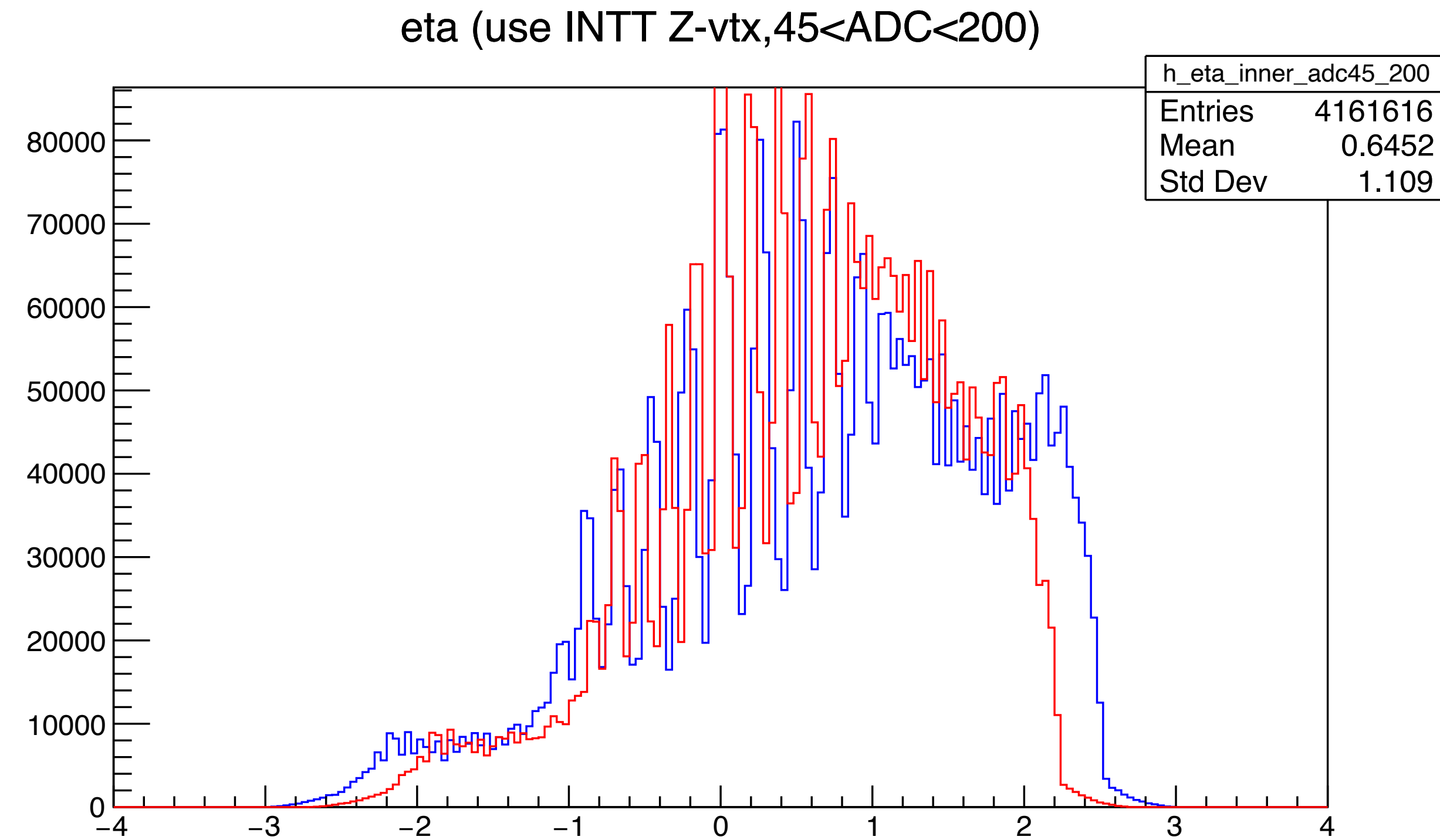
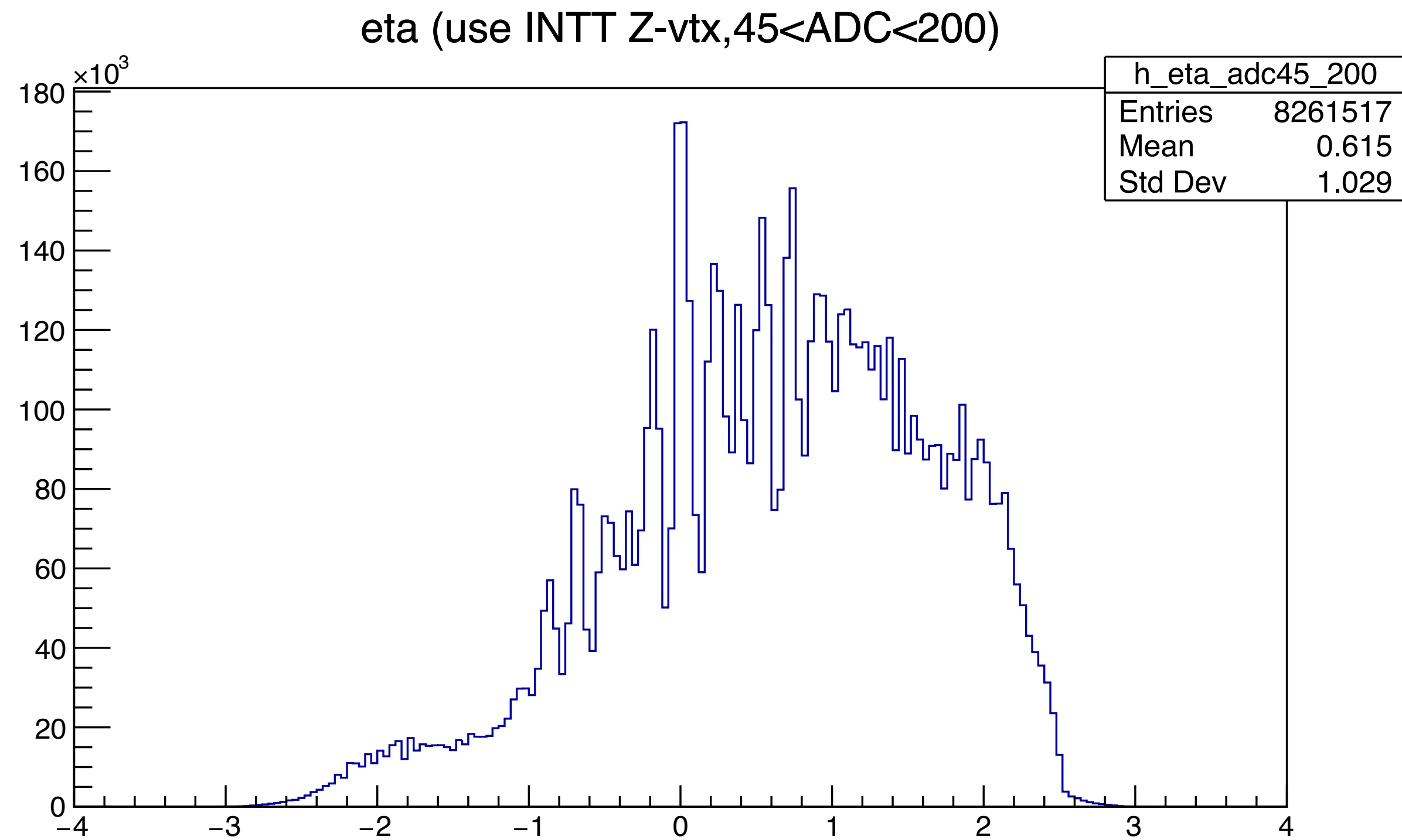


eta z=-5~5 (inner barrel)



# eta (45<ADC<200)

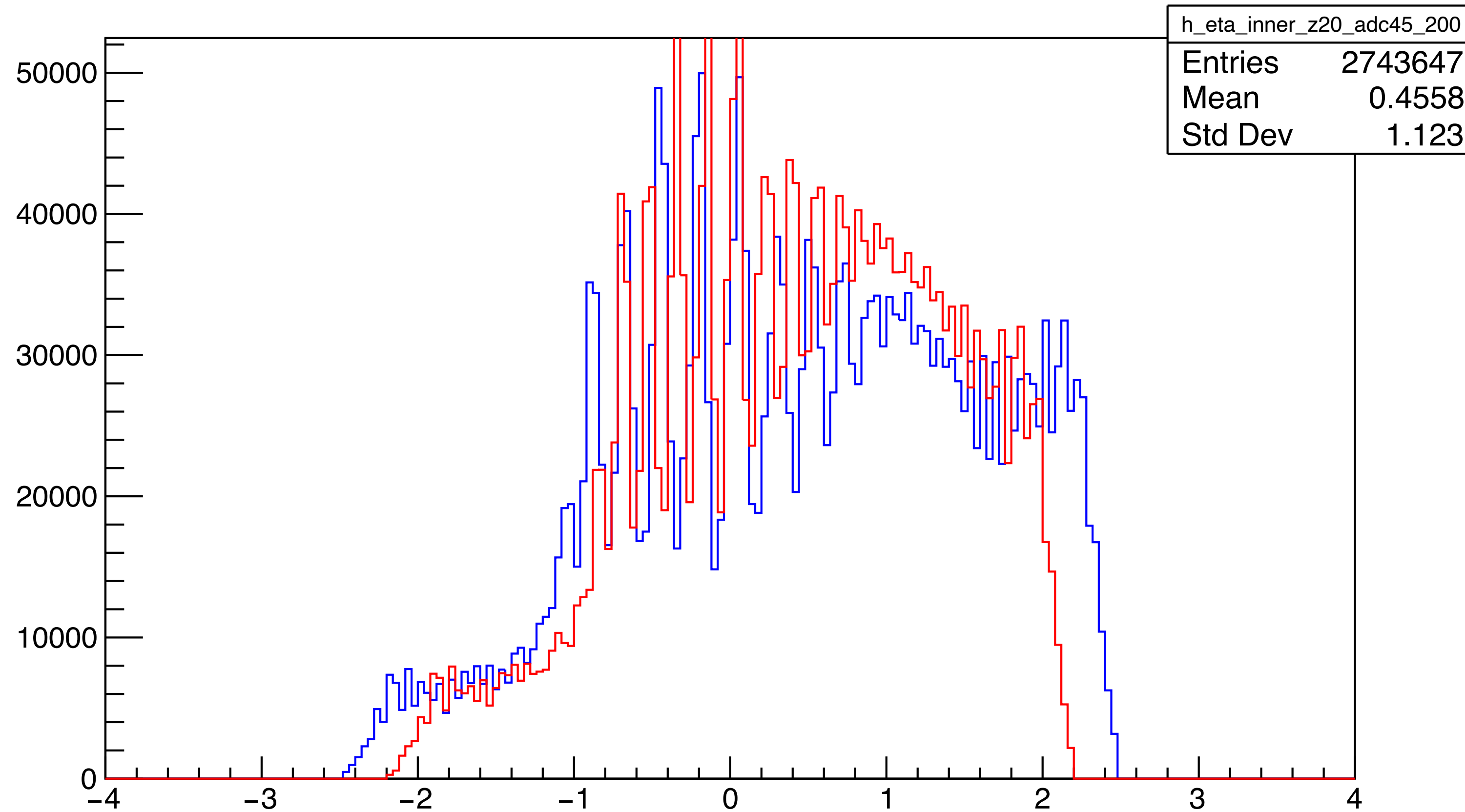
left: All, right: blue->inner barrel, red->outer barrel



# eta ( $Z_{vtx}=\pm 20\text{cm}$ & $45 < \text{ADC} < 200$ )

blue->inner barrel, red->outer barrel

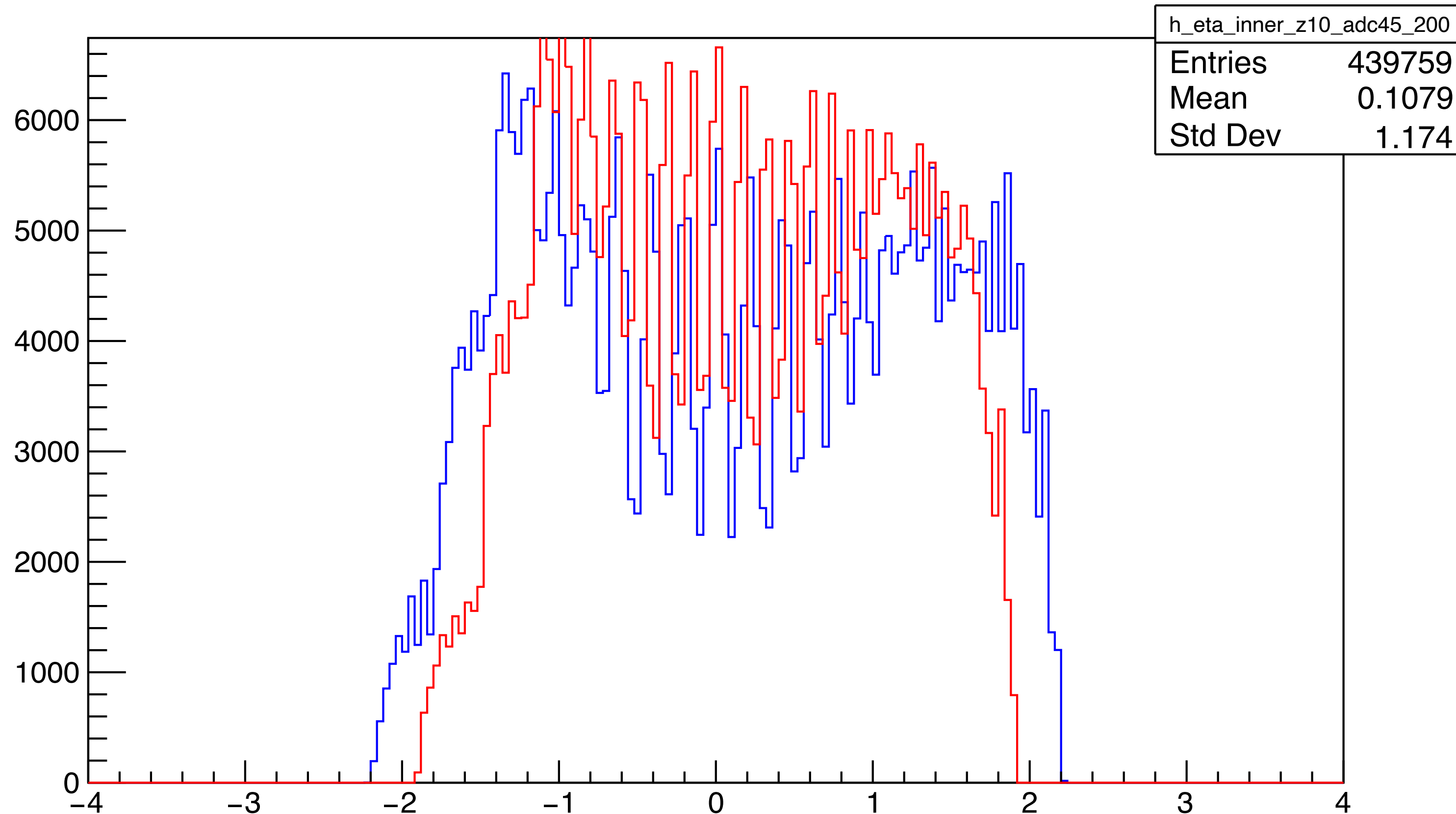
eta (INTT,  $z_{vtx}=-20\sim 20, 45 < \text{ADC} < 200$ )



# eta ( $Z_{vtx}=\pm 10\text{cm}$ & $45 < \text{ADC} < 200$ )

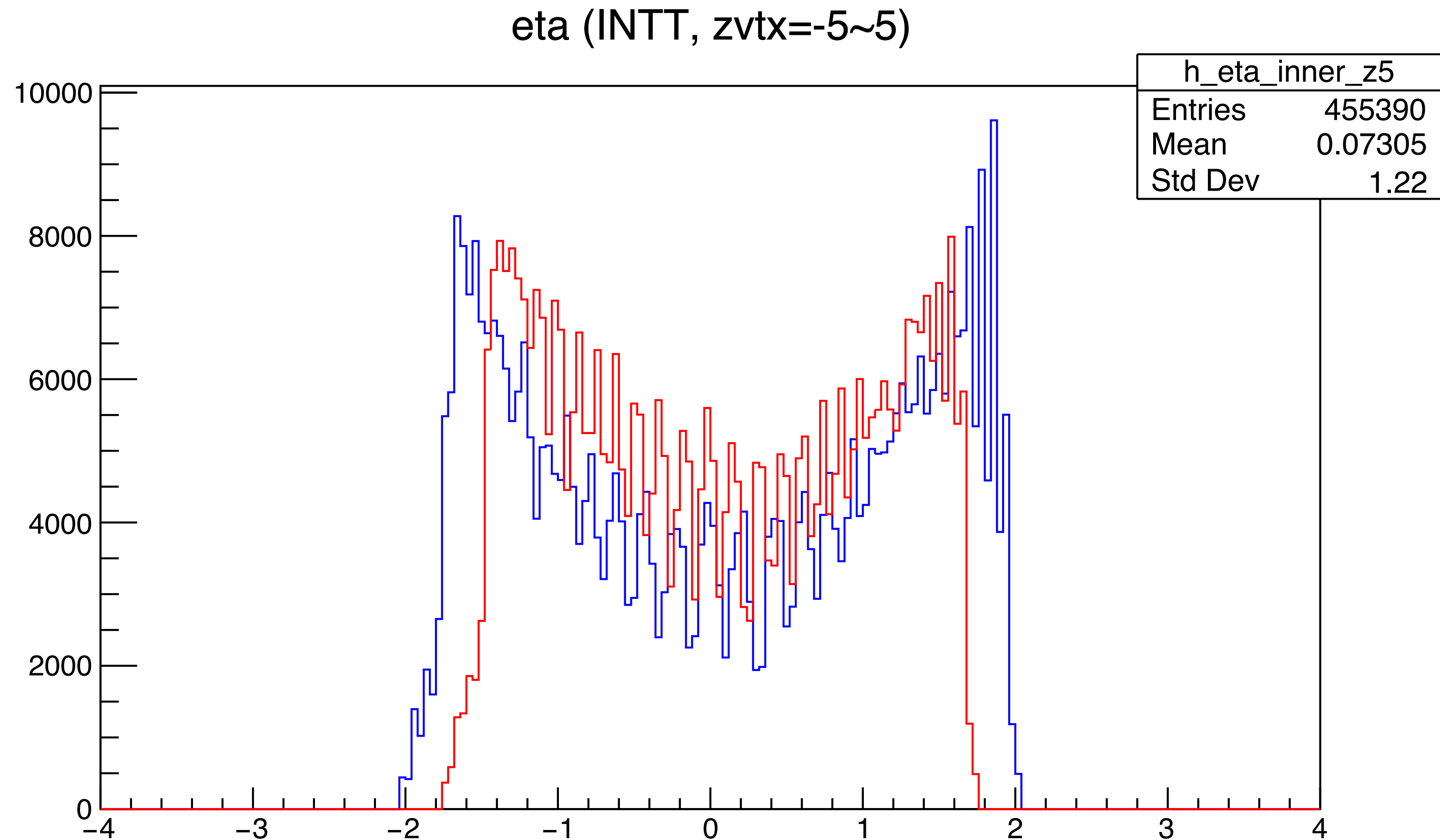
blue->inner barrel, red->outer barrel

eta (INTT,  $z_{vtx}=-10\sim 10, 45 < \text{ADC} < 200$ )



# eta ( $Z_{vtx}=\pm 5\text{cm}$ & $45 < \text{ADC} < 200$ )

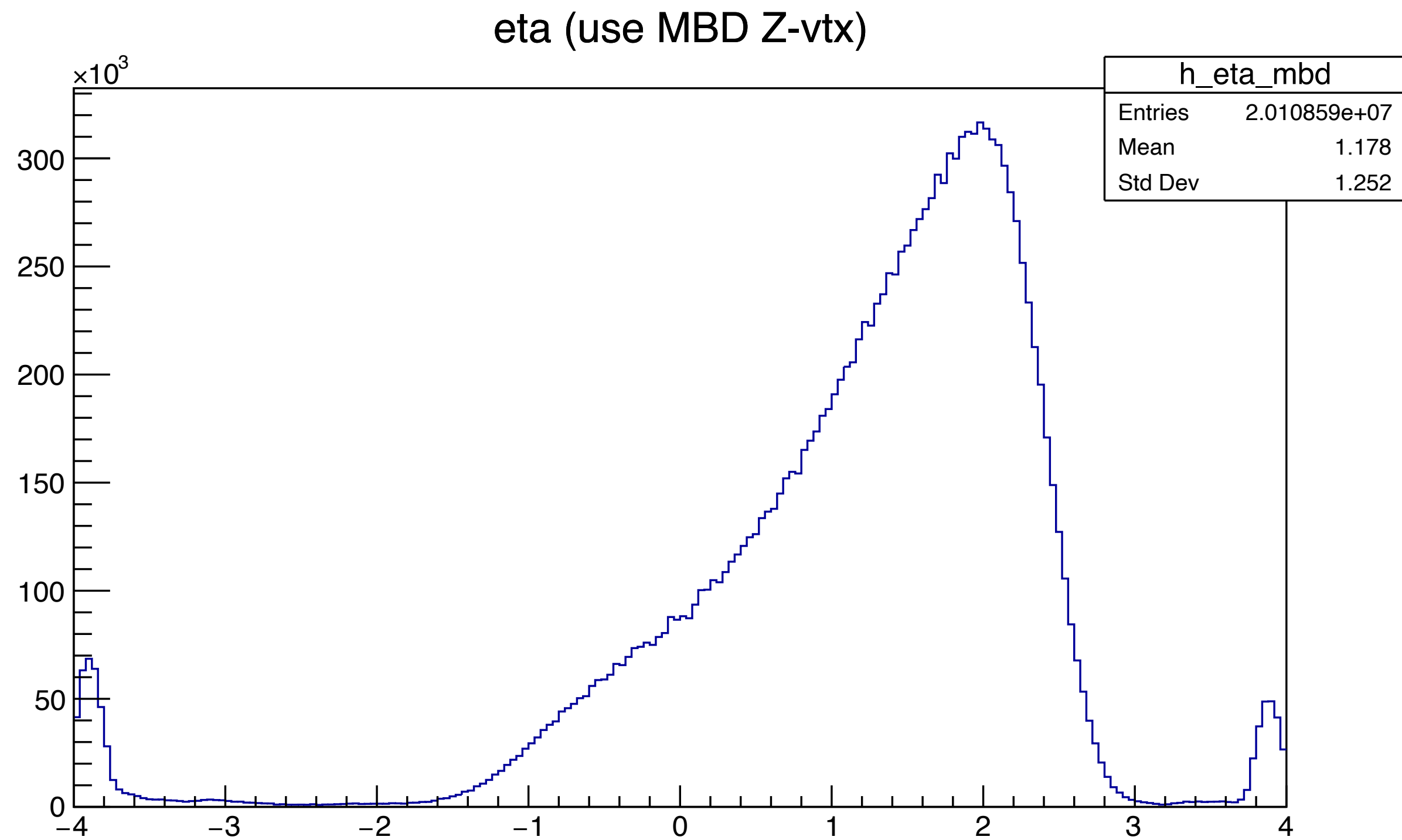
left: All, right: blue->inner barrel, red->outer barrel



eta distribution (use MBD  $Z_{vxt}$ )

