ARES Operation Meeting

Summary of week 37 / 2023

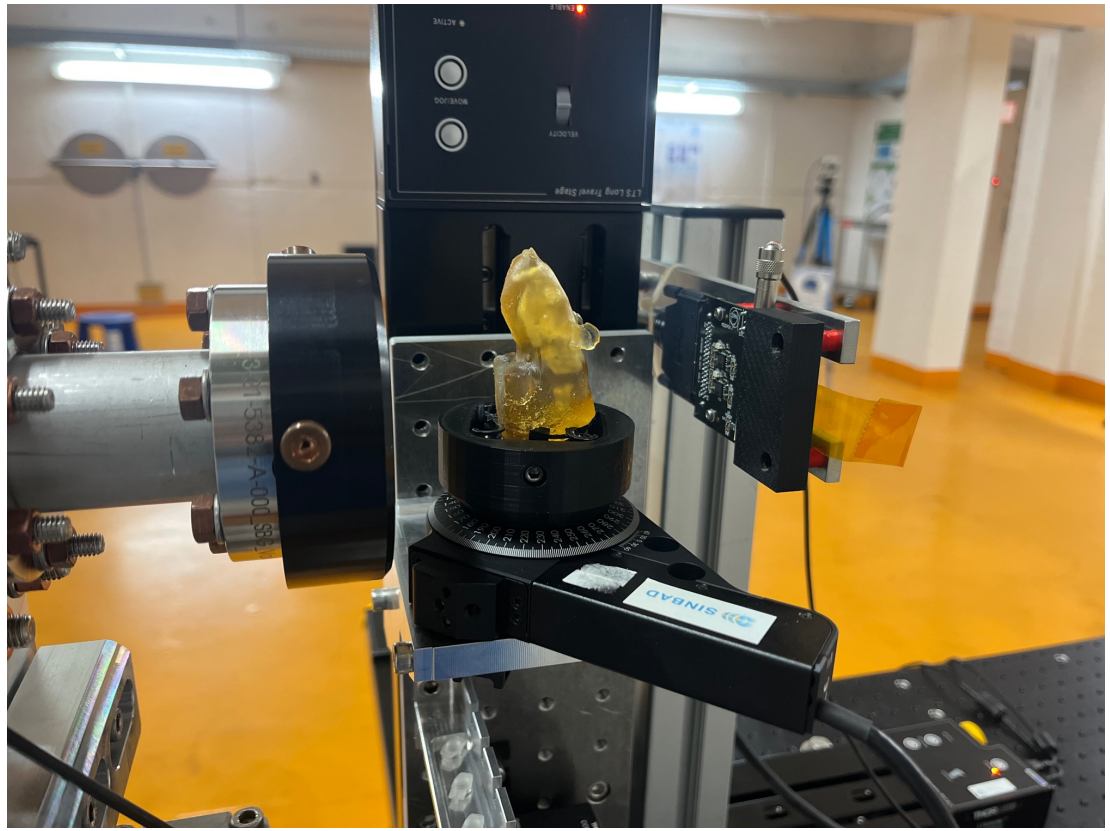
Max Kellermeier, on behalf of the ARES crew

Summary of week 37

	Mon. 11th Sep	Tue. 12th Sep	Wed. 13th Sep	Thu. 14th Sep	Fri. 15th Sep
Achievements		• Beam setup for eCT beamtime • Initial eCT measurements • Investigations of Gun issues	• Gun water temperature and flow rate investigations → finally solved • eCT studies continued with stable beam, 2D scans	• Manual rotational scans with automated 2D scan for full 3D reconstruction • Long 2D high res. scan in the evening	• 3D scans continued • High res 2D slice scan, i.e. rotational and horizontal scan
Difficulties	• Gun modulator unstable (operational for ~1h)	• Gun modulator interlock overnight • TWS2 in fault state	• TWS2 in fault state	• Beam jump by 0.5mm on Timepix detector	
Notes	• *Tunnel open* • *Tunnel closed in the late afternoon*				• *Gun conditioning over the weekend*

