

Status of DATCON

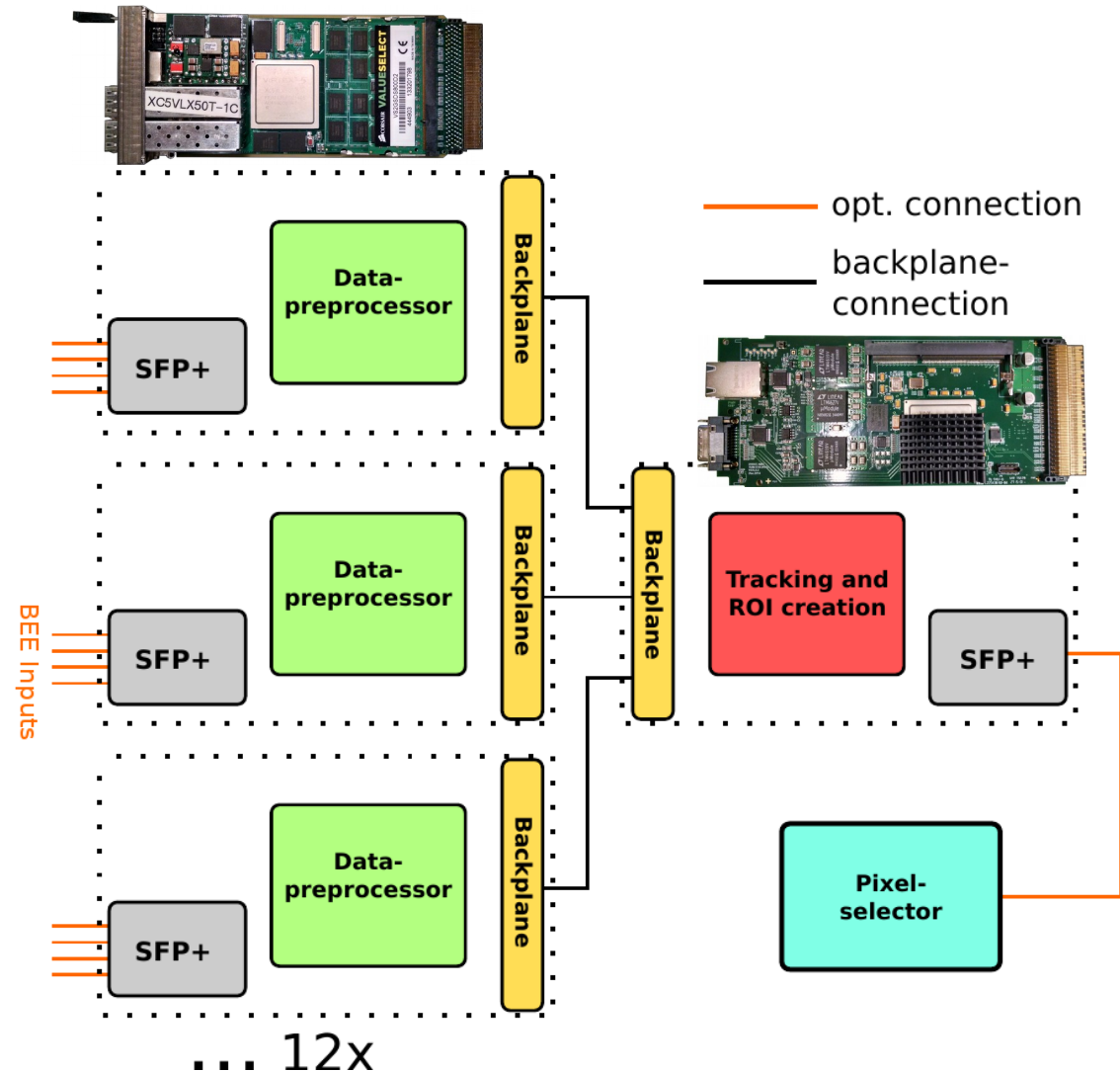
B.Deschamps, J. Dingfelder,
C. Marinas, C.Wessel,



