



LEHIGH  
UNIVERSITY

# Toward $J/\psi$ dependence on multiplicity at 500 GeV

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# Dataset: pp-2017 510GeV

For example:

`st_physics_18053128_raw_1000002.picoDst.root`

## Event selection:

Triggers:	VPDMB-30	(570001)
	BBC	(570006)
	<b>BHT1*VPD30</b>	<b>(570214)</b>
	BHT2*BBCMB	(570215)
	BHT3	(570201)
	BHT3*L2W	(570202)



# Event cuts:

$vz_{\text{TPC}}$	$-50 \rightarrow 50 \text{ cm}$	$-21\%$
$ vz_{\text{VPD}} - vz_{\text{TPC}} $	$< 10.0 \text{ cm}$	$-46\%$

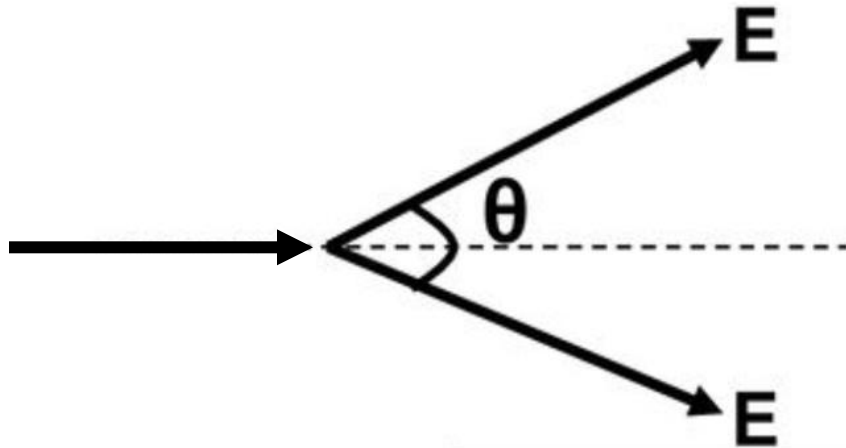
# Tracking cuts:

eta	-1.0	->	1.0
$p_T$	0.2	->	50 GeV/c
DCA	0	->	1 cm
nHitsFit	20+		
nHitsRatio	0.52		
nHitsdEdx	11+		

# PID cuts:

nSigmaElectron	-1.9	->	3.0
E/p	0.67	->	3.33 (p/E 0.3->1.5)
beta	0.97	->	1.03





$$M_{eff} = \sqrt{2EE(1 - \cos \theta)}$$

$$M^2 \simeq 2p_{T1}p_{T2}(\cosh(\eta_1 - \eta_2) - \cos(\phi_1 - \phi_2)).$$

$$M^2 = (E_1 + E_2)^2 - \|\mathbf{p}_1 + \mathbf{p}_2\|^2$$

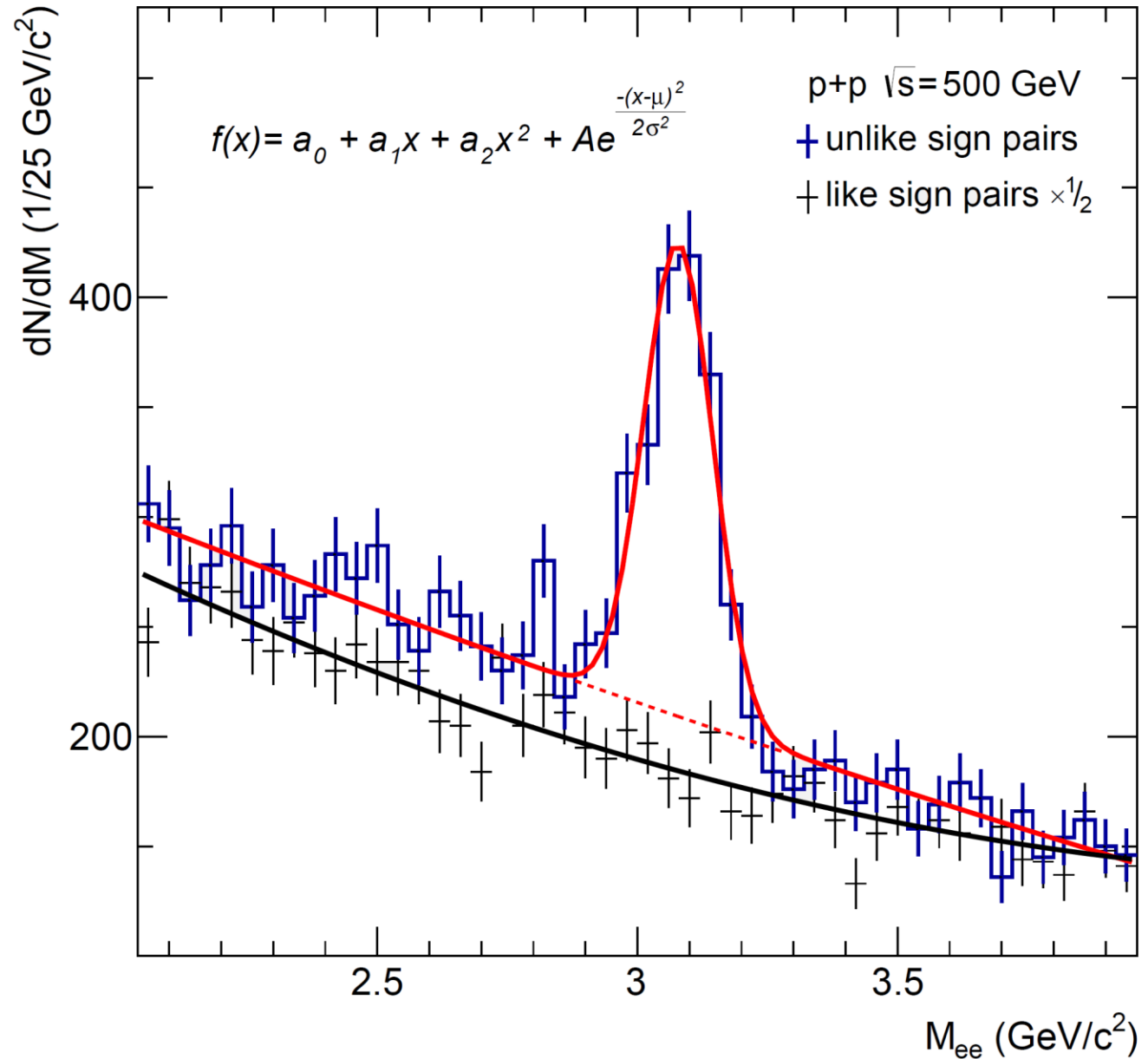
# BHT1:

6% of PicoDST  
files analyzed

15.4M evts

$J/\psi$  1/17k

S/B ( $3\sigma$ ): 1.43



$J/\psi$  production cross section and its dependence on charged-particle multiplicity in  $p+p$  collisions at  $\sqrt{s} = 200$  GeV

STAR Collaboration

Physics Letters B 786 (2018) 87-93

[arxiv.org/pdf/1805.03745.pdf](https://arxiv.org/pdf/1805.03745.pdf)

**$J/\psi$  Production as a Function of Charged Particle Multiplicity in pp Collisions at  $\sqrt{s} = 7$  TeV**

The ALICE Collaboration \*

Physics Letters B 712 (2012) 165-175

[arxiv.org/pdf/1202.2816.pdf](https://arxiv.org/pdf/1202.2816.pdf)

$J/\psi$  dependence on multiplicity at 500 GeV?

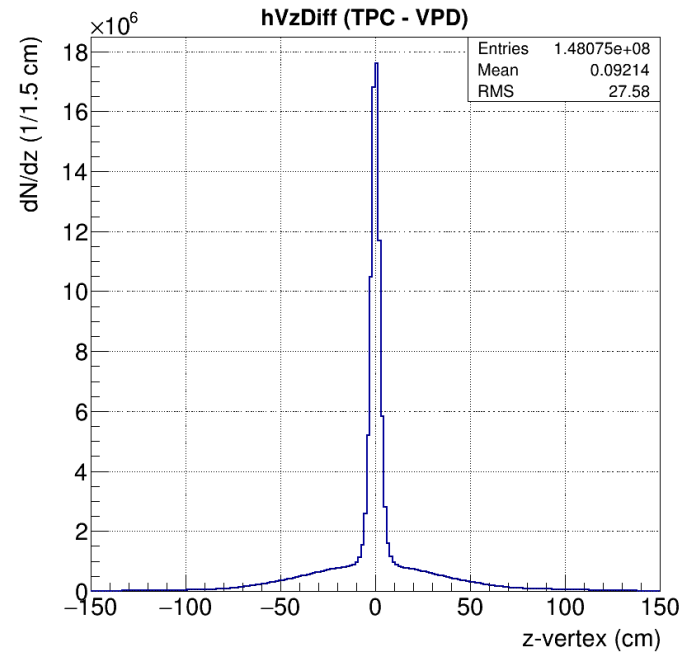
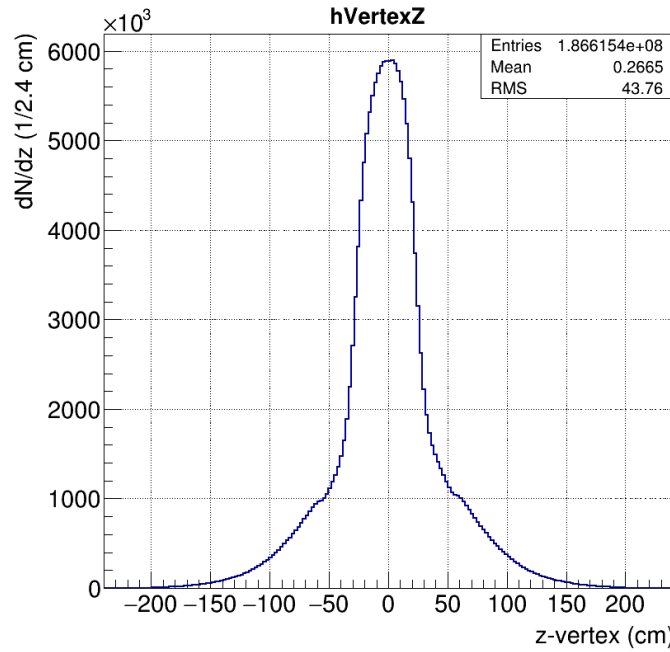
# Backup