Electron CT

Recap from last week



- Mouse phantom scanned with low charge (< 10 fC) beam
- Scattering detected with TimePix3 detector
- 2D scans: translational stages in x and y
- 3D scans: additional rotational stage

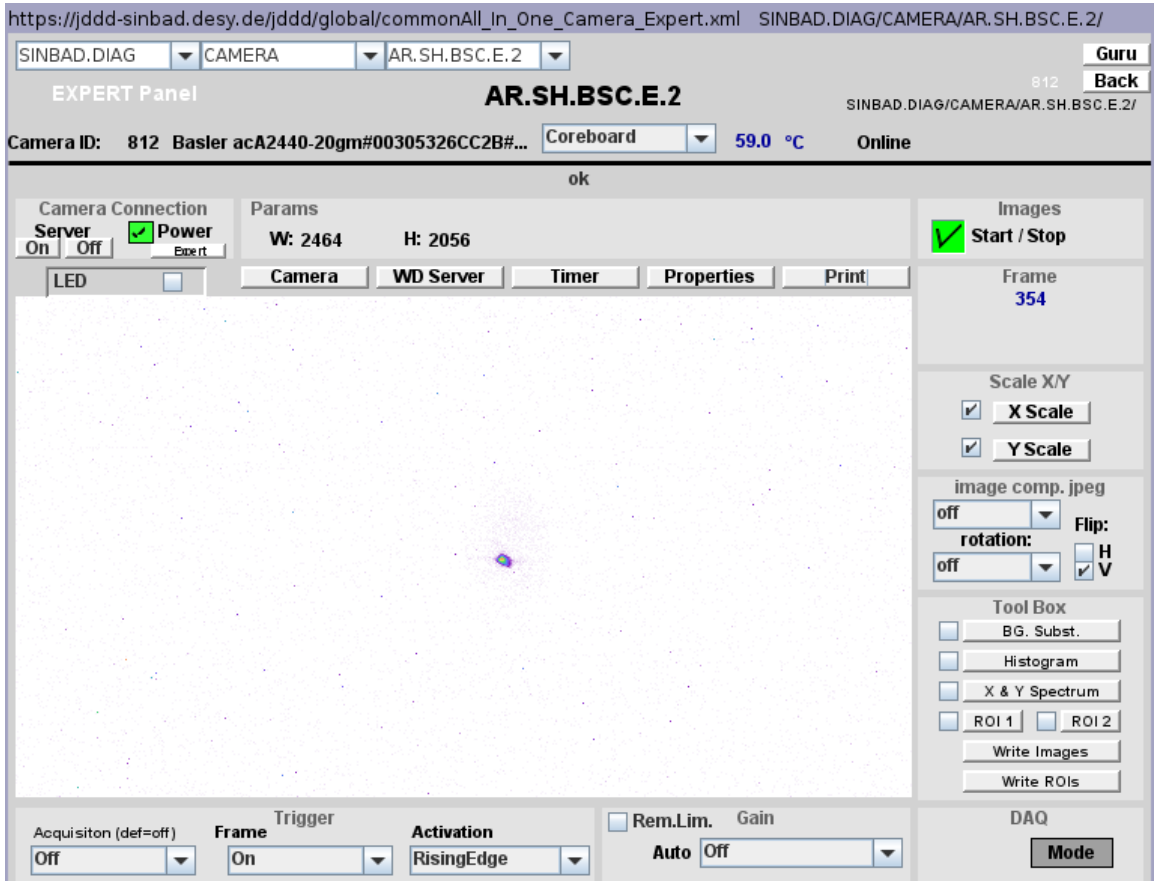
Synchronization procedure:

- Scan always start at aluminum base plate → onset when moving into the gap between aluminum and mouse

