

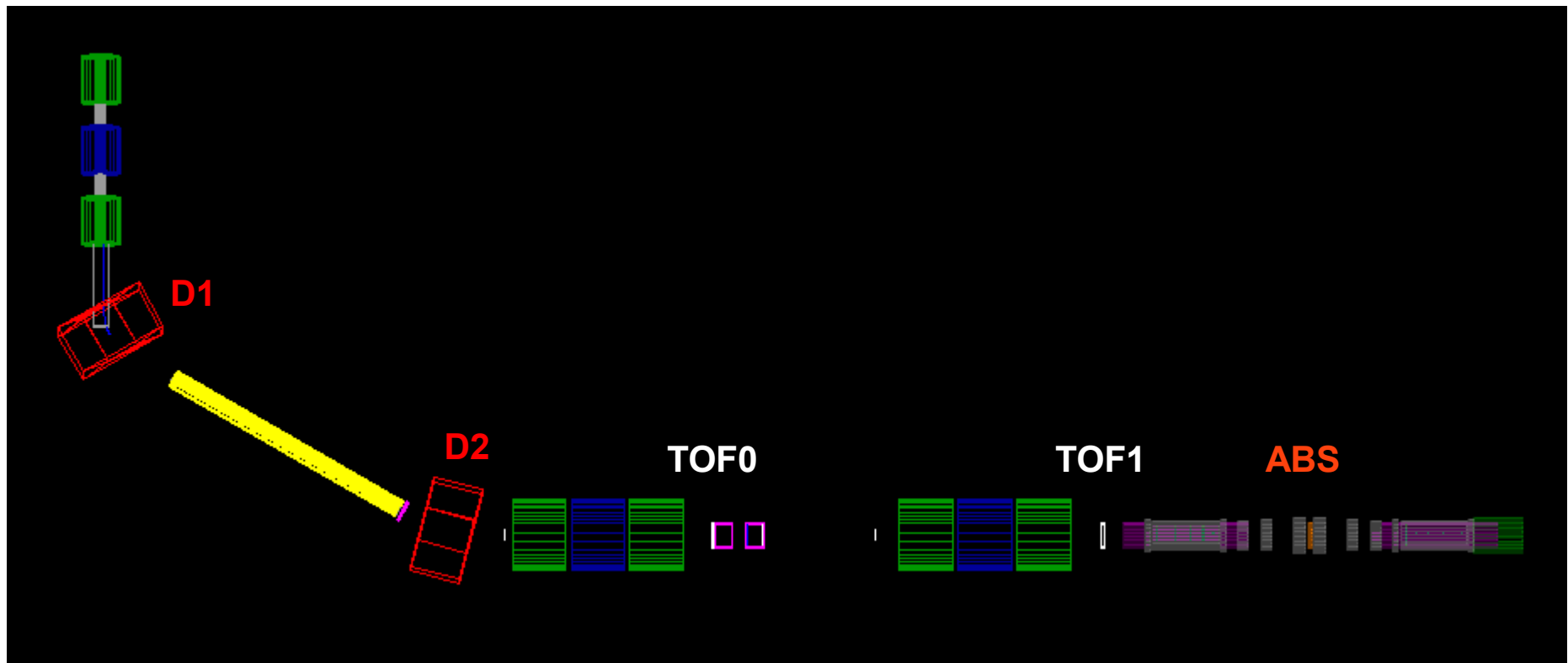
# Pion Beam line settings and commissioning

