



**EUROPEAN
SPALLATION
SOURCE**



ECDC in the journey to getting the instruments operational.

Science and Technology Advisory Panels (STAPs)
October 2025

VINCENT HARDION
ON BEHALF OF ECDC++

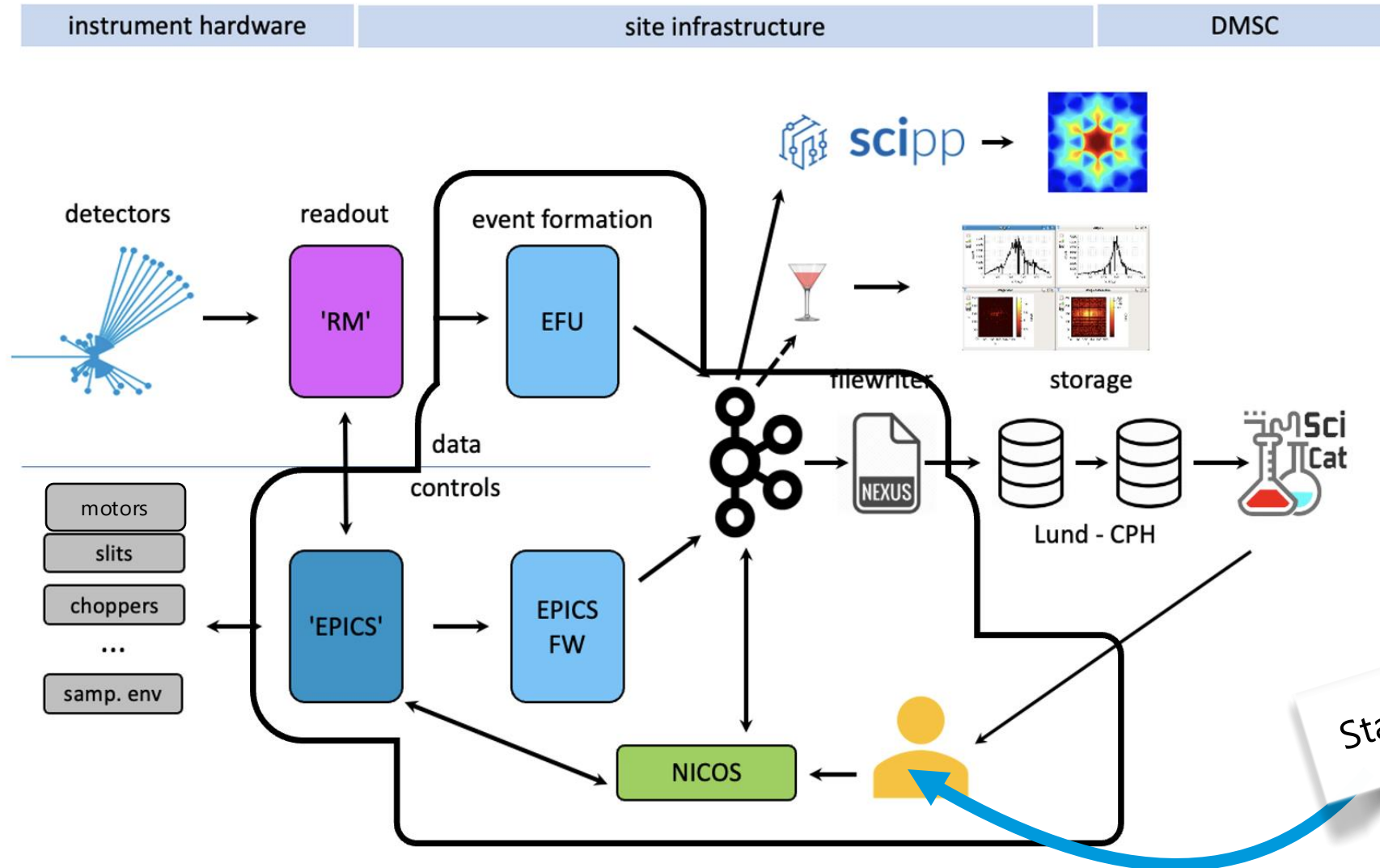
Agenda



1. ECDC System
2. Commissioning Progress
3. Data Collection and System Maturity
4. Firmware and Hardware Collaboration
5. Experiment Control and Integration
6. Sample Environment
7. Organisational Updates
8. Risks and Outlook

