ATLAS micomegas test beam in H4

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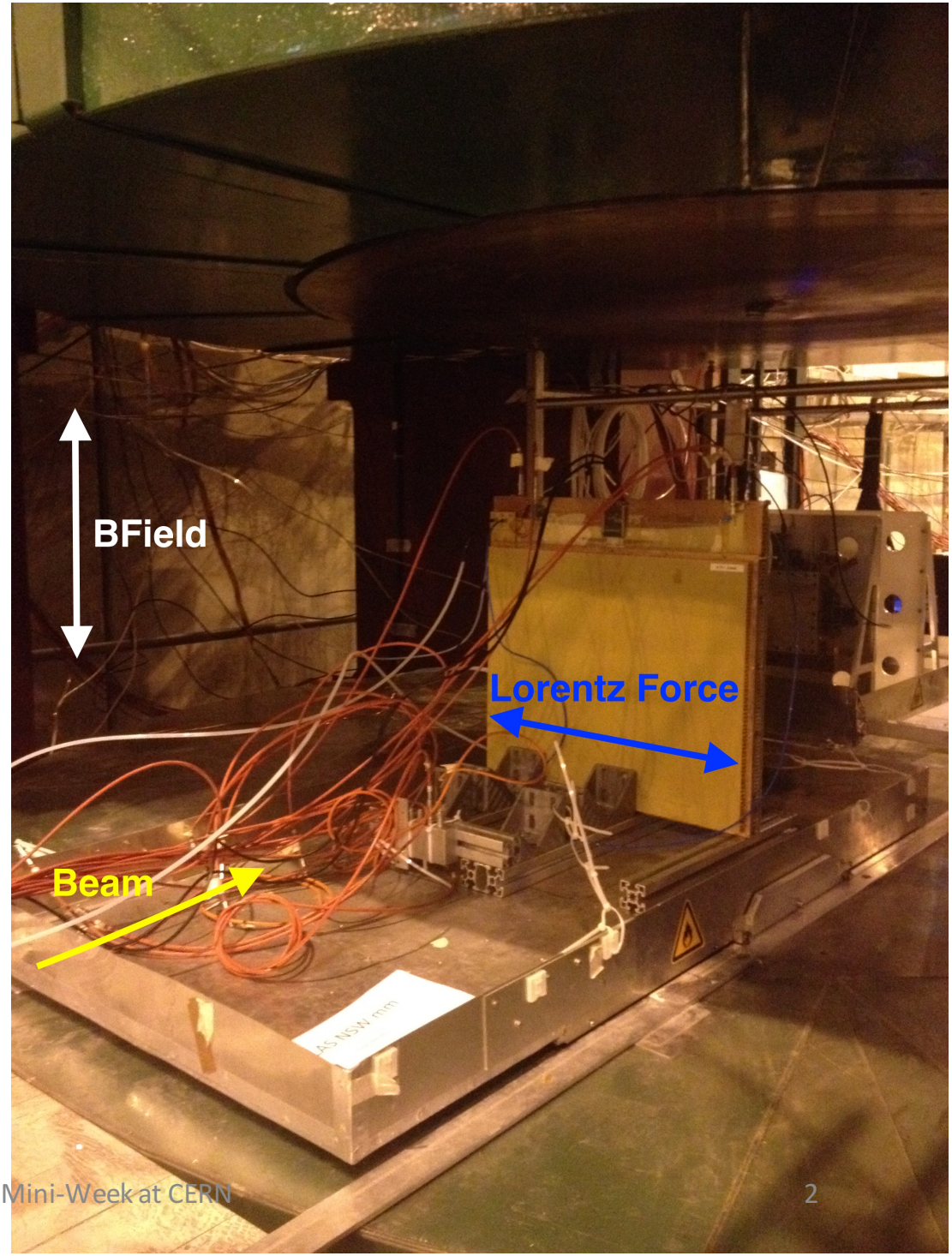
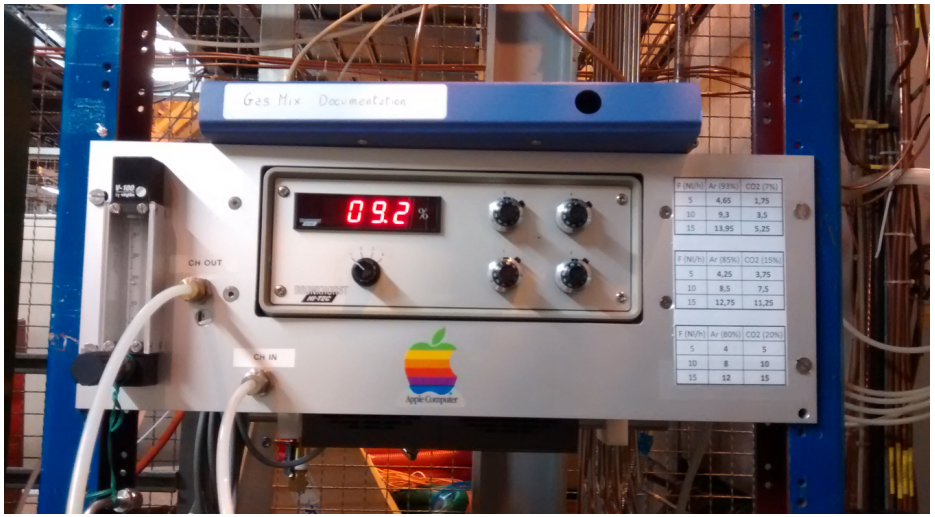
- Reserved slot in H4 Test Beam period of RD51
- Beam time shared with LNF and CMS groups in 12h shifts (08:00-20:00-08:00)
- ATLAS MM setup inside Goliath magnet (***B***-Field with +/− polarity up to 1.5T)

