Status of DATCON

B.Deschamps, J. Dingfelder,
C. Marinas, C. Wessel,
University of Bonn

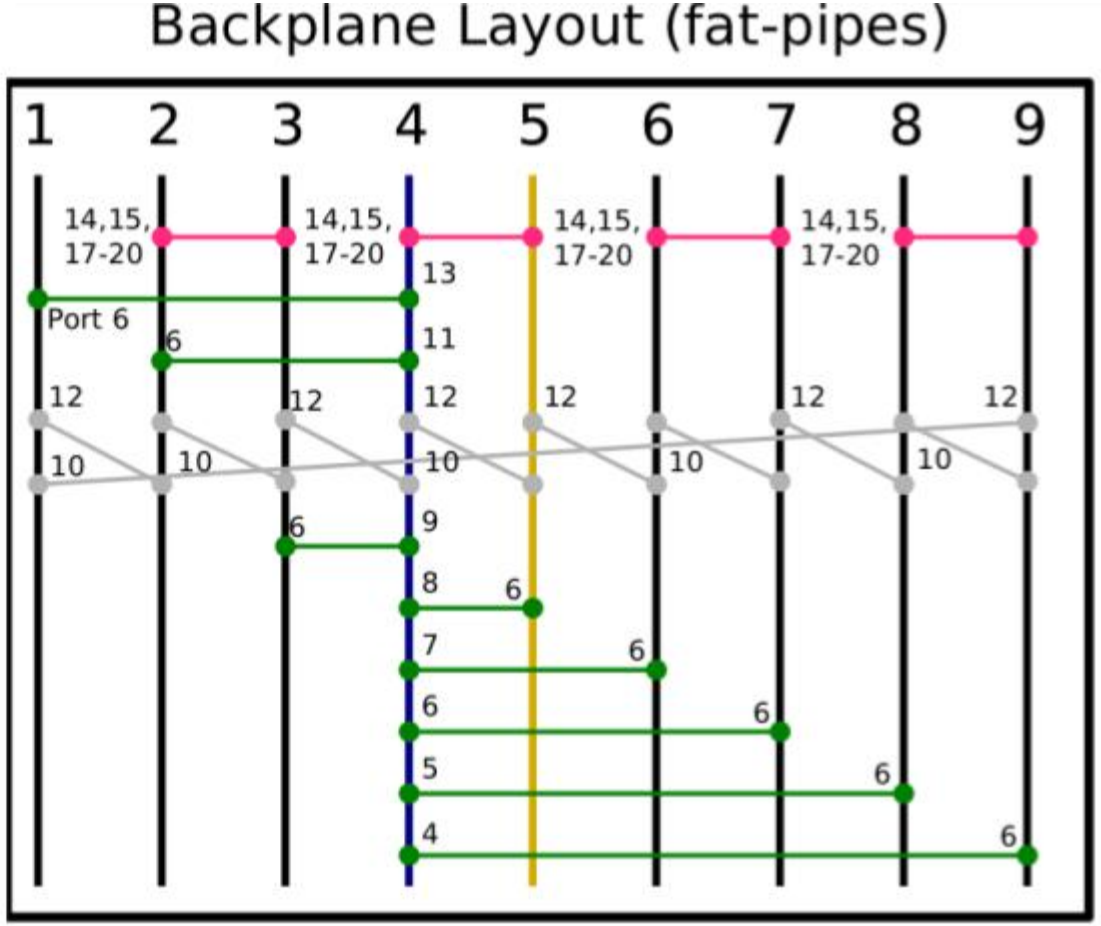
deschamps@physik.uni-bonn.de

Final hardware

- Almost all the final DATCON components were received
- 3 chassis from Pentair
- 3 DHE
- 5 extension boards
- 15 AMC V3.1
- 1 MCH and 1 PM from N.A.T(need one pair per chassis). For some time we had had to face inopportune crashes. Fixed with new power module

