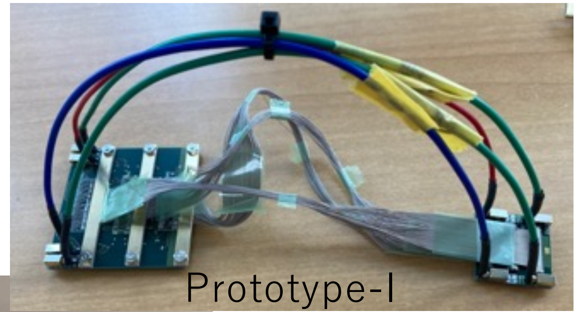
Production Status

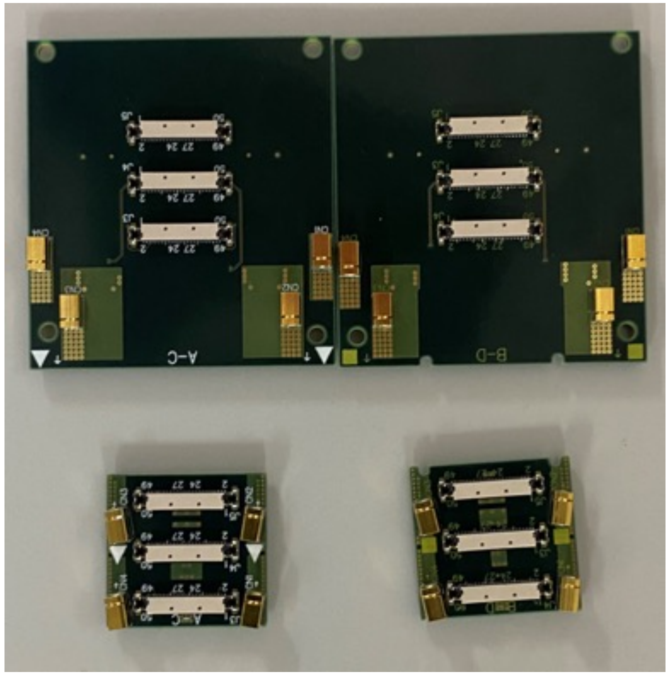
RIKEN/RBRC

Itaru Nakagawa

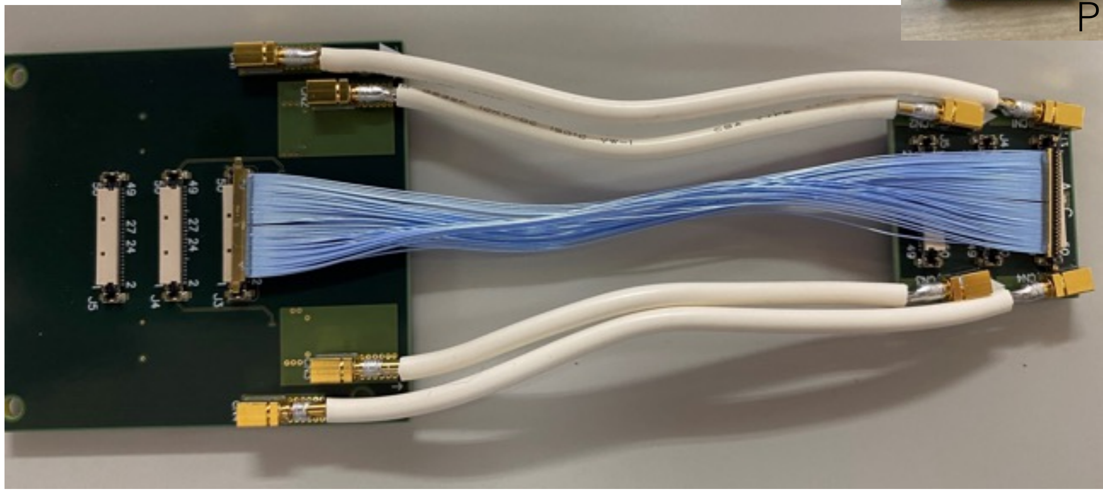
Prototype-II Conversion Cables

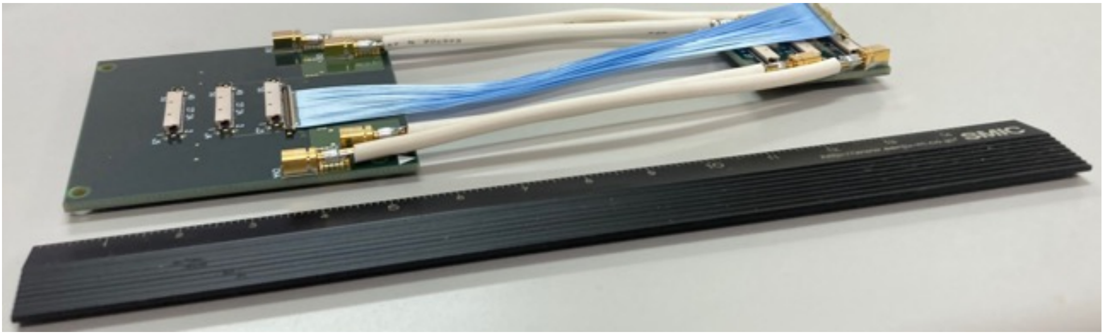


Prototype-I



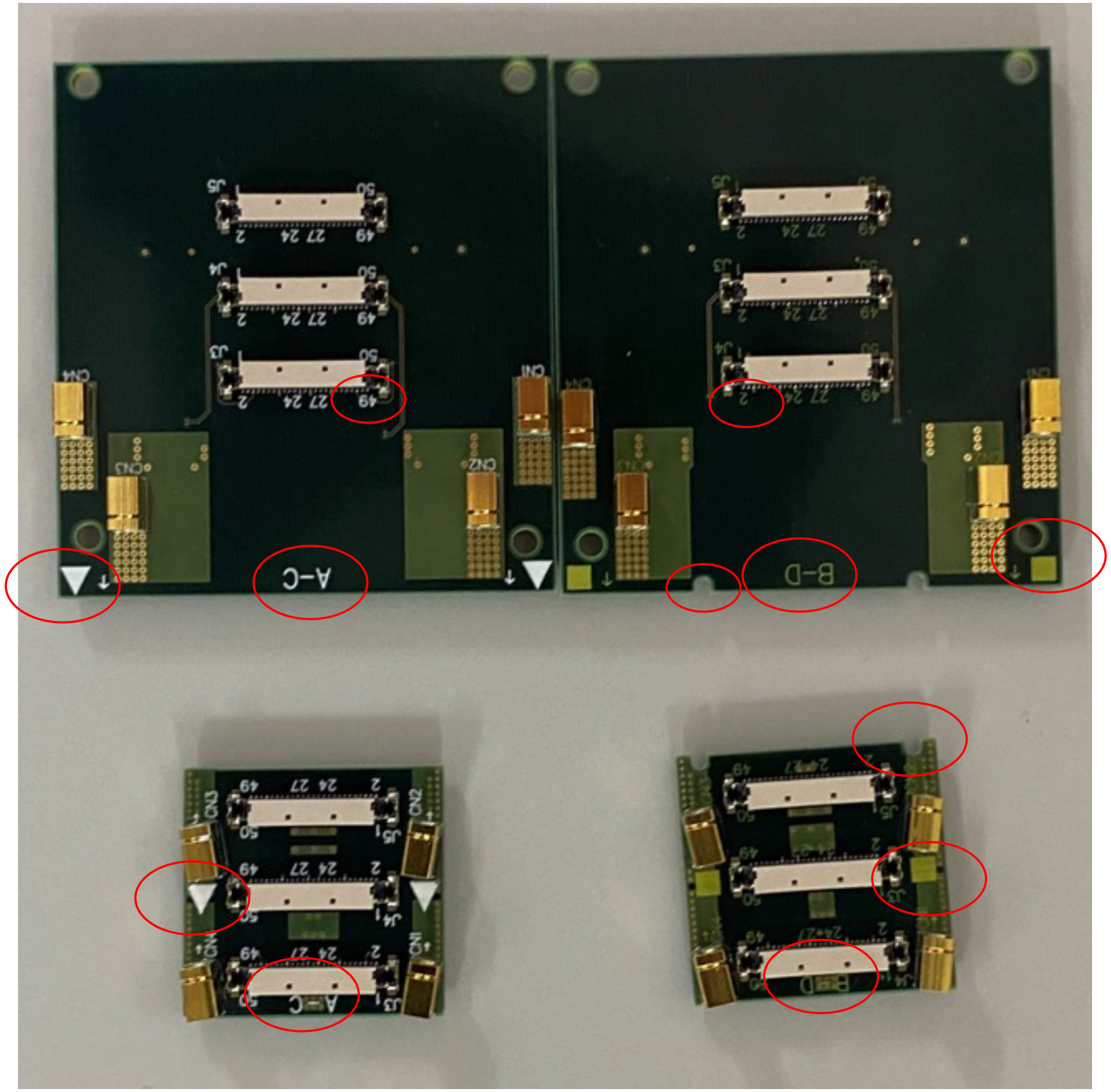
To be delivered today to RIKEN



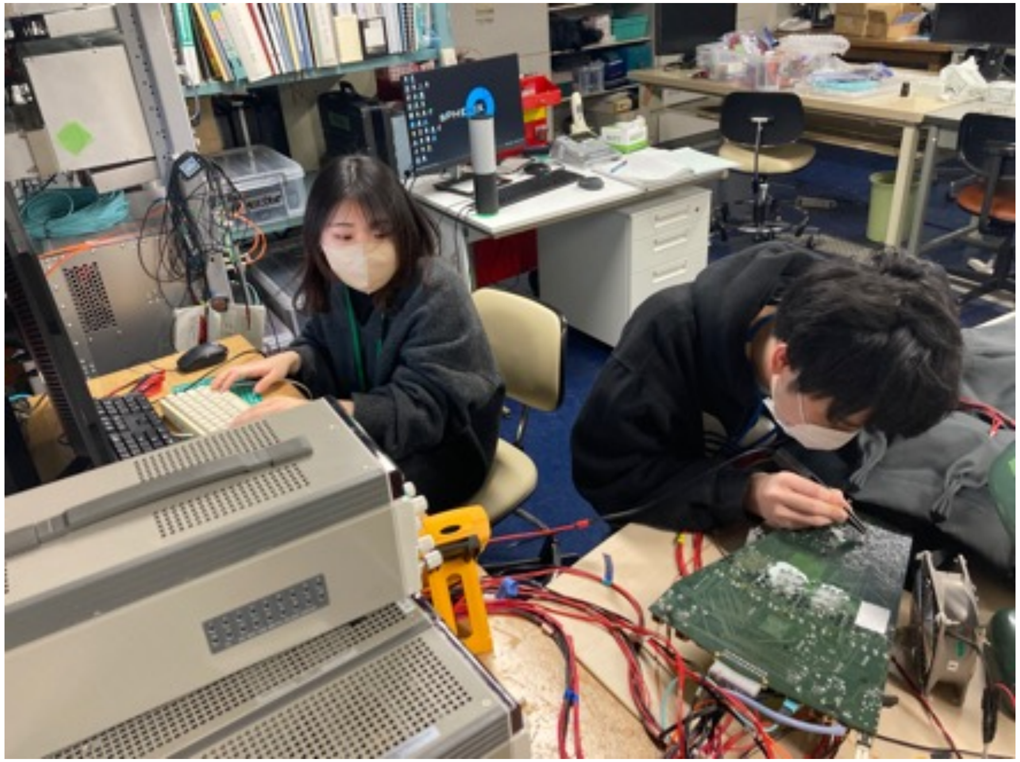


Next week@RIKEN

- Channel map check
- Calibration data taking



ROC Test



Genki Nukazuka, **Hikaru Imai**, Runa Takahama, Yumika Namimoto, Tomoya Kato, Kazuma Fujiki, Ryota Shishikura

ROC Test So Far

Regulator replacement done

index	shipped	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3
1	NE0												
2	NE1												
3	NE2												
4	NE3												
5	NE4												
6	NE5												
7	SW5												
8	NW1												
9	NW2												
10	NW3												
11	NW4												
12	SE0												
13	SE1												
14	SE2												
15	SE3												
16	SE4												
17	29												

Shipped to BNL on May 8

Regulator replacement not yet done

index	packed	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3
1	ROC7												
2	ROC9												

class 1	11	class 1 → All good!
class 2	5	class 2 → Bad port less than 2
class 3	3	class 3 →Bad port more than 3

