

Heimdal Instrument @ ESS STAP April 2021

Dan Mannix

Lead Scientist Heimdal Instrument ESS, Lund Sweden



ESS April 2021



The Heimdal Team



Isabel Llamas (IFE)
choppers



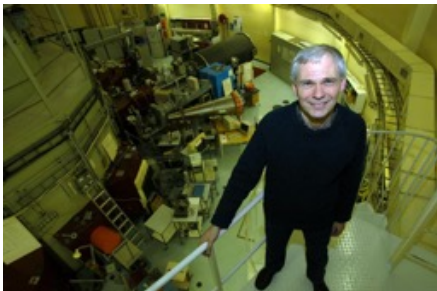
Dan Mannix (AU)
Lead Scientist



Kåre Iversen (AU)
Lead Engineer



Rodion Kolevatov (IFE)
Neutronics



Bjørn Hauback
Lead in-kind partner IFE



35%



Mogens Christensen (PI)
Lead in-kind partner AU



30%



Uwe Stuhr
Lead in-kind partner PSI



35%



Heimdal Lead Scientist Position ?



Dan Mannix (AU)
Lead Scientist

In-Kind Contract Aarhus University 4 Years (1st January 2018 - 31st December 2021)

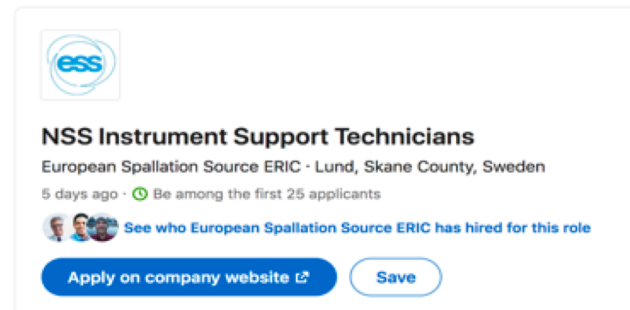
On leave from Institut Néel CNRS-Grenoble, France.

Brought up in Spring & Autumn Diffraction STAP in 2020.

No Position opened at ESS & Currently Hiring Freeze.

There was an agreement to open an ESS position for Heimdal Scientist in 2021.

AU IFE PSI - Request STAP comments



Job advert in Technical Division ESS – April 2021

Heimdal: PSI in-kind agreement



PSI TA signed but In-Kind agreement not approved by Swiss Government in 2020

Now has been agreed for 2021.

Currently waiting for PSI procurement office to find time for us (summer 2021)

~12 Month or more delay in start of procurement of 2D detector & Guide systems

Delays in obtaining full costs towards change request of guide.

COVER PAGE
PAUL SCHERRER INSTITUTE
IN-KIND CONTRIBUTION AGREEMENT

SCHEDULE NIK 6.13 #5 – INSTRUMENT HEIMDAL CONSTRUCTION PROJECT
TO THE IN-KIND CONTRIBUTION AGREEMENT TO BE SIGNED BETWEEN

1. **European Spallation Source ERIC**, Swedish Reg. No. 768200-0018, a European Research Infrastructure Consortium established by decision (EU) 2015/1478 of the European Commission in accordance with Regulation (EC) No 723/2009, having its statutory seat in Lund, Sweden (“**ESS**”), and
2. **Paul Scherrer Institut**, a Swiss national research institute, incorporated under the laws of Switzerland whose registered office is at Forschungsstrasse 111 in CH-5232 Villigen PSI, Switzerland (the “**Partner**”),

European Spallation Source ERIC

Paul Scherrer Institut

Date

Date

Signature

Signature

Name (in block letters)

Name (in block letters)

Position

Position

14.9.2021

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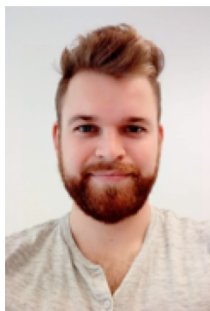
Marc Janoschek

