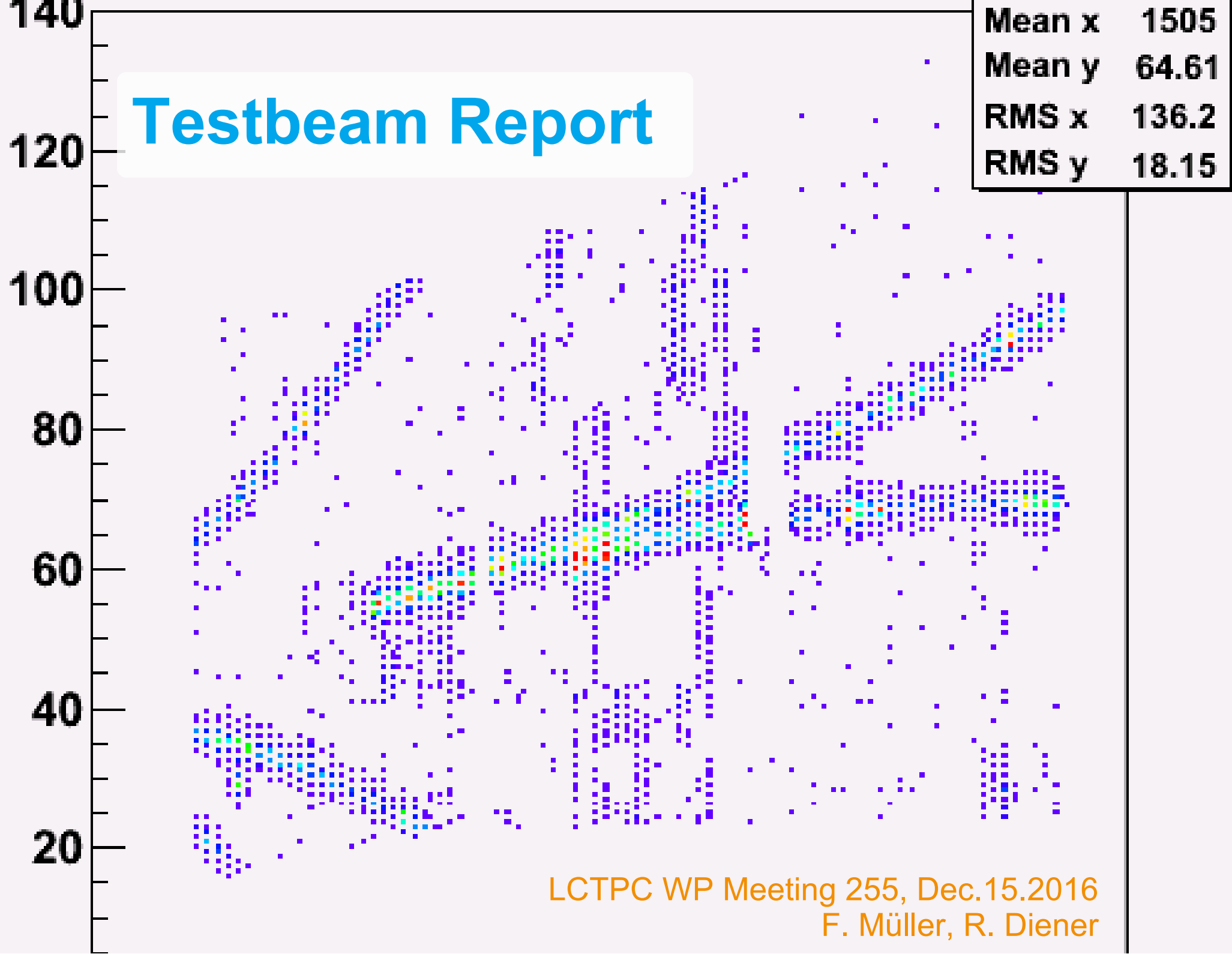


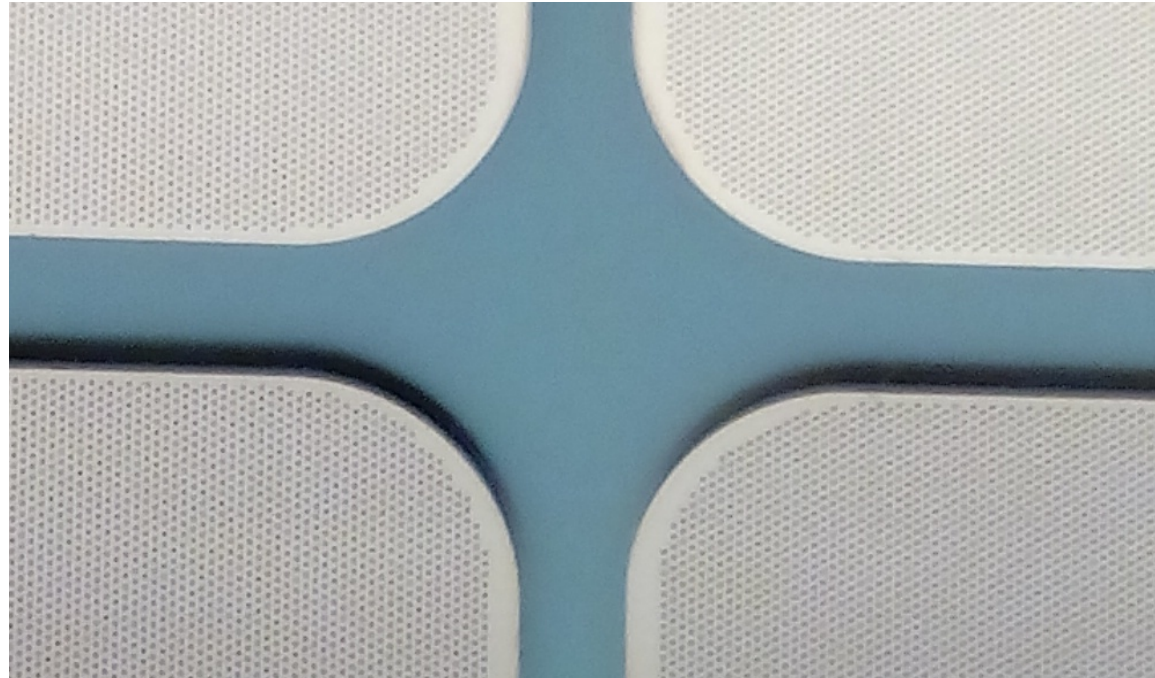
