

# PID detector alignment

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# Processed data and event selection for DS alignment

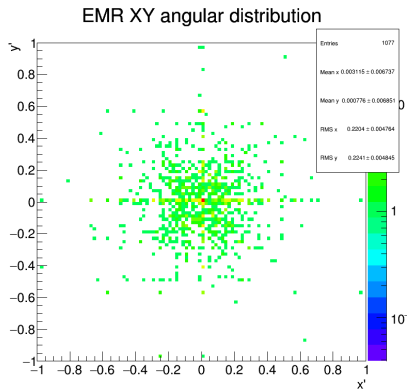
## Run 7417

- 200 MeV/c muon beam, DS on
- 12347 spills, 158320 triggers

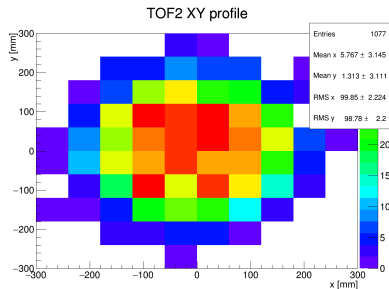
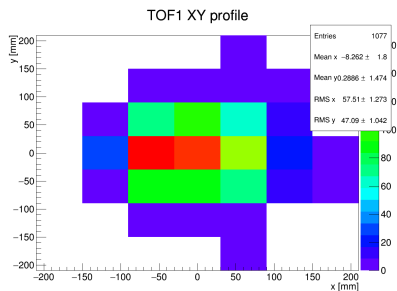
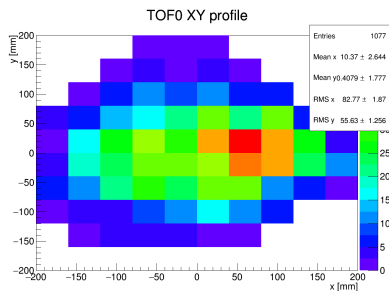
## Event selection

- With a trace in the EMR are kept (HasPrimary)
- Single space point in all the TOF stations
- Track assumed straight beyond TOF2 (backwards), as the emittance growth is too significant in KL

$$\theta_{\max} = \tan^{-1} \sqrt{2d/D} \sim 0.05$$

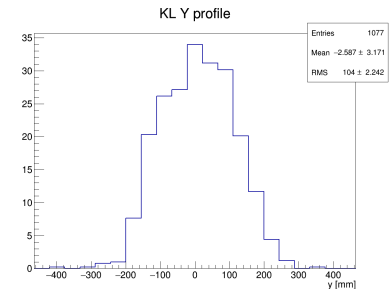


# TOFs beam profiles and surveys (manual)



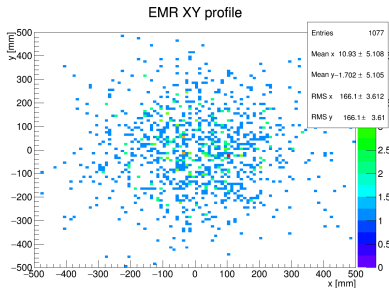
ID	x/y	Mean	RMS
0	x	<b>+10.37</b>	2.64
	y	+0.41	1.78
1	x	<b>-7.094</b>	1.80
	y	+0.29	1.47
2	x	<b>+5.77</b>	3.15
	y	1.31	3.11

# KL and EMR beam profiles



Measured  $y$  in the KL with respect to the CDB geometry (ID 70):

$$\rightarrow \delta_y = \overline{y - y_{\text{CDB}}} = -2.587 \pm 3.171 \text{ mm}$$

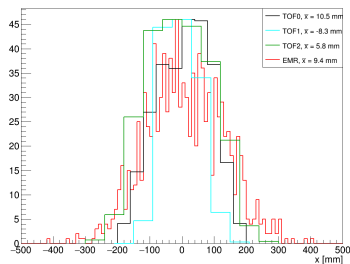


EMR alignment data:

x/y	Measured
$\delta_x$	$10.93 \pm 5.11$
$\delta_y$	$-1.70 \pm 5.105$

# Combined alignment with the beam axis

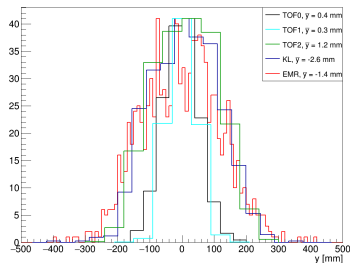
X profile



## Combined X profile

Det.	Res.
TOF0	+10.5
TOF1	-8.3
TOF2	+5.8
EMR	+9.4

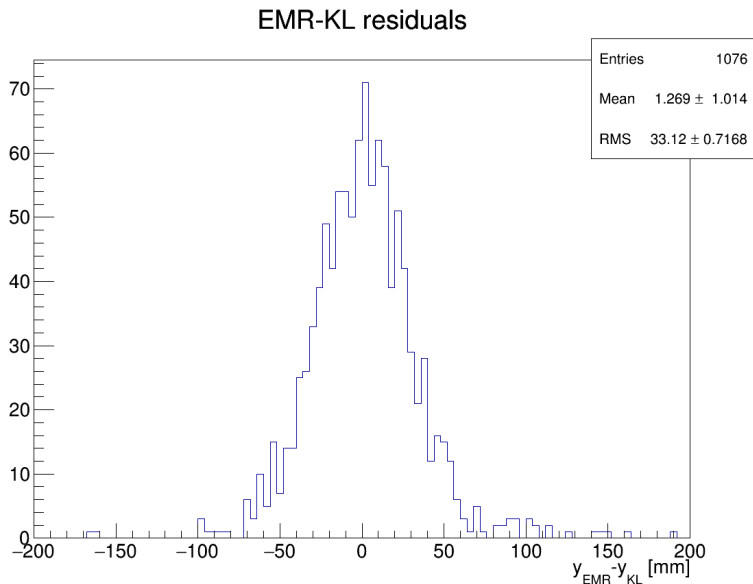
Y profile



## Combined Y profile

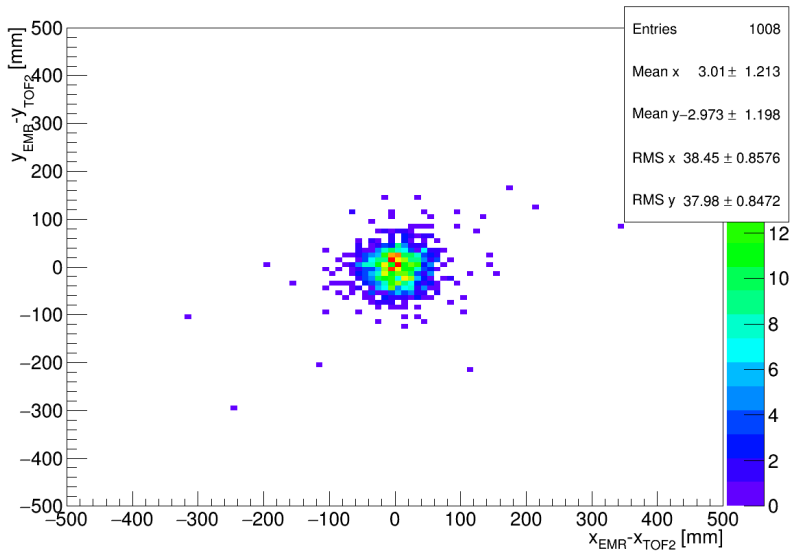
Det.	Res.
TOF0	+0.4
TOF1	+0.3
TOF2	+1.2
KL	-2.6
EMR	-1.4

# EMR-KL residuals (185mm)



# EMR-TOF2 residuals (195mm)

EMR-TOF2 residuals



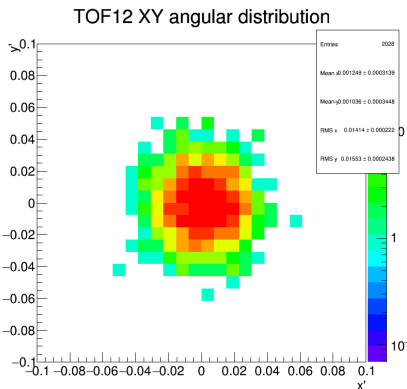
# Processed data and event selection for US alignment

## Run 7489

- 300 MeV/c pion reference beam, DS on
- 620 spills, 122128 triggers
- **Q789 OFF**