Head of Laboratory, Neutron and Muon Instrumentation

Project Leader, PSI-ESS Project

New PSI TA to be approved at next IKRC

Heimdal Science Activities



2020 -Ph.D Aarhus University in 2D Rietveld Refinement: Matias Mørch

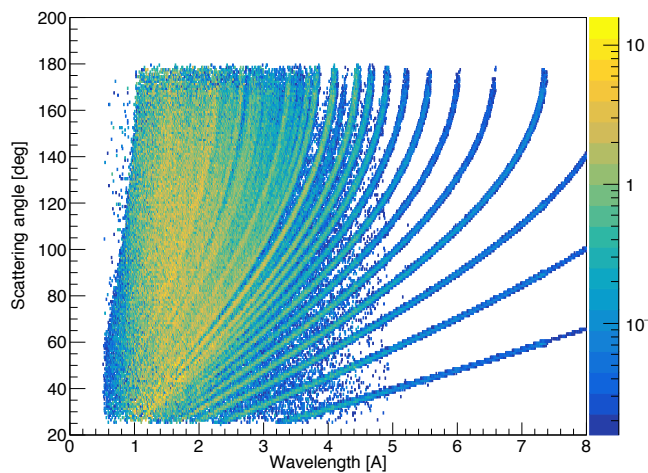
2020 - Nordforsk Postdoc: Sample Environment (Heimdal & Dream):
Fast Temperature Change - High Throughput NPD - Jakob Voldum Ahlburg

New 2021 - Qmat Danish Lighthouse PhD Student ?
Neutron & X-ray Scattering Magnetic Materials - supervisor Dan Mannix.
Need to resolve Heimdal Scientist Position.



Open Flow Cooling Induction Heating

Hot Air Blower



Project Progress



Component	Procurement	Design Specification	CTV	KO	TG3	SAT	proposed Installation
NBOA	PSI	X	X	X	Q12022	Q1 2021	Q1 2022
Light Shutter	ESS /AU	X			Q4 2021		Q2 2024
Heavy Shutter	AU	X			Q4 2021		Q2 2024
BWI	AU	X	05/20				Q2 2024
Choppers	ESS / IFE	X	05/19	Oct 2020	tbd		Q2 2024
T0 Chopper	ESS / IFE	X	05/19		tbd		Q2 2024
Thermal Guide	PSI	X	03/19	Delayed Q3 2021			Q2 2023
Slits / Collimator	AU	X	05/20		05/20		Q3 2021 @ Aarhus
Sample X,Y,Z ω	AU	X	05/20		05/20		Q3 2021 @ Aarhus
2D Detector	PSI / CDT	X	05/20	Delayed Q3 2021		Q2 2023	Q2 2024
Detector Collimator	AU	X	05/20		Q3 2021		Q3 2021 @Aarhus
Detector Support	AU	X	05/20		05/20		Q2 2021
Monitors	PSI				Final TG3		Q3 2024
Cave / Beamstop	IFE	X	05/20	12/20	Q3 2021		Q2 2022