Testbeam Report

Mean x	1505
Mean y	64.61
RMS x	136.2
RMS y	18.15

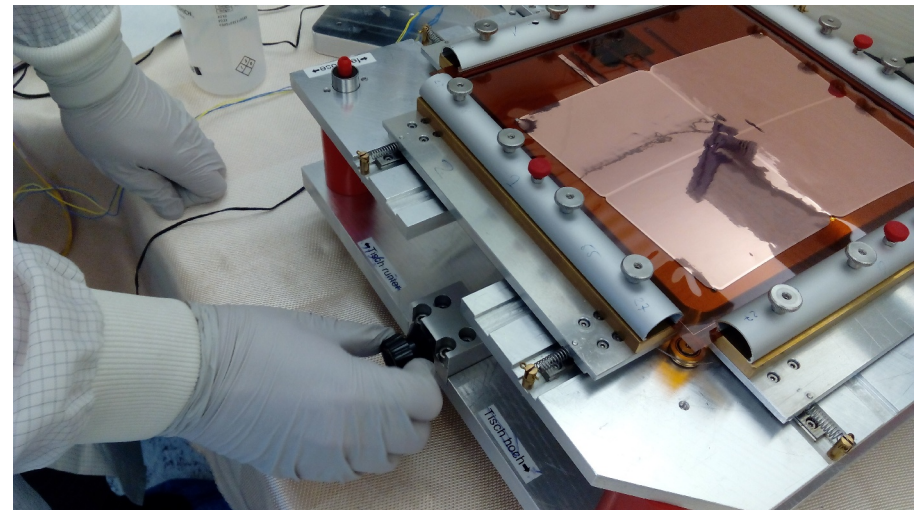
