

KLM-CRT meeting

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Current KLM sector config: 7/28/2015

SCROD on MB1 ESN: 000013ccf59001

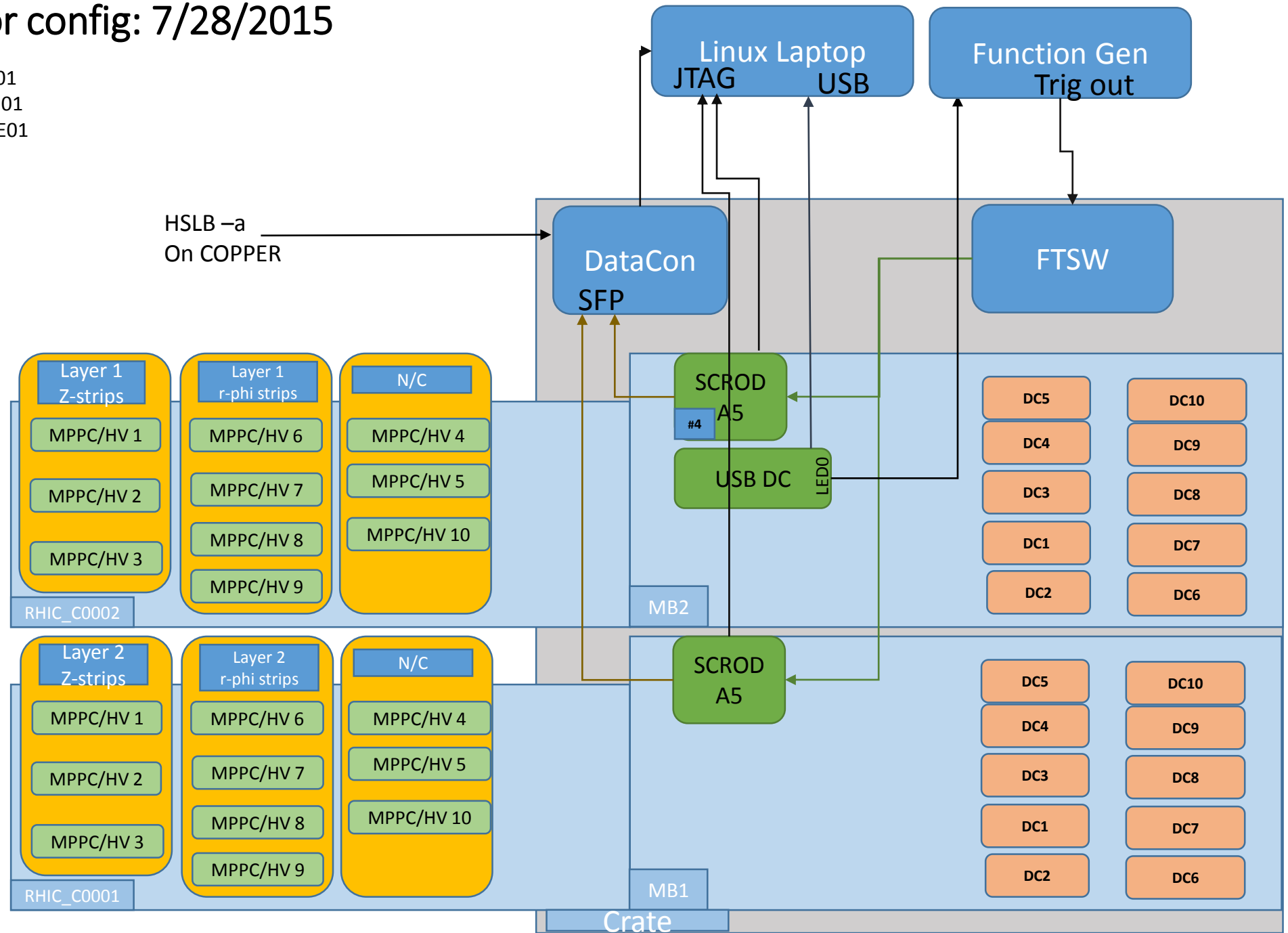
SCROD on MB2 ESN: 000013cab23b01

Data Con ESN: 000014D2F2DE01

Ribbon cable map:
Detector=>MB

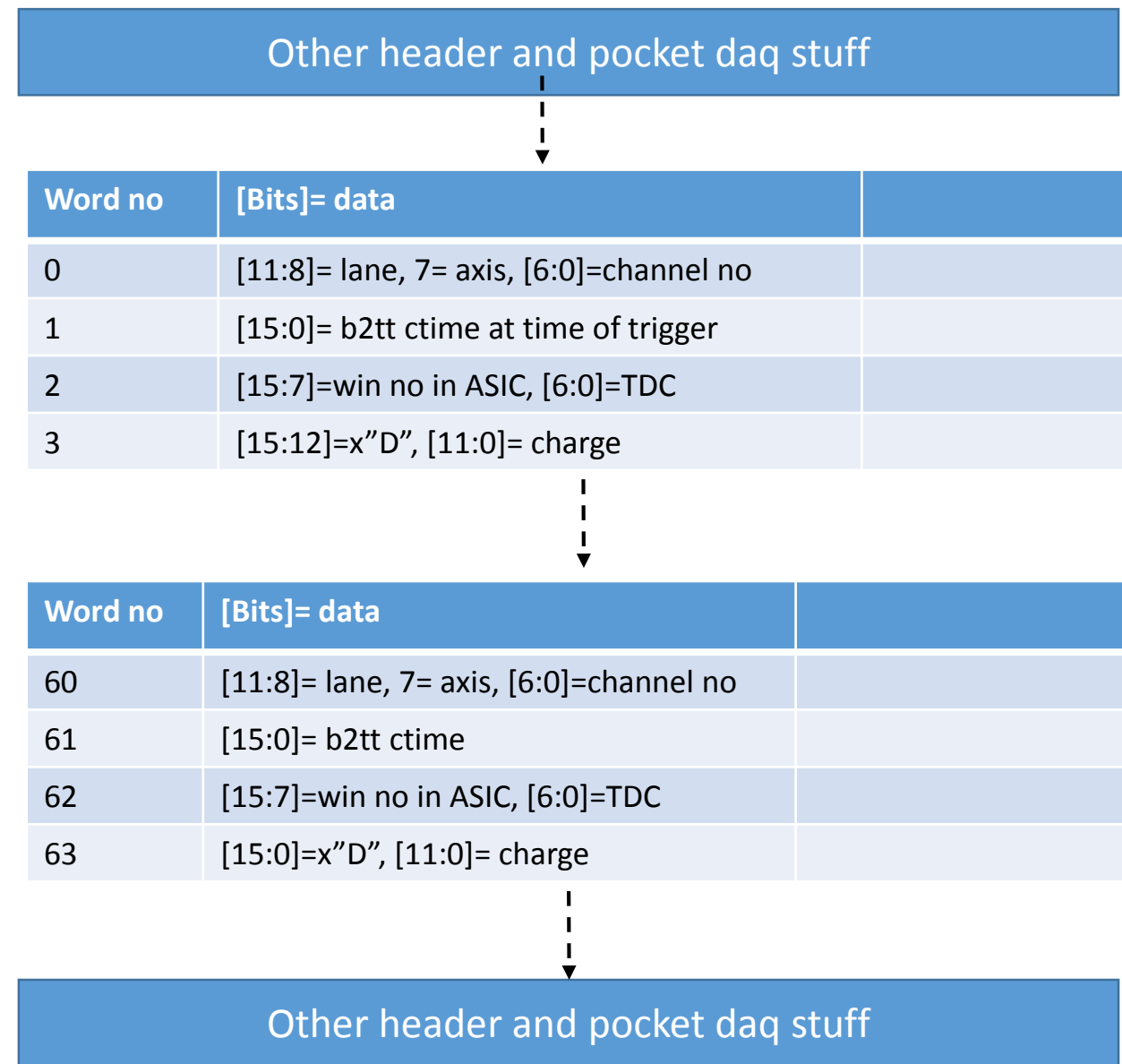
Detector /chs	MB /chs
1	1
2	2
3	3
4	6
5	7
6	8
7	9

DC= Daughtercard aka ASIC no
N/C= No Connect
MB= Motherboard
chs= channels



SROOT file contents

- Each trigger will cause at least ONE 64 word data packet from each of the lanes (layers) or an empty packet
- Each 64wd can be one of these:
 - Empty set, where no ASIC had any trigger data in the look-back window
 - Actual C&T of readout for ASICs that had a trigger bit in look-back