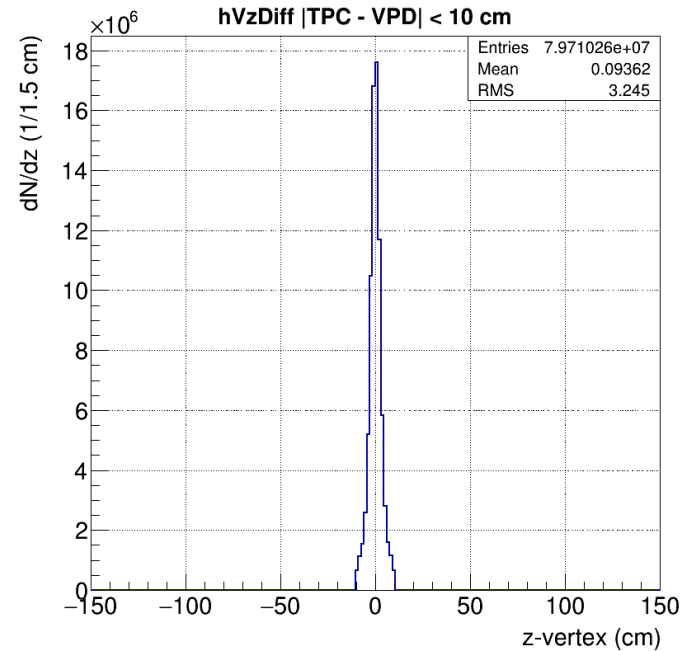
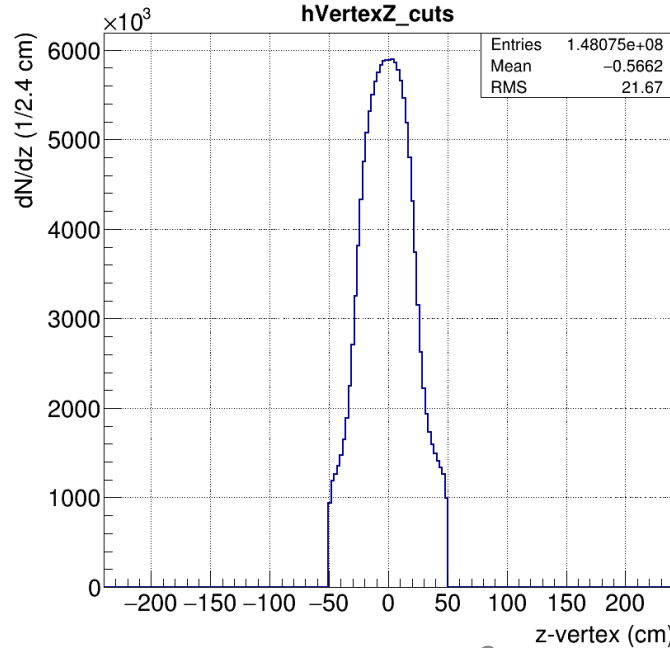
# Backup

vzTPC  
< |50 cm|

Uncut



Cut

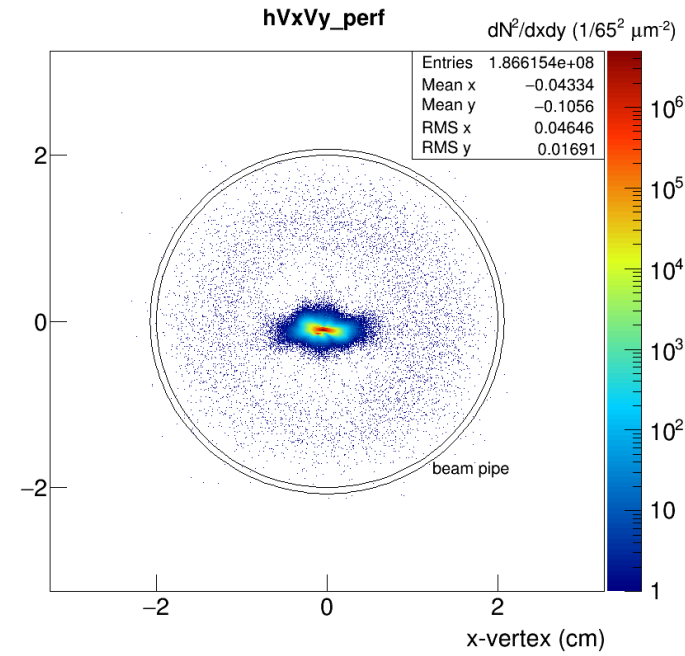
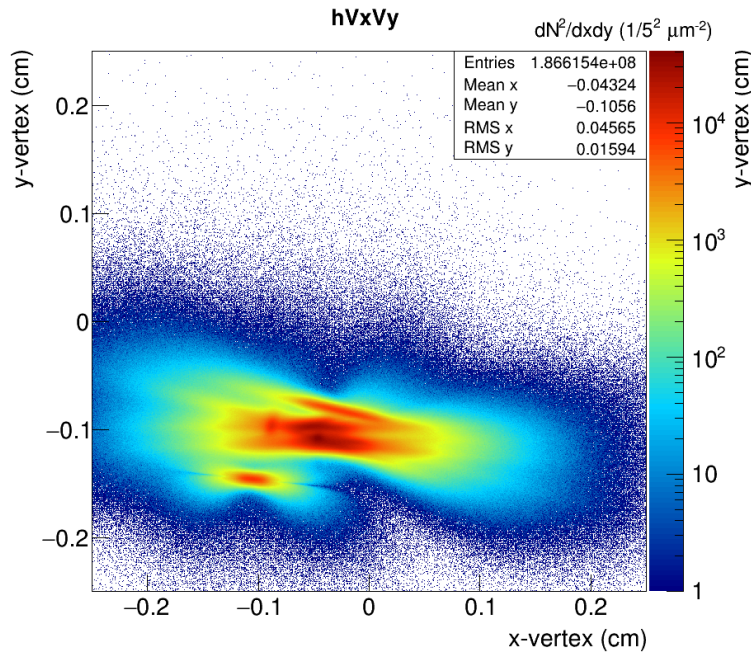


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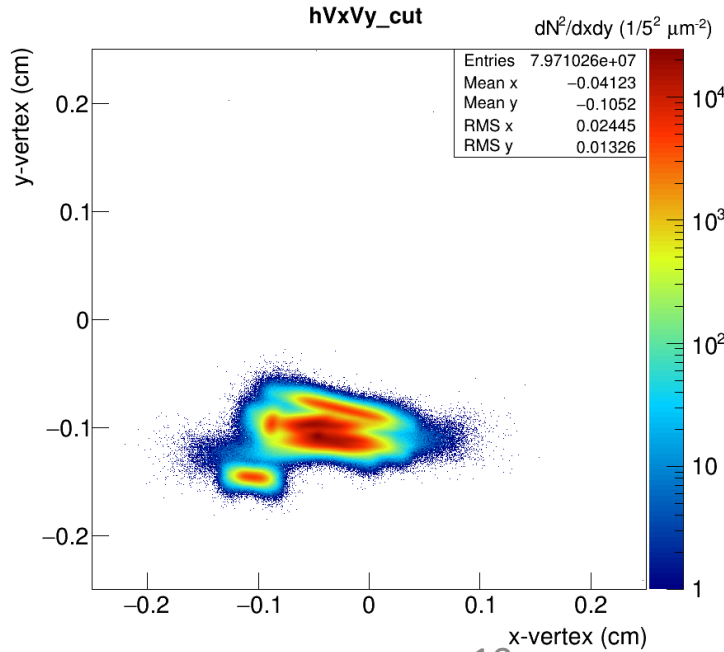
vzTPC