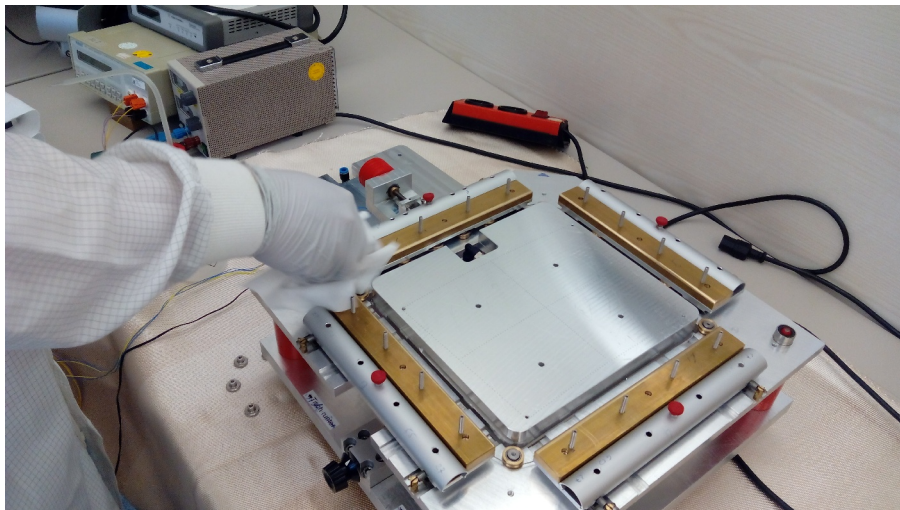
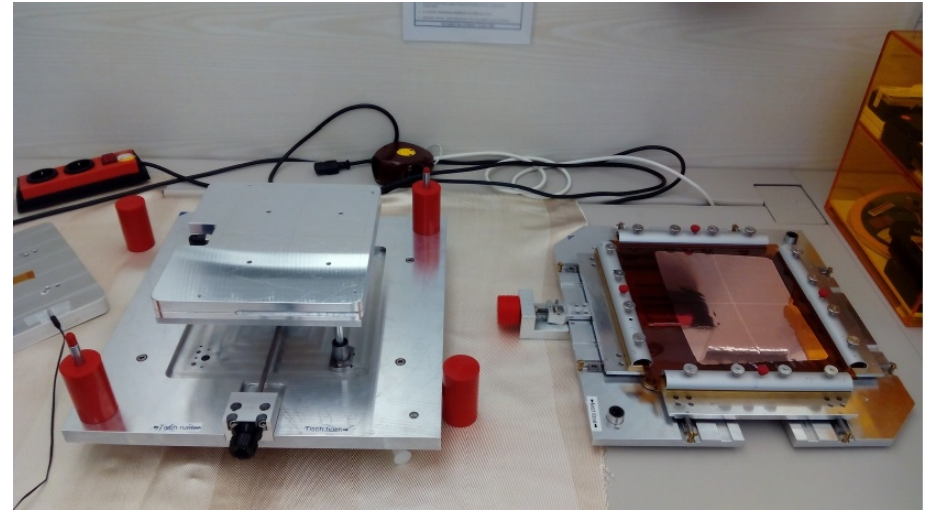


