Scientific Support Division Update

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Reorganisation of Scientific Support

Reorganisation for optimal user program support

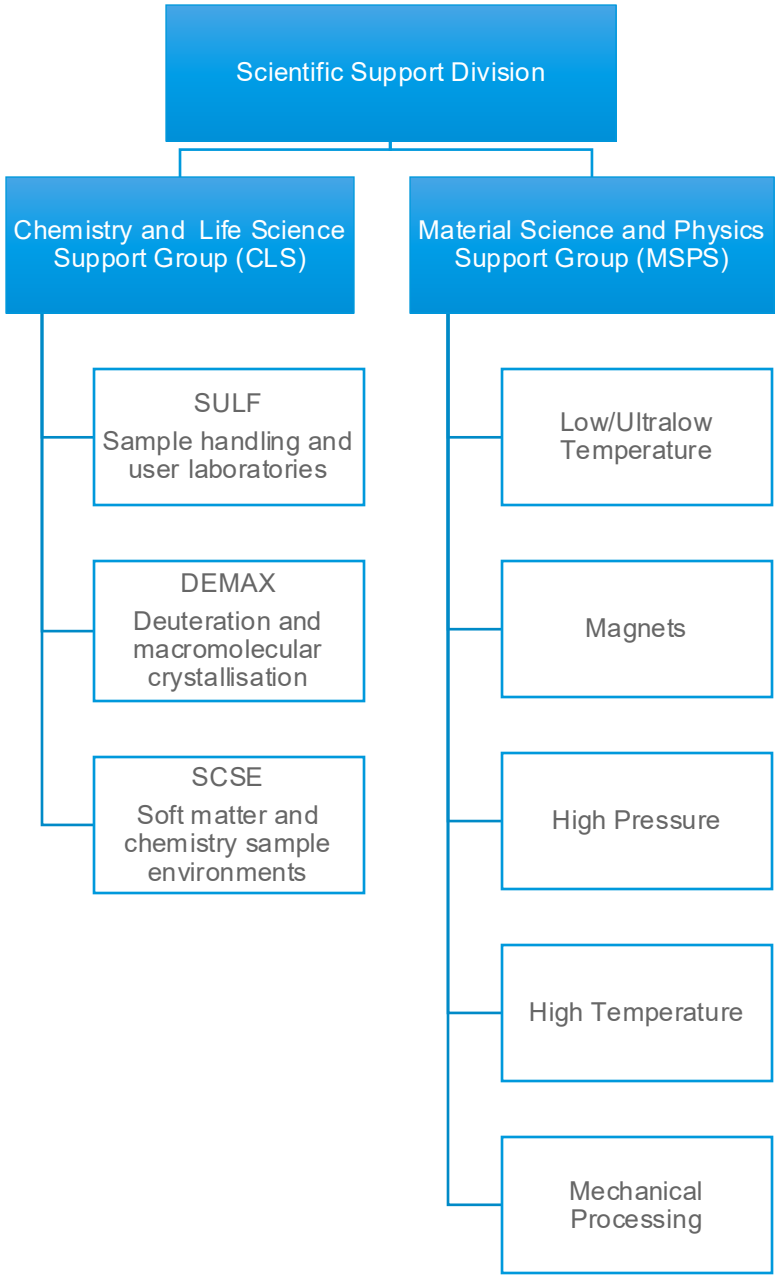
In time for hot commissioning and SOUP

We have a large number of operational aspects of the support to plan and prepare while also completing project deliverables