Beam setup for eCT

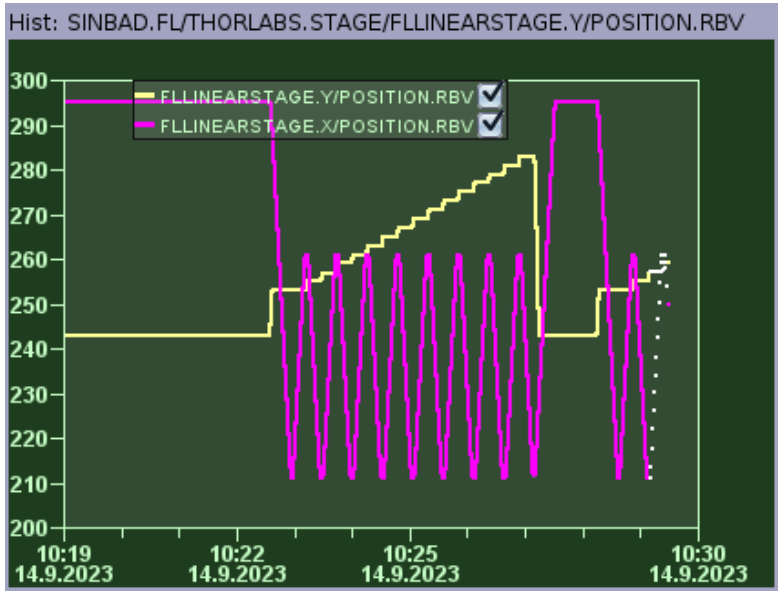
Tuesday

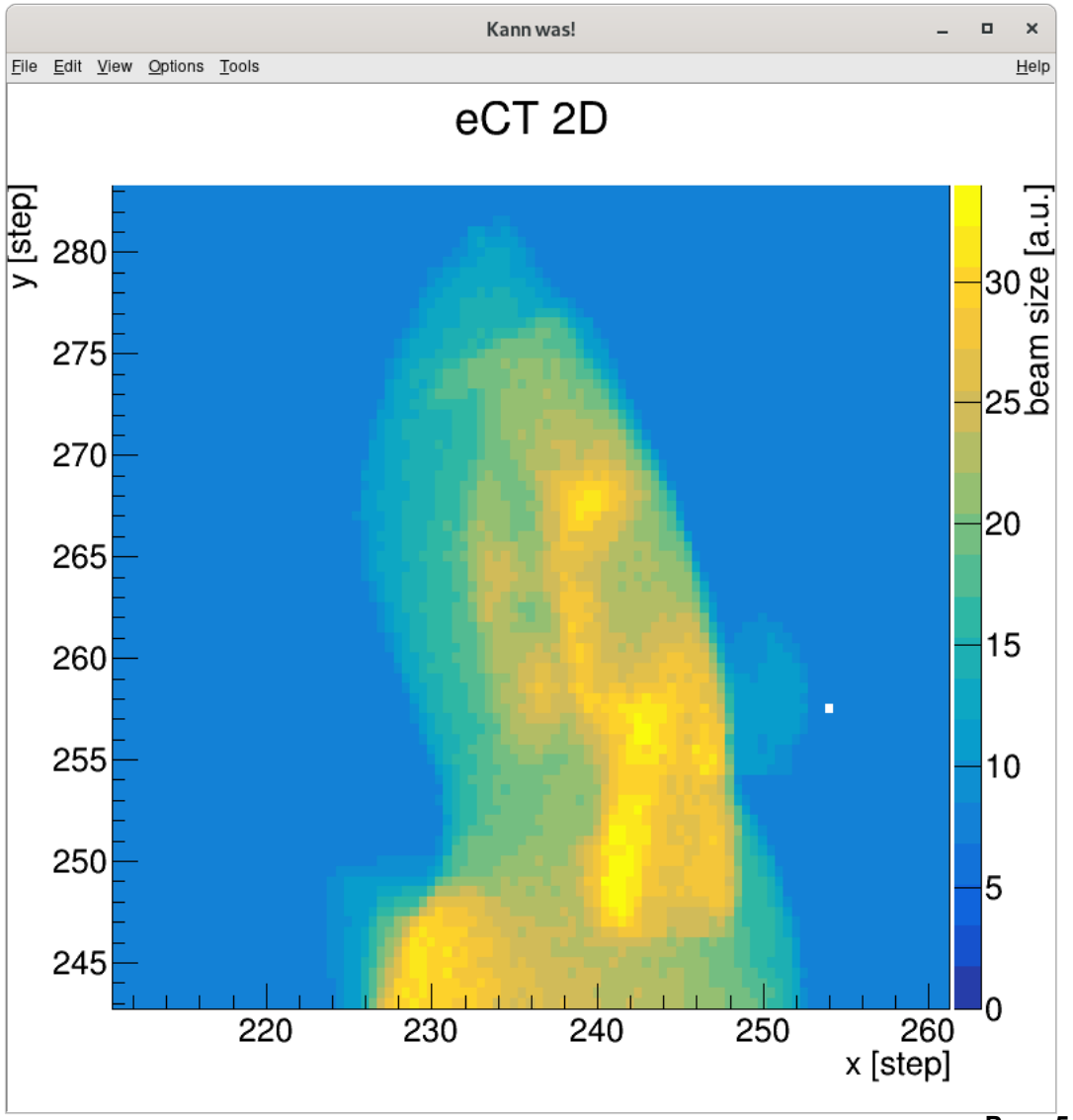
- Low charge beam (0.4 pC) transported to FL section, imaged on FL.A1
- Charge decreased by laser attenuator, beam position and size monitored with TimePix
- All our diagnostics blind:
  - T-ICT lower limit is 12 fC
  - Photobeam on FL.A1 hardly distinguishable from dark current