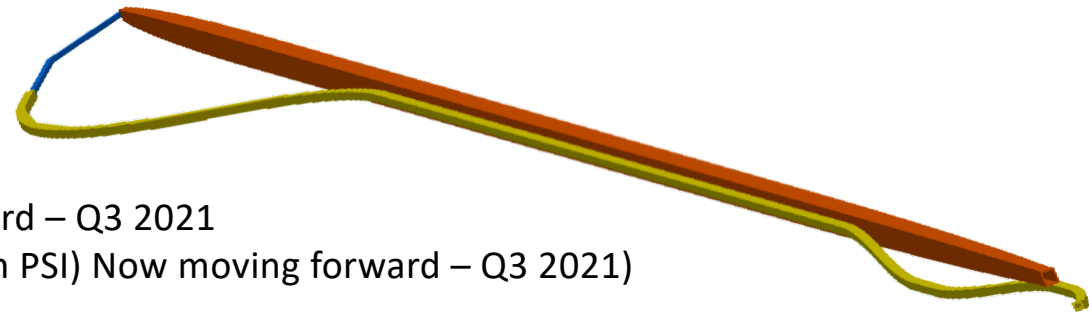
Change Request Status

CR to include more cold guide in scope



ESS – Required real costing of large equipment and infrastructure to continue

- (1) Guide Shielding Costed (ESS Common) - OK
- (2) Chopper Systems all costed (ESS Common) – OK