1. System Definition

Complete ECDC delivery package



DETECTOR

FIRMWARE

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DST

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INFRA



2. Commissioning Progress



- Focused on SAR of TBL, BiFROST, and LOKI.
 - Now DREAM, ODIN, ESTIA, NMX
 - Close collaboration with instrument staff to meet SAR requirements.
- Validated ECDC architecture for early operations.
- Issues tracked in Jira; SAR-priority issues resolved first.
- Major case: beam monitor integration — cross-group effort including hardware, firmware, software, and vendor coordination.
- Challenges:
 - Software last in line
 - Effort shared between hot commissioning, cold commissioning and T2/3

Two Dimensional Filter Statistics: ECDC NIT					
To be resolved before	IN PROGRESS	RESOLVED	IN REVIEW	TO DO	T:
SRR	0	2	1	8	11
TG5/ SAR	10	5	11	12	38
TG6/ ORR	5	6	3	17	31
Total Unique Issues:	15	13	15	37	80
Grouped by: Status					

Showing 3 of 3 statistics.

ECDC - Installation and Testing



Test of NICOS installation
of the LOKI workstation.

Test of NICOS installation
of the TBL workstation.



Service Test

Application: [Setup](#) NICOS - guest at localhost:3389

NICOS Instrument: BiFROST Run Title: bifrost_Tuesday_beamlimetest_2_1 Status: RUNNING ✖

Proposal ID: 470857 Run Number: 168697

Experiment

Setup

Instrument interaction

Scripting

History

History/TESTING

Logs

Proposal information

[Find my proposal](#)

Proposal ID: 470857

Proposal title: BiFROST local testing

Local contact:

name	email	affiliation
Maximiliano Novelli		European Spallation Source ESRF (ESS)
Jonas Petersson		European Spallation Source ESRF (ESS)
George Oswald		European Spallation Source ESRF (ESS)
Tobias Ruckert		Other
Gregory Tucker		European Spallation Source ESRF (ESS)
Rasmus Toff-Petersen		European Spallation Source ESRF (ESS)
Matt Clarke		European Spallation Source ESRF (ESS)

Users:

name	email	affiliation
Maximiliano Novelli		European Spallation Source ESRF (ESS)
Jonas Petersson		European Spallation Source ESRF (ESS)
George Oswald		European Spallation Source ESRF (ESS)
Tobias Ruckert		Other
Gregory Tucker		European Spallation Source ESRF (ESS)
Rasmus Toff-Petersen		European Spallation Source ESRF (ESS)
Matt Clarke		European Spallation Source ESRF (ESS)

Sample information:

name	Some sample
Formula	
Number of	
mass/volume	
density	
temperature	
electric field	
magnetic field	

