INTT Beam Test (Phase-II) Preparation Status and Run Plan

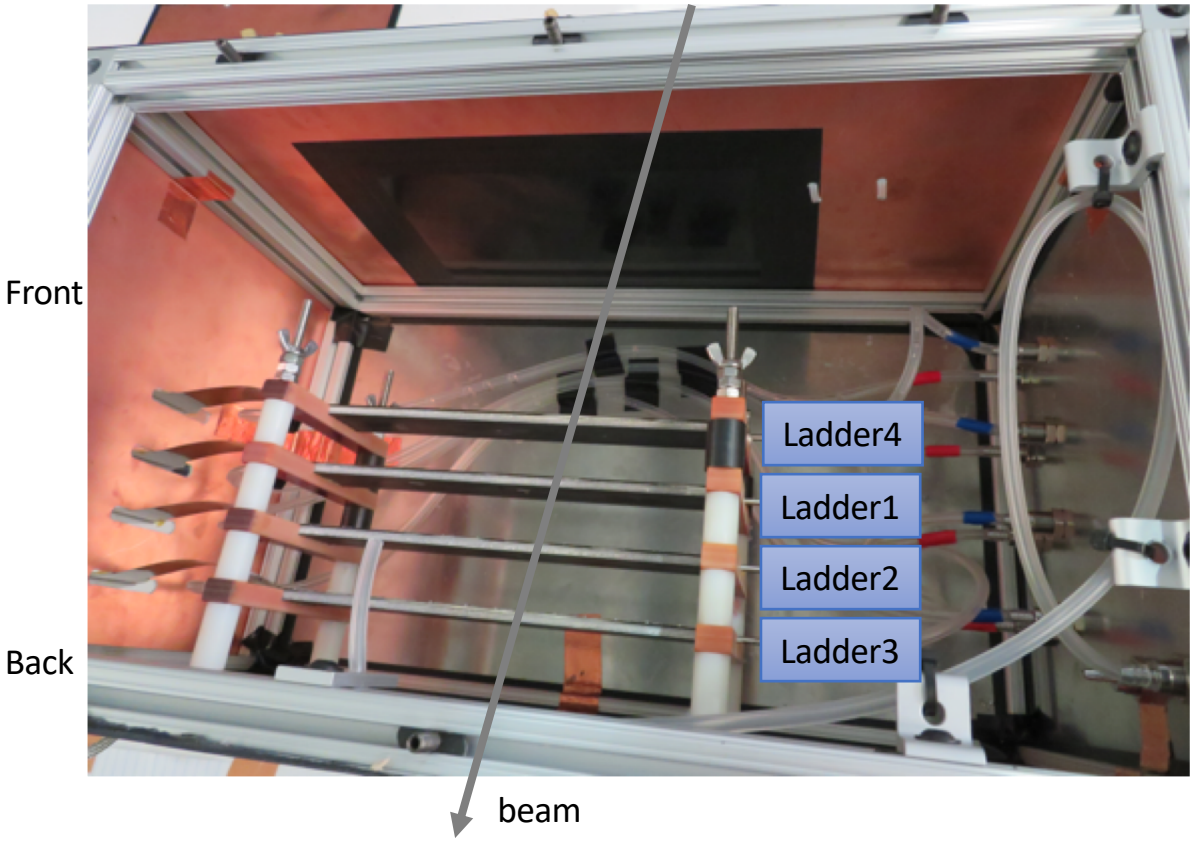
RIKEN/RBRC

Itaru Nakagawa

On behalf of INTT group

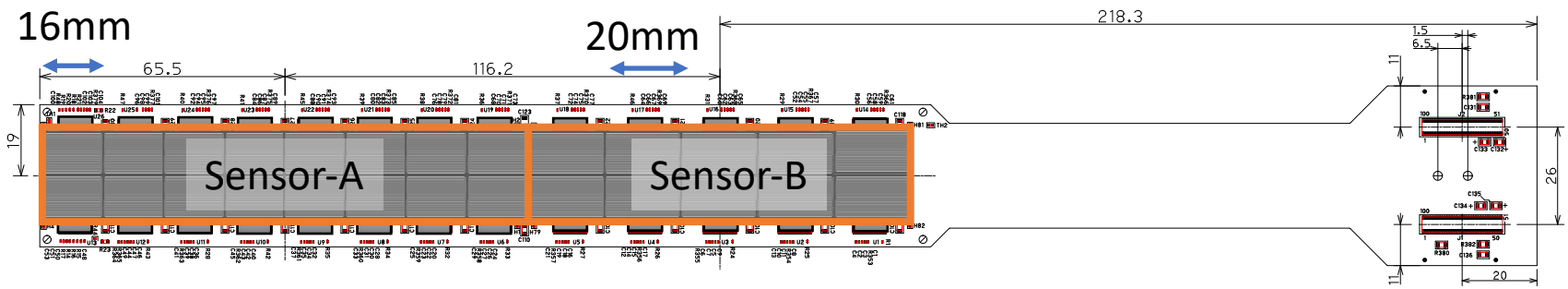
Last update : 6/22 17:50

Ladder Configuration



Station	Ladder
1	4
2	1
3	2
4	3

INTT Ladders



FPHX Chips @ FNAL (Completed)

Assembly @ BNL

Default Configuration

Telescope

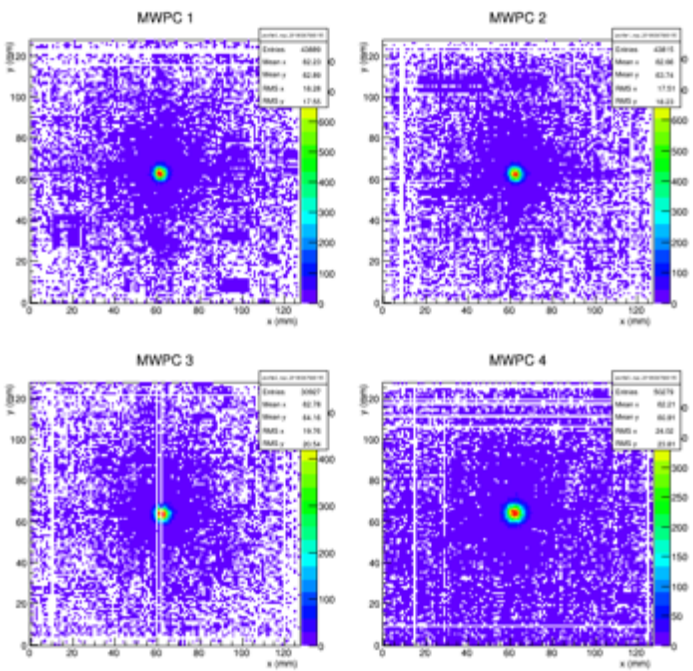
- Position
  - x=1570mm
  - y=150mm
- Rotation
  - 0°
- Vertical Tilt
  - 0°

