Pion Beam line settings and commissioning

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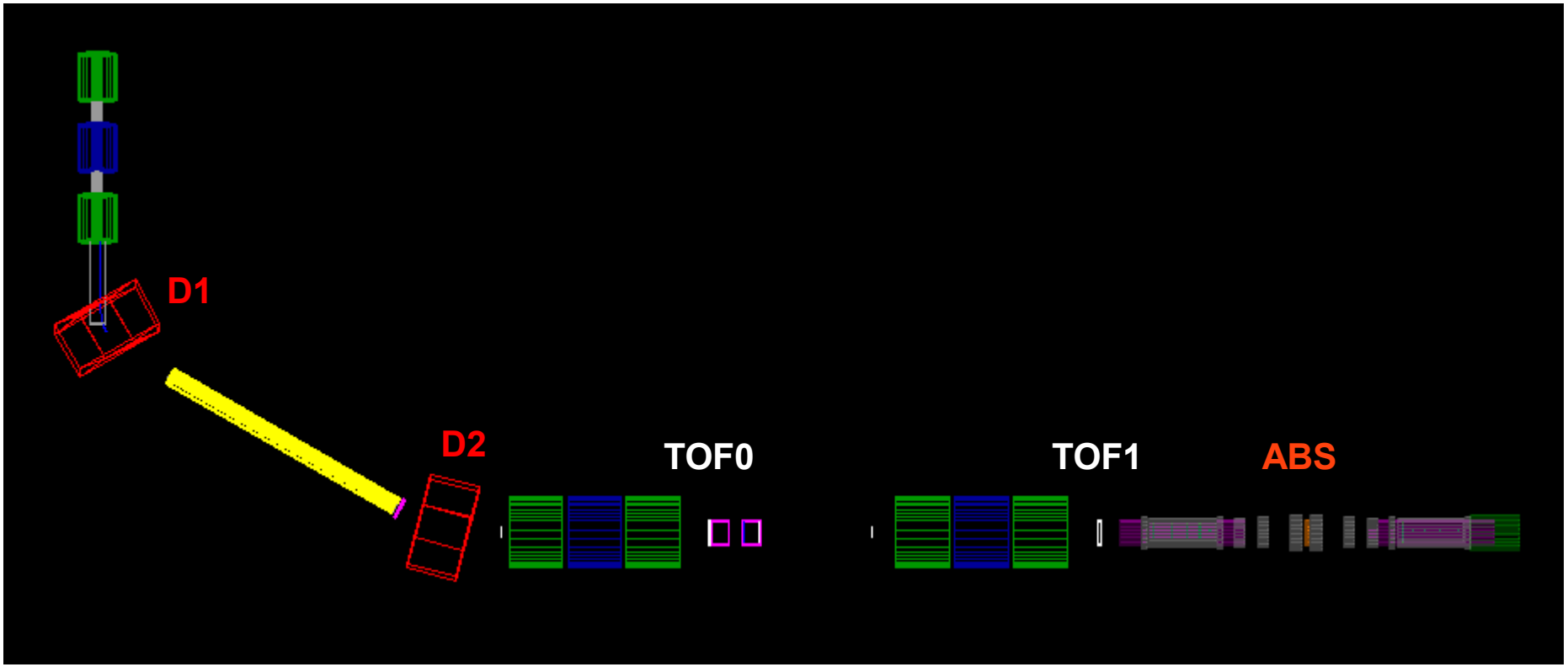
CM 45
28th July 2016

Beamline simulation

- G4BL simulation of all the beam line + cooling channel



Scan of D1

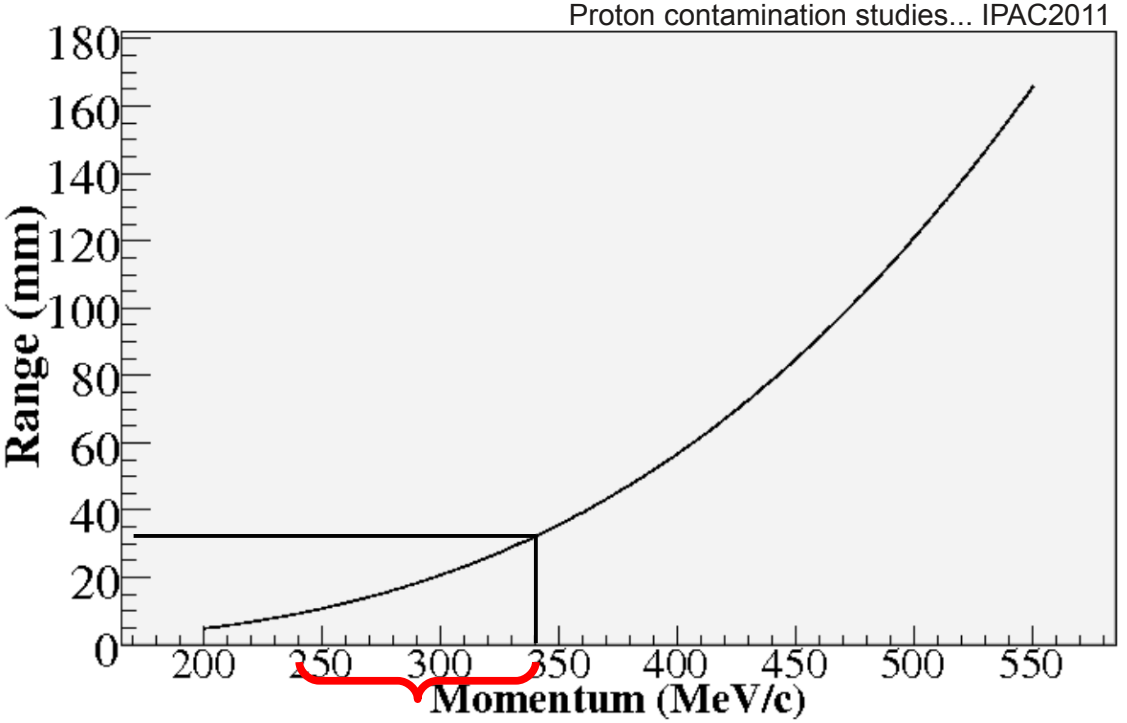
- Simulated a pionic beam: P(D1) ~ P(D2) using the Magic Spreadsheet
- Match the nominal momentum value in TKU Station 5:
  - 140/170/200/240 MeV/c
- No diffuser