Good

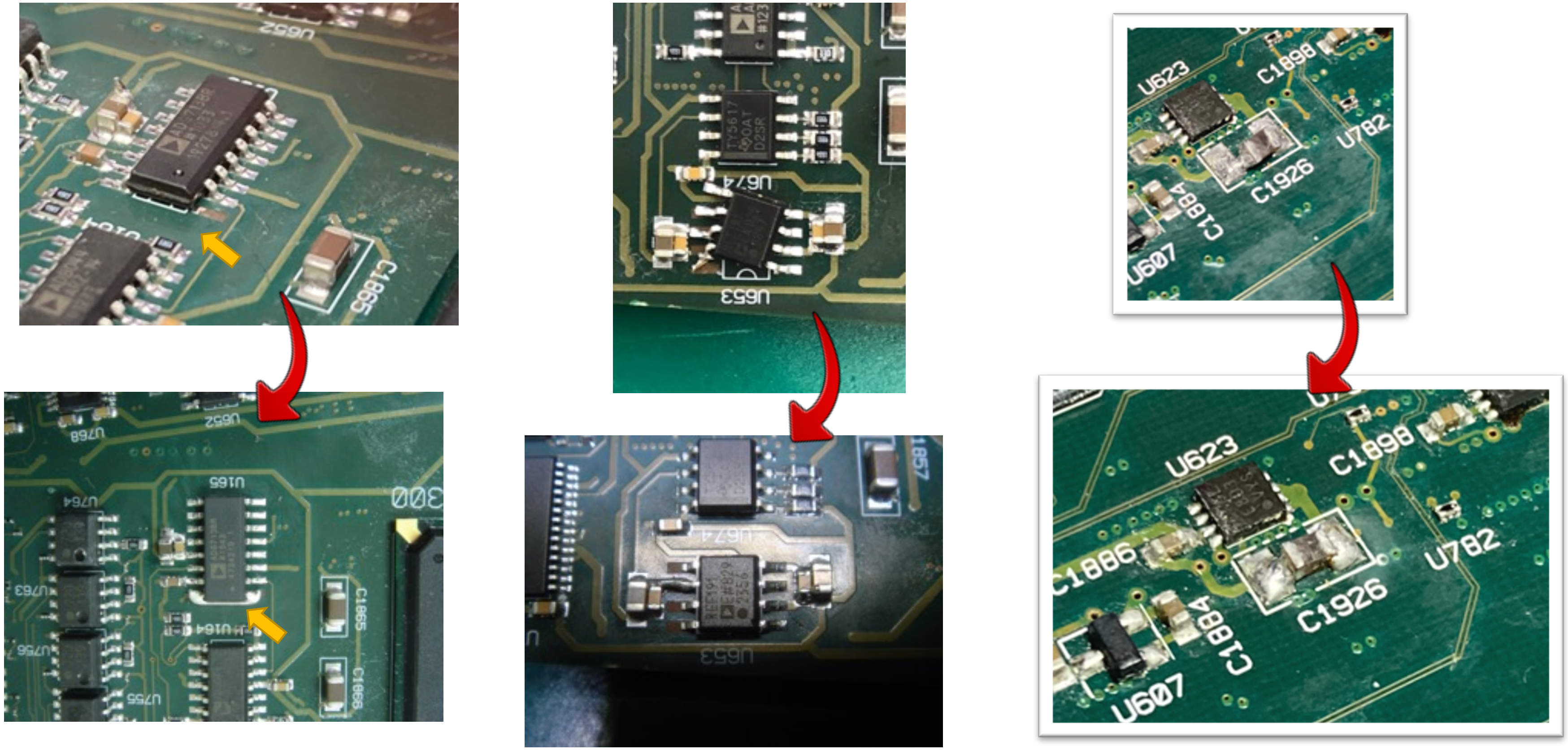
LED Typically issue in data fiber sync

Bad

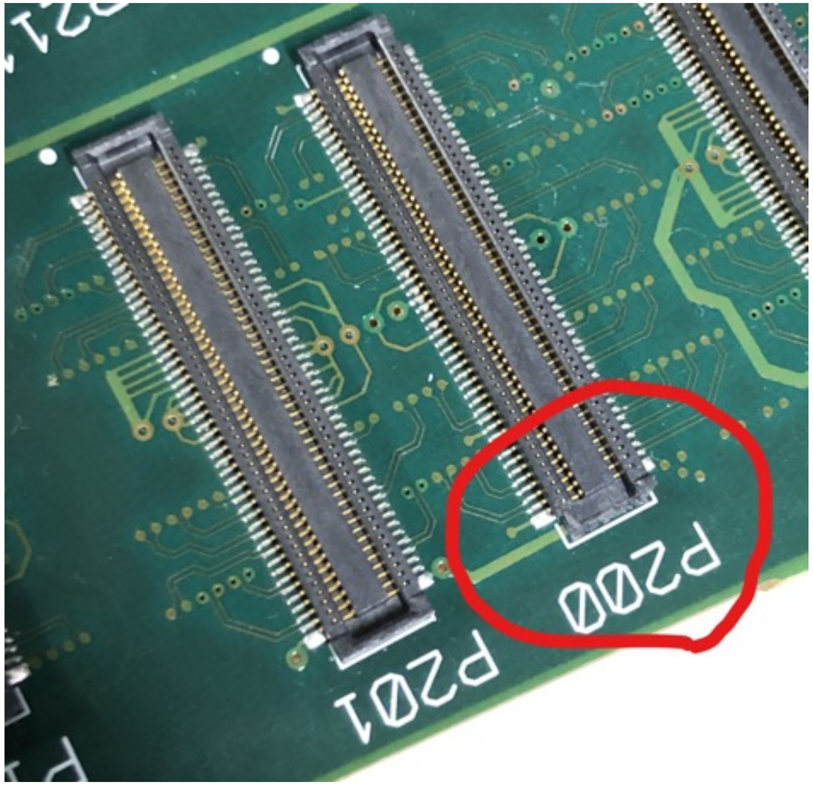
Tests are completed. Now we are in debugging problems.

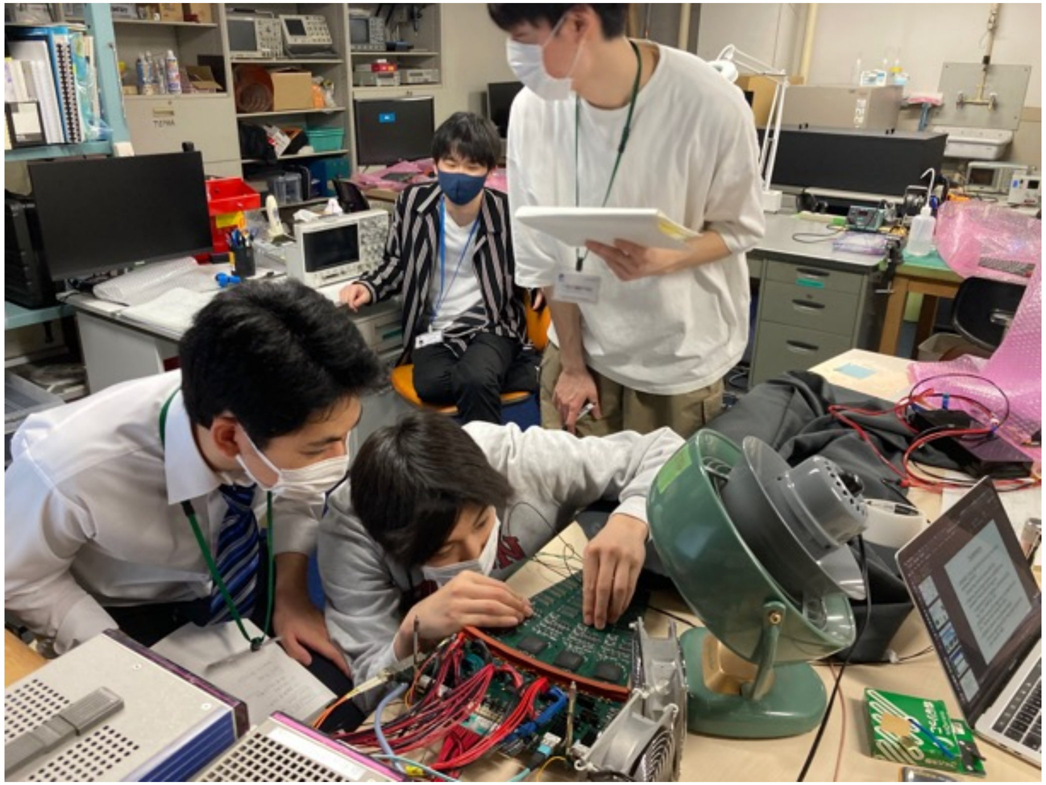
ROC Repair Works

Some components have been repaired/replaced and ROC are back in functional.