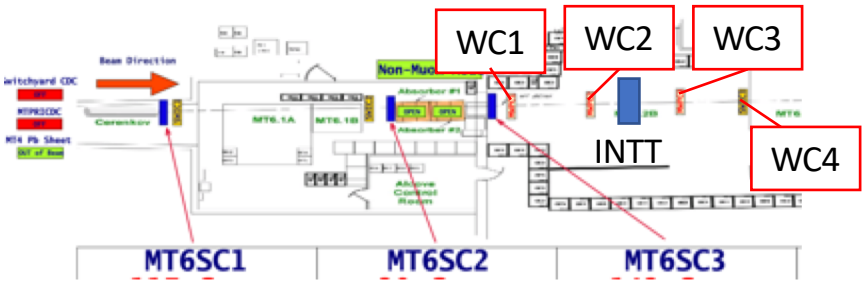
Beam

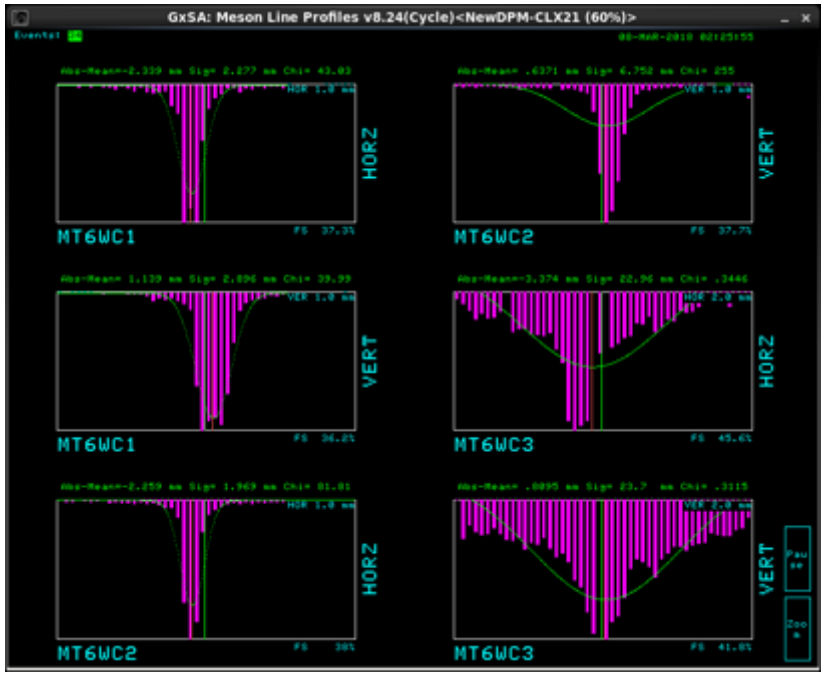
- 120 GeV primary proton
- ~10kHz
- σ_y ~2mm, σ_y~6mm

DAC	Threshold Value
0	8
1	16
2	32
3	48
4	80
5	112
6	144
7	176

2018 Beam Condition







- Proton beam rate ~10kHz
- a few ~ several mm at MWPC2

INTT Telescope in the Beam Line

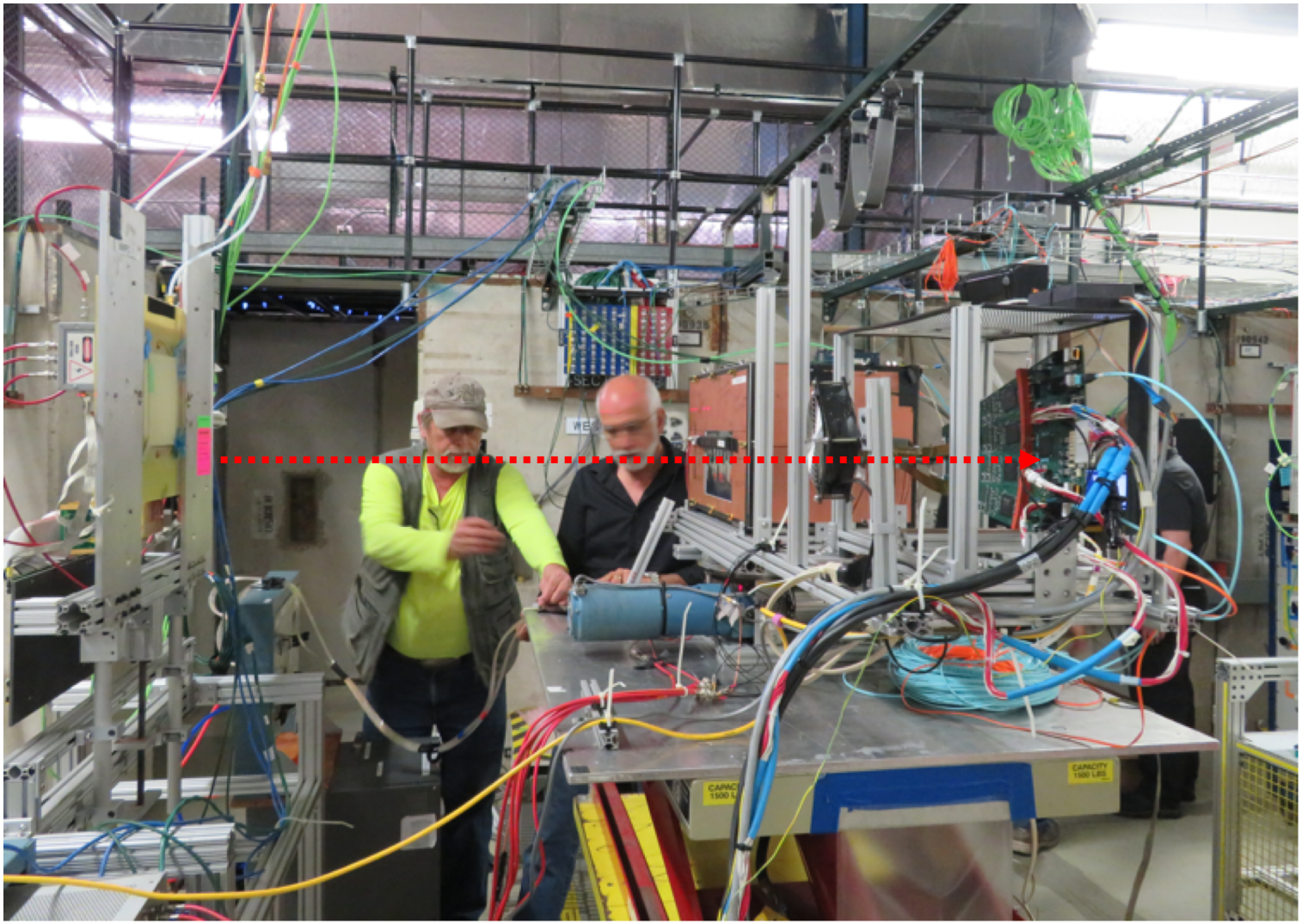
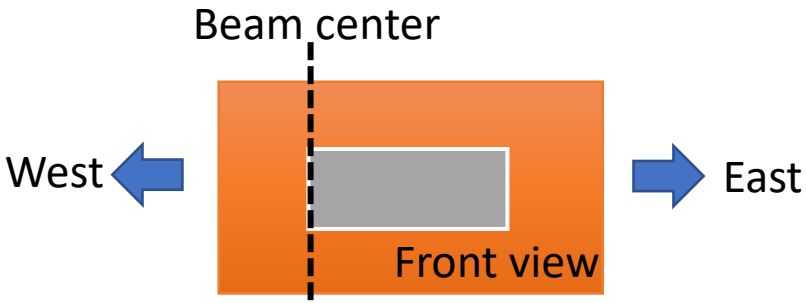