Wednesday: 2D scans

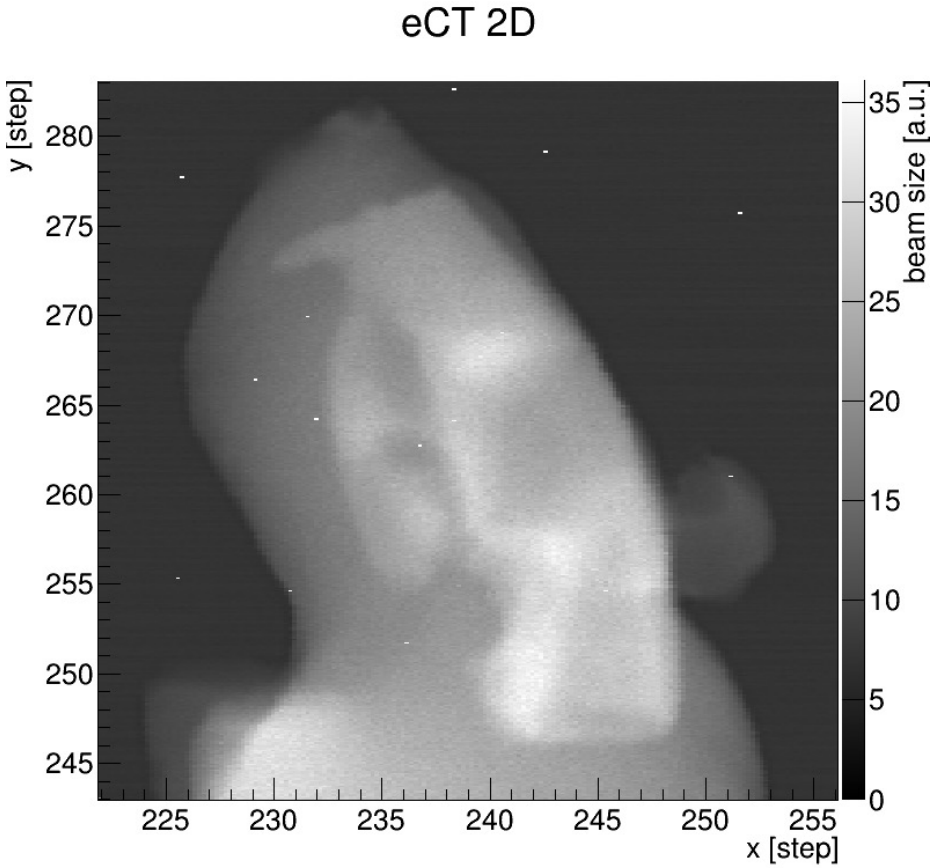
- Issues with data interpretation delivered by Timepix detector
- “Workaround necessary to analyse data”