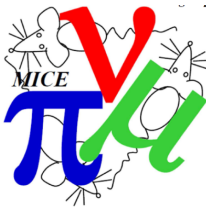
P. Franchini

CM 46  
4<sup>th</sup> October 2016

# Beamline simulation

- G4BL simulation of all the beam line including the diffuser + cooling channel





# Currents definition

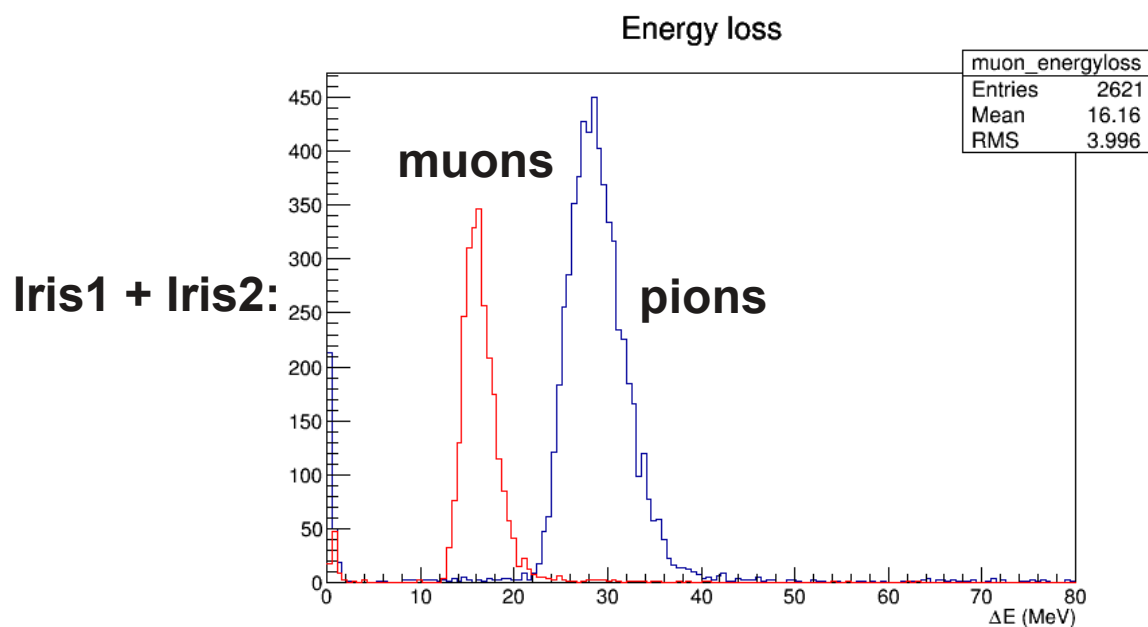
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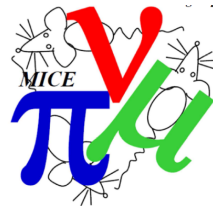
- Simulated a pionic beam:  $P(D1) \sim P(D2)$  using the Magic Spreadsheet for the initial values
- Match the nominal momentum value in TKU Station 5:
  - 140/170/200/240 MeV/c
- Diffuser implemented in the MC
- Calculated emittance, beta and alpha in TKU

# Diffuser

Table 1: Material thicknesses of the brass-tungsten diffuser

Iris Number	Material	Thickness (mm)	Fractional $X_0$	$\Delta E$ (MeV)
1	Brass	2.97	0.207	4.4
2	Brass	5.9	0.4108	8.7
3	Tungsten	2.8	0.799	6.7
	Brass (backing)	2.0	0.139	2.9
4	Tungsten	5.6	1.598	13.4
	Brass (backing)	2.0	0.139	2.9





# Final settings

[https://micewww.pp.rl.ac.uk/projects/operations/wiki/Step4\\_Pionic\\_beam\\_Tags](https://micewww.pp.rl.ac.uk/projects/operations/wiki/Step4_Pionic_beam_Tags)