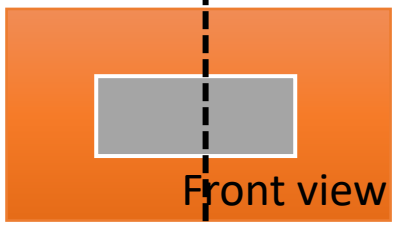
Table Position

View from upstream

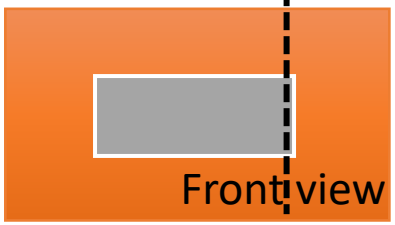
- Horizontal Position : 1693mm



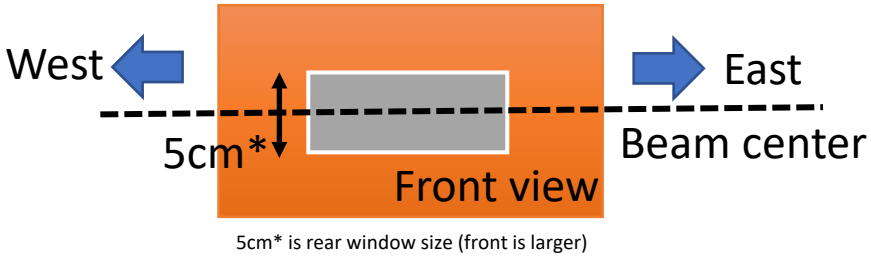
- Horizontal Position : 1570mm



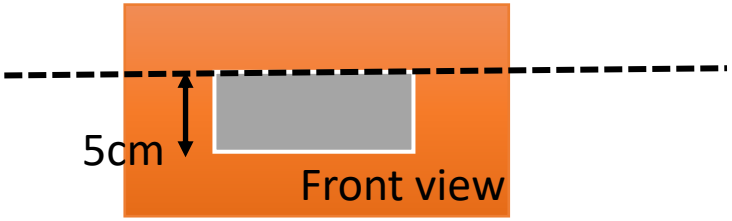
- Horizontal Position : 1446mm



- Vertical Position : 150 mm

