

# **Status of DATCON**

B.Lampshades, J. Deferring,C.Marinas C. Vessel, University of Bonn



lampshades@physio.uni-Bonn.DE



# **Status of DATCON**

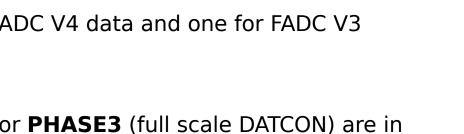
B.Deschamps, J. Dingfelder, C. Marinas, C. Wessel, University of Bonn



### Setup at KEK



- **Currently at KEK** : ٠
  - 2 chassis with MCH (chassis managment) and PM (power module)
  - 2 DHE (used for tracking)
  - 4 AMC v3.1 (used as concentrators)
  - 2 extension boards
- Out of which the following parts will be used for **PHASE 2** ٠ sytem
  - One chassis will be used with 2 concentrators
  - One to receive FADC V4 data and one for FADC V3
  - One DHE
- All the other pieces for **PHASE3** (full scale DATCON) are in • Bonn
  - One MCH currently being repaired

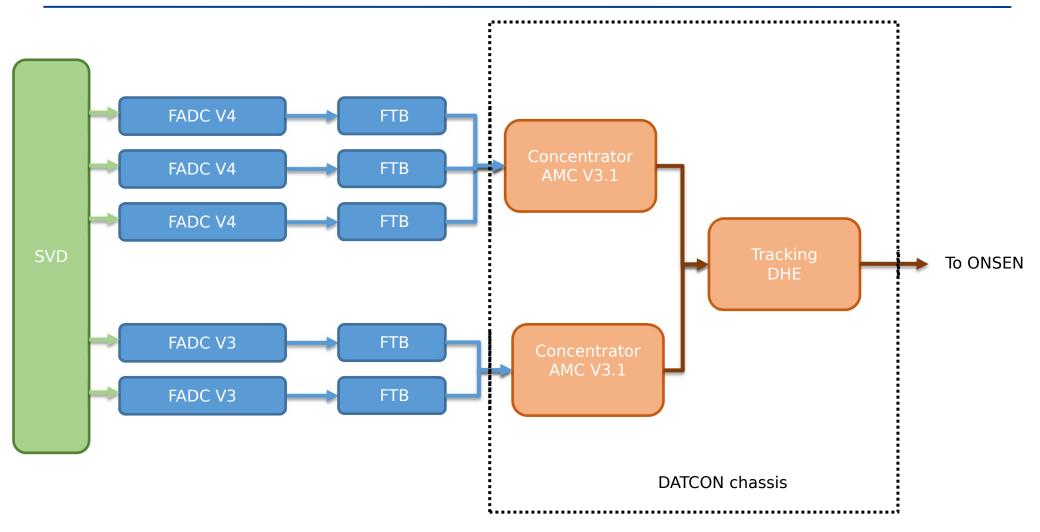


XC5VLX50T-10



#### Setup at KEK

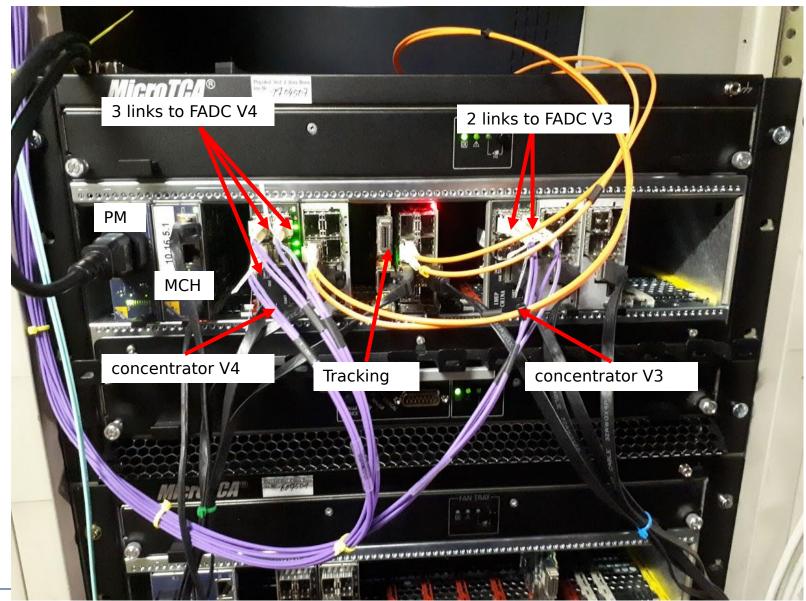




deschamps@physik.uni-bonn.de

#### Setup at KEK





### **Firmware update for FADC V4**



- FADC and FTB:
  - FADC gets analog signal from SVD and digitizes it
  - FTB transforms it into optical signal
  - FTB are connected to COPPER and to DATCON
  - Reminder
    - Previously only used FADC V3 -> only connected to P or N side of SVD
    - FADC V4 are now connected to P **and** N side
    - ADC\_ID directly defines the side (N= odd , P= even)
- Concentrator
  - P/N splitting -> preprocessor module.