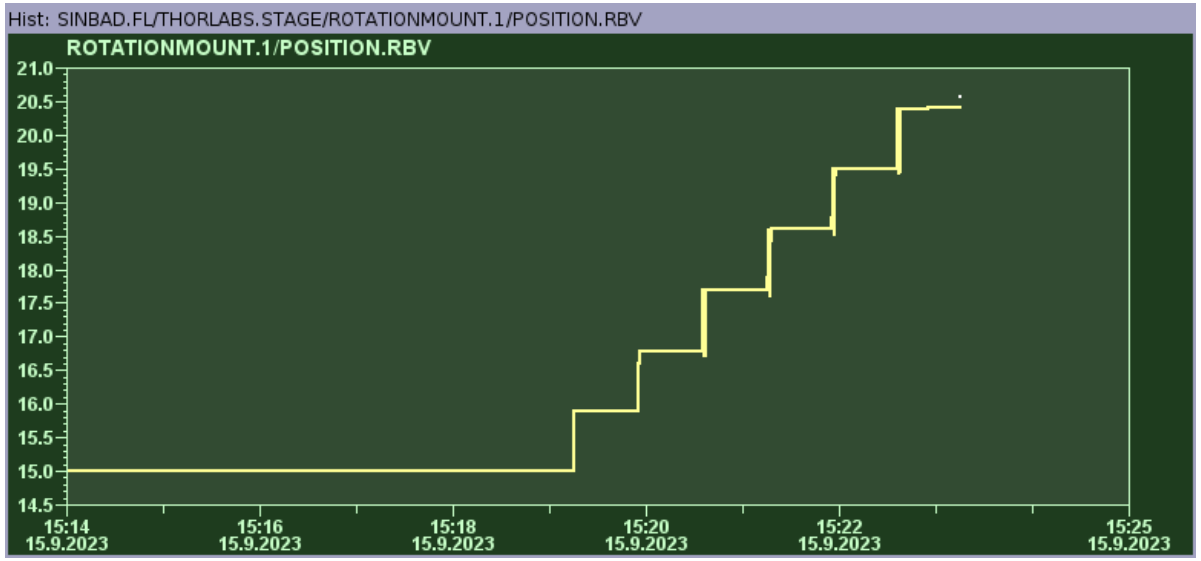
Thursday: Manual 3D Scans

- 2D scans with manual rotations in between
  → Time consuming
- Issue with beam jump (0.5mm) after about 75% of the measurement
  - Continued measurement
  - Beam jump corrected
  - All 2D scans repeated which where conducted after the jump
- Automated 3D scans prepared; to be tested in future
- High resolution scan in the evening