$< |50 \text{ cm}|$

Uncut



Cut

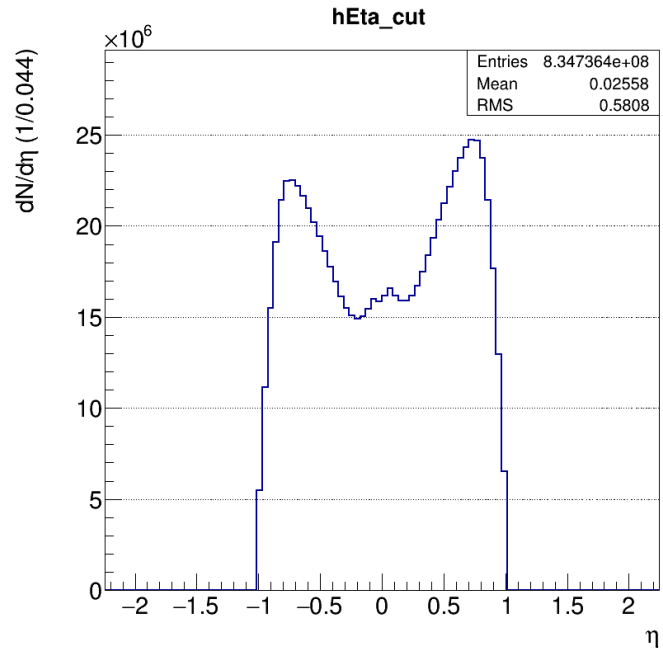
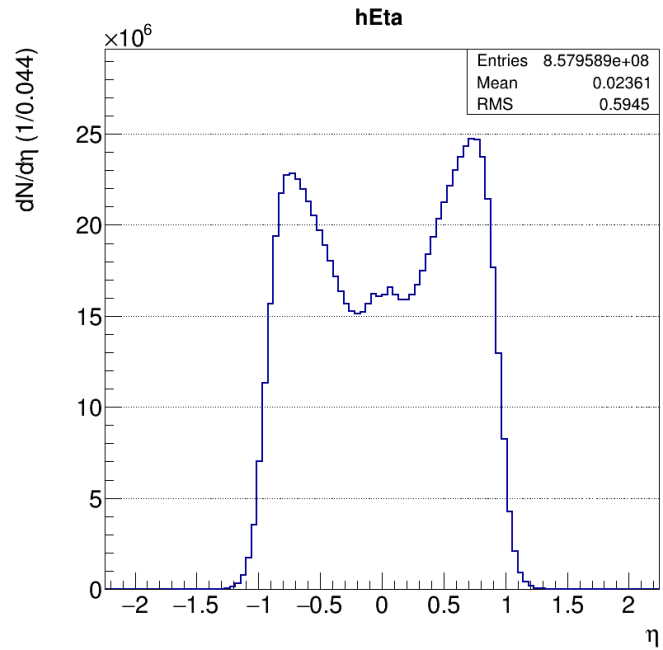


# Backup

$\text{Eta} < |1|$

Uncut

Cut

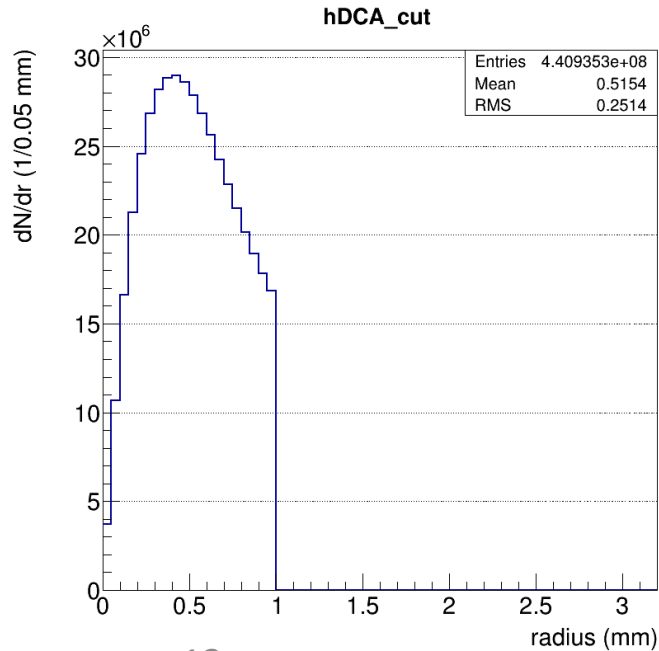
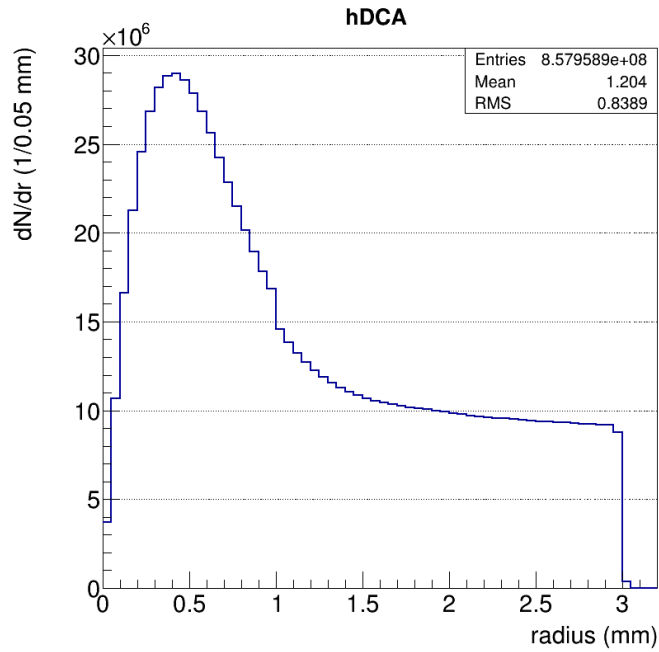


