Status Forward Endcap EMC

$\overline{\text{P}}$ANDA EMC Meeting, February 2024, Bochum

Thomas Held

Ruhr-Universität Bochum
Institut für Experimentalphysik I

Forward Endcap Status

- Remark: This talk compiles information about various aspects of the PANDA Forward Endcap EMC that almost all are or have been given in much more detail in the various specific talks by my colleagues in this meeting!
- If contradictory statements occur you better refer to the respective expert's talk!
- Forward Endcap EMC: System in idle transition mode, COSY beam times passed, awaiting move to Bonn
- Electronics switched off, chiller system (partially) drained
- TOF hall: Timeline of clearance not yet certain
- Move anticipated for mid 2024

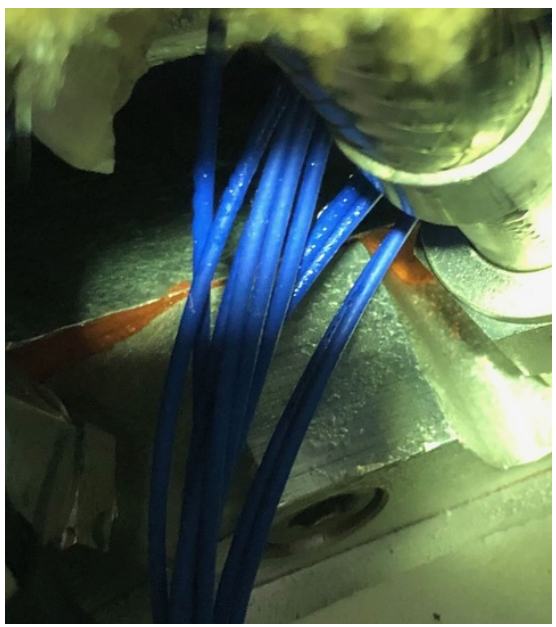
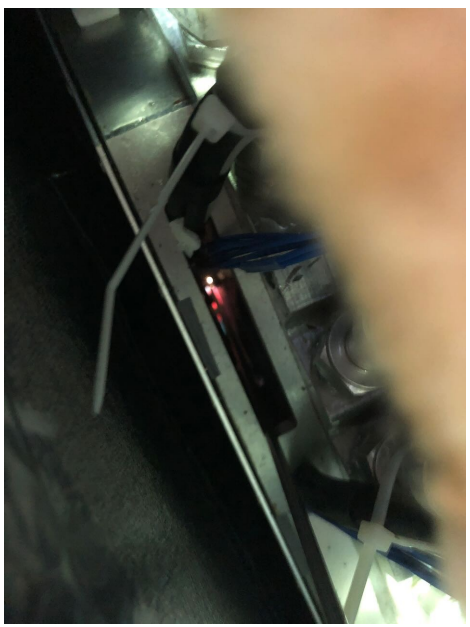
2023 COSY Beam Times

- Overall success in meeting the time constraints and setting up a running detector in due time
  (very few would have bet on this in the beginning of 2023)

- A big thank you and congratulations to the building and shift team often working at unearthly hours rectifying anything from small deficiencies to serious problems:
  - Rerouting flushing lines, switching to nitrogen, installing alternative humidity monitor system from hardware store, remachining brass feet (IKP workshop), replacing insulation panels, on the fly-modification of LP triggering, exchanging annealing LEDs, reworking HV sockets/plugs, installing alternative DAQ, installing flow meters, building humidity shields, etc. etc.