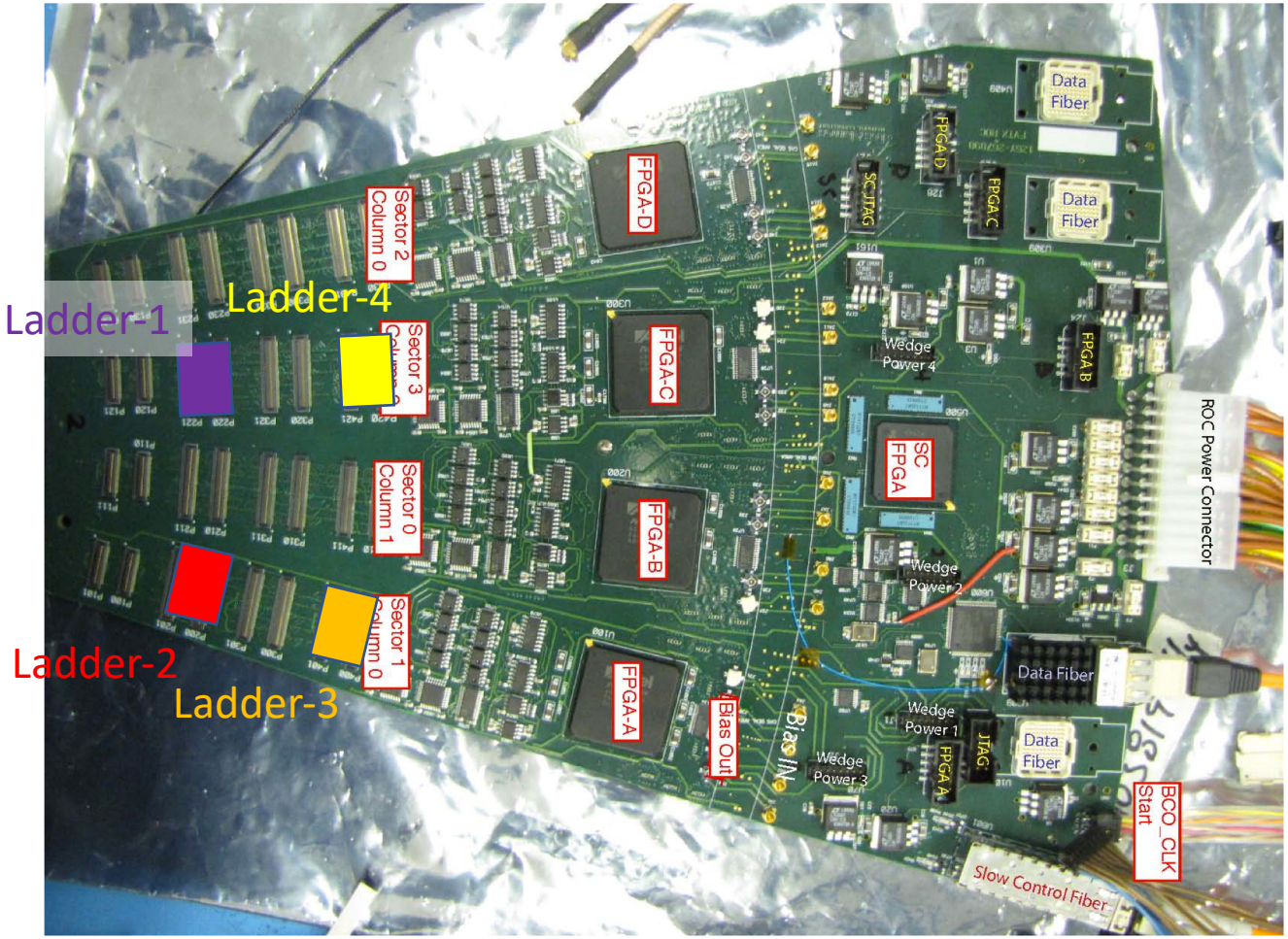


- Vertical Position : 175 mm



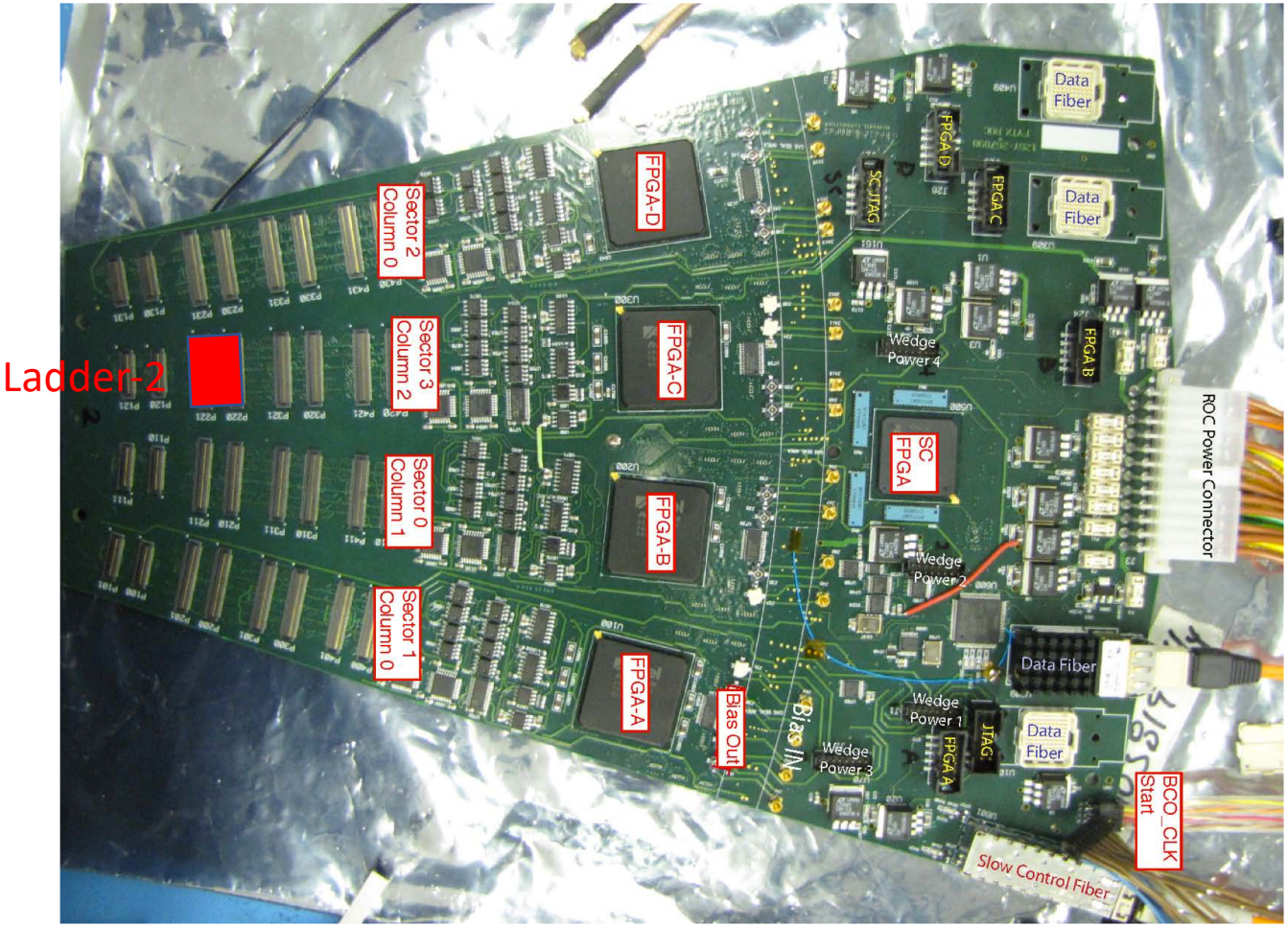
Motion table control panel is found in
ftbf_user@> ~/acnet/run_table_select.sh

ROC Configuration 6/17 – 6/18 14:00



Old ROC

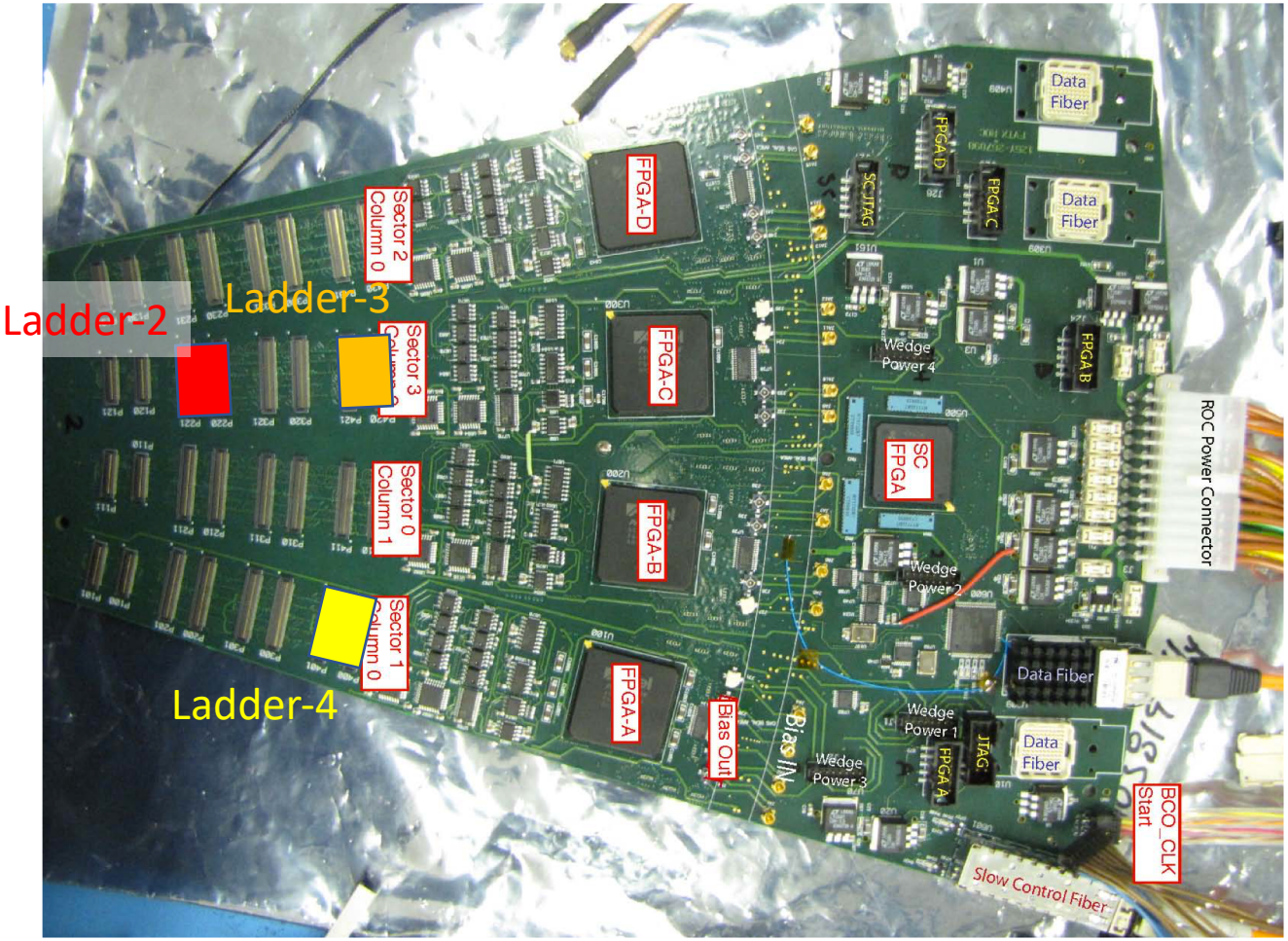
ROC Configuration 6/18 16:00 – 6/19 1:00



