

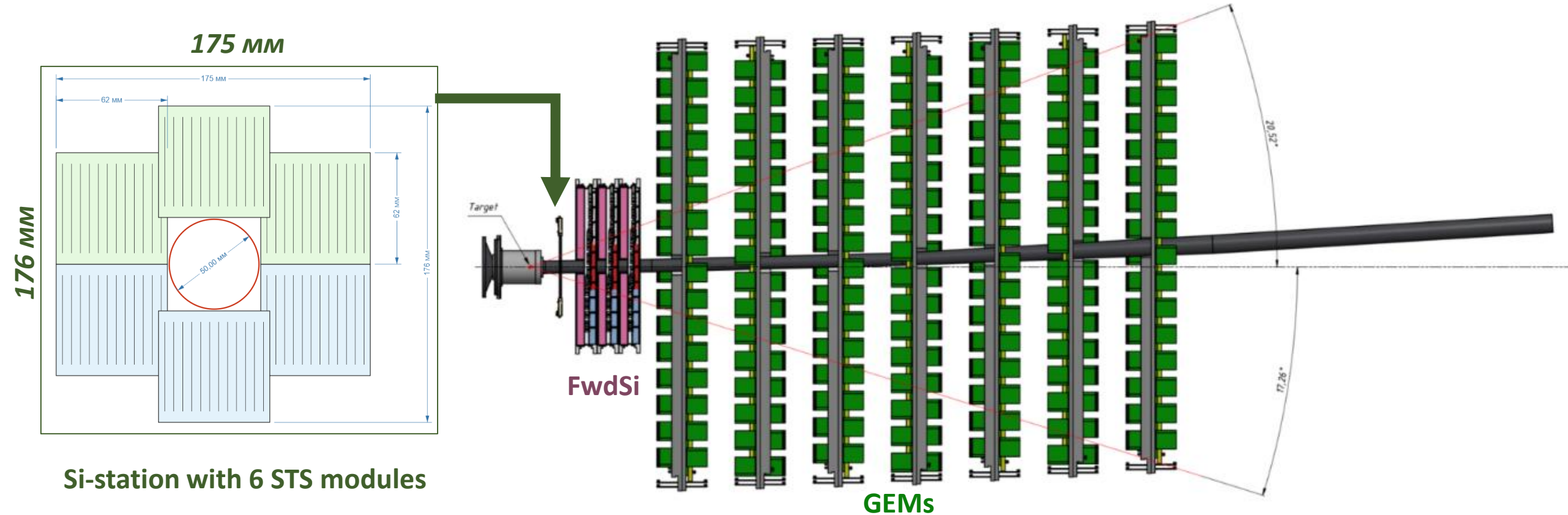
# Si-station based on STS modules

Dmitrii Dementev for STS team

---

1. **Mechanics** (*Alexey Sheremetev, Denis Andreev, Ilya Gorelikov*)
2. **Test of the modules** (*Mikhail Shitenkov, Vladimir Leontyev*)
3. **DAQ integration** (*Raul Arteche Diaz, Mikhail Shitenkov, Anatoly Kolozvary*)
4. **Timelines**

# Hybrid Tracker of BM@N Experiment

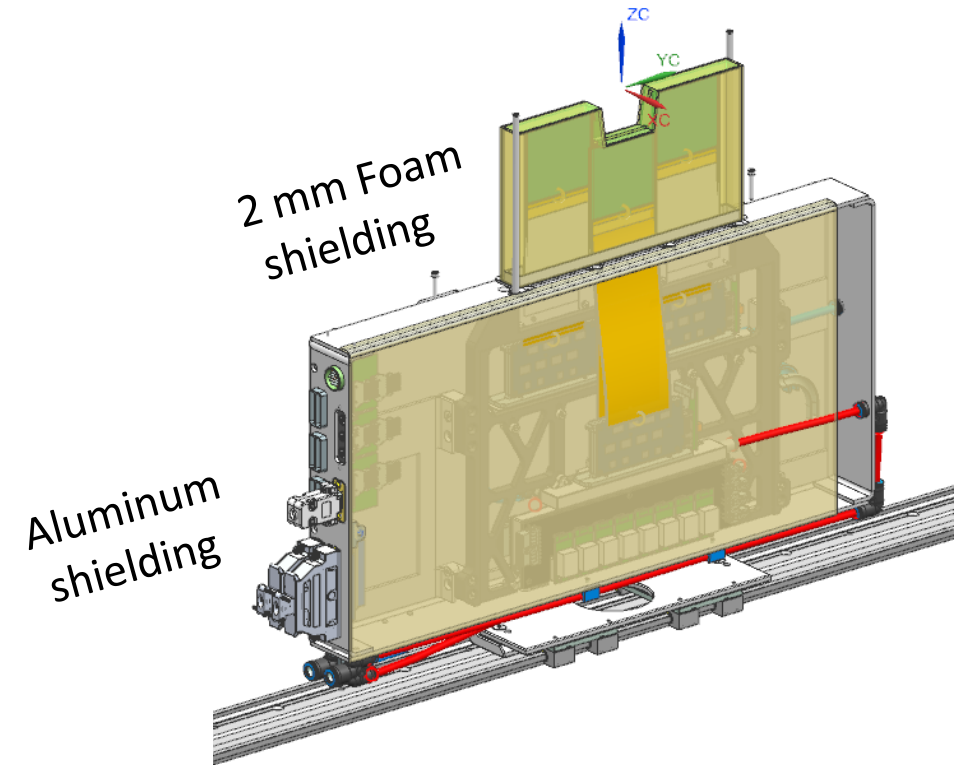
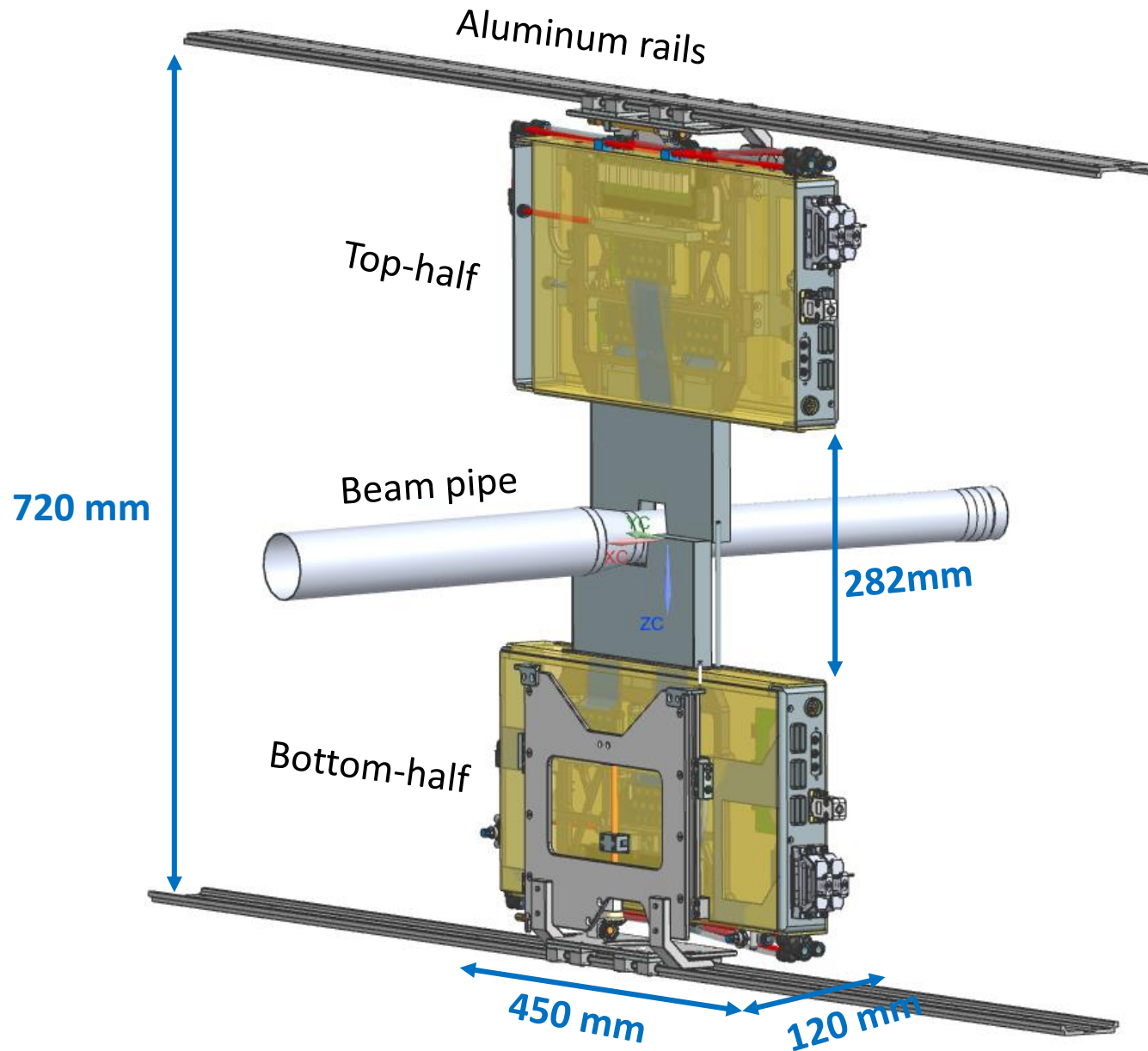


