ESS Diffraction STAP 22-23 October 2024 – initial comments

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

- Thanks to ESS and instrument teams for clear reports and presentations.
- Joint session on first day useful.
- Good progress is noted.
- **EoI process for instruments 16-22 noted. STAP will be happy to review outline cases. A dedicated HP diffraction beamline remains a priority to fill an important scientific capability gap.**
- **STAP endorses rescoping plans of the Diffraction and Imaging Group Director, with proposed detector coverage of DREAM, HEIMDAL, MAGIC as first priorities. Scheduling of production with CDT needs careful consideration.**
- **Gas mixing and supply for CDT detectors/monitors requires consideration. Potential widespread ESS risk.**

DREAM

- STAP notes continuing excellent progress of the instrument project.
- Congratulations to Florence Porcher – new lead scientist. Commissioning scientist position (with Uppsala U.) noted positively. Also initial operating engineer (IOE).
- Good progress on Utilities, Choppers, Cave, Detectors - slight delay in mantle elements OK.
- Good progress on data reduction, export, and analysis with standard programs for powders (and perhaps anticipate workflows for single crystals).
- **Detectors;. Requirement for flowing Ar/CO2 (without O2) through CDT detectors and monitors raises some important questions for Diffraction and probably other ESS Groups. Engineering of gas mixing and flow (through many modules) system? Does the constant Ar/CO2 gas flow for CDT detectors raise long-term issues (e.g. variations in gas proportions/flow/pressure affecting detector performance, corrosion?, carbonates?). Gas premix is a useful interim solution for detector testing. [STAP repeats its previous view that some long term testing of detectors in a pulsed neutron beam would be useful.]**
- Design/build of DREAM cryostat/cryofurnace with 20 sample changer is still unclear. Gas blower (100-1073 K) + conventional cryostats good mitigation plan.
- **Full detector coverage still strongly supported by STAP as first priority.**

MAGIC

- STAP notes excellent progress across all areas of the instrument project. Cave has been installed very smoothly.
- Welcome to Denis Vasiukov - instrument scientist (from 12/24), and Moritz Braun – new Engineer.
- Rebaselined timing noted – TG5 in 2/27.
- Good chopper, guide, detector, cave, monitors, PSC, bender, analyzer progress. Slight vacuum housing delay – critical for in-bunker installation.
- **MAGIC FS planning start in April 2025. (MAGIC FS likely Q1 2027). Manuel Angst and Denis Vasiukov to coordinate.**
- **STAP supports proposed rescoped detector coverage.**
- STAP notes that a simple spectroscopy option could be a worthwhile future upgrade.

HEIMDAL

- STAP notes excellent progress.
- Welcome to new lead engineer Siamak Kianzad, another likely to be needed soon.
- New TG5 target of Q3 2027 is ambitious but realistic with sufficient resources.
- Good progress in installation/manufacture/planning noted – NBOA, choppers, thermal and cold guides, detectors, shutters.
- **Upgrade of detector coverage 1.0 → 2.0 (and later → 3.0) sr strongly supported by STAP. A basic 1.0 sr movable detector is not recommended for the long term (as it limits science case for variable time, T etc expts) but could be a temporary solution.**
- SANS rescope, adding final 25% of cold guide with flux gain from redesign is also supported.
- STAP notes that communications with cave manufacturer will require careful attention and monitoring.
- **Start FS paper preparation 10/25.**

DREAM First Science

- STAP thanks Romain Sibille and Florence Porcher for writing Outline Paper, and all contributors.
- **Plan in place to progress from beamline characteristic studies through standard to more complex (new science) experiments such as magnetism, MOFs and battery materials (including in situ setups - testing pre-existing PND cells may be useful). Many exciting science ideas and samples.**
- **Samples to be provided via ESS and STAP people.**
- Keep focus on high resolution PND (including analysis with standard software – FullProf, GSAS, etc) while also testing PDF, single crystal and polarised SANS during commissioning.
- **We note ESS-RCO issues under consideration: How will HC time be allocated? Can outside 'friendly' users come? Travel/accommodation? Collaboration/publication policy?**

Main points/recommendations

General:

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