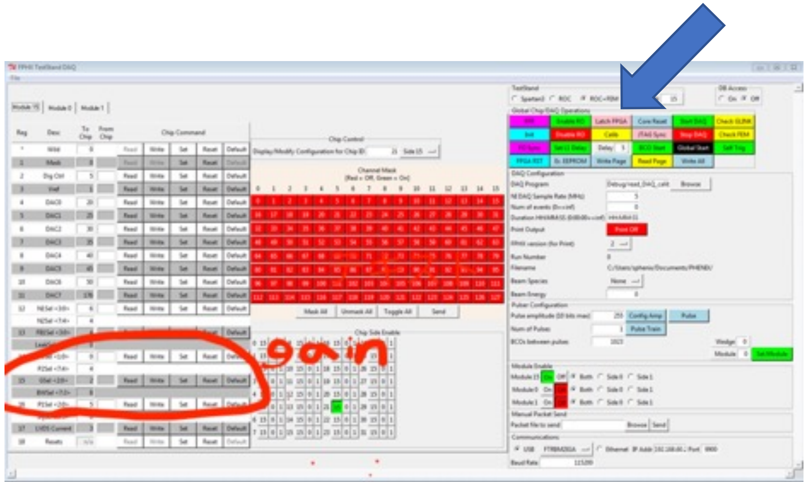
Still debugging and hope for the recovery

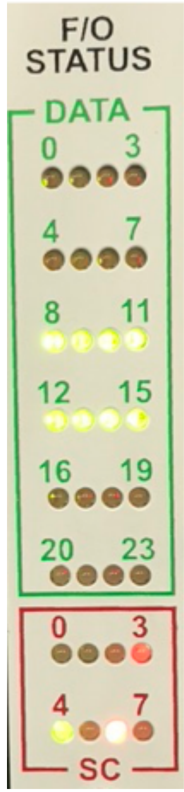


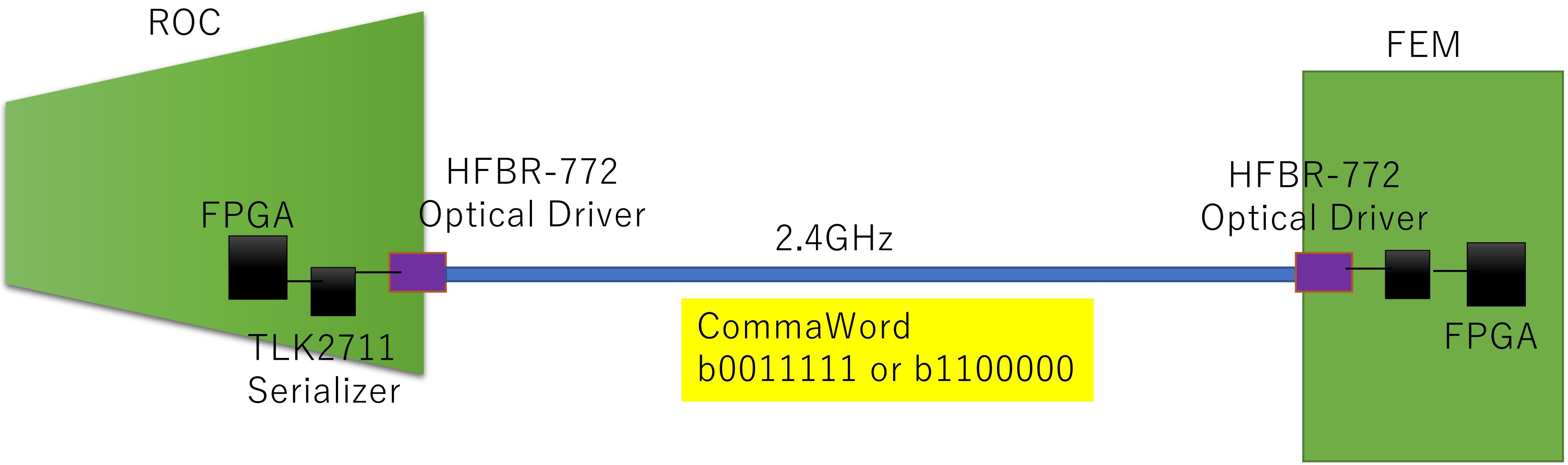


Fiber Synchronization

- Need to establish the fiber communication before sending data.

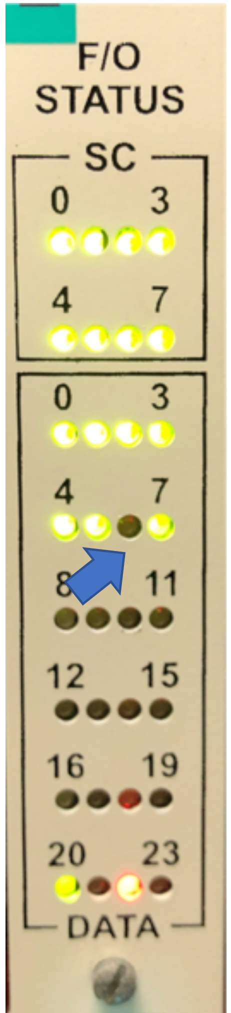






Fiber Sync Error

- Debugging this error is not trivial.
- Need high speed oscilloscope and relevant probes which are not available in RIKEN.
- Also rich experience and high skills are required for this debugging.
- Consulted with John Kuczewski in BNL and he agreed to help us debugging with necessary equipments.
- The plan is to send ROC boards which have fiber sync error to BNL from RIKEN and continue debugging in BNL test bench.
- Use of BNL TB for this purpose need to be arranged depending on how urgent to recover these ROC boards. If we secure 16 Class-1 boards without them, the priority will be lowered.