Si-station with 6 STS modules

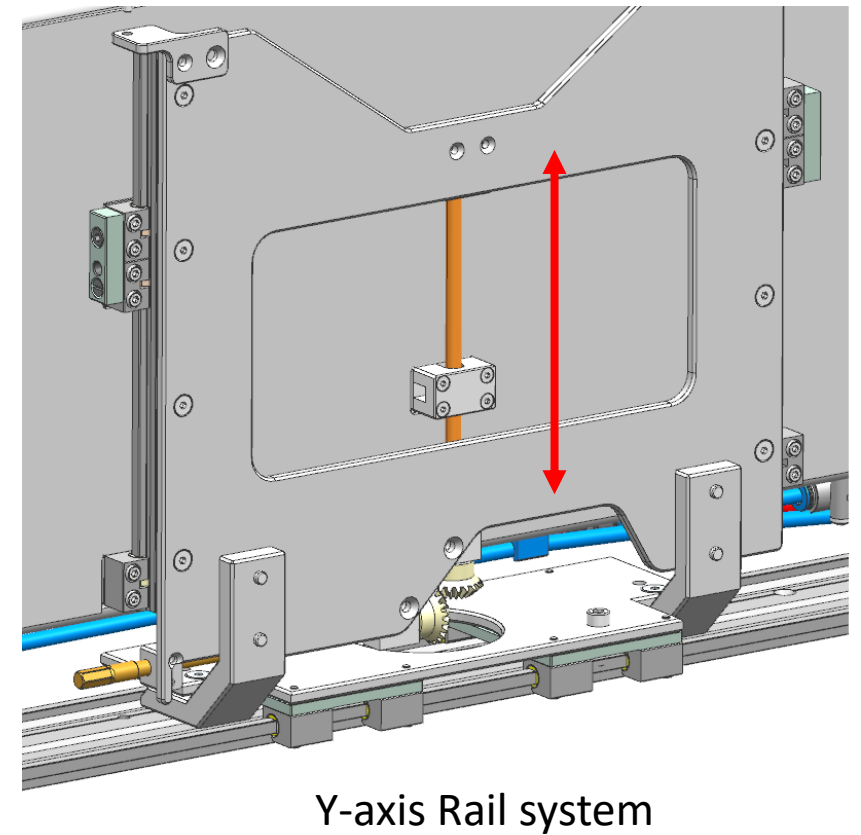
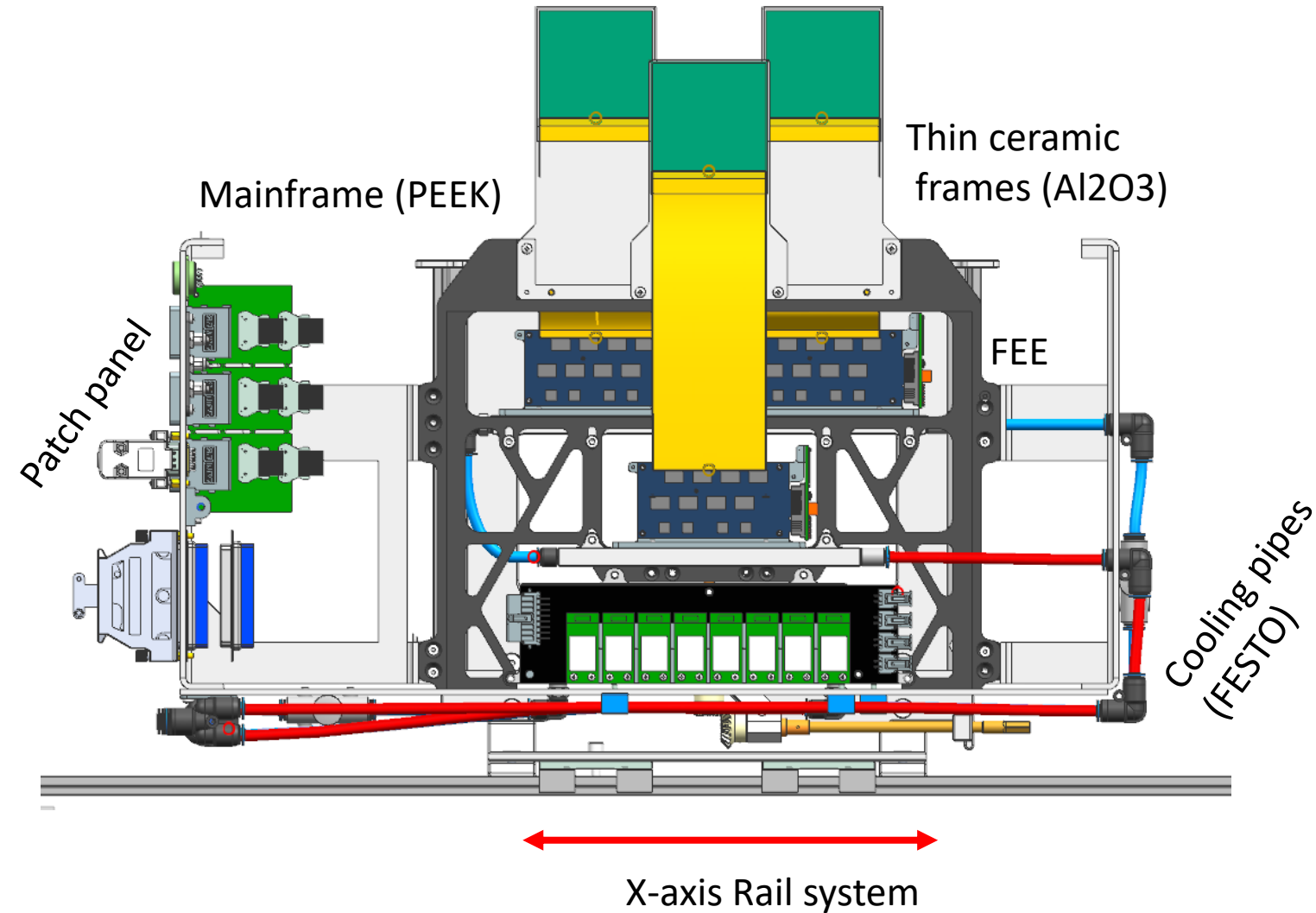
**Pitch:** 58  $\mu\text{m}$ ;  
**Stereo angle:** 7.5 deg;  
**Thickness:** 320  $\mu\text{m}$ .