## 3-140 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

## 3-170 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

## 3-200 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

## 3-240 MeV/c

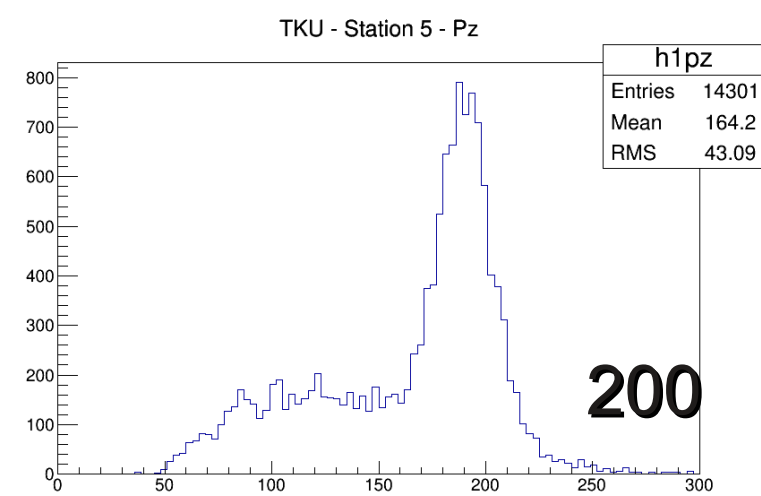
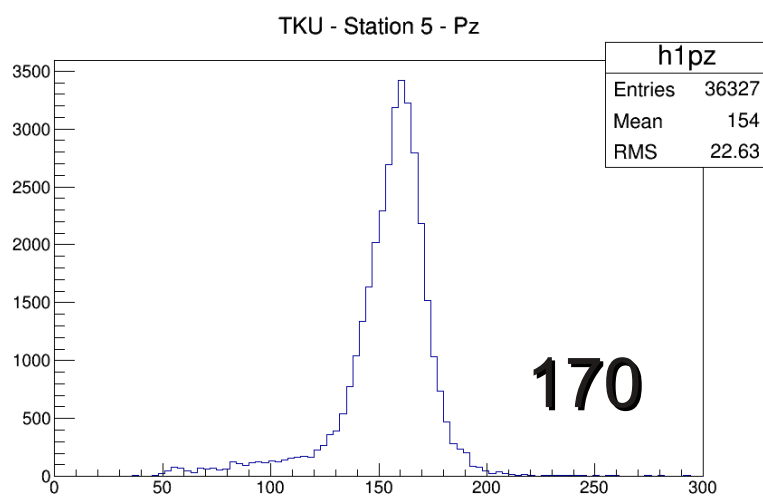
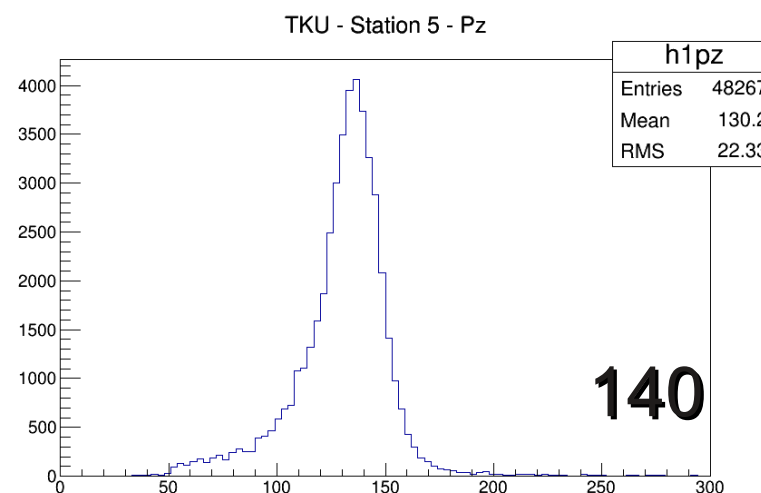
Particle Species	Pz @ TKU Station 5	Proton Absorber	Diffuser setting	Q1	Q2	Q3	D1	DS	D2	Q4	Q5	Q6	Q7	Q8	Q9	RunControl Tag
	MeV/c	mm		A	A	A	A	A	A	A	A	A	A	A	A	
muons/pions	240	29	no diffuser	70.38	87.9	61.14	210.61	459.00	110.82	187.59	251.57	166.86	235.68	356.81	304.90	3-240+M3-Test1

## 6-140 MeV/c

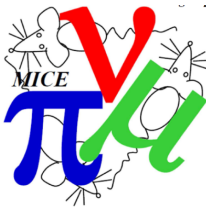
Particle Species	Pz @ TKU Station 5	Proton Absorber	Diffuser setting	Q1	Q2	Q3	D1	DS	D2	Q4	Q5	Q6	Q7	Q8	Q9	RunControl Tag
	MeV/c	mm		A	A	A	A	A	A	A	A	A	A	A	A	
muons/pions	140	29	no diffuser	47.98	59.88	41.62	142.66	311.97	70.0	131.25	176.01	116.62	110.74	167.46	142.87	3-140+M3-Test2