TB Plan:

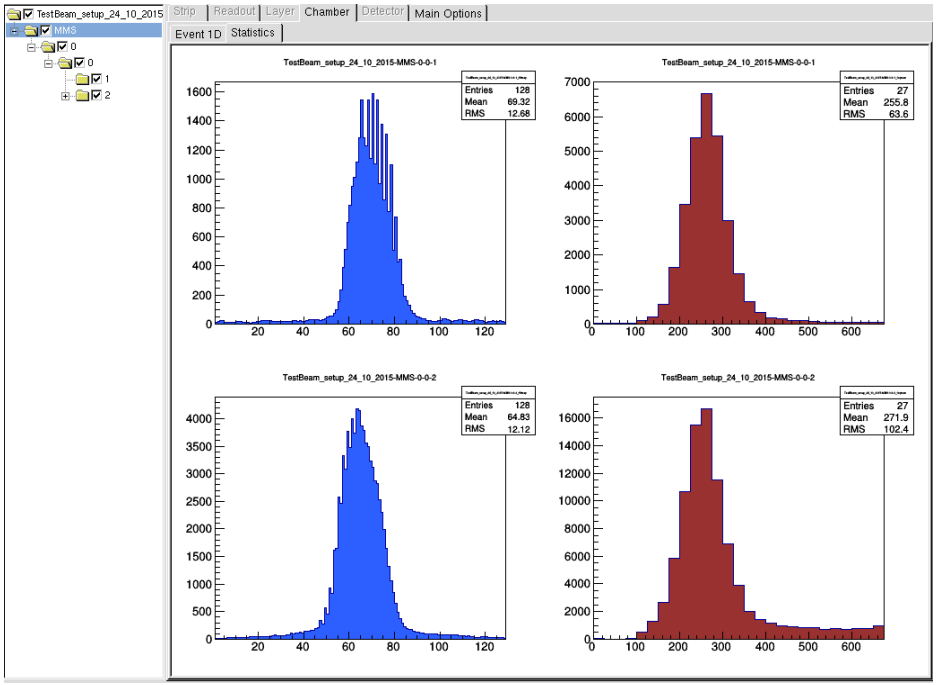
- Test of the MMS double-gap chamber in *B*-Field with APV25
- Study *B*-Field effect with 3.5mm strip pitch
- Study *B*-Field effect with perpendicular resistive & readout strips (rotate chamber by 90◦) B-Field scan 0−0.8T, both polarities
- Test different inclination angles (10◦, 20◦, 30◦)

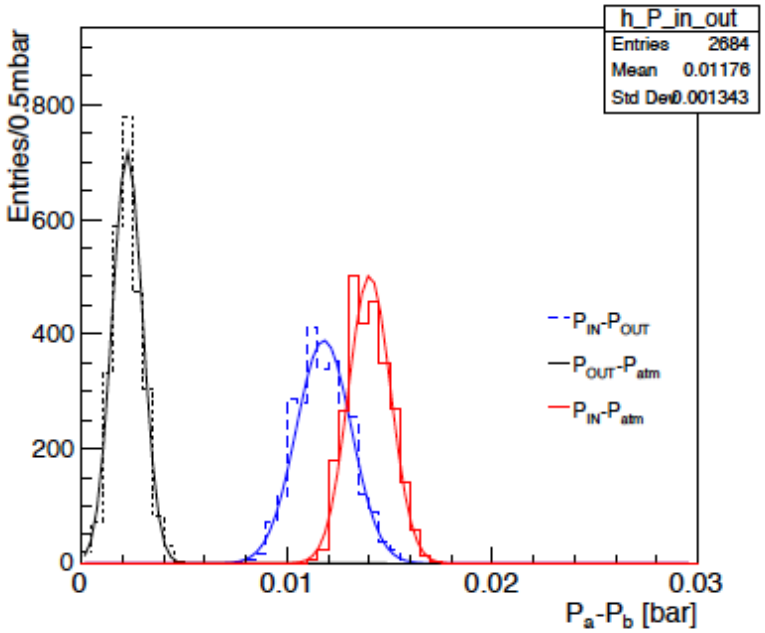


Pre-mixed Ar:7%CO2 gas mixture constantly monitored using gas system by Marco Schiopa