Exact position of the station along the beam pipe is not yet defined

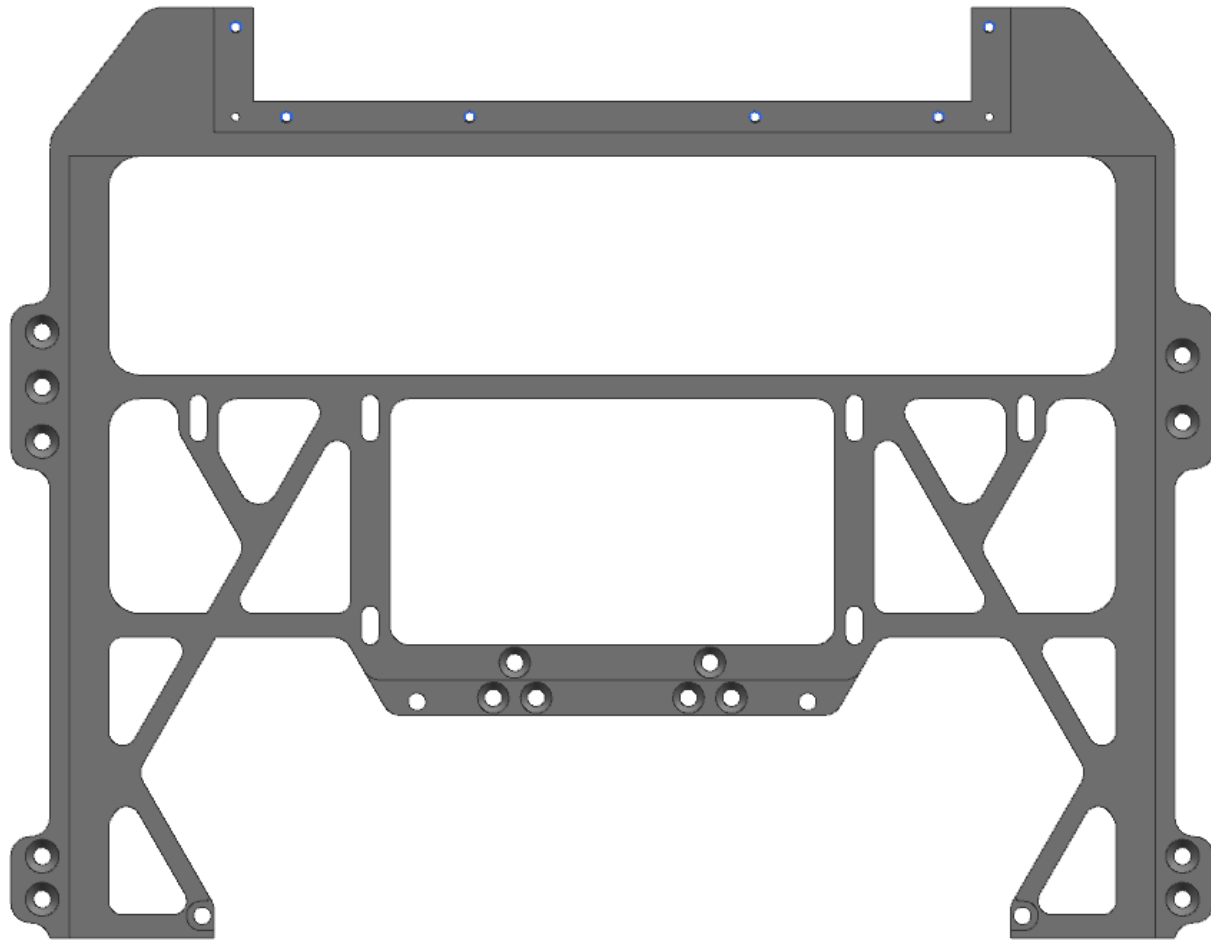
# Si-plane with 6 STS modules



# Half-station



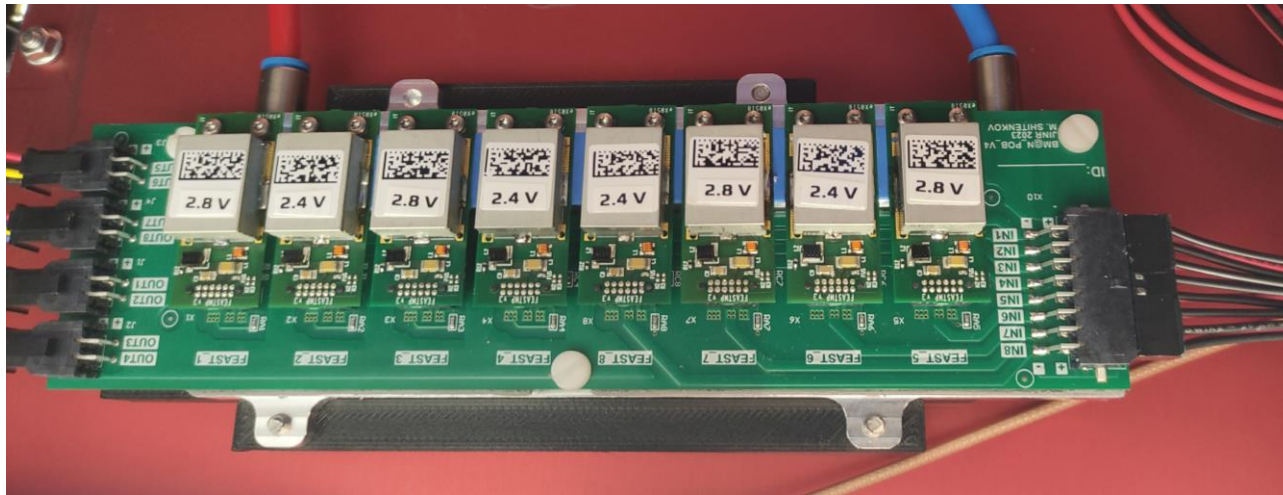




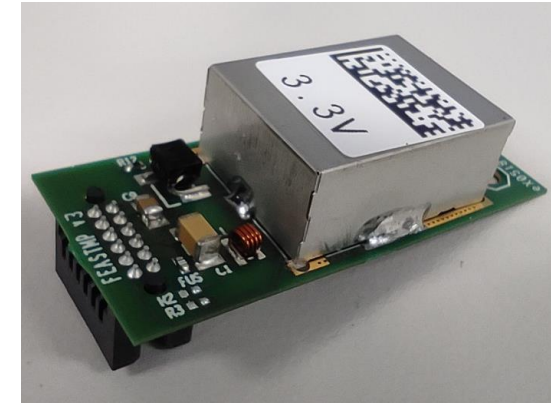
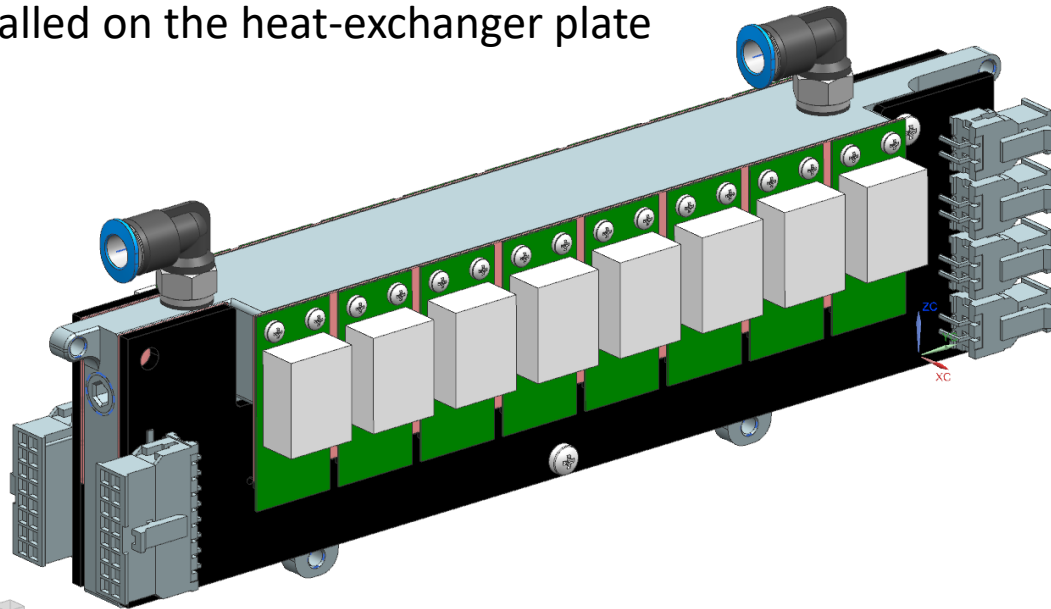
Material: plastic (PEEK)

Status: Alum. version in April  
PEEK version in July

# Power Board with FEAST MP



Power Board with FEAST MPs  