Preprocessor's job is to extract hits from FADC data, convert it to strip and find a cluster.

- Number of preprocessor and FIFOs (x2) is doubled
- Mixed FADC 3 and 4 setup successfully tested with random FTB data
- Ready to deal only with FADC V4

deschamps@physik.uni-bonn.de



The PHASE2 firmware is ready, simulated but never fully tested on hardware

#### 1) Event building (tracking excluded)

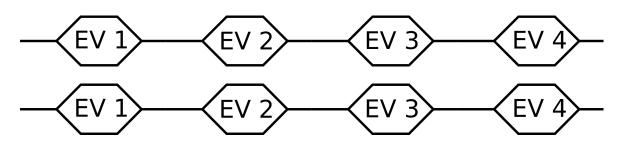
- Tested with dummy FTB data without event mismatch.
- Forced crashes using bad conditions such as :
  - broken link
  - large differences in event ID between links

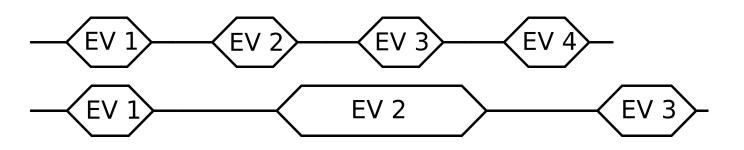
#### -> Improve protection against pathological cases

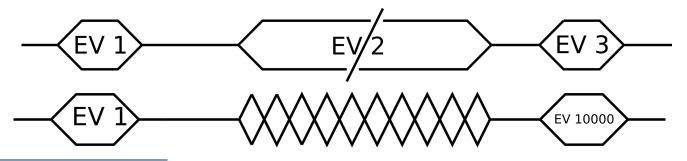
- For every event received, a predefinded ROI with corresponding event number is sent to ONSEN
  - -> Verify that no event is missed
  - -> Verify stability of ROI transmission

deschamps@physik.uni-bonn.de











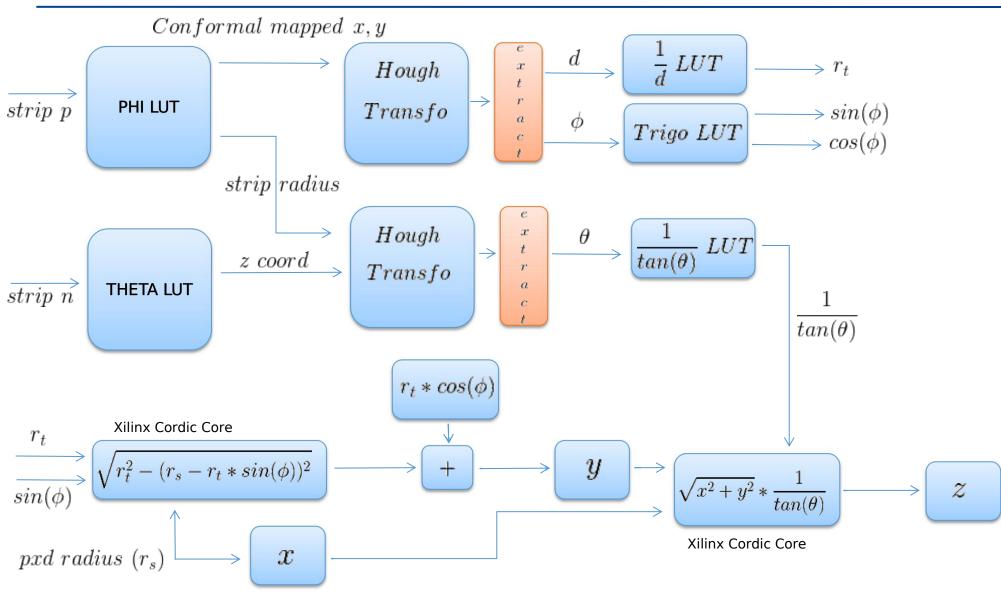
#### 2) Include Tracking unit

- Cross-check that SVD hits are correctly received
- Test the Hough Space clustering under realistic conditions (tested at low rate and only for few events)
- Test extrapolation to PXD (only tested in simulation)
- >Verify stability of ROI transmission

deschamps@physik.uni-bonn.de

### **Extrapolation**







#### 3) Systematic test suite

#### **DATCON** internal

- Set of different test patterns of FTB input
- Load balancing test
- On-purpose failure test (link down, large event size, large event mismatch)
- Nominal test with 30 kHz and expected occupancy
- Variation of occupancy (varying SVD threshold ) :
  - Effect on track/ROI finding
  - Effect on stability