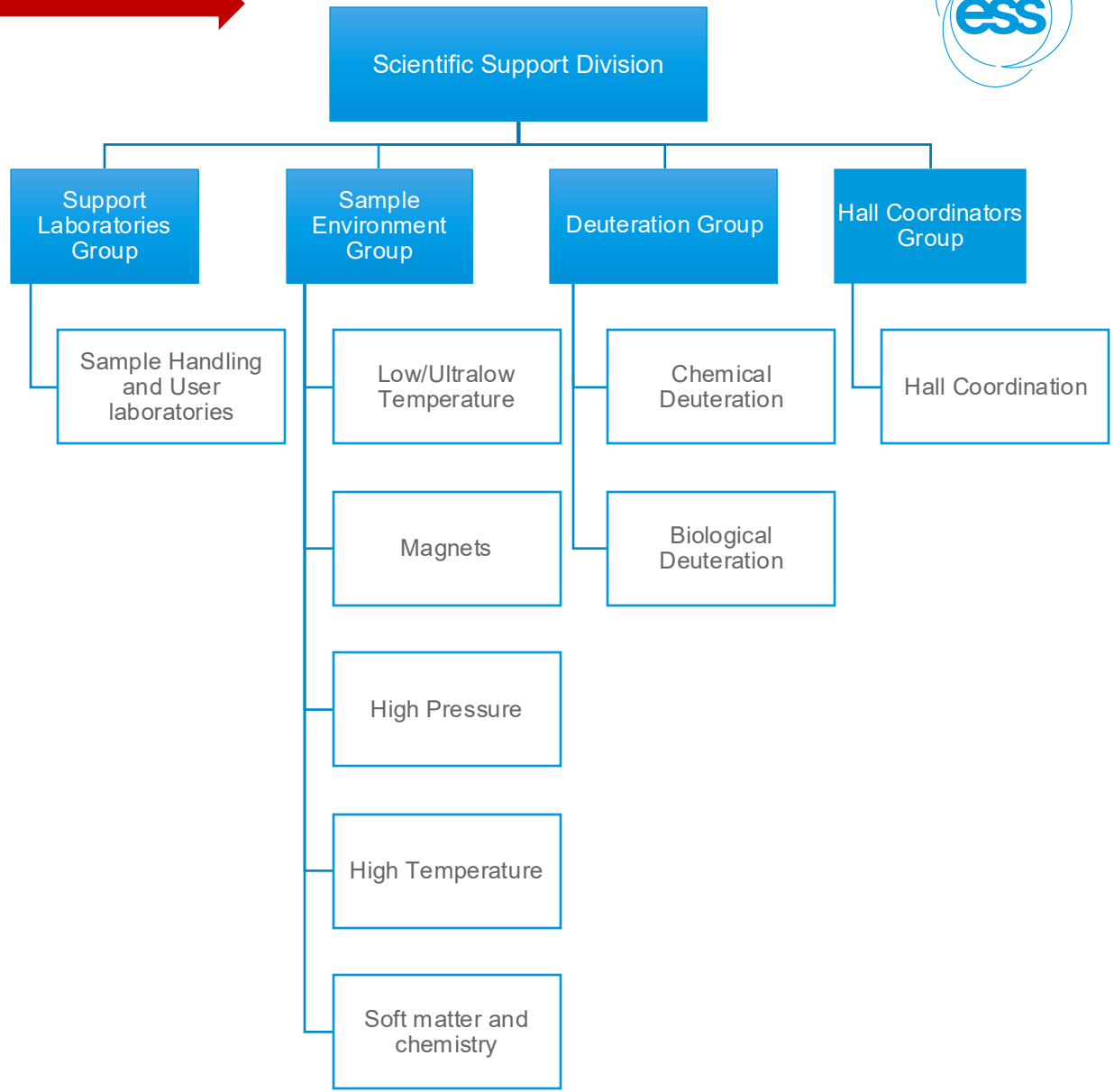
New structure focuses on:

- how we operate the different support functions
- providing clear roles and responsibilities
- enabling effective operational management of the support functions

April 2025



1 Sep 2025:



April 2025

- Scientific Support Division
  - Chemistry and Life Science Support Group (CLS)
    - SULF
      Sample handling and user laboratories
    - DEMAX
      Deuteration and macromolecular crystallisation
    - SCSE
      Soft matter and chemistry sample environments
  - Material Science and Physics Support Group (MSPS)
    - Low/Ultralow Temperature
    - Magnets
    - High Pressure
    - High Temperature
    - Mechanical Processing