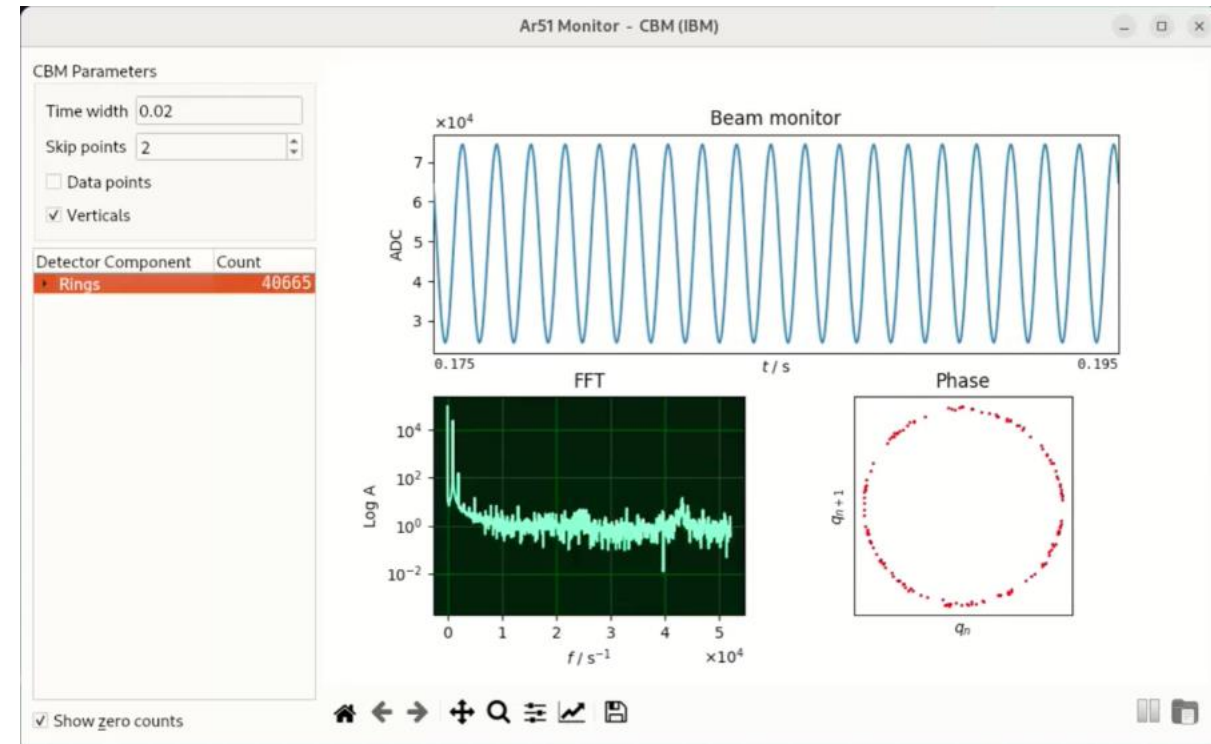
☒ Do not continue scripts after fatal errors

Service Test at the BiFrost Instrument:
the “local testing” proposal number 470857

3. Data Collection and System Maturity



- The detector and metadata pipeline met expectations during integrated tests.
- Event Formation Unit validated across many type of detectors.
- Specific cases tested successfully:
 - EPICS AreaDetector to Kafka streaming tested successfully (ORCA & nGem).
 - TimePix3 achieved its first full NeXus data chain and time-of-arrival validation.
- Produce several Diagnostic tools
- Presence during commissioning for on-site support
- Challenges:
 - Testing geometry
 - Testing timestamping without synched neutron source