#### **DATCON-ONSEN** interplay

- Send same frame twice or different frames with same event ID
- What happens in ONSEN if DATCON sends ROI for an event that already arrived from HLT
- Generate back pressure

#### 4) Introduce two-way DATCON <-> ONSEN communication ?

deschamps@physik.uni-bonn.de

### **DATCON Slow Control**



- Final DATCON slow control ready for PHASE2
- Essential information as frame, ROI , event counter -> now functionnal
- Now integrated into EPICS: live plot o SVD hits and ROIs.

- Integration into Run Control:
  - Only Abort and Ready PVs

	*****			
		DAT	CON TRACKING	
	DECET	Conc	entrator FADC4	Temperature
	RESET	Channel	🥥 Lane 🥥	50
		Soft 🥘	Hard 🥥 Frame 🥥	0 37.4 1, 100
		CRC errors	0	
	DEADY	Concentrator FADC3		VccAux
	READY	Channel	Lane	2.5
i		Soft  Hard  Frame  CRC errors  0		2.38 25 25 2.62
	ABORT		ONSEN Link	VccInt
	Abolit	ONSEN channe	el 🧿 ONSEN lane 🥥	0.95
	RU		N and trigger	0.95
of		<b>RUN</b> 466		
				Cold Start
		EVT track fnd	1553927 14.19	
	DAT		NTRATOR	
	Aurora status	FADC	Aurora errors	Temperature
RESET	6 10 10 10 10 10 10 10 10 10 10 10 10 10	TADC	Autora errors	
	Channel 1 Lane 1	0	Soft 1 🥝 Hard 1 🥥 Frame	
ESEI	Channel 1 G Lane 1	0	Soft 1 🥥 Hard 1 🥥 Frame Soft 2 🥥 Hard 2 🍏 Frame	1 🥥 🍏 50
		0 0 0	Soft 1 🔌 Hard 1 🍑 Frame Soft 2 🥥 Hard 2 🥥 Frame Soft 3 🍑 Hard 3 🕥 Frame	1 0 50 2 0 31.5 100
	Channel 2 🥥 Lane 2	0	Soft 2 🥥 Hard 2 🥥 Frame	50 2 0 3 0
	Channel 2 June 2 Channel 3 Lane 3	0 0 0 0	Soft 2   Hard 2   Frame Soft 3   Hard 3   Frame	1 0 50 2 0 1 1 7 100 3 0 VccAux
	Channel 2 June 2 Channel 3 Lane 3 Channel 4 Lane 4	0 0 0 0	Soft 2   Hard 2   Frame Soft 3   Hard 3   Frame	50 2 0 3 0 50 1/ 1/ 100 50 1/ 100
	Channel 2 Lane 2 Channel 3 Lane 3 Channel 4 Lane 4 sfp0 cnt 45168 sfp2 cr	0 0 0 0	Soft 2  Hard 2  Frame Soft 3  Hard 3  Frame Soft 4  Hard 4  Frame CRC CRC error sfp1  CRC error	50 2 0 3 0 4 0 VccAux 2.5 2.38 2.5 2.38 2.5 2.5 2.49 2.62 0 2.62
READY	Channel 2 Channel 3 Channel 4 Sfp0 cnt 45168 Sfp1 cnt 7399 Sfp3 cnt 7399 Sfp3 cnt 7399 Channel 4 Sfp3 cnt 7399 Sfp3 cnt 7399	0 0 0 0	Soft 2  Hard 2  Frame Soft 3  Hard 3  Frame Soft 4  Hard 4  Frame CRC	50 2 0 3 0 4 0 VccAux 2.5 2.38 2.5 2.38 2.5 2.5 2.49 2.62 0 2.62
READY	Channel 2 Channel 3 Channel 4 Sfp0 cnt 45168 Sfp1 cnt 7399 Back channel 9 Back lane 4	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Soft 2	1 0 50 2 0 0 1 1 1 1 1 0 0 3 0 VccAux 2 .5 2 .38 2 .5 2 .38 2 .5 2 .38 2 .5 2 .49 4 4 2 .52 0 VccInt 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Channel 2 Channel 3 Channel 4 Sfp0 cnt 45168 Sfp1 cnt 7399 Back channel Fifos status	0 0 0 0 0 0	Soft 2  Hard 2  Frame Soft 3  Hard 3  Frame Soft 4  Hard 4  Frame CRC error sfp1  CRC error sfp1  CRC error sfp2  Frame	1 50 2 0 0 3 1 5 7 100 3 0 0 4 0 VccAux 2.5 2.38 2.5 2.38 2.5 2.49 7 2.62 0 VccInt
READY	Channel 2 Channel 3 Channel 4 Sfp0 cnt 45168 Sfp1 cnt 7399 Back channel 9 Back lane Fifos status Fifo1 empty 9 Fifo1 full		Soft 2  Hard 2  Frame Soft 3  Hard 3  Frame Soft 4  Hard 4  Frame CRC error sfp1  CRC error CRC error sfp2  0 CRC error sfp3  0 CRC error sfp4	1 50 2 0 0 1 1 7 7 7 100 3 0 2.5 2.38 2.5 2.38 2.5 2.38 2.5 2.49 7 7 2.62 or VccInt 0.95 1 0.98 7 1.05
READY ABORT	Channel 2 Channel 3 Channel 4 Sfp0 cnt 45168 Sfp1 cnt 7399 Back channel 8 Fifo1 empty Fifo1 full Fifo2 empty Fifo2 full Fifo2 full 1 Fifo2 full 1 Full 1 Full 1 Full 1 Full 1 Full 2 Full 1 Full 2 Full 1 Full 1 Full 2 Full 1 Full 2 Full 1 Full 1 Full 2 Full 1 Full 2 Full 1 Full 1 Full 2 Full 2	0 0 0 0 0 0	Soft 2  Hard 2  Frame Soft 3  Hard 3  Frame Soft 4  Hard 4  Frame CRC error sfp1  CRC error CRC error sfp2  CRC error sfp2  0	1 50 2 0 0 1 1 7 7 7 100 3 0 2.5 2.38 2.5 2.38 2.5 2.38 2.5 2.49 7 7 2.62 0 VccInt 0.95 1 0.98 7 1.05
	Channel 2 Channel 2 Channel 3 Channel 4 Sfp0 cnt 45168 Sfp1 cnt 7399 Back channel 8 Fifos status Fifo1 empty Fifo2 full Fifo2 empty Fifo2 full Fifo3 empty Fifo3 full Fifo3 full	0 0 0 0 0 0 0	Soft 2  Hard 2  Frame Soft 3  Hard 3  Frame Soft 4  Hard 4  Frame CRC error sfp1  CRC error CRC error sfp2  0 CRC error sfp3  0 CRC error sfp4	1 50 2 0 0 1 1 7 7 7 100 3 0 2.5 2.38 2.5 2.38 2.5 2.38 2.5 2.49 7 7 2.62 0 VccInt 0.95 1 0.98 7 1.05