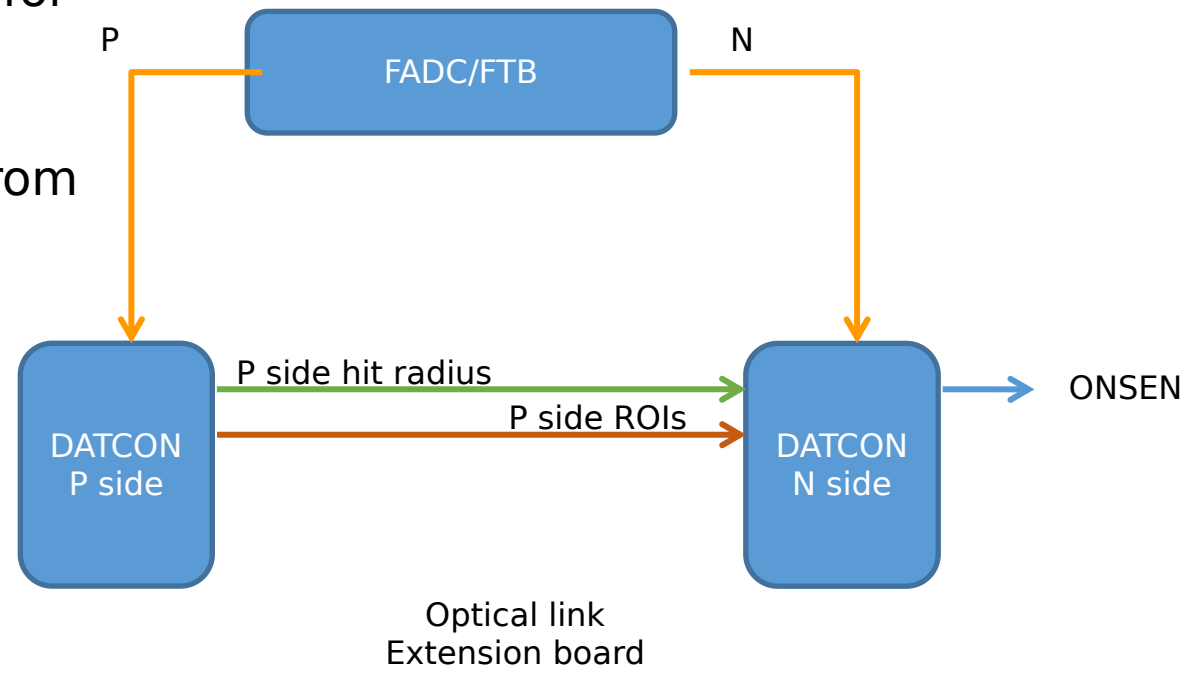
- On every single AMC the oscillator will have to be replaced
- They will then be tested