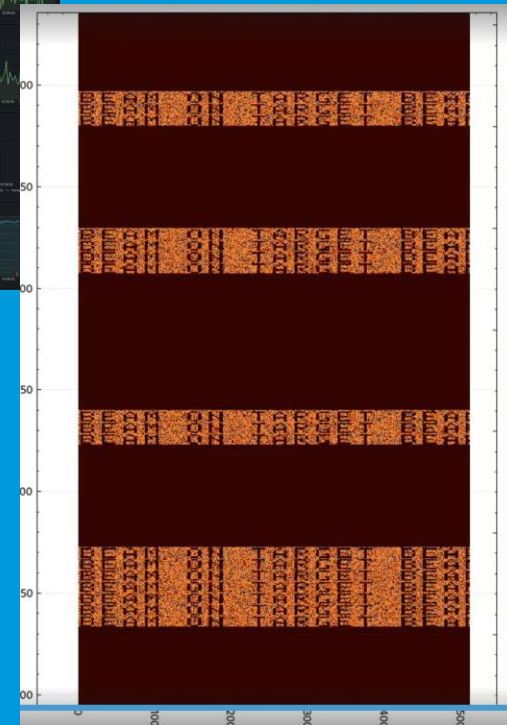


Data pipeline test

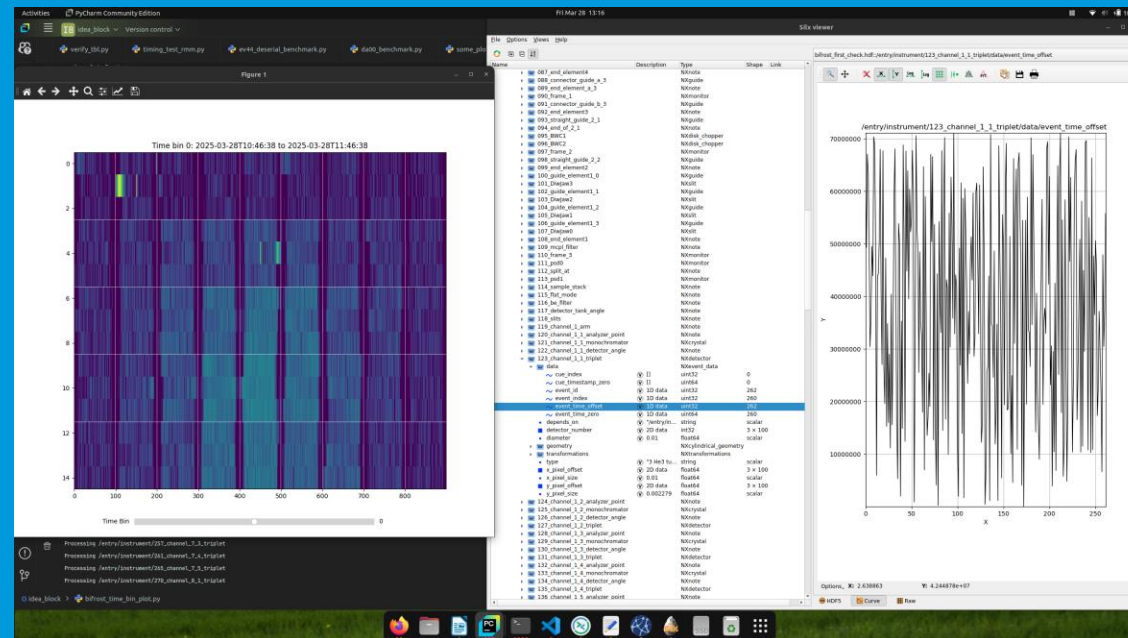


Top: Data pipeline Test of the BiFrost He-3 detector: the monitoring tool shows the EFU receiving data stream.

Right: Example of data generator simulating data and mask



Data workflow test



Data workflow Test of the BiFrost detector:
the detector data are recorded in a NeXus file (Silx viewer)

4. Hardware and Firmware Integration



- Strong collaboration with ICS WP12: EPICS integration
 - Handed over motion, piezo, hexapod, ...
- Improved reliability and performance of detector integration.
 - Hiring of 3 FPGA consultant as team leader + tester
 - Collaboration with Detector, FPGA and ICS teams ensured validation of readout modules and timing systems.
 - Joint effort clarified interfaces from firmware to high-level data handling
 - Established baseline for future high-throughput instruments i.e SONDE
- Challenges:
 - Highly dependent on information/resource from 3rd parties
 - SSO