Proton absorber

Beam	Peak after D1 (MeV/c)	Range (mm)	PA (mm)
140	247	10	15
170	274	15	29
200	304	20	29
240	340	30	29

- Selected **PA=29mm** for the simulation
- Rate to be studied with data

Proton contamination studies... IPAC2011



Final settings

140 MeV/c

Particle Species	Pz @ TKU Station 5	Proton Absorber	Diffuser setting	Q1	Q2	Q3	D1	DS	D2	Q4	Q5	Q6	Q7	Q8	Q9	RunControl Tag
	MeV/c	mm		A	A	A	A	A	A	A	A	A	A	A	A	
muons/pions	140	29	no diffuser	47.98	59.88	41.62	142.66	311.97	70.0	131.25	176.01	116.62	110.74	167.46	142.87	3-140+M3-Test2

170 MeV/c

Particle Species	Pz @ TKU Station 5	Proton Absorber	Diffuser setting	Q1	Q2	Q3	D1	DS	D2	Q4	Q5	Q6	Q7	Q8	Q9	RunControl Tag
	MeV/c	mm		A	A	A	A	A	A	A	A	A	A	A	A	
muons/pions	170	29	no diffuser	54.12	67.56	46.97	160.8	353.33	86.55	144.68	194.03	128.6	124.87	188.89	161.24	3-170+M3-Test1

200 MeV/c

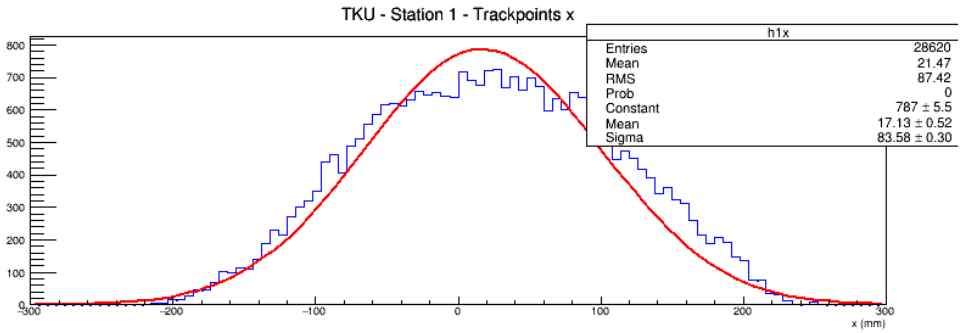
Particle Species	Pz @ TKU Station 5	Proton Absorber	Diffuser setting	Q1	Q2	Q3	D1	DS	D2	Q4	Q5	Q6	Q7	Q8	Q9	RunControl Tag
	MeV/c	mm		A	A	A	A	A	A	A	A	A	A	A	A	
muons/pions	200	29	no diffuser	60.74	75.84	52.74	180.7	395.77	94.91	159.44	213.82	141.76	69.99	105.93	90.44	3-200+M3-Test1

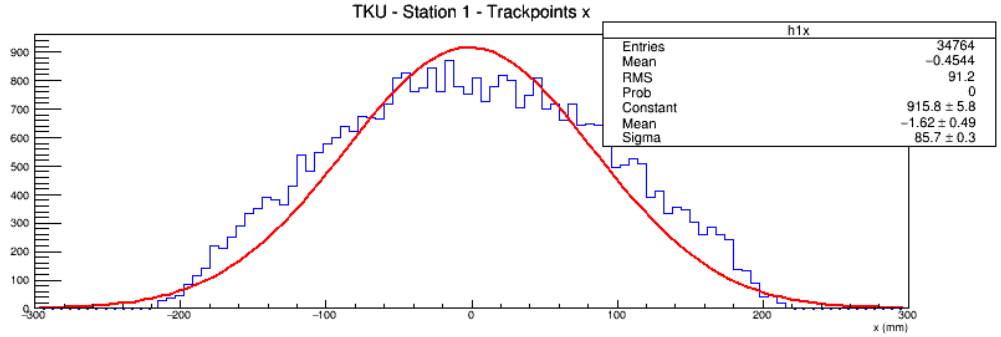
240 MeV/c

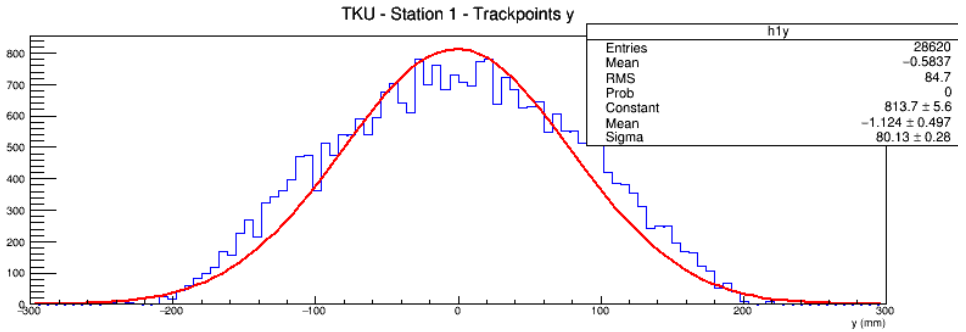
Particle Species	Pz @ TKU Station 5	Proton Absorber	Diffuser setting	Q1	Q2	Q3	D1	DS	D2	Q4	Q5	Q6	Q7	Q8	Q9	RunControl Tag
	MeV/c	mm		A	A	A	A	A	A	A	A	A	A	A	A	
muons/pions	240	29	no diffuser	70.38	87.9	61.14	210.61	459.00	110.82	187.59	251.57	166.86	235.68	356.81	304.90	3-240+M3-Test1