# Backup

DCA < 1.cm

Uncut

Cut



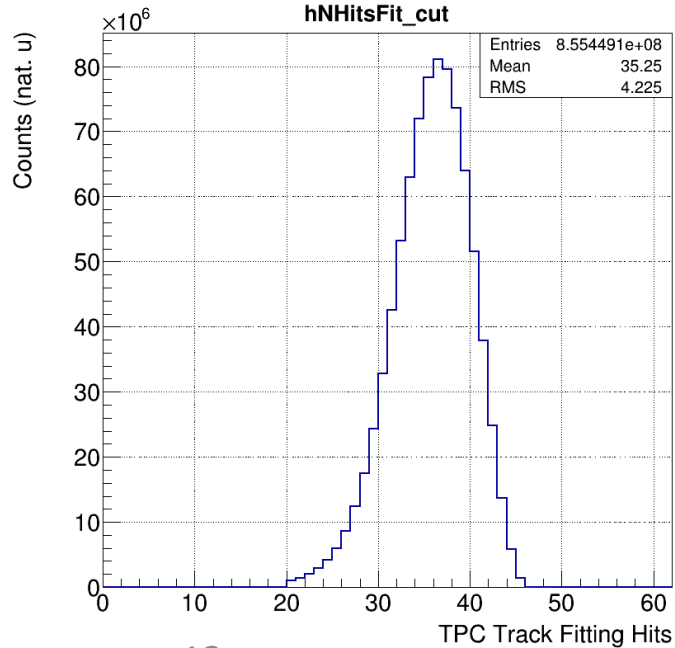
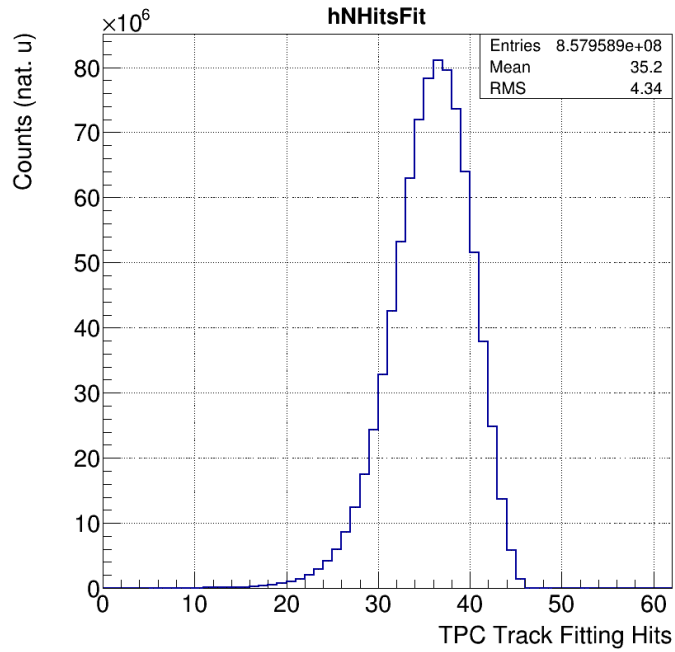
# Backup

nHitsFit (TPC)

20+

Uncut

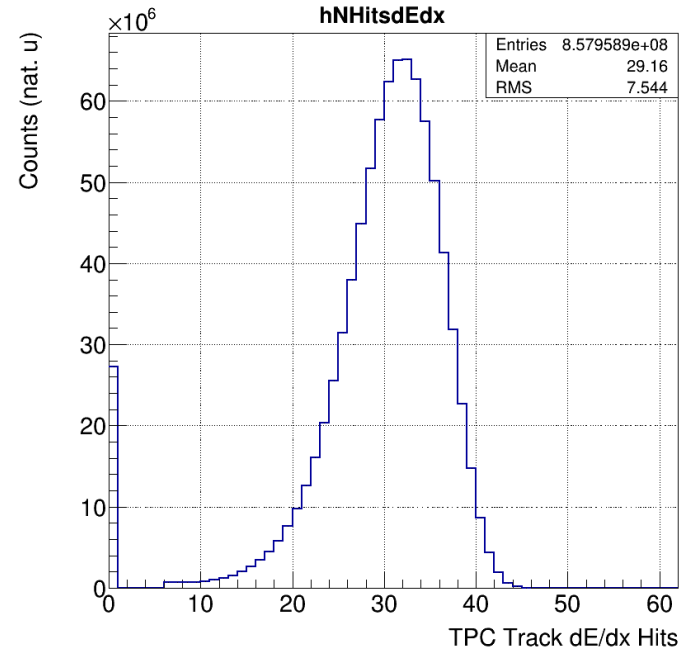
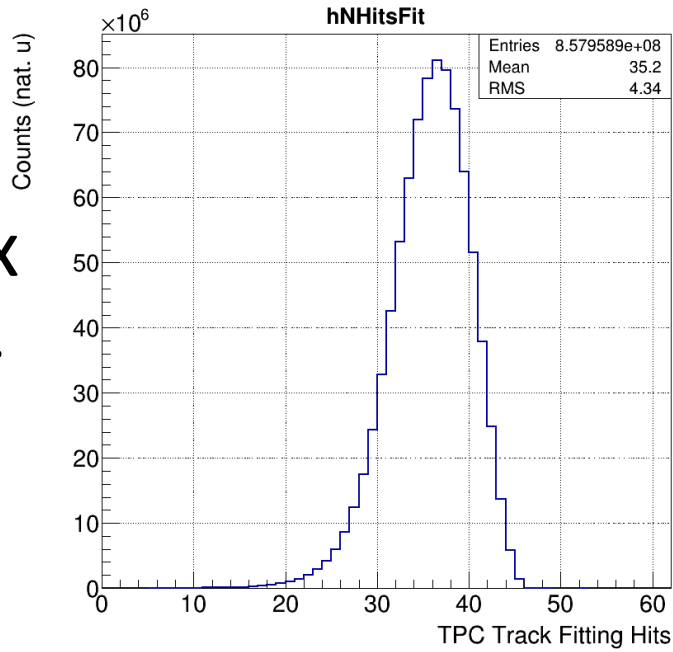
Cut