Datcon connection



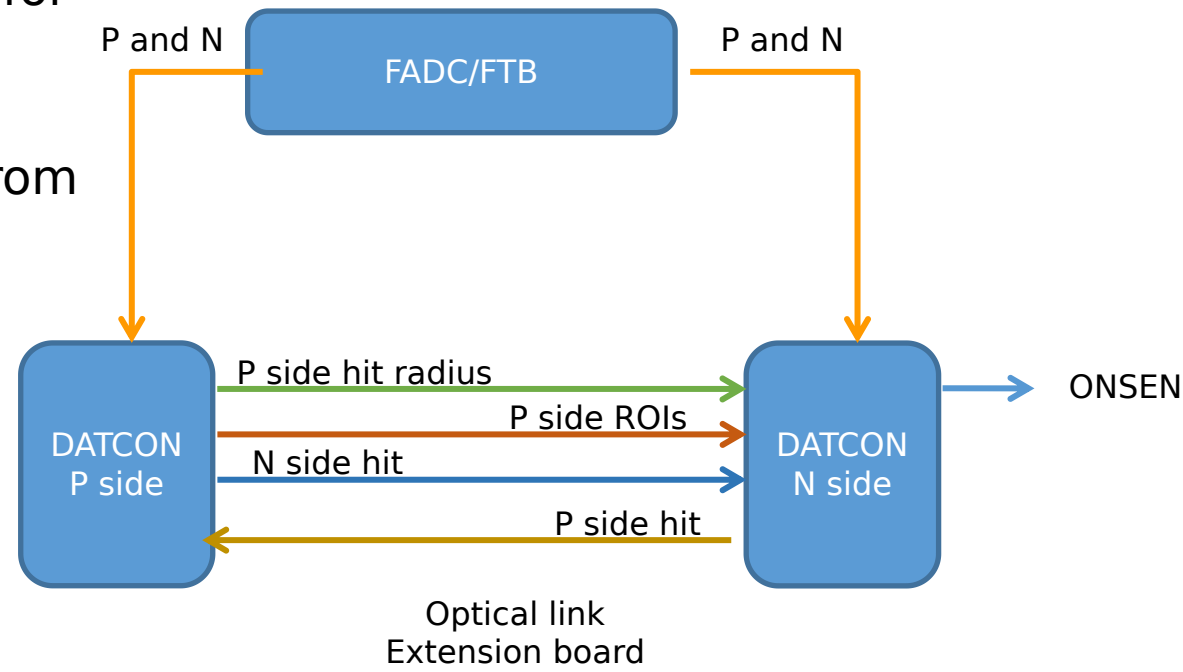
New FADC implications

- The first idea of DATCON's hardware was based on separated P or N side data coming from FADC and FTB
- New FADC will process both P and N side
- Backplane connection and DATCON architecture was not imagined for mixed side input
- Only one backplane channel available to send mixed data from concentrator to tracking

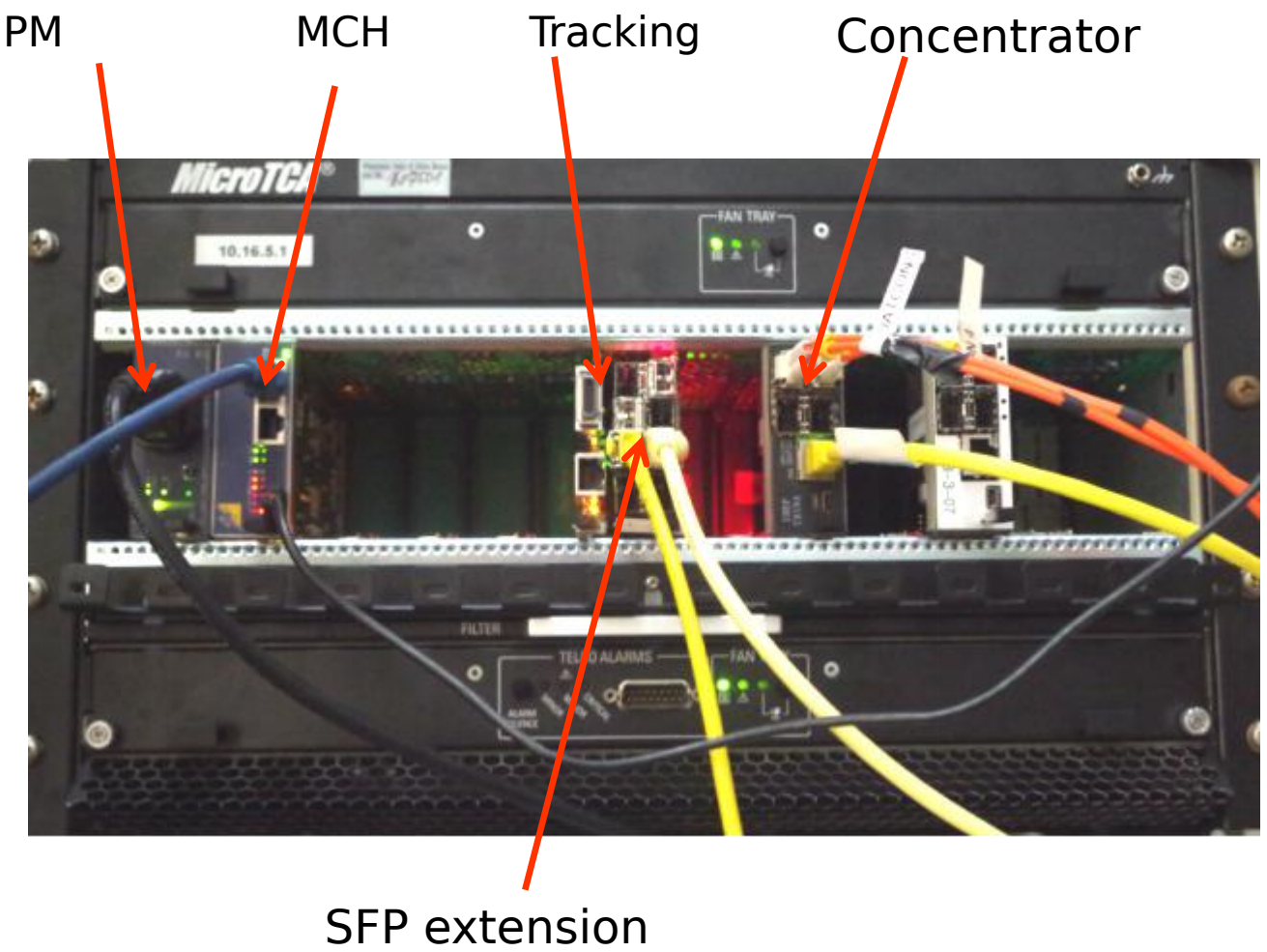


New FADC implication

- The first idea of DATCON's hardware was based on separated P or N side data coming from FADC and FTB
- New FADC will process both P and N side
- Backplane connection and DATCON architecture was not imagined for mixed side input
- Only one backplane channel available to send mixed data from concentrator to tracking