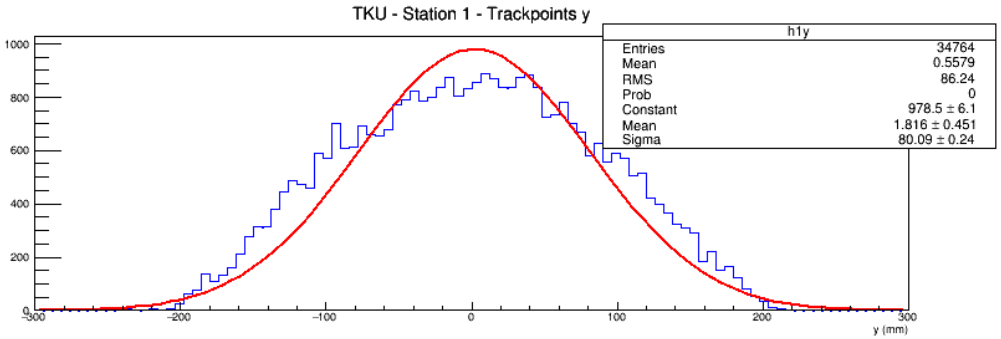
140 MeV/c alignment @ TKU

- D2 adjustment: 78.9A → 70.0A



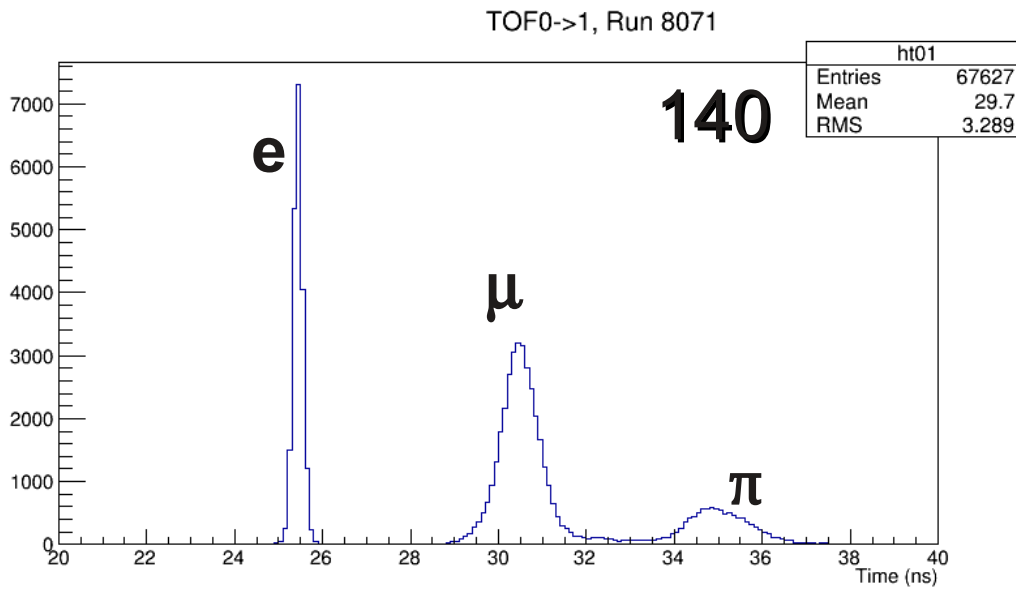


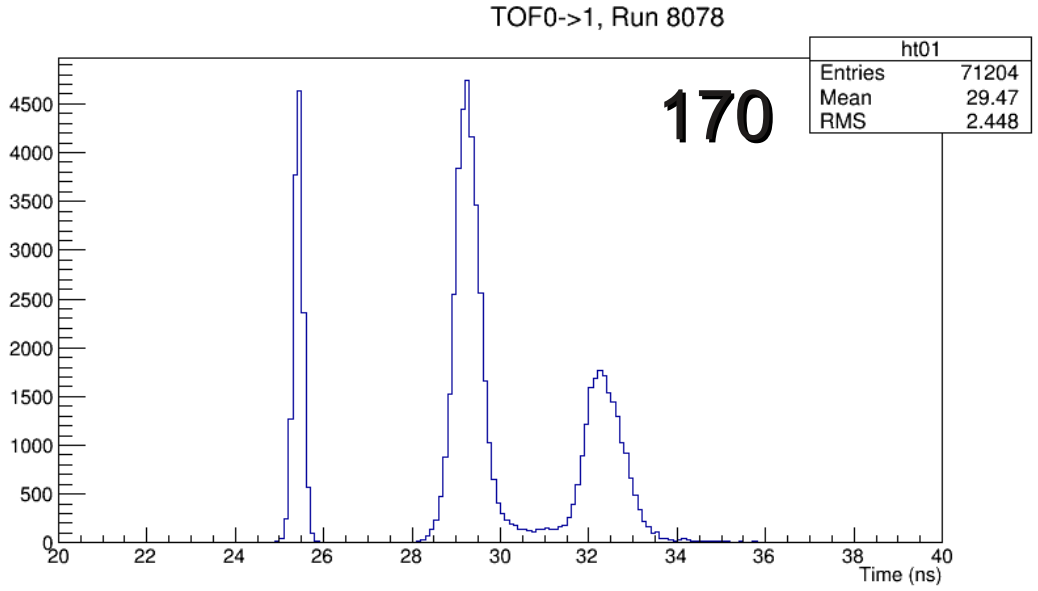




