ESS Diffraction STAP 22 April 2026

(Main points/recommendations in **Bold** and listed at the end)

- Thanks to ESS and instrument teams for clear reports and presentations.
- **Change of ESS timetable to BoT in Q1/2027 and SOUP in Q1/2028 noted – we hope for no further slippage.**
- **CC/HC times may be short, need to focus on main instrument capabilities.**

DREAM

- **STAP notes continuing excellent progress of the instrument project. TG5 done in 3/26.**
- **Final corrections expected by 10/26. Build is almost complete. CC before BoT.**
- Some detector units require repairs from manufacturer.
- No further progress on DREAM cryostat/ cryofurnace with 20 sample changer.

MAGIC

- Welcome to Moritz Braun as Instrument Operation Engineer position, and to new designer starting in May.
- **STAP notes excellent progress across all areas of the instrument project.**
- **TG5 ~3/2027, but not much time for CC/HC before SOUP.**
- Demonstrate polarised and ‘unpolarised’ capabilities during HC.

HEIMDAL

- Welcome to Mathieu Leme - instrument operation engineer.
- Data scientist at DMSC and instrument scientist positions to be filled soon.
- **STAP notes excellent progress with construction now underway**. Cave and in-bunker components – light and heavy shutters, choppers, started. 50% of detectors manufactured. Sample table contract awarded.
- TG5 expected 9/27. No slippage anticipated at present.
- The fixed 1.0 sr detector (2theta = 10-90 deg.) gives minimal coverage but upgrade of detector coverage 1.0 → 3.0 sr is strongly endorsed by STAP.
- **Pathway for SANS upgrade of HEIMDAL should be established (in preference to supporting new diffraction+SANS instruments).**
- FS discussed (see next page)

HEIMDAL First Science

- STAP thanks Dan Mannix for preparing initial FS paper.
- **Sensible to focus on diffraction for FS (with 10-90 deg. detector) although ultimate aim remains to offer simultaneous diffraction + SANS + imaging. Plenty of SE expected to be available.**
- Standard samples mostly magnetic. Perhaps reduce number of samples to fit HC time period. Include some samples for which SANS would also be useful e.g. nanoparticles.
- **FS proposals from collaborators cover a good range of science problems including magnetism, liquid transitions, operando-batteries. Perhaps add fast kinetics examples to highlight the high neutron flux of HEIMDAL? H-storage materials.**
- Further FS ideas from ILL-ESS workshop at November User Meeting.
- Further developments at 2026 Oct STAP meeting, with STAP members MS, RS.

New instrument concepts

- Three concepts were reviewed as requested:

‘With respect to **new diffraction instrument proposals**, we ask the STAP to comment on the following points for each new instrument concept:

• Scientific impact of instrument parameters.

• Strategy and uniqueness. How well does the instrument complement the ESS, European and world neutron scattering landscape?

• ESS pulse structure. Does the instrument concept use the strength of the ESS pulse structure?

• Technical feasibility. Is the instrument concept feasible (in this preliminary phase). Note that this is not the main focus of the current review but please note any technical issues that may prove difficult/impossible to resolve.’

BRAGI - TOTAL SCATTERING DIFFRACTOMETER

- Neutron PDF focus. Cover a large Q range from <0.01 to >50 $Å^{-1}$. Constant resolution ΔQ/Q of 1.4% over Q = 0.4 - 52 $Å^{-1}$. Complements DREAM and HEIMDAL with QMAX = 25 $Å^{-1}$. Study many amorphous, disordered and nanoparticle materials.
- Scientific impact of instrument parameters. High quality local structure results in amorphous, disordered materials….
- **Strategy and uniqueness. High-Q and wide Q-range.**
- ESS pulse structure. Clever use of ESS pulse.
- Technical feasibility. Feasible with similar costs to other ESS diffractometers.
- **Overall STAP recommendation. Very strong case to fill important capability gap at ESS and in future European landscape from broad community.**

HUGIN AND MUNIN - SINGLE CRYSTAL DIFFRACTION

- Studies of small single crystals and multigrain samples. Two ~65 m end stations; Hugin - bispectral thermal and cold neutrons ~0.5 to 4.8 Å; Munin - cold neutrons 1.8 to 5.8 Å with higher flux. Study quantum and functional materials including HP-DAC studies.
- Scientific impact of instrument parameters. As below.
- **Strategy and uniqueness. Unique ability to study very small crystals (10-30 micron, synchrotron scale).**
- ESS pulse structure. Effective use of bispectral and cold spectra.
- Technical feasibility. Cost effective use of limited port and for 2 endstations.
- **Overall STAP recommendation. Extremely strong case to develop unique capability for small crystals/samples from broad community (inc. synchrotron users).**

SLEIPNIR: A High-Capacity Instrument Cluster

- Compact suite of flexible small monochromatic single crystal and powder diffractometers plus imaging at beam endstation, to increase ESS capacity. Low flux compared to ToF diffractometers. Can study many materials by ND + imaging.
- Scientific impact of instrument parameters. Flexible ND 'farm'.
- **Strategy and uniqueness. Outside current ESS strategy but ideal for a future CRG-type mechanism. Meets community capacity and training needs for ND and imaging.**
- ESS pulse structure.
- Technical feasibility. Makes good use of beamports. Cost effective
- **Overall STAP recommendation. Extends capacity for ND but not competitive with other diffractometers. Would be ideal as a CRG-type proposal from national communities. Good use of otherwise inaccessible beamport. ESS should consider CRG mechanism.**

Main Points and Recommendations 1.

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Main Points and Recommendations 2

New Instrument Concepts:

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