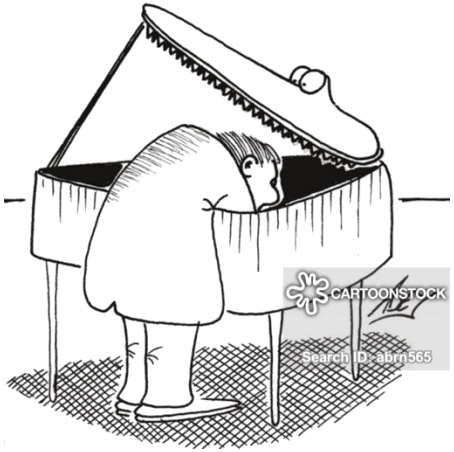


Tuning to real data

Tune what to what? ...and why?

comparison to the **test beam data** collected on **April 2018**

RD51 testbeam
- H4 beam line, SPS-NA (CERN)
- GOLIATH dipole magnetic field
- 150 GeV/*c* muons

triple-GEM specifics
- planar triple-GEM, 10 x 10 cm^2
- double view readout, APV-25
- gas: Ar:*i*-C_4H_{10} (90:10)
- HV: 275/275/275 V
- fields: 1.5/2.75/2.75/5 kV/cm
- magnetic field *off* or *on* (B = 1T)
- incident angle: 0°, 5°, 10°, 15°, 20°, 30°, 45°

Settings we kept in the GTS simulation
- conversion factor : 30 ADC = 1 fC (*)
- threshold : 45 ADC = 1.5 fC
- noise sigma: 15 ADC = 0.5 fC

(*) K. A. Ntekas, CERN-THESIS-2016-019

Tuning to real data

need to check the consistency between simulation and real data, due to:

- various approximations applied
- measured charge >> simulated one → **tuning factor** on gain!

Scan

particle incident angle [0°, 40°], B = 0,±1T

Tuning factor on

Gain, diffusion

Sentinel variables

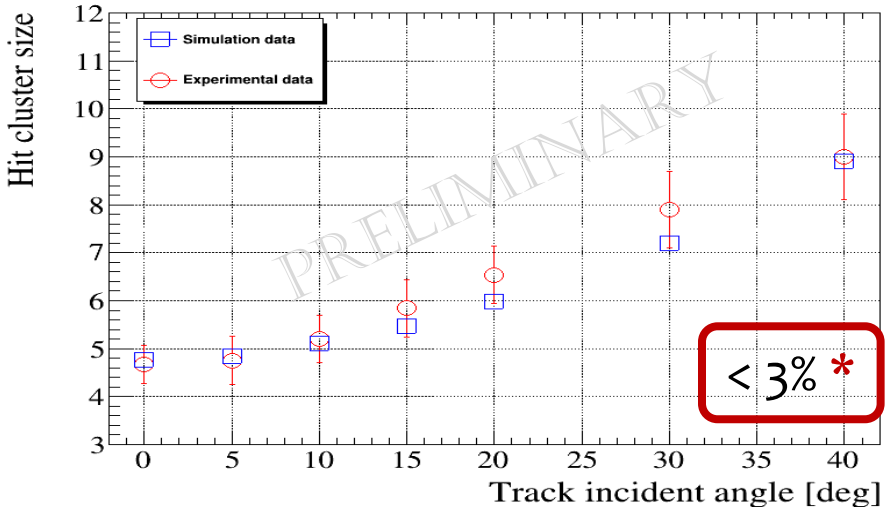
- measured charge
- cluster size
- position resolution (charge centroid)
- position resolution (μ–TPC)