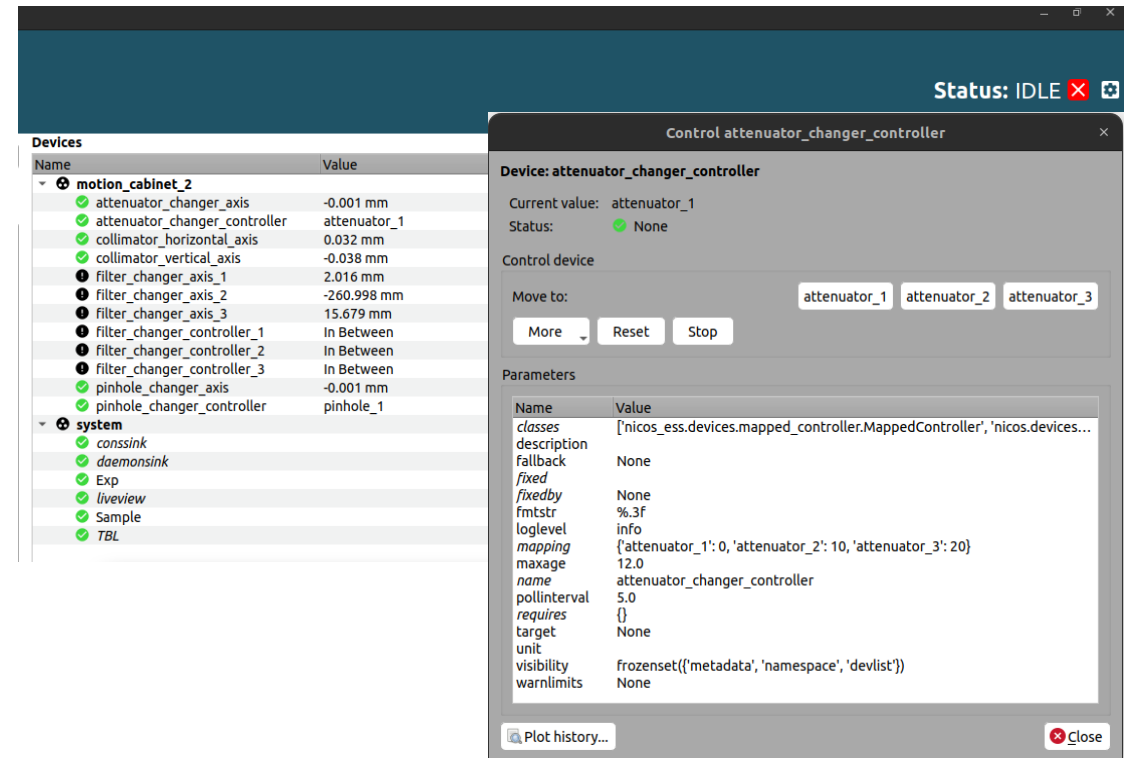
Arch	ID	FENor RMM variants	Firmware variants	BIFROST	VESPA	LOMI	CSPEC	MIRACLES	DREAM	MAGIC	HEMDAL	ESTIA	TBL H43	TBL M8	FREIA	T-ALEX	NMAAX	AMOR-PSI	SKADI	ODIN	BIFROST
0	0	RMM (Readout Master Module)	1.0.0															1.0.0			
			2.0.0	2.0.1		0.0.0			0.0.0			1.0.1	0.0.0	0.0.1						1.0.0	
1	1	CAEN R5560	v.ISIS																		
	2		v.ILL																		
2	3 -9	CDT CDRE w. CIPX sub AS20B	v.CDRE x 7 var																		
3	10	Gd gem – VMM Hybrid ESS Ass	v.xxx																		
	11	Multi-Blade – VMM + Ass KC705	v.yyy																		
	12	Multi-Blade – VMM Hybrid Mini Ass	v.xxx_NMX																		
	13		v.xxx_MB									1.1									
4	14	IDEAS	v.Zzz (external)																		
5	15	ZCU111 Zynq US+ RFSoc	v.zzz																		
6	16	NI DAQ1412S (8ch)	v.1.0.0	1.04																	
7	17	I-BM, CDT CDRE	v.1.20	1.02																	
8	18	CDT CASCADE-GEM DAQ	v.xxx																		
9	19	NI 128D DAQ (Gemini)	v.xxx																		
10	20	CAEN R550 BM Firmware	V.xxxxx																		

Firmware status in 2025-08-20

5. Experiment Control and Integration



- NICOS/EPICS interface refined for motion, chopper, and sample environment devices along the way.
- Closer collaboration with ICS, DMSC, and Detector, MCA & Chopper Groups for integration and diagnostics.
- Focus on unified operator view for control, data collection, and monitoring, including live view.
- Work ongoing to harmonize GUIs and improve usability.
- Challenges:
 - High level control for User Operation
 - Meta-data and high accuracy timestamping