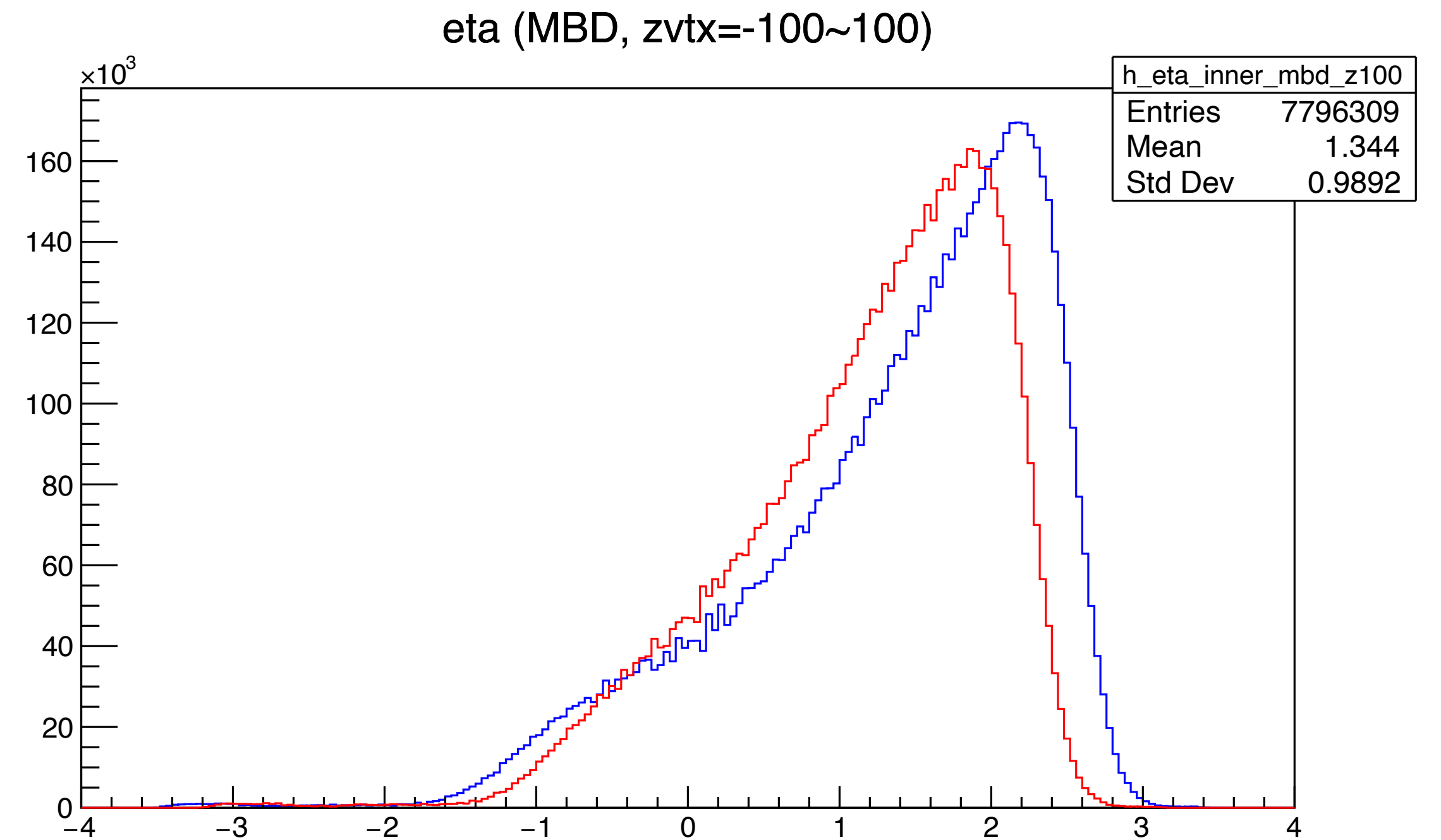
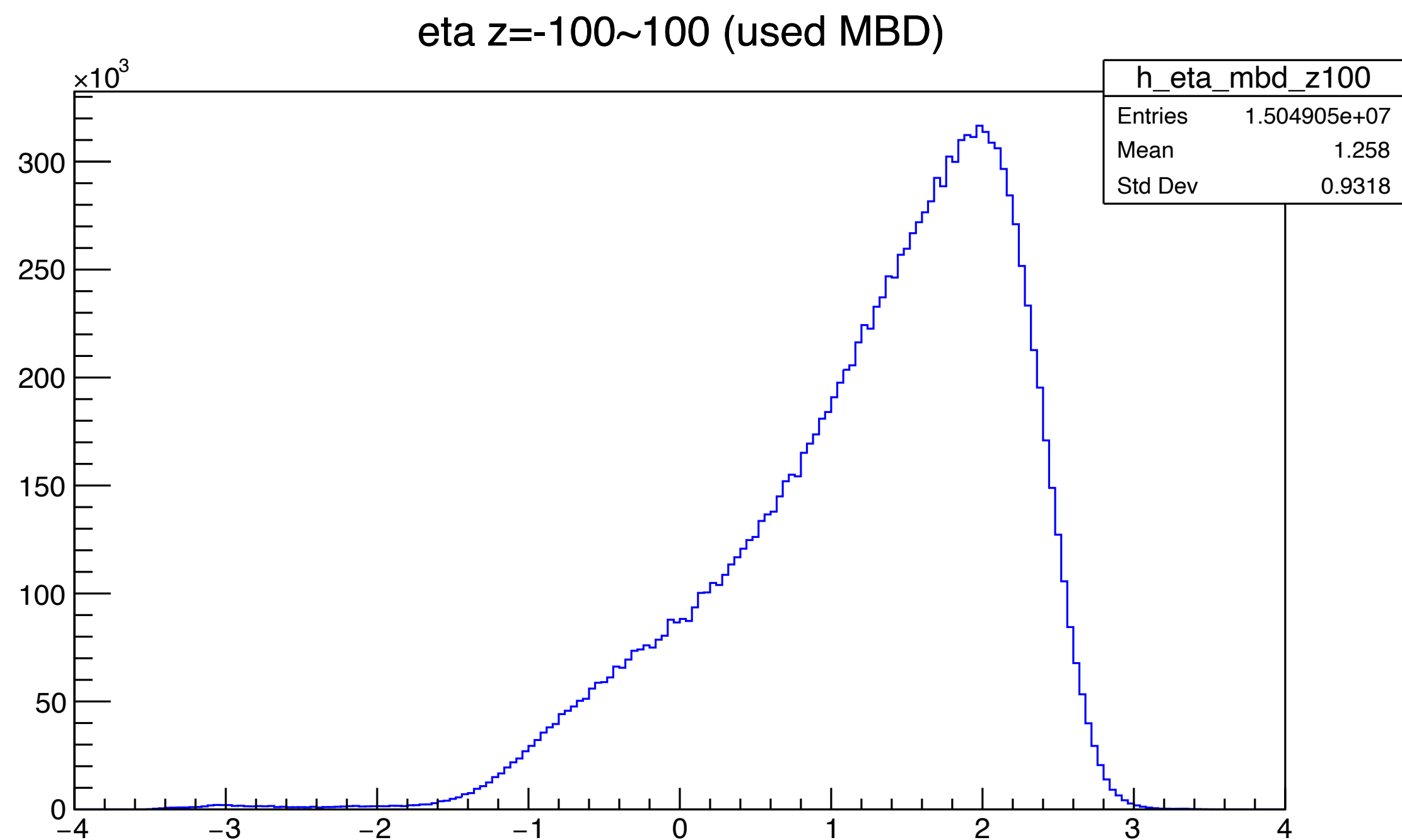
# eta (no cut)

left: All, right: blue->inner barrel, red->outer barrel



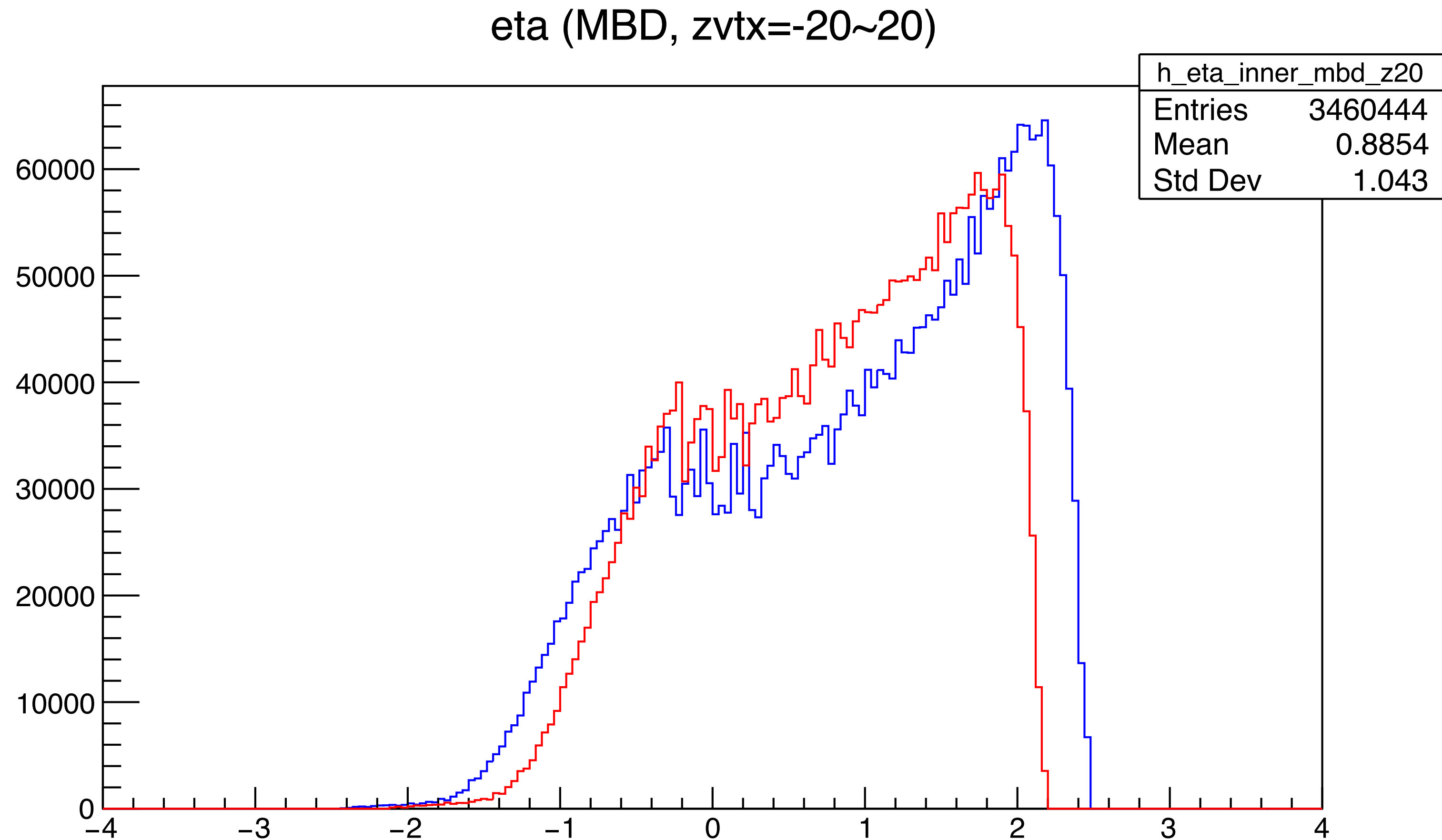
# eta ( $Z_{vtx}=\pm 100\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel



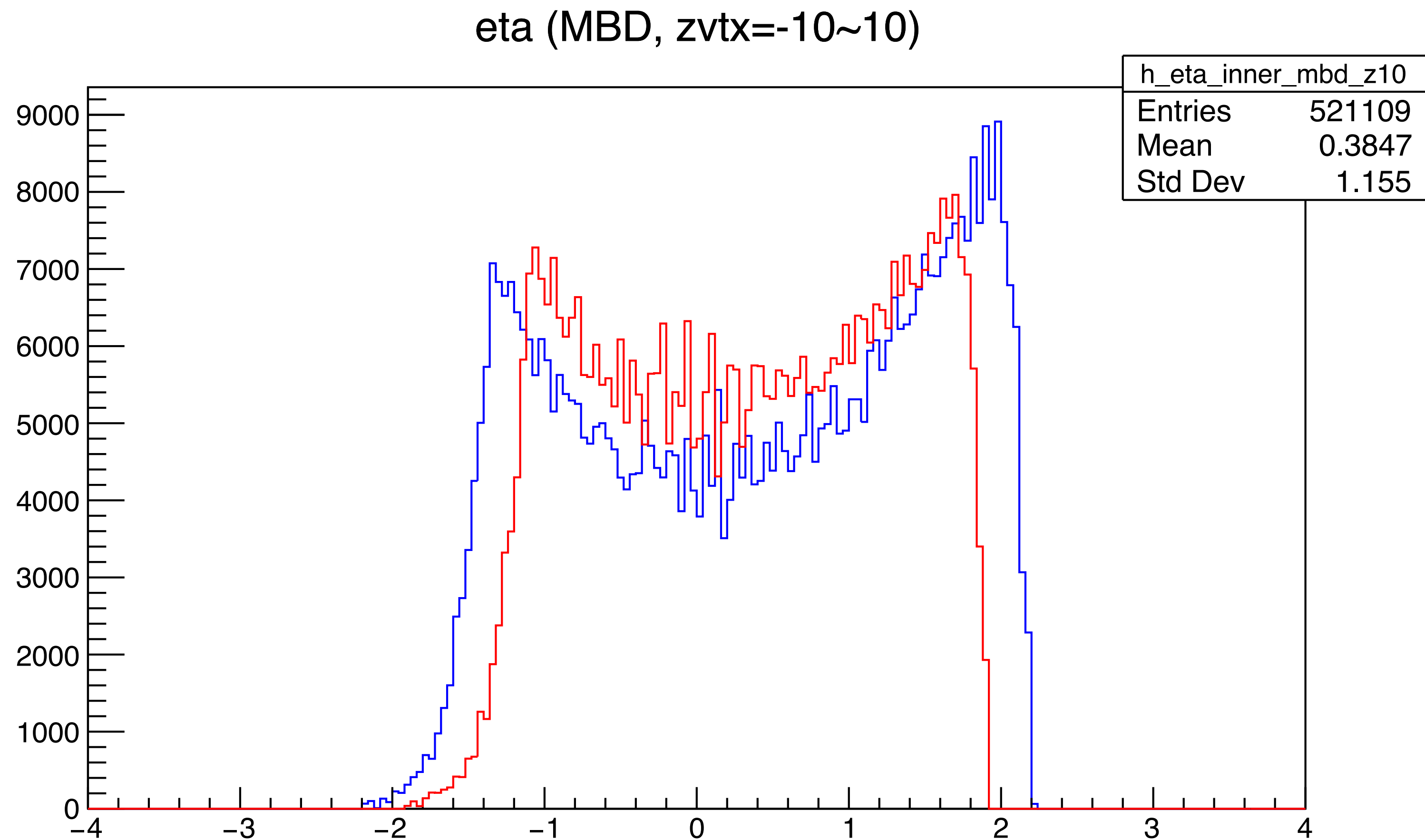
# eta ( $Z_{vtx}=\pm 20\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel



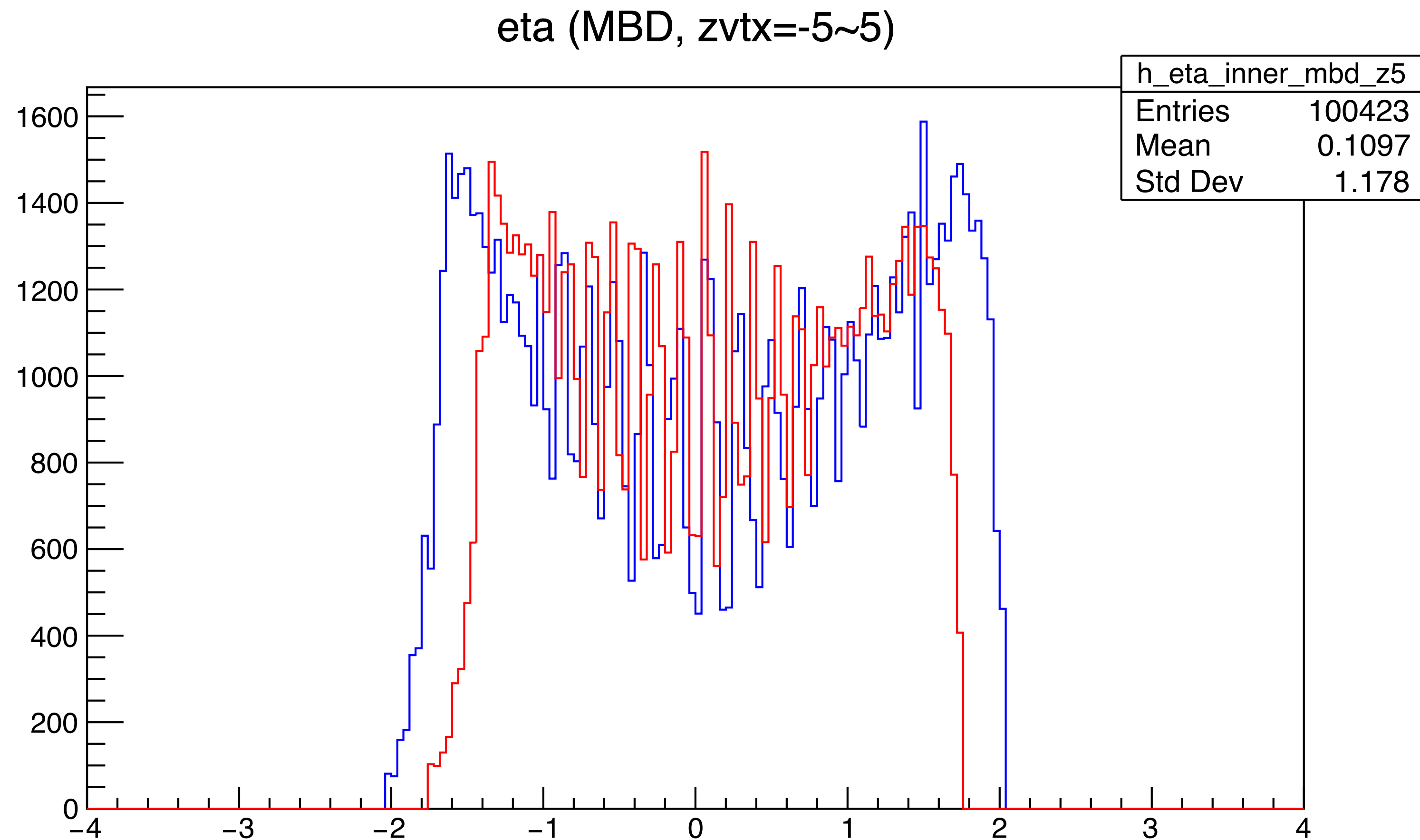
# eta ( $Z_{vtx}=\pm 10\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel



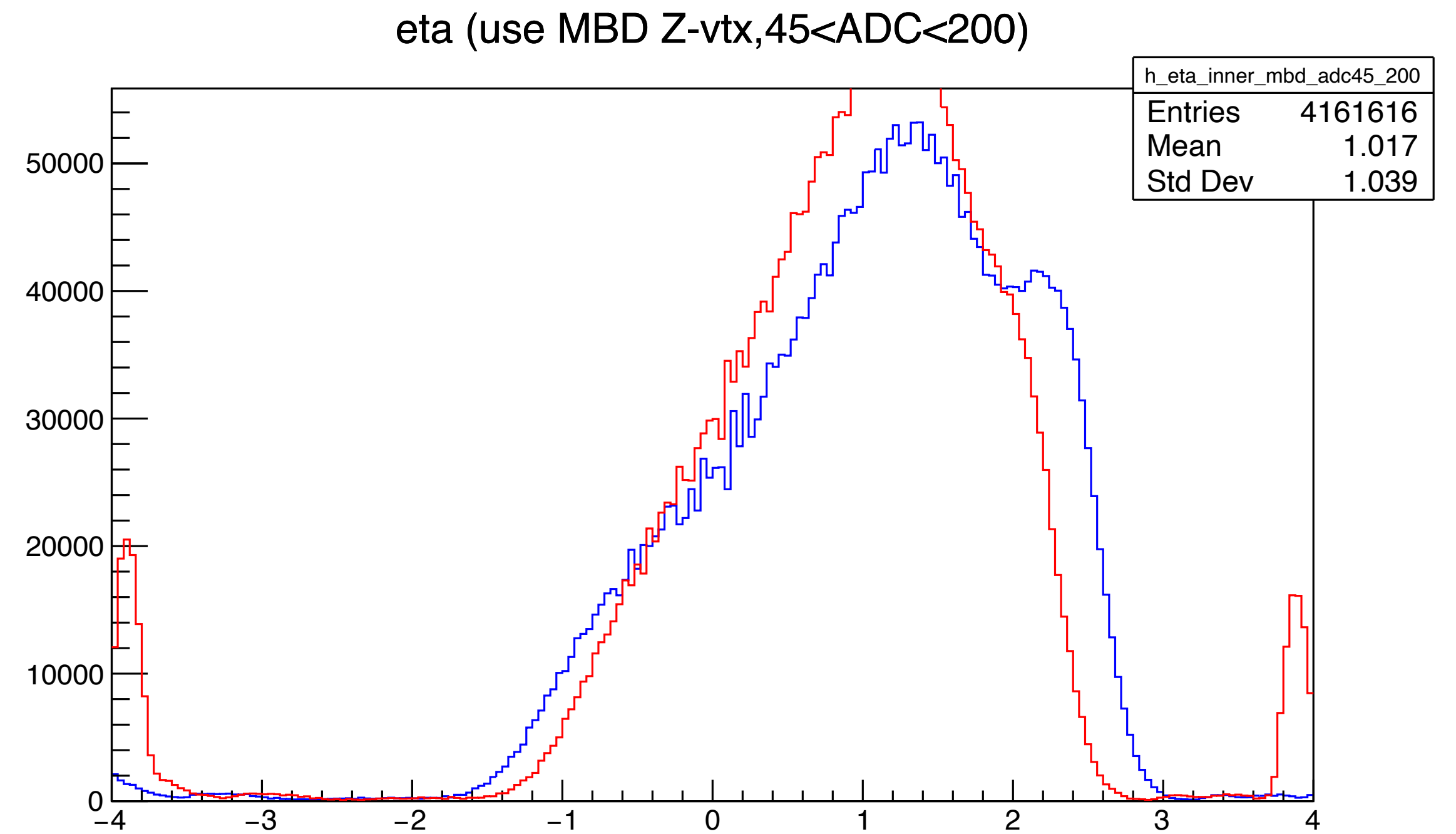
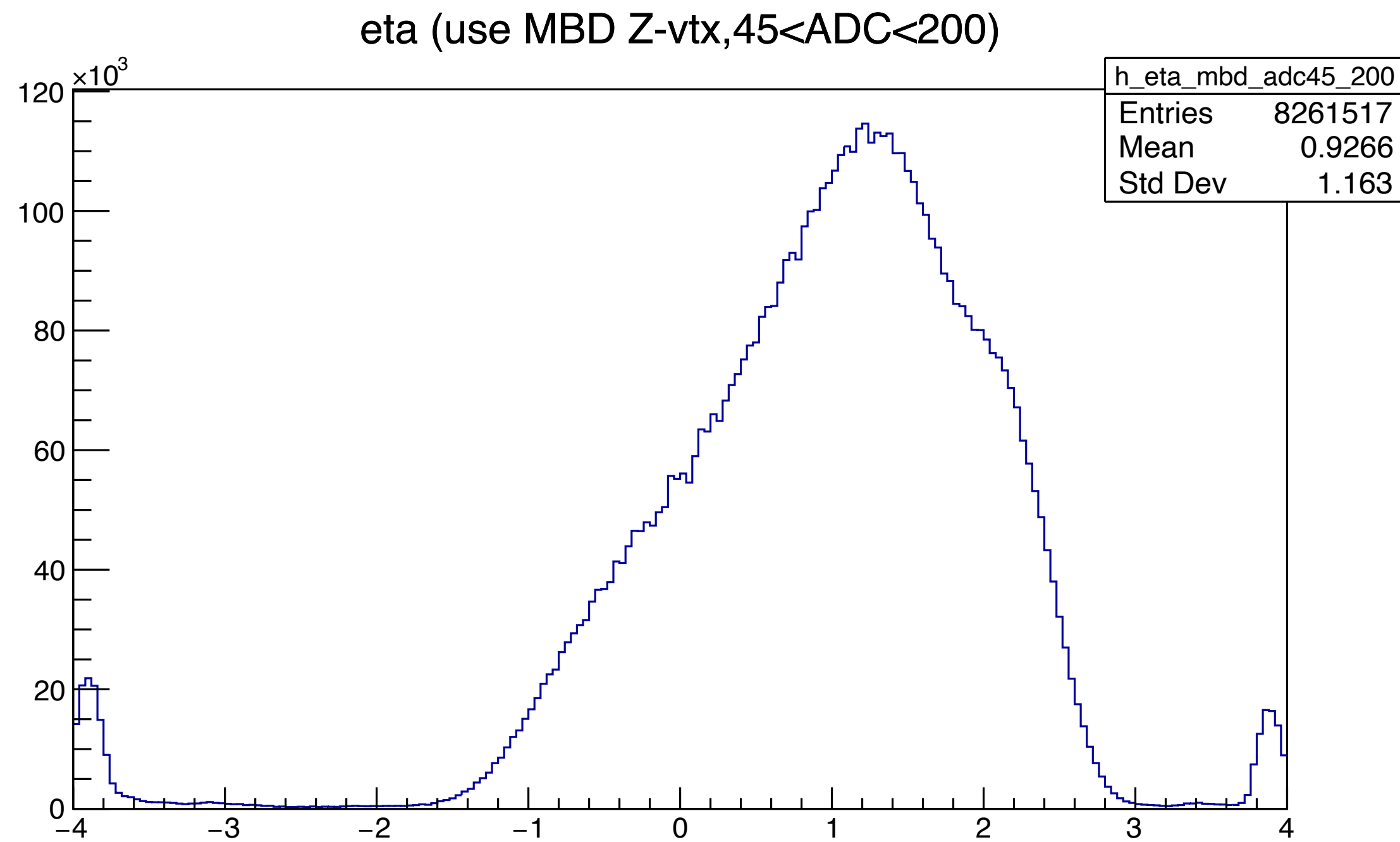
# eta ( $Z_{vtx}=\pm 5\text{cm}$ )

left: All, right: blue->inner barrel, red->outer barrel



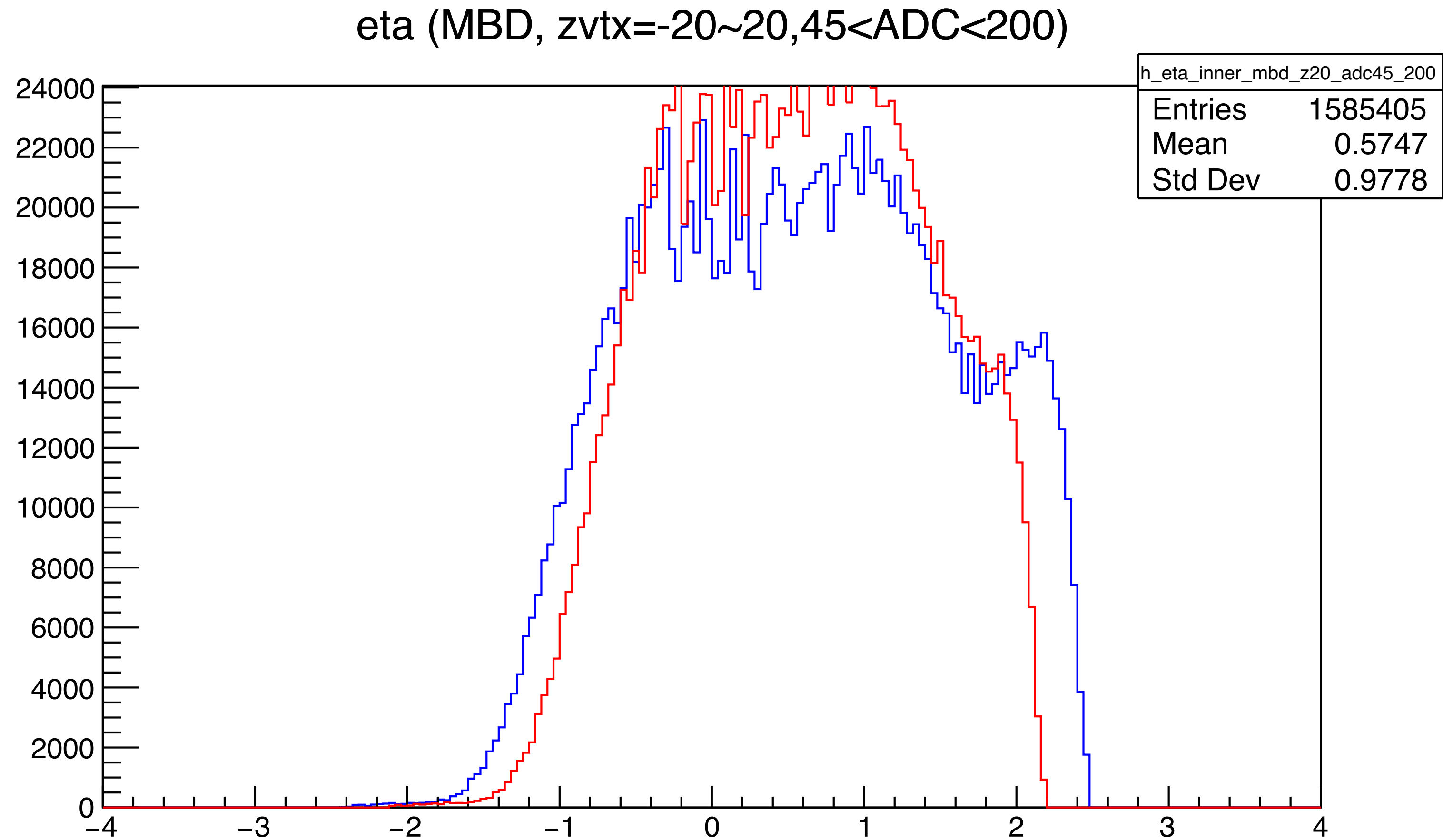
# eta ( $45 < \text{ADC} < 200$ )

left: All, right: blue->inner barrel, red->outer barrel



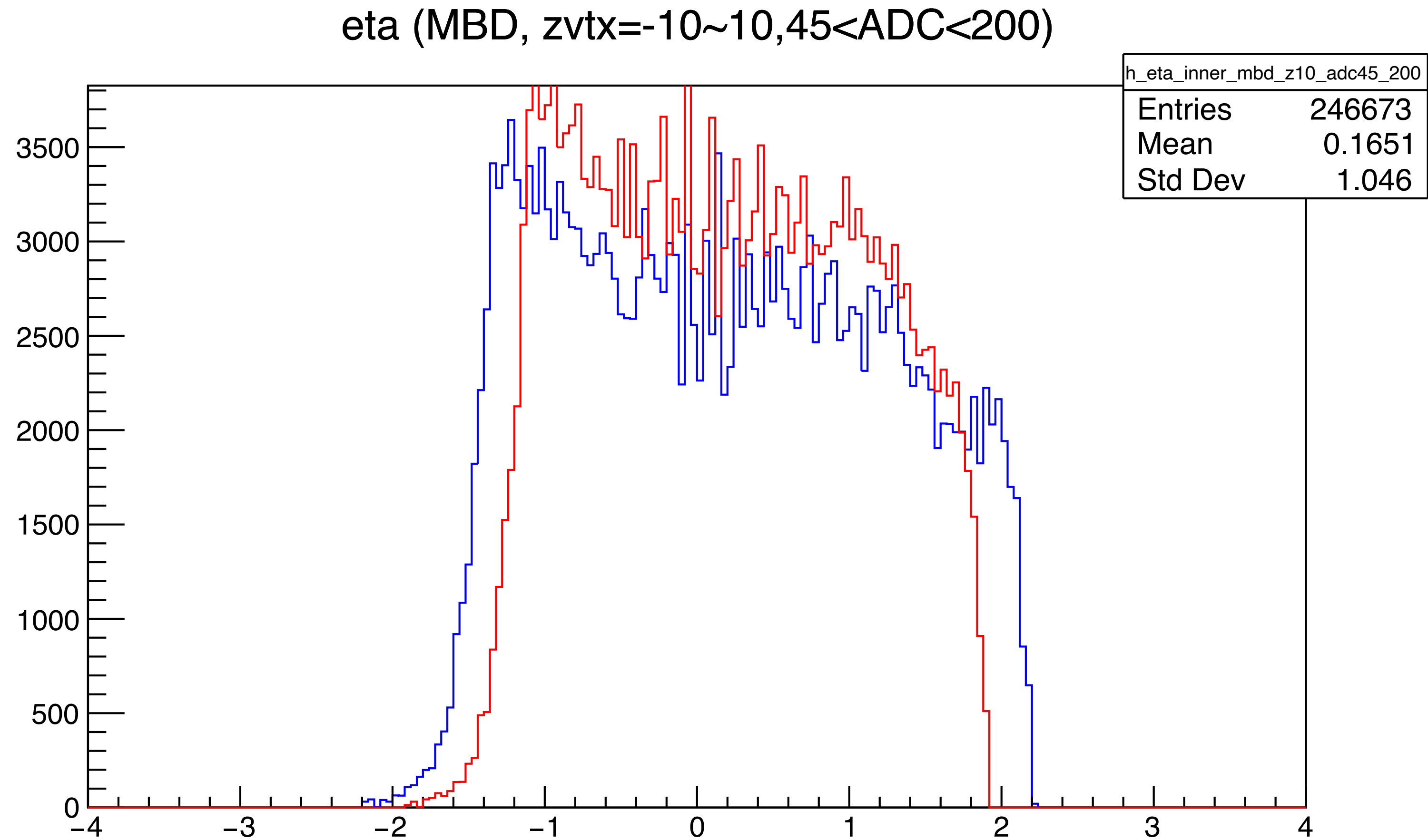
# eta ( $Z_{vtx}=\pm 20\text{cm}$ & $45 < \text{ADC} < 200$ )

left: All, right: blue->inner barrel, red->outer barrel



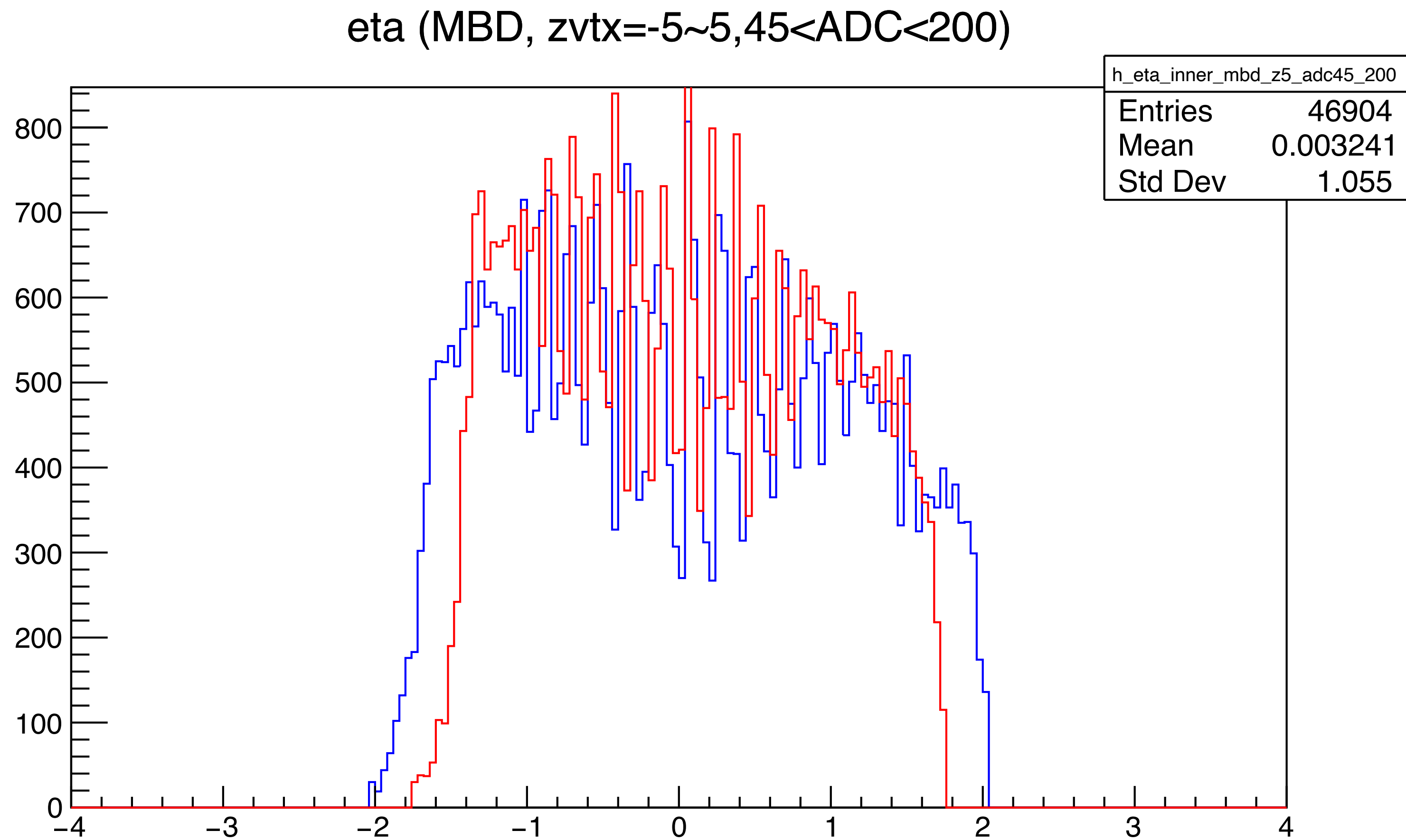
# eta ( $Z_{vtx}=\pm 10\text{cm}$ & $45 < \text{ADC} < 200$ )

left: All, right: blue->inner barrel, red->outer barrel



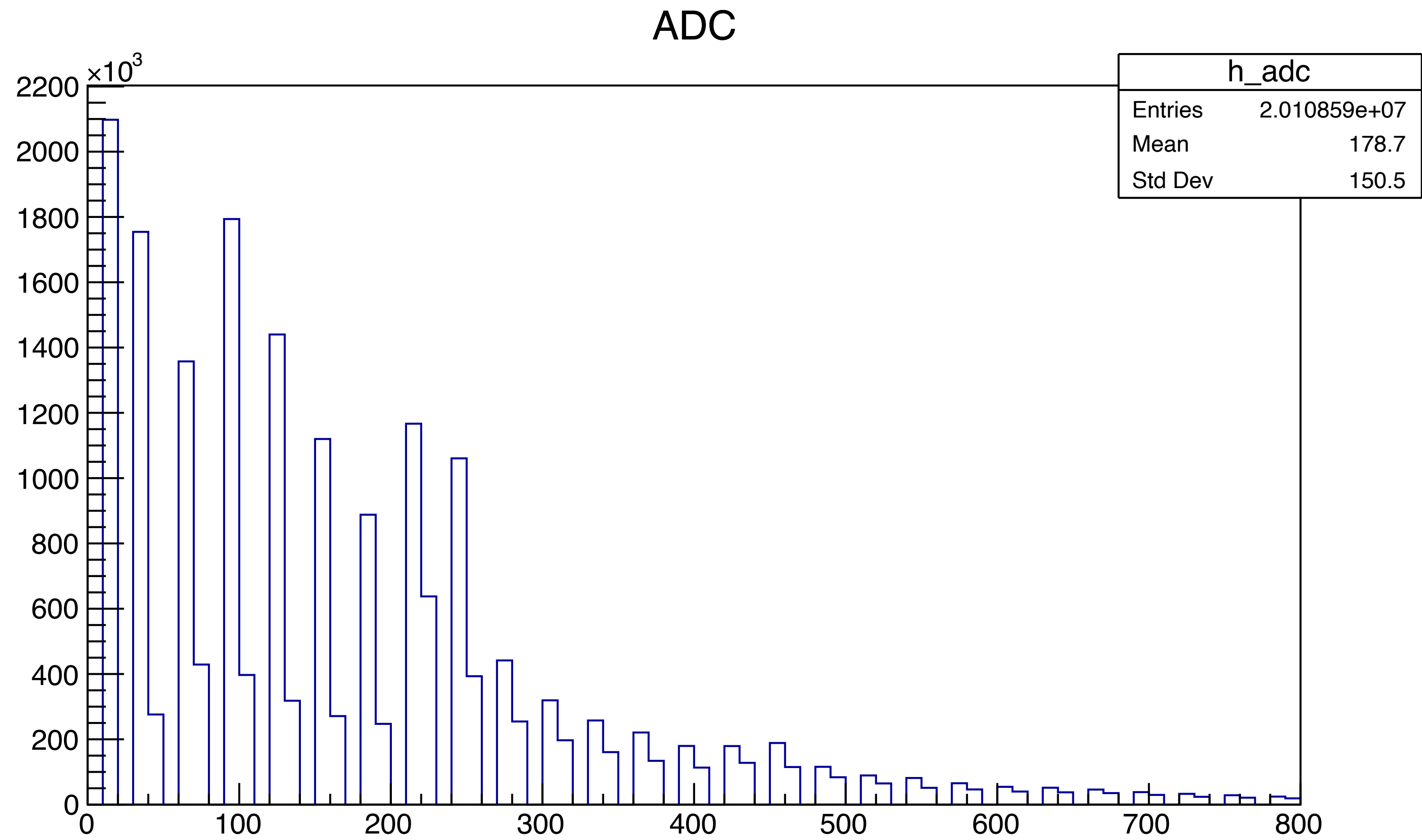
# eta ( $Z_{vtx}=\pm 5\text{cm}$ & $45 < \text{ADC} < 200$ )

left: All, right: blue->inner barrel, red->outer barrel



ADC distribution (no Cut)