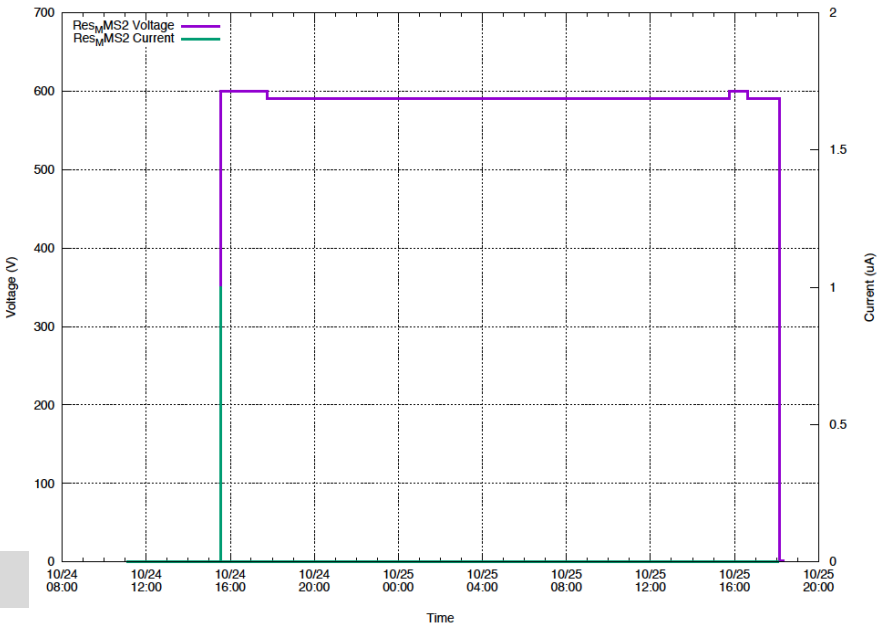


mmdaq3+eventBrowser, testBeam DCS system



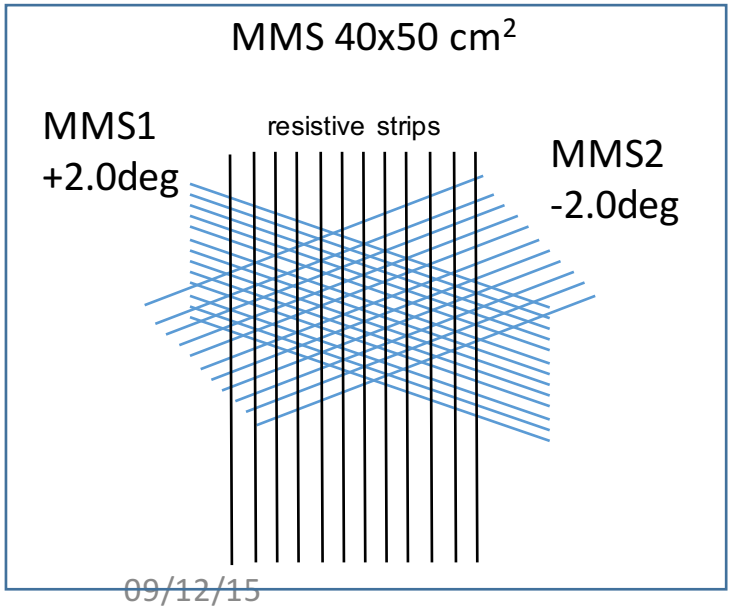


MMS2 Resistive Strips

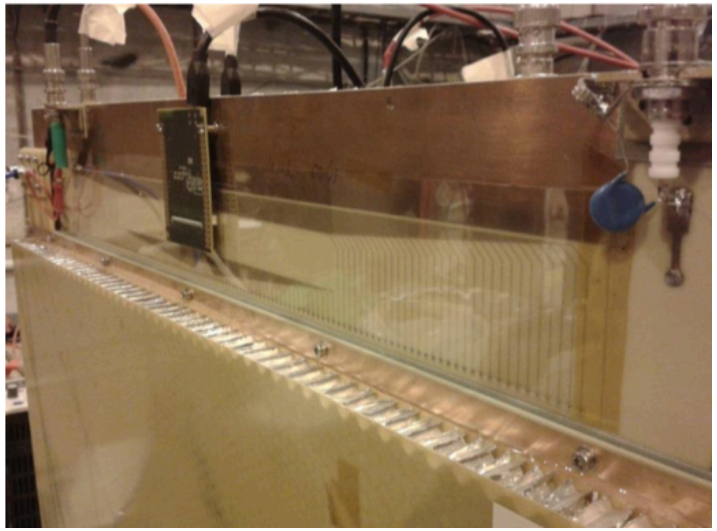


Trigger kindly provided by CMS colleagues (10×10cm2 scintillators)

- MMS medium size (0.5x0.5 m^2) prototype inside a magnetic field for the ATLAS MM project. The special characteristics of this chamber are:
- double gap MM with the two gaps placed in back-to-back configuration
- large strips 3.25 mm wide, with a pitch of 3.5 mm (128 strips per gap). The idea is to minimise the number of electronics channels, i.e. we use only 2 APV25 chips to readout both gaps of the detector
- resistive strips perpendicular to the readout strips in order to spread the charge of a single resistive strip to several readout strips
- stereo geometry in the readout strips with 4 degrees angle between the strips of the two gaps allowing for the 2D hit reconstruction by combining the information of the two readouts



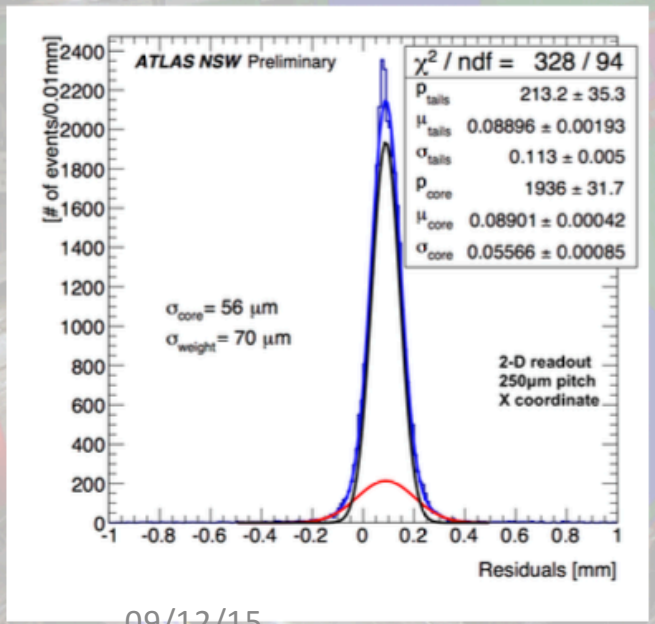
MMS strips (3.5mm pitch,1.5 deg)

