



# System Acceptance Review meeting for BIFROST

Detectors & Beam Monitors - Site Acceptance Tests

2025-09-04

**BIFROST Neutron Detector System**  
**=ESS.NSS.H01.BIFRO.B01.B01.B01-B05**

**BIFROST Neutron Detector Electronics**  
**=ESS.NSS.H01.BIFRO.B01.C01.C01-C02**

# Site Acceptance Test Report

## Neutron Detector System



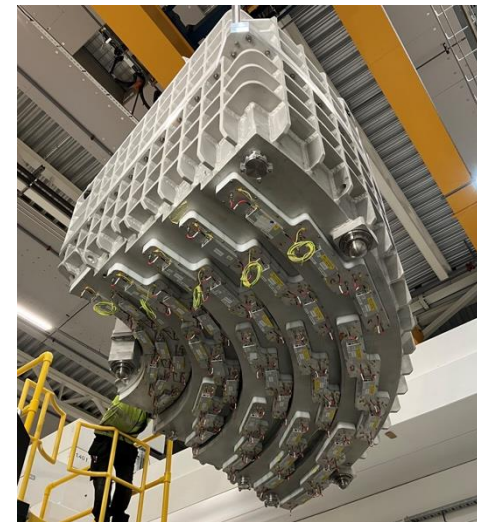
System name	FBS	EPL	FAT	LOCAL SAT	INTEGRATED SAT	Compliance
BIFROST Neutron Detector System	BIFRO.B01.B01.B01-B05	ESS-4159661	ESS-5201462	ESS-5592068	ESS-5637422	<div>■ Non CE-MARKED equipment resolved through derogation (ESS-5350674)</div>
BIFROST Neutron Detector Electronics	BIFRO.B01.C01.C01.UH01-C02.UH01	ESS-5293718 (C01.UH01) ESS-5293719 (C02.UH02)				

### System scope:

- discriminate and analyse the neutrons scattered from the sample

### Status:

- detector modules, preamplifiers and racks have been grounded in accordance with the NSS grounding guideline
- detector system and electronics tested, integrated and commissioned
  - issue observed: detector noise pickup related to grounding



Detector System



Front-end Electronics



Back-end Electronics

# Open Issues after SATs



Item	#NIT	Action	Current Status	Severity	Responsible Group
1	NIT-258	Replace bad resistor on 2.7 meV, 2, detector module	Open	MINOR	In-kind - DetG
2	NIT-259	Implement setting firmware registries on individual DAQs	Open	MINOR	ICS - DetG
3	NIT-260	Test RMM timing using general NSS method	Open	MINOR	ECDC - DetG
4	NIT-261	Documentation of firmware registries (to be updated with NIT-262)	In-progress	MINOR	DetG
5	NIT-262	Finetune firmware registries to maximize gamma suppression and efficiency	Open	MINOR	In-kind - DetG
6	NIT-31	Instrument Earthing System	Open	<b>MAJOR</b>	CEP

## Items 1-5:

- expected to be resolved before TG6/ORR

## Item 6 (Grounding):

- CEP carried out measurements (ESS-5815721) to verify compliance with the NSS grounding guideline
- the results showed that the field devices of most systems (e.g. chopper, motion control etc) are electrically connected to the building earth, which conflicts with the NSS grounding guideline
- to identify the source of the fault (devices unintentionally connected to the building earth), it will be necessary to disconnect the cables of the systems mentioned above

# Open Issues after SATs



Item	#NIT	Action	Current Status	Severity	Responsible Group
1	NIT-258	Re			In-kind - DetG
2	NIT-259	Im			ICS - DetG
3	NIT-260	Te			ECDC - DetG
4	NIT-261	Dc			DetG
5	NIT-262	Fin			In-kind - DetG
6	NIT-31	Ins			CEP

Grounding issue must be resolved before SAR acceptance

Items 1-5:

- expected to be

Item 6 (Grounding)

- CEP carried out
- the results show the building earth, which conflicts with the NSS grounding guideline
- to identify the source of the fault (devices unintentionally connected to the building earth), it will be necessary to disconnect the cables of the systems mentioned above



# Hot commissioning

## Neutron Detector System

- Readyng of the system for hot-commissioning
  - grounding issue needs to be addressed
- DetG planned activities:
  - support Instrument team with addressing any open issues