# Pz distribution @ TKU

	Peak @ TKU Station1
140 MeV/c	135
170 MeV/c	162
200 MeV/c	189



→ tuning needed with SSU on



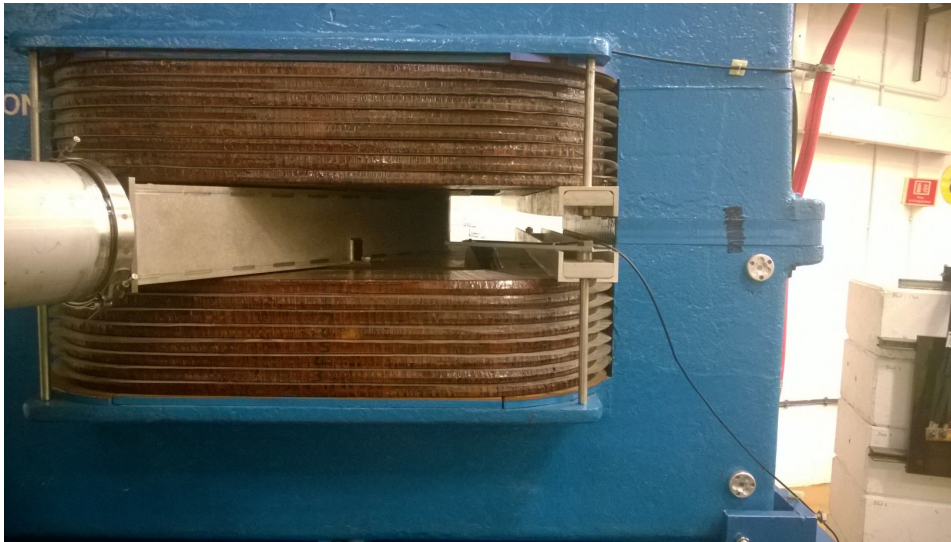
# Field mapping of the dipoles

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- NIMROD 6" Type 1 dipoles
- Formula  $I(B)$  used in the MC shown a discrepancy with a measurement done by Henry in 2013
- Another survey will be done:
  - Field measurement inside the dipoles to be compared with the field model
  - Comparison between D1 and D2
  - Field map along the z-axis
  - Field vs current relationship
  - Hysteresis evaluation

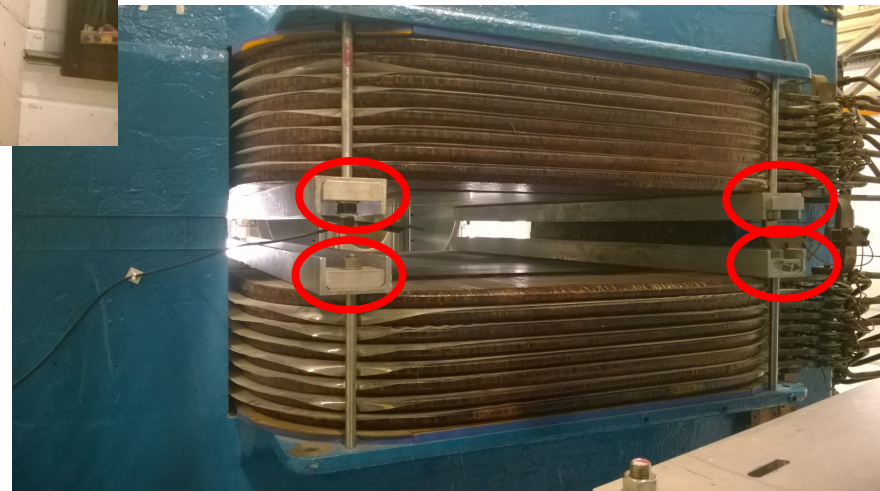
# Field mapping of the dipoles

- Jig with a gaussmeter to be mounted on D1 and/or D2 during next shutdown



D1

D2





# ToDo

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- Tuning of the beam line settings (alignment, momentum peak)
- Dipoles measurement during next shutdown earlier in November