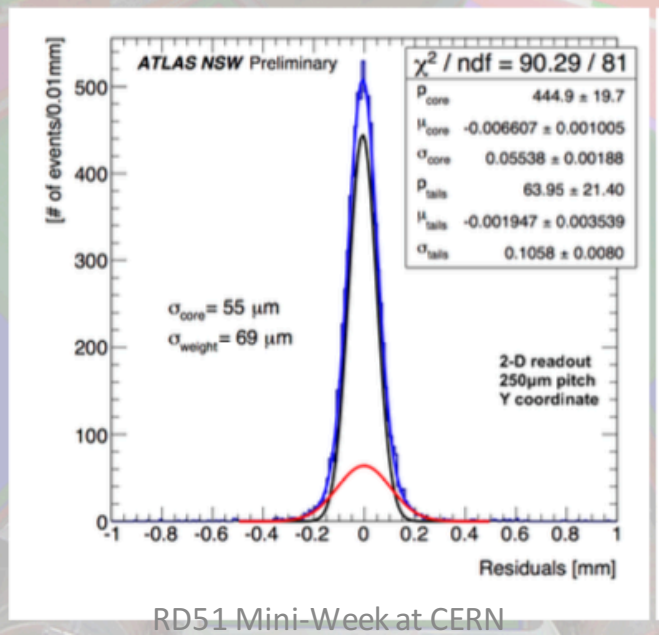


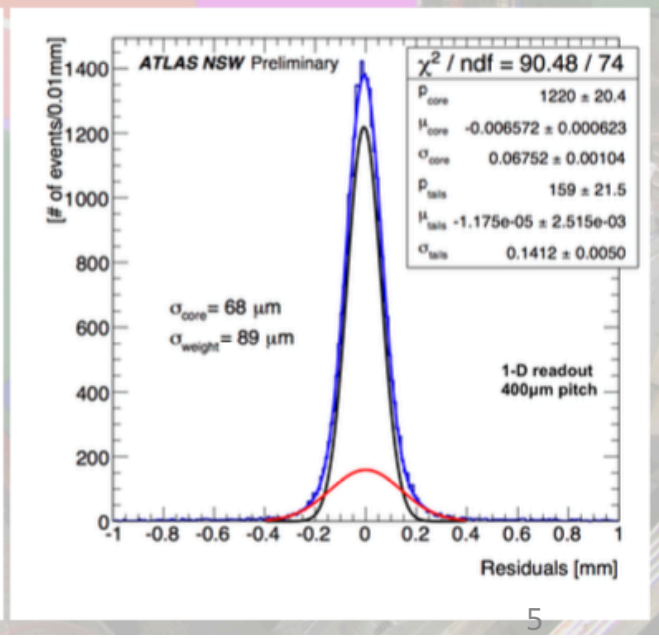
Spatial resolution for perpendicular tracks - The Centroid method, TMM & T MM

- For perpendicular tracks the, charge is most likely spread among 3 resistive strips of one cluster, assuming 400 μm strip pitch (4 strips for 250 μm pitch)
- This accounts for very precise charge interpolation for the hit reconstruction
- The average of the strip addresses, in one cluster, weighted by their charge provides the Centroid reconstructed hit position
- The spatial resolution of the Centroid hit is only limited by the granularity of the readout elements (strip pitch)

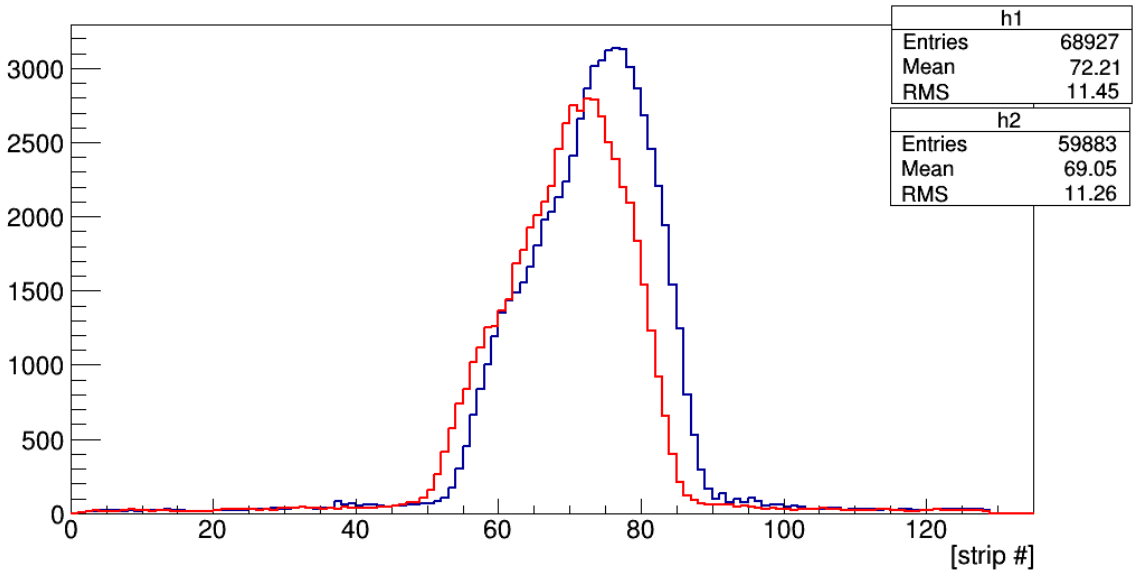
- In the case of 2-D readout chambers the y-strips direction is perpendicular to the resistive strips
- The charge, owing to its propagation along the resistive strips, is spread along several Y readout strips
- No difference in the resolution between X and Y readout strips has been observed