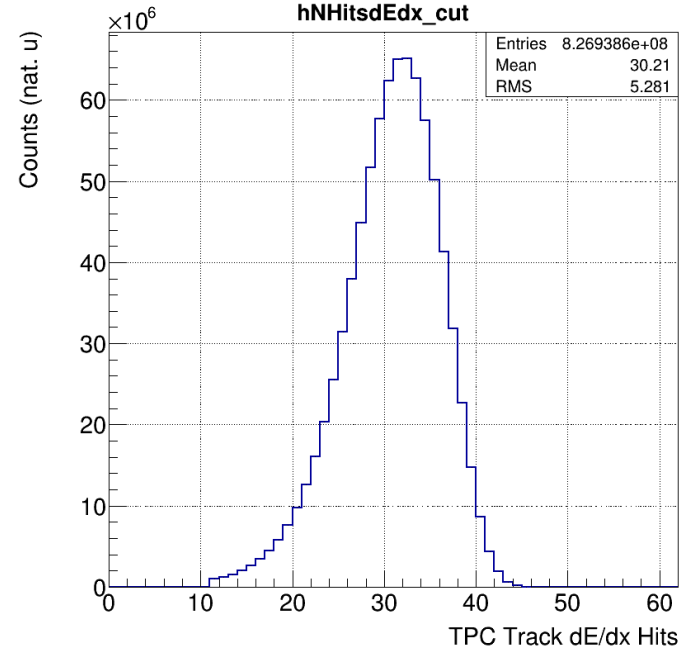
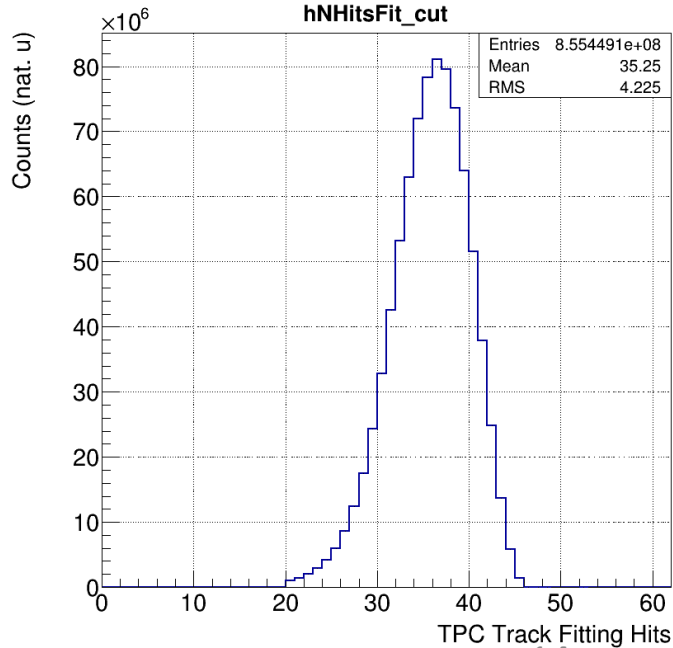
# Backup

## nHitsdEdx (TPC) 11+

### Uncut



### Cut

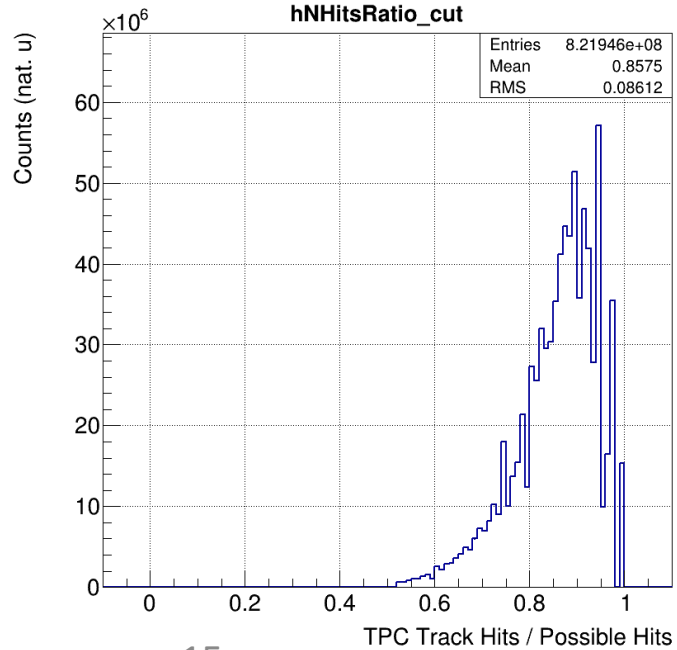
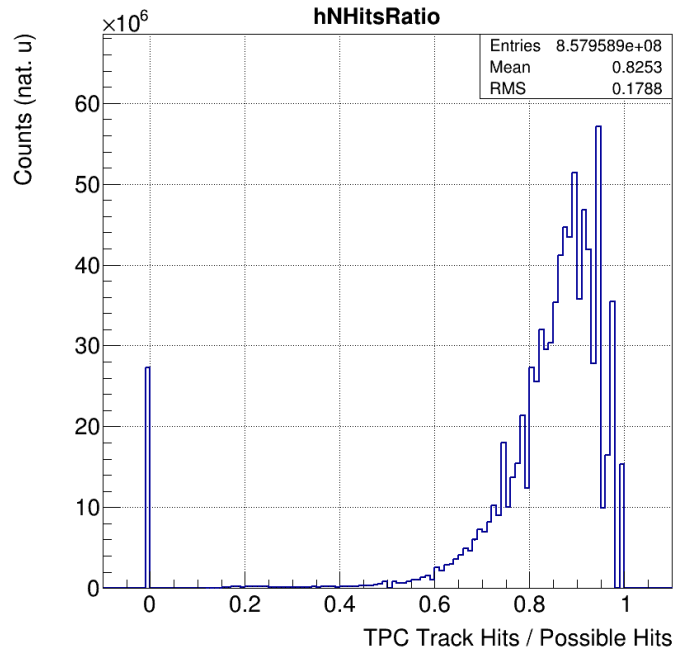


