

Progress report of the Estia project

Since the last STAP meeting in September 2019



General Progress:

- Selene Guide:
 - The Selene Guide Vacuum vessel and mineral cast carrier for Selene 1 are in production. Vacuum tank had FAT and is now stored in Italy due to travel restrictions. Mineral cast carrier has been welded and waiting transport to Germany for the casting.
 - Most other components (motors, adjusters, metrology cart, etc.) on schedule or already delivered. Installation at PSI delayed due to current crisis.
 - WTO tender for Selene optics has been published. Contract to be signed before the summer holidays.
 - The last missing component designs have been defined. This is the shielding within the vacuum tank, which now is borated glass as “heat shield” and mostly against activation of the tank itself. Second is the definition of the control rack and cabling of the system. As ESS standard rack definition could not be finalized, yet, we have worked with ESS to make the prototype control rack build by FZ-Jülich meet the Estia requirements. This will be tested at PSI with the full system and if no issues are found it will be the final rack used at ESS, too.
- Activation analysis of most critical components within the bunker area was carried out. We estimate that this time-consuming process would only be required for three more components; the shutter, middle focus mask and divergence slit package. No critical issues were found and results are within expectations.
- Start of design for sample stage and detector arm. Kick-off meeting with PSI designers and relevant ESS groups during last IKON.
 - Interface to detector vessel was defined in detail.
 - Detector vessel conceptual design was finished and a prototype is in building.
 - Start of magnetic guide field optimization for the large polarization analyzer. The design goals are defined towards high field at the mirror location and minimized field angle with respect to the mirror surface. While data for the necessary field

strength are available, no quantitative information on the field direction could be obtained from PSI or vendors. We are therefore planning an experiment at PSI to determine the minimum field direction requirement. (This is challenging for the Estia geometry as the analyzer is very large and changes width from front to back.)

Any qualitative or quantitative input from the STAP to define these requirements is welcome.

- Issues with VAT in Sweden and the associated procurement stop at PSI could be (practically) resolved without significant impact on Estia components.
- Beamline controls integration is well on track. In addition to the work done during our Selene Guide prototype, we have started the integration of the full Selene Guide 1 controls into EPICS and NICOS. (12 motors, 10 interferometer channels, 16 temperature sensors, temperature controller, vacuum sensors)
- Artur Glavic will leave the Estia project in the near future to work as coordinator for ESS projects at PSI. We start the search for a replacement soon and would appreciate the STAP support in this.

STAP recommendations:

- Participated in a ToF solid-liquid experiment at ISIS on a biological system to learn about the requirements of such measurements.
- While there is still plans at ESS to look into the fast neutron background it seems improbable that reliable evaluations will be available before the end of detailed design for Estia. The main reason is limited resources at ESS to evaluate the various contributions as these are bound by licensing related work as this is of higher priority.
The resulting mitigation within Estia will be a cave design that supports easy installation of additional shielding and, if possible, borated concrete for all cave walls and roof. In addition the detector vessel and flight tube will be using borated materials to minimize background from moderated neutrons. (We can discuss the exact concepts, if the STAP requests it.)
- There are plans for extensive testing of the multiblade detector. PSI and ESS work on a collaboration where the Estia prototype will be used as temporary detector for the newly upgraded AMOR instrument.