#### Conclusion



- Communication with FTB-FADC V4 has been implemented
- Defined to-do list for PHASE2
  - Event building
  - Test every single part of the tracking unit (HS, clusterizer, extrapolation)
  - Systematic test suite
  - DATCON-ONSEN interplay
- Slow control ready , should be intergrated to RC
- Before cosmic ray DATCON without tracking should be tested and stable
- Time before first collision will be used to test the tracking part
- Christian and I will be at KEK next week

deschamps@physik.uni-bonn.de

# Thank you

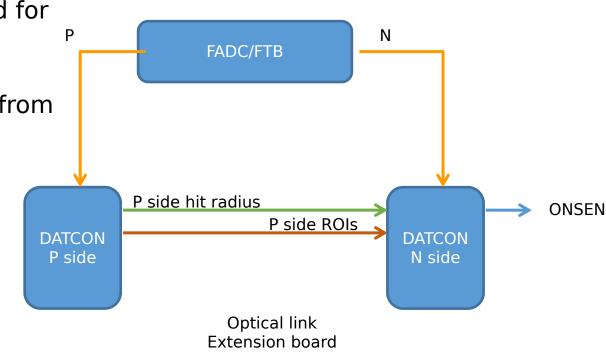
### **New FADC implications**



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



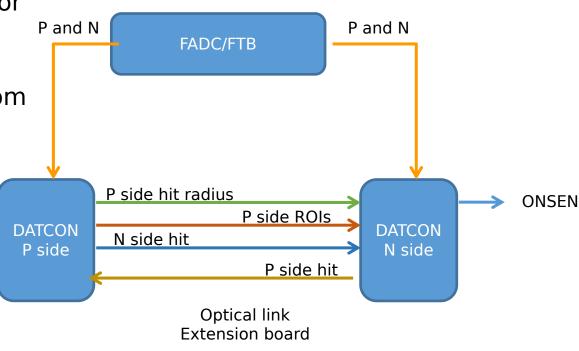
UNIVERSITÄT BON

deschamps@physik.uni-bonn.de

### **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



deschamps@physik.uni-bonn.de