Micromegas in Magnetic Field

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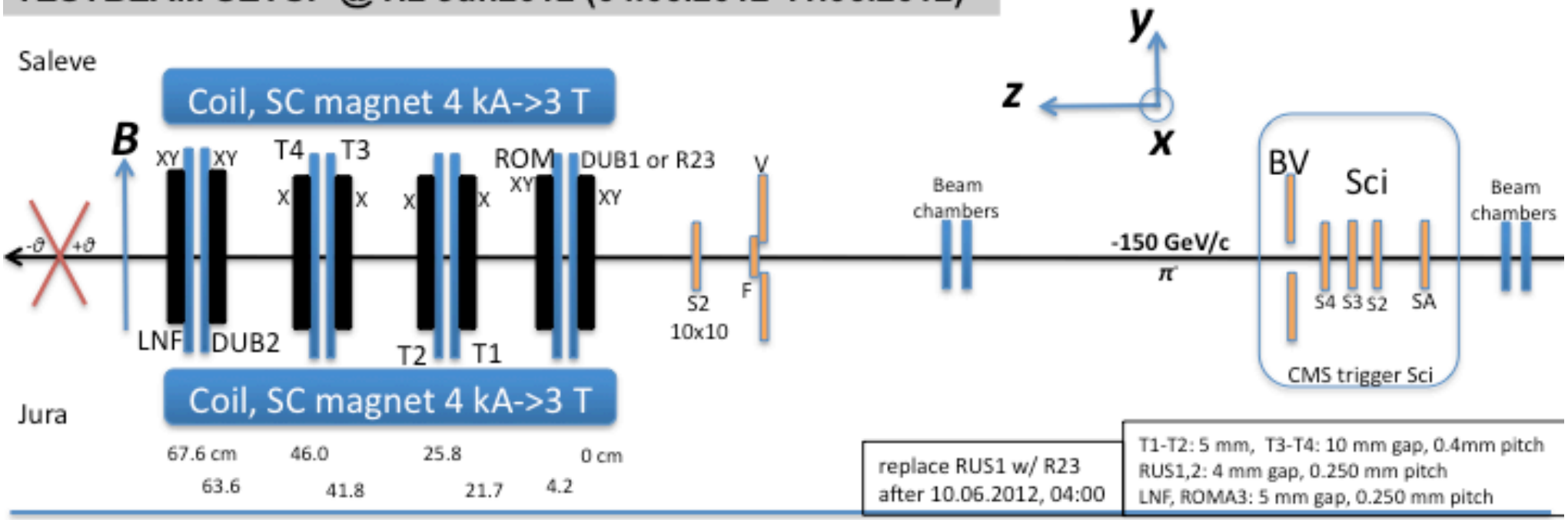
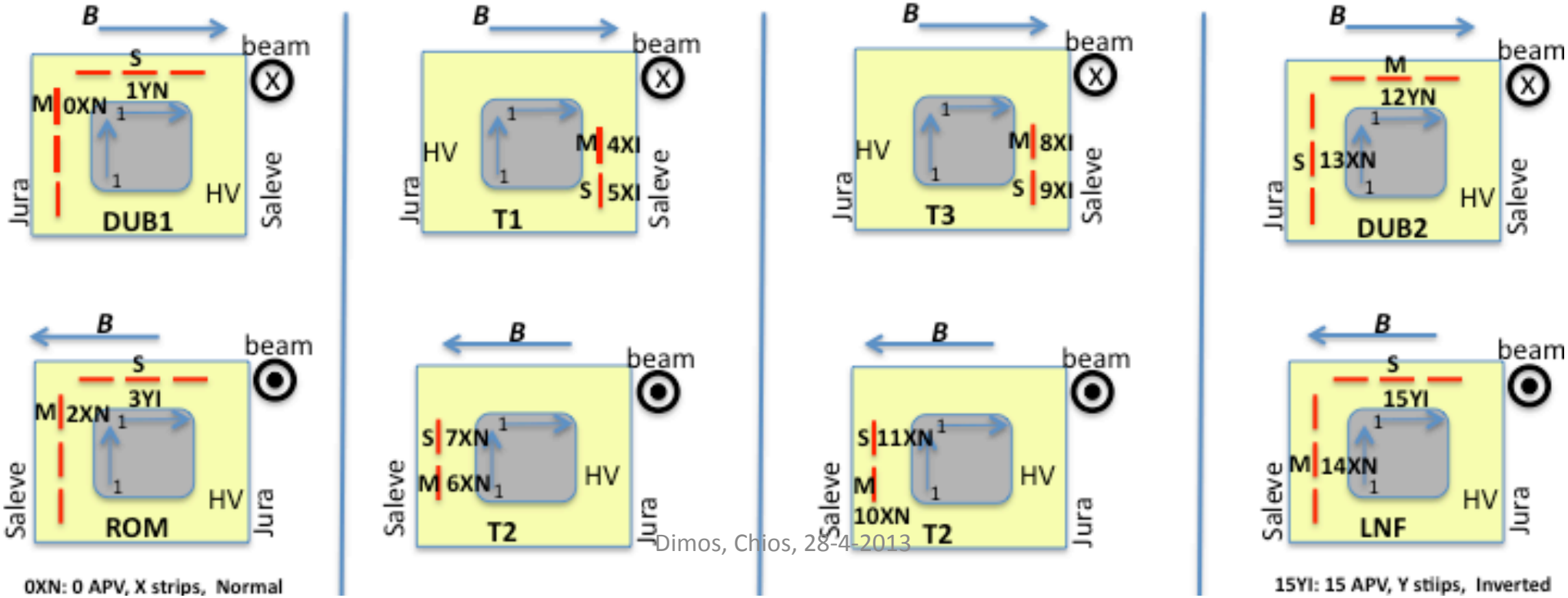
TESTBEAM SETUP @ H2 Jun2012 (04.06.2012-11.06.2012)