# Backup

nHitsRatio  
(TPC) 0.52+

Uncut

Cut

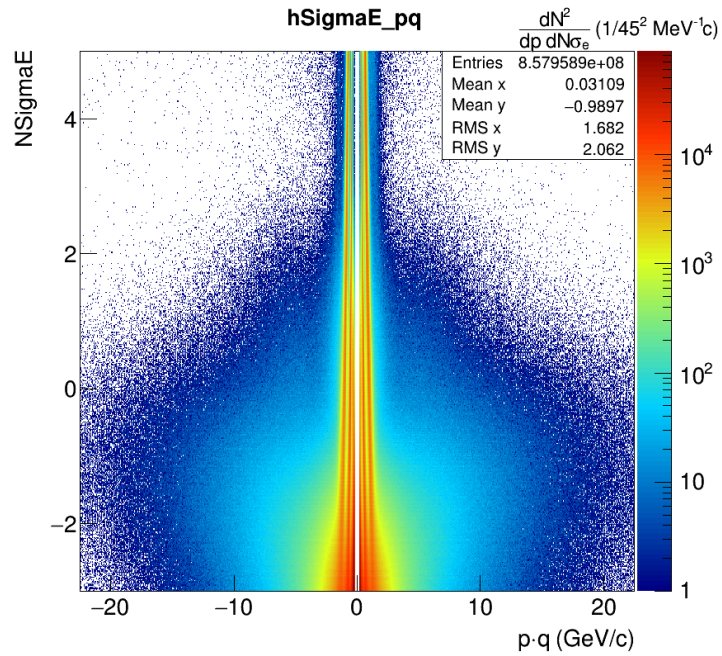


# Backup

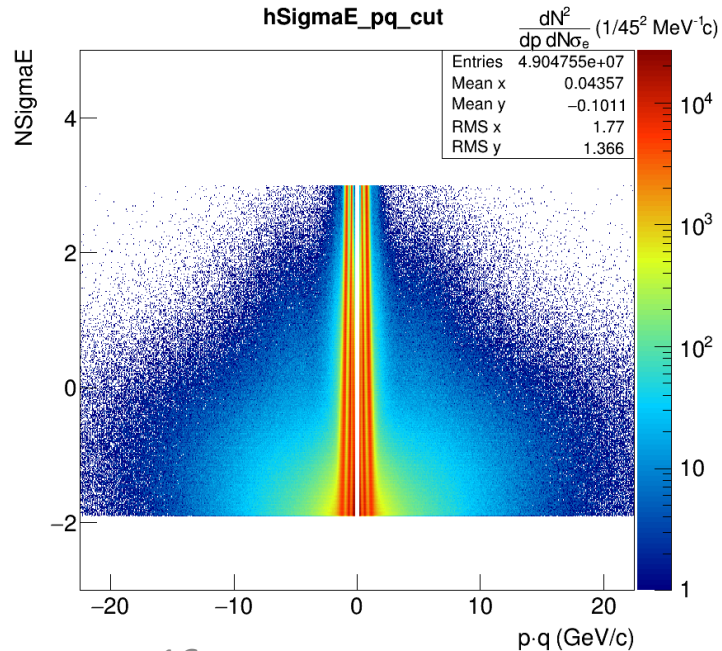
$$dE dx \sigma_E$$

$$-1.9 < n\sigma_E < 3.0$$

Uncut



Cut





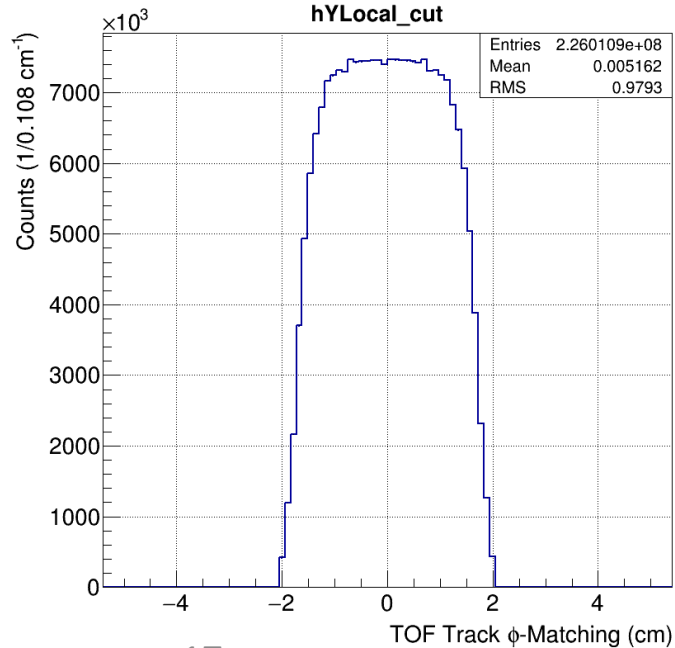
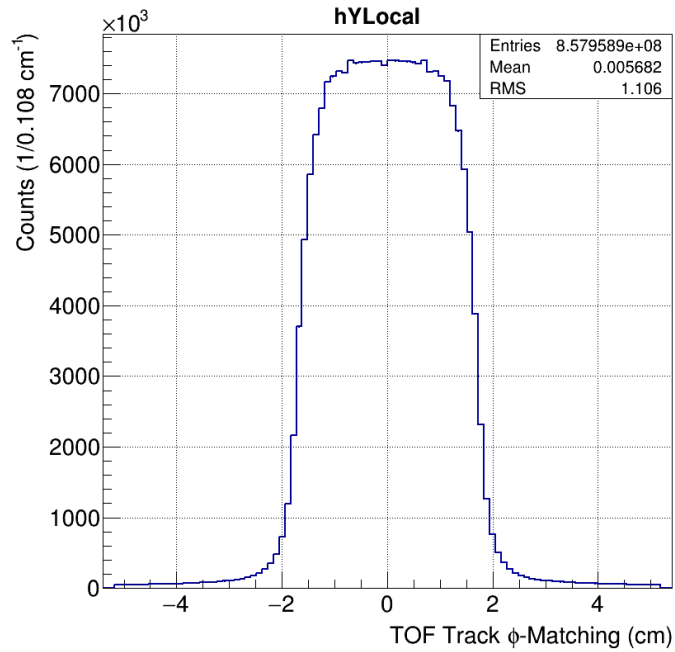
# Backup