No displaced working hours or on-call support currently anticipated

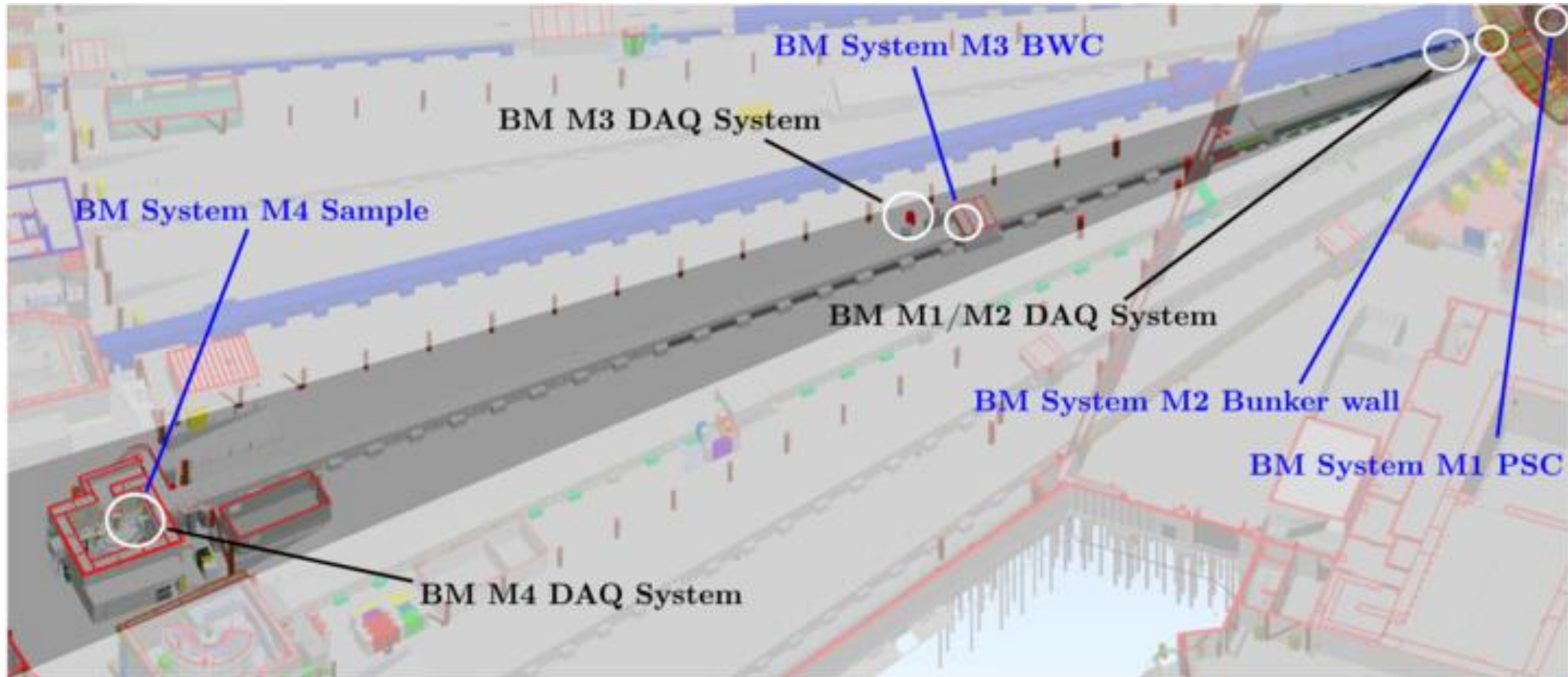
- but can be provided if the need arises



# BIFROST Beam Validation System = ESS.NSS.H01.BIFRO.A01.B01

OURANIA SIDIROPOULOU ON BEHALF OF THE CBMP

# BIFROST Beam Monitor Systems





# Status Report

## Beam Monitor System - M1 PSC (Fission Chamber)



System name	FBS	EPL	FAT	LOCAL SAT	INTEGRATED SAT	Compliance
BIFROST BM System M1 PSC	BIFRO.A01.B01.B01	ESS-4003636 (head) ESS-5350609 (preamp)	ESS-5546615	In-progress	In-progress	Risk Assessment (NIT-45, NIT-46) -> approved for installation; waiting for derogation report
BIFROST BM M1 DAQ System	BIFRO.A01.B01.C01	ESS-5765281				