top view



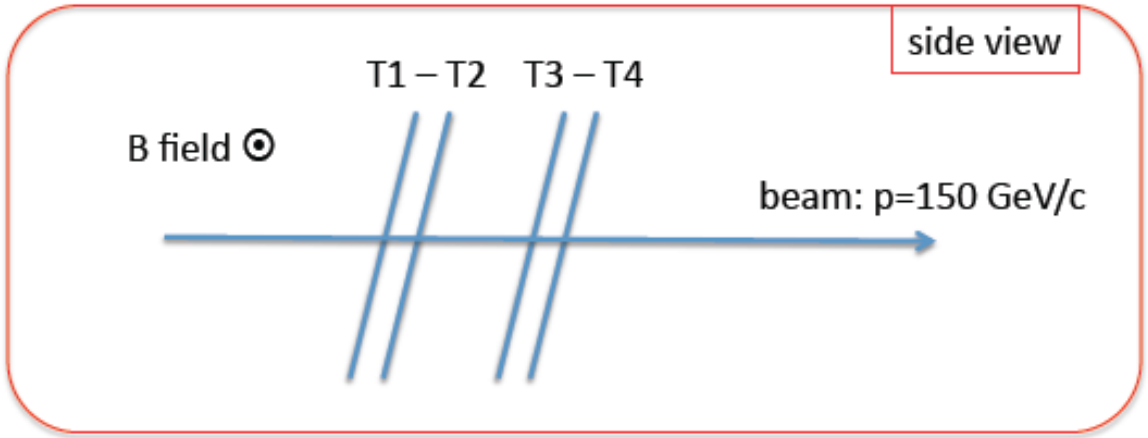
replace RUS1 w/ R23
after 10.06.2012, 04:00

T1-T2: 5 mm, T3-T4: 10 mm gap, 0.4mm pitch
RUS1,2: 4 mm gap, 0.250 mm pitch
LNF, ROMA3: 5 mm gap, 0.250 mm pitch