2023 COSY Beam Times

- Two beam weeks: August (-16 °C) and September (-25 °C)
- August beam time: Combined problems
  - T-oscillation in lowest flow subcircuits (front/side cooling) probably due to trapped air (low coolant level) in the cooling circuit
  - Humidity problem: Safety margin to deal with high humidity level (in interspace)

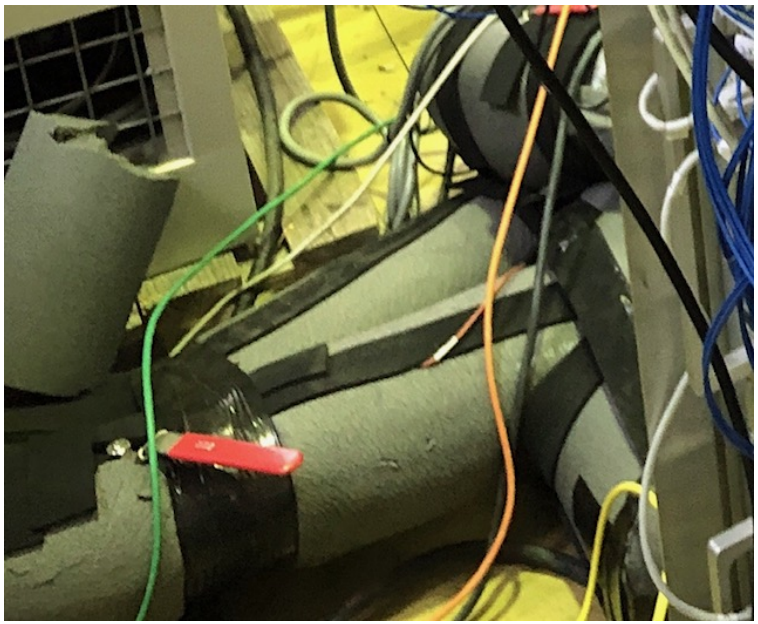




2023 COSY Beam Times

- PANDA-like DAQ system could not be finished to be ready for the FWEC beamtimes
- “Development of LVDS Data Concentrator”
  (talk by Pawel Marciniewski tomorrow)
- Instead: ‘Last minute DAQ’ adopted from CB/Bonn
  (more difficult to deal with aquired data)
  “Using the CB-DAQ for the FWEC Test-Beamtimes at COSY” (talk by Benedikt Otto tomorrow)
- No finihshed π^0 calibration yet
  “A First Glance into Data” (talk by Celina Frenkel)

Problems/Lessons Learned

- Chiller system (talk by Sebastian Coen):
  - Larger reservoire capable of storing the full coolant content of the FWEC (avoiding staged filling/draining)
  - Remotely well-defined controllable valves instead of manual lever-operated ones
    - Readjustable flow distribution (even during beam)