installed on the heat-exchanger plate



FEAST MP: Radiation and magnetic field tolerant  
DC/DC converter

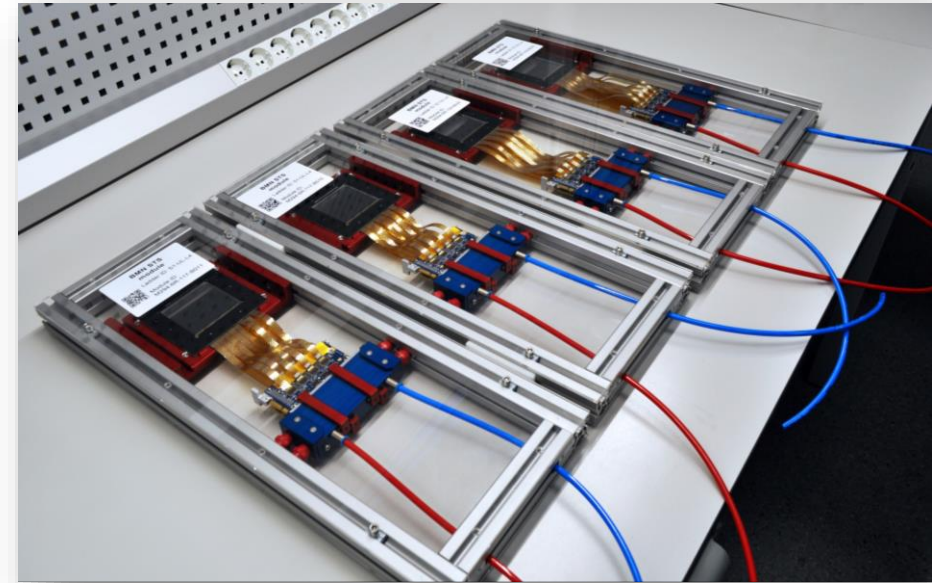
- Power consumption: 34 W/module;  
*(including power dissipation in cables)*
- Total Power Consumption: 205 W;
- Status: - FEAST MPs modified to provide 2.8 V & 2.4 V;  
- PoB PCBs designed & produced  
- Heat exchanger plate designed & produced