Old ROC

ROC Configuration 6/19 1:00 – 6/22 8:00

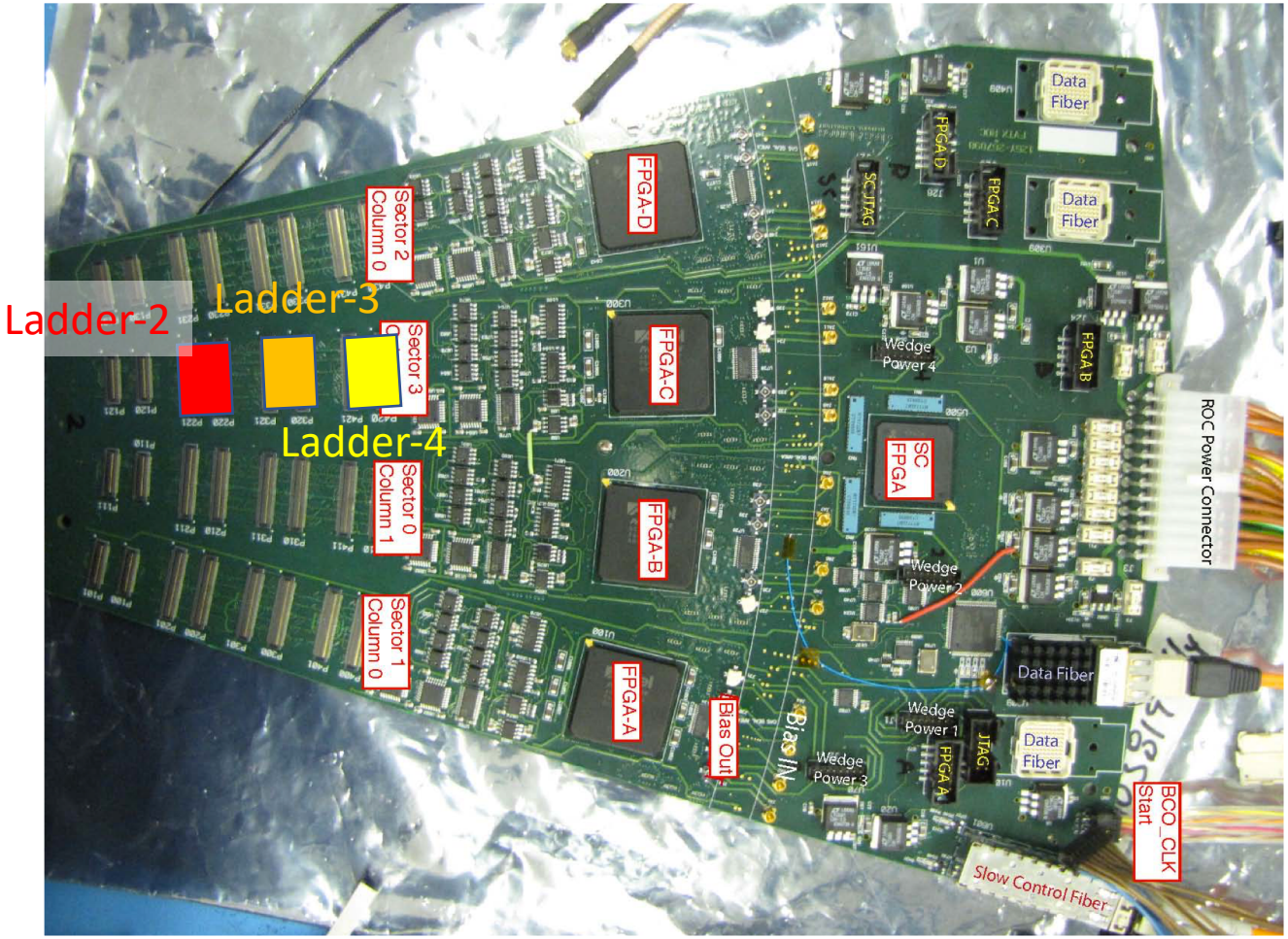
- Run 631



Old ROC

ROC Configuration 6/22 7:00 – 6/22 20:00

From Run632 -



Old ROC

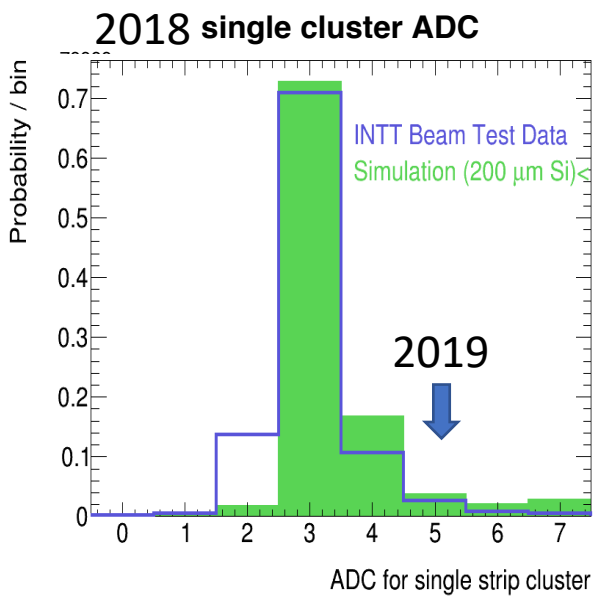
Run Plan

1. Timing Scan
2. Ladder 3 Bias voltage scan 100, 120, 140, 160, 180V.
3. DAC scan
4. DAC0 threshold scan
5. Middle cell efficiency measurement
6. Install bus extender and stays for the rest of program unless disaster is observed Eye diagram (with/without bus extender, low rate, high rate, cell position dependence)
7. DAC0 threshold scan
8. Position dependent efficiency (middle cell, intersection)
9. Horizontal Rotation +45, +22.5
10. Vertical Tilt 16, 17 degree
11. Rates (10kHz ~ 300kHz) + (300kHz + Pb brick?)
12. 120GeV proton, 5GeV electron