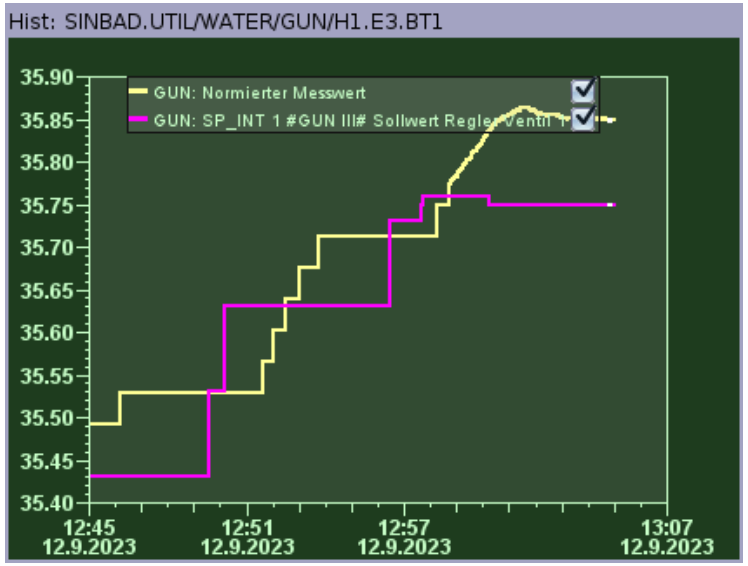
Friday: 3D scans

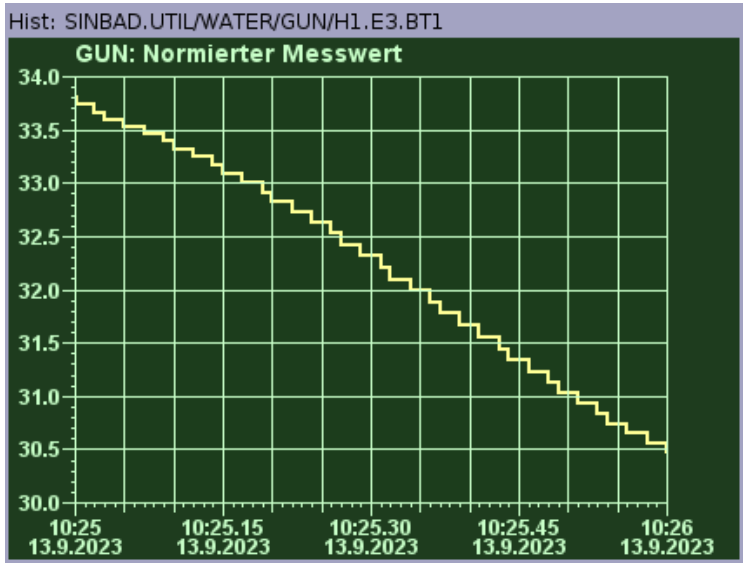
- Resolution from Thursday's 3D scans not sufficient → repeated with smaller ROI (same number of data points)
- High resolution slice scan: 1D scans along x-axis at slow stage velocity, repeated at more angular positions (automated with scan tool)



Gun Modulator Interlocks

- Event logs: ”Interlock TI\DoorSts\Input missing” → **Event log messages are outdated (old settings from Pitz modulator) and have no meaning for our modulator**
- Tested gun water temperature:
  - (TUE) first due to detuning of gun operating at lower gradient
  - (WED) Later to trigger water temperature interlocks on purpose → works, interlock threshold at 32 deg C