# System Components: Status

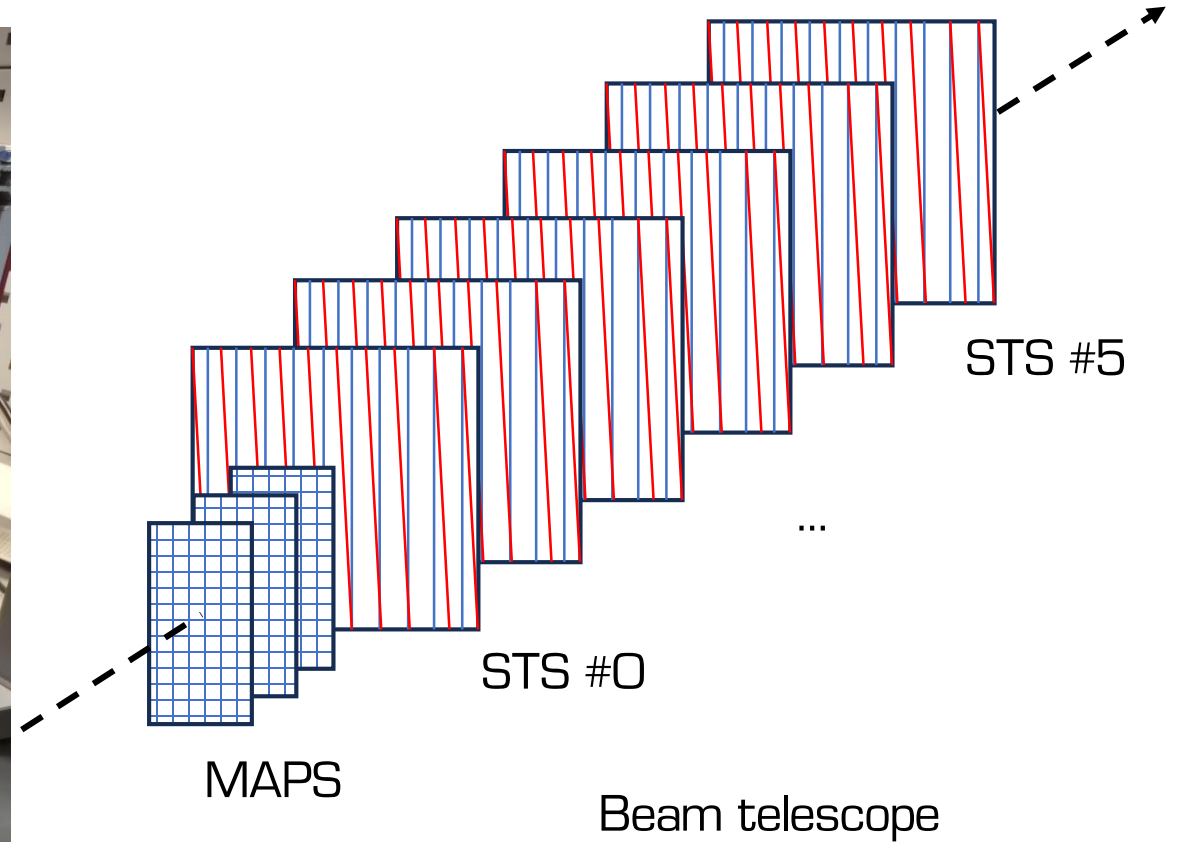
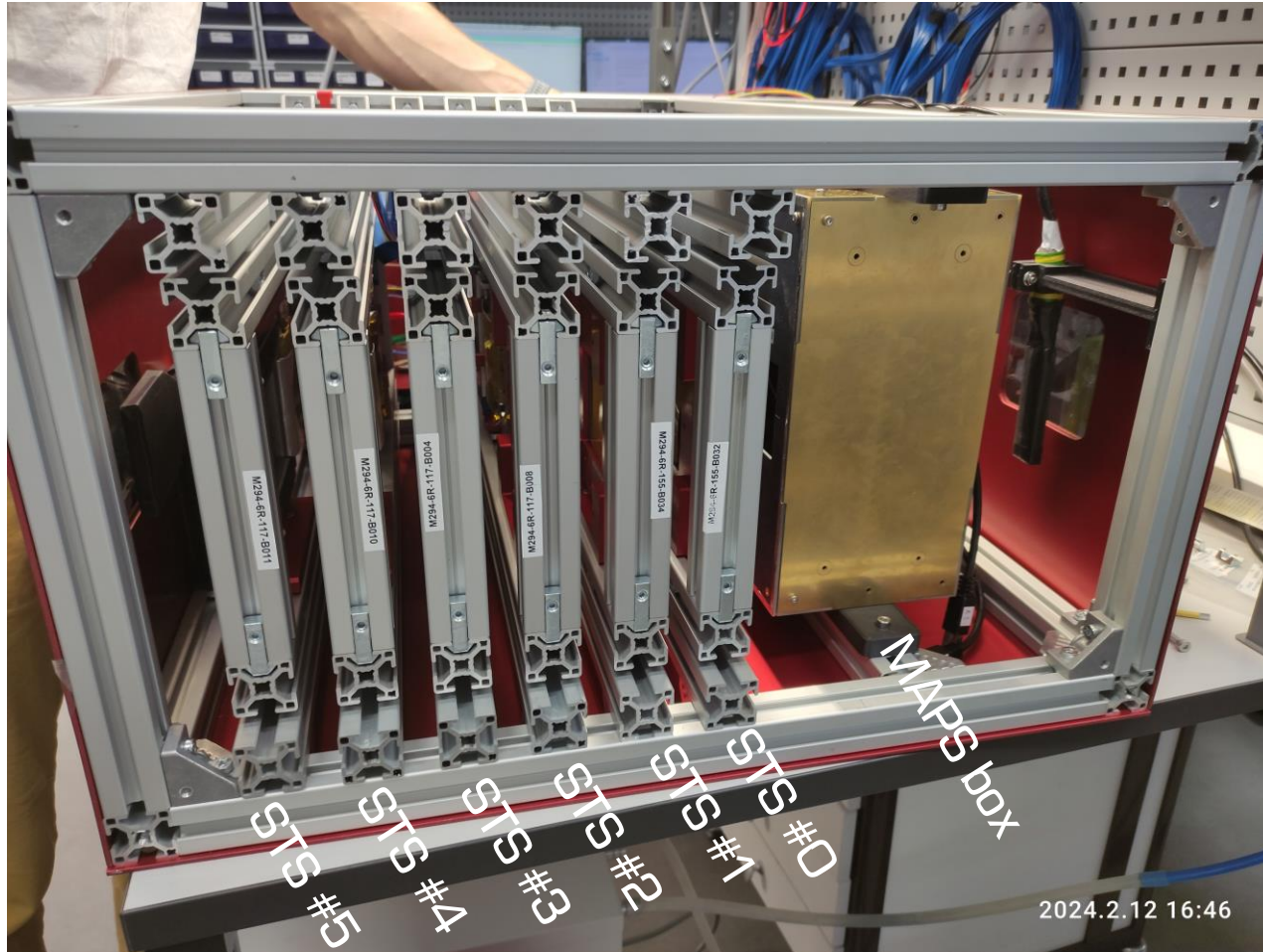
	2024					
	March	April	May	June	July	Aug
STS modules	✓					
Mainframe	prototyping		final version			
Sensor-frames	production					
Heat-exch. FEE	production					
Rail System	delivery					
Heat-exch. PoB	✓					
Sheet-metal cover	production					
Foam box	production					
Connectors	✓					
Cables	✓					
PoB	✓					
LV & HV Power modules	✓					
Readout electronics	✓					
Chiller	✓					
FESTO Pipes & fittings	✓					
Rack	✓					