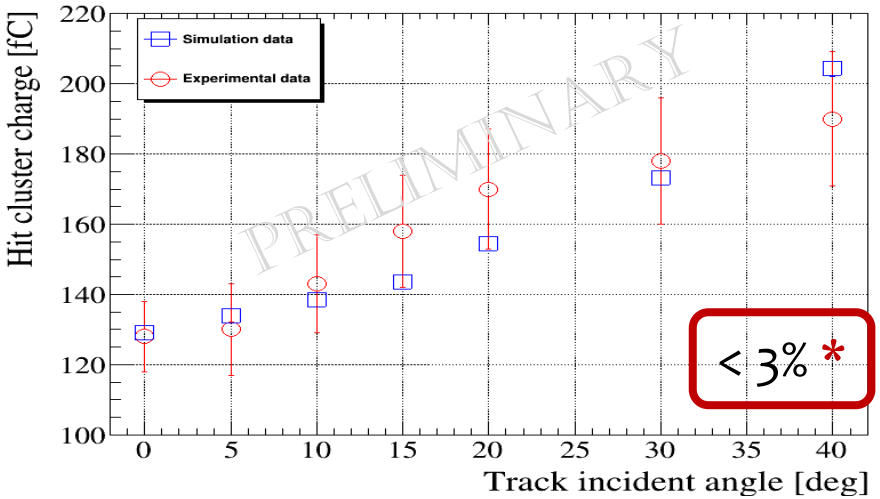
Procedure

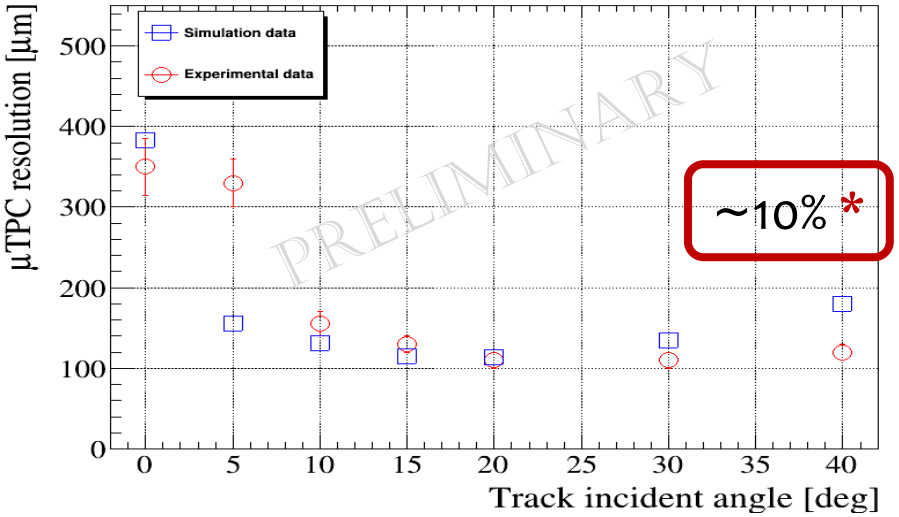
- for each gain and diffusion values, simulate 7 angles: 0, 5, 10, 15, 20, 30, 40
- for each angle, run 20k muons → statistical error around 1%
- compute $\chi^2 = \chi^2_{\text{charge}} + \chi^2_{\text{cl.size}} + \chi^2_{\text{CCresol.}} + \chi^2_{\mu-\text{TPCresol.}}$
- evaluate χ^2/NDF