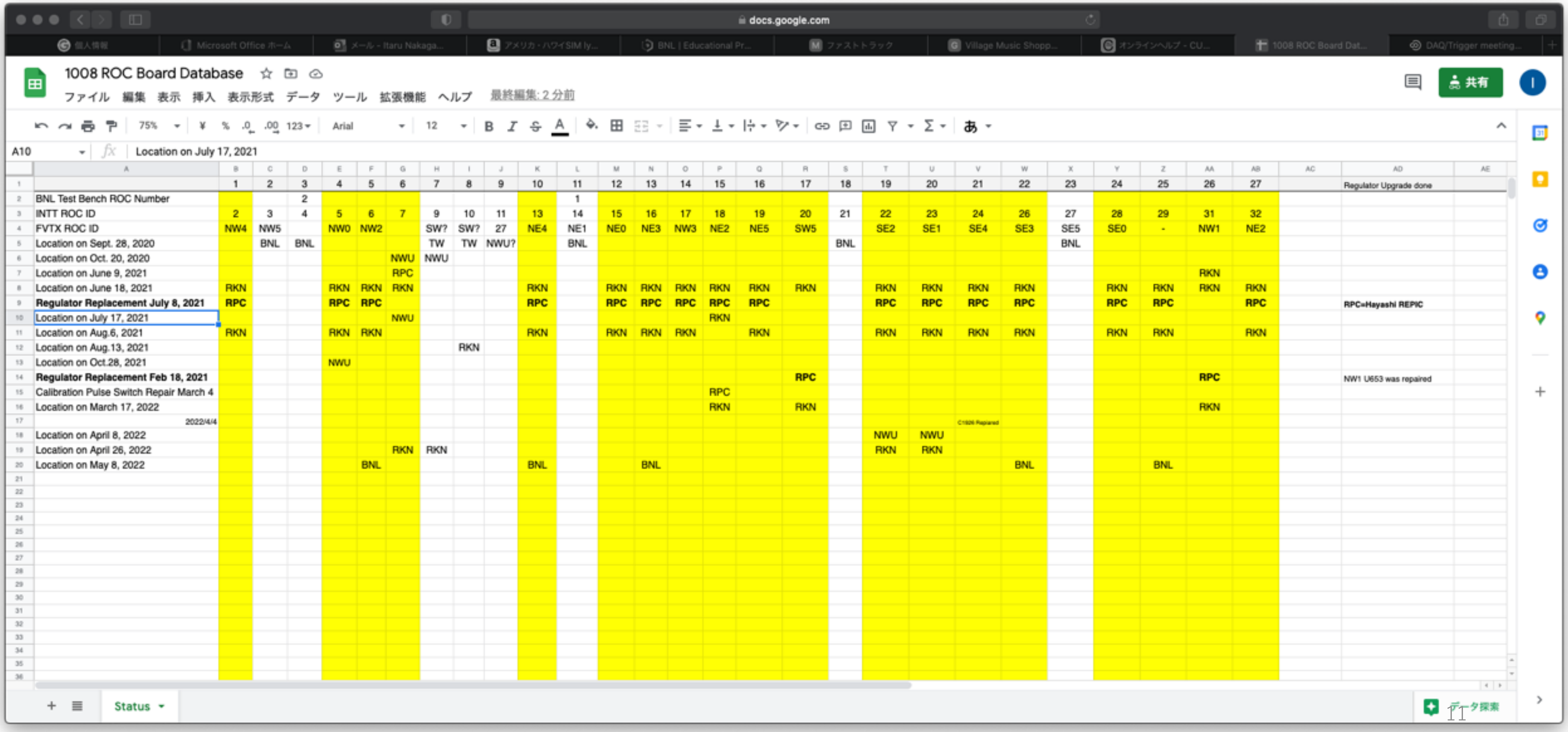
BNL ROC

- There are 5 ROCs in BNL test bench
- 3 of them are taken out from FVTX big wheel in 1008 (NE1, NW5, SE5)
- 1 of these 3 have been heavily used in BNL test bench (NE1)

Serial No.	1008	Test Bench
3	NW5	
4		Test Bench ROC2 (old ver.)
14	NE1	Test Bench ROC1
21		
27	SE5	

ROC Database

https://docs.google.com/spreadsheets/d/1NqsqNfkyfRpXj9aPM9hcaYEB5UxvhhLp_wnfW-ExAG0/edit?pli=1#gid=0



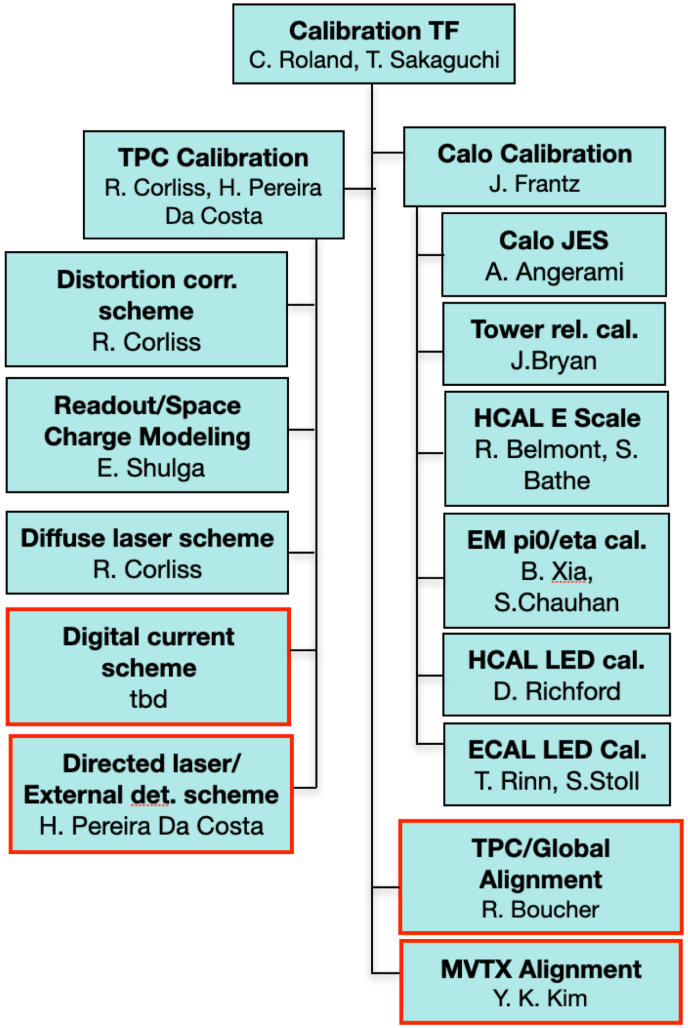
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	Regulator Upgrade done
BNL Test Bench ROC Number			2								1																	
INTT ROC ID	2	3	4	5	6	7	9	10	11	13	14	15	16	17	18	19	20	21	22	23	24	26	27	28	29	31	32	
FVTX ROC ID	NW4	NW5		NW0	NW2		SW?	SW?	27	NE4	NE1	NE0	NE3	NW3	NE2	NE5	SW5		SE2	SE1	SE4	SE3	SE5	SE0	-	NW1	NE2	
Location on Sept. 28, 2020		BNL	BNL				TW	TW	NWU?		BNL							BNL					BNL					
Location on Oct. 20, 2020						NWU	NWU																					
Location on June 9, 2021						RPC																				RKN		
Location on June 18, 2021	RKN			RKN	RKN	RKN				RKN		RKN	RKN	RKN	RKN	RKN	RKN		RKN	RKN	RKN	RKN		RKN	RKN	RKN	RKN	
Regulator Replacement July 8, 2021	**RPC**			**RPC**	**RPC**					**RPC**		**RPC**	**RPC**	**RPC**	**RPC**	**RPC**			**RPC**	**RPC**	**RPC**	**RPC**		**RPC**	**RPC**		**RPC**	**RPC=Hayashi REPIC**
Location on July 17, 2021						NWU									RKN													
Location on Aug.6, 2021	RKN			RKN	RKN					RKN		RKN	RKN	RKN		RKN			RKN	RKN	RKN	RKN		RKN	RKN		RKN	
Location on Aug.13, 2021								RKN																				
Location on Oct.28, 2021				NWU																								
Regulator Replacement Feb 18, 2021																	**RPC**									**RPC**		NW1 U653 was repaired
Calibration Pulse Switch Repair March 4															RPC													
Location on March 17, 2022															RKN		RKN									RKN		
2022/4/4																					C1026 Repaired							
Location on April 8, 2022																			NWU	NWU								
Location on April 26, 2022						RKN	RKN												RKN	RKN								
Location on May 8, 2022					BNL					BNL			BNL									BNL			BNL			