# STS Modules

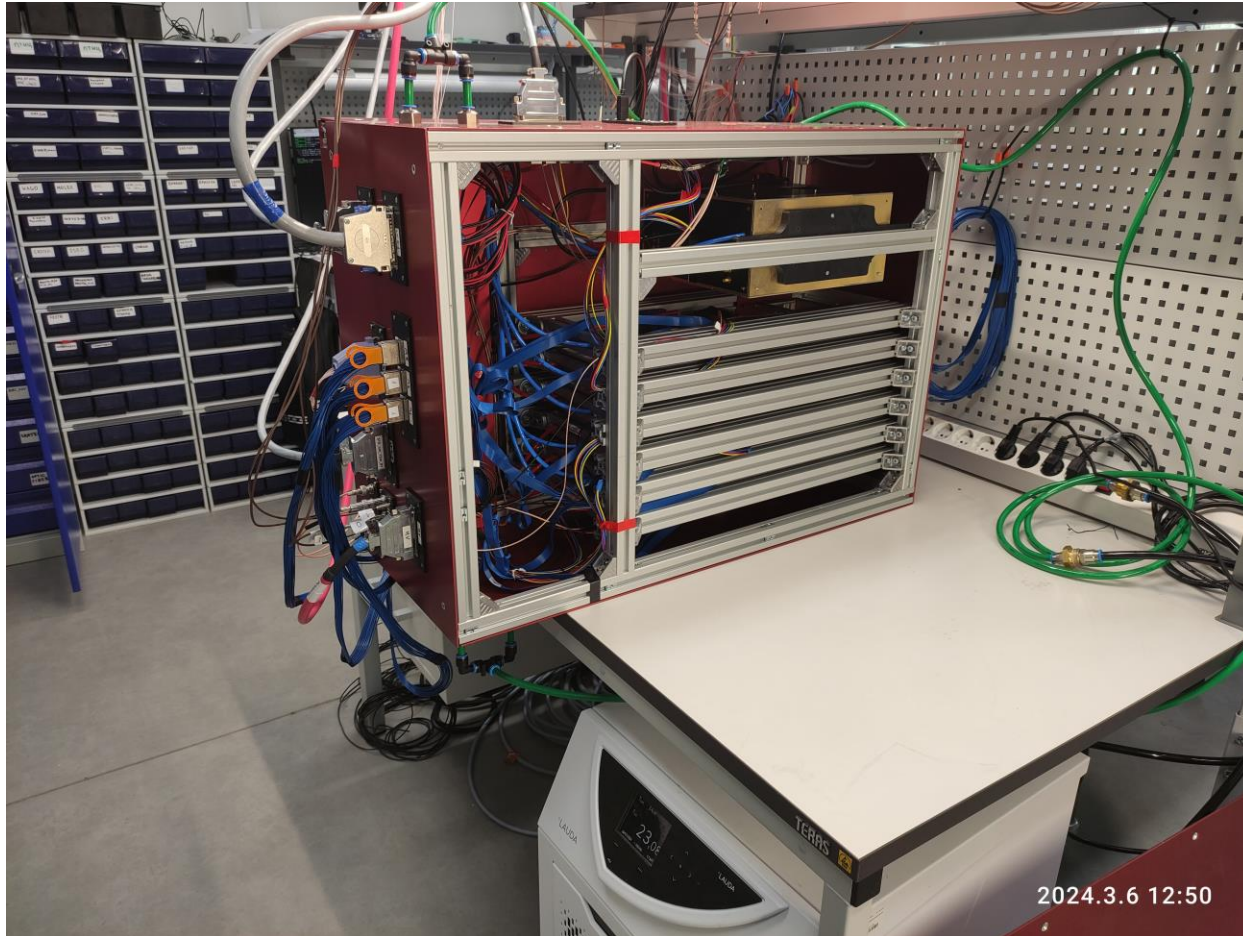


module_ID	Cable length	NOK channels	Av. noise P-side	Av. noise N-side
M294-6R-117-B010	117	20	1184	1058
M294-6R-117-B011	117	14	1093	942
M294-6R-117-B004	117	28	945	865
M294-6R-117-B008	117	24	928	892
M294-6R-155-B034	155	19	1095	885
M294-6R-155-B032	155	56	1216	799