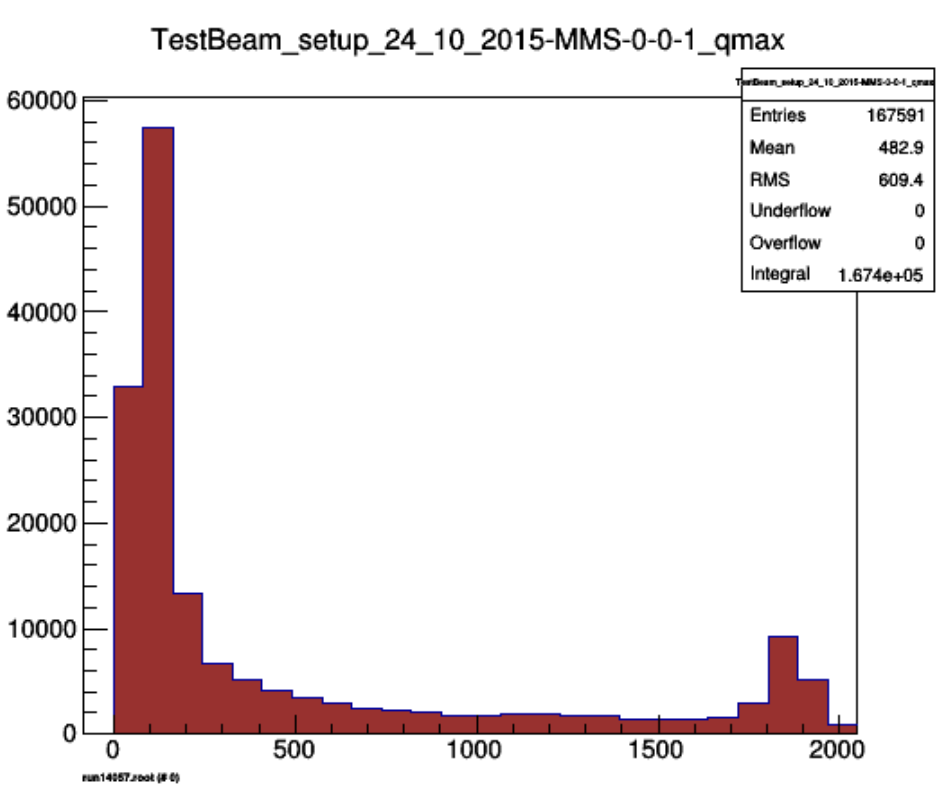


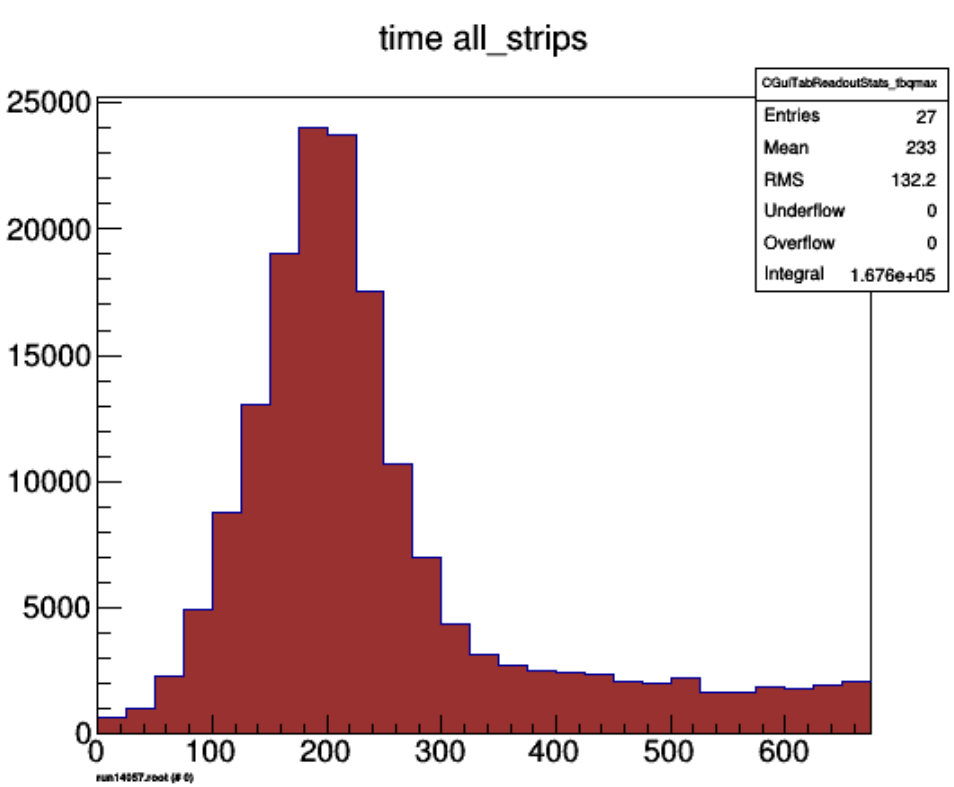


no field

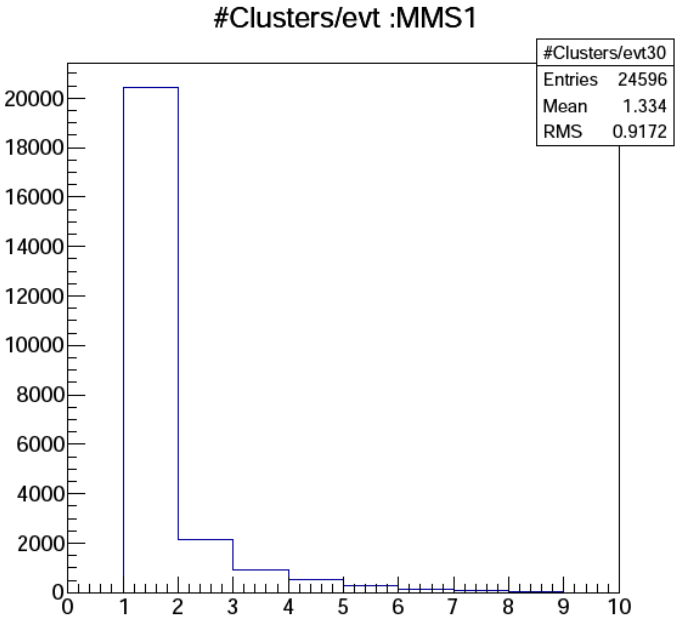


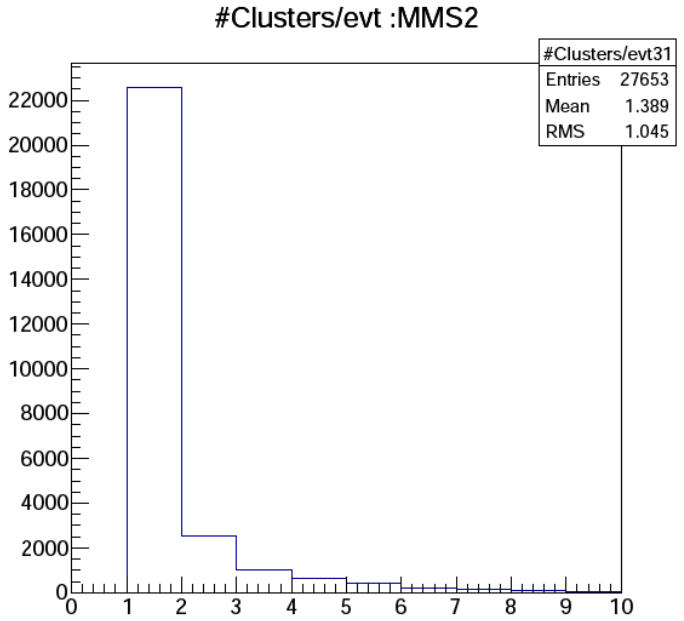
Beam profile



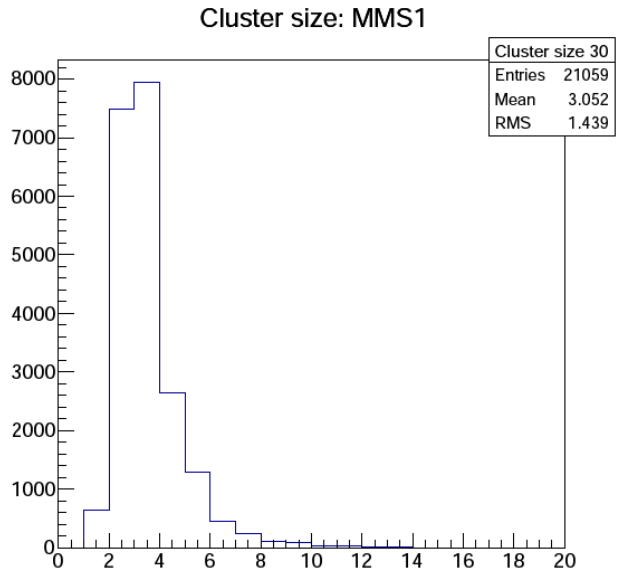