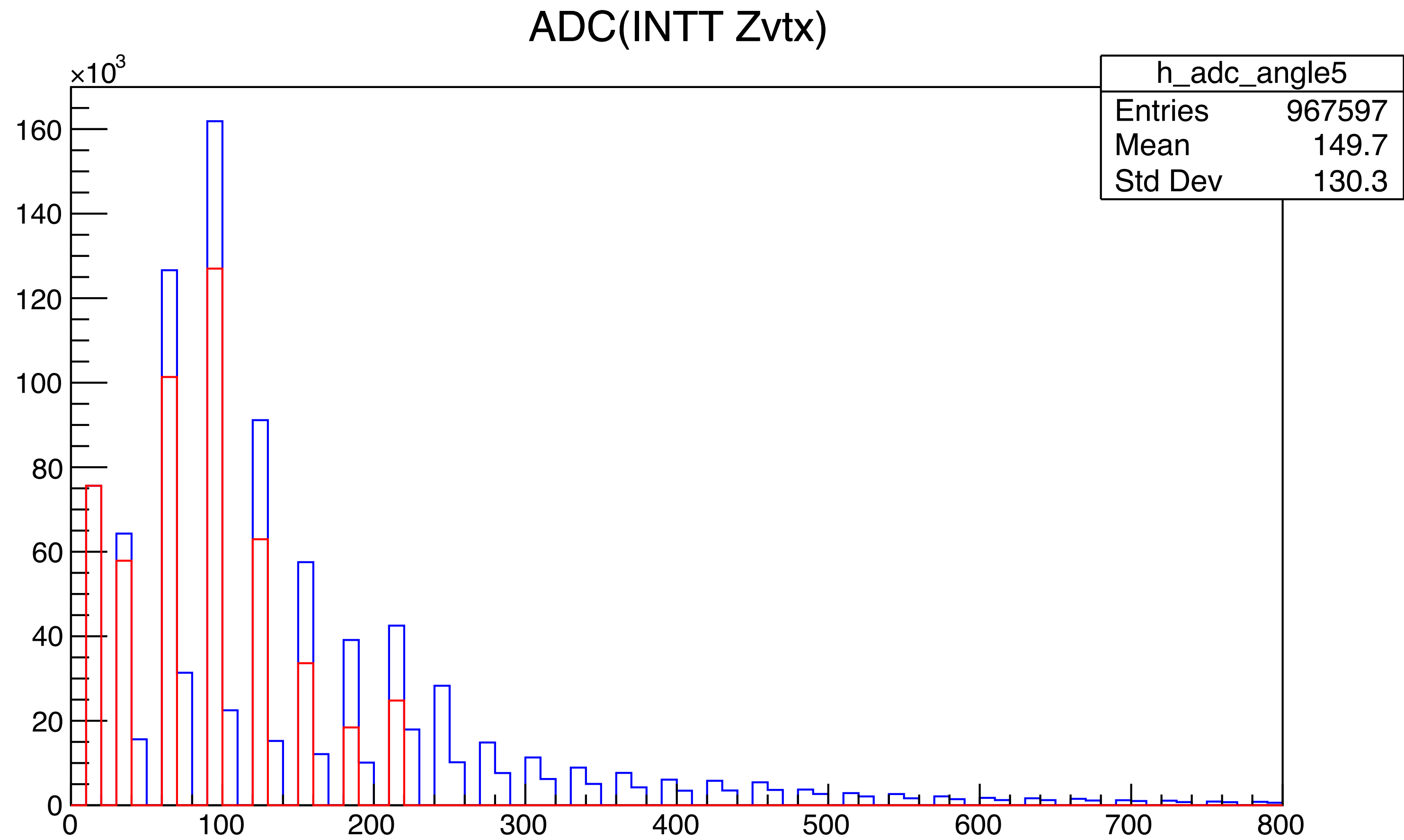
# ADC (no cut)



ADC distribution (use INTT Zvxt)

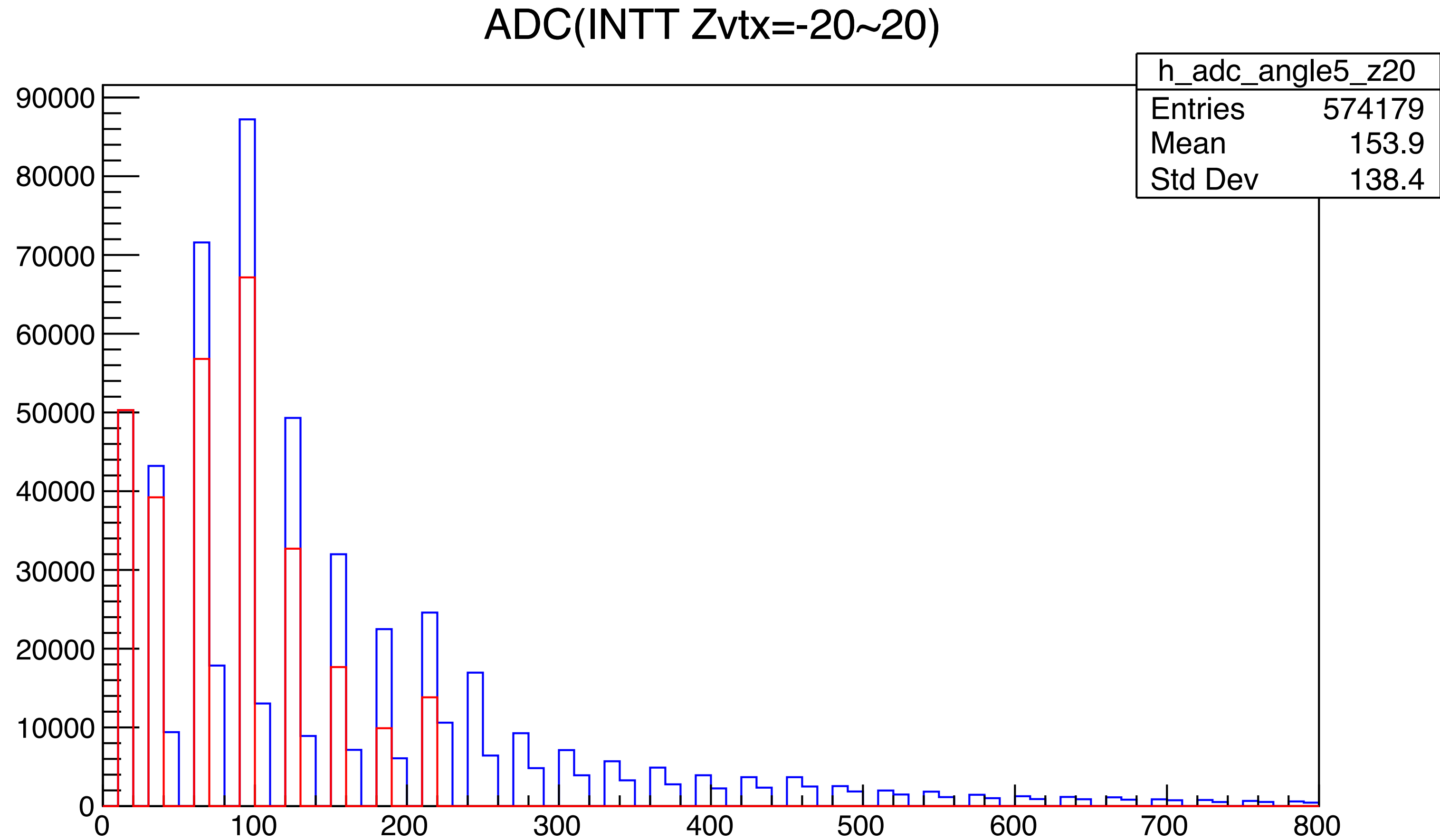
# ADC ( $85 < \theta < 95$ )

blue: all size, red: size=1



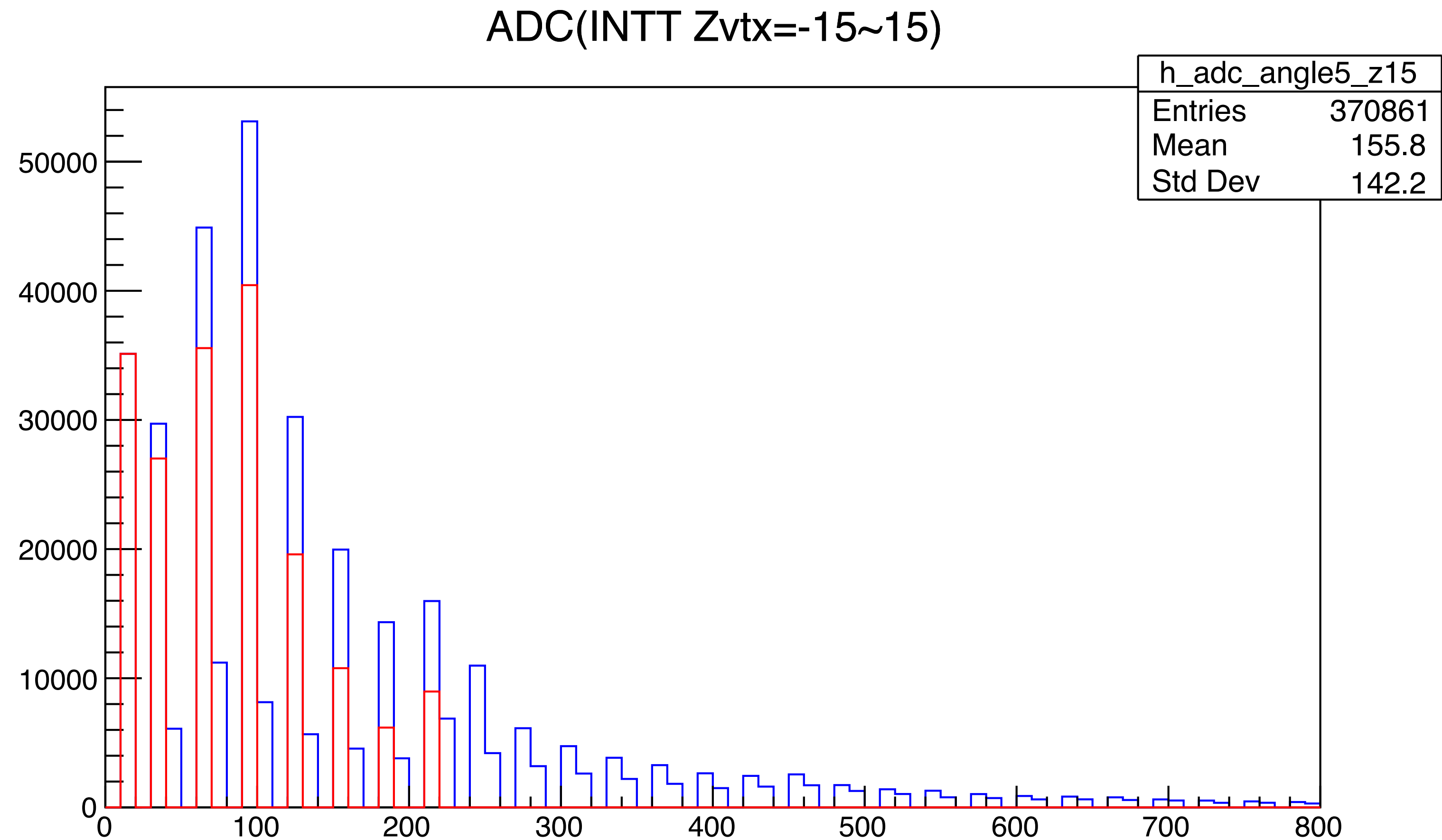
# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 20\text{cm}$ )

blue: all size, red: size=1



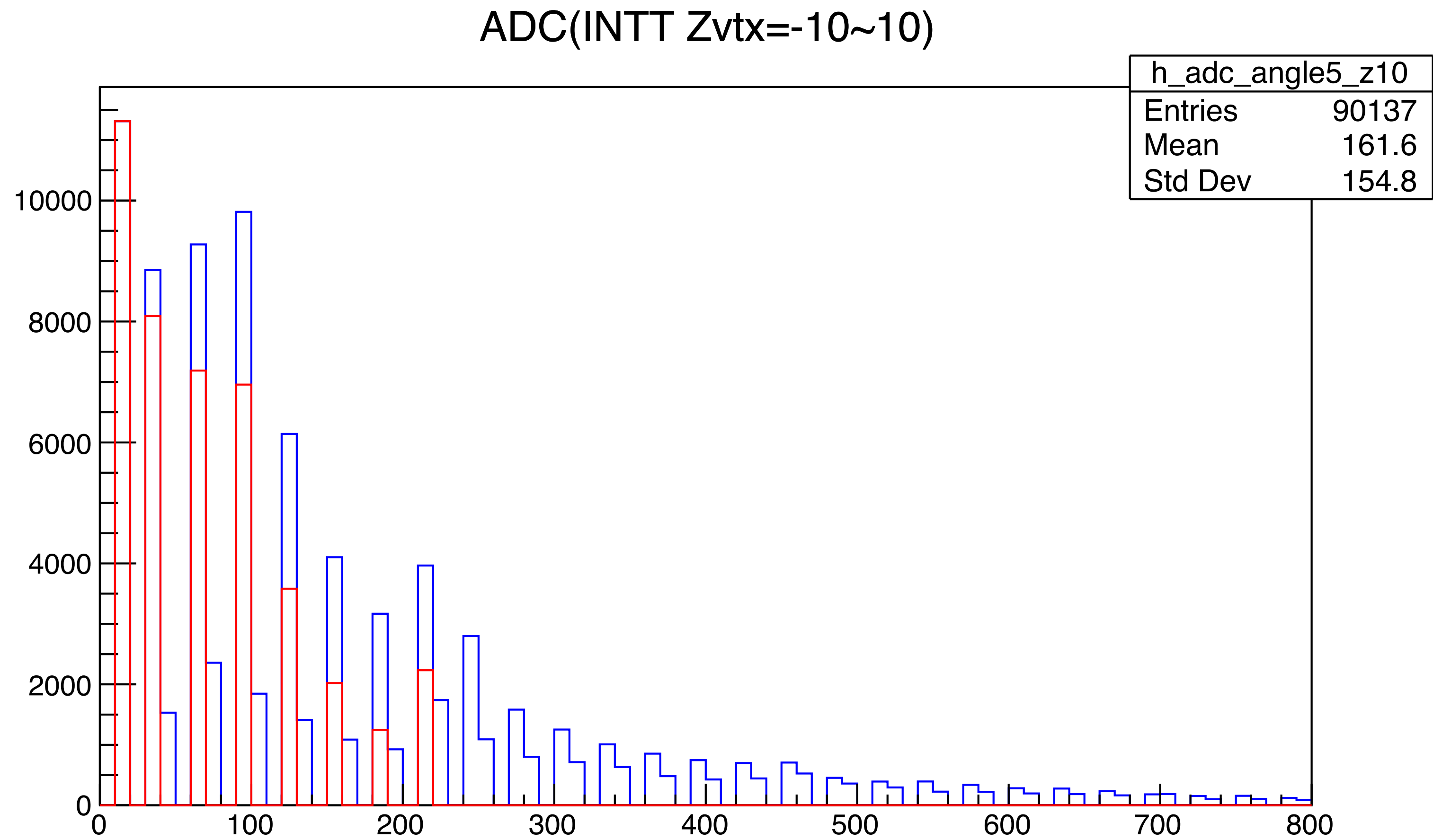
# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 15\text{cm}$ )

blue: all size, red: size=1



# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 10\text{cm}$ )

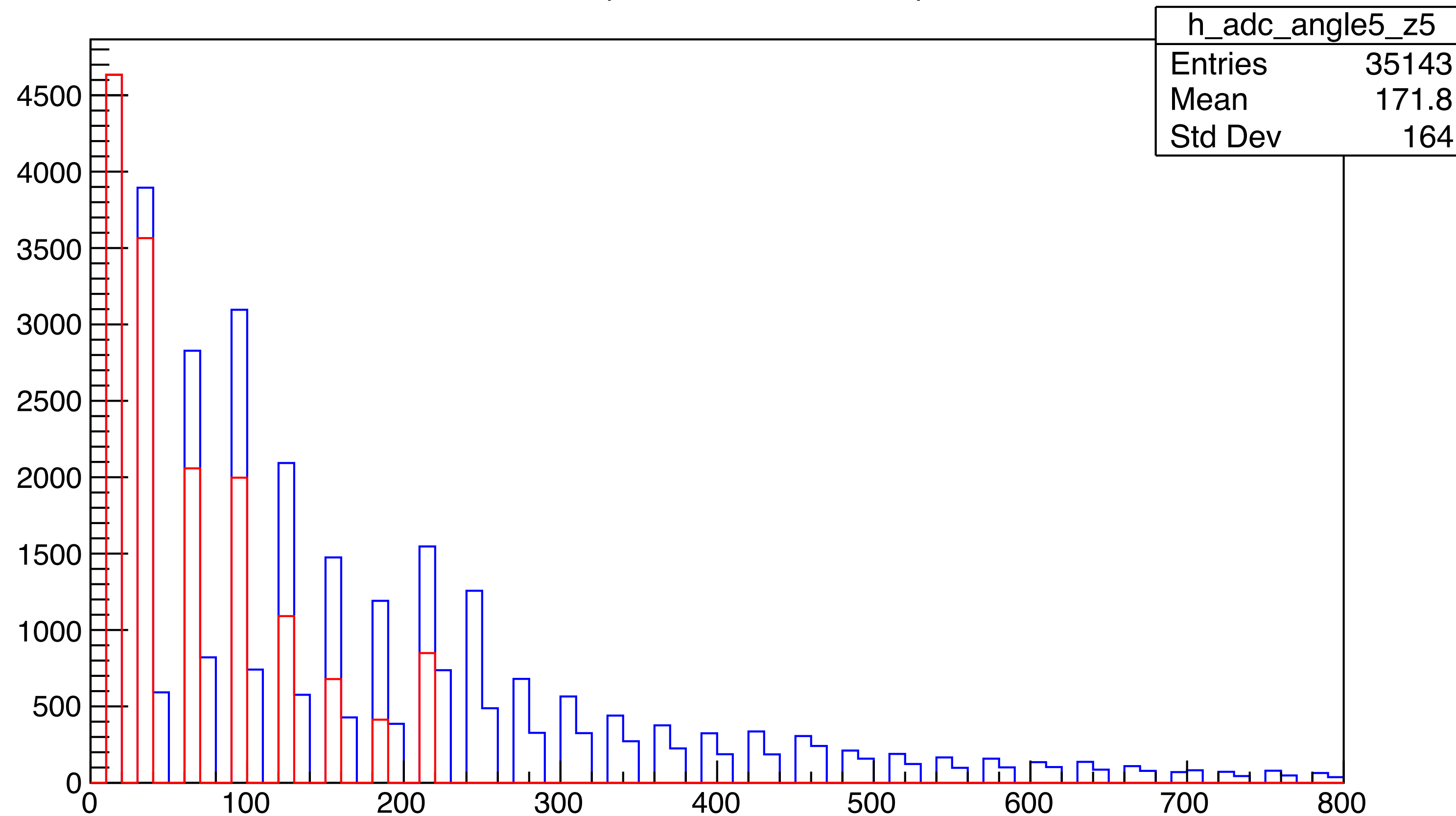
blue: all size, red: size=1



# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 5\text{cm}$ )

blue: all size, red: size=1

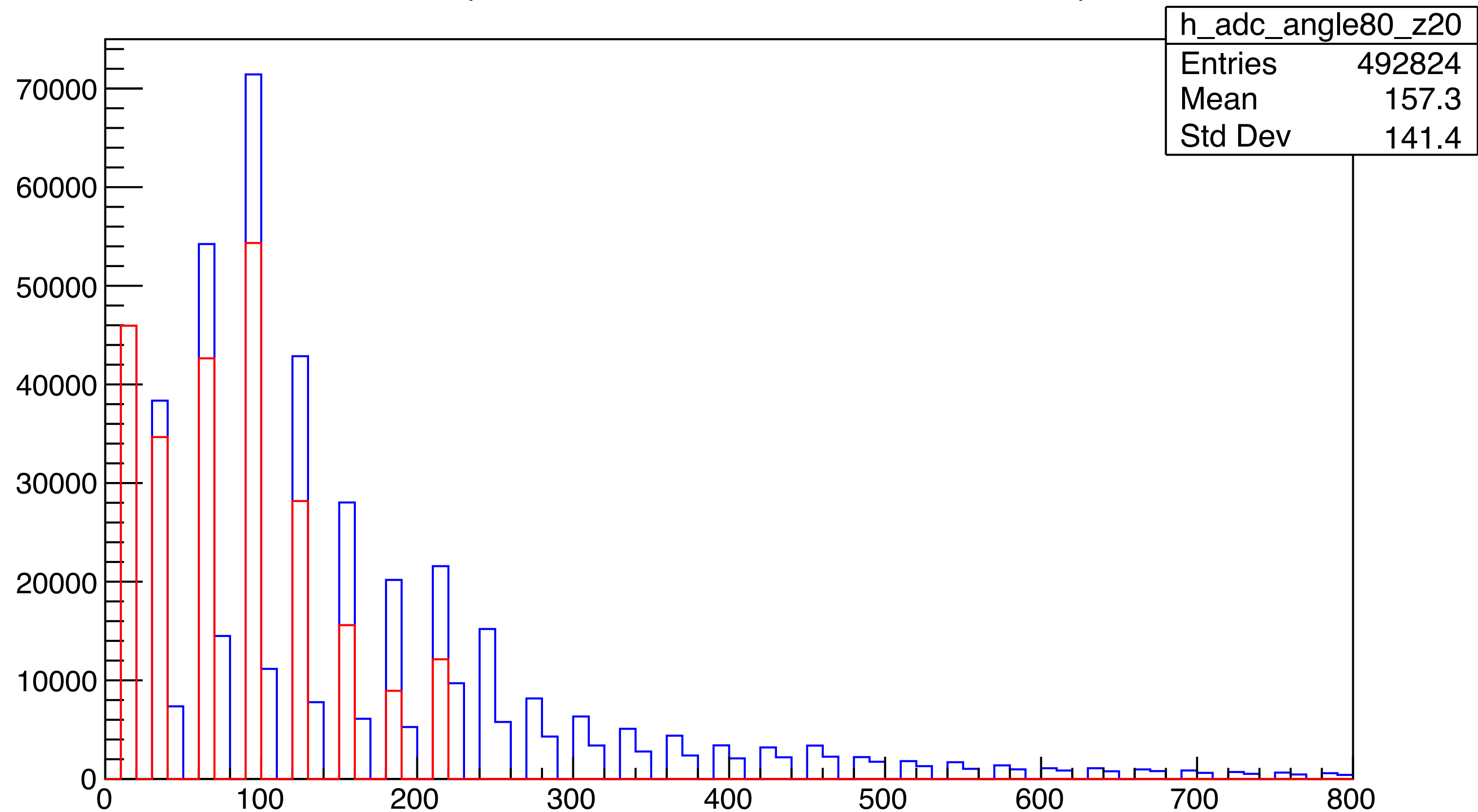
ADC(INTT  $Z_{vtx} = -5 \sim 5$ )