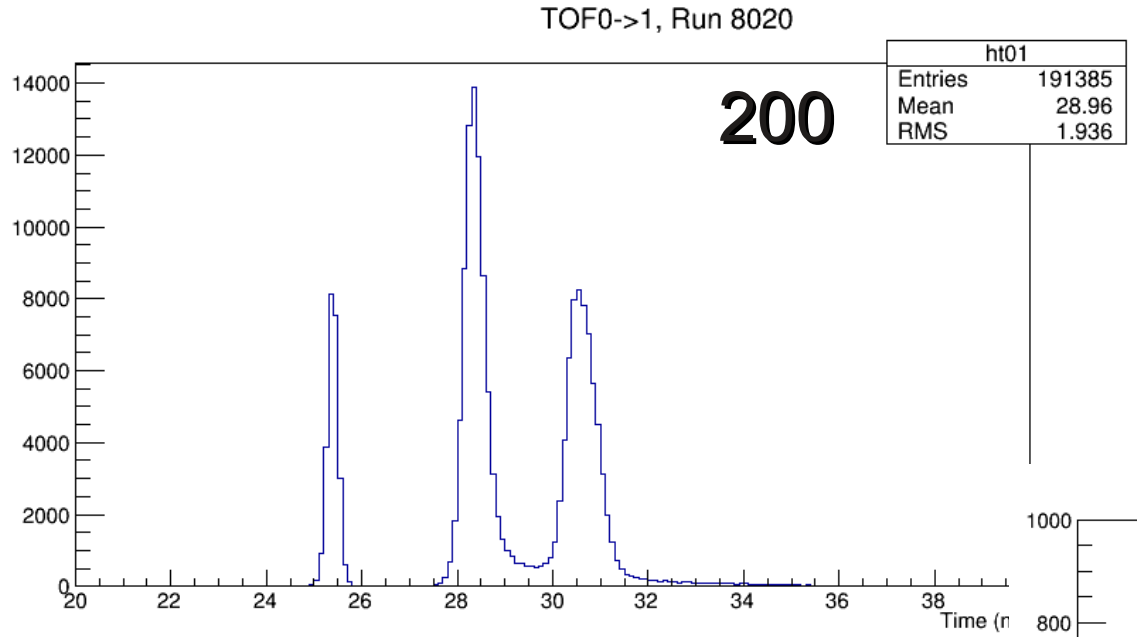
Improved rates and Δt separation

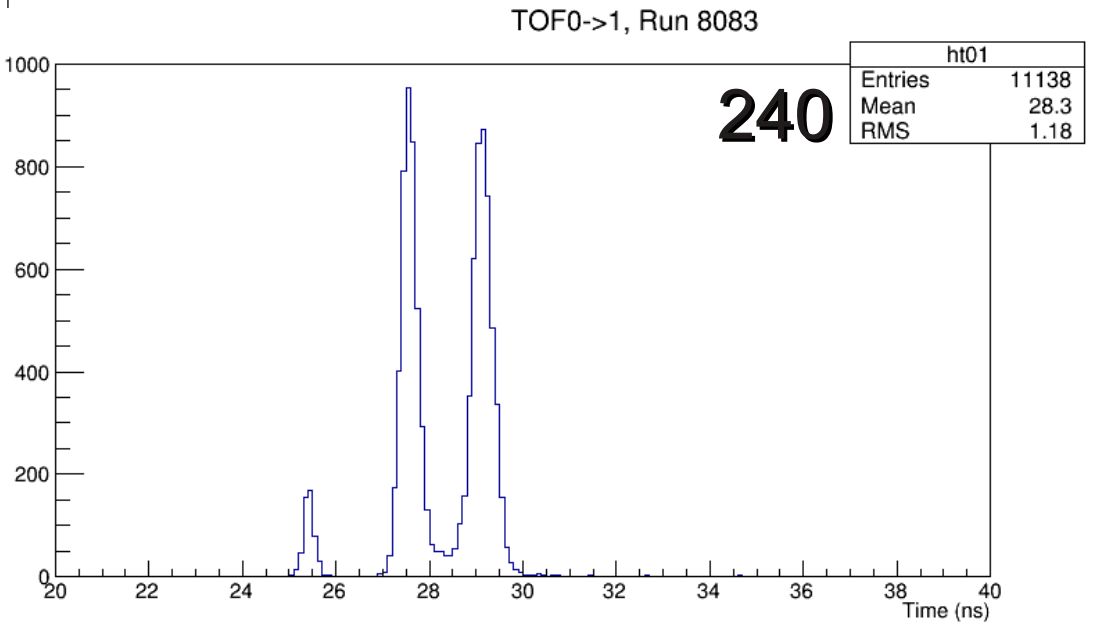
Setting [MeV/c]	Real triggers/spill
140	25.1
170	47.9
200	62.5
240	84.3