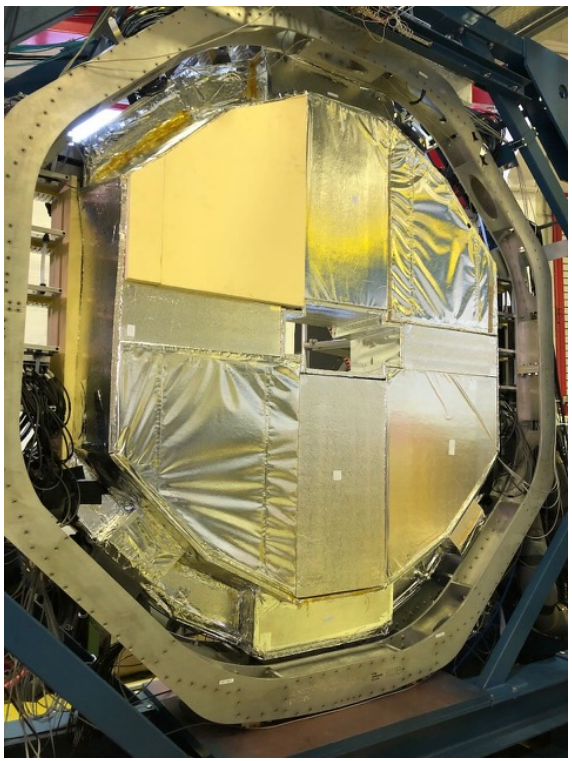


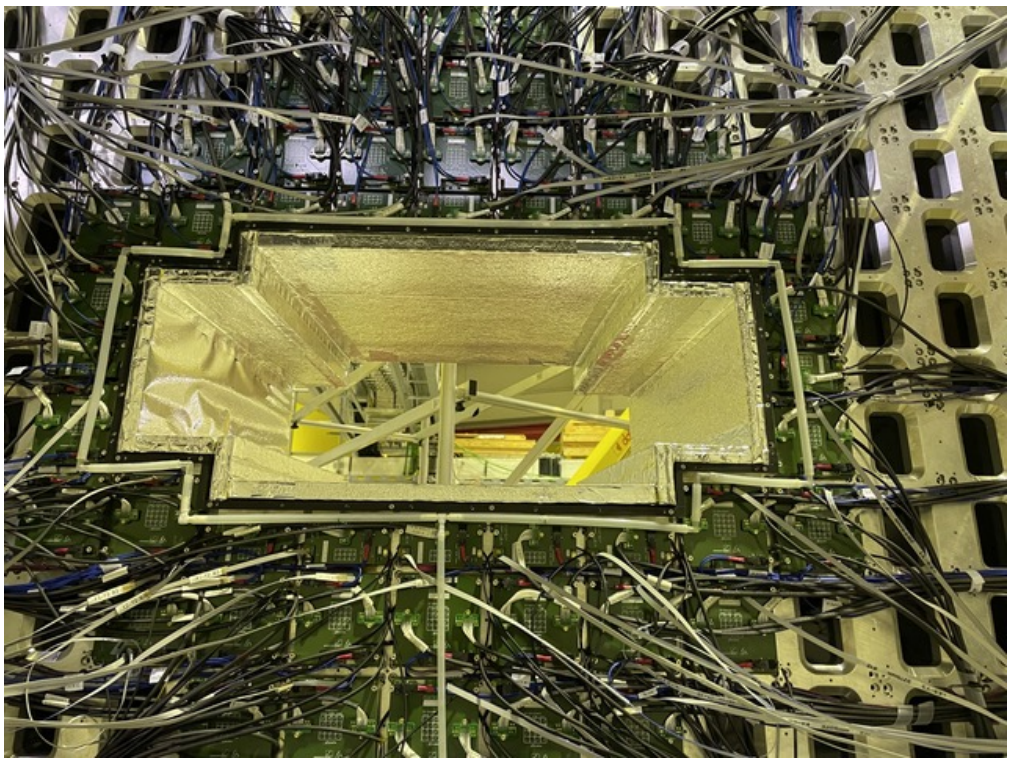
Problems/Lessons Learned

- SADC crate cooling:
  - Sufficient cooling power is not the only criterion!
    - Serious problems with condensation on cold crates (Shorts! Damaged PSUs)
  - Need to regulate cooling power/coolant (water) temperature
  - Situation different at ELSA:
    - More power to dissipate (full system)
    - Cooling water temperature?