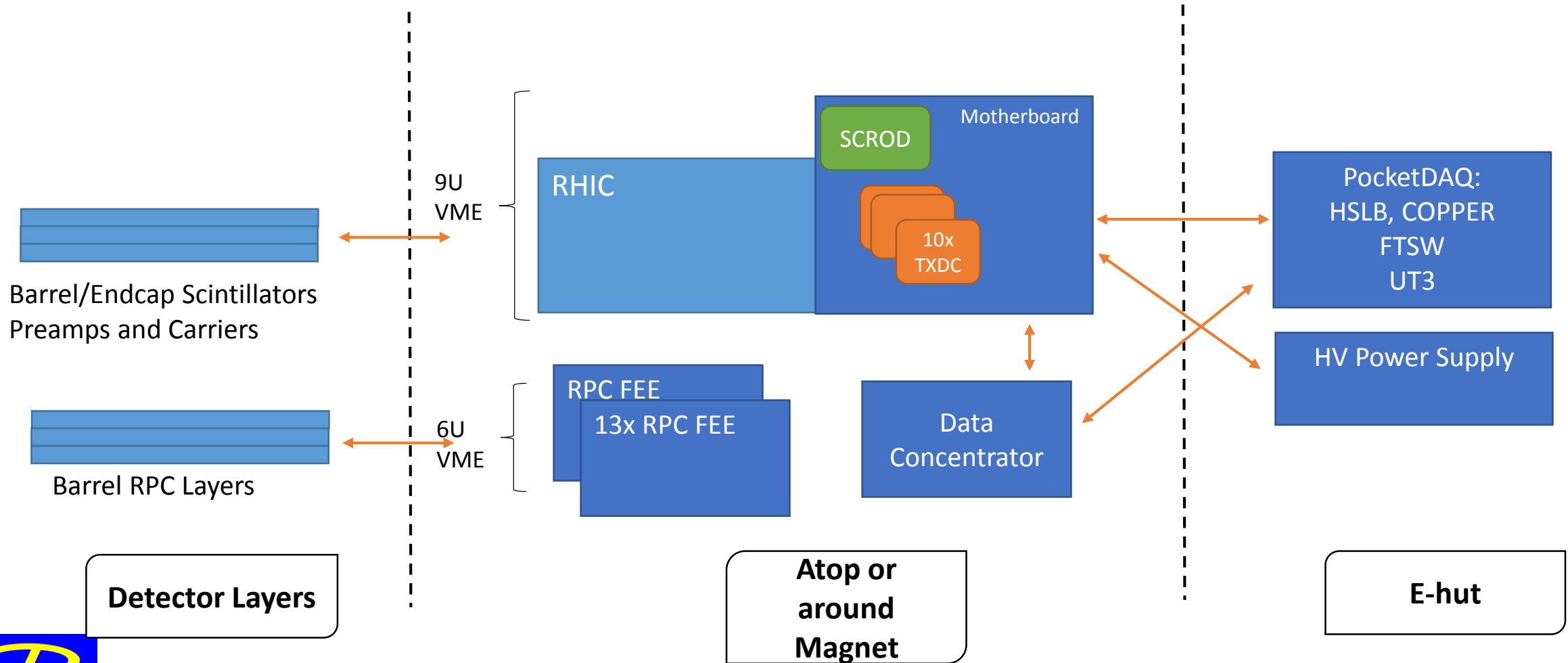
Definition of terms

- **WDno: 0, bit [11:8]= lane**
 - Lane= Layer= Data Concentrator port= 1 or 2 for this setup
- **WDno: 0, bit [7]= Axis bit=**
 - 0 when $1 \leq \text{ASICno} \leq 5$
 - 1 when $6 \leq \text{ASICno} \leq 10$
- **WDno: 0, bit [6:0]= Channel no in data stream=**
 - $(\text{ASICno}-1) * 15 + \text{ASICchno} + 1$ when $1 \leq \text{ASICno} \leq 5$
 - $(\text{ASICno}-5) * 15 + \text{ASICchno} + 1$ when $6 \leq \text{ASICno} \leq 10$
 - ASICno= ASIC slot number on the scintillator MB: 1~10
 - ASICchno= channel on the ASIC: ~0-15