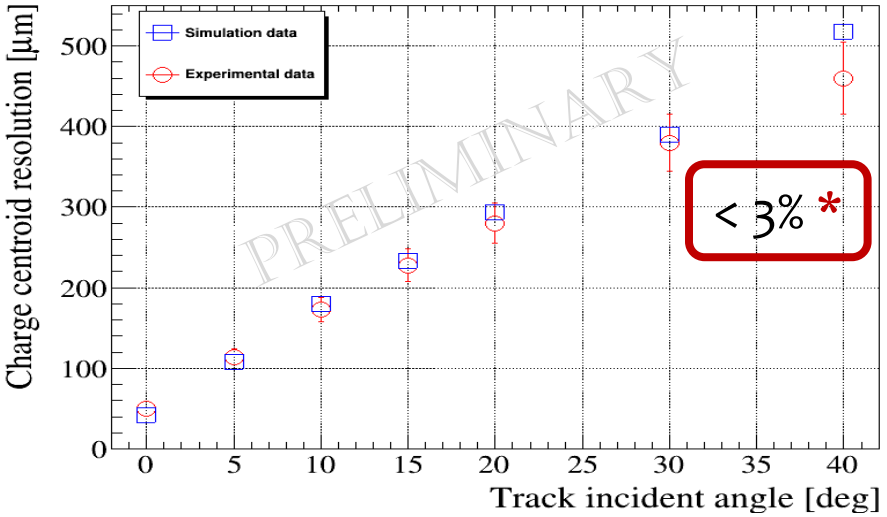
Tuning to real data w/o B

Best result χ^2/NDF ~ 3 ← *gain tuning = 6.8* ← *diffusion tuning = 1.5*





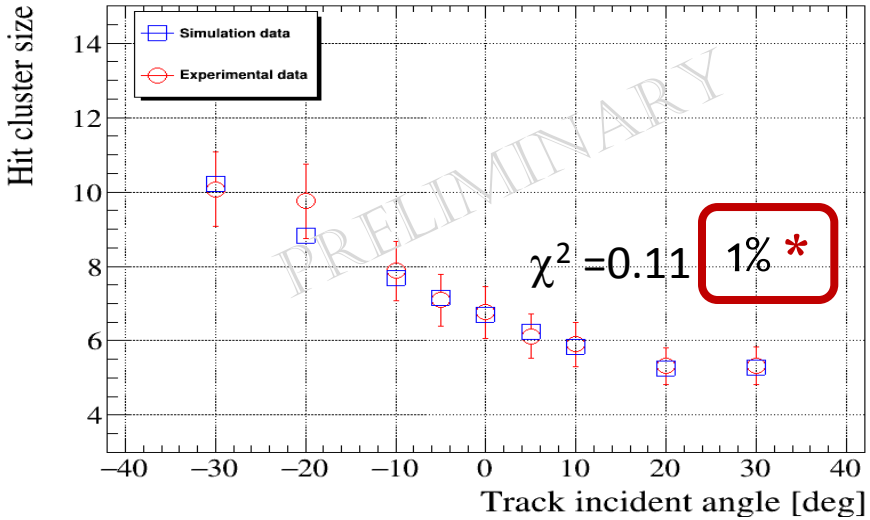


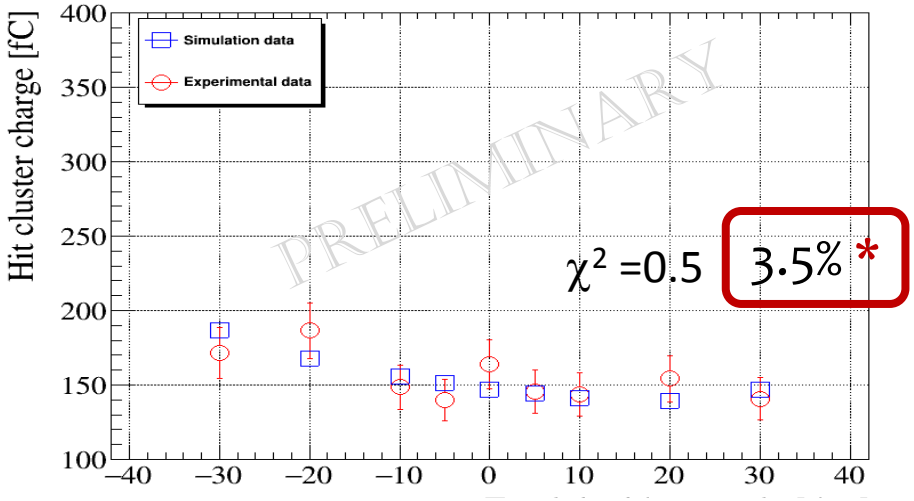


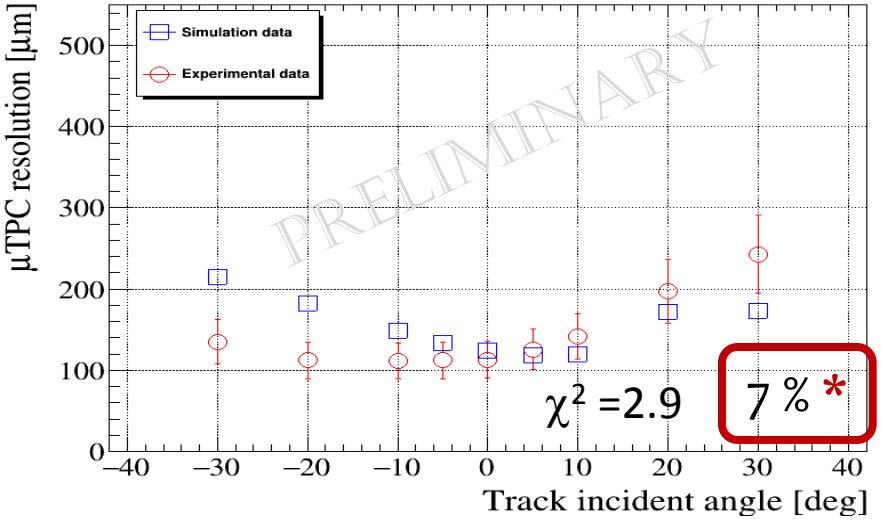
* (experimental –simulated)/experimental

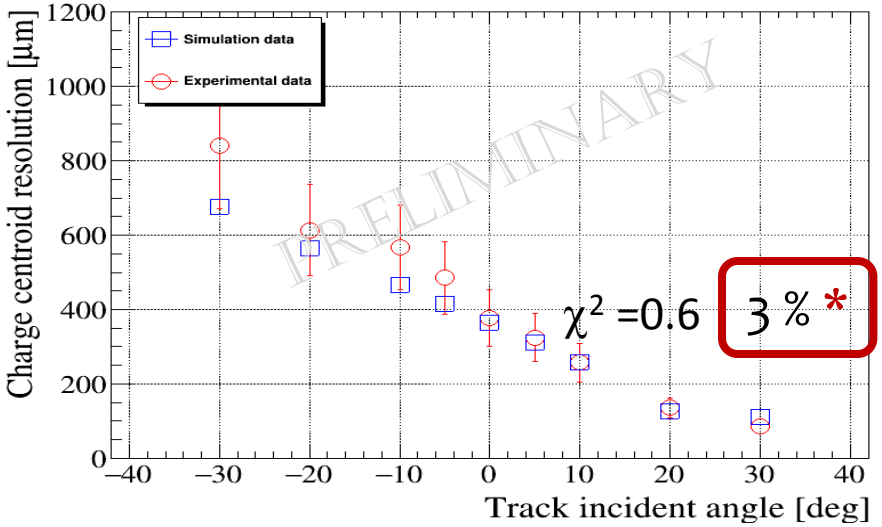
Tuning to real data w/ B

Best result χ^2/NDF ~ 3 ← *gain tuning = 6.8* ← *diffusion tuning = 1.5*









* (experimental –simulated)/experimental