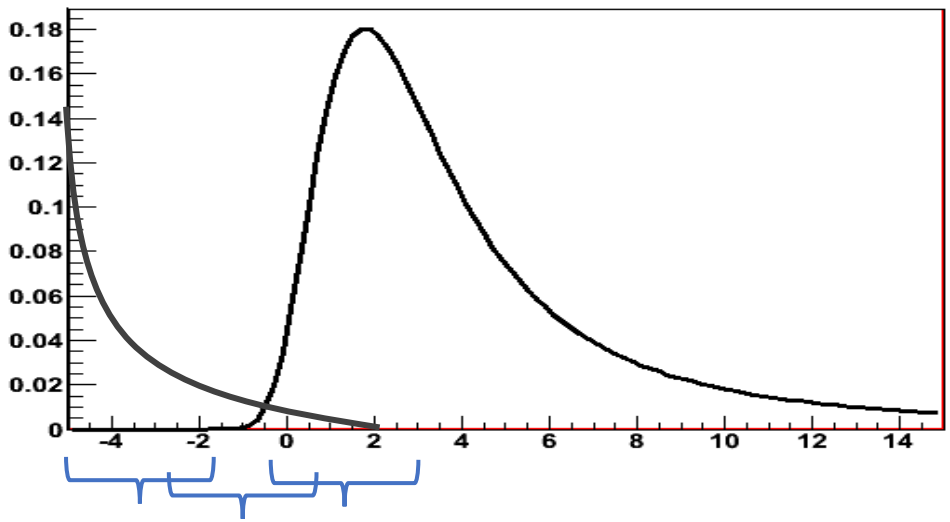
2018 DAC0 Threshold Setting

	Si thickness [μm]
2018	200
2019	320

DAC	Threshold Value	2018 Beam Test	Integ V [mV]
0	8	14	266
1	16	16	274
2	32	32	338
3	48	48	402 MIP
4	80	80	530
5	112	112	658
6	144	144	786
7	176	176	914



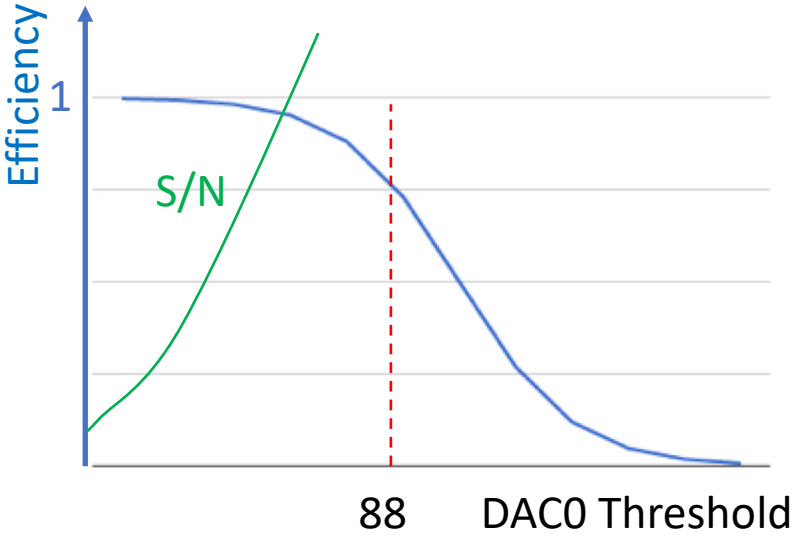
DAC Scan



- Need to to develop script to automate fvtxvme set_threshold NW [DAC] [value]
- Use script to set DAC values (Kai-Yu is in preparation)
- 10k events / run

	DAC Scan 1	DAC Scan 2	DAC Scan 3	DAC Scan 4	DAC Scan 5	DAC Scan 6	DAC Scan 7	DAC Scan 8
DAC	Value	Value	Value	Value	Value	Value	Value	Value
0	8	28	48	68	88	108	128	148
1	12	32	52	72	92	112	132	152
2	16	36	56	76	96	116	136	156
3	20	40	60	80	100	120	140	160
4	24	44	64	84	104	124	144	164
5	28	48	68	88	108	128	148	168
6	32	52	72	92	112	132	152	172
7	36	56	76	96	116	136	156	176

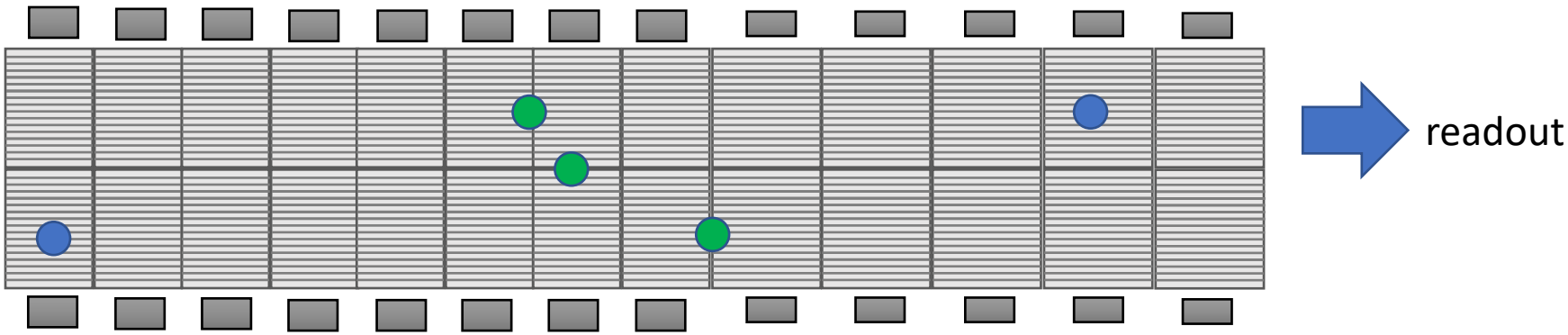
DAC0 Threshold Scan



DAC	Default	1	2	3	4	5	6	7	8	9	10	16
0	8	16	24	32	40	48	56	64	72	80	88	96
1	16	16	24	32	40	48	56	64	72	80	88	96
2	32	32	32	32	40	48	56	64	72	80	88	96
3	48	48	48	48	48	48	56	64	72	80	88	96
4	80	80	80	80	80	80	80	80	80	80	88	96
5	112	112	112	112	112	112	112	112	112	112	112	112
6	144	144	144	144	144	144	144	144	144	144	144	144
7	176	176	176	176	176	176	176	176	176	176	176	176