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 20\text{cm}$ )

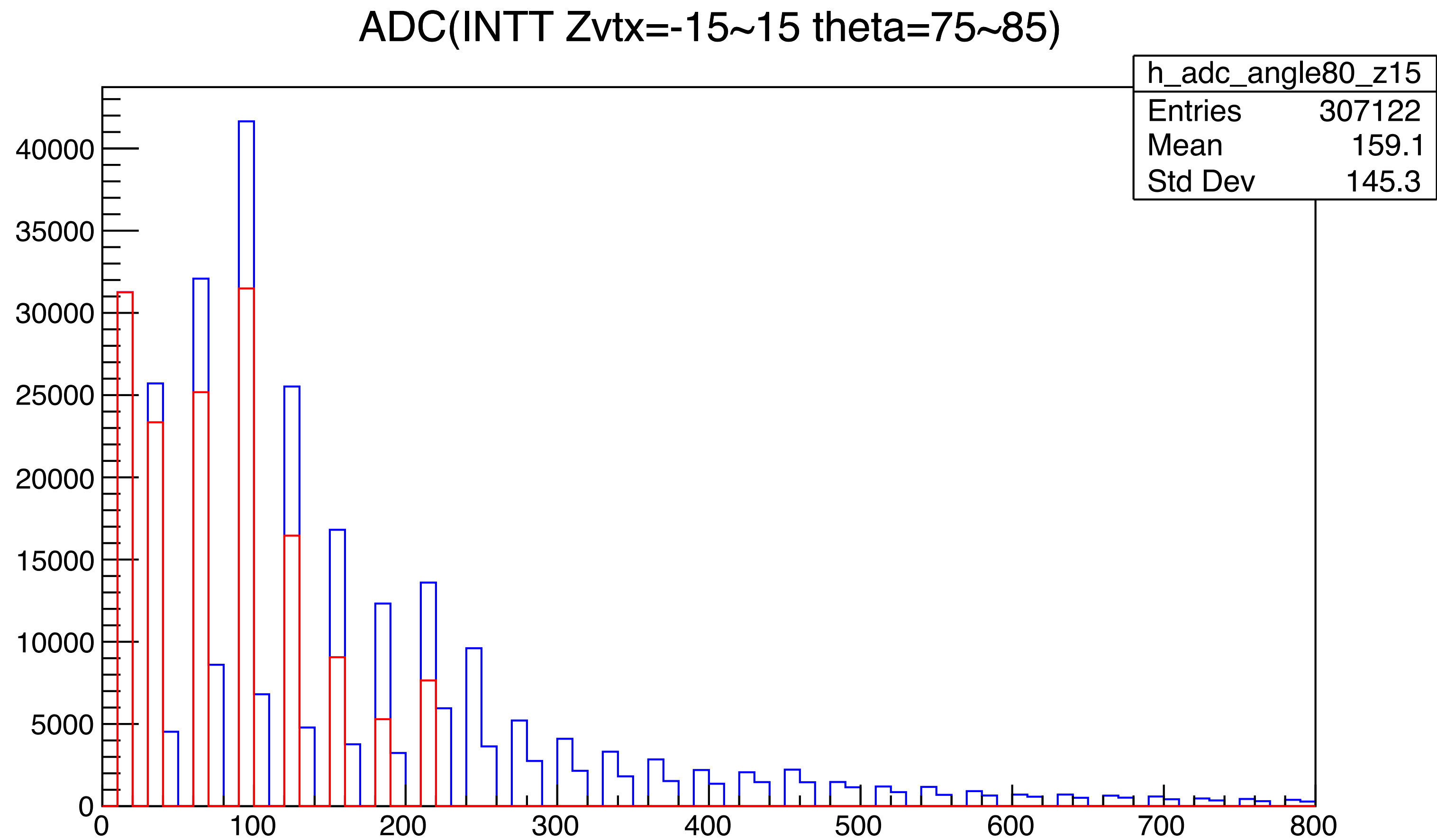
blue: all size, red: size=1

ADC(INTT  $Z_{vtx} = -20 \sim 20$   $\theta = 75 \sim 85$ )



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 15\text{cm}$ )

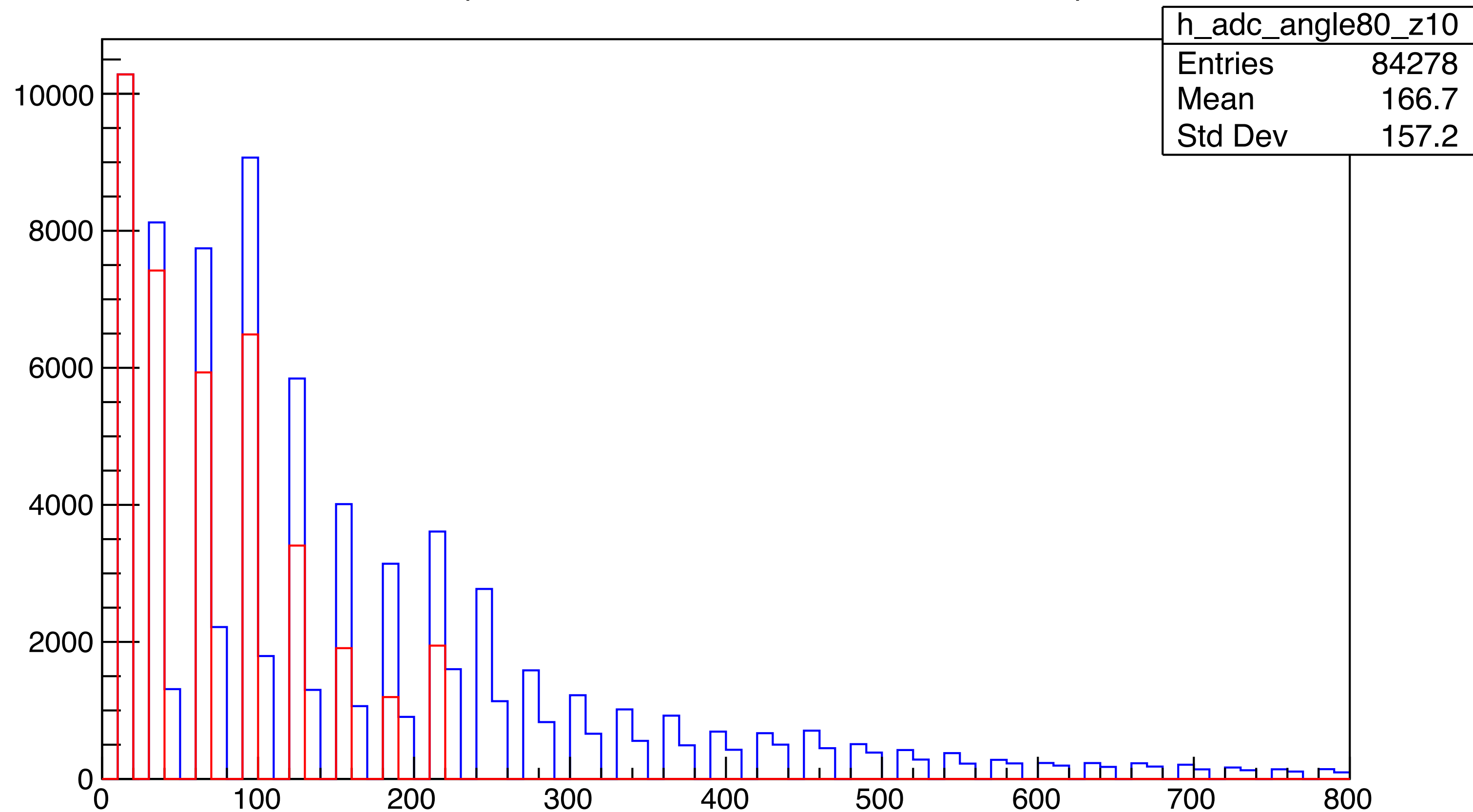
blue: all size, red: size=1



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 10\text{cm}$ )

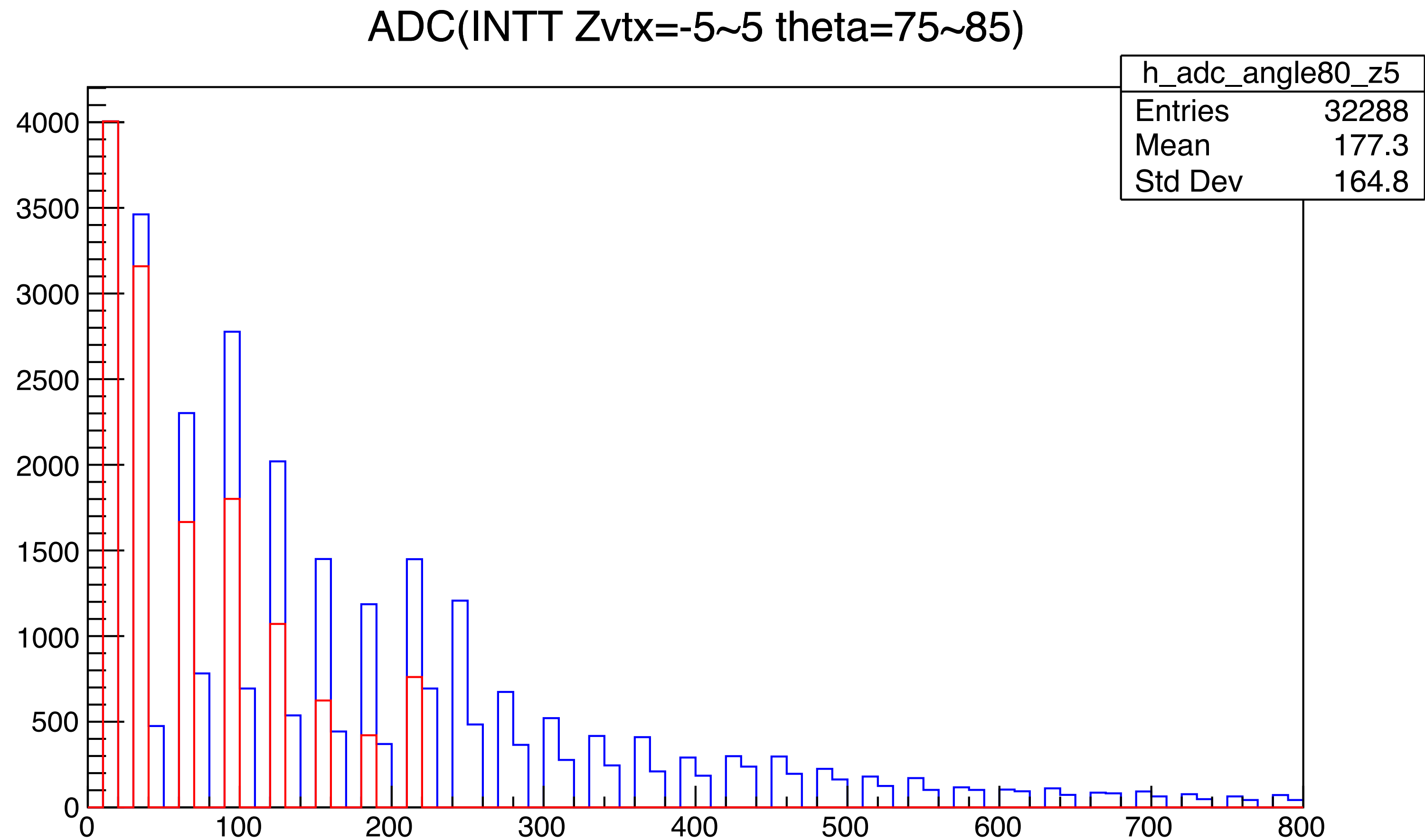
blue: all size, red: size=1

ADC(INTT  $Z_{vtx} = -10 \sim 10$   $\theta = 75 \sim 85$ )



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 5\text{cm}$ )

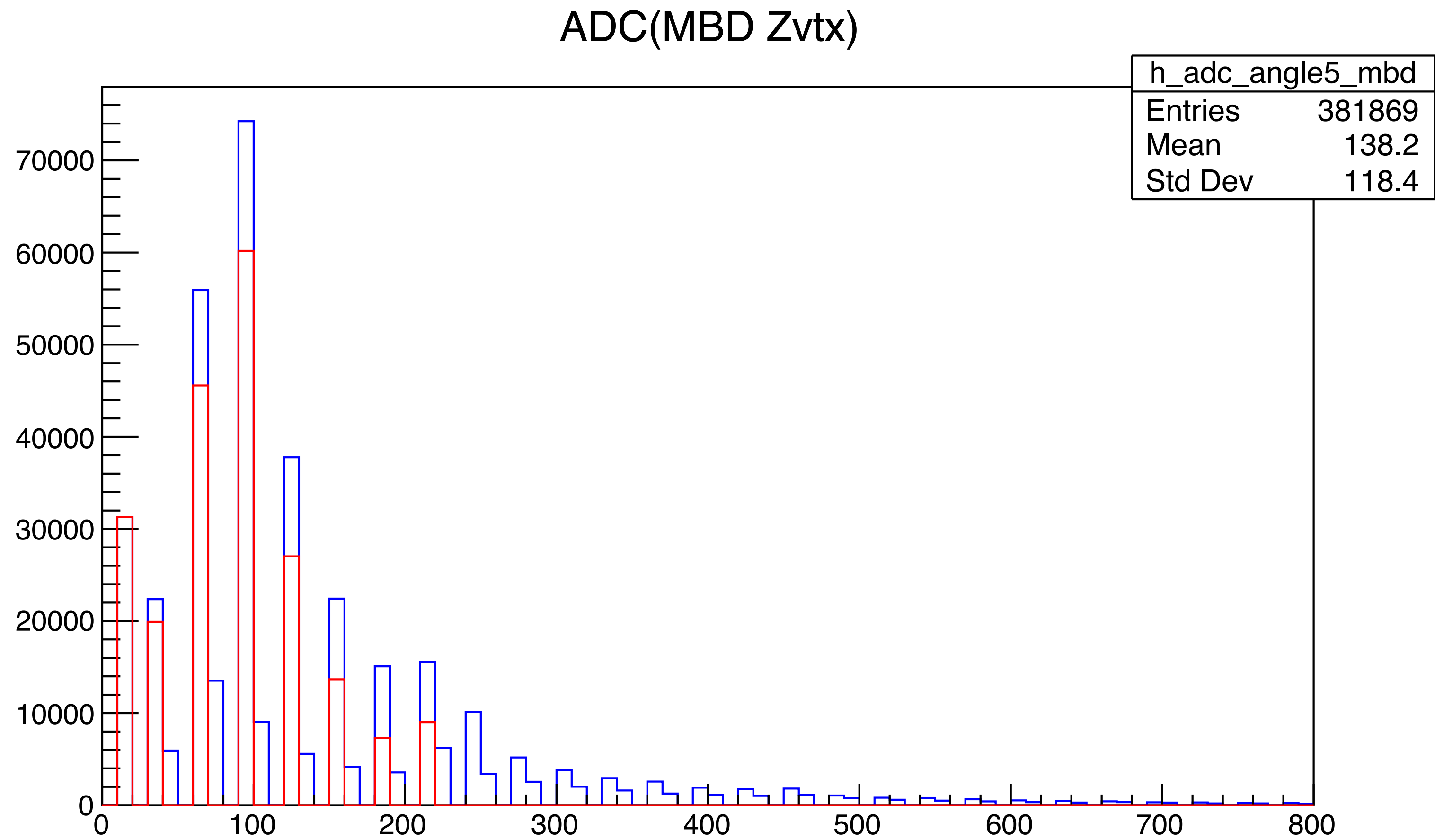
blue: all size, red: size=1



ADC distribution (use MBD Zvxt)

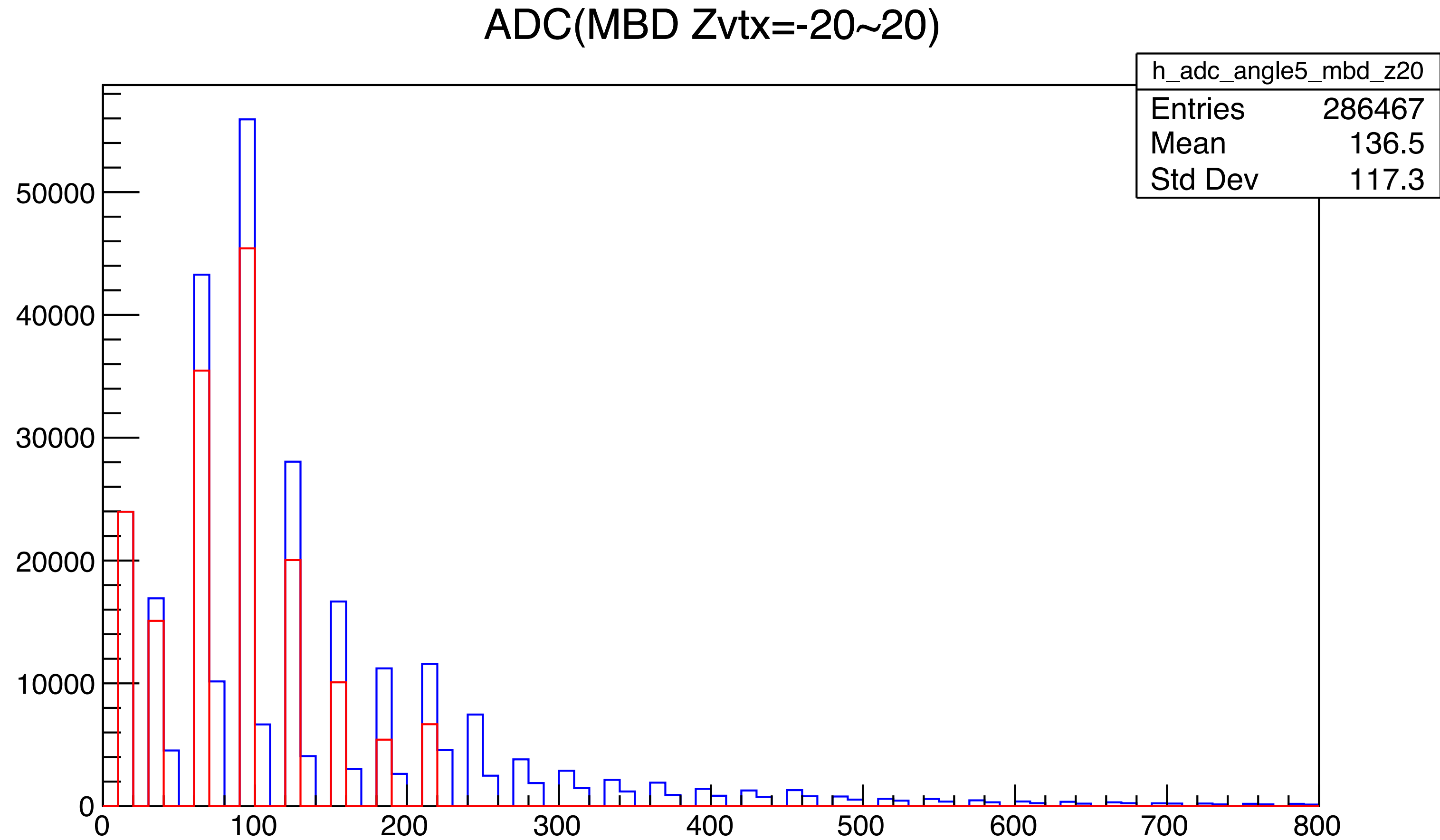
# ADC ( $85 < \theta < 95$ )

blue: all size, red: size=1



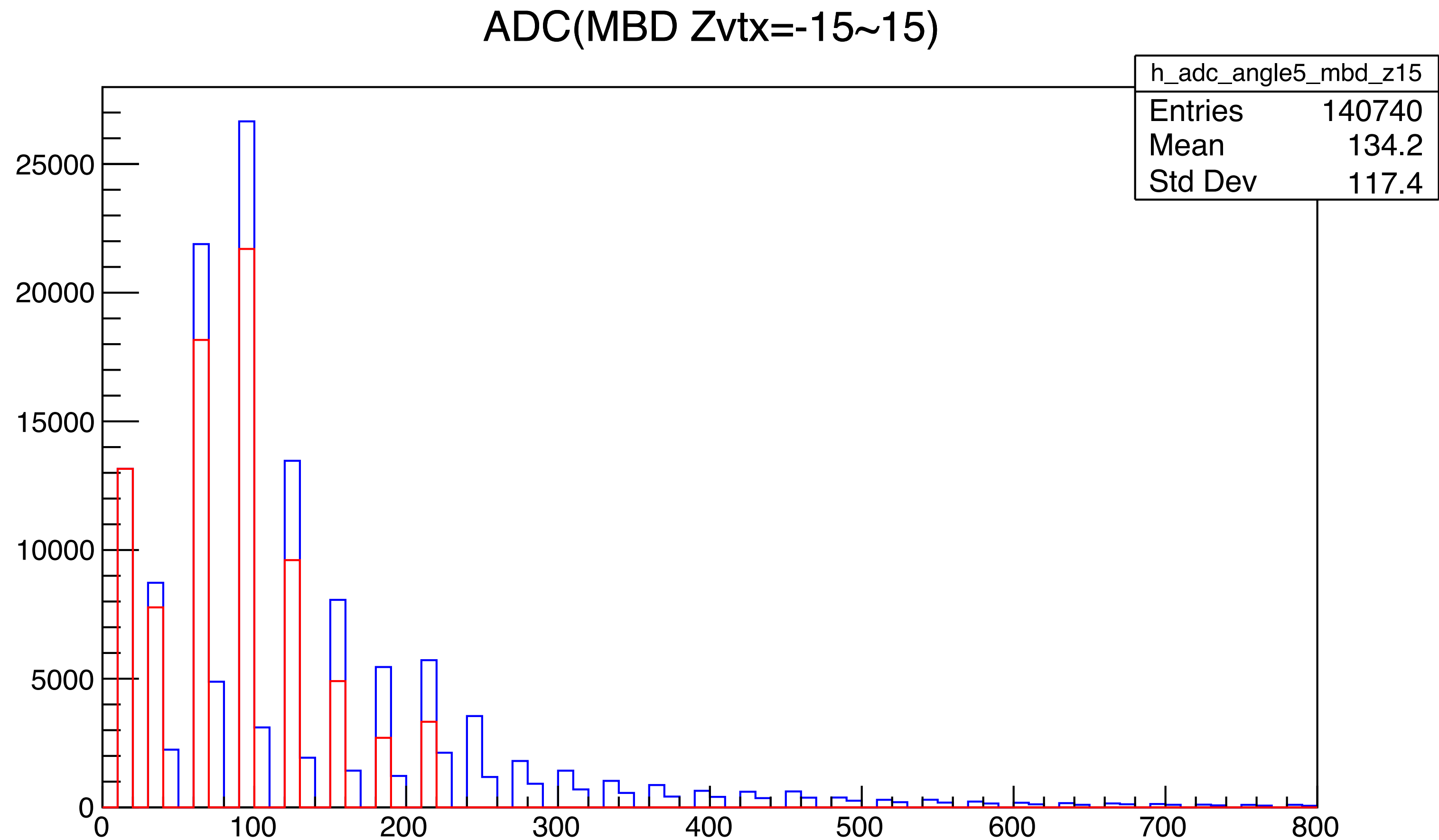
# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 20\text{cm}$ )