Problems/Lessons Learned

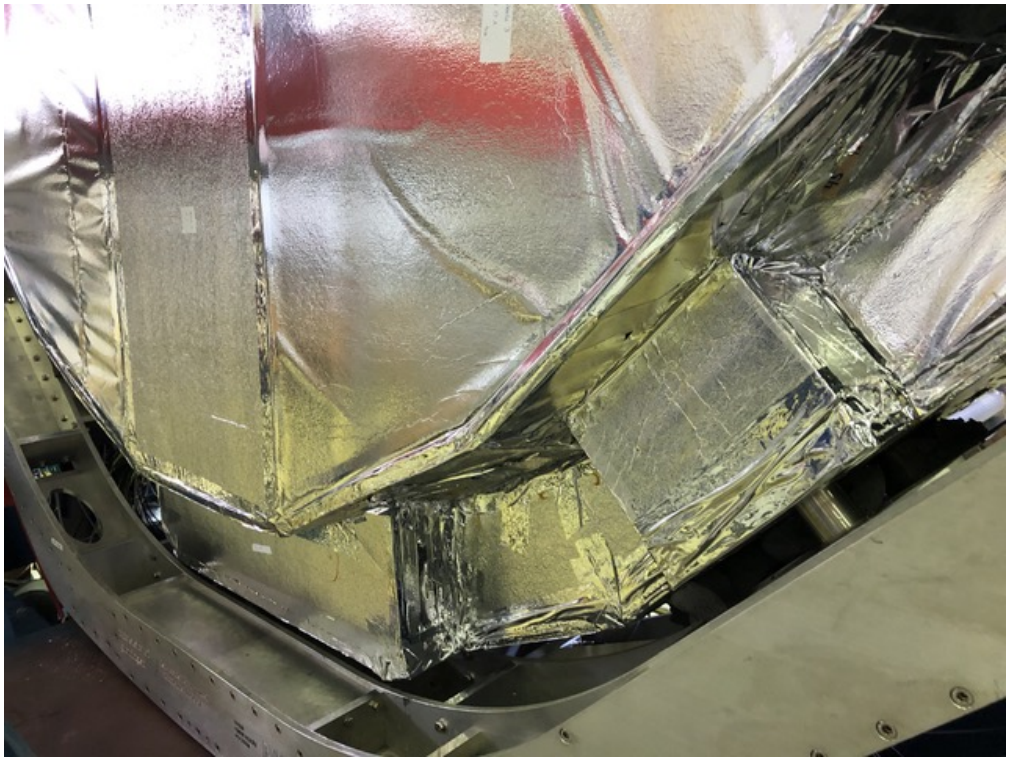
- Thermal insulation:
  - Sufficient in terms of cooling power, T distribution (for reduced system)
  - Many VIPs ventilated! Some replaced by standard insulation