0XN: 0 APV, X strips, Normal

15YI: 15 APV, Y stips, Inverted



→Magnetic field orthogonal to Electric field

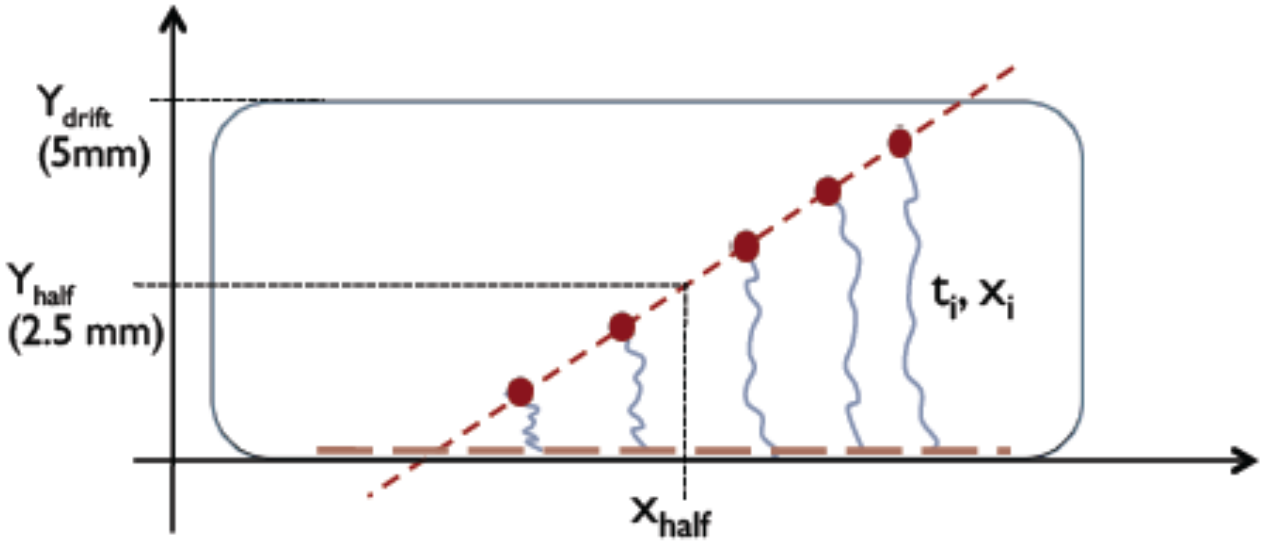
→Xstrip readout (vertical coordinate)

→particle bending non-negligible (displacement ≈ 50μm×B(T) btw. T1 and T3)

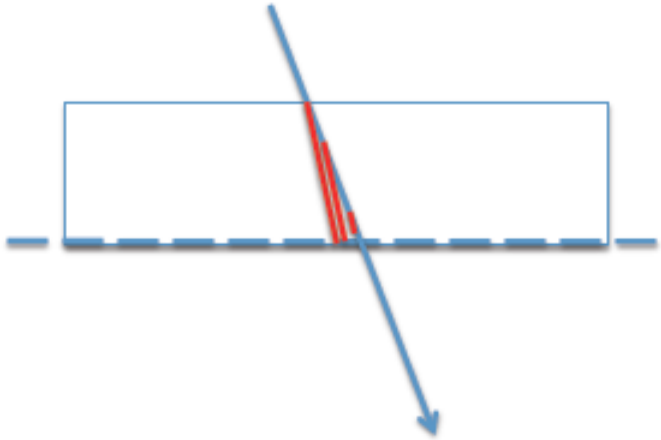
→T1, T2: 400 μm pitch, 5mm gap, HV_{mesh} = 500(?) V; HV_{drift} = 300 V , Ar-CO_2 93-7

→T3, T4: 400 μm pitch, 10 mm gap, HV_{mesh} = 500(?) V; HV_{drift} = 600 V , Ar-CO_2 93-7