- Complete and functional data chain
 - Receive and extract data from FTB
 - Extract strip
 - Convert strip into coordinate
 - Tracking (Hough transformation)
 - Extrapolation
 - Correct transmission to ONSEN

- Extract information from Hough space not optimized
- Extrapolation not efficient
- Slow control not adapted

- Data Acquisition Tracking Concentrator Online Node
- 48 optical links from the SVD Back End Electronics (BEE)
- Expected data rate: 6 Gbps
- 12 AMC for data acquisition and preprocessing
- 2 DHE for Tracking and ROI calculation



- Tracking is based on Fast Hough Transformation
- Use to find straight tracks

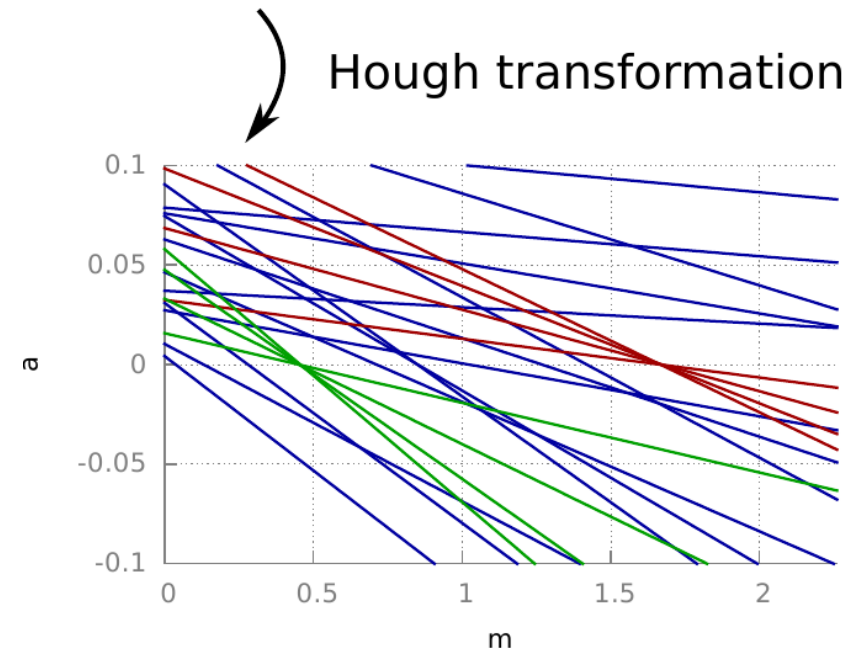
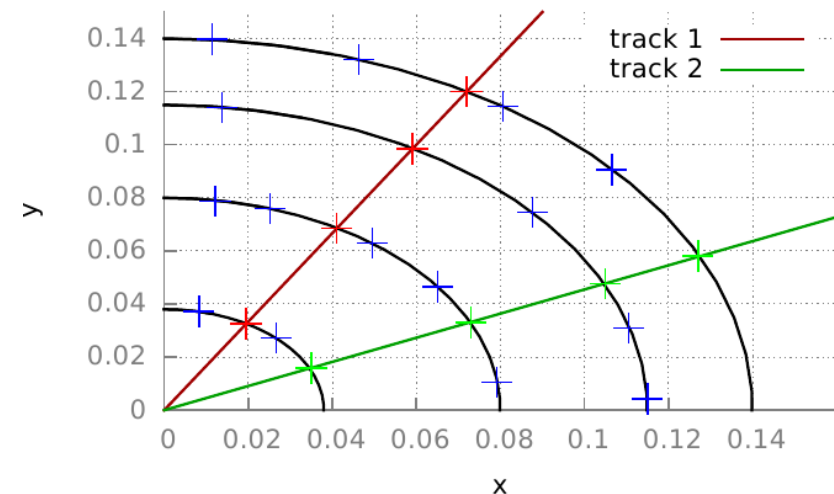
Simple Hough Transformation

$$y_i = m \cdot x_i + a \xrightarrow[\text{trafo}]{\text{Hough}} a = -m \cdot x_i + y_i$$