blue: all size, red: size=1



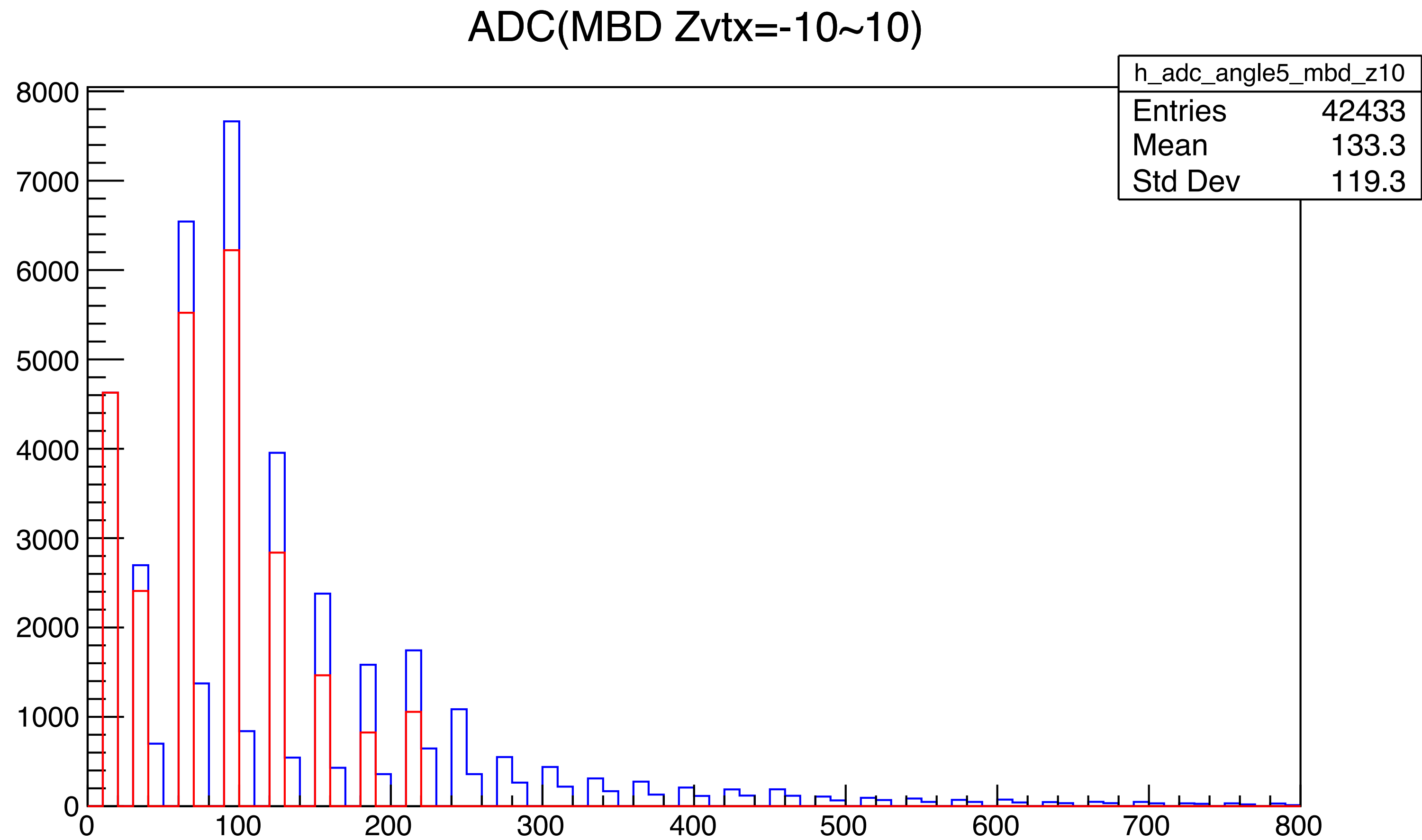
# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 15\text{cm}$ )

blue: all size, red: size=1



# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 10\text{cm}$ )

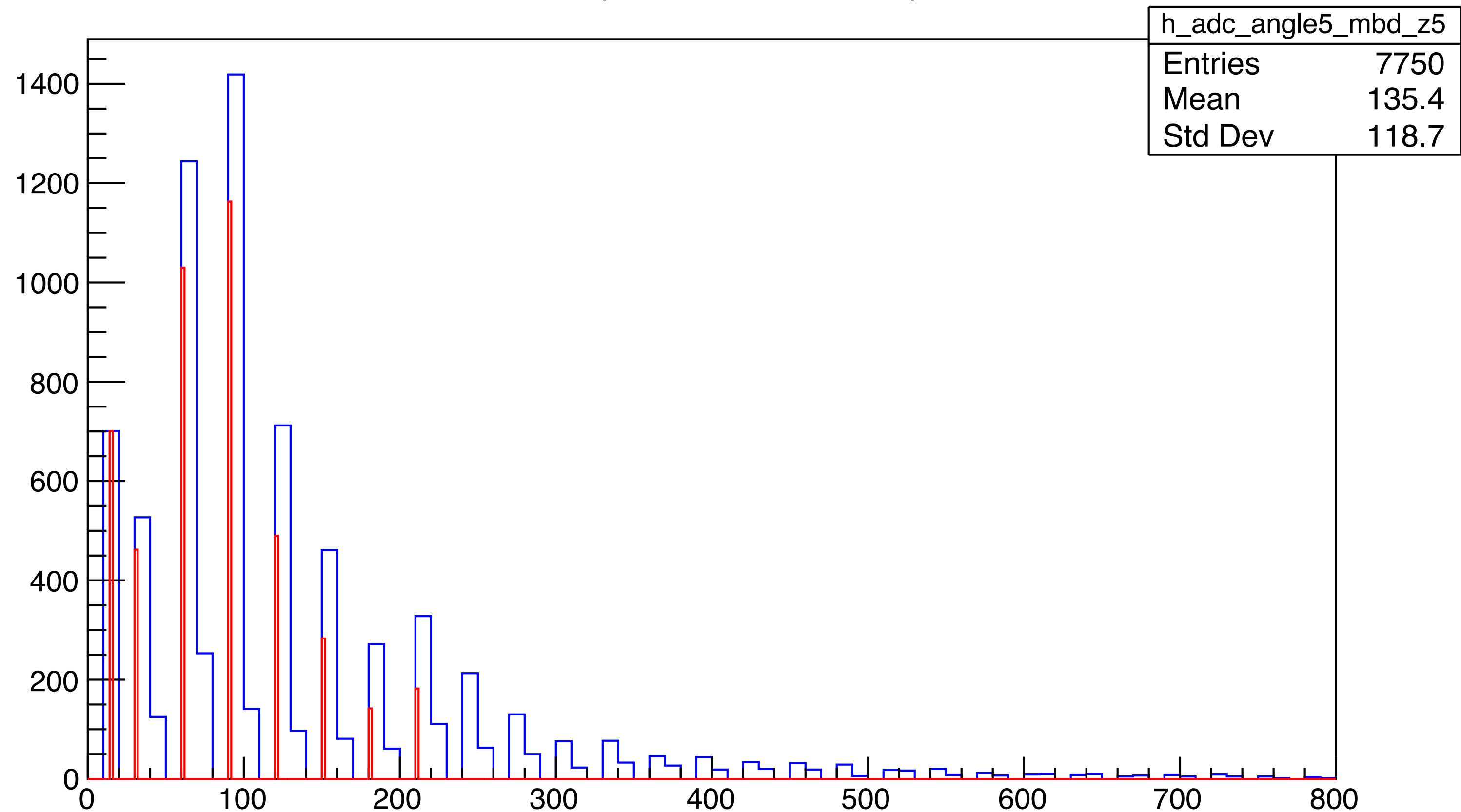
blue: all size, red: size=1



# ADC ( $85 < \theta < 95$ & $Z_{vtx} = \pm 5\text{cm}$ )

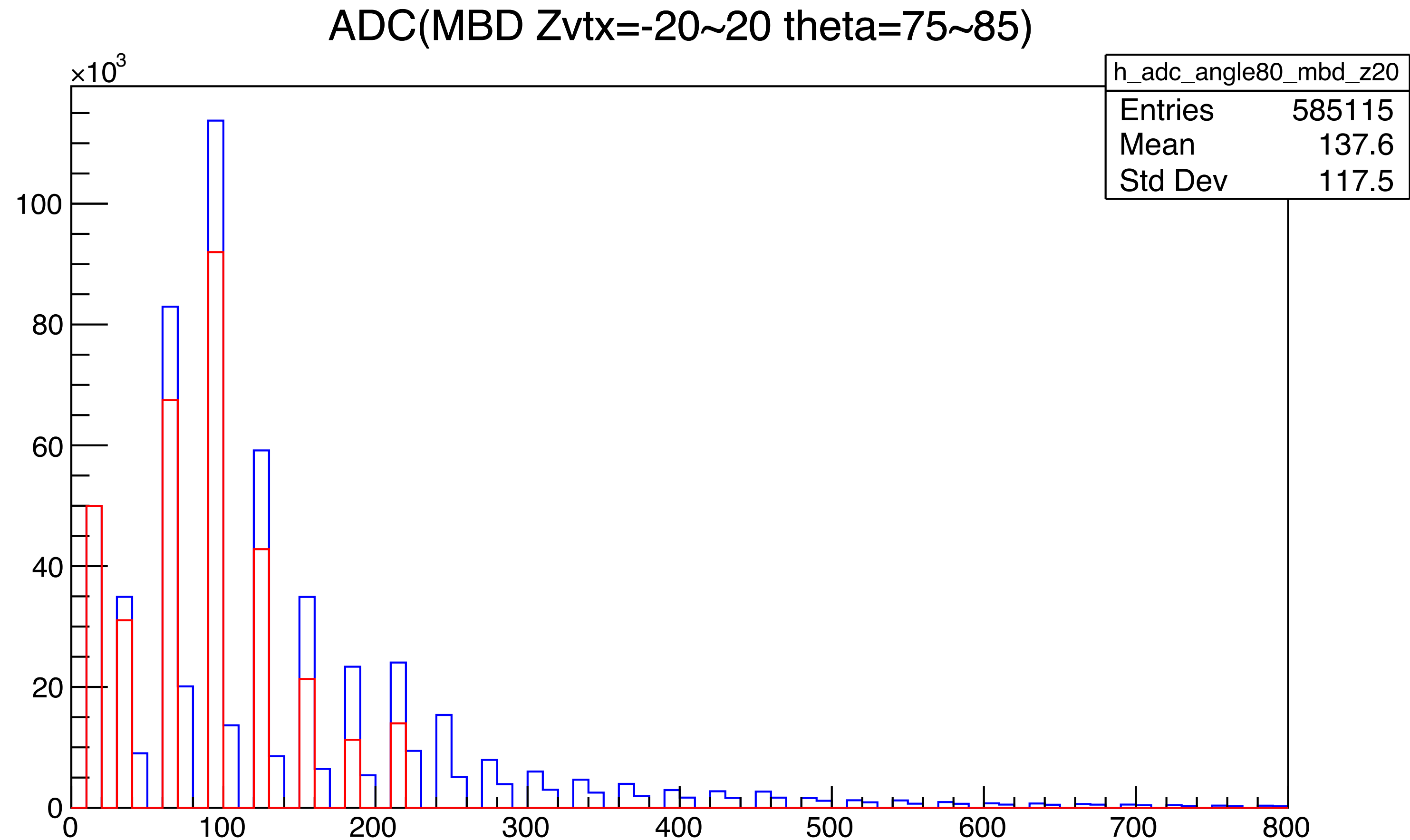
blue: all size, red: size=1

ADC(MBD  $Z_{vtx} = -5 \sim 5$ )



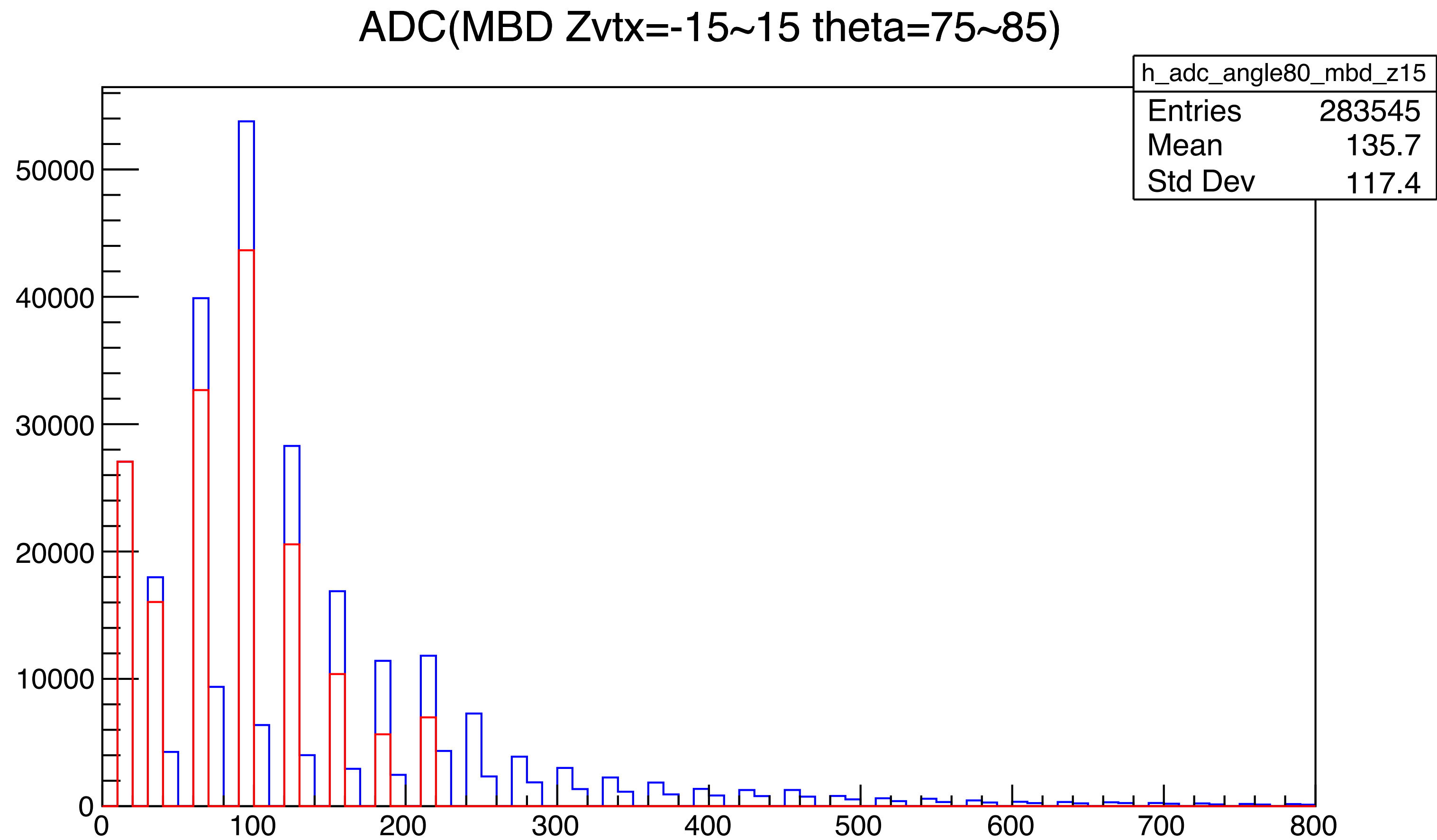
# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 20\text{cm}$ )

blue: all size, red: size=1



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 15\text{cm}$ )

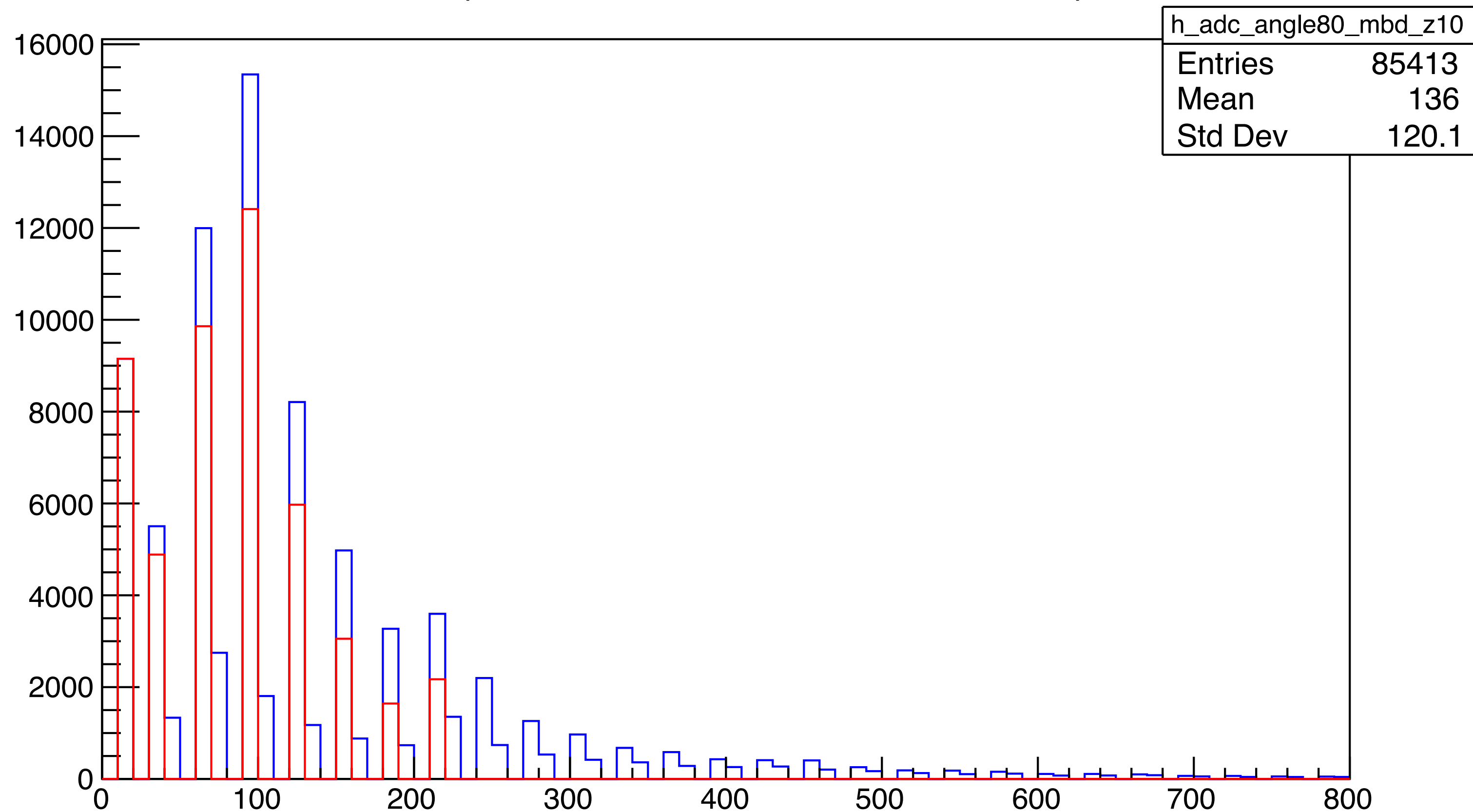
blue: all size, red: size=1



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 10\text{cm}$ )