- (3) Cave CTV published – with ESS (results May 2021)
- (4) 2D detector (Delayed from PSI) Now moving forward – Q3 2021
- (5) Guide optics and vacuum housing – ((Delayed from PSI) Now moving forward – Q3 2021)

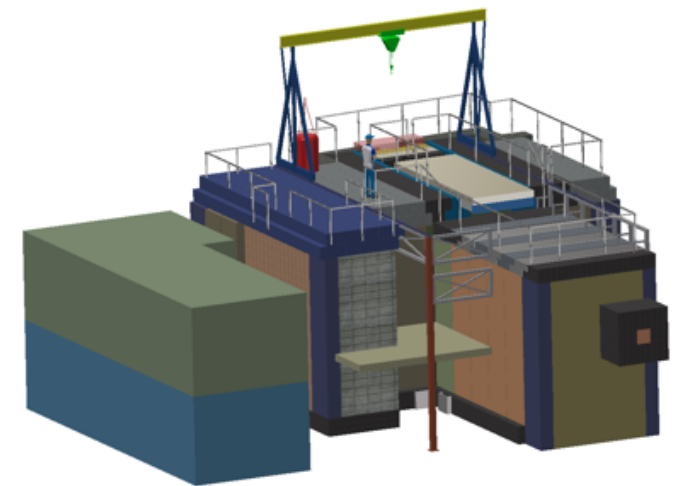
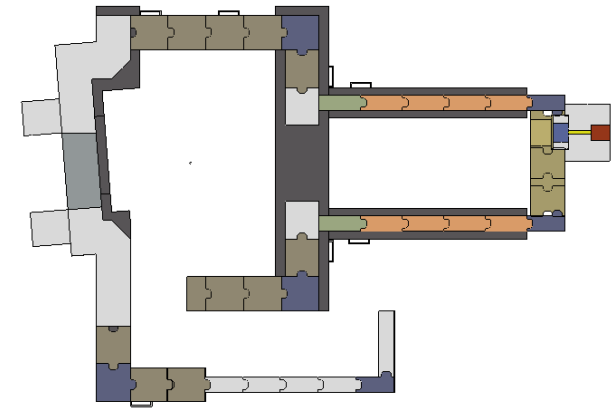
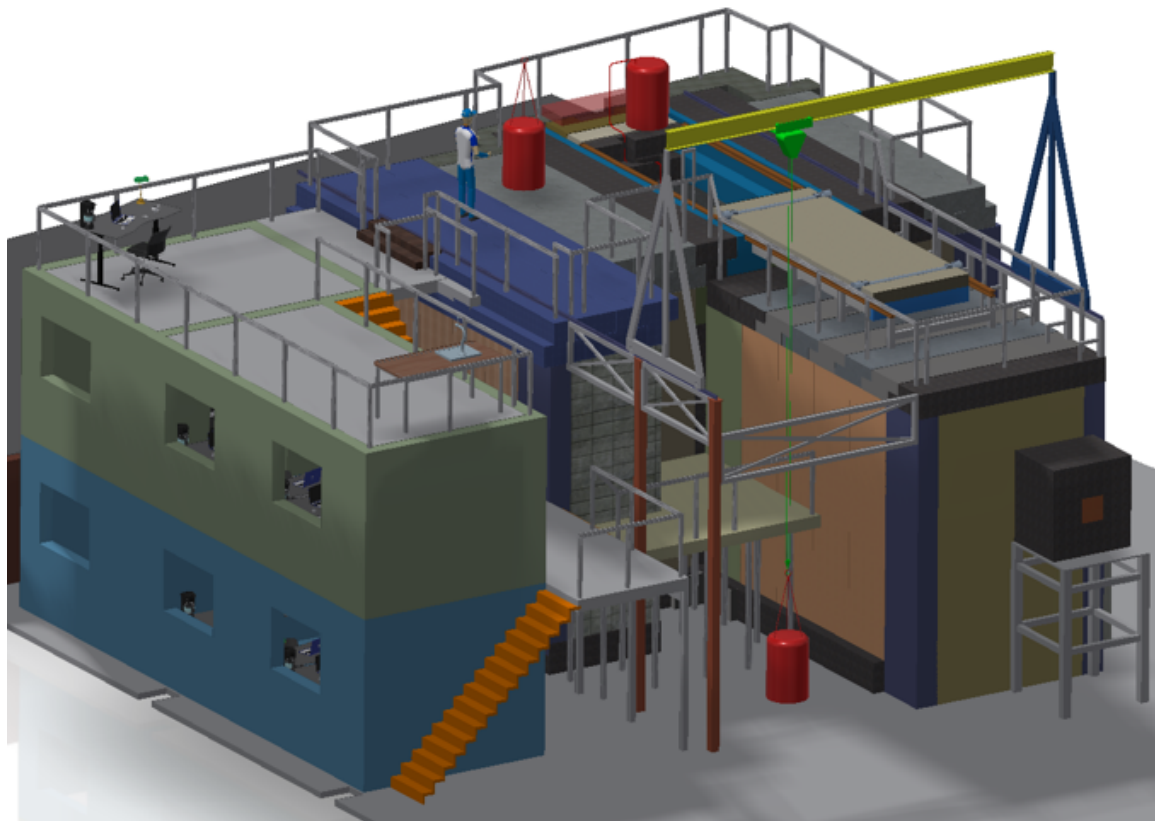