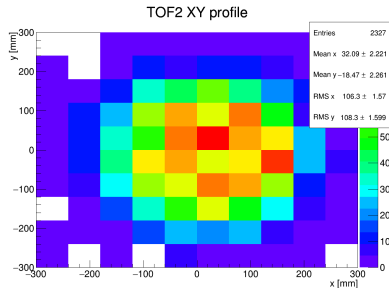
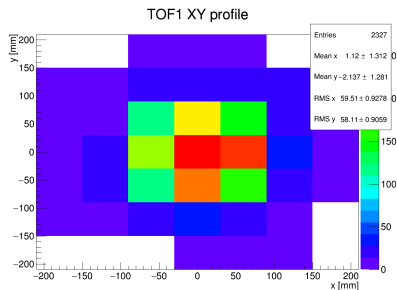
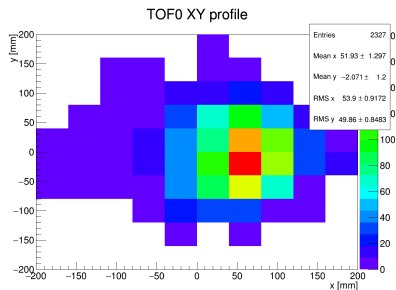
## Event selection

- Single space point in all the TOF stations
- Angle reconstructed between TOF1 and TOF2, track projected into TOF0



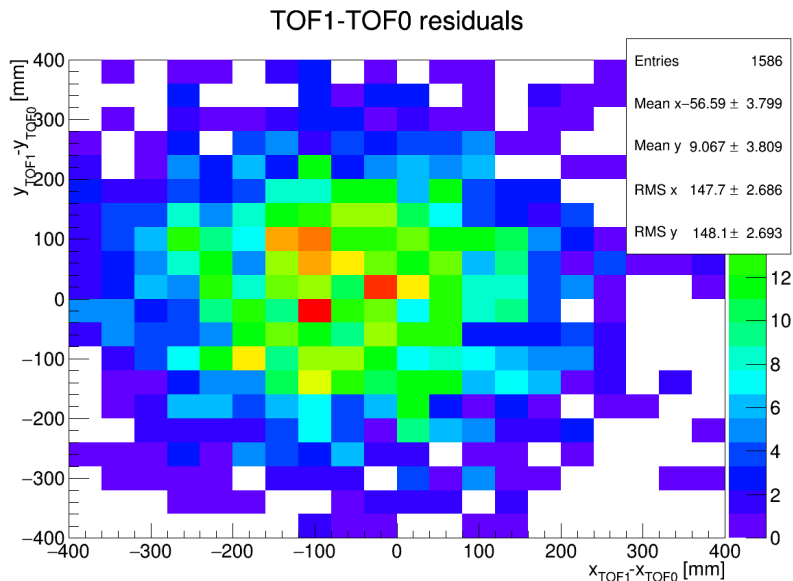


# TOFs beam profiles and surveys (manual)



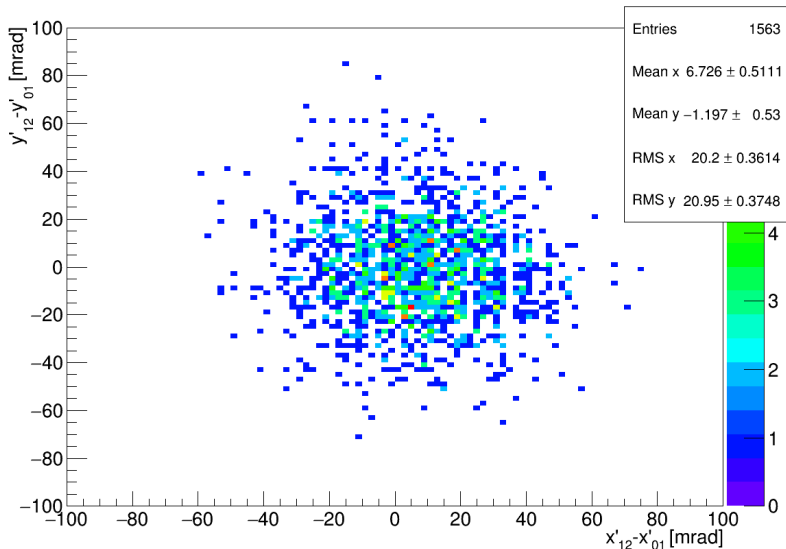
ID	x/y	Mean	RMS
0	x	+51.93	1.30
	y	-2.071	1.20
1	x	1.12	1.31
	y	-2.13	1.29
2	x	+32.09	2.22
	y	-18.47	2.26

# TOF1-TOF0 residuals (TOF12 angle)



$x'_{TOF12} - x'_{TOF01}$  residuals

a12-a01 residuals



# TOF2-TOF1 residuals (straight)