### System scope:

- monitoring the Pulse Shaping Chopper and NBOA

### Status:

- tested with neutrons
- local SAT incomplete
- under integration



BM head





BM DAQ System

# Status Report

## Beam Monitor System – M2 Bunker Wall (I-BM)



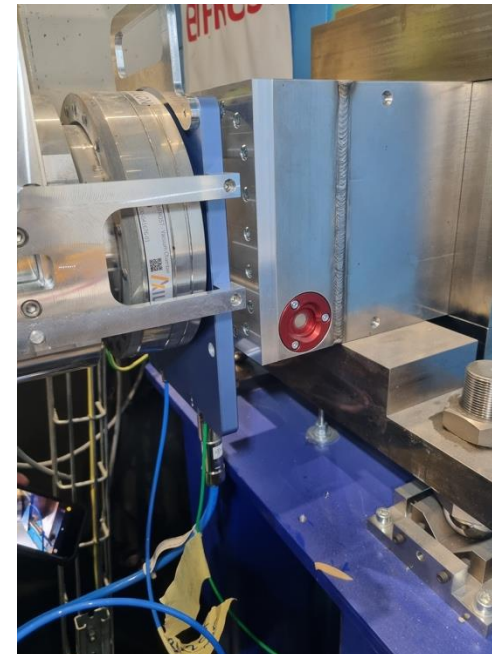
System name	FBS	EPL	FAT	LOCAL SAT	INTEGRATED SAT	Compliance
BIFROST BM System M2 Bunker Wall	BIFRO.A01.B01.B02	ESS-4049854	ESS-5472460	ESS-5774690	ESS-5795896	 CE-MARKED (ESS-5514888)
BIFROST BM M2 DAQ System	BIFRO.A01.B01.C02	ESS-5765281				 CE-MARKED (ESS-5471996)

### System scope:

- monitor/confirm frame overlap and pulse width

### Status:

- tested with neutrons
- local SAT complete
- integrated SAT complete



BM head



BM DAQ System

# Status Report

## Beam Monitor System – M3 BWC (I-BM)



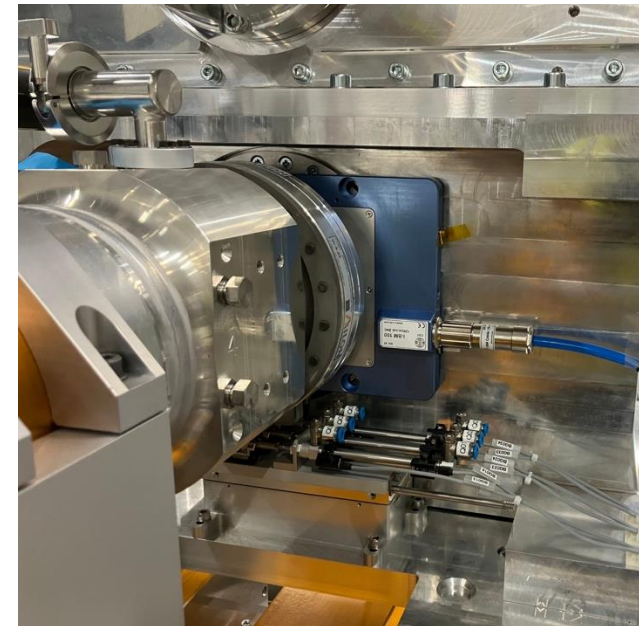
System name	FBS	EPL	FAT	LOCAL SAT	INTEGRATED SAT	Compliance
BIFROST BM System M3 BWC	BIFRO.A01.B01.B03	ESS-4074337	ESS-5472460	ESS-5774690	ESS-5795896	■ CE-MARKED (ESS-5514888)
BIFROST BM M3 DAQ System	BIFRO.A01.B01.C03	ESS-5501684				■ CE-MARKED (ESS-5471996)