Calibration Taskforce Introduction

Christof Roland, MIT

For the Calibration Taskforce

Calibration Traskforce Organization



- Weekly meetings of sub-taskforces
- Monthly executive meetings of sub-taskforce leaders

Remaining items

- Alignment
  - Alignment group still has to reach critical mass in terms of person power
  - Individual subdetector alignment work has started
    - MVTX internal alignment project using ML
    - Global alignment to be addressed in summer/fall 2022
    - Software “hooks” to apply alignment corrections provided by ACTS

- QA for all subsystems
  - Implementation foreseen for Fall 22 as detector expert person power becomes available once installation in complete

- Commissioning
  - A dedicated taskforce has been formed to address the commissioning strategy of sphenix consisting of project management, computing, detector and hard-/software experts

Arrangement

- On 2022/05/18 9:33, Christof E Roland wrote:

Hi Itaru,

a contact person for the INTT in the calibration taskforce would be more than welcome! the tracker calibration meetings are on Tuesdays at 11am, the tracking meetings are Mondays at 10am. It would be nice to have someone representing the INTT in those meetings once in a while.

The alignment effort is just ramping up, now would be a good time to join this as well, since there is no obvious plan yet how to include the INTT is the global alignment scheme. Tony has started to organize the alignment effort, I put him in cc in this mail. On **Friday at 11am EST** will be the first brainstorming meeting for the alignment. There are no regular meetings scheduled yet, but I assume there will be soon.

cheers Christof

Installation and Commissioning

Discussed in the general meeting on May 13, 2022

Report from the sPHENIX commissioning task force

Putting together information from Russ Feder, the commissioning task force members, and others