PERSY setup



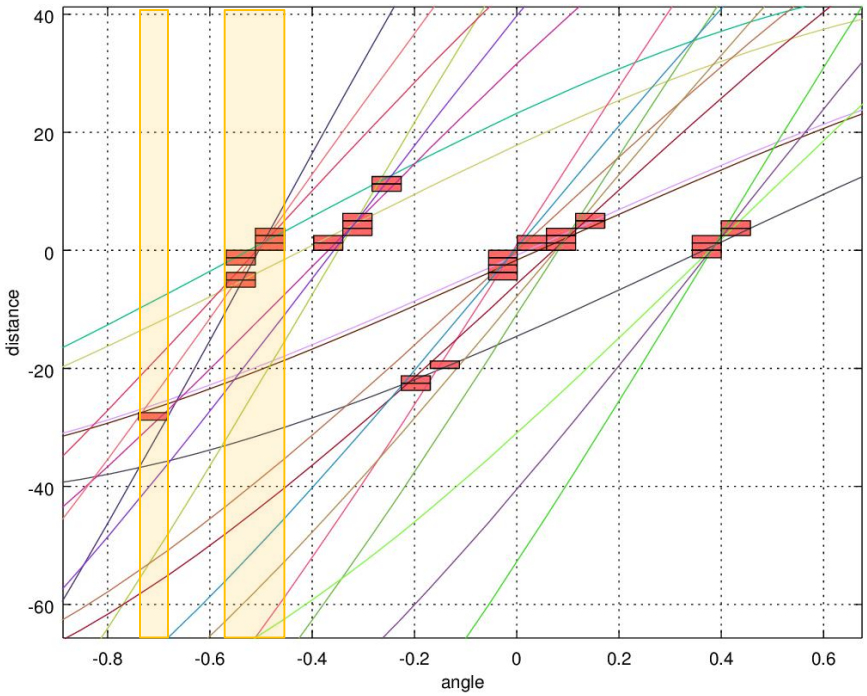
- uTCA chassis
- Custom back-plane for DATCON requirements
- 9 slots
- 2 chassis will be used for final experiment