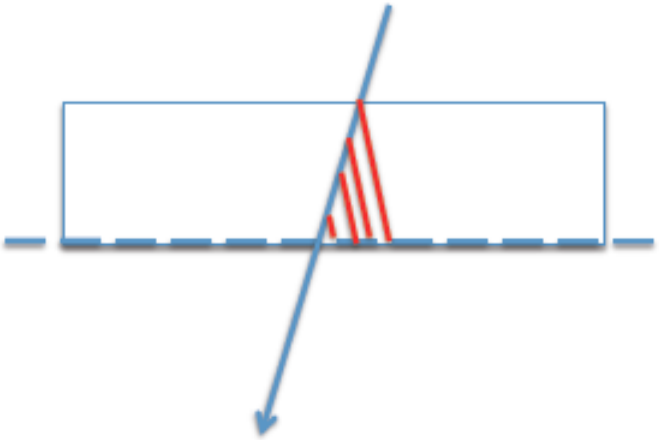
μTPC



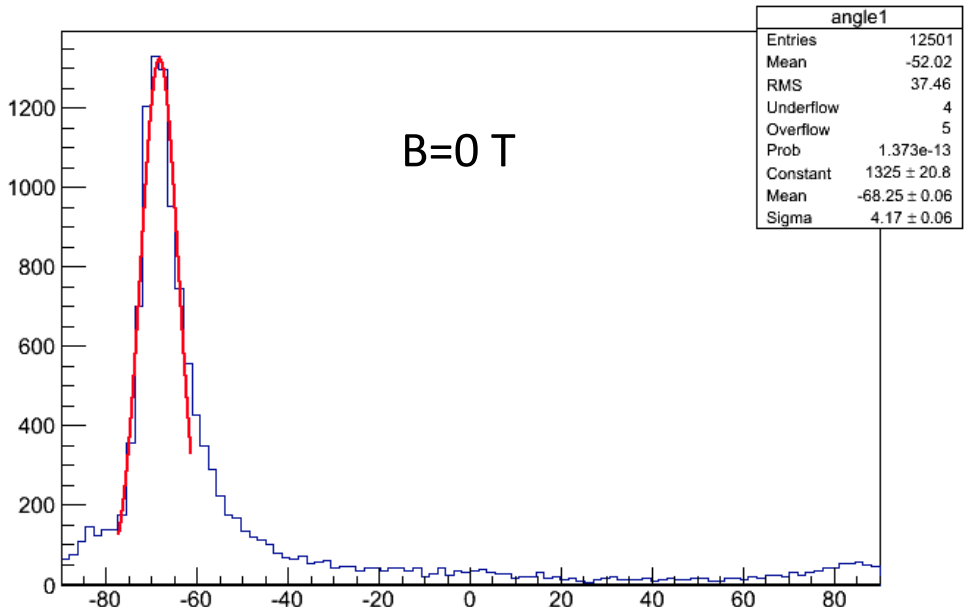
Dataset A: bending “track-side”
-10° and -20° data