DEMAX → NMX – LSS Division

Mechanical Processing → Diffraction and Imaging Division

1 Sep 2025:

- Scientific Support Division
  - Support Laboratories Group
    - Sample Handling and User laboratories
  - Sample Environment Group
    - Low/Ultralow Temperature
    - Magnets
    - High Pressure
    - High Temperature
    - Soft matter and chemistry
  - Deuteration Group
    - Chemical Deuteration
    - Biological Deuteration
  - Hall Coordinators Group
    - Hall Coordination

Group Leader vacancies opened in June

Scientific Support for operations

Support laboratories:

- user laboratories and services for the ESS user programme
- sample handling services including receiving, storing, handling, shipping, disposal
- technical support for laboratory characterisation and on-site preparation of samples
- training to users in the on-site user laboratories
- procurement and inventory of chemicals for the user program
- laboratory safety

Sample Environment:

- sample environment service for the ESS neutron user program, including on-call support
- design, develop, procure, integrate and commission sample environments
- training sample environment users
- calibrate, maintain and repair sample environment equipment
- helium management for sample environments
- sample environment safety

Deuteration:

- scientific deuteration support for user program
- development of new deuteration methodologies
- chemical and biological deuteration facilities and equipment

Hall Coordination:

- hall coordination support in the experimental hall buildings
- 24/7 user support during user cycles
- coordination between the neutron science program and machine directorates
- technical services and coordination for experimental hall activities outside neutron user cycles
- experimental hall safety and emergency response

Staffing changes

Recruitments

- Deuteration chemist Oleksandr Kovalenko starts 1 December

Vacancies:

- Interviews for Hall coordinators and Support Laboratories group leaders completed – offers pending union negotiations etc.
- Sample environment group leader: 2nd interviews in November
- Sample environment workshop technician: applications closed, scheduling interviews
- Postdoc for lipid biodeuteration (AMBER COFUND): recruitment on-going

Staffing

Changes

- Deuteration chemist Anna Leung left in June, replacement recruited
- Zoe Fisher has joined NMX team in LSS Division with Macromolecular Crystallisation activity
- Monika Hartl was recruited into the VESPA team in Spectroscopy Division
- Caroline Curfs has joined Diffraction and Imaging Division with Mechanical Processing sample environments

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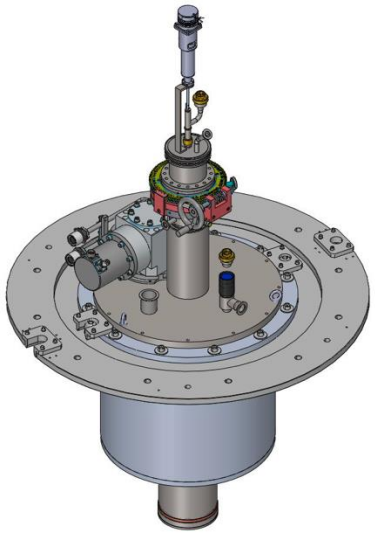
Updates

Highlights

Sample environment

- **DREAM Electrochemistry Cryofurnace ready**, FAT organised
- **Helium recovery installed E03** SE workshops + dewar stations
- **High Pressure Cryostat SAT successfully completed**
- **ILL-Type furnaces (DREAM and HEIMDAL):**
- 2 x Niobium 2nd hand IK from LLB (delayed)
- 1 new Vanadium - specification on-going
- **Spectroscopy magnet proposals received** - Preferred choice is 14T magnet from HTS110