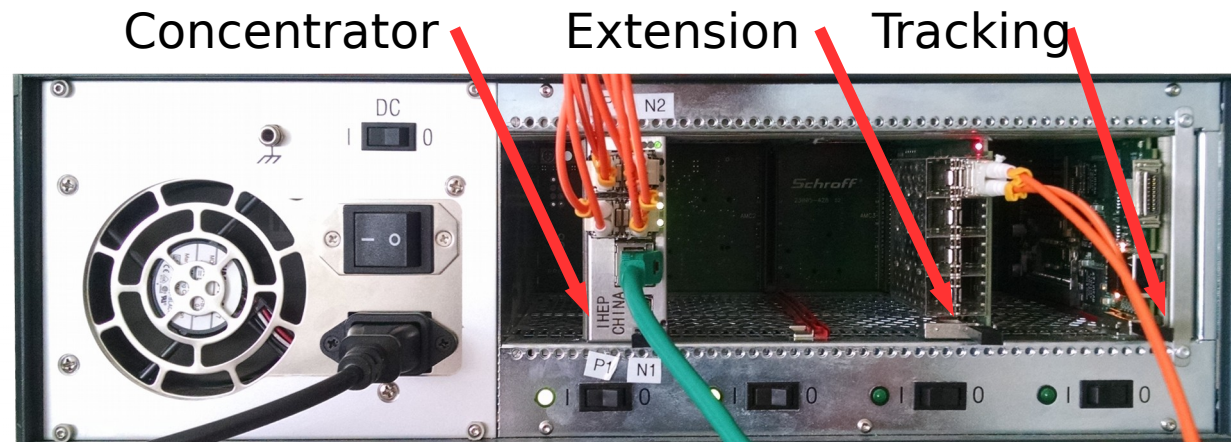
- Also works for arc track after conformal transformation

Conformal Transformation

$$x' = \frac{x}{(x-x_n)^2 + (y-y_n)^2}$$
$$y' = \frac{y}{(x-x_n)^2 + (y-y_n)^2}$$



- Limited version of DATCON running under realistic condition
- 1 AMC v3.1 used as concentrator
- Connected to 4 FTBs at 1.27 Gbps with 30 and 50 meters optical fibers.
Running with latest firmware modified during testbeam.
- 1 DHE used as tracking unit
- 1 extension board
- Link to ONSSEN at 3.125 Gbps