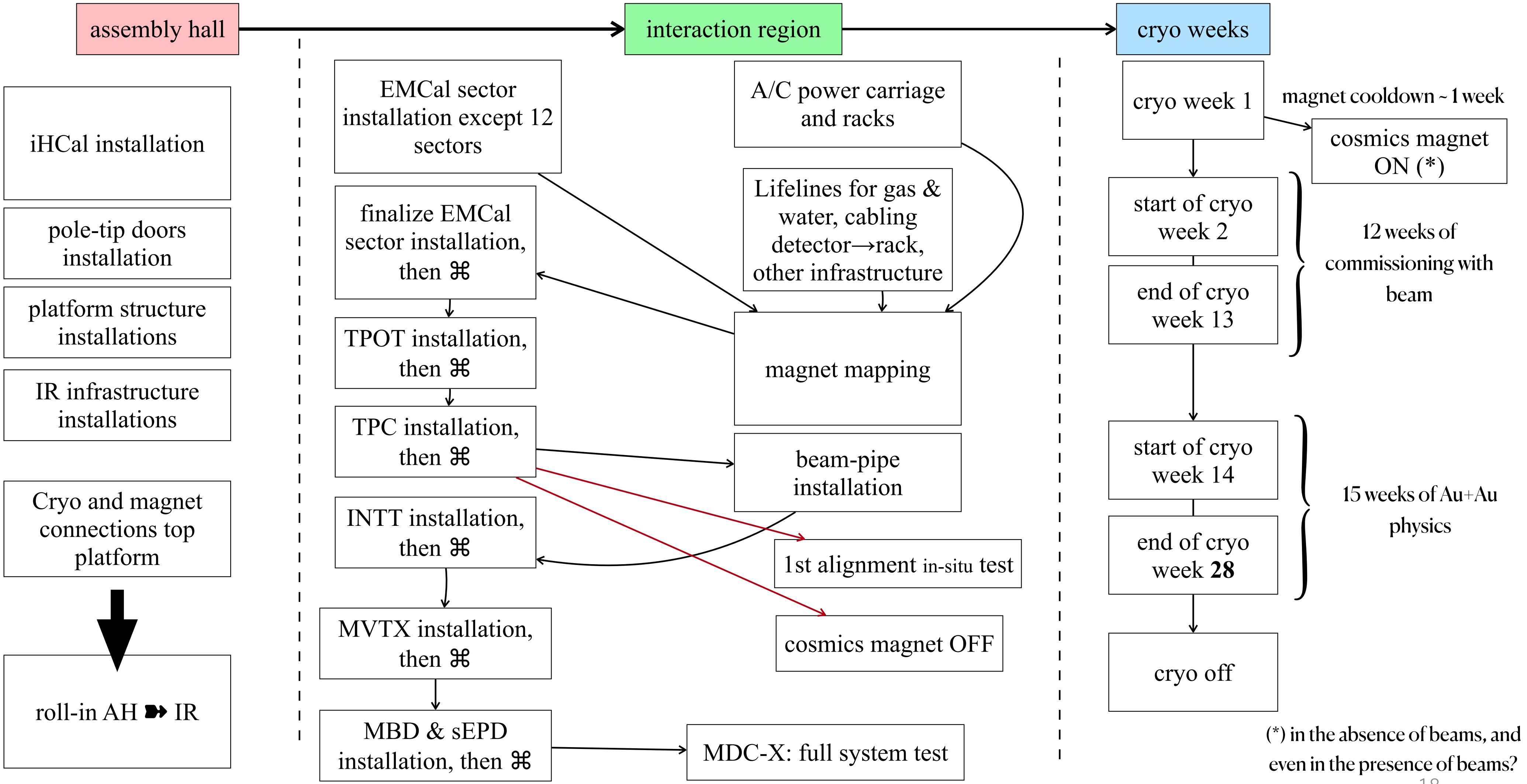
first beams
February 2023

sPHENIX General Meeting - May 13, 2022

C. Riedl, J. Haggerty

⌘= service installation and cabling

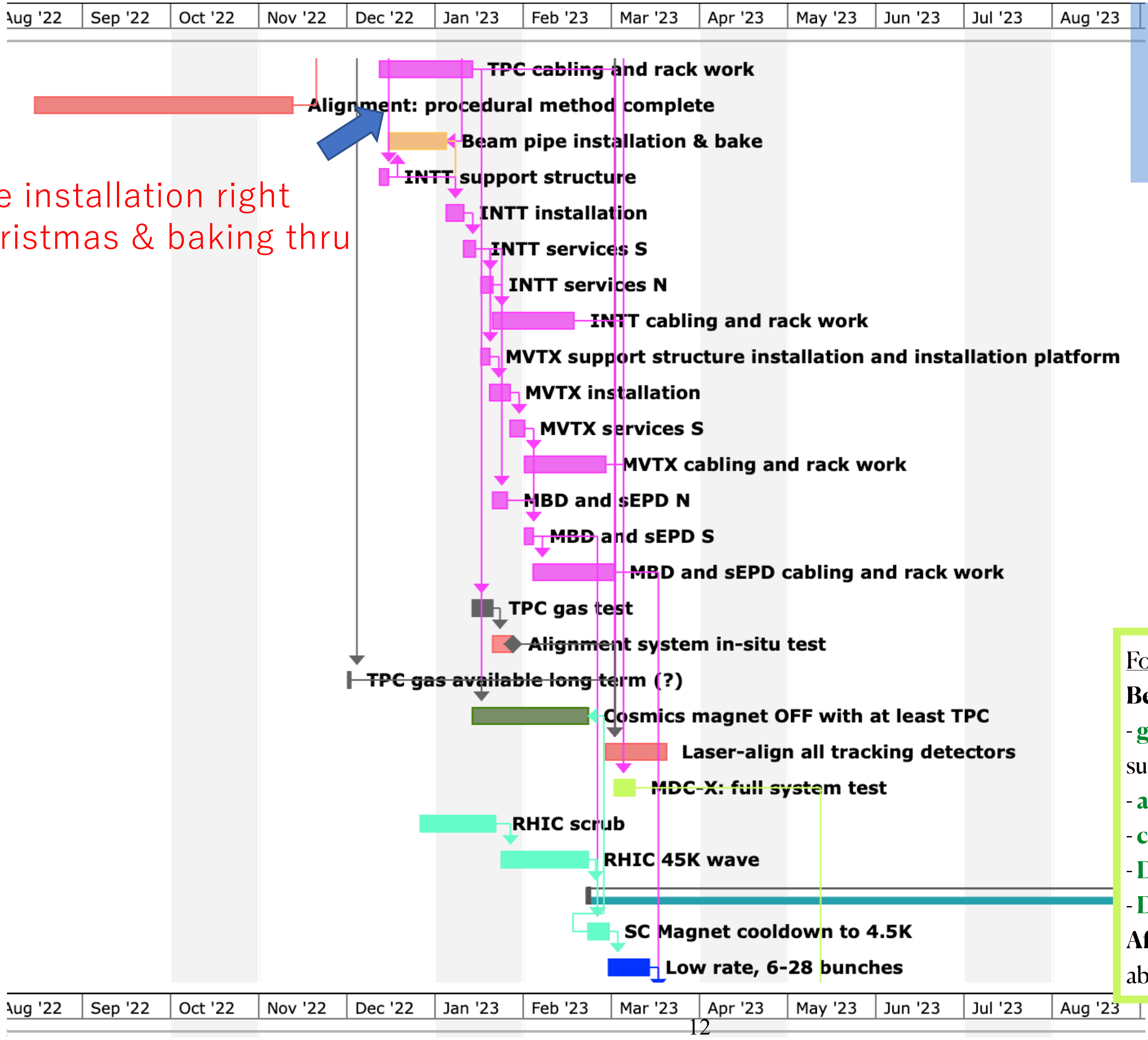
Schedule logic without dates - overview



(*) in the absence of beams, and even in the presence of beams?

zoom: putting it together

Beam pipe installation right before Christmas & baking thru holidays



calorimeters
tracking detectors
SC magnet
cryo
beam pipe
infrastructure
alignment
cosmics
software
data

For every detector - software milestones:

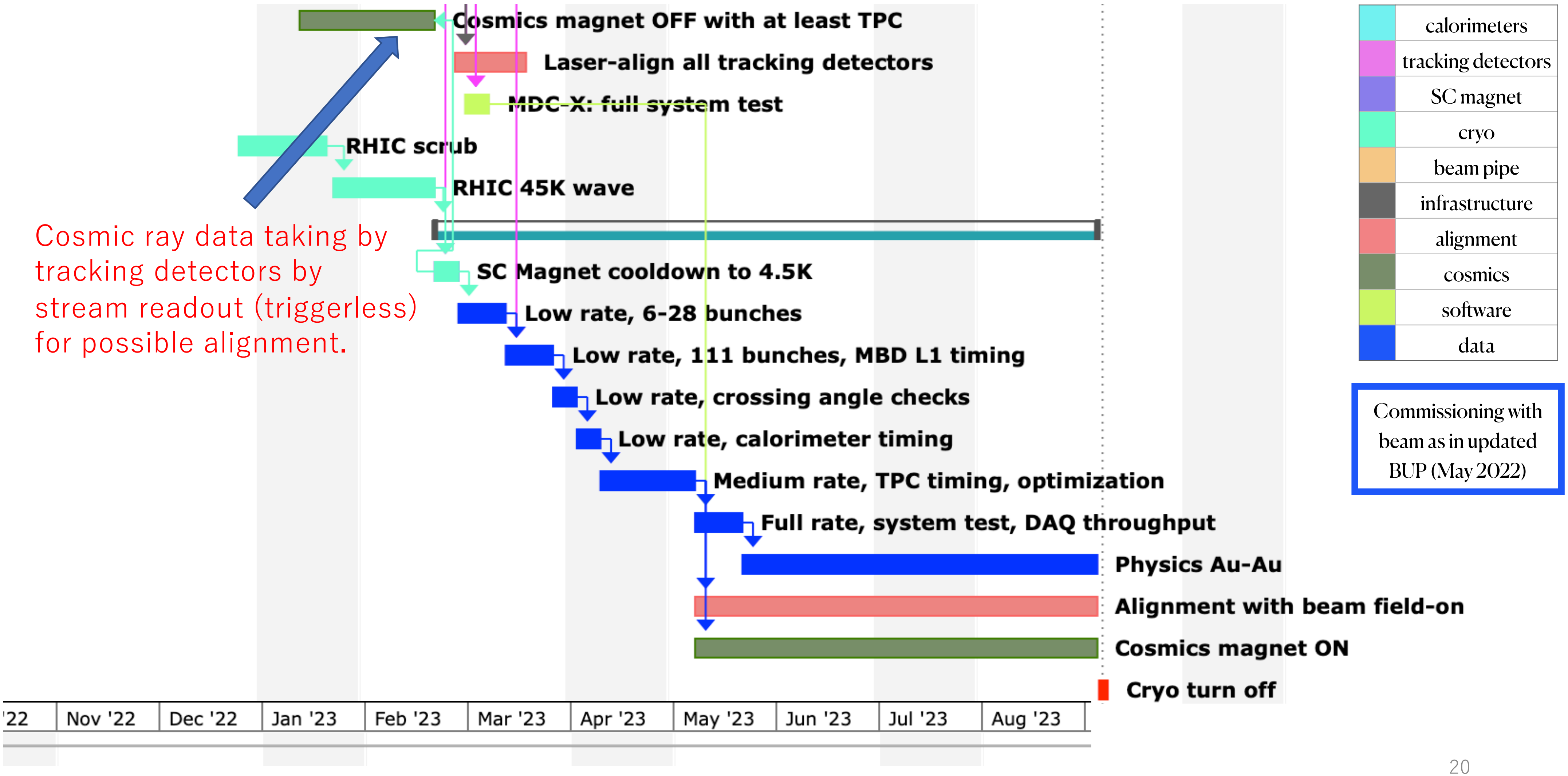
Before installation of each individual detector:

- **geometry** implemented incl. possibility to use survey data
- **alignment** strategy defined and software available
- **calibration** strategy defined and software available
- **DAQ** - able to use packet API
- **DQM** - have strategy, software and hardware ready