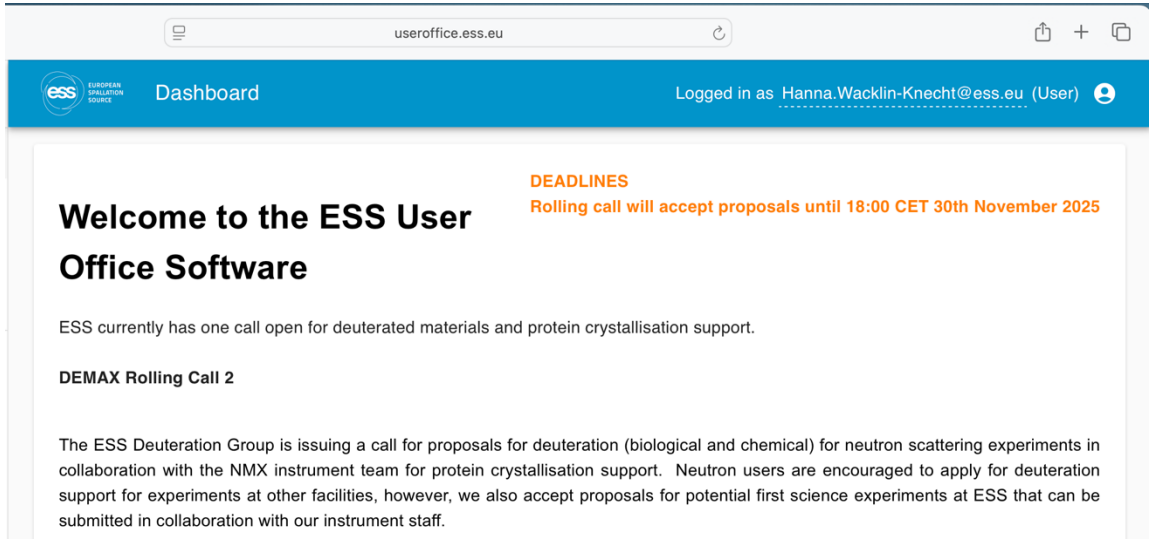
Highlights

Support Laboratories

- Water and gas installation in D08 completed, testing in November
- Laue Diffractometer installed
- X-ray reflectometer installation January
- IK Estonia on electrochemistry glove box
- Automatic fire suppression in RML Nov.

Deuteration

- h-LPS and d-LPS were extracted from E. Coli In HALRIC collaboration
- Publication on deuterated deep eutectic solvents/SANS in Communications Chemistry (DOI: 10.1038/s42004-025-01571-6).
- **Call for proposals open** for experiments at other facilities + First science at ESS



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Sample environment progress/status

Magnets

MAG-001 15T for BIFROST (2nd hand from HZB)

- Done: Tested, basic control integration (Octopy)
- Mechanical integration to L2, L1 including force testing rig complete
- NICOS control on instrument tested
- Installation on instrument (right)
- Next step: Testing to field on BIFROST

MAG-002 15T for POOL (2nd hand from HZB)

- Ongoing: Testing to field in lab with full Octopy integration
- Next step: Finalise testing and mechanical integration

MAG-003 6.5T for ESTIA (2nd hand from HZB)

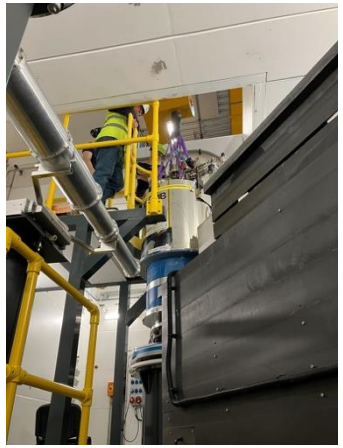
- Tested up to 6.5 T with new electronic racks
- Next step: Control (via Octopy) and mechanical integration

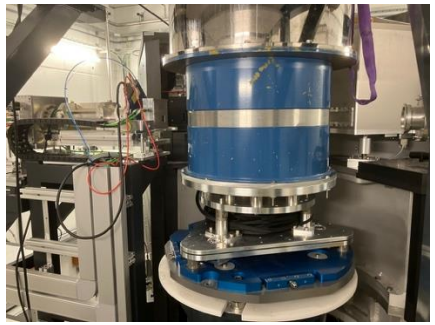
MAG-004 2.1T WBM for ESTIA

HTS 110 compatible with flow cryostat and polarisation

- Done: Site Acceptace Test successful
- Design for mechanical integration complete
- Next step: Control integration and installation on instrument

15T magnet for BIFROST





2.1T WBM for ESTIA

MAG-005 1T Electromagnet For SANS, DREAM and ESTIA

- Delivered tested and accepted
- Next step: Control & mechanical integration

MAG-006 8T for Diffraction for MAGIC (Cryogenic Ltd.)