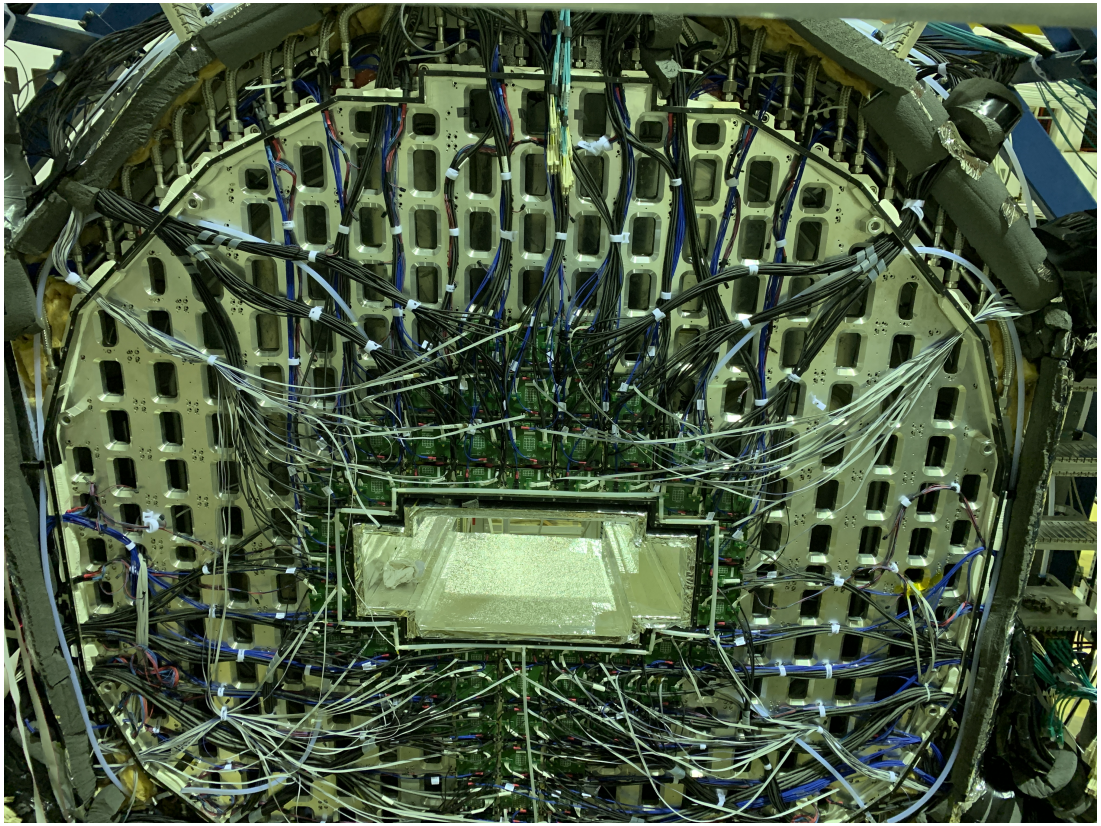
Problems/Lessons Learned

- Thermal leaks at connecting VIP edges (imperfect puzzle)
- How to proceed?
  Less susceptible VIPs today? ($$$?)



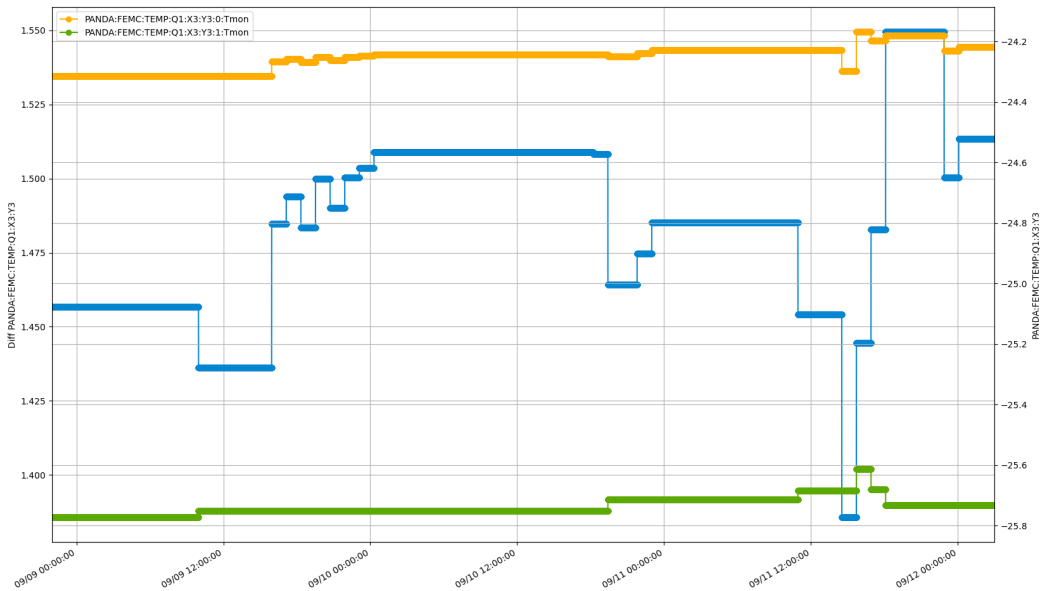
Problems/Lessons Learned

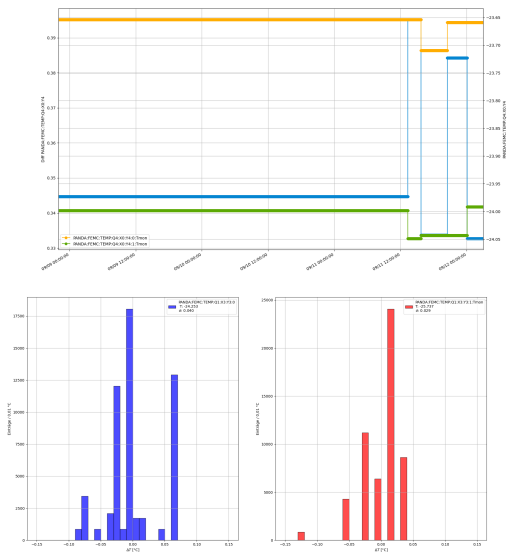
- Humidity problems: Flushing of cold volume heavily modfied (new pipes): Nitrogen instead of dried air
- Added flushing of interspace with dried air