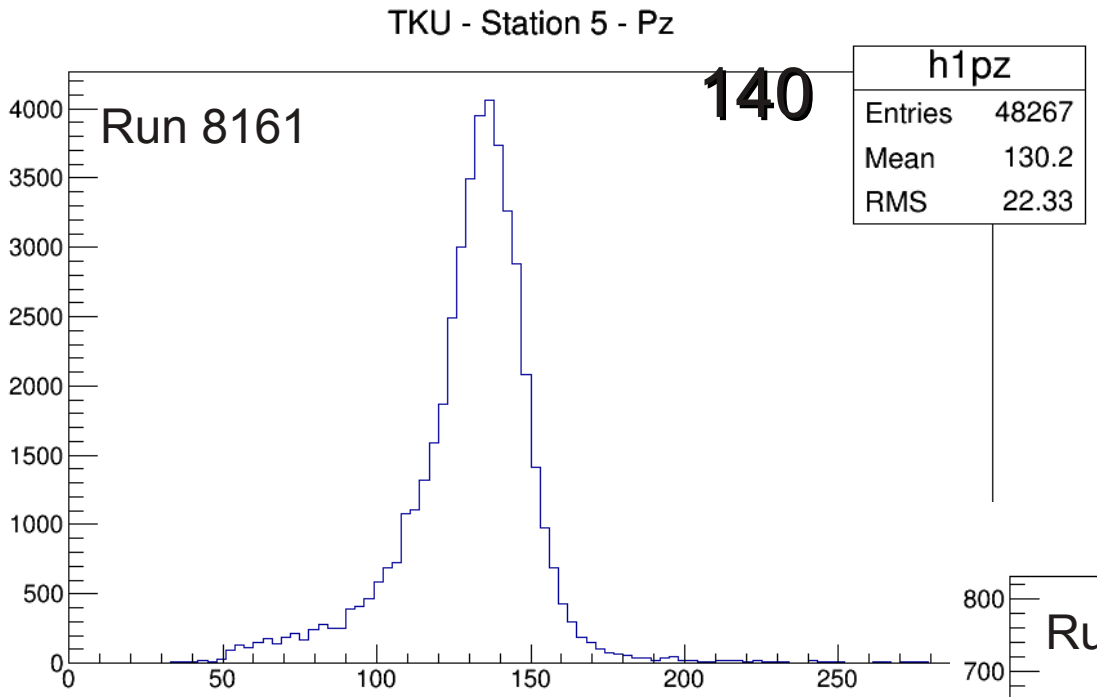


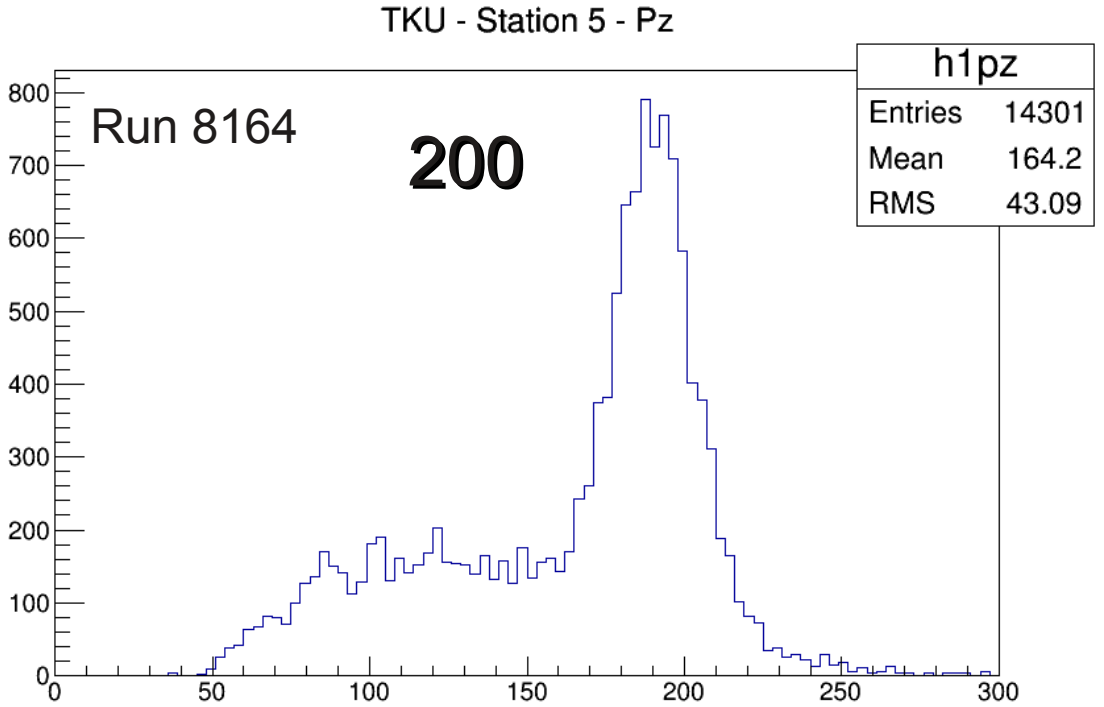
Δt separation





Pz distribution @ TKU

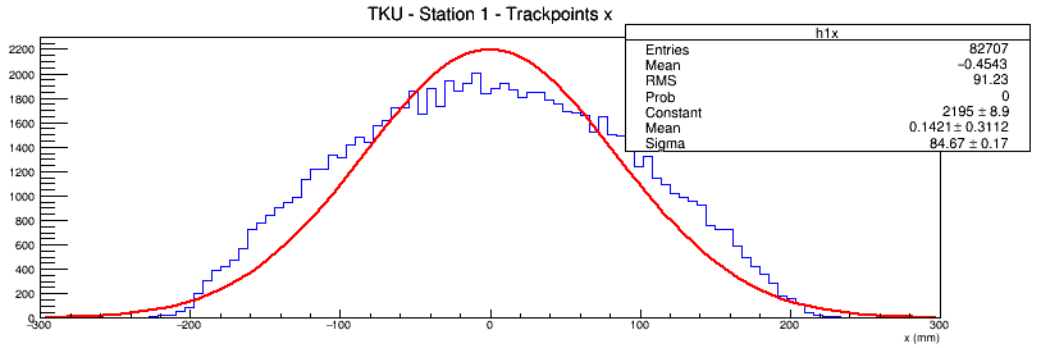


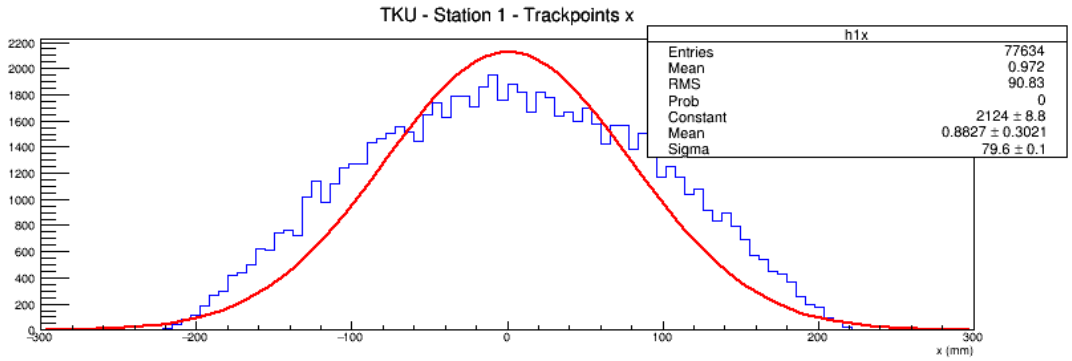


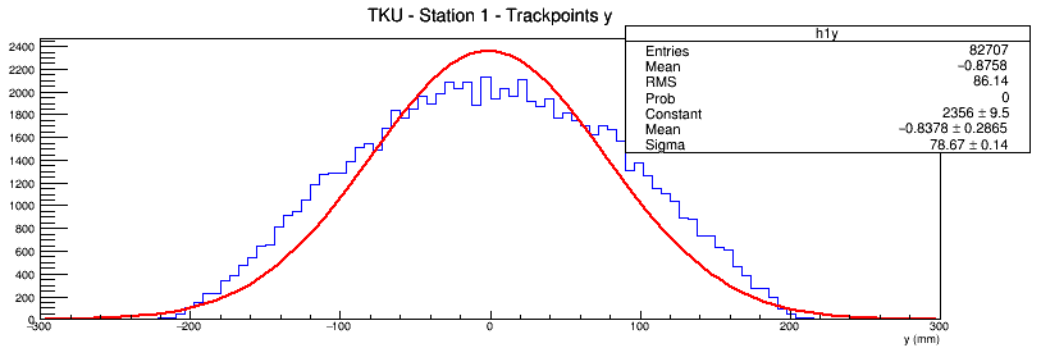
- SSU on
- Peak slightly lower