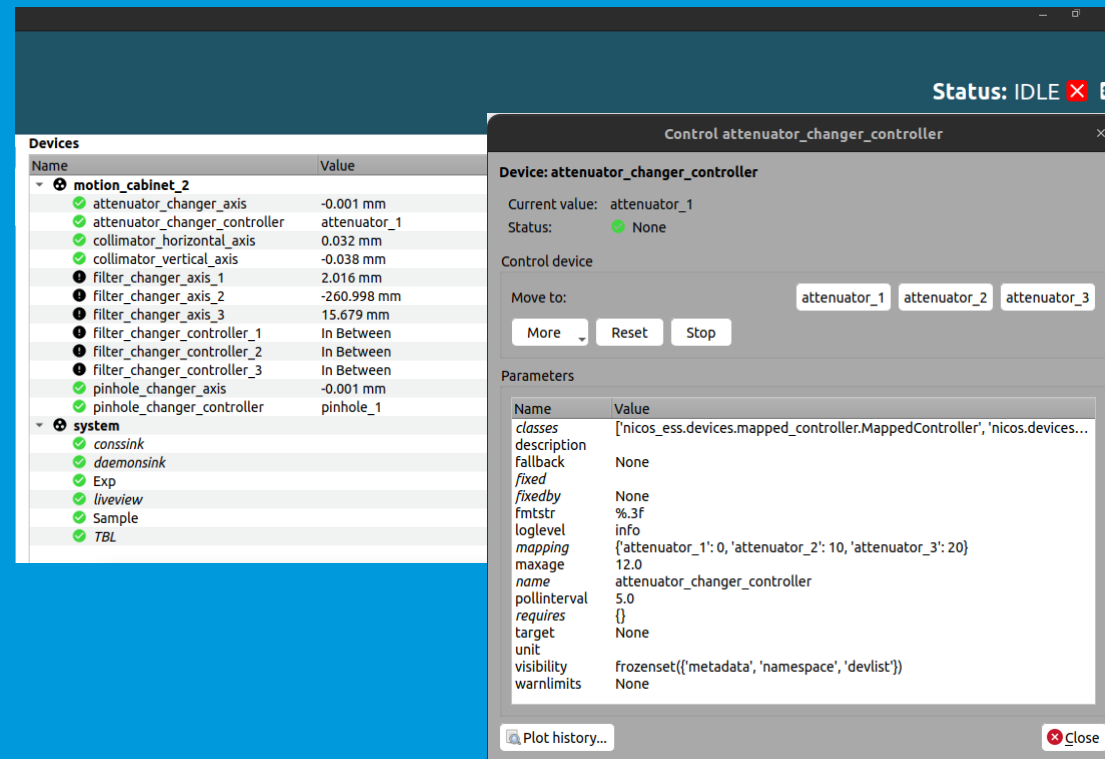


Control Test



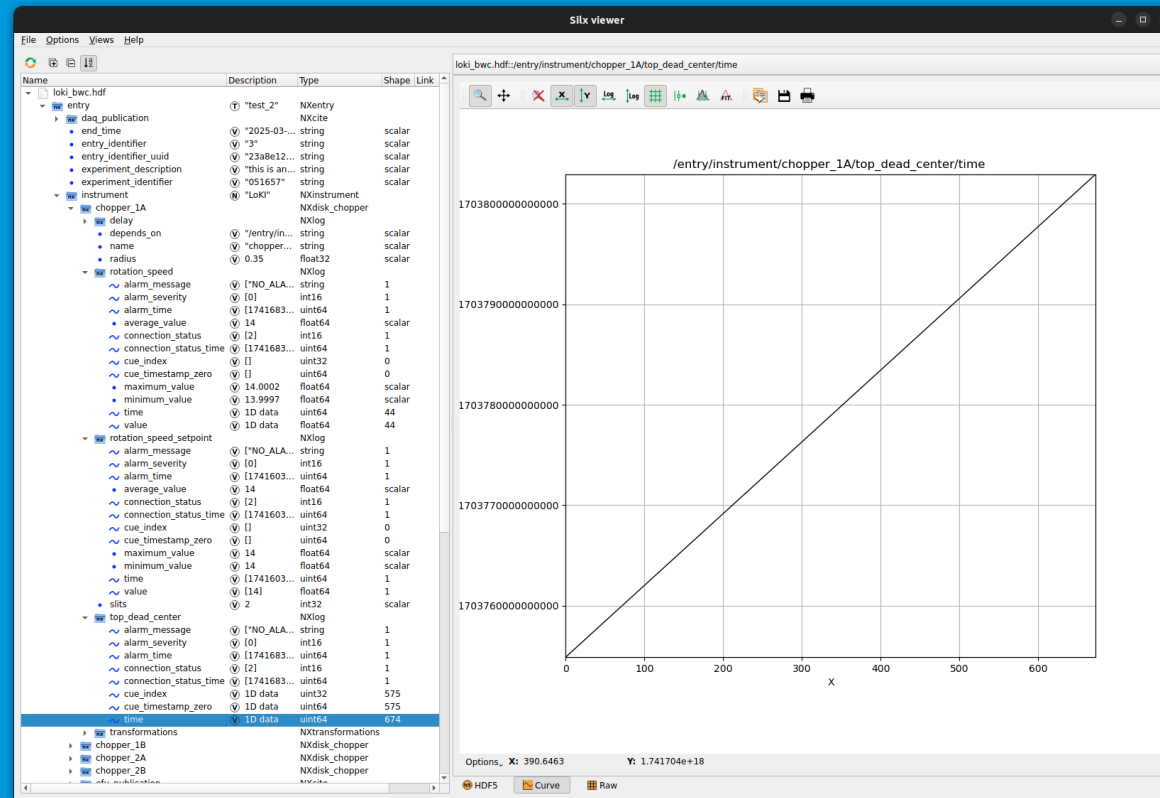
Control Test of the LOKI Chopper
User Interface

Advanced Control test



Advanced Control Test of the TBL attenuator:
the GUI proposed 3 pre-defined positions.