After installation: dress rehearsal for everything above

zoom: with beam

RHIC 28 cryo weeks in 2023



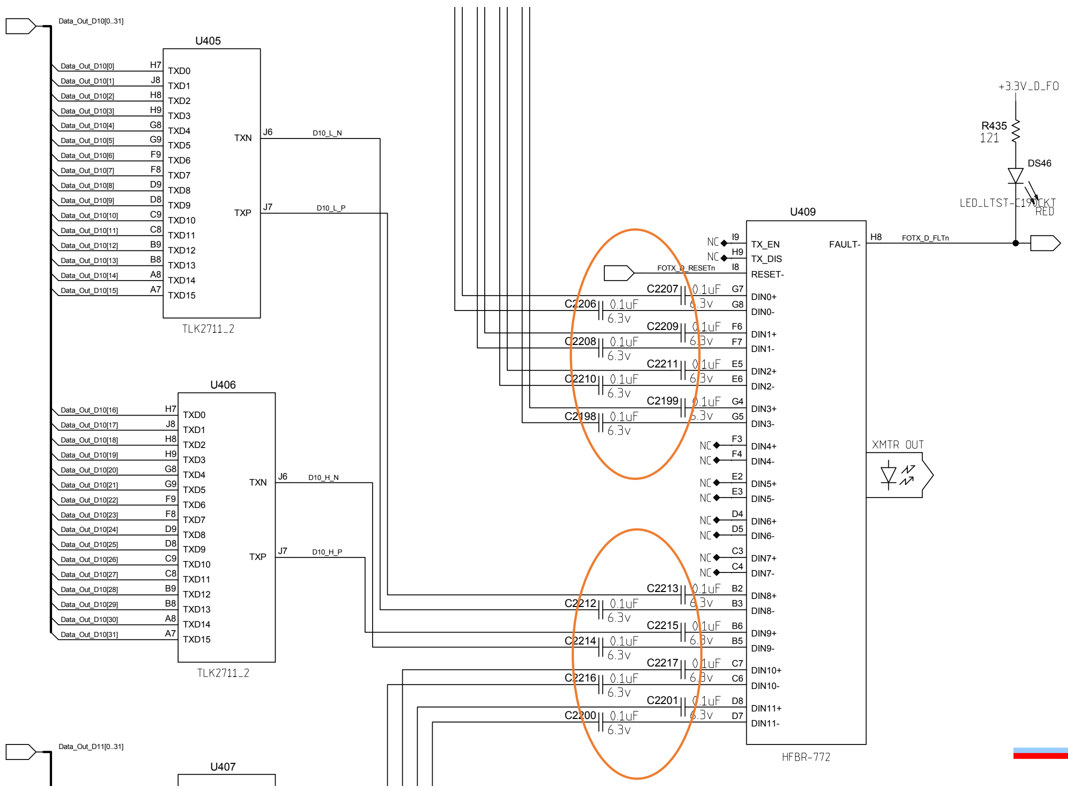
backup

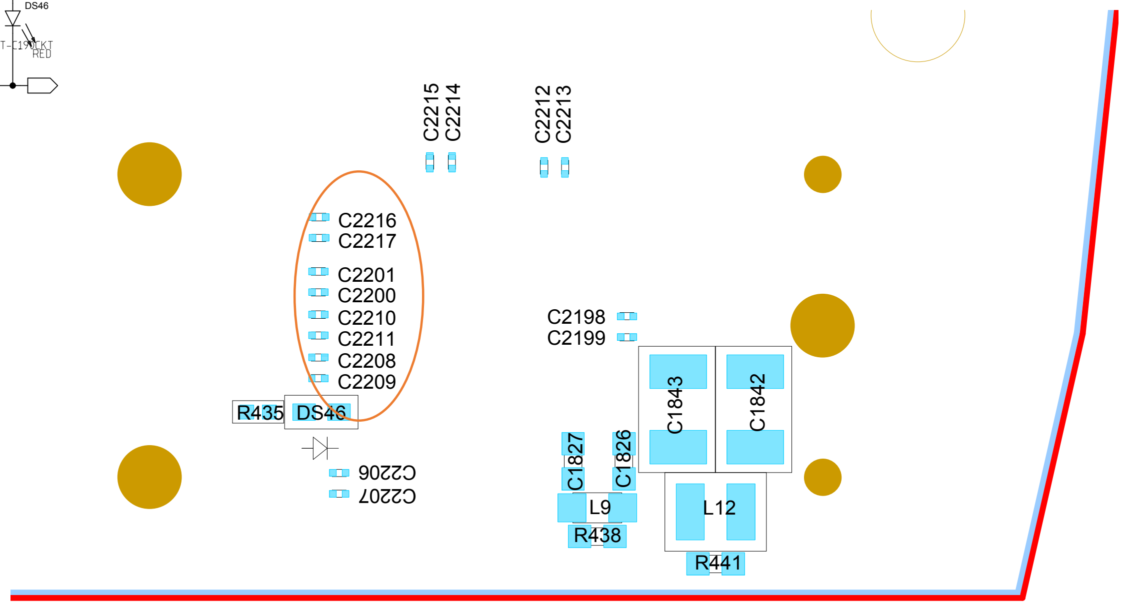
Consulted with John Kuczewski

- May 13, 2022
- He suggested following debugging approaches
  1. Monitor current draw of power supply if there is any change in the current draws when synchronization is failed.
  2. Check regulator outputs to see if there is any voltage drop.
  3. Execute PRBS Test for the health check of TLK2711-SP chip.
  4. John will setup a 4GHz Fast Oscilloscope and optical divider casset at the silicon lab **at BNL** to help us diagnose the problem.
  5. The existence of HFBR-772 shouldn't affect on the comma word issuance in upstream ICs. However, there is a better way to probe by scope as proposed in the next page.

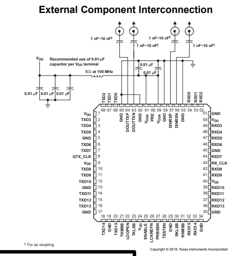
Probe Point of Oscilloscope

To be probed AC coupling capacitors which are dedicated to each channels. This way, there is no need to remove the driver for monitoring signals.





Backside of HFBR-772 area



Pseudo-Random Bit Stream (PRBS)

8.3.5 Pseudo-Random Bit Stream (PRBS) Generator

The TLK2711-SP has a built-in $2^7 - 1$ PRBS function. When the PRBSEN pin is forced high, the PRBS test is enabled. A PRBS is generated and fed into the 10-bit parallel-to-serial converter input register. Data from the normal input source is ignored during the PRBS mode. The PRBS pattern is then fed through the transmit circuitry as if it were normal data and sent out to the transmitter. The output can be sent to a bit error rate tester (BERT), the receiver of another TLK2711-SP, or looped back to the receive input. Because the PRBS is not really random, but a predetermined sequence of 1s and 0s, the data can be captured and checked for errors by a BERT.

8.3.14 PRBS Verification

The TLK2711-SP also has a built-in BERT function in the receiver side that is enabled by the PRBSEN. It can check for errors and report the errors by forcing the RKLSB pin low.