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F. Müller, R. Diener

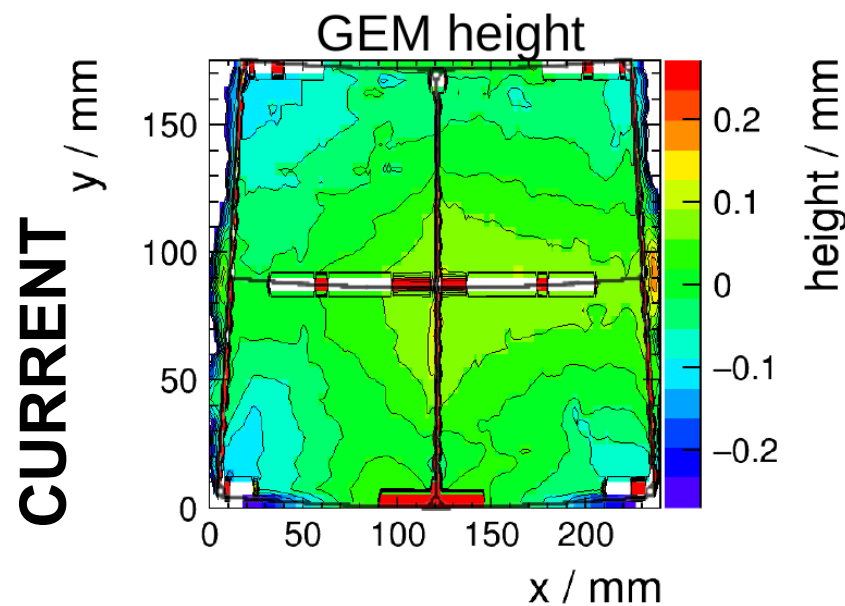
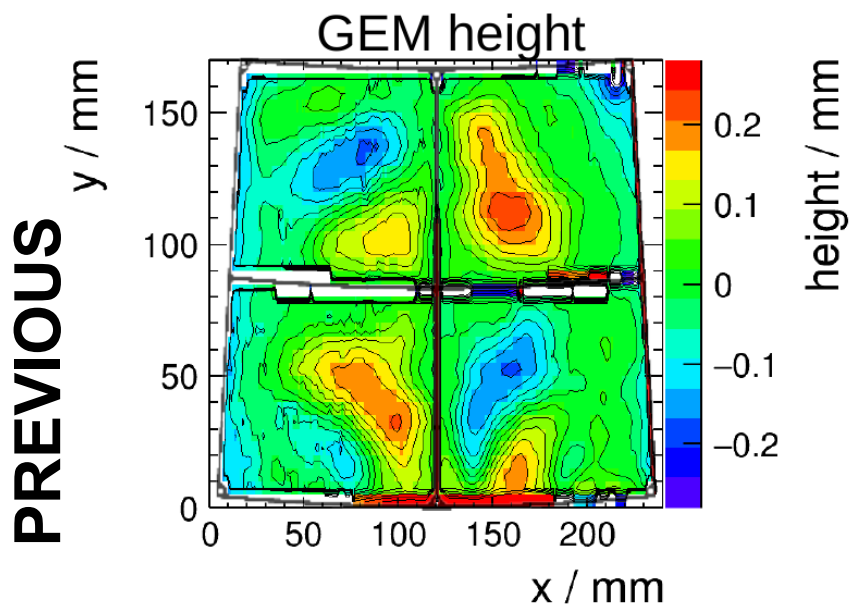
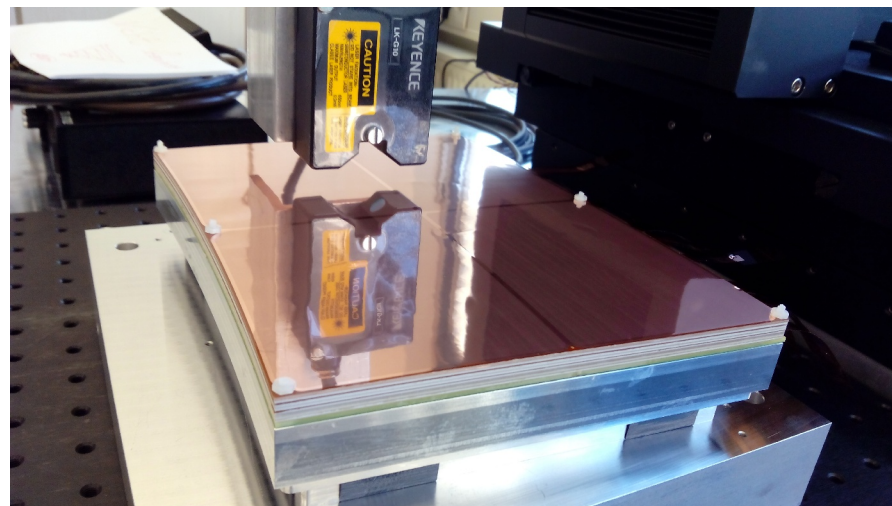
- Main Goal: double track/hit resolution studies
 - Measurements with target to create multiple secondary particles ($\frac{1}{2} X_0$ stainless steel bar inside the solenoid right in front of the LP)
 - Simulation showed $\sim 5\%$ usable double track events with right ratio of overlap and separation
- Improvements on modules
 - Glue + gluing speed optimized (full coverage, minimal spill)
 - Slight increase of area without holes around the ceramic grid
 - Only needed HV lines per GEM (not sharp edges due to cutting)
 - Improved stretching/gluing procedure (new tool)
- Ceramic GEM mounting frames arrived only mid November:
Could not start testbeam as planned end of November