- Manufacturing started
- Delayed by manufacturer capacity issues
- Expected to arrive at ESS Q2-Q3/26

MAG-007 High field magnet for Spectroscopy

- Design study completed – specifications for 14T magnet determined. Tender completed, supplier chosen.
- Next step – secure funding.
- 2 year delivery time.

MAG-101 17T magnet (Lund University)

- Control integration tested (Octopy)
- Next step – mechanical integration

Next from instruments' wish list:

+ 10+T split pair horizontal SANS magnet
+ Design study for 5-7T horizontal SANS for polarisation analysis (RÅC proposal)

Low Temperatures

Pools cryostats and cryofurnaces

- 3 wet + 3 dry cryostats, 3 wet + 1 dry cryofurnace for MAGIC, BIFROST, LOKI, SKADI, DREAM, HEIMDAL, T-REX and MIRACLES
- Kicked off cryostats DREAM, SKADI, LOKI, BIFROST, T-REX
- CDR for "WET" CRYOFURNACE (DREAM) is done. Manufacturing is in process.

Cryofurnace for Electro-chemistry (DREAM)

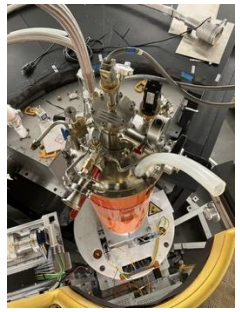
- Dry cryofurnace dedicated to electrochemistry and diffraction. Large sample space (100 mm)
- Manufacture complete, FAT planned 02 November

Cryostat for MAGIC (2nd hand from FRMII)

- Leakage in the glue joint of the tail has been fixed.
- Control using the Mercury ITC temperature controller from Oxford Instruments (parts ordered).

The following items from Oxford Instruments has been ordered:

1. Auxiliary board for the stepper motor
2. Pressure sensor board
3. Cryogen level meter board (for helium and nitrogen)
4. Helium level probe



Orange cryostat for BIFROST

- Cooled on instrument, connected to instrument helium recovery
- NICOS basic control tested and working
- Test on instrument with full NICOS controls in Nov
- filling on the roof only as a temporary solution, plan long multi-part siphon for filling with the roof open.

Helium recovery lines E03

installed and tested.

Dilution fridges

Tender for 2 dilution inserts will be open end of Oct 2025

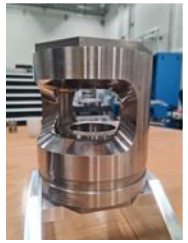
Progress High-Pressure Systems (all instruments)

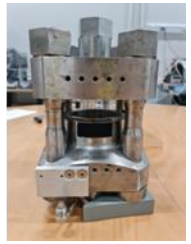
5 Gas (max. 5kbar) , 4 Liquid (max. 5 kbar) and 1 clamp cell (max 15kbar)

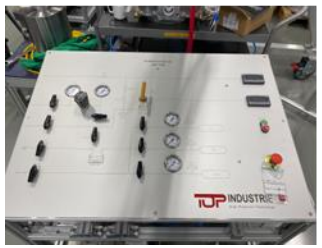
- Leak-tests of gas and liquid cells tested with manual 7kbar liquid compressor completed
- Clamp cell tested up to 5kbar

Paris-Edinburgh (PE) Presses

- 2 x VX1,
- VX5,
- V6







10kBar SITEC He gas pressure generator

- SAT performed in September 2023

H_2 Booster and PE Press gas loader

- SAT September 2024 with He

Other compressors

- Vinci pump and PACE 5000 control integrated

Diamond anvil cells (DAC)

- Set of membrane-driven UoE DACs for neutron scattering experiments.
- One 20DAC available for the Lab single X-tal diffractometer