TOF

YLocal < 3.0 cm

Uncut

Cut

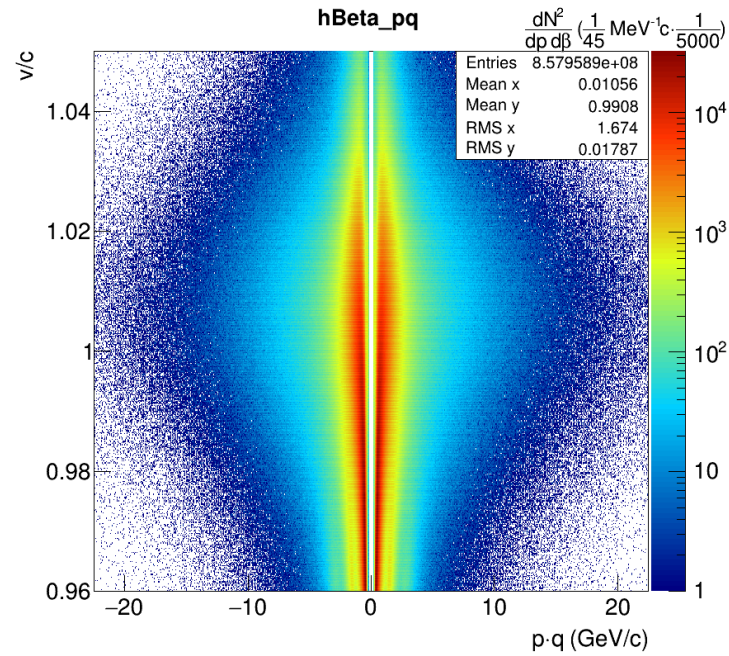


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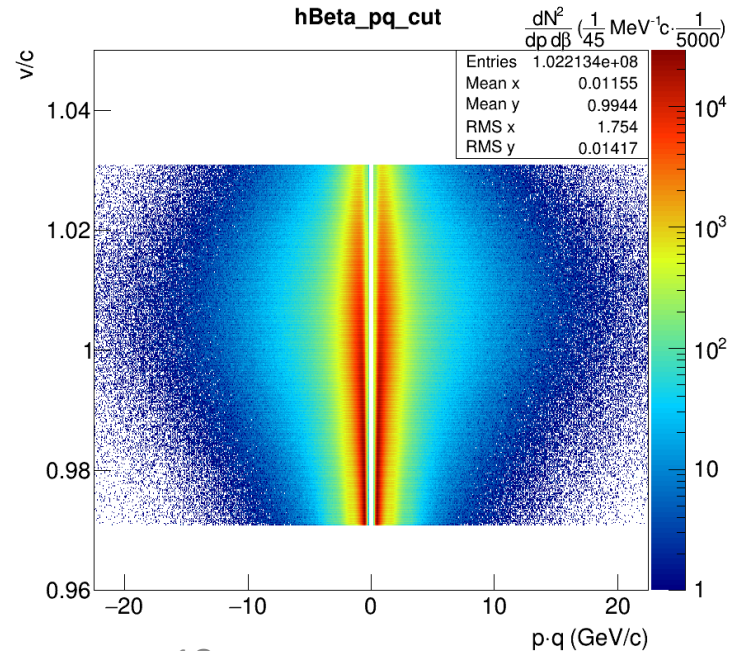
TOF  $\beta$

0.97 -> 1.03

Uncut



Cut

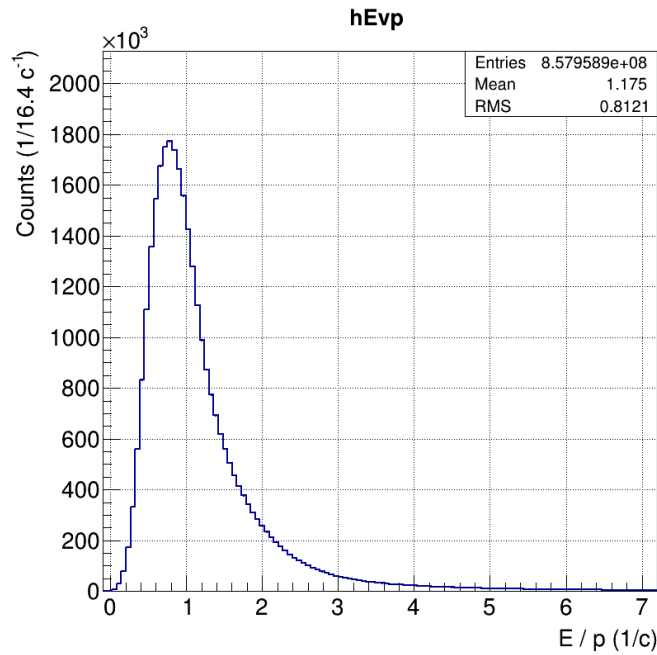


# Backup

B.EMCal

$$0.67 < E/p < 3.3$$

Uncut



Cut