Odd run numbers are redundant

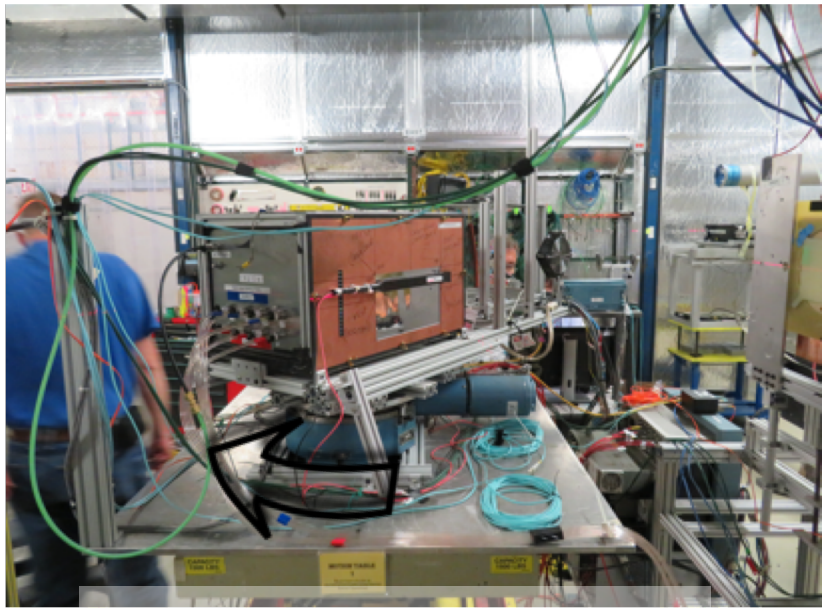
Position Depedent Efficiency Runs



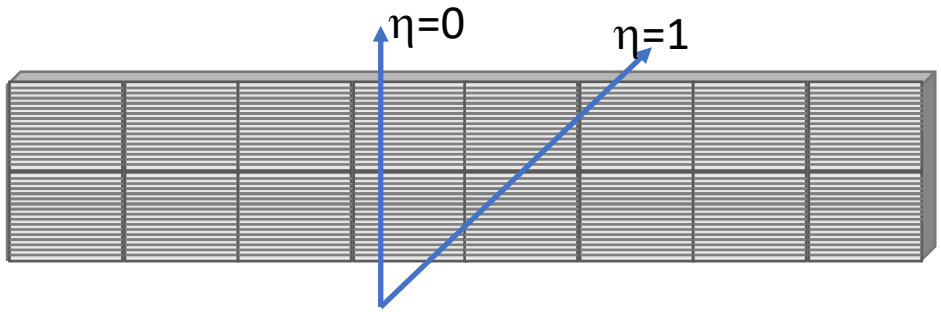
- 10kHz
- At least middle of 1 cell in type-A, and 1 cell in type B
- Intersection between cell and type-A&B silicons

Horizontal Rotation Configuration

Run#644-648, 659-661



Horizontal Rotation

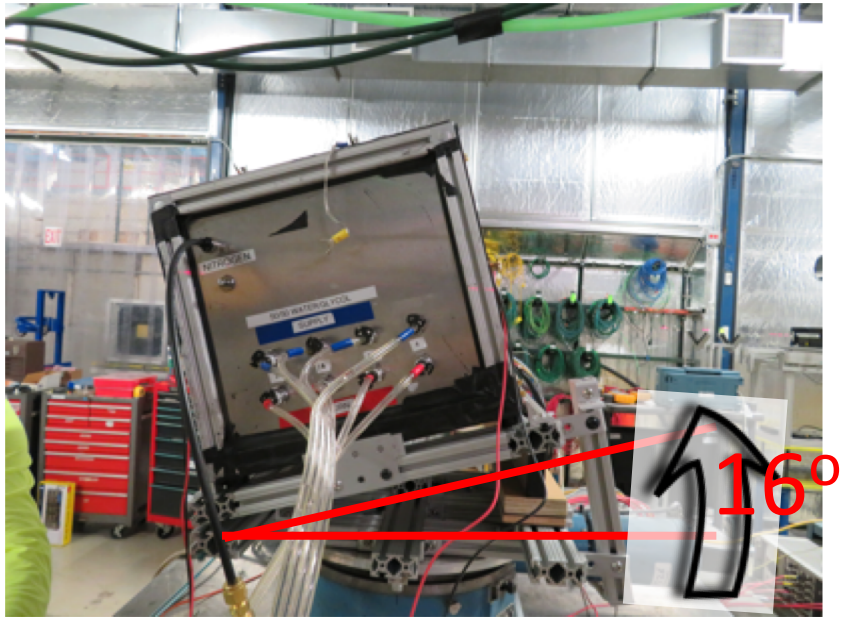


- +40°, +22.5° in a priority order
- Beam condition is default
- Larger energy deposit is expected.

DAC	Threshold Value
0	14
1	16
2	32
3	48
4	80
5	112
6	144
7	176

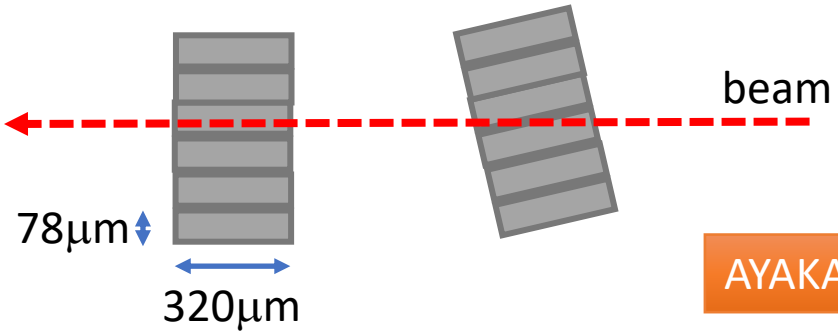
Multistrip Hit Configuration

Run#656 - 658

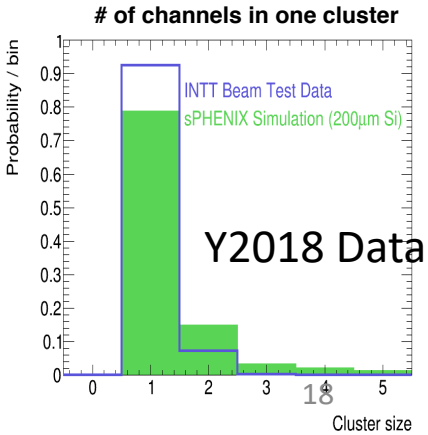


Vertical Tilt

- To let beam fire multiple strips.
- Develop charge sharing model for INTT simulation
- Improve cluster size matching between data and simulation