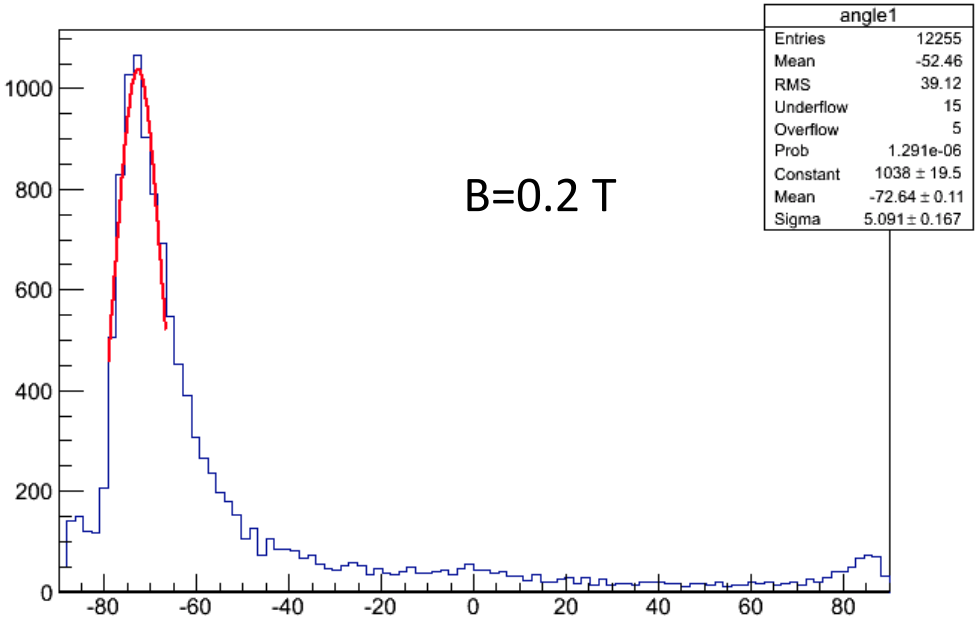


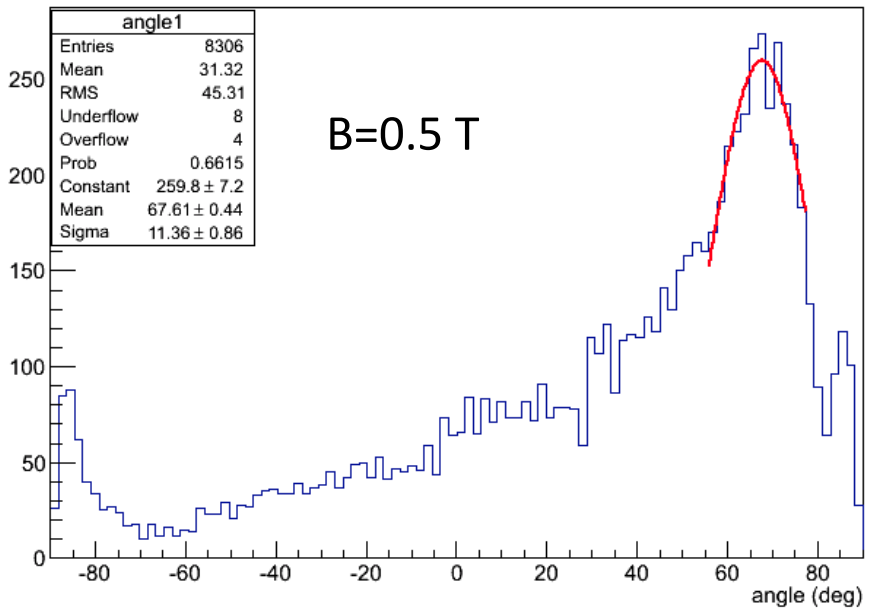
Dataset B: bending “opposite-side”
+10° and +20° data