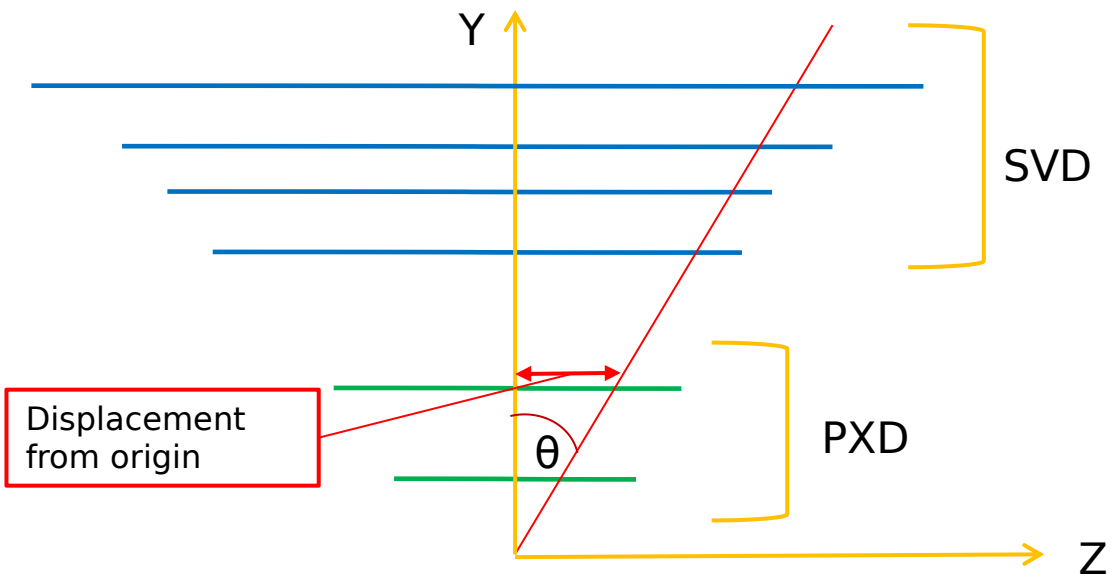
Test Beam parameters

UNIVERSITÄT BONN

- For P side, tracking was made using the x and y coordinates of SVD hits after conformal mapping with origin of the track set to (x,0,0) where x is the x coordinate of the center of the beam pipe
- For N side, tracking was based on x and z coordinate of SVD hits
- For both side the Hough space size was set to 64*64 sectors
- P side HS covering [-18 18] deg
- N side HS covering [-36 36] deg
- ROI generation for inner and outer backward PXD modules

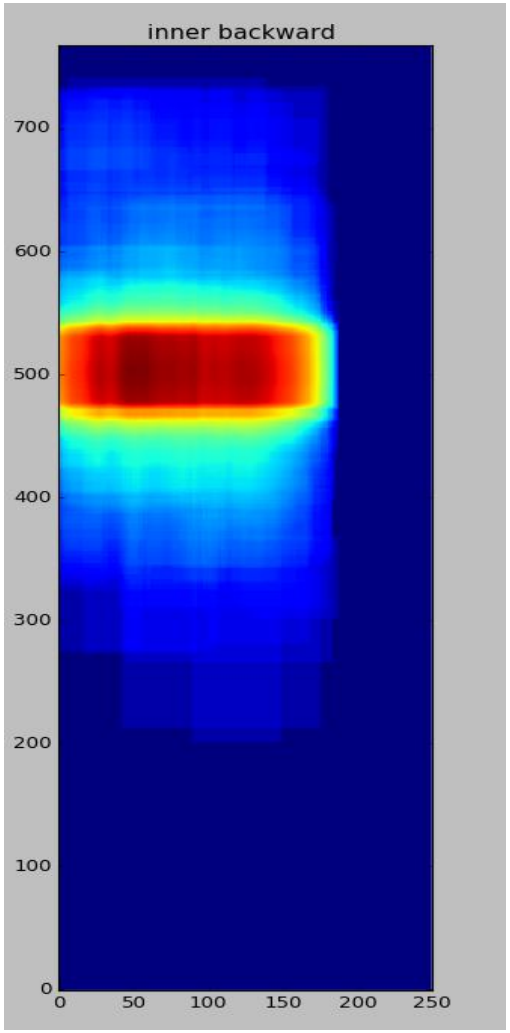
Extrapolate from Hough Space





- No clustering of the Hough Space sectors
- Only interested on the angle of active columns
- Displacement from origin is calculated to get position on PXD
- ROI size directly depending on the width of angle range from HS
- Not suited for low momentum curved track on Φ