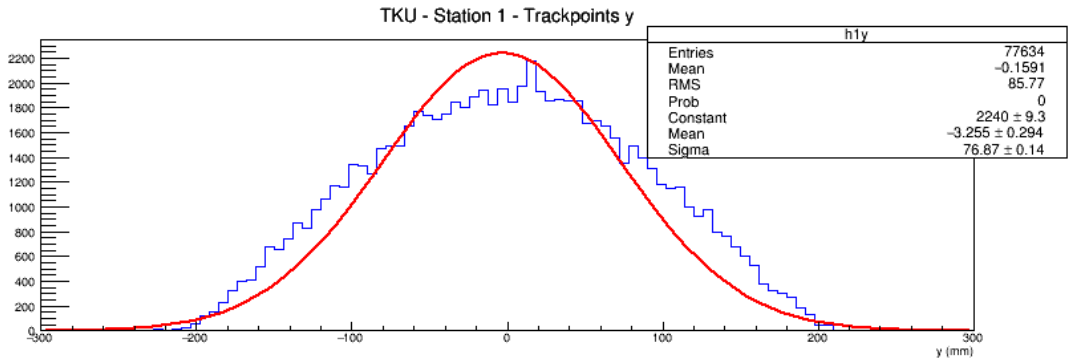
Magnets “memory”

- Ramp D2 down and back up



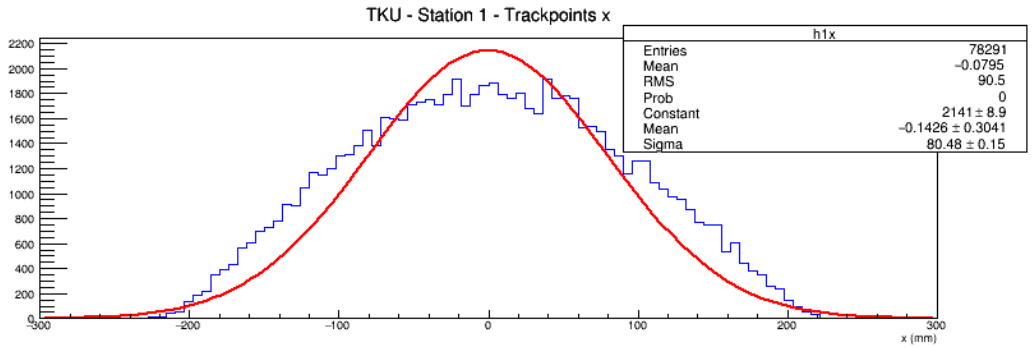


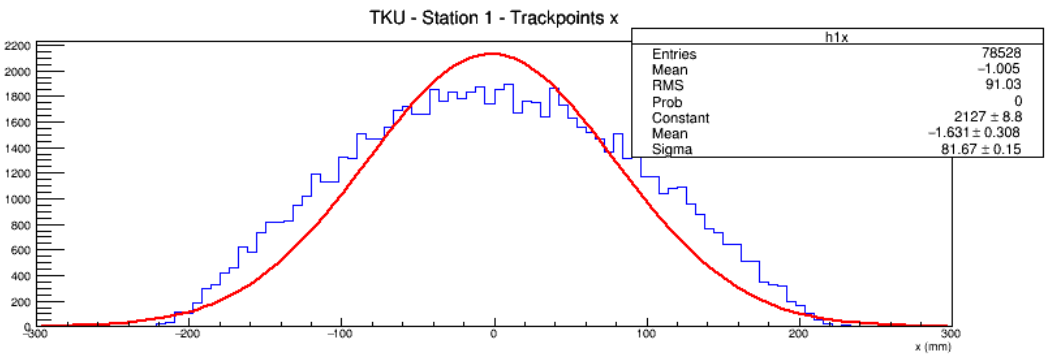


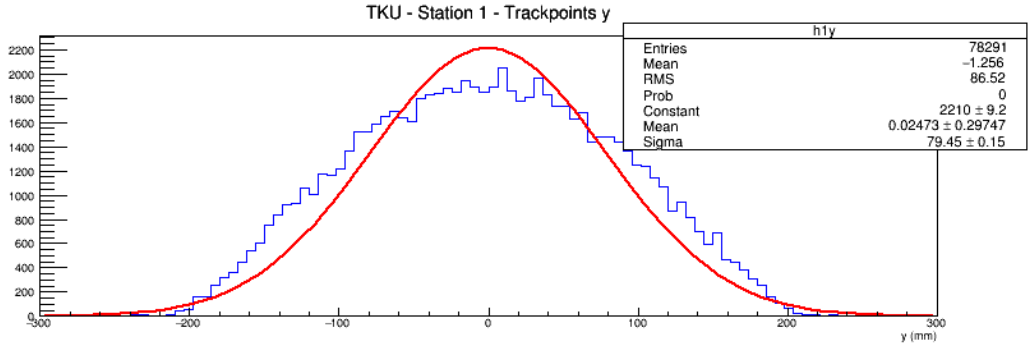


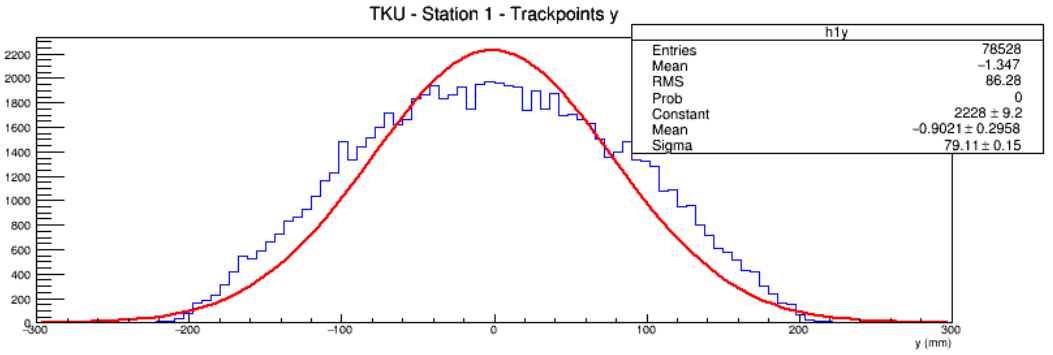
Magnets “memory”