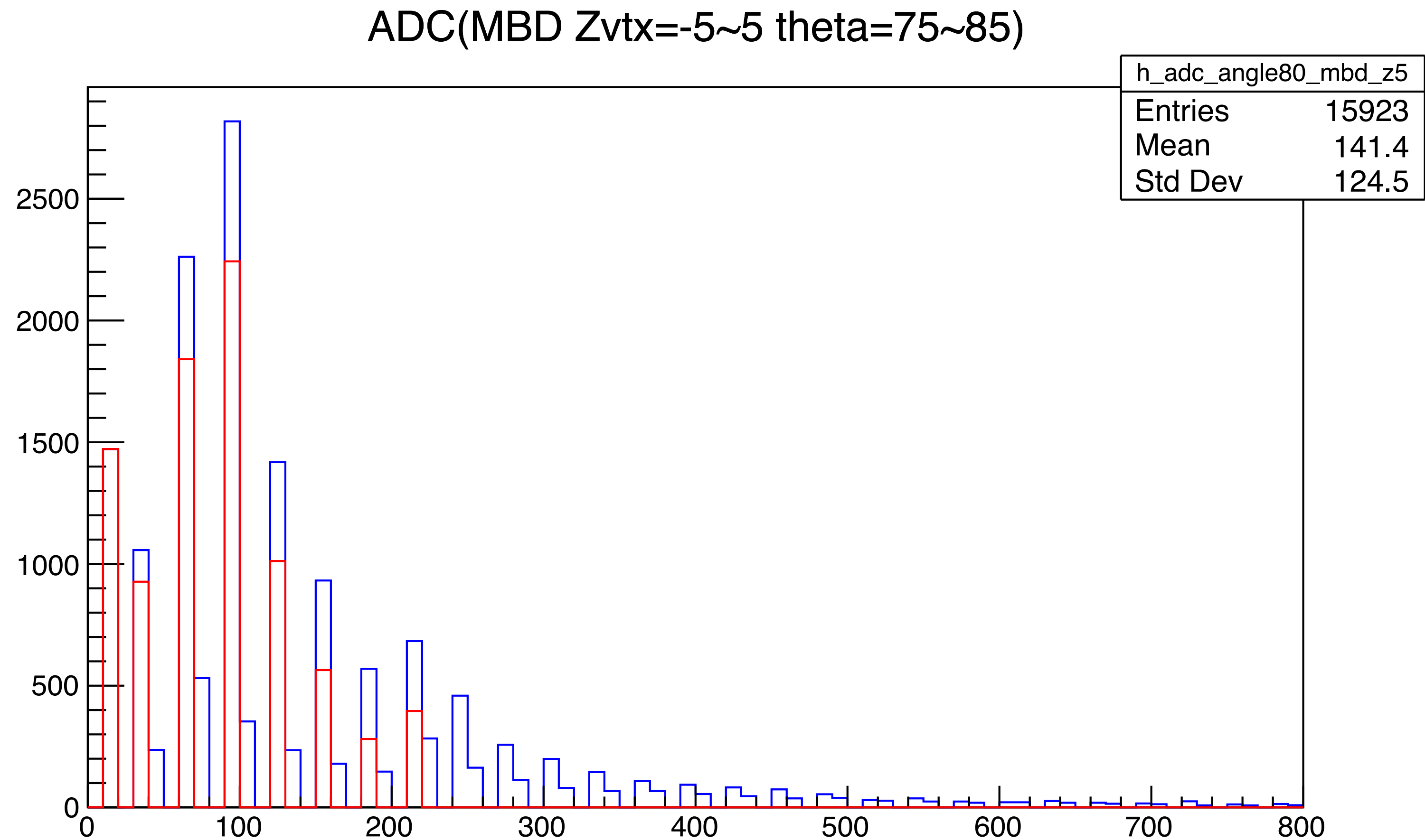
blue: all size, red: size=1

ADC(MBD  $Z_{vtx} = -10 \sim 10$   $\theta = 75 \sim 85$ )



# ADC ( $75 < \theta < 85$ & $Z_{vtx} = \pm 5\text{cm}$ )

blue: all size, red: size=1

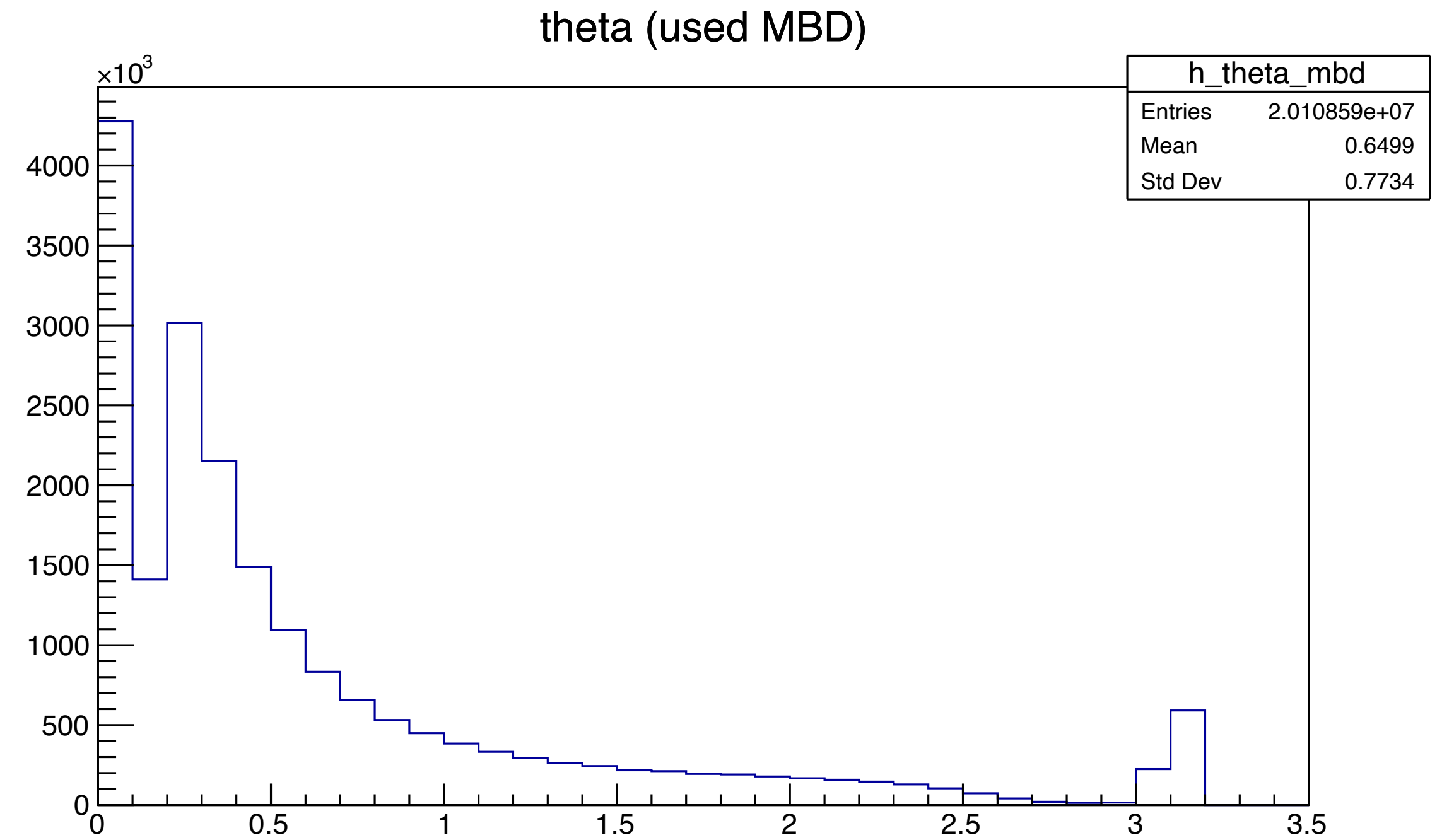
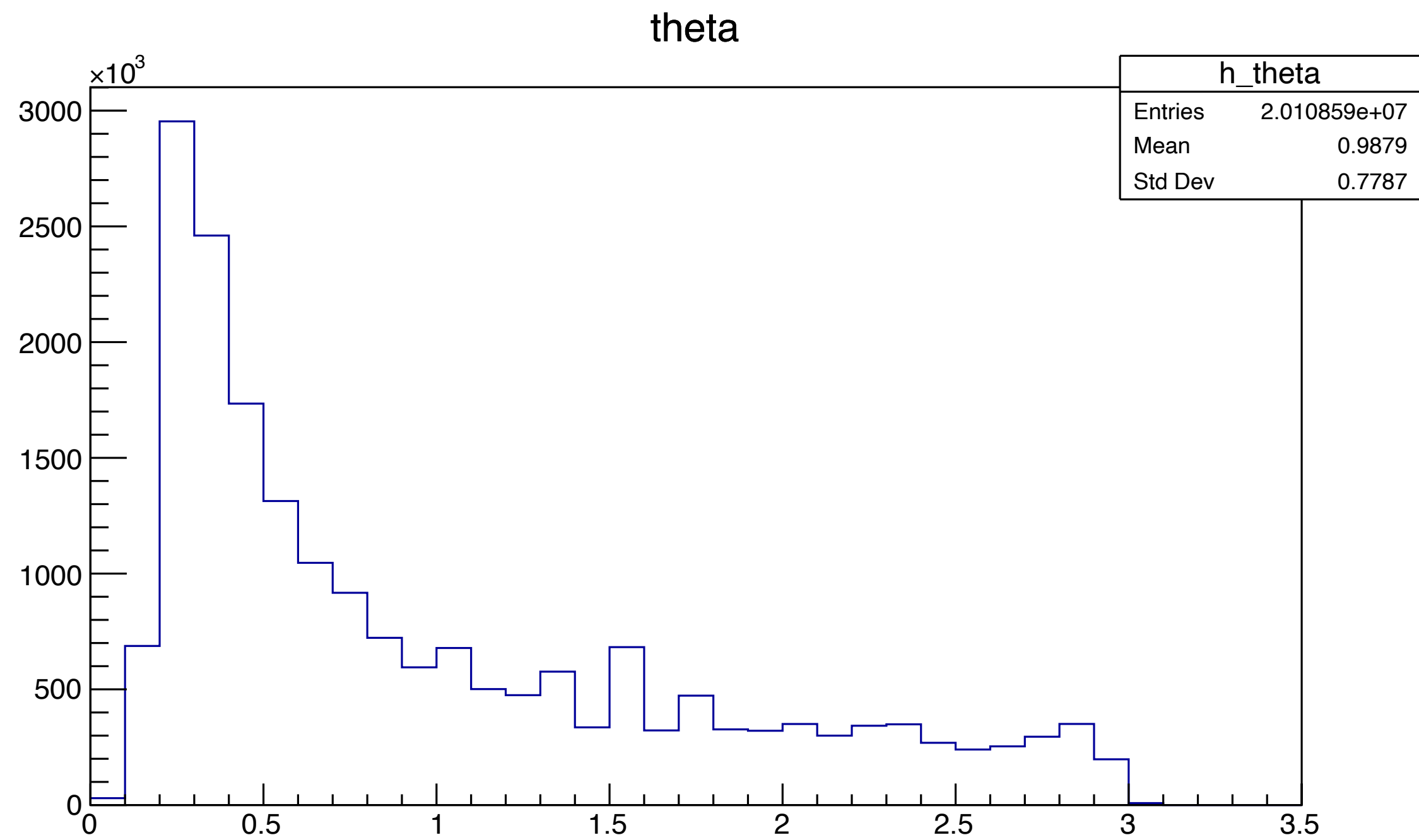


others

# theta

left: use INTT Zvtx

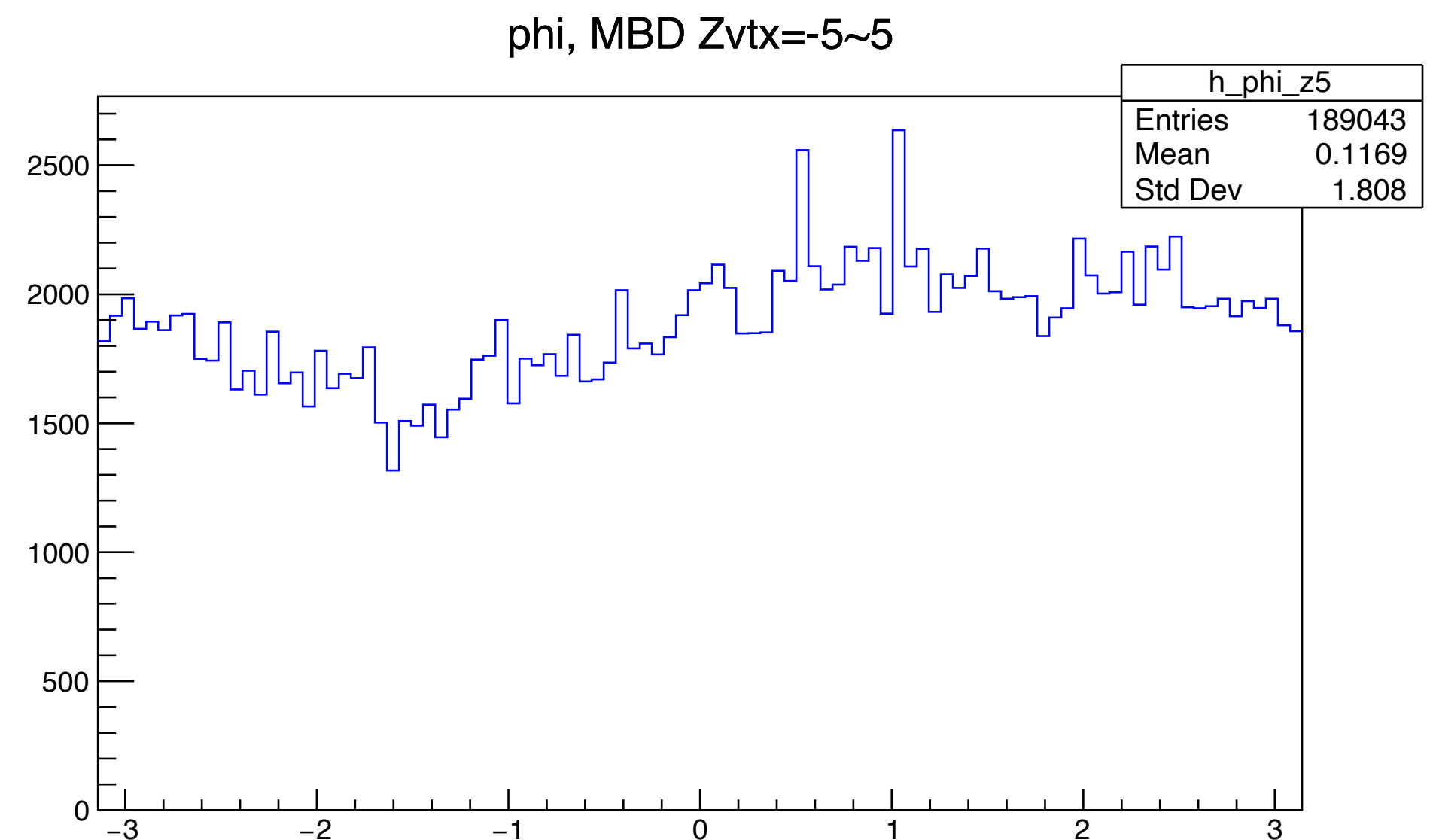
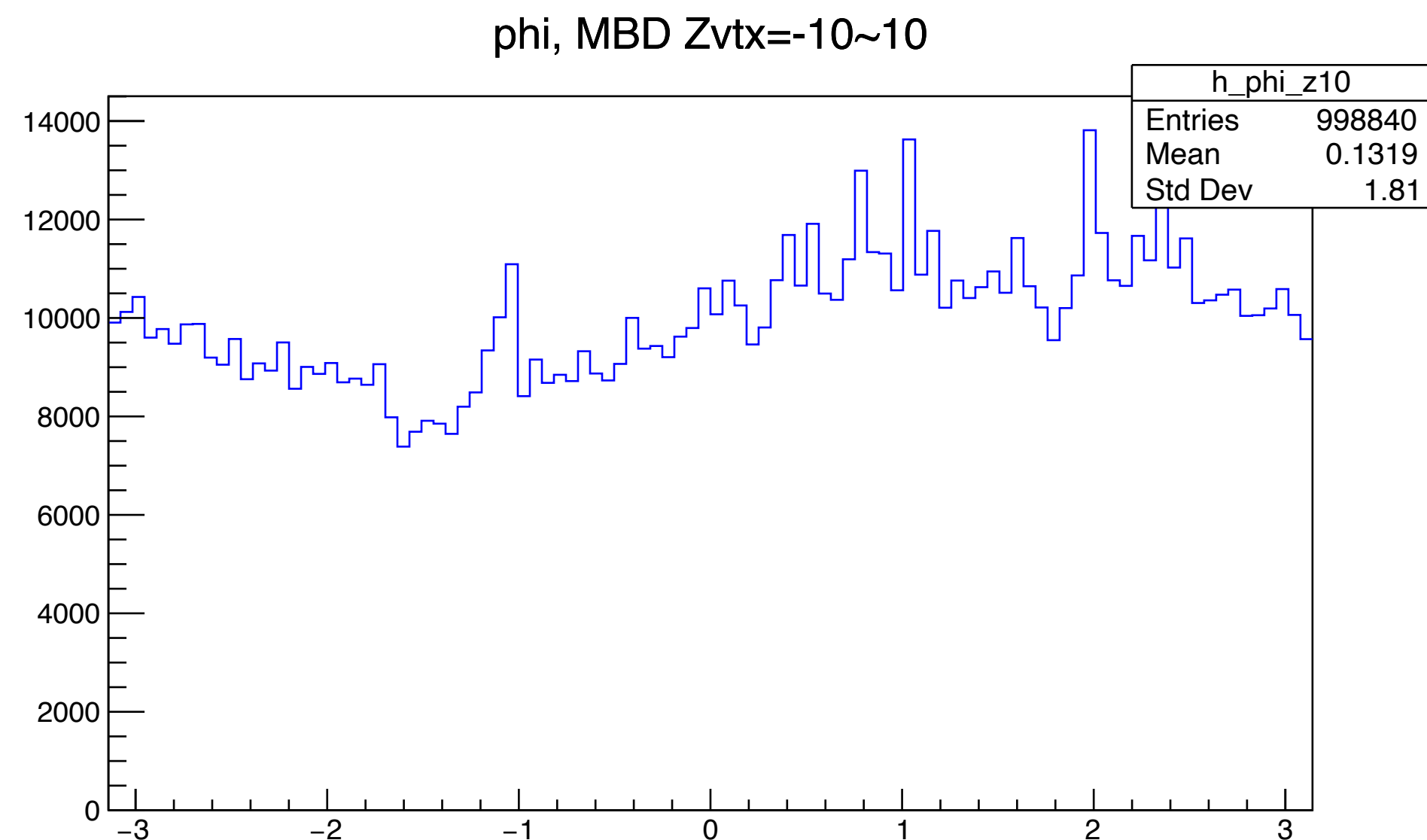
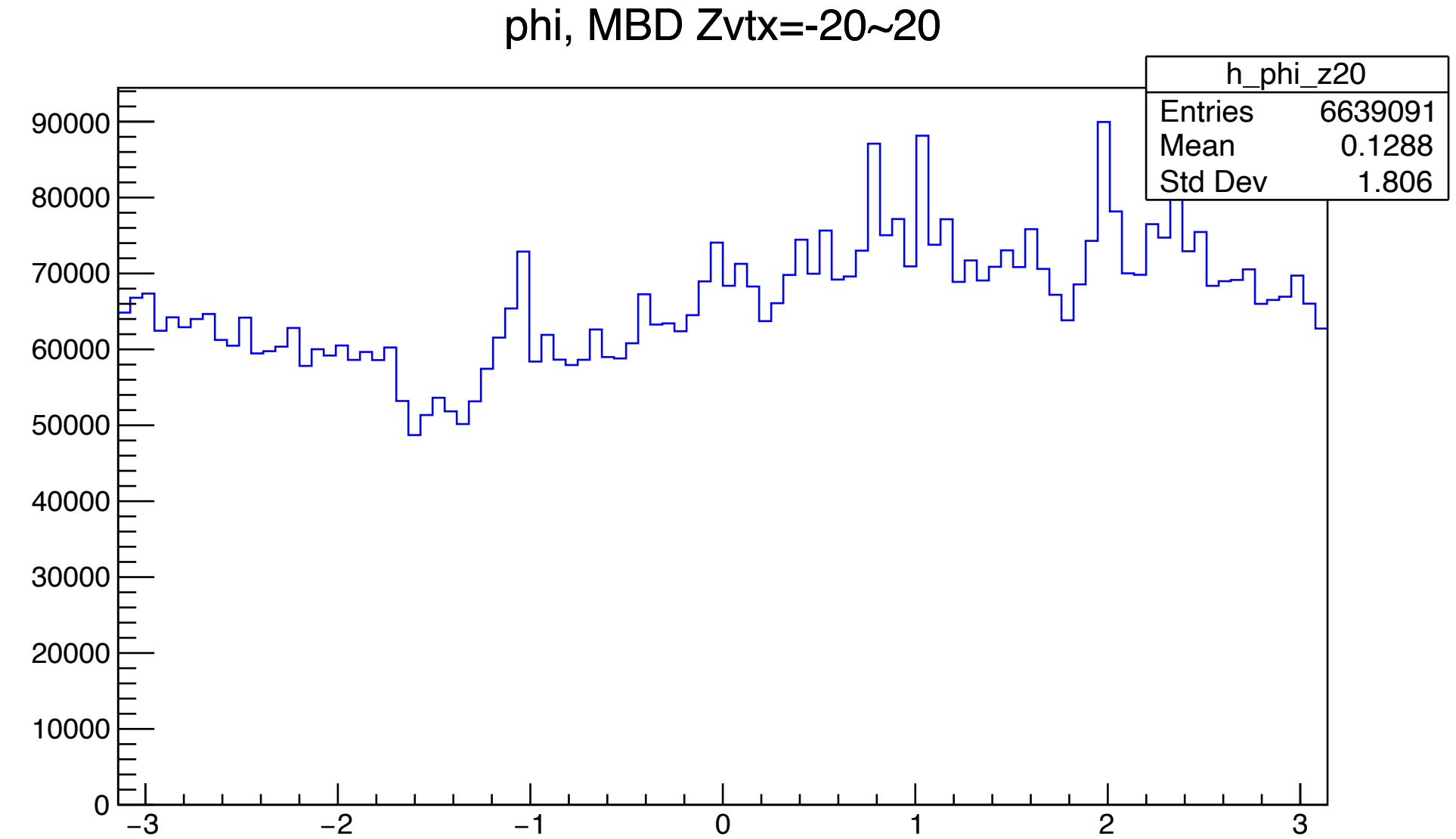
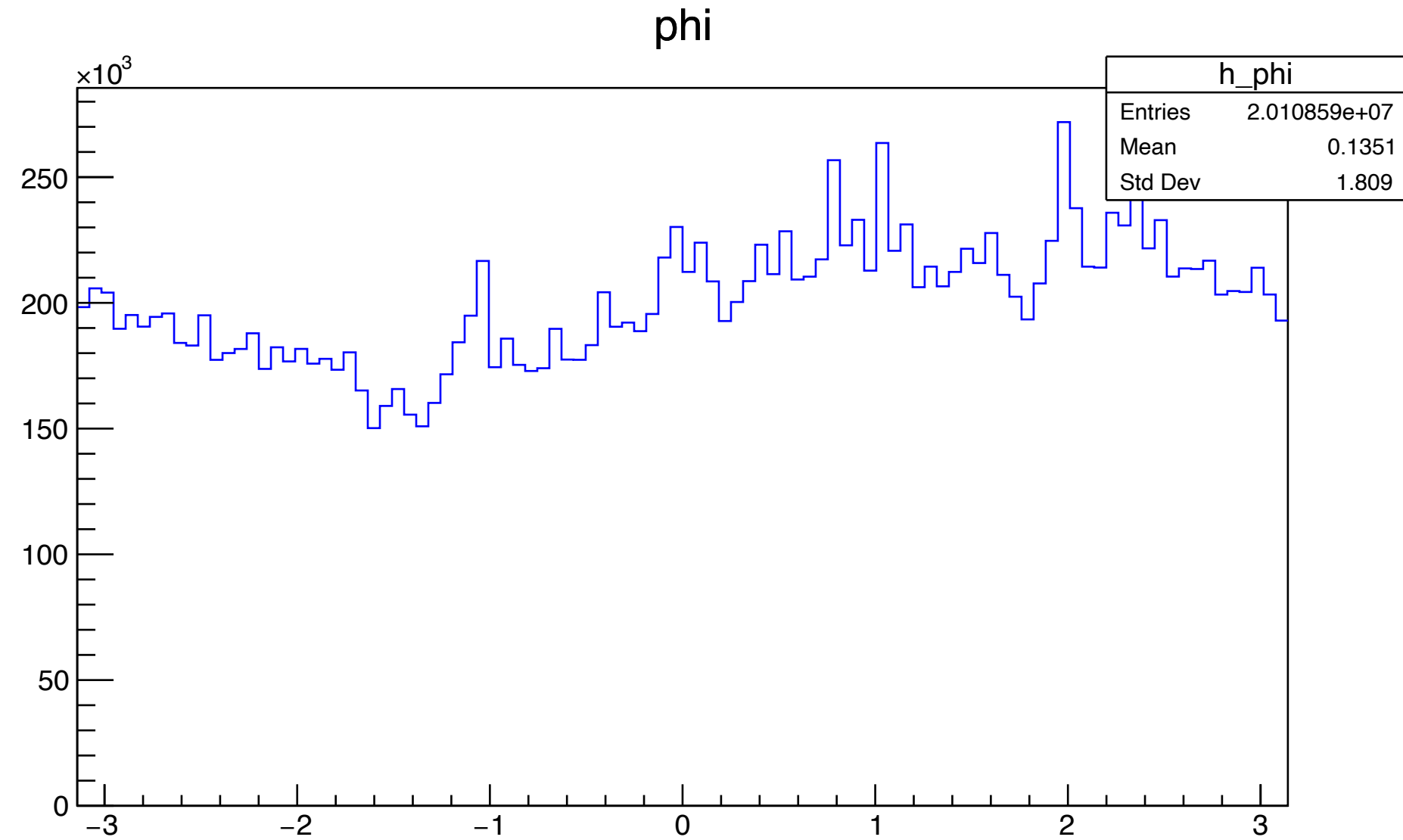
right: use MBD Zvtx