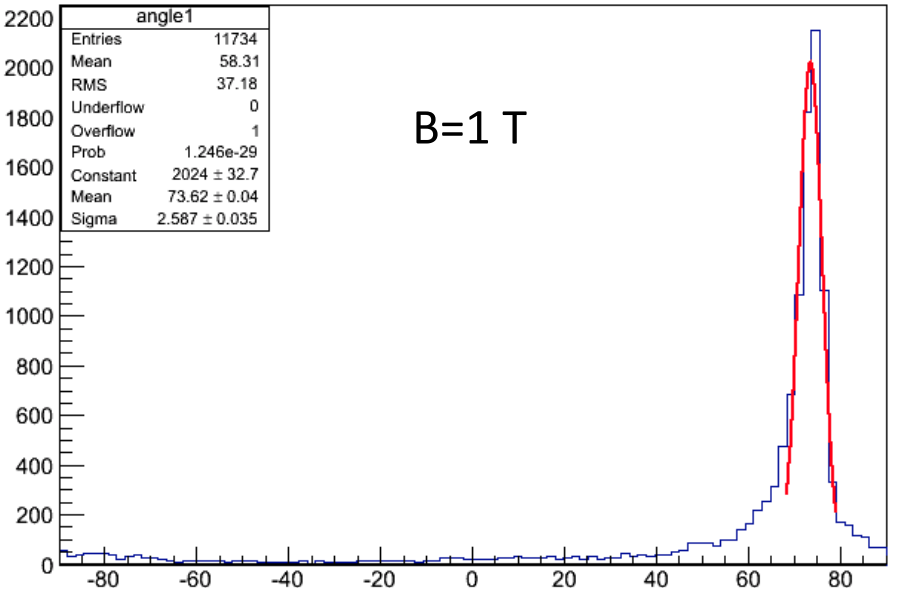


T1, E=0.6, -20

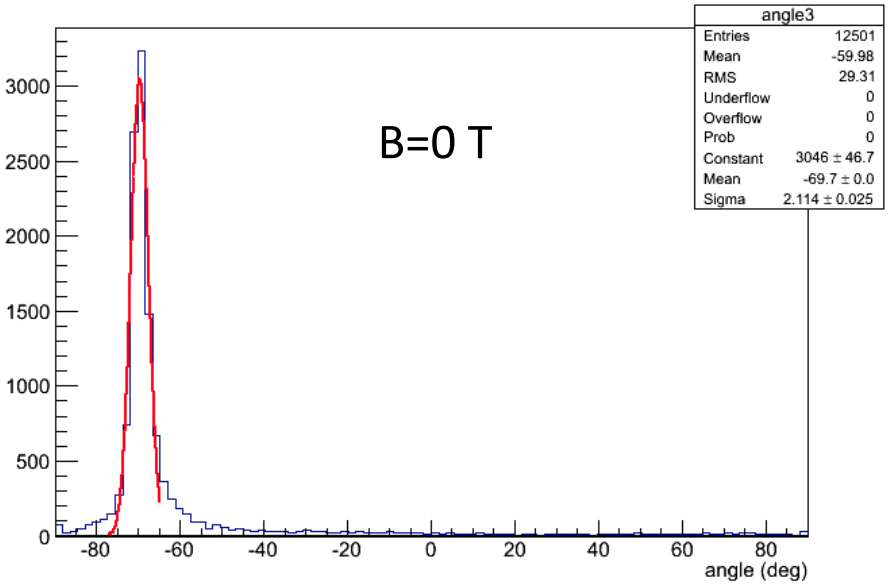

angle1
Entries 12501
Mean -52.02
RMS 37.46
Underflow 4
Overflow 5
Prob 1.373e-13
Constant 1325 ± 20.8
Mean -68.25 ± 0.06
Sigma 4.17 ± 0.06
B=0 T

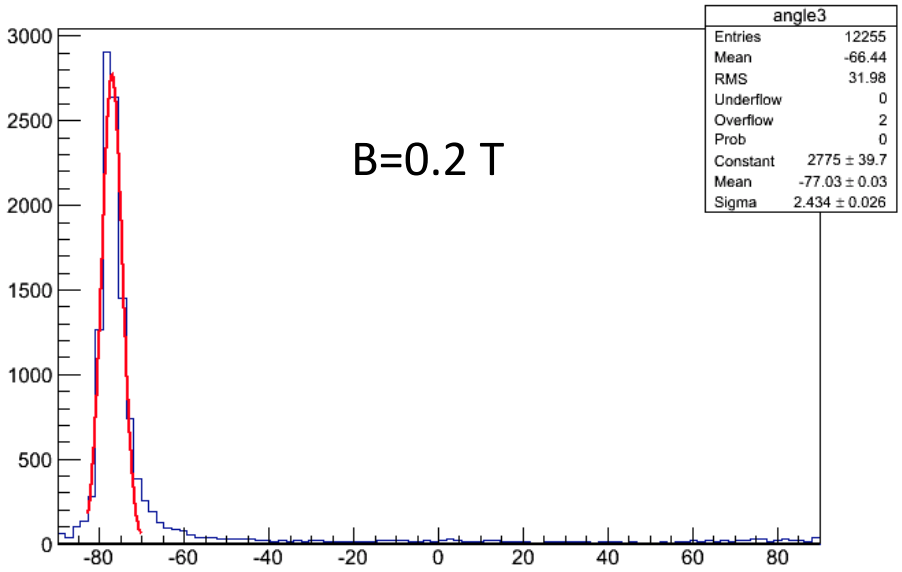

angle1
Entries 12255
Mean -52.46
RMS 39.12
Underflow 15
Overflow 5
Prob 1.291e-06
Constant 1038 ± 19.5
Mean -72.64 ± 0.11
Sigma 5.091 ± 0.167
B=0.2 T