AYAKA's Measurement



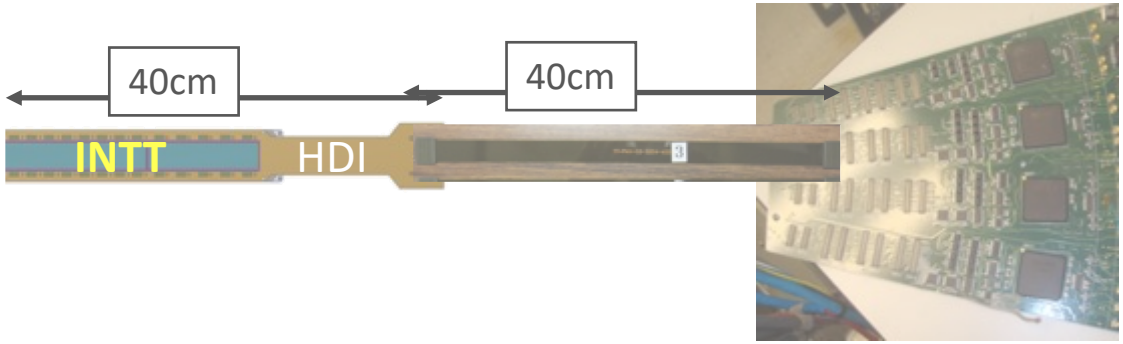
Multistrip Hit Configuration

- Beam Rate : 10kHz
- H. Rotation : 0°
- DAC Setting : default

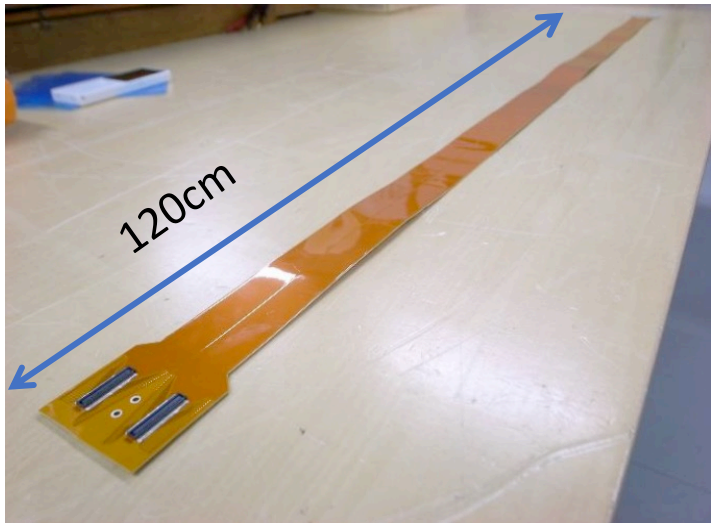
- Vertical Tilt
  - 16°
  - 17°

With / Without 1.2m Bus Extender

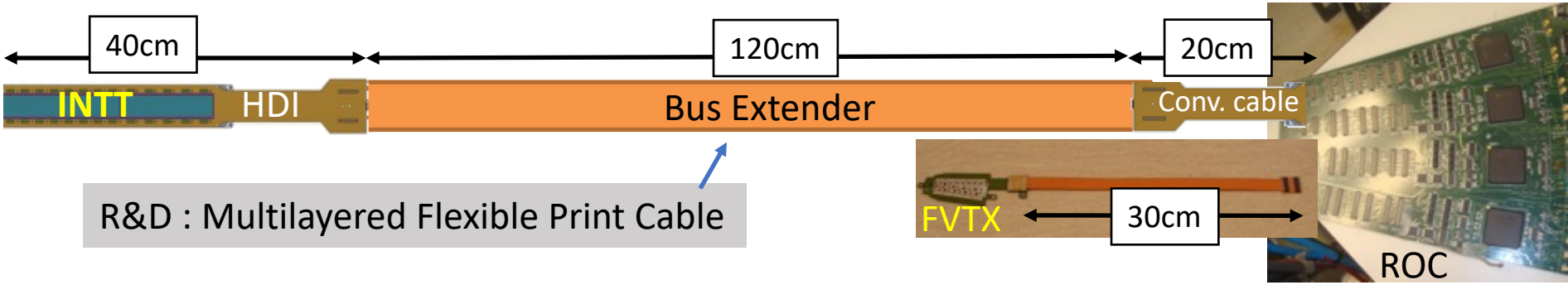
2018 Beam Test



1.2m Bus extender



2019 Beam Test

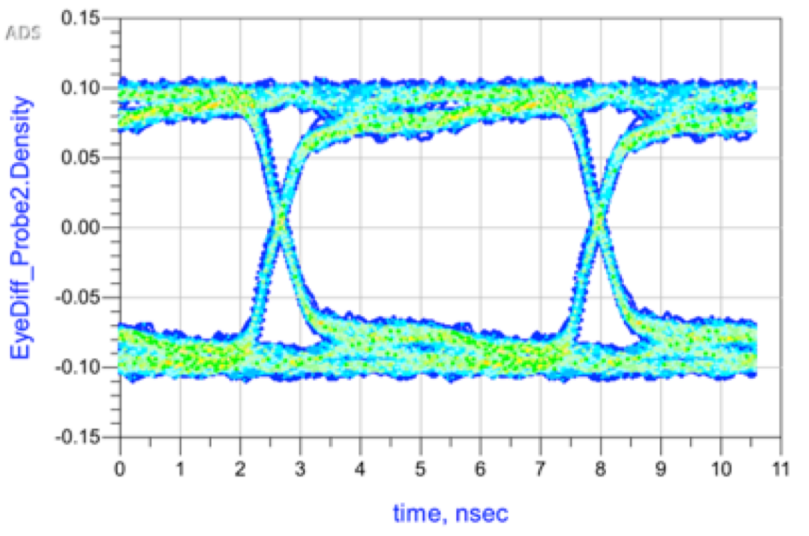


R&D : Multilayered Flexible Print Cable

Bus Extender Test

- Install bus extender to ladder front 4, 1, 2, not 3.
- Efficiency measurement of the middle cells
- Low DAC setting (Check DAC0 entry)

Eye Diagram Measurement with/without the bus extender



Shift Schedule

INTT-Readout Expert
Data Transfer/Production/Monitoring Expert

7:30 – 16:00	15:30 – 24:00	23:30 – 8:00
Takahito*	Rachid*	Takashi H. *
Rui	Kai-Yu	Ayaka
Shoichi	Ming Itaru	Takashi K.

*Shift Leader

DAQ On-call : John and Ed