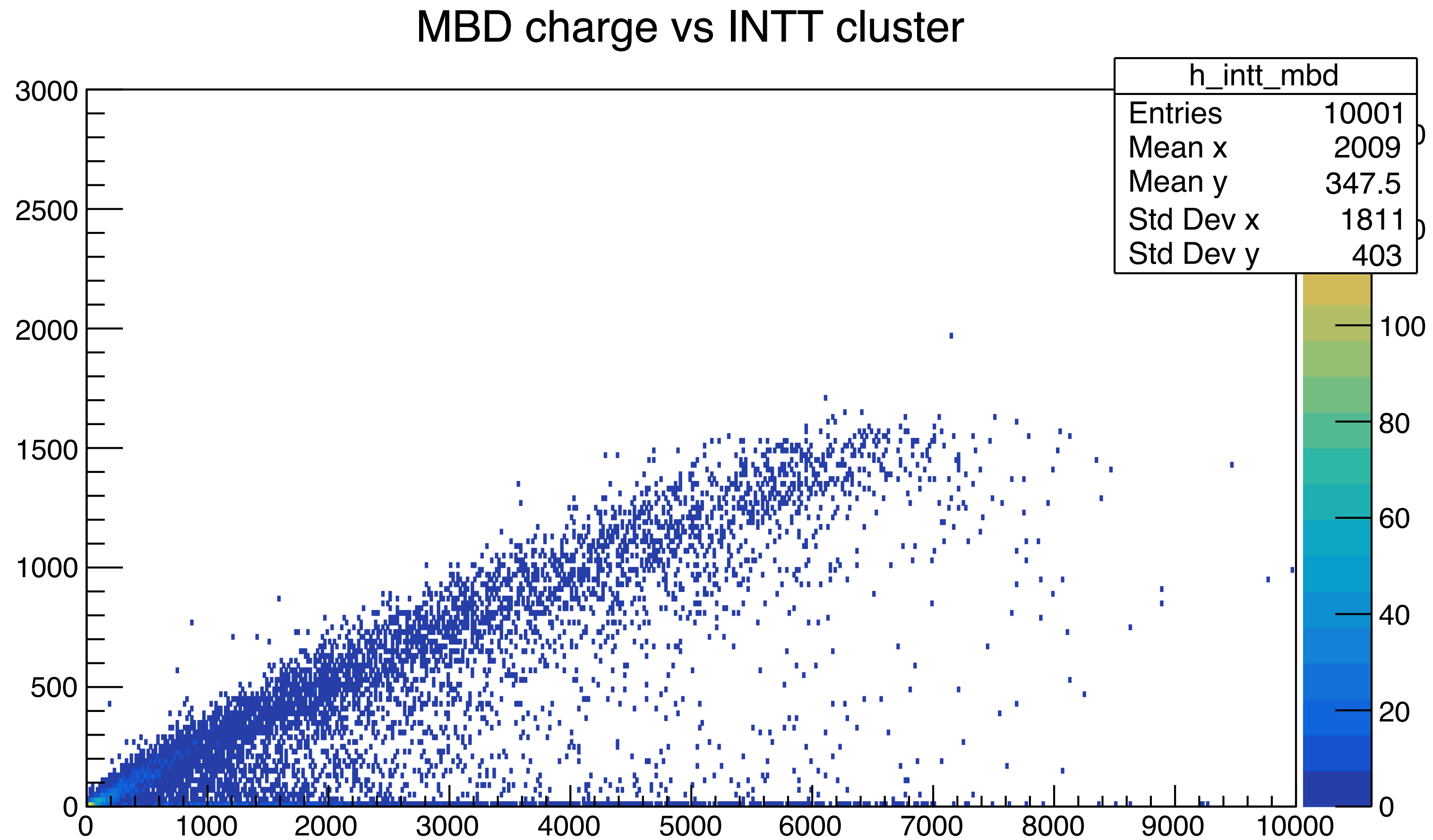
# phi

left top: no cut, right top:  $Z_{vtx}=\pm 20\text{cm}$ ,

left bottom:  $Z_{vtx}=\pm 10\text{cm}$ , right bottom:  $Z_{vtx}=\pm 5\text{cm}$

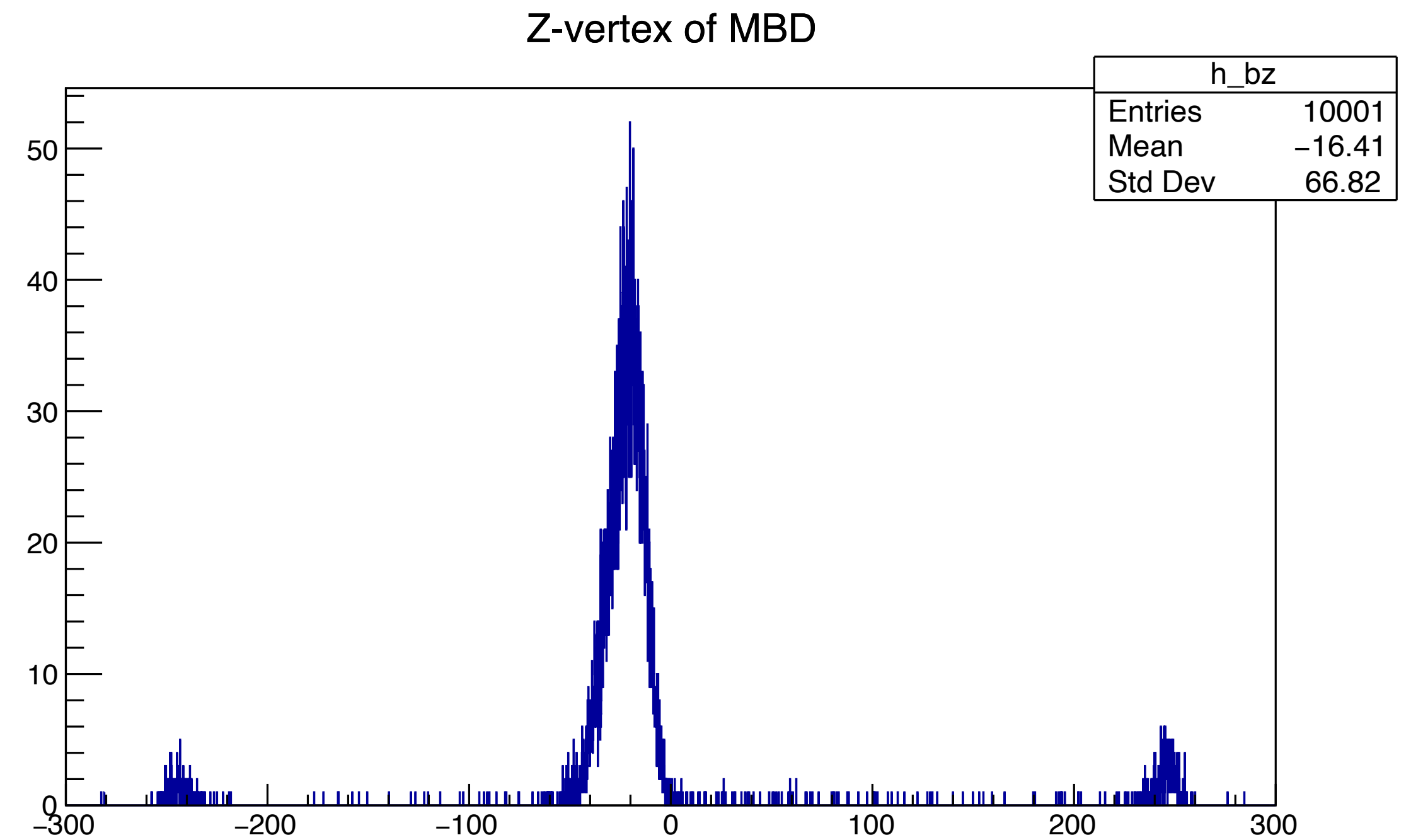
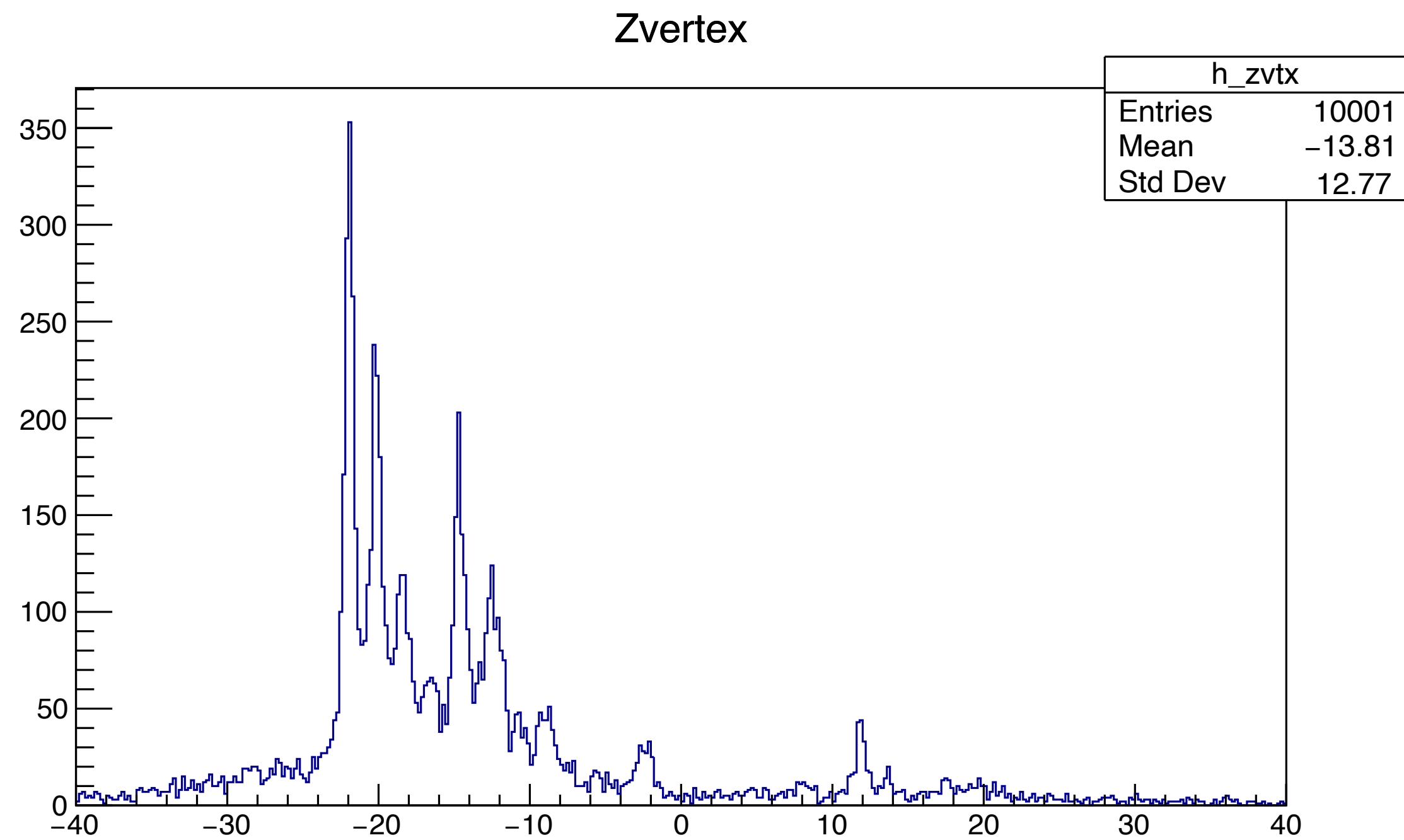


# MBD charge vs INTT cluster

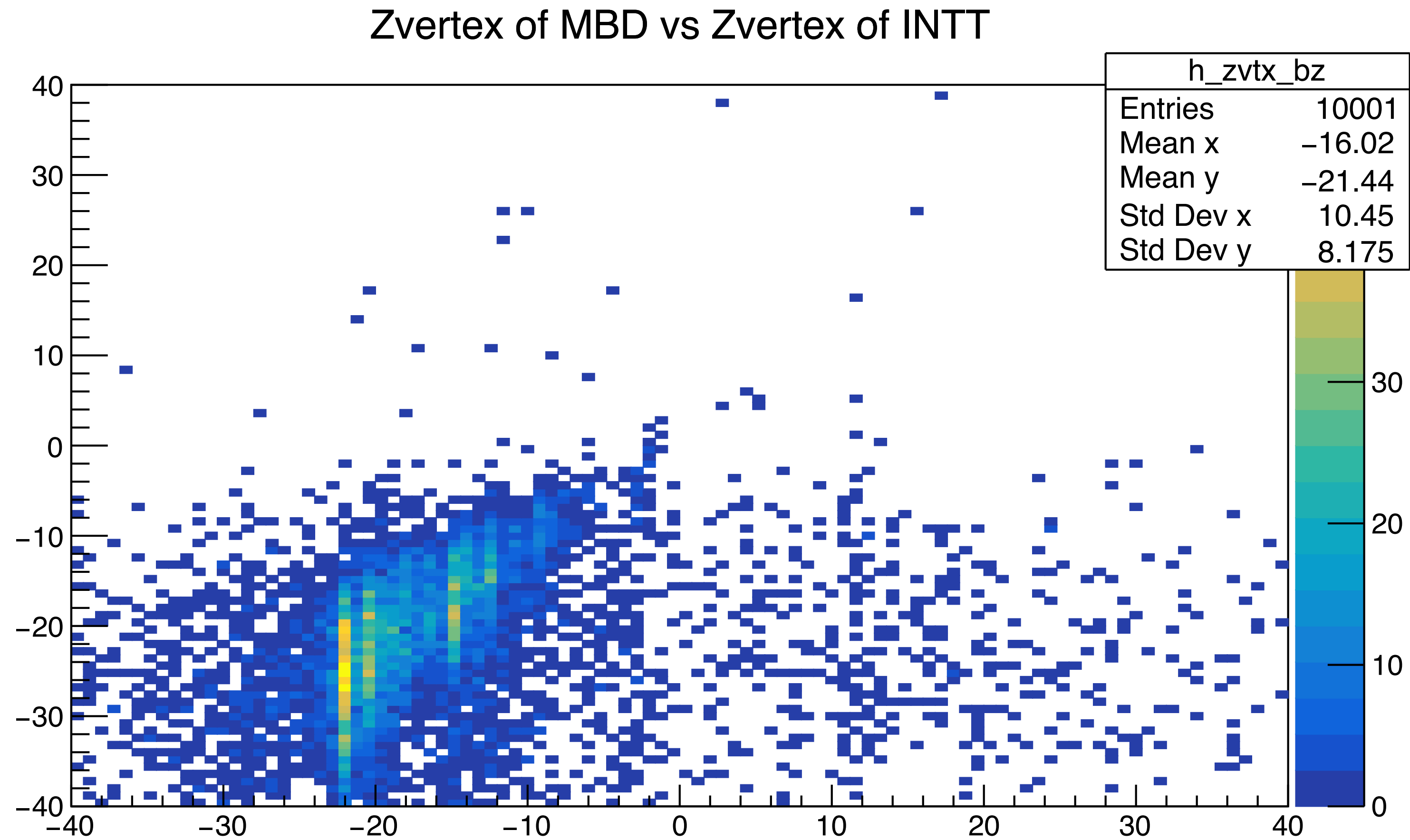


# Zvtx

left: INTT, right: MBD

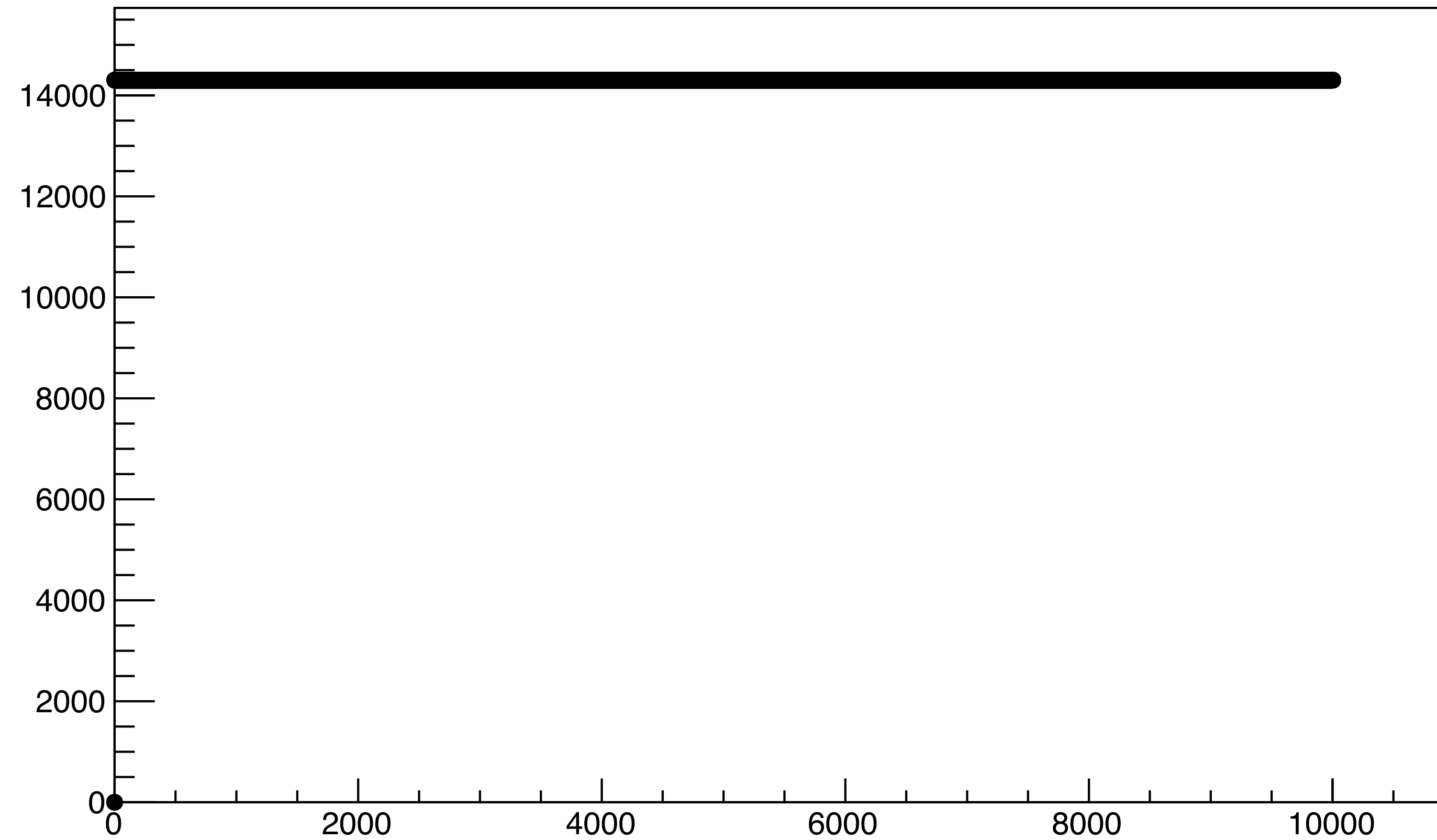


# MBD Zvtx vs INTT Zvtx



# Graph: deltaT vs number of event

$$\text{deltaT} = \text{MBDCLK} - \text{BCO-Full}$$



memo