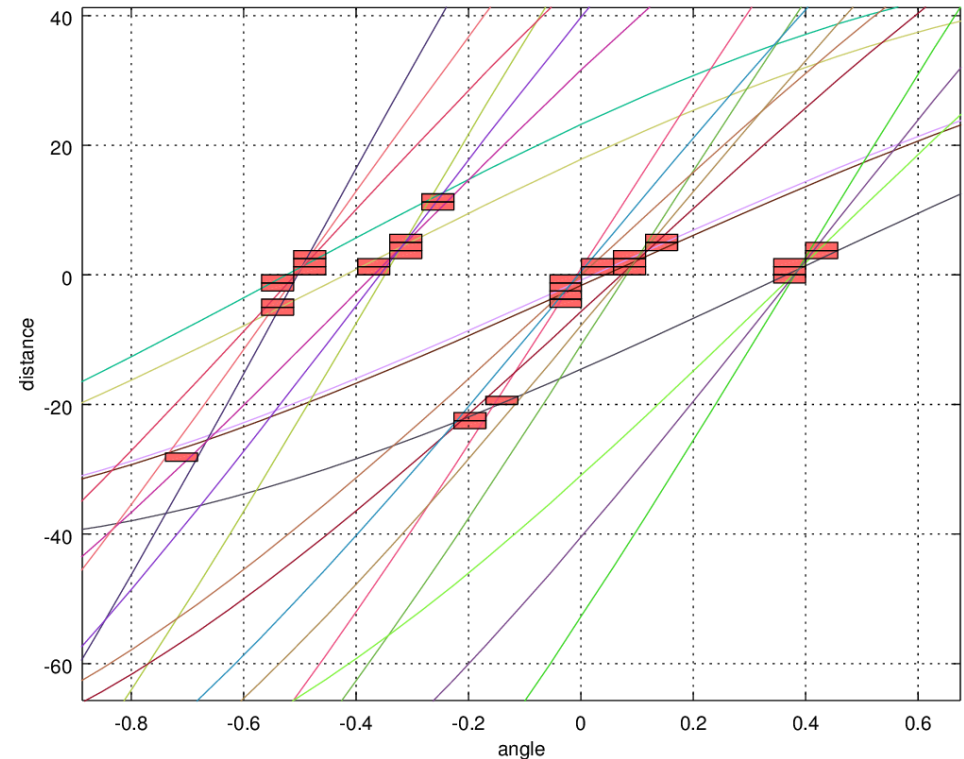


- Hough sector clusterizer not adapted. Too many sectors used for extrapolation
- Simple extrapolation

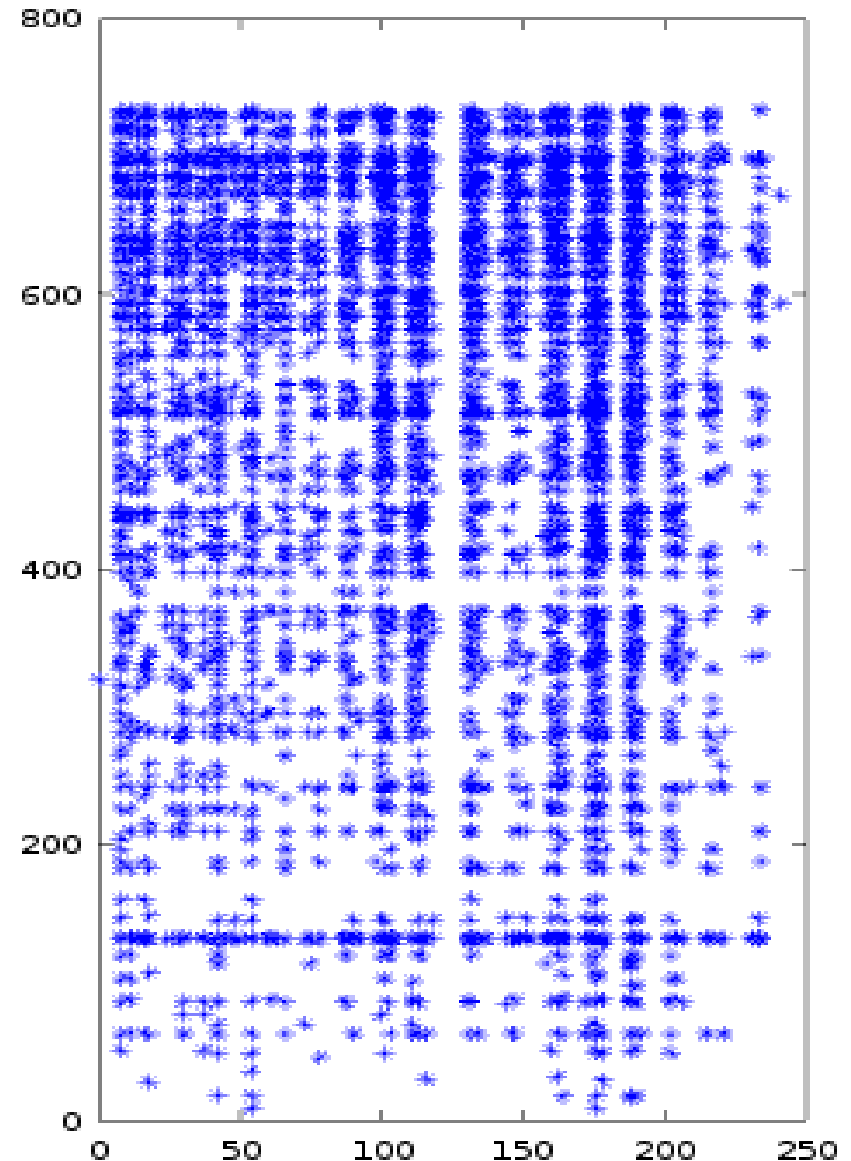
$$d = x \times \cos(\theta) + y \times \sin(\theta)$$