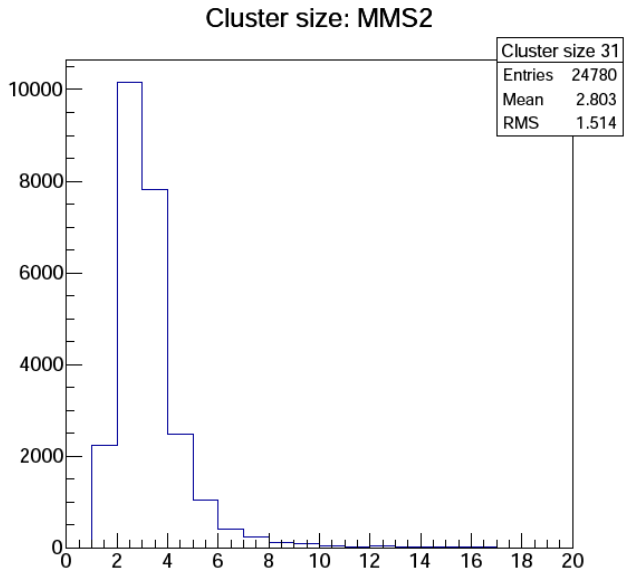
no field



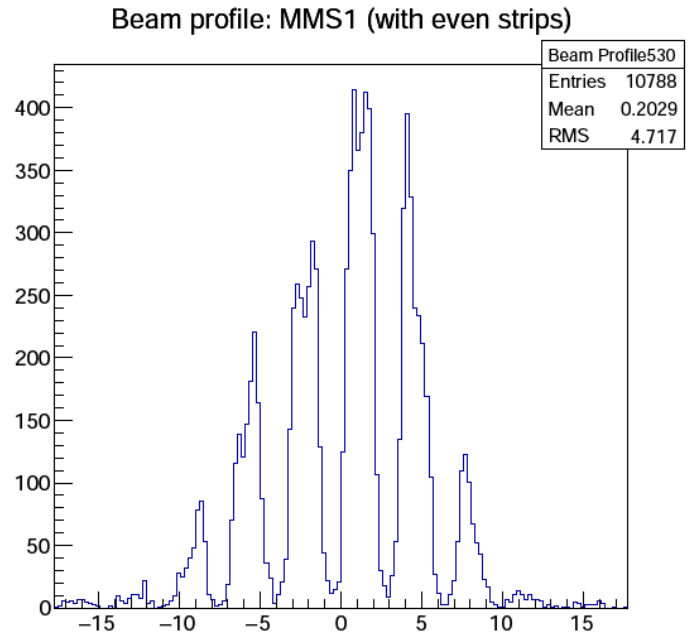


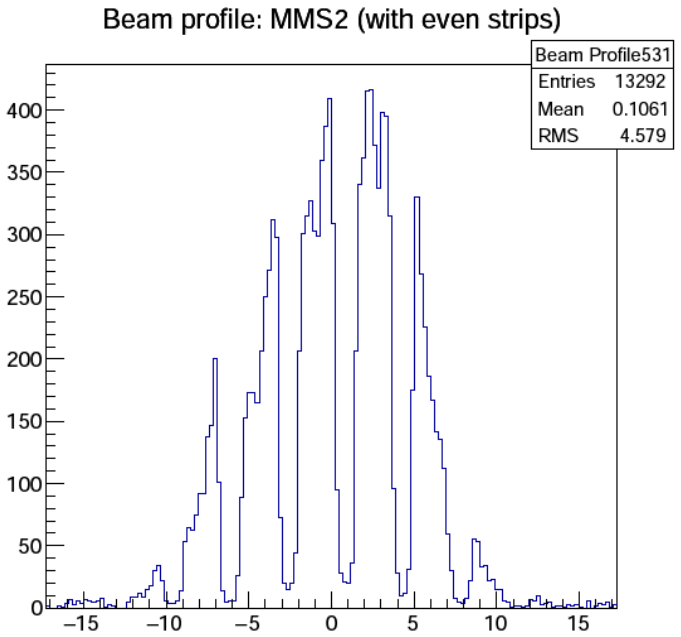
number of clusters





Cluster size

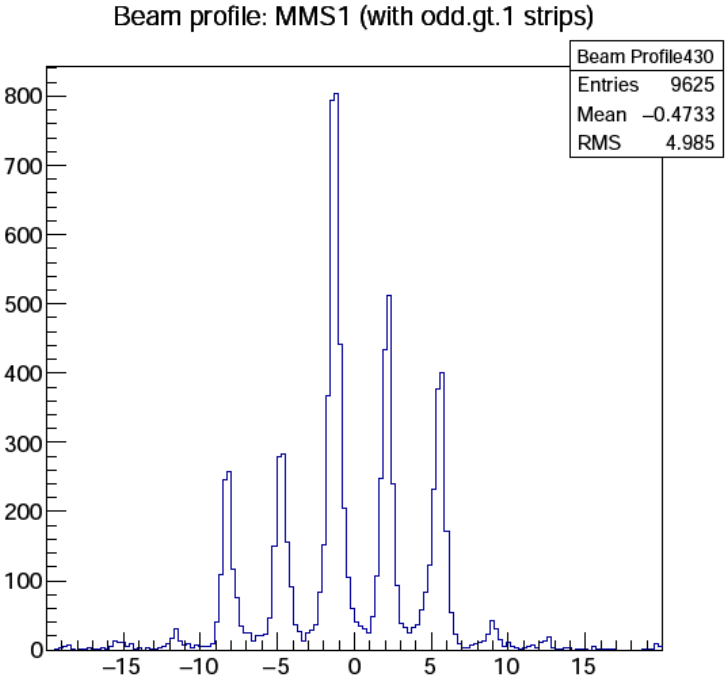


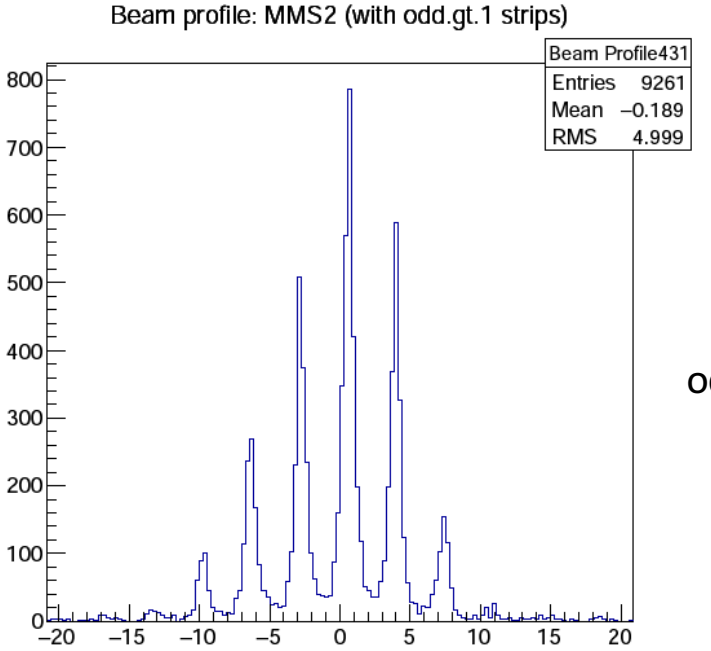