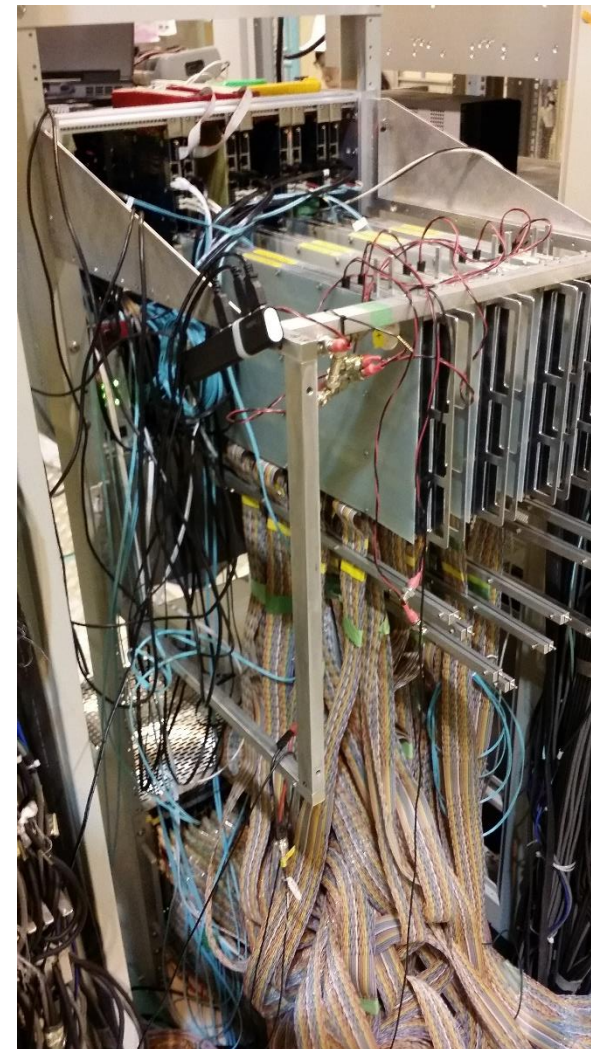
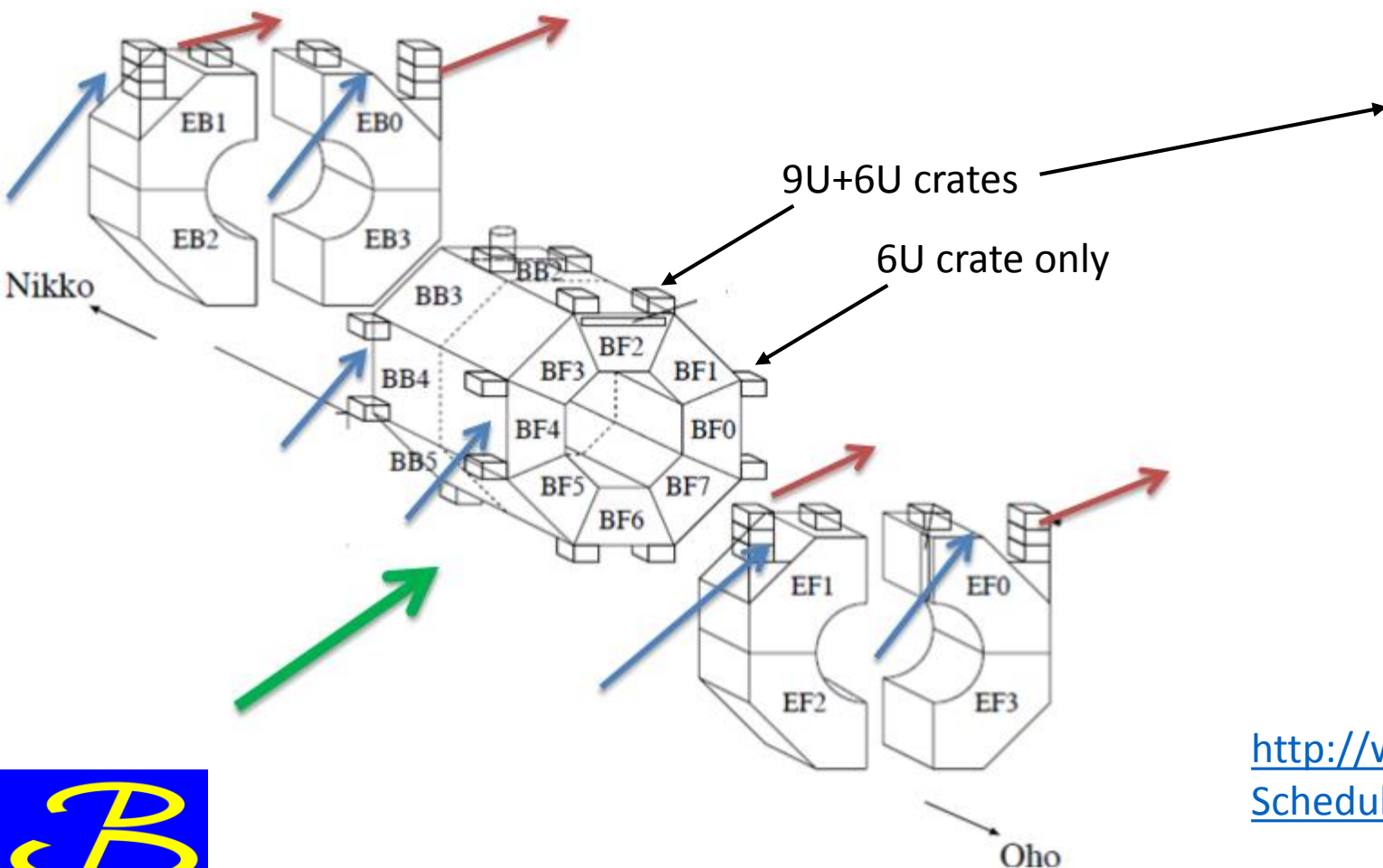
Definition of terms