# Test Setup for the beam time in Gatchina (March 2024)



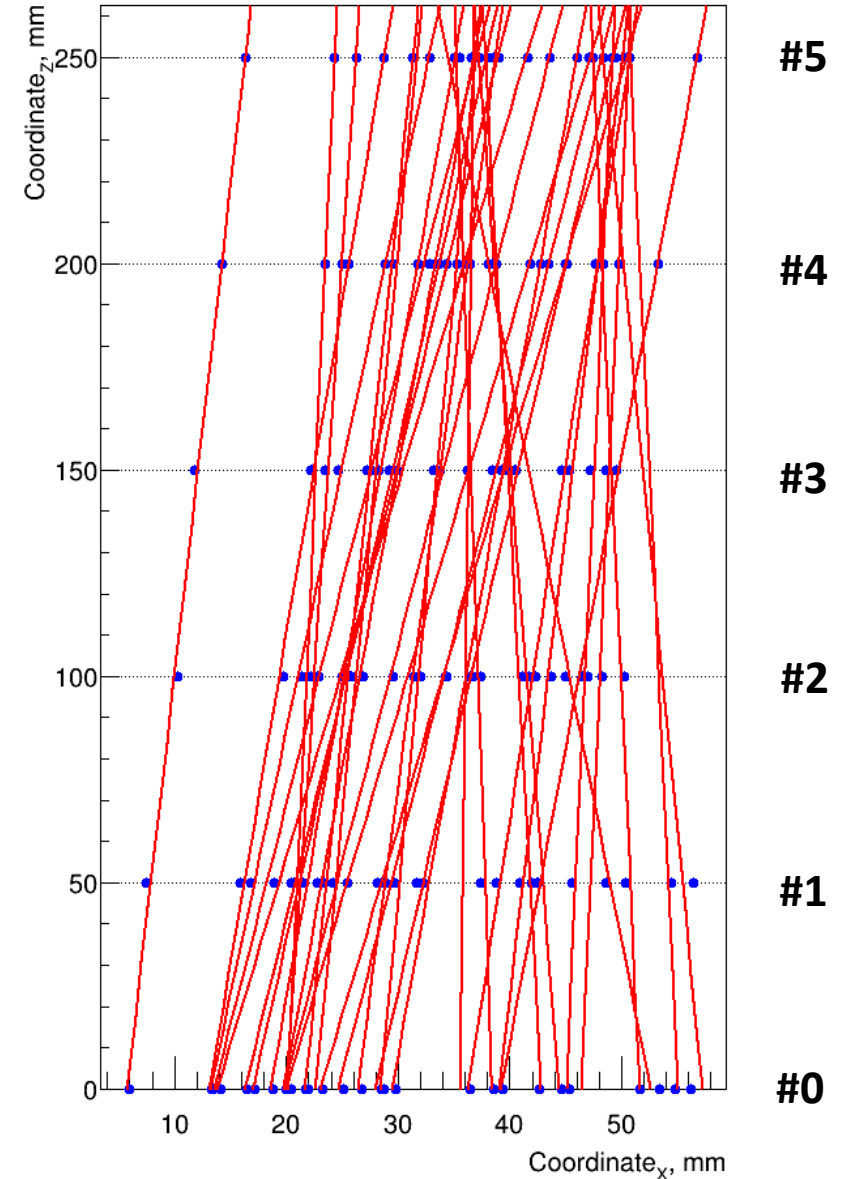
# Tests with cosmic rays



Test setup

Zenith

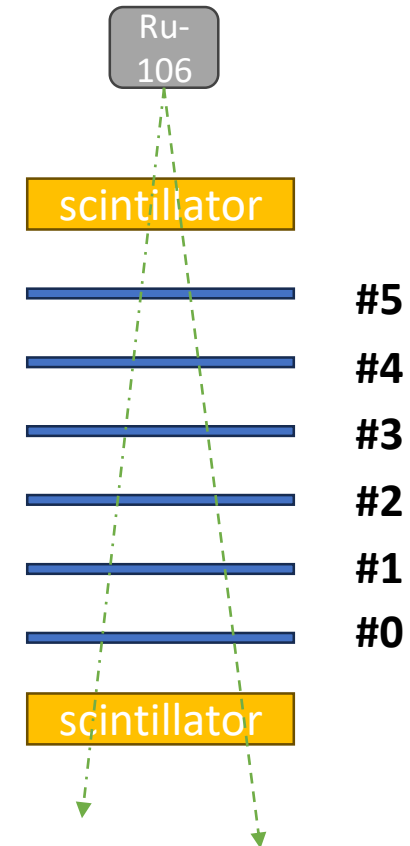
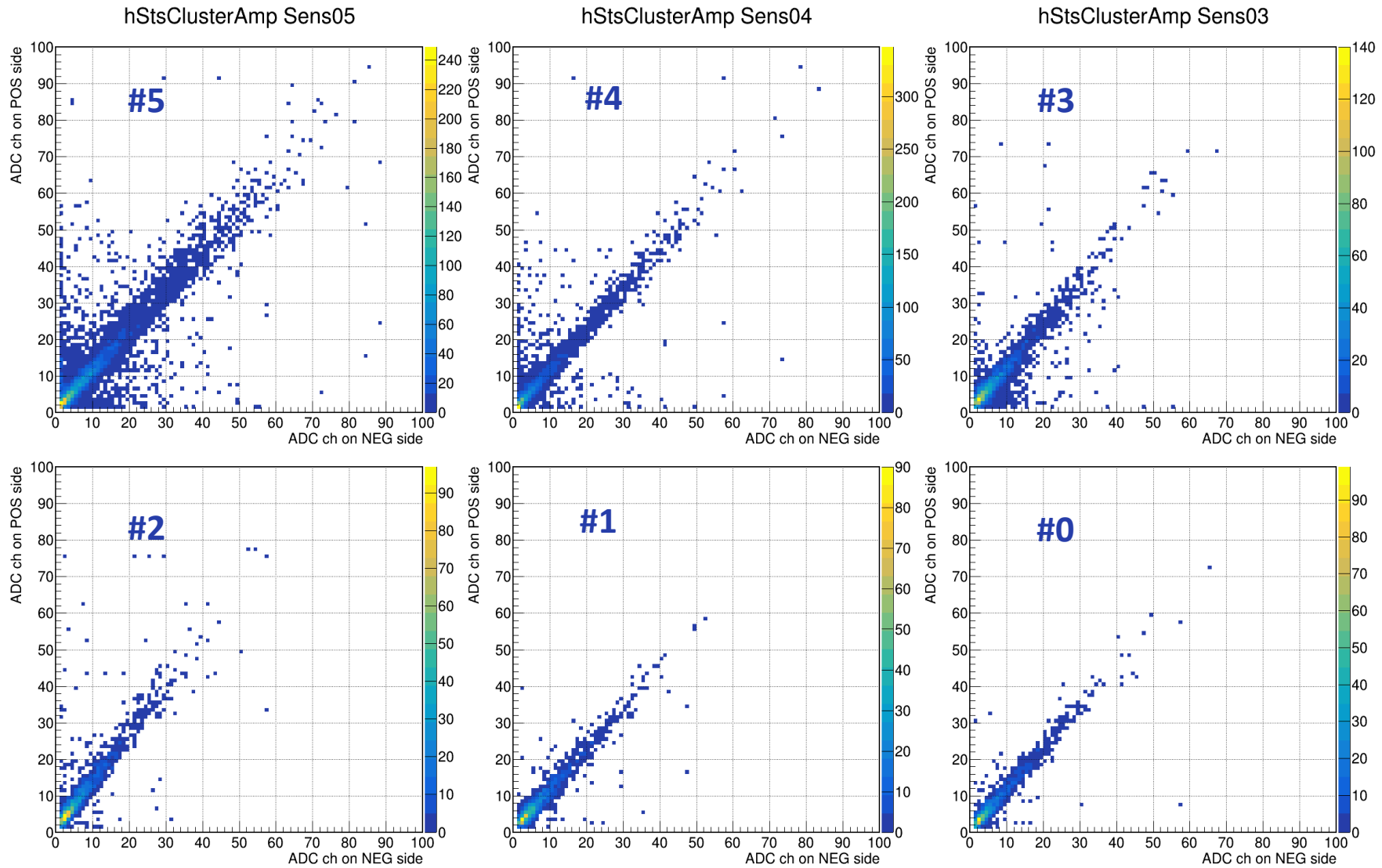
Nadir