DATCON results



DATCON ROIs hit map

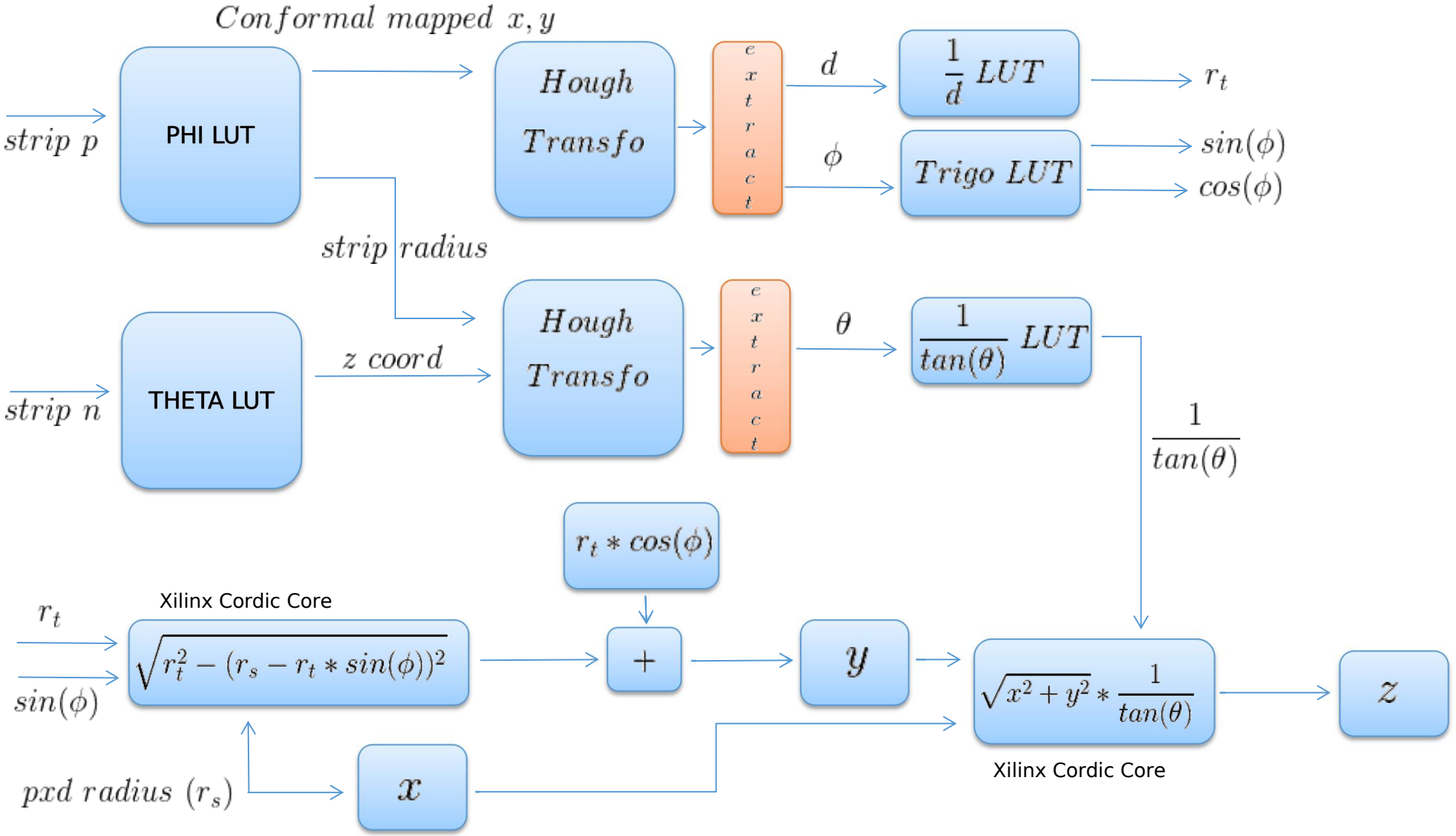
- Communication problems kept DATCON and ONSEN disconnected
- Reset has to be made before new run starts
- DATCON has proven to be stable over several runs
- ROI spreading limited by Hough space angle range
- Clear concentrated ROIs spot. The row position shifted compared to HLT ROIs due to shift of the setup
- DATCON ROIs rely on an interaction point at the origin which was not the case during beam test meaning Φ ROIs

Improvements on clustering extrapolation

UNIVERSITÄT BONN

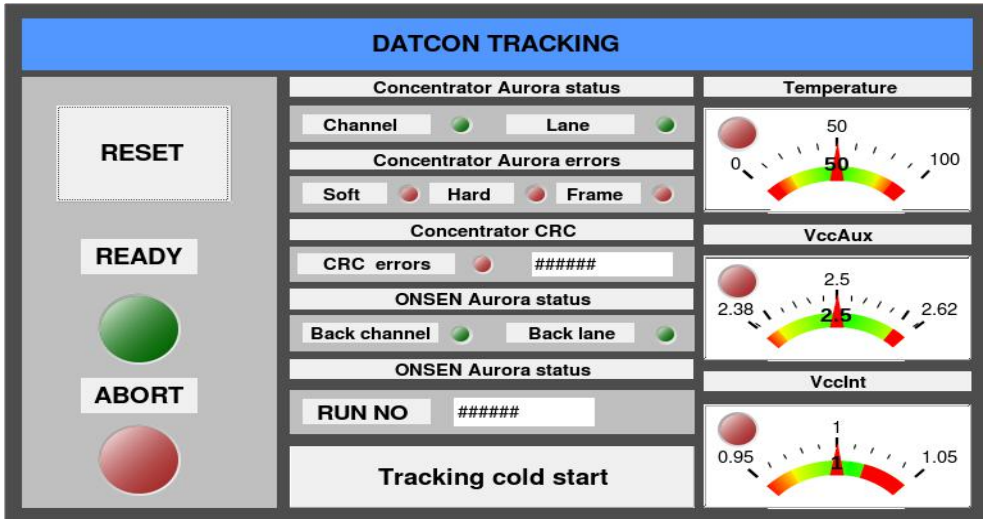
- Complete clustering of the Hough Space is now implemented
- Return the center of gravity of cluster for clusters that fit the requirement, like the size and the shape
- Based on connected component theory and DFS (Depth First Search) algorithm
- To find the starting cell of a cluster we don't have to go through the entire matrix
- Thus the number of clock cycles always lower than n*m
- More than one event can be processed in parallel if clustering takes too much time