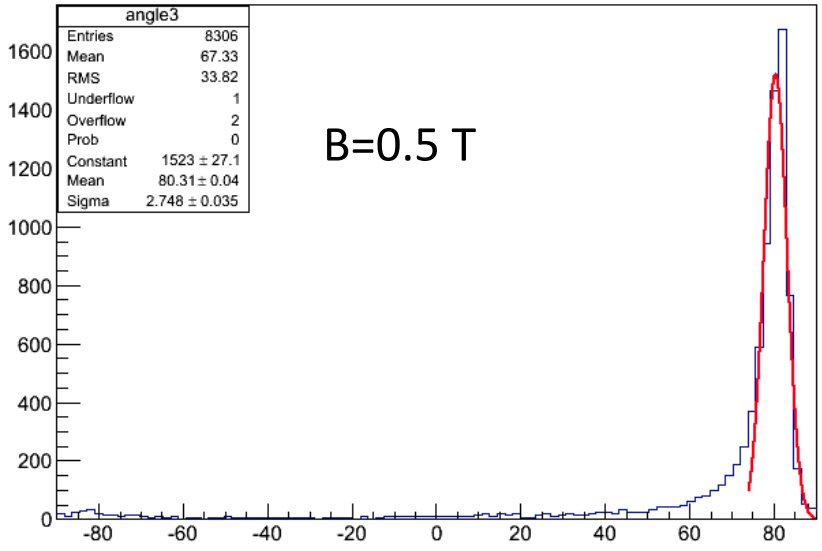

angle1
Entries 8306
Mean 31.32
RMS 45.31
Underflow 8
Overflow 4
Prob 0.6615
Constant 259.8 ± 7.2
Mean 67.61 ± 0.44
Sigma 11.36 ± 0.86
B=0.5 T
angle (deg)

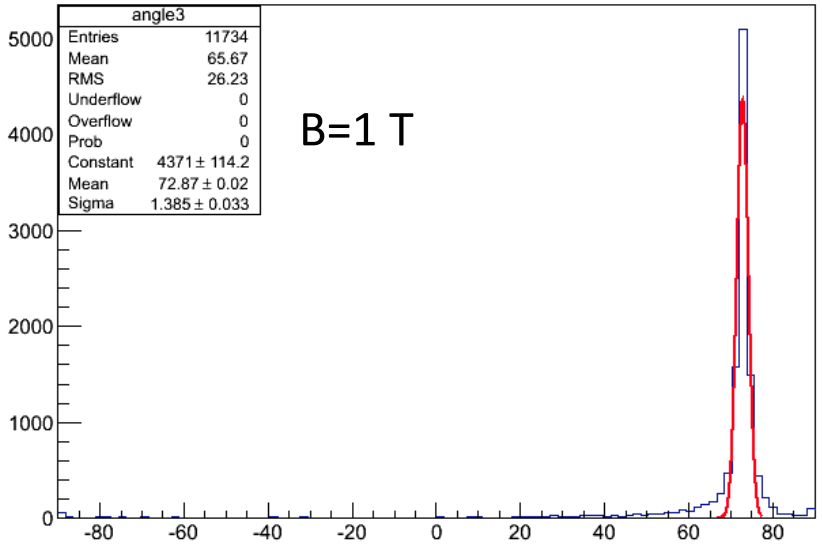

angle1
Entries 11734
Mean 58.31
RMS 37.18
Underflow 0
Overflow 1
Prob 1.246e-29
Constant 2024 ± 32.7
Mean 73.62 ± 0.04
Sigma 2.587 ± 0.035
B=1 T