- **WDno: 1**= “b2tt ctime.
- **WDno: 2, bit [15:7]**= win no in ASIC
 - The position of the read pointer in the ASIC at readout time.
- **WDno: 2, bit [6:0]**= TDC
 - Position of the peak sample within a 4 consecutive window readout.
- **WDno: 3, bit [11:0]**= Charge
 - Pedestal subtracted peak value associated with TDC

Key Hardware Components and Locations

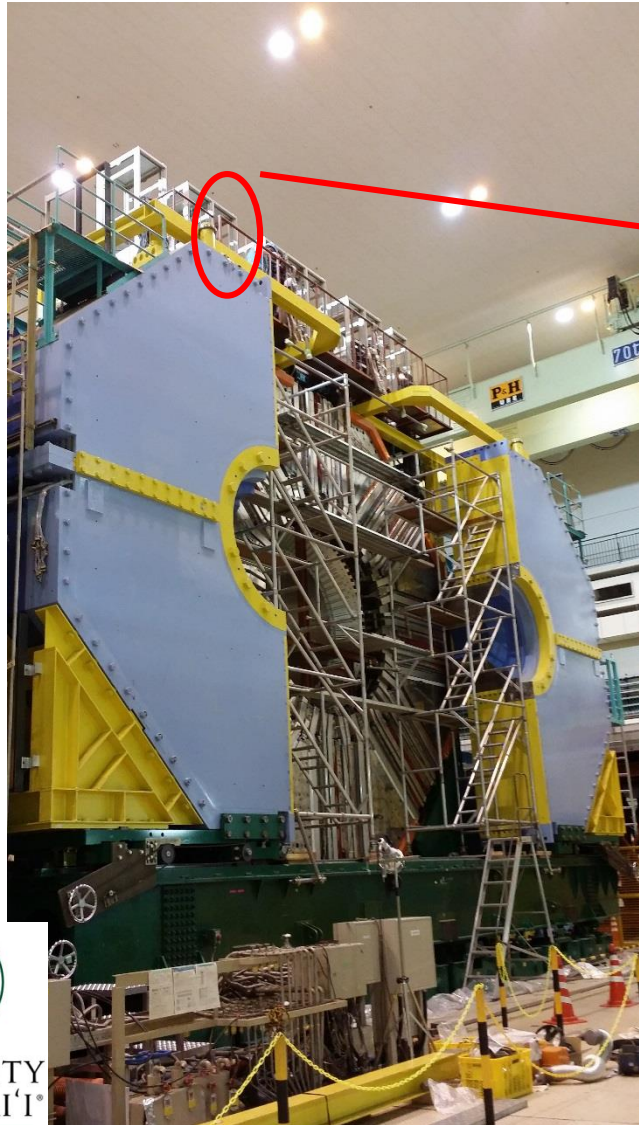


KLM Geometry



http://www.phys.hawaii.edu/~idlab/taskAndSchedule/KLM/KLMcrate_config.pdf

BKLM Crate Location

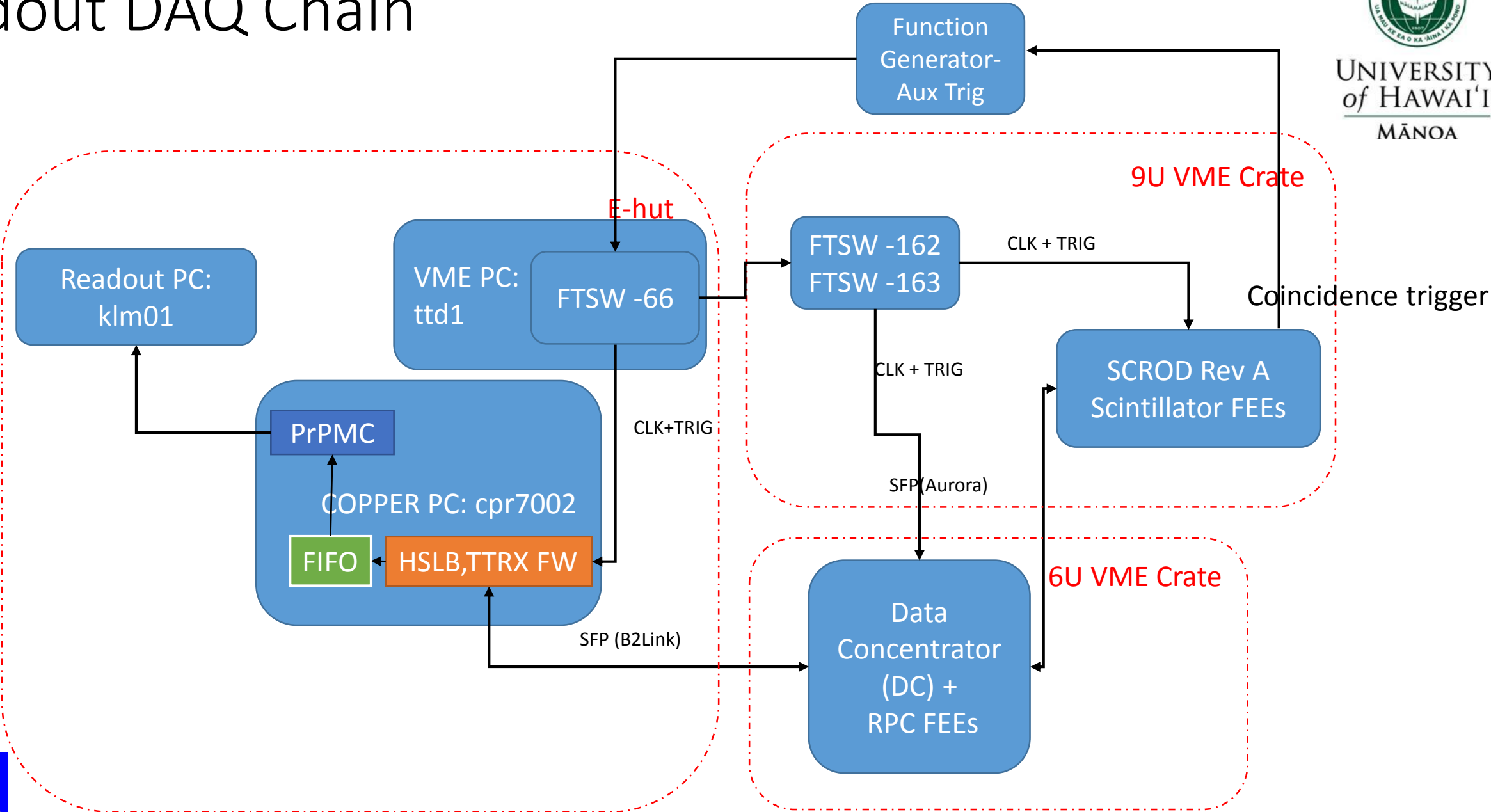


Fully populated KLM barrel crate at KEK. Ribbon cables enter from the bottom. 4 Sectors, 2 layers each