Reconstructed tracks

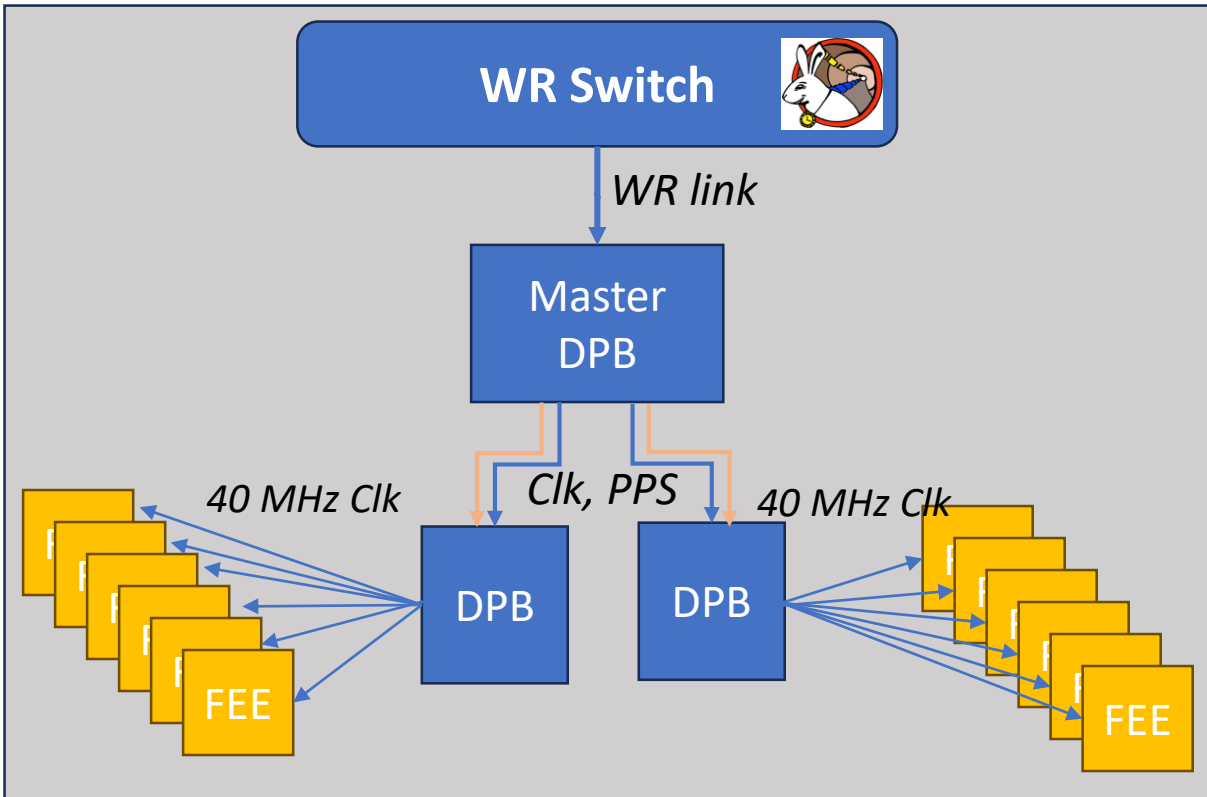
# Tests with Ru-106

Signal P-side



Signal N-side

# Synchronization with WR network



```
8. COM4 (WR-AFCK Slave)
Re-attach Fullscreen Stay on top Duplicate
WR PTP Core Sync Monitor: PPSI - AFCK Board
Esc = exit
TAI Time: Fri, Feb 9, 2024, 17:24:58
Link status:
wru1: Link up (RX: 2201, TX: 1249) IPv4: BOOTP running
Mode: WR Slave Locked Calibrated
PTP status: slave
Synchronization status:
Servo state: TRACK_PHASE
Phase tracking: ON
Aux clock 0 status: enabled
Timing parameters:
Round-trip time (mu): 902723 ps
Master-slave delay: 450873 ps
Master PHY delays: TX: 205325 ps, RX: 227797 ps
Slave PHY delays: TX: 205320 ps, RX: 226812 ps
Total link asymmetry: 977 ps
Cable rtt delay: 37469 ps
Clock offset: 0 ps
Phase setpoint: 2224 ps
Skew: 2 ps
Update counter: 460
```

- 6 STS modules for the Si-station were chosen and will be tested with the proton beam in Gatchina (March 2024);
- Design of the Si-station is almost finished;
- Project timelines:

- **Spring 2024:** Production of the mechanical parts;  
Beam tests of the modules in Gatchina;
- **Summer 2024:** Assembling and tuning;
- **Fall of 2024:** Installation and integration in the test area.

*Request to the BM@N team: to allocate the place for the STS rack in the BM@N test area*

# THANK YOU FOR YOUR ATTENTION!

---





BACKUP SLIDES

# Si-station inside the magnet