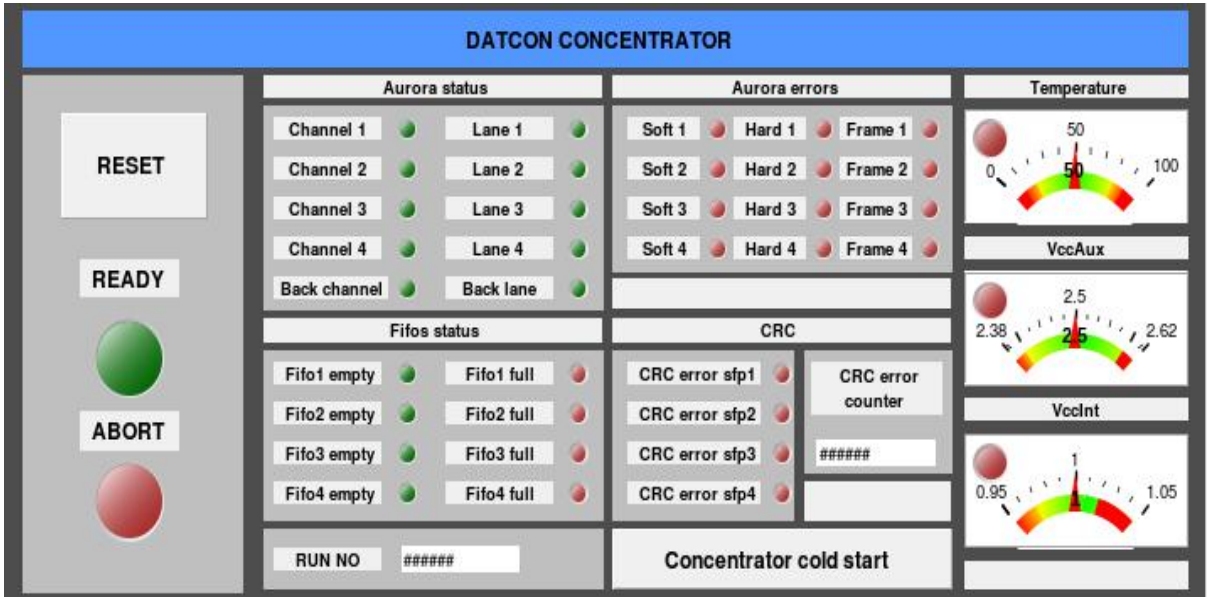
Improvements on extrapolation



DATCON Slow Control

- Second version of DATCON slow control
- Last year was the first time DATCON used EPICS and IPbus for slow control
- Basic monitoring are still missing (for example packet counter , event number ...)
- During TB2017 the ROIs and strips hit could be sent and saved on computer
- Those features will be merged to the actual GUI to centralized DATCON monitoring
- DATCON integration to RC has to be improved





Conclusion

UNIVERSITÄT BONN

- DATCON was stable and generating ROIs for several runs
- Main problem being the communication with ONSEN
  - Flow control on Aurora will help in case of back pressure
  - Reason of the error on ONSEN seemed to be caused by missing end of frame from DATCON
- Hough space size was limited to 64*64 sectors. The new firmware will use around 50*250 sectors and a wider angle range to fits the estimations made by Christian Wessel for full geometry detector
- Phase 2 final extrapolation is under development
- Slow control has to be improved and properly included to RC
- Urgent need to implement new FTB-DATCON communication
- Even if limited number of DATCON hardware will be needed for phase2 we will use 2 chassis, 2 tracking and 2 concentrator boards to ease scale up efforts for Phase 3

Thank you