Experiment Control Flow



Experiment Control Flow Test of the LOKI Chopper:
The chopper meta-data are stored in NeXus file.

6. Sample Environment Integration



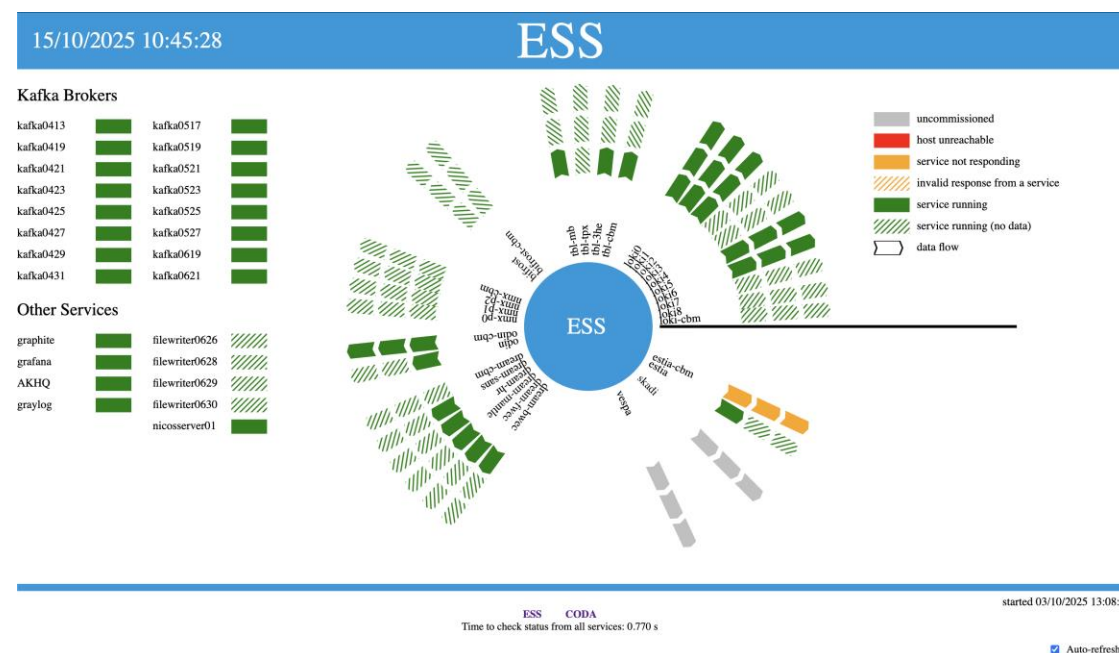
- Re-starting coordination with SE group to standardize interfaces and testing.
- Integration maturity and complexity have impacted cold commissioning.
 - basic control in Cold Commissioning
- Mitigation plan:
 - investigating a full inventory and readiness assessment Integration ECDC,
 - incremental testing,
 - early validation.
- Challenges:
 - diversity and readiness of sample environment.
 - technical stack



7. Organisation and Infrastructure



- Two new members joined; senior developer for neutron science to start soon.
- On-call framework initiated for NSS technology groups.
- Automated deployment enhanced with Ansible and CI/CD pipelines => Step toward better configuration management
- Centralized dashboards deployed for EFU and Kafka services i.e <https://ecdcpos.esss.dk/ess>
- Current challenges on the complexity of IT landscape impacting support response.



Outlook



- Focus on being ready for hot commissioning.
- Extend test workflows to Tranche 2 and 3 instruments.
- Improve user experience.
- Strengthen automation and diagnostic infrastructure.
- Continue to foster collaboration across divisions.

→ ECDC is eager to see the first neutron events displayed through its systems.