PE High Pressure Cryostat

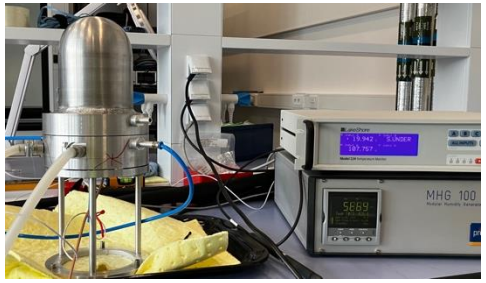
- custom-made cryostat built by ILL
- SAT test performed in September 2025

Tests performed in a Sample Environment vacuum test tank

In Kind NIK 3.7 Agreement on High Pressure Systems between ESS and LLB

CLS Chemistry

- **Humidity chamber**,
  - 90 % relative humidity
  - tested and improved
  - Control integration ongoing



- **Electrochemistry/Battery cells**,
  - Cells for Spectroscopy and Diffraction
  - Tests and development ongoing
  - Trigger box for potentiostat available
  - Cell tested at SNS (Vision)

- **Gas manifolds** (Diffraction / spectroscopy)
  - Automatic up to 200 bar
    - tested with extended sample stick
    - tests ongoing for use in-situ experiments
  - Manual up to 20 bar
    - for flow and small pressures
    - prototype built, parts ordered for second one.

- **Laser pump probe set up**,
  - IK project ES
  - waiting for labotory installation

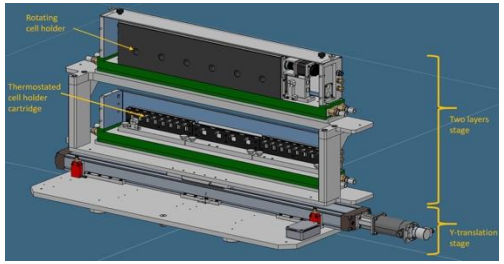
Other pieces of equipment:

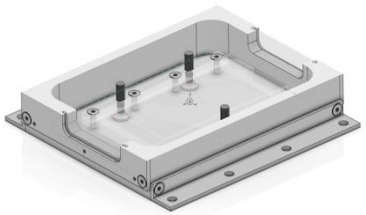
- Syringe pumps
- HPLC pumps
- Potentiostat
- Julabos
- Drop levitator
- Reaction and flow cells

CLS

Soft matter

- **SANS**
  - Rheometer: control integration on going
  - Mechanical integration done
  - Stopped flow cell: remote controlled by trigger
  - SANS Magazine - Done
    - 2 rows of 24 cells thermostated
    + Rotating cell holder
  - In-situ optical setup for flow cell (NURF): Done





- **Reflectometry**
  - Solid/liquid cells
    - Horizontal (ESTIA): final tests at PSI
    - Vertical (FREIA): on going
  - In-situ Ellipsometer/ATR-FTIR setup: design done and equipment procured.
  - Liquid troughs – on-going
    - static troughs and Langmuir troughs
    - Automation (RÅC project)

Progress

Soft Matter and Chemistry

Instrument owned equipment			Needed for :
LOKI	SANS Magasin	Done	CC
LOKI	NuRF (optical SANS flow cell)	Done	FS
ESTIA	Solid liquid cell sample changer	Done	CC
SANS	Flexiprobe (German project)	Done	–
1) SCSE owned equipment			
SANS	Stopped-flow cell	Control integration to be finalized	FS
POOL	Isorb gas sorption High pressure	Preparing for integration	FS
Spec	Laser pump probe	At ESS, waiting for installation of the lab	–
SANS	Humidity chamber/generator	Test in the lab and control ongoing	–
POOL	Electrochemistry cells, 2 types	Test at SNS ok, development needed.	–
LLS	Rheometer	Done, Basic integration done	HC
POOL	Individually thermostated cuvette rack - Huginn	Done, development can be made	–
2) Small devices- accessories			
	Syringe pumps	Integration done	CC
	HPLC pumps	Integration done	CC
	Potentiostat	Integration ongoing	FS
	Julabos	Integration control + mechanical done	CC
	Gas manifold manual	Done	FS
	Gas manifold V2	Ongoing	FS
	Standard Cart for SES equipment	Done	–

Questions?