T3, E=0.6, -20


B=0 T
angle3
Entries 12501
Mean -59.98
RMS 29.31
Underflow 0
Overflow 0
Prob 0
Constant 3046 ± 46.7
Mean -69.7 ± 0.0
Sigma 2.114 ± 0.025
angle (deg)

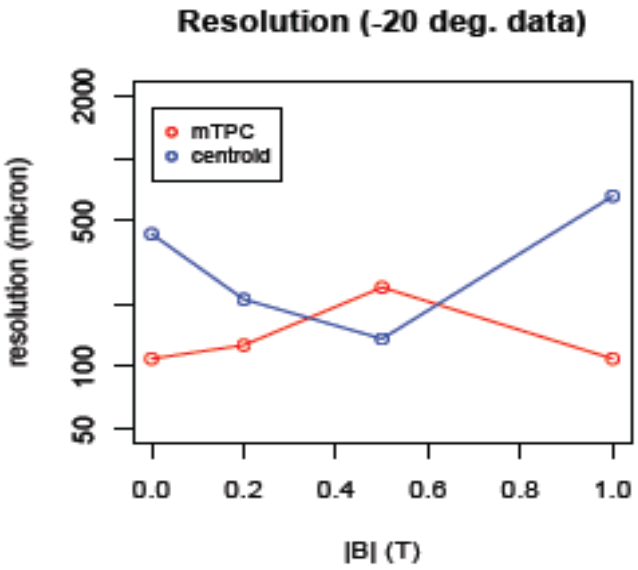

B=0.2 T
angle3
Entries 12255
Mean -66.44
RMS 31.98
Underflow 0
Overflow 2
Prob 0
Constant 2775 ± 39.7
Mean -77.03 ± 0.03
Sigma 2.434 ± 0.026

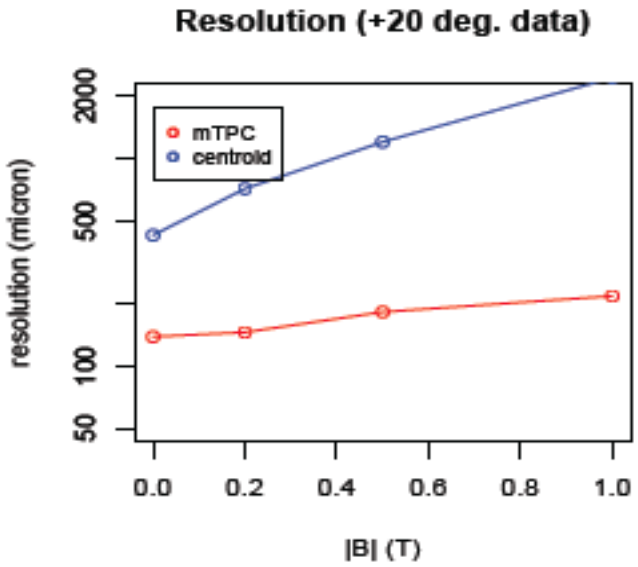

B=0.5 T
angle3
Entries 8306
Mean 67.33
RMS 33.82
Underflow 1
Overflow 2
Prob 0
Constant 1523 ± 27.1
Mean 80.31 ± 0.04
Sigma 2.748 ± 0.035


B=1 T
angle3
Entries 11734
Mean 65.67
RMS 26.23
Underflow 0
Overflow 0
Prob 0
Constant 4371 ± 114.2
Mean 72.87 ± 0.02
Sigma 1.385 ± 0.033

Resolution

Resolution: σ_{core}(T1-T3)/√2 (not completely correct…)





Conclusions

The operation of MM in magnetic field requires a careful knowledge of the field map and a careful calibration procedure providing corrections at O (100 **μm) level.**

μTPC works fine with acceptable resolution in the full |B|-θ plane apart from specific angles (θ=-10o, |B|=0.2 T and θ=-20o, |B|≈0.4T) where the Lorentz angle "compensates" the track inclination.

Corrections on the data with the Lorentz angle recovers the track angle and improves the resolution (but not dramatically)

In the singularities the centroid method will be used to recover resolution (or combination of the two methods should be used).