Problems/Lessons Learned

- T distribution and stability sufficient (< 0.1 K)
- Absolute values vs. calibration
  (adding commercial PTs, Mainz Ansatz?)
- Regulation: Coolant supply (high intensity regime: Xtal-T)
- Forward Endcap Detector Control System
  (talk bei Meike Küssner tomorrow)





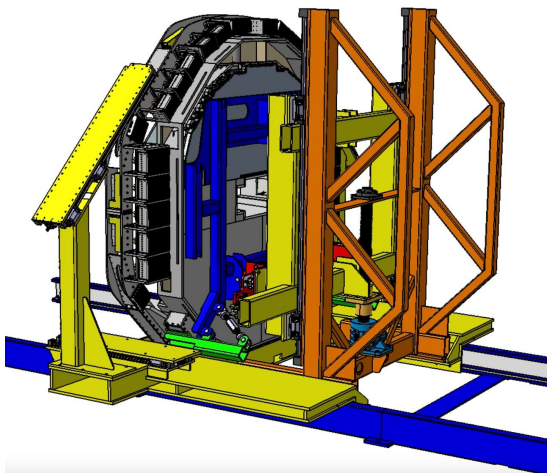
Move to Bonn

- Foreseen: Transport as supposed for move to Darmstadt with full detector (loaded with submodules)
- Shielding wall outside hall: “Removal has to be authorized”
- Gas pipe traverse removal: “Effort has to be investigated” (crane load?)

- Company for transport (cheap), insurance?
- ”Does it not go out as in?” No!
- Dedicated talk “Moving FWEC to ELSA” by Christoph Schmidt tomorrow

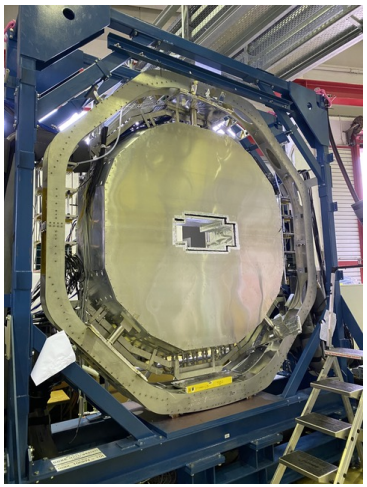
New Setup in Bonn

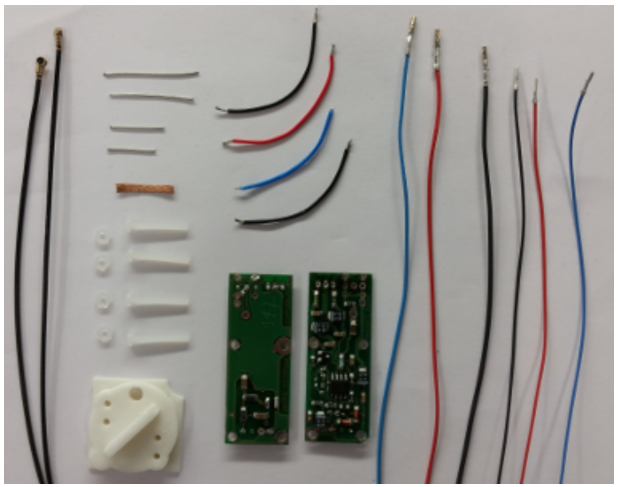
- Chiller/pump stack
- New coolant reservoire: Kozina GmbH, Euskirchen (Custom built vessels)
- Integration into CB: New suspension frame (talk by Marcus Grüner)