### System scope:

- monitor the output of the bandwidth chopper

### Status:

- tested with neutrons
- local SAT complete
- integrated SAT complete



BM head



BM DAQ System



# Status Report

## Beam Monitor System – M4 Sample (CASCADE)



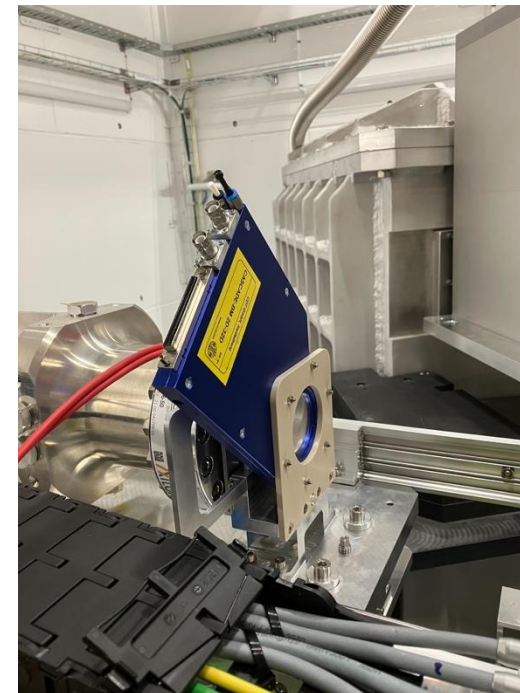
System name	FBS	EPL	FAT	LOCAL SAT	INTEGRATED SAT	Compliance
BIFROST BM System M4 Sample	BIFRO.A01.B01.B04	ESS-5474648	ESS-5546615	ESS-5774690	In-progress	Related to gas pressure (NIT-70) -> open for all DetG installations
BIFROST BM M4 DAQ System	BIFRO.A01.B01.C04	ESS-5545653				CE-MARKED (ESS-5546616)

### System scope:

- normalization of the incident beam flux
- 2D profile for diagnostics at the sample position

### Status:

- tested with neutrons
- local SAT complete
- integrated SAT on-going



BM head



BM DAQ System

# Open/Resolved Issues after Local SAT



■ open  
■ in progress  
■ resolved

**MINOR** = Testing & operation NOT affected

**MAJOR** = Testing & operation IS affected

Item	#NIT	Action	Test Case	Description	System Affected	Initial Status (Local SAT)	Current Status	Severity	Responsible Group
1	NIT-276	Update e-plan	Cable Connections	LV connections to BM1 and amplifier required changes; fiber scheme update needed; fiber connections to some patch panels not yet done.	M1	Fail (changes required)	<span style="color: red;">■</span> Relevant team informed	MINOR	DetG
2	NIT-277	Include missing FBS tags	Cable Tagging	Not all components were marked with correct FBS cable tags	All	Fail (tags missing)	<span style="color: red;">■</span> Relevant team informed	MINOR	DetG
3	NIT-278	Investigate electrical connection between beam monitor head and instrument line	Electrical Grounding	Persistent ~1 $\Omega$ unwanted connection between head and line; system correctly installed; source undetermined; further investigation required	All	Fail	<span style="color: red;">■</span> Issue persists	MAJOR	CEP
4	NIT-279	BM1 resolve amplifier and LV connection issues	Power up/Amplifier	Power-up revealed amplifier and LV connection issues needing investigation and possible replacement.	M1	Fail	<span style="color: green;">■</span> Resolved	MAJOR	DetG
5	NIT-280	Complete gas system	Gas System	<ul style="list-style-type: none"> <li>Monitor-to-CUP gas piping complete</li> <li>Bottle-to-CUP gas piping incomplete</li> <li>Temporary bottle setup used for one monitor</li> </ul>	All	Incomplete	<span style="color: yellow;">■</span> Work in progress	MAJOR	DetG

# Open/Resolved Issues after Local SAT



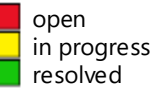
open  
in progress

operation NOT affected  
operation IS affected

Item	#NIT		ty	Responsible Group
1	NIT-276	Update e-	R	DetG
2	NIT-277	Include mi	R	DetG
3	NIT-278	Investigate connection monitor he instrument	R	CEP
4	NIT-279	BM1 resolve LV connec	R	DetG
5	NIT-280	Complete	R	DetG
		monitor		