If we are within budget we will submit change request Q3/Q4 2021.

Note: PSI are open to the possibility of procuring additional cold guide as a costed option in the tender document. **But will NOT accept any risks of overspend on procurement the guide system.**

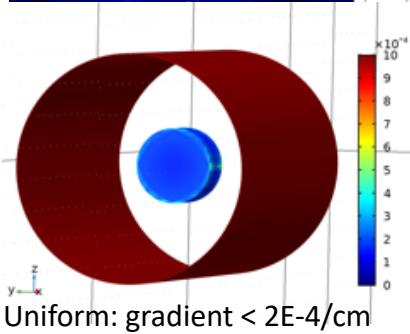
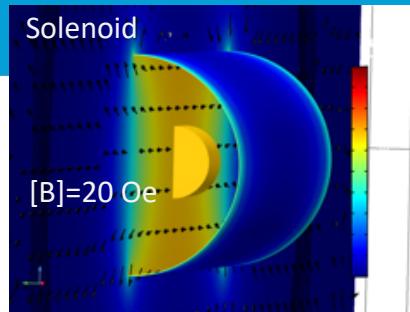
Buying more cold important for upgrade to SANS + Diffraction

Cave Design CTV Published Results expected 6th May 2021



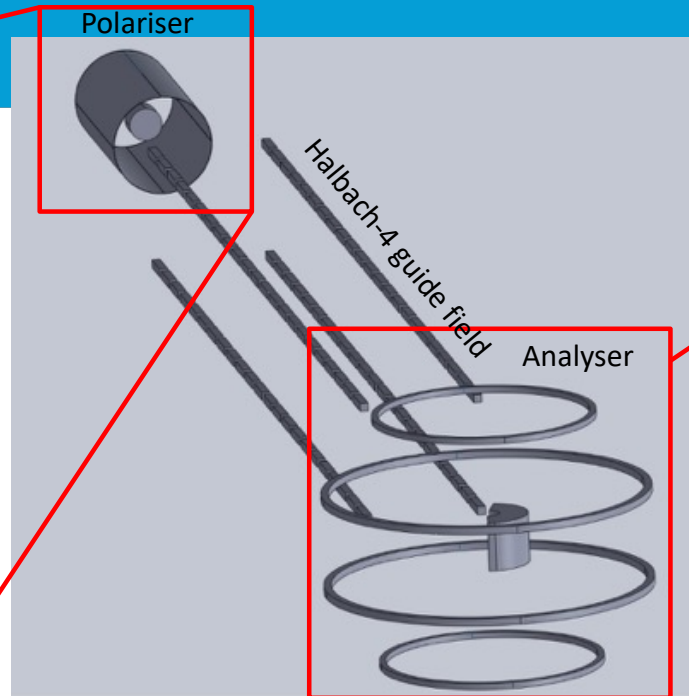
HEIMDAL Polarisation setup

Polariser cell in solenoid
Technique: Polarised ^3He



MEOP + local gas exchange
Good: Fast turn-over
Bad: Polarisation decay

SEOP + *in-situ* pumping
Good: Polarisation stable
Bad: 1 day to be ready



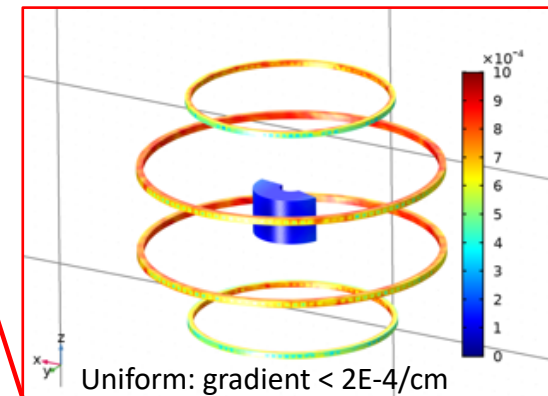
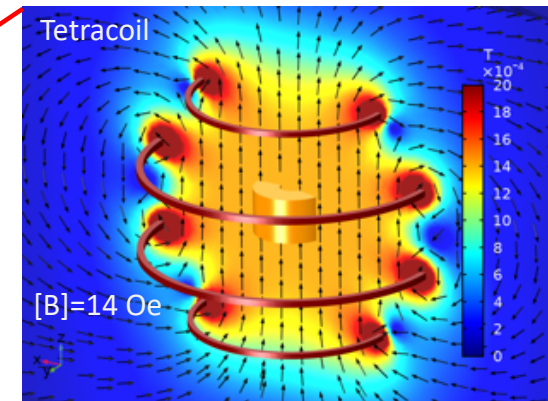
First-cut modelling: a setup will work.

Further development:

- transition region between device.
- Field-turn device
- 3D field

Analyser cell in tetracoil
Technique: Polarised ^3He
MEOP + “Local-filling” to fill cell at HEIMDAL.

Analyser cell can cover both diffraction and SANS



NSS tipping-point plan: (basis for Scenario 1 at ERIC Council March meeting)