- Production process well prepared
- New GEM mounting and gluing tool
 - Goal: consistent+reproducible flat GEM mounting
 - Step towards “mass production”
- Speed of gluing/mounting GEMs limited by lab access
 - even with new heat drying box only one GEM per day possible
- 3 modules built and tested in ~ 2 weeks



- Quality control: foil flatness
- GEMs of 2 modules measured
- Last generation height RMS: 50-90 μm
 new RMS: 30-50 μm
 → New generation consistently more flat by almost a factor of two
- Calculated gain fluctuation for triple GEM stacks: 6.1% → 4.2%



- Insertion of 3 fully tested modules on December 1st
 - Gas tightness very good: 6 mbar overpressure at 40 l/h (set flow), O₂: ~60 ppm, H₂O: ~50 ppm
- Improvement: newly developed connector clamps work very well → nearly no dead channels

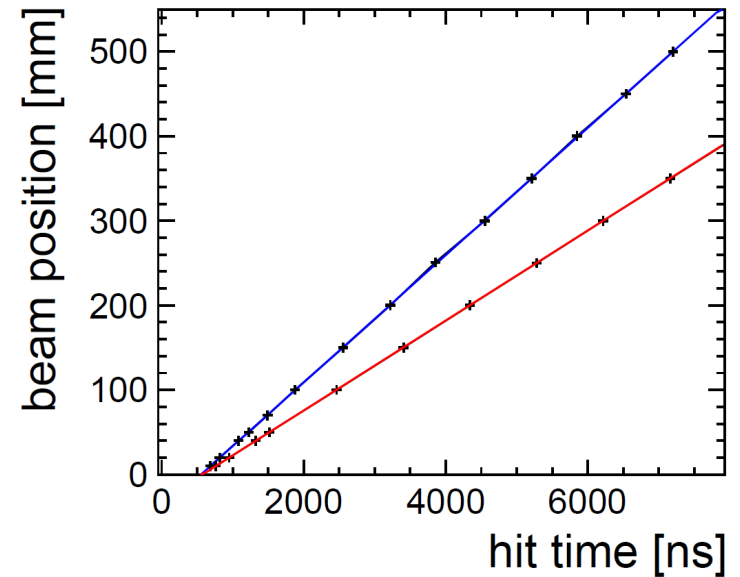


- Newly installed oil filters for compressed cooling air seem to work well (some oil in filter but none on the FECs so far)