Readout DAQ Chain





Current connections on barrel crate as of 150713

KLMS	MB/RHIC	Octant	Layer	Datacon: port
KLMS_0001	1/1	3	0	Datacon 10:Port 3
KLMS_0002	2/2	3	1	Datacon 10:Port 4
KLMS_0006	6/6	2	0	Datacon 13:Port 4
KLMS_0003	3/3	2	1	Datacon 13:Port 3
KLMS_0005	5/5	5	0	Datacon 15:Port 4
KLMS_0004	4/4	5	1	Datacon 15:Port 3
KLMS_0009	9/7	4	0	Datacon 9: Port 3
KLMS_0010	10/8	4	1	Datacon 9: Port 4

Datacon	VME Addr.	Loc.	CPR	HSLB
0010	0x00	RPC crate	cpr7002	a
0013	0x11	Barrel term RPC	cpr7002	b
0015	0x12	VME 6U	cpr7002	c
0009	0x13	VME 6U	cpr7002	d

Note: Datacon '10' is the original data concentrator capable of reading out RPC signals- has not been touched.
 KLMS= KLM Scintillator readout module= Motherboard+RHIC+SCROD+Daughtercards





Barrel KLM DAQ Map

- FTSW 66
 - Located in E-hut: Master FTSW for the crate FTSWs 163 and 162
- FTSW 163
 - Out 5: Motherboard 6
 - Out 7: Data Concentrator 13 TTD
 - Out 9: Motherboard 3
 - Out 11: Motherboard 4
 - Out 13: Data Concentrator 15 TTD
 - Out 15: Motherboard 5
- FTSW 162
 - Out 5: Motherboard 1
 - Out 7: Data Concentrator 10 TTD
 - Out 9: Motherboard 2
 - Out 11: Motherboard 10
 - Out 13: Data Concentrator 9 TTD
 - Out 15: Motherboard 9
 - Out 6: Data Concentrator 13 remote Jtag
 - Out 8: Data Concentrator 15 remote Jtag
 - Out 10: Data Concentrator 10 remote Jtag
- CPR7002 HSLB connections
 - Hslb a: Datacon 10
 - Hslb b: Datacon 13
 - Hslb c: Datacon 15
 - Hslb d: Datacon 9



Readout sequence of events

- A coincidence trigger signal is generated on the motherboard (MB) based on scintillator signals.
- This trigger travels through a function generator and then to the main FTSW in the ehut where it will be broadcasted to all MBs and Dataconcentrators.
- The SCROD will look back $\sim 5.2\mu\text{s}$ in the buffers and if there are channels with hits it will read out the entire asic (15 channels) belonging to those channels and send the data to Datacon.
- The Datacon will look back $\sim 5.2\mu\text{s}$ in the RPC buffers and send out the hits.
- VME PC ttd1 and Readout PC klm01 must be running certain commands to allow trigger and data taking.

Scanning MPPC bias/gain parameters

- Run simultaneous scripts on Readout PC, COPPER PC and FTSW VME:
 1. Sweep MPPC bias 8bit trim DACs: 0 to 255, step=4 ($\sim 70\text{mV}$)
 2. Sweep ASICs (0 to 9) on the motherboard (~ 15 channels / asic)
 3. Send pulse triggers and record $\sim 10\text{k}$ events at 50 events/second
- Generate a single .sroot file, copy, parse and analyze
- It will take $\sim 200\text{s}$ /data point, or $64 \times 10 \times 200\text{s} \sim 35$ hrs.
- I generated a smaller file (1k event/ data point) and am analyzing to generate gain-bias plots

Cosmics Runs

- Two data files were generated over the weekend:
 - 37k events
 - 318k events
 - Located in isar's public folder on kekcc
- RPC health seems to be ok
- Some data quality issues exist that needs to be fixed
- C-time and other issues will be fixed in the next FW release