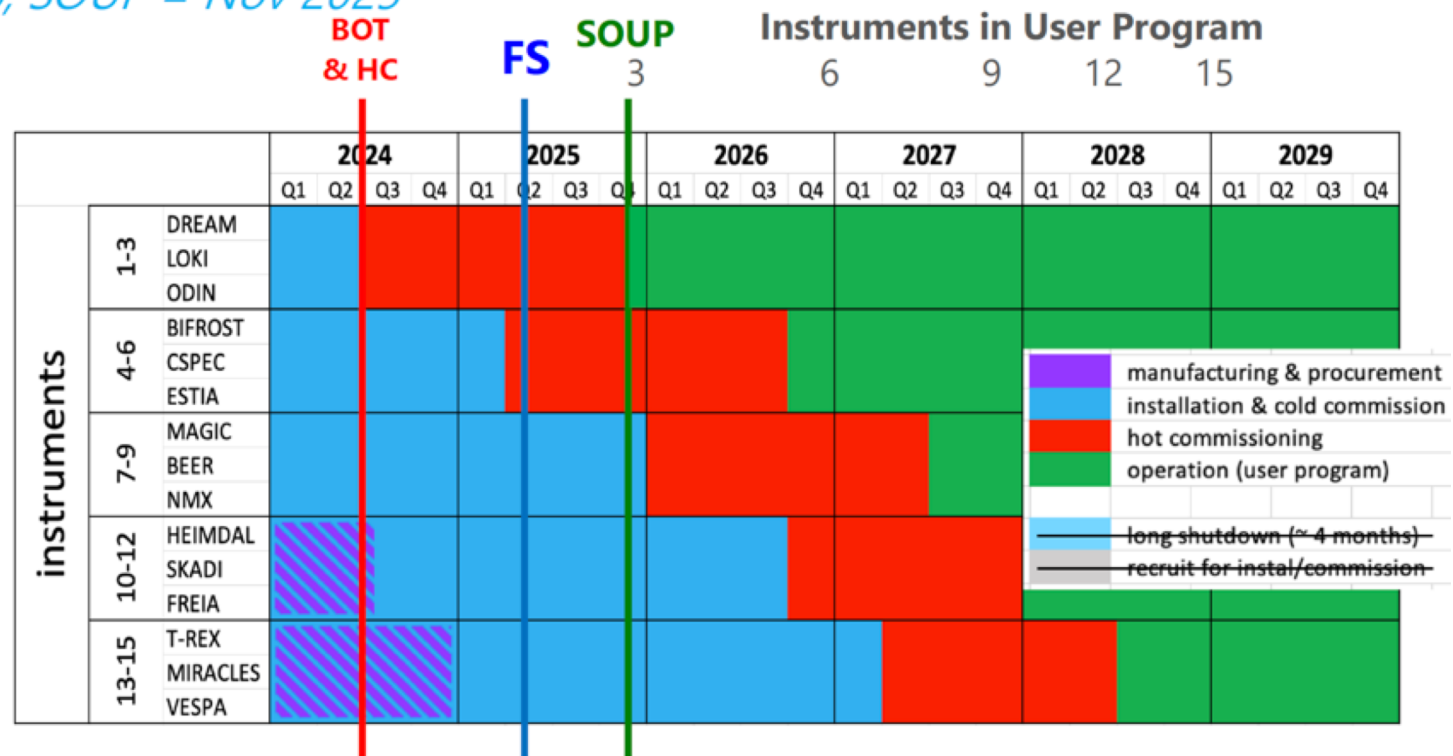


Balance science (FS+SOUP), instrument completion and schedule risk

BOT = July 2024, FS = May 2025, SOUP = Nov 2025

Outcome/impact

- 3 instruments to operations before EOC
- + 3 in 2026
- + 3 in 2027
- + remaining instruments in 2028
- 80% installation complete; *more than current plan (MS V4.4)*
- 9 months float from rolling wave plan
- 6 last instruments rescheduled to allow construction to continue into 2027
- incentive for late instruments (8-15) to complete manufacturing early
- No long shutdown needed



New Baseline schedule for Neutron Beam Instruments



New Instrument Rebaseline due to delays in ESS Schedule (Accelerator & Target).

Still to be agreed with council.

Current Proposed delay to Heimdal SOUP by 18 months (We don't want it !).

Use delay to Allow for Bunker access for all instruments instead of in the planned long shutdown.

Conclusions



Heimdal Generally progressing ok. Main Delay in procurement ~12 Month for 2D detector and Guide systems from PSI in-kind agreement. This is now moving ahead. Cave Tender published and should have results in May 2021.

Main issue for instrument is **end of contract for Lead scientist at end of 2021**. Despite discussions with ESS this still has not been addressed. Request STAP input.

New instrument baseline: Earlier bunker access for Heimdal and reduced shutdown.

We expect to know about our real costs for the change request by Q3/Q4 2021 once we can re-start procurement activities with PSI

Good support for additional science activities 2 Ph.D students and 1 Postdoc for 2D Rietveld, Magnetic Scattering Research and fast sample environments (Heimdal & Dream). Resolving lead scientist position important to start new PhD student.