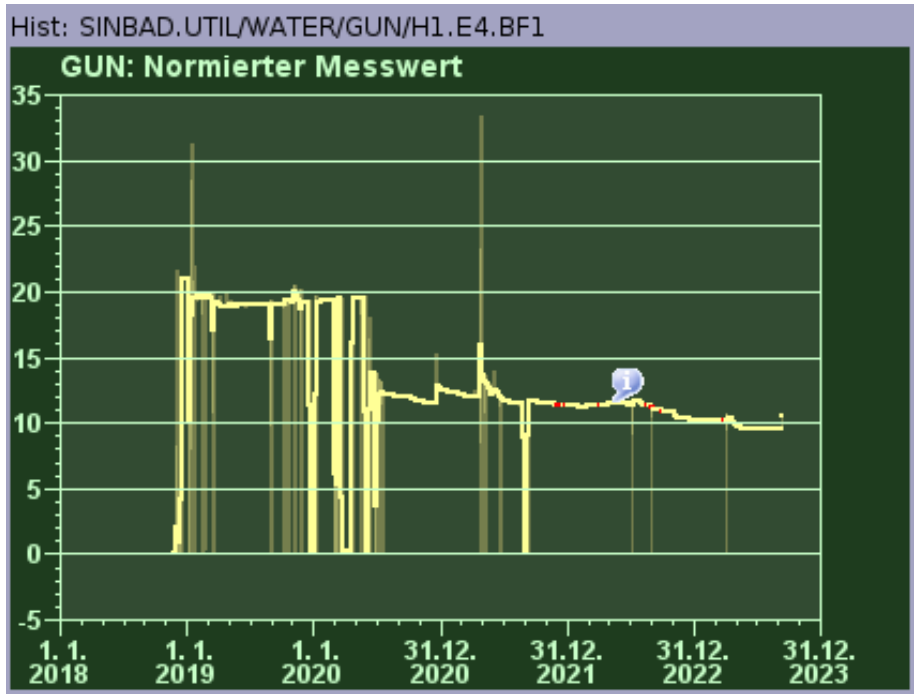
→ Gun modulator could not be reset

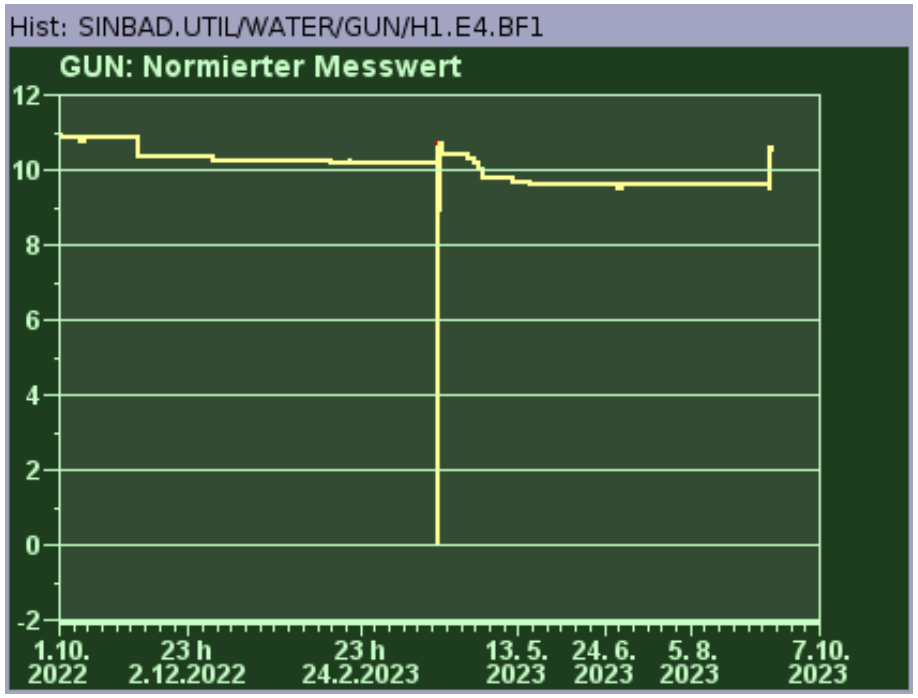
Gun Water Flow Rate

Investigations by MIN and MKK2

- Final interlock reason found: Water flow rate too low, threshold at 9.5 l/min

Same Error Bit set due to Gun water temperature, water flow rate and water pressure (not monitored regularly)





→ Fixed on Wed around noon
→ Stable operation for rest of week

Plan for the week

TWAC beam time

- Optimize WP3 (increase gun gradient and optimize transverse focusing) + characterize trtansmission through alignment channel
- Generate WP4 (WP3 with compression in time via velocity bunching).
- Measure emittance at experimental location (wire scanner) to ease comparison with simulations.
- Continue tests of longitudinal wakefield effect (going off-axis in the alignment channel).
- Try to go down to 10 MeV/c to be closer to the beam available at PHIL.
- Try to improve transverse quality by starting with more charge and then collimate to 10 pC.

(Sorted by priority)

On Thursday evening: partial AA shift, i.e. preparing autonomous agents for overnight runs

Schedule

Week 38

Date	Shift Crew
18.09.	--
19.09.	Thomas, Max
20.09.	Thomas, Max
21.09.	Thomas, Max
22.09.	Thomas, Max

Week dedicated to TWAC

If you want to learn or join the shift: please give the shift leader a call (BKR 2840 / SINBAD Box 2454)