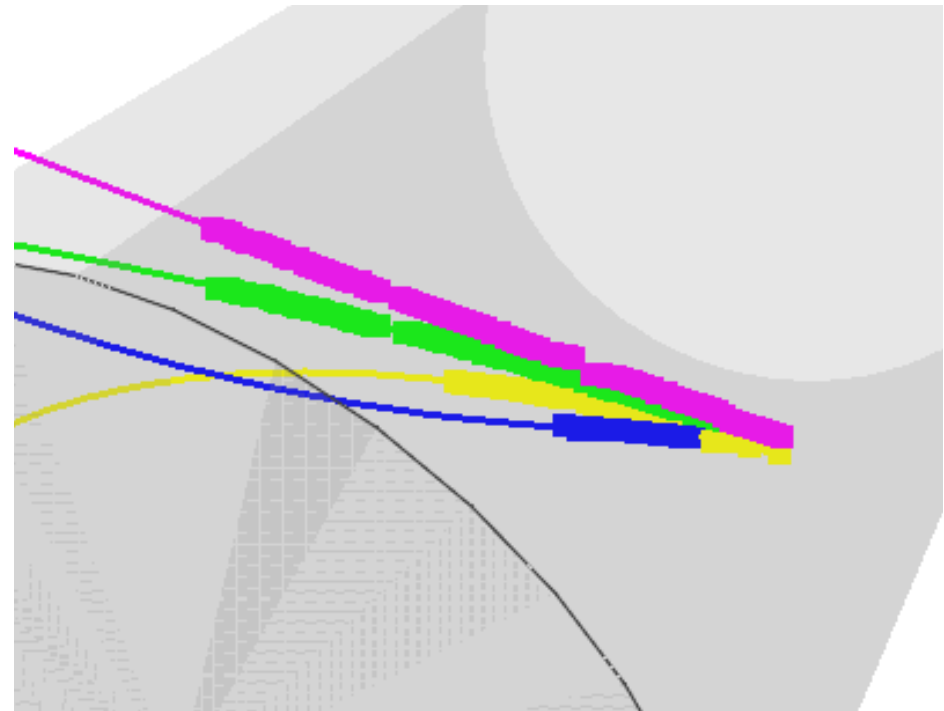


- System fully and stably running in data taking mode since December 6th (first data already a couple of days earlier, but some small hick-ups)

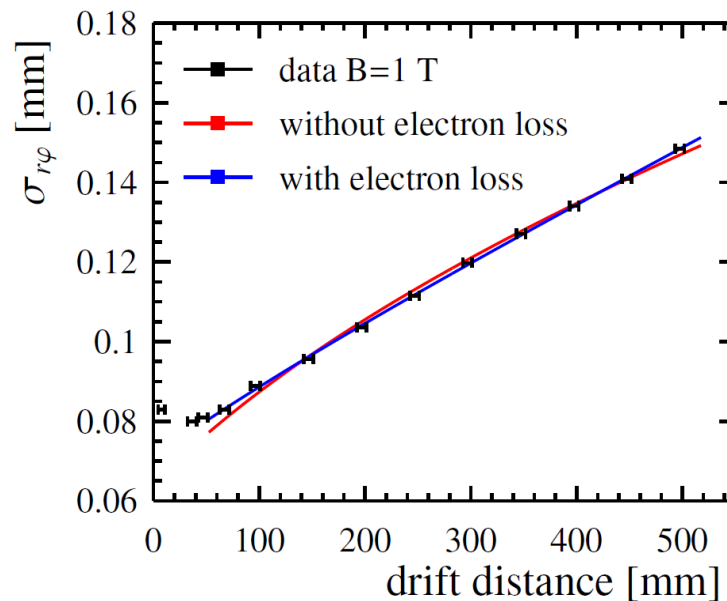
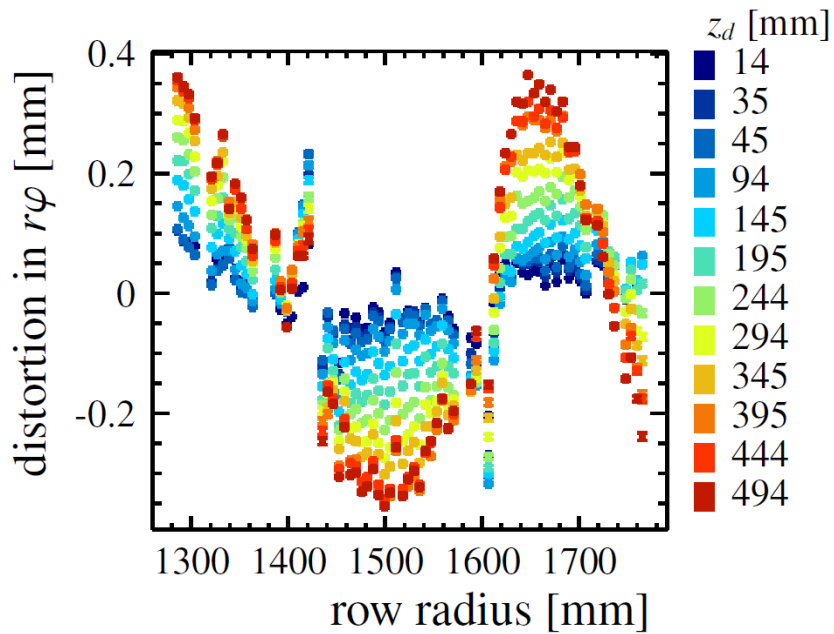
- > 3.5 M events recorded so far
- System characterization runs (z-scans) done