New Setup in Bonn

- New Front plate?
- Plugging the hole: Use of outer submodules?
  $\rightarrow$ Very advantageous as we lack almost all material for additional submodule manufacturing - ironically not crystals!
- Closing of the backplate accomplished by Bonn
  (talk by Jan Schultes)





New Setup in Bonn

- 29 submodules in Bochum, 2/3 still need to be repaired

Raum	Wo im Raum?	Submodul-Position	Grund für Reparatur?					Status?
NB 2/65	Tisch an der Tür	1-X0Y8			Interchanged			muss noch repariert werden
NB 2/65	Tisch an der Tür	1-X1Y7					Sonstiges	muss noch repariert werden
NB 2/65	Tisch an der Tür	1-X2Y6			Interchanged			muss noch repariert werden
NB 2/65	Tisch an der Tür	1-X4Y7	Ringing					muss noch repariert werden
NB 2/65	Tisch an der Tür	2-X2Y7		Channel(s) dead		Temp.Sensor		muss noch repariert werden
NB 2/65	Tisch an der Tür	2-X6Y5	Ringing	Channel(s) dead				repariert
NB 2/65	Tisch an der Tür	2-X8Y2		Channel(s) dead				muss noch repariert werden
NB 2/65	Tisch an der Tür	3-X3Y6		Channel(s) dead				muss noch repariert werden
NB 2/65	Arbeitstisch	2-X3Y8			Interchanged			muss noch repariert werden
NB 2/65	Arbeitstisch	3-X1Y7					Sonstiges	muss noch repariert werden
NB 2/65	Arbeitstisch	3-X6Y3		Channel(s) dead				repariert
NB 2/65	Arbeitstisch	4-X2Y6		Channel(s) dead	Interchanged			muss noch repariert werden
NB 2/65	In Kisten	1-X2Y7		Channel(s) dead				repariert
NB 2/65	In Kisten	1-X4Y5					Sonstiges	repariert
NB 2/65	In Kisten	3-X7Y5		Channel(s) dead				muss noch repariert werden
NB 2/65	Tisch am Schrank	2-X3Y4			Interchanged	Temp.Sensor		muss noch repariert werden
NB 2/65	Tisch am Schrank	2-X3Y5			Interchanged			muss noch repariert werden
NB 2/65	Tisch am Schrank	2-X6Y4					Sonstiges	muss noch repariert werden
NB 2/65	Tisch am Schrank	2-X8Y1			Interchanged			repariert
NB 2/65	Tisch am Schrank	2-X8Y3					Sonstiges	repariert
NB 2/65	Tisch am Schrank	4-X5Y5				Temp.Sensor		muss noch repariert werden
NB 2/65	Tisch am Fenster	1-X2Y8		Channel(s) dead				repariert
NB 2/65	Tisch am Fenster	1-X3Y5		Channel(s) dead				repariert
NB 2/65	Tisch am Fenster	1-X3Y8		Channel(s) dead				muss noch repariert werden
NB 2/65	Tisch am Fenster	1-X6Y3		Channel(s) dead				repariert
NB 2/65	Tisch am Fenster	1-X7Y1					Sonstiges	repariert
NB 2/65	Tisch am Fenster	1-X7Y3					Sonstiges	muss noch repariert werden
NB 2/65	Tisch am Fenster	2-X2Y5	Ringing					muss noch repariert werden
NB 2/65	Tisch am Fenster	2-X2Y6				Temp.Sensor	Sonstiges	muss noch repariert werden

Summary

- We need to prepare for the move of the FWEC to Bonn in mid 2024
- Heavy load transportation, Insurance? (Getting out of the hall...)
- Modification for Bonn setup;
  - Completion with all APD submodules
  - Installation of all SADCs (cooling)
  - New suspension frame (movable on rails, incl. chiller system)
  - Need to plug the hole (front and back lid)