Pending items must be resolved before SAR acceptance

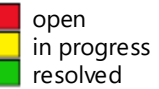
# Open Issues after Integrated SAT



**MINOR** = Testing & operation NOT affected  
**MAJOR** = Testing & operation IS affected

Item	# NIT	Action	System Affected	Initial Status (Integrated SAT)	Current Status	Severity	Responsible Group
1	NIT-295	Debug bit/cropping problem in IBM2 DAQ	M2	FAIL	Under investigation	MAJOR	ECDC - DetG
2	NIT-296	Finalize the firmware of the CASCADE monitor	M4	FAIL	Being tested	MAJOR	ECDC - DetG
3	NIT-282	Deploy and test the slow control of CASCADE monitor	M4	FAIL	Developing stage	MAJOR	ICS
4	NIT-290	Verify data aggregation for Fission and CASCADE monitors	M1, M4	FAIL	Developing stage	MINOR	ECDC - DMSC
5	NIT-288	Verify time stamping for Fission and CASCADE monitors	M1, M4	FAIL	Being tested	MINOR	ECDC
6	NIT-287	Confirm data format for Fission and CASCADE using on site DAQs	M1, M4	FAIL	Being tested	MINOR	ECDC
7	NIT-286	Test EFU functionality for Fission and CASCADE monitors	M1, M4	FAIL	Being tested	MAJOR	ECDC
8	NIT-293	Verify that NICOS can count against Fission and CASCADE 14 Hz integrated count numbers	M1, M4	FAIL	Being tested	MINOR	DMSC
9	NIT-292	Test that a 14 Hz integrated count number for Fission and CASCADE can be broadcasted over Kafka	M1, M4	FAIL	Being tested	MINOR	ECDC
10	NIT-281	Deploy all 4 monitors on the same ring	M1-4	FAIL	Being tested	MAJOR	ECDC - DetG
11	NIT-291	Test that aggregated data can be saved in the nexus file	M1-4	M3-4 pass, M1-2 fail	Developing stage	MINOR	ECDC - DMSC
12	NIT-285	Modify and test R5560 firmware for Bragg peak monitor	M5	FAIL	Developing stage	MINOR	ECDC - DetG
13	NIT-283	Deploy and test the slow control of the fission monitor	M5	FAIL	Developing stage	MINOR	ICS - DetG
14	NIT-289	EFU for Bragg peak monitor	M5	FAIL	Developing stage	MINOR	ECDC
15	NIT-278	Resolve 1 Ohm connection error on beam monitors	ALL	FAIL	Under investigation	MAJOR	CEP
16	NIT-284	Deploy and test backend rack PDU control for RMM power cycling	ALL	FAIL	Developing stage	MINOR	ICS
17	NIT-277	Mark all monitor components with the correct FBS tags	ALL	FAIL	Work in progress	MINOR	DetG
18	NIT-294	Release ICD and firmware documentation for the monitor system	ALL	FAIL	Work in progress	MINOR	ECDC - DetG

# Open Issues after Integrated SAT



**MINOR** = Testing & operation NOT affected  
**MAJOR** = Testing & operation IS affected

Item	# NIT	Action	System Affected	Initial Status (Integrated SAT)	Current Status	Severity	Responsible Group
1	NIT-295	Debug					ECDC - DetG
2	NIT-296	Finalize					ECDC - DetG
3	NIT-282	Deploy					ICS
4	NIT-290	Verify d					ECDC - DMSC
5	NIT-288	Verify ti					ECDC
6	NIT-287	Confirm					ECDC
7	NIT-286	Test EFU					ECDC
8	NIT-293	Verify th integrat					DMSC
9	NIT-292	Test tha can be t					ECDC
10	NIT-281	Deploy					ECDC - DetG
11	NIT-291	Test tha					ECDC - DMSC
12	NIT-285	Modify					ECDC - DetG
13	NIT-283	Deploy					ICS - DetG
14	NIT-289	EFU for					ECDC
15	NIT-278	Resolve					CEP
16	NIT-284	Deploy					ICS
17	NIT-277	Mark all monitor components with the correct FBS tags	ALL	FAIL	Work in progress	MINOR	DetG
18	NIT-294	Release ICD and firmware documentation for the monitor system	ALL	FAIL	Work in progress	MINOR	ECDC - DetG

- PDU control deployment must be resolved before TG6 / ORR
- Rest items must be resolved before SAR acceptance



# Hot commissioning

## Beam Validation System

Full system not ready for hot-commissioning

- M2 & M3 ready for hot commissioning
- M1 & M4 not ready → Work in progress
- Bragg peak monitor → Work in progress

CBMP & DetG planned activities:

- support instrument team with addressing BM related issues

No displaced working hours or on-call support currently anticipated

- but can be provided if the need arises

### BM systems naming

M1	M1 PSC (Fission Chamber)
M2	M2 Bunker Wall (I-BM)
M3	M3 BWC (I-BM)
M4	M4 Sample (CASCADE)