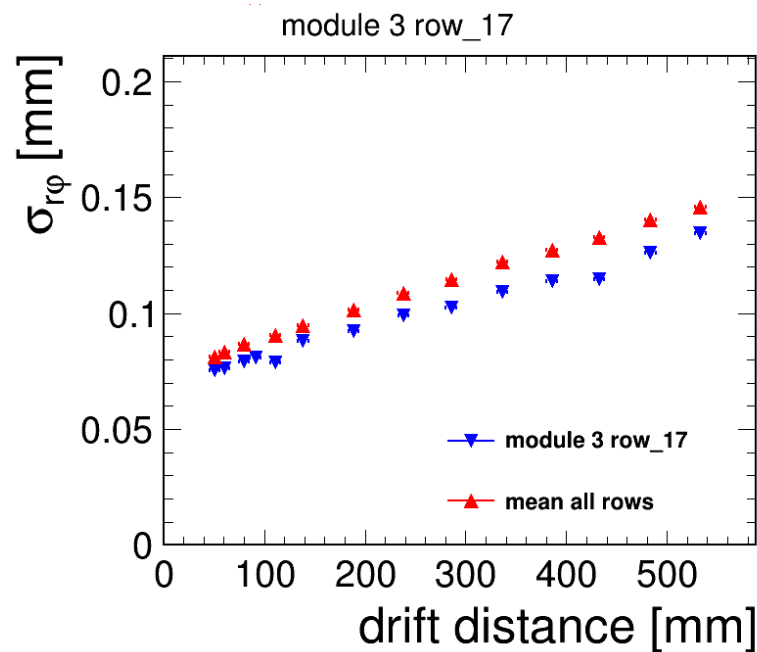
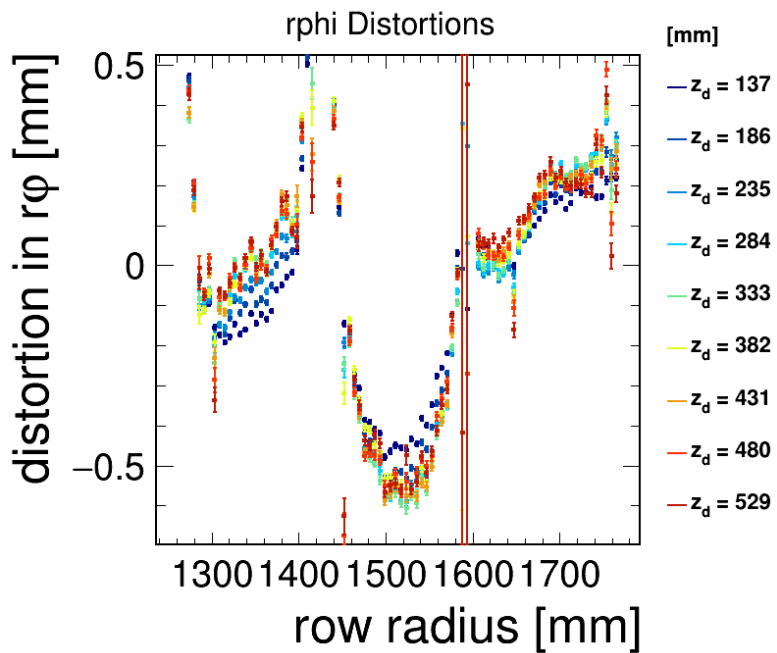
- Measurements with target:
 - Runs at 0, 0.5, 1T magnetic field and different drift lengths: 50, 100, 200, 300, 400, 500 mm
 - Rate of usable double track events:
 - ~3-4 % for 1 T magnetic field
 - ~10 % for 0.5 T
 - Can most probably be increased by selection criteria optimized on real data



2013
Aligned
& Data
selection



2016
Raw &
preliminary



- New modules show the expected improvements (GEM flatness) and good performance in testbeam
- Testbeam running well:
 - Compulsory measurements done
 - Now more statistics and “*second priority*” measurements: angle scans, x-scan
 - Software: full chain of fast analysis framework works very well
 - First results look promising
- Status:
 - This week short pause since Belle II needs to do magnet measurements
 - One more week of testbeam before Christmas from Belle II
- Big thanks to everyone involved in the preparation and the running!