- Ramp Q8 down and back up

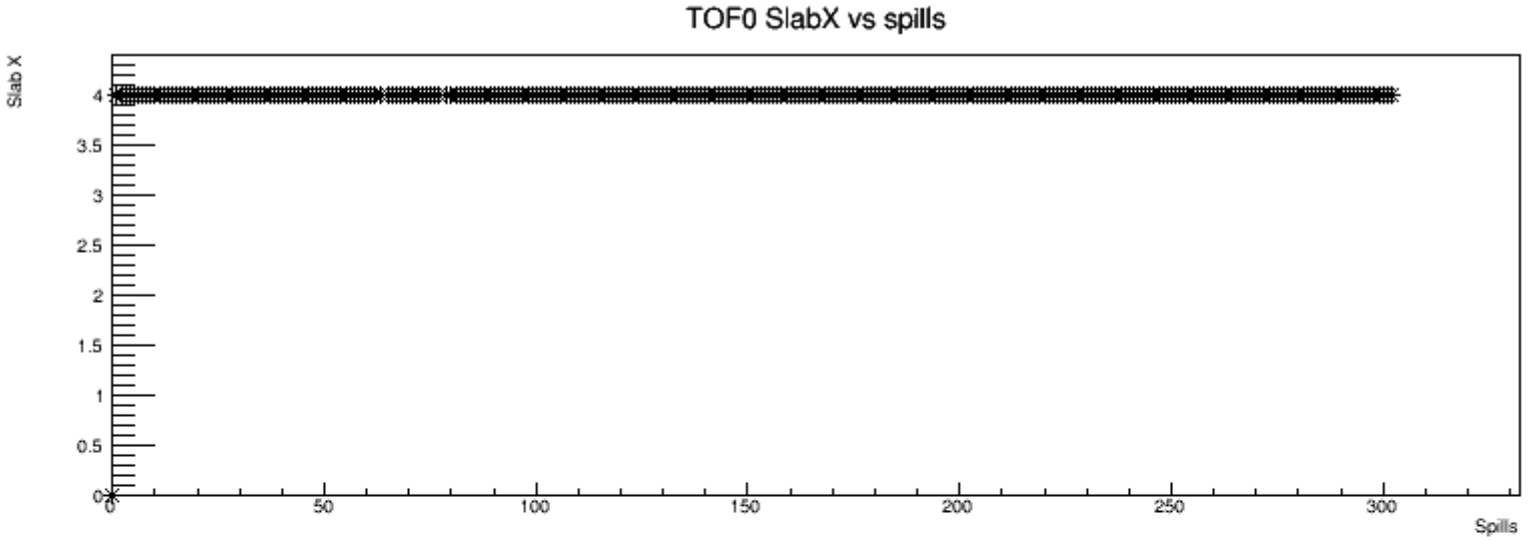


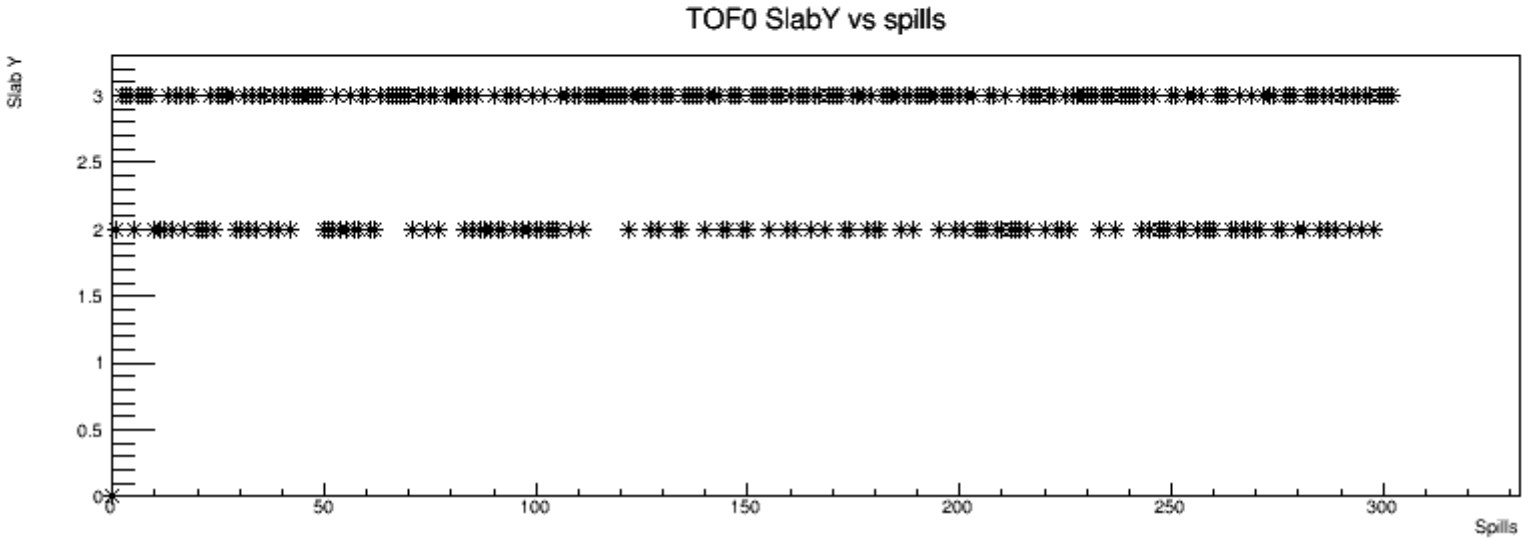






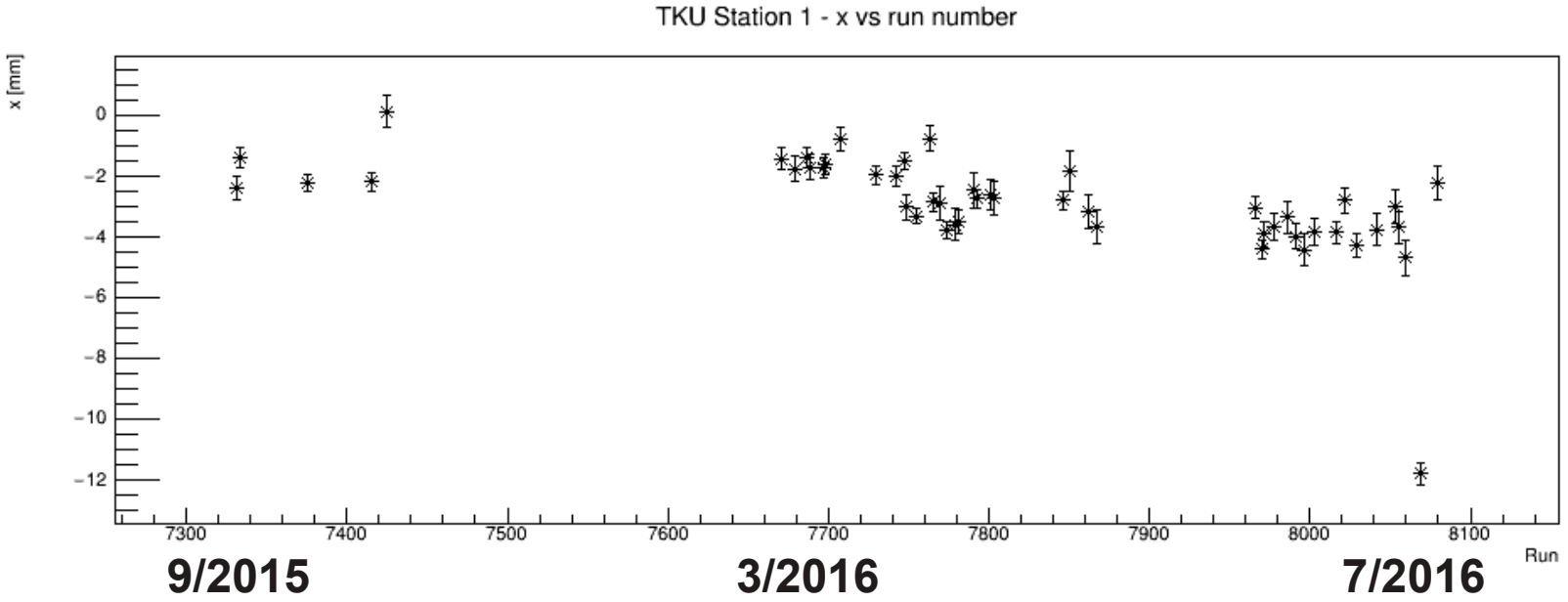
Field adjustment after ramping



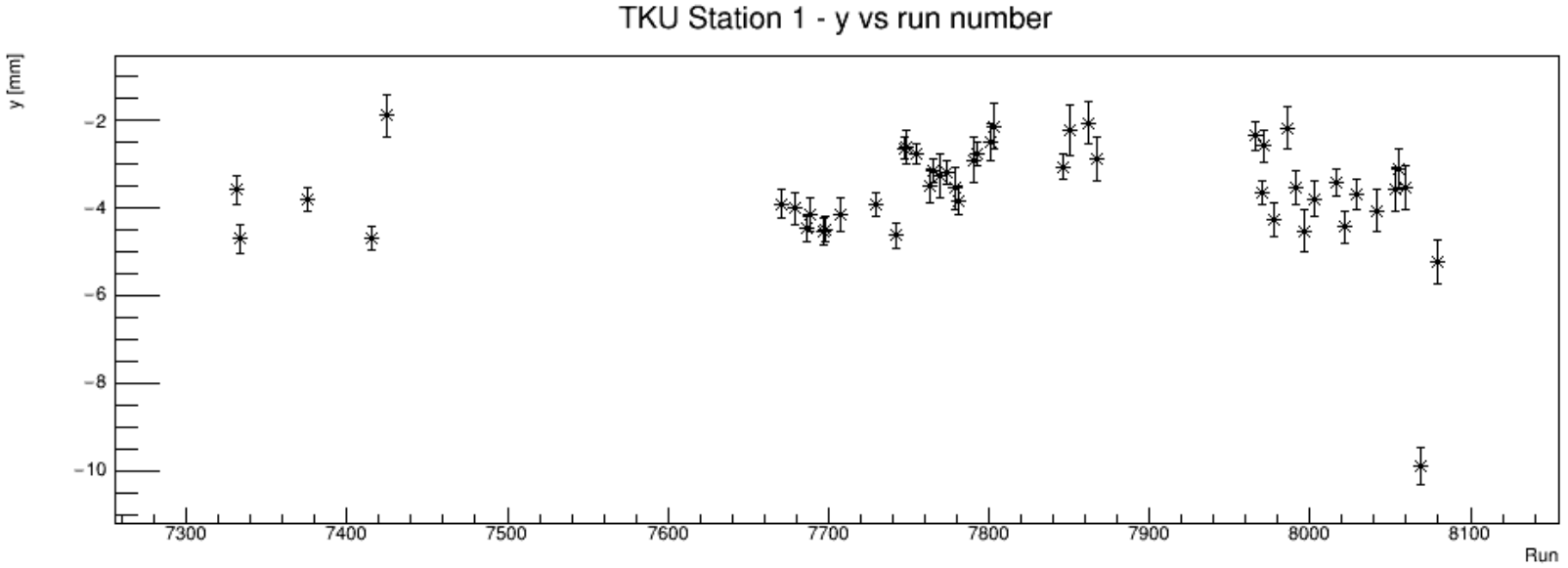


Reference run

Reference runs comparison



9/2015 **3/2016** **7/2016**



ToDo

- Is the beam line always reproducible?
- Understand some other behaviours
- Tuning of D2 for all the settings

- We are taking more data with SSU on
  - Diffuser study
  - Pion contamination