$$x = \frac{y \times \sin(\theta) - d}{\cos(\theta)}$$

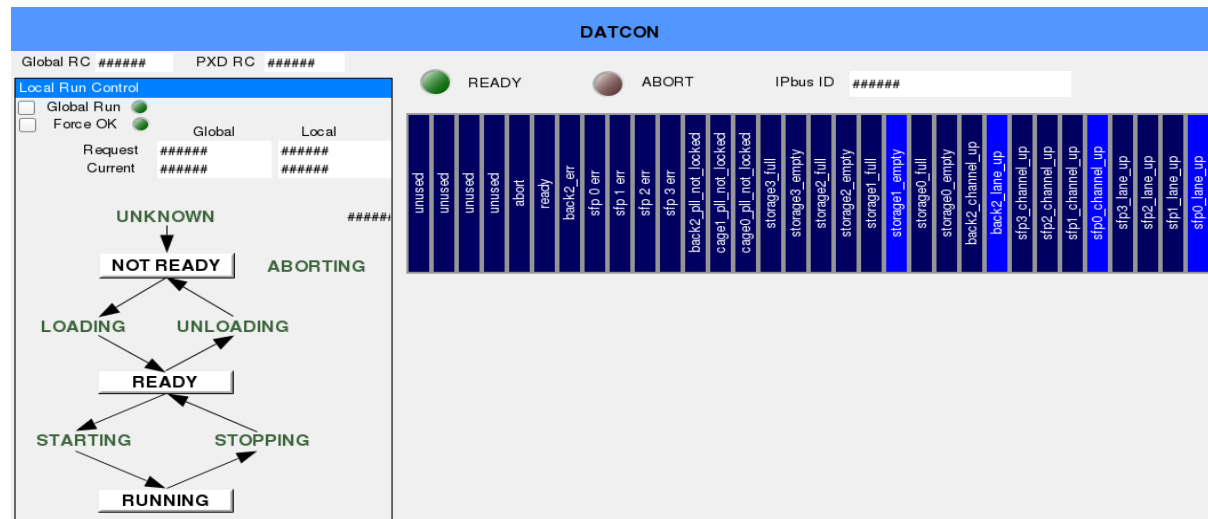
- To extract pixel id , position is divided by the appropriate pitch
- Low precision on the division



- Hough space size of 64×64 for Θ and Φ
- No conformal mapping
- Extrapolation and pixel position calculated as explained previously
- ROI defined with a size of 16×16 pixels
- Plotted :PXD layer 1, center of ROI,
Run 343, 4 GeV, 0 Tesla
- Full data processing has proven to work
- Improvement have to be made for the extrapolation



- Slow control was ready but not adapted
- Custom UDP transmitter/receiver was removed
- Equivalent using IPbus was then implemented
- Ready abort signals, status of the links and buffers
- First time DATCON is connected to EPICS
- Interfacing implemented by Björn Spruck (Mainz)



- DATCON has shown problems to keep running
- All the links and data transmission were stable, but
- After undefined amount of time FTB data misread
 - Event id mismatch
 - FTB number mismatch
- Internal trigger mismatches from SVD side
- Buffer full and never read out
- If one or more FTB id is wrong the concentrator is blocked
- Nothing to be sent to tracking
- No obvious reason have been found yet
- **Absolute need for more lab test to fix this issue**

- First test with final hardware, basic demonstration has been performed
- FTB-DATCON connection loss has to be investigated
- Need to have well defined SVD/APV mapping
- More precise but fast Hough sector cluster finder
- Include conformal mapping
- Adapt Hough space size with result from simulation
- Implement the latest progress made by Christian Wessel
 - Running complete $Y(4S)$ decays with so far good performance
- With 14 boards to be monitored , a complete slow control will be implemented
- Add debugging , limited here by the number of connection

Thank you