no field

even clusters

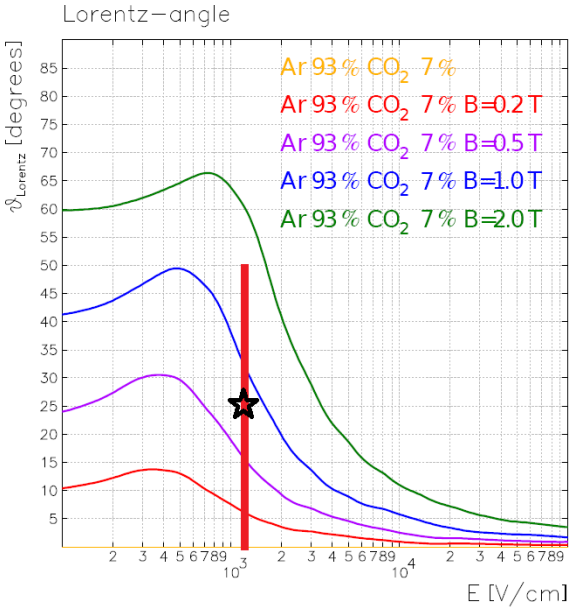
Beam profiles

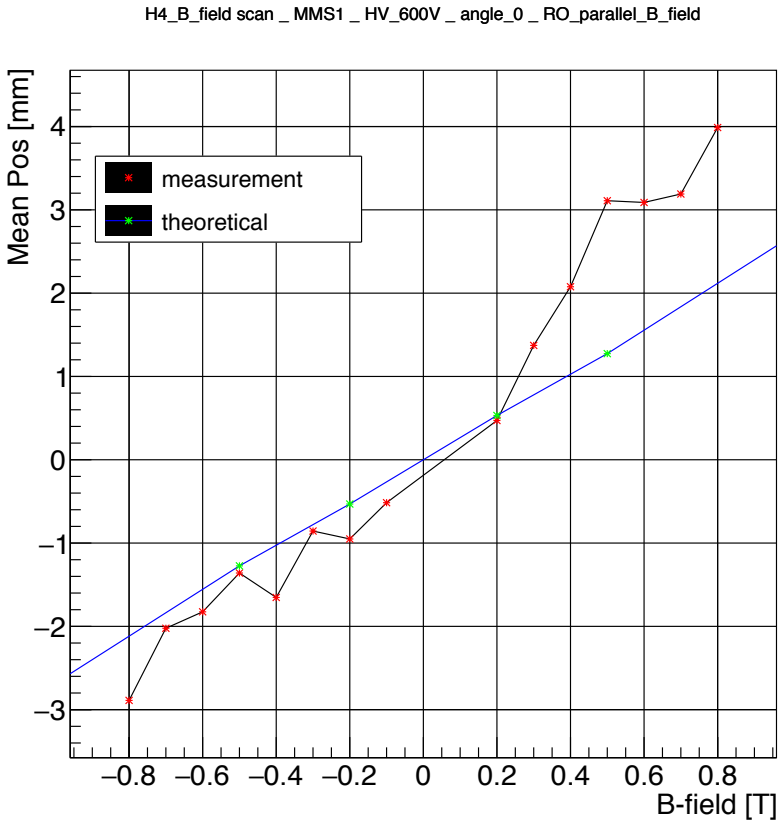


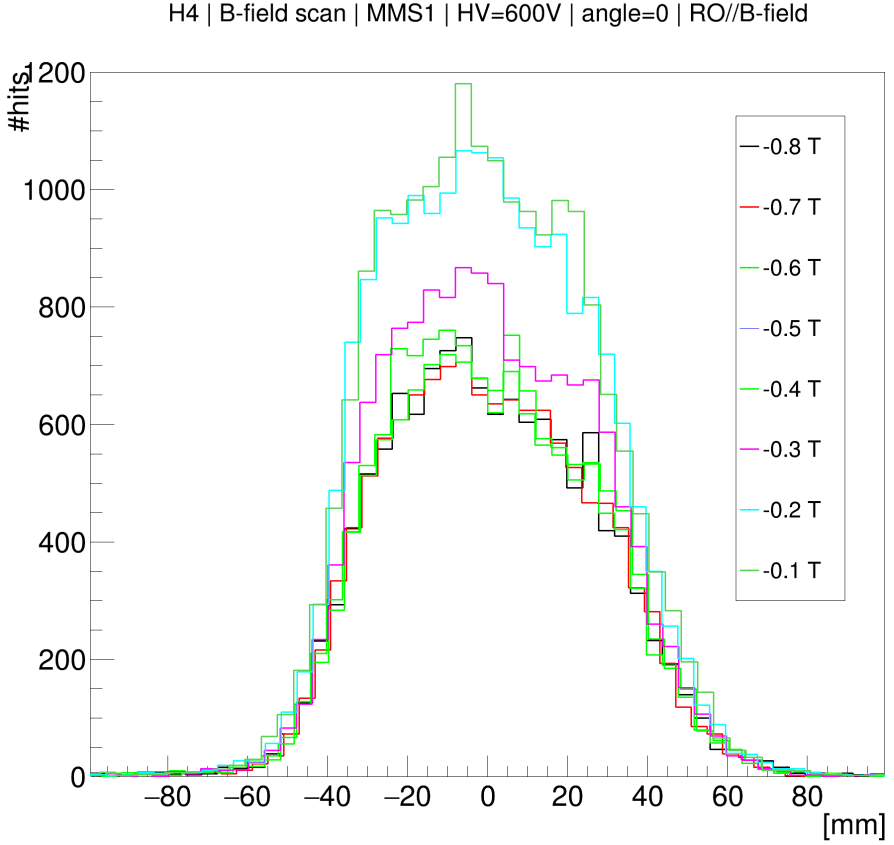


odd clusters

Normal tracks;
For each *B*-field setting get the mean beam position







Future Plans: testbeam at H4 during 2016

- Test new Electronics, frontend (MMFE8) with 8 VMM2 ASICS
- Test MM with different pillar pattern; cross-type vs circular; 100um pillar height

Thank you for letting us participate!