

## CSPEC STAP report October 2022

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In this STAP report, we provide an overview of the status of the main components.

FAT = Factory Acceptance test

TG3 Internal ESS review, completion of detailed design.

### Guides

NBOA and BBG (first guide elements): FAT and inspection on site completed. BWF (bunker wall feedthroughs) installed. FAT of ca 90 m of out-of-bunker guides at TUM (second batch FAT completed in October 2022), arrival and inspection on site foreseen in November 2022.



Figure 1. From left to right: 1-2, FAT of the second batch of out-of-bunker guides at TUM; 3, BWF installed; 4, NBOA inspection.

### Shielding (common project)

All the shielding blocks for the primary spectrometer have been produced. Installation in progress.



Figure 2 Shielding blocks for CSPEC (common shielding project)

### Choppers

The choppers blades and main structure are under manufacturing by Airbus. However, the support system needs more work before being ready for the TG3 of the complete chopper setup.

### Radial oscillating collimator

TG3 completed and manufacturing almost completed. The collimator drive internal design will be developed internally (LLB) and is lacking manpower.

### Cave and control cabin

The design is complete and the tender will be published shortly. The cave is a very complex component with many internal and external interfaces. The tender of the cave includes the instrument crane and the

control cabin. For the control cabin, we are currently revising the user hardware requirements together with the DMSC (see document by G. Tucker).

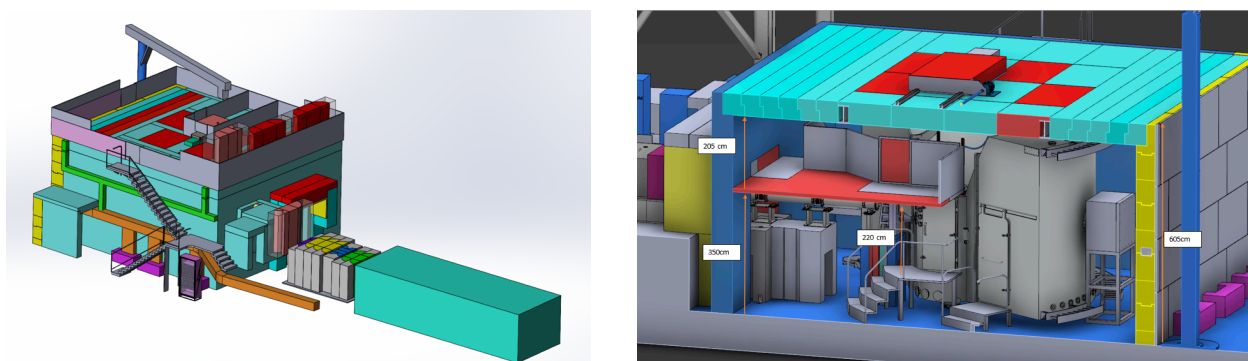


Figure 3 Overview of the cave and control cabin (left) and cut of the experimental cave (right).

### Detectors

After the unsuccessful MG test at LET in May 2022, it was clear that the MG does not currently meet CSPEC requirements and timeline. It was therefore decided to move to  $^3\text{He}$  detectors, with day 1 coverage as agreed in the MG contract (see Figure 4). In addition, an area inside the CSPEC detector tank has been identified for future testing of MG modules. For the  $^3\text{He}$  detector, at present, two options for tube configuration and manufacturing are under consideration: single tubes (ST) produced by Baker-Hughes and Multitube (MT) in collaboration with the ILL. The MT option allows the selection of  $^3\text{He}$  pressure (and hence efficiency) to be flexible in time (as for Panther@ILL), so the  $^3\text{He}$  pressure could be increased in the future. Considering the current cost increase of  $^3\text{He}$  and its variability over time, the MT design clearly allows more flexibility with respect to the necessary future upgrades and hence day 1 priority choices and early science opportunities. We also note that the ST option requires substantial engineering work for the design and manufacturing of the supports (not provided by Baker-Hughes as the provider of  $^3\text{He}$  stainless tubes), and that the ILL option ensures a vital transfer of knowledge of  $^3\text{He}$  detector technology to the ESS detector group. Overall, the CSPEC team see the MT option as the most favourable solution.

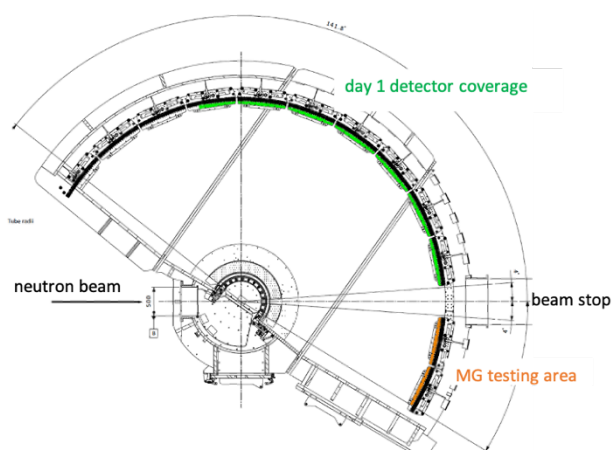


Figure 4 CSPEC detector tank view. In green, the day 1 detector coverage (58%); in orange, the possible MG testing area

### Detector tank

The detector tank manufacturing with SDMS is progressing well. There was a cost increase due to the current worldwide situation regarding material costs.

As advised by the STAP, the detector tank was designed to allow some flexibility regarding the detector technology. Nevertheless, substantial engineering resources were needed to make the necessary modifications for the change from MG to  $^3\text{He}$ , such as the reconfiguration on the vacuum ports, the

redesign of the vanes, the reconsideration of the internal crane, the preliminary design of the support for the  $^3\text{He}$  detectors for two tube configurations.

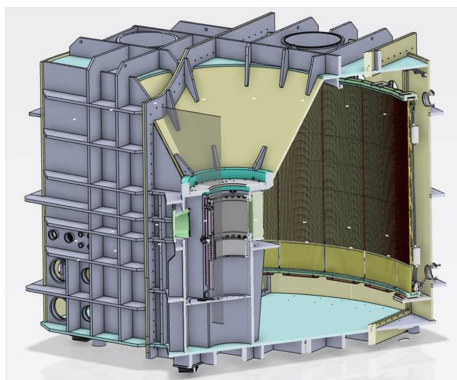


Figure 5 CSPEC detector tank with  $^3\text{He}$  detectors (MT option).

### **Data acquisition, transformation and analysis**

See report by G. Tucker.

### **Sample environment**

Tender for cryofurnace to be published after the cave is published.

### **Beam Monitors (common project)**

See document by detector group.

### **Safety (common project)**

The IHA (instrument hazard analysis) report has been updated and submitted to ESS awaiting PSS (personal safety system) resources to consider detailed design.

### **Electrical installation and utilities installation (common projects)**

Detailed design for utilities and electricity after the cave tender is published.

### **Staffing level**

It is clear that the CSPEC project has suffered from a lack of engineering staff (until recently the lead engineer was alone for almost one year). Even prior to the lack of resources CSPEC took the decision to design a significant part of the instrument by the CSPEC engineering team, not outsourcing it to companies as a cost reduction effort. With the lack of engineering support, the lead engineer could not focus on all tasks at hand. More engineering support will accelerate the project. An on-site engineer has been recruited from the TUM side: Mats Olsson, who previously worked within the ESS common shielding project, has joined the CSPEC team in September. There is a preliminary agreement to recruit an on-site engineer from the LLB side.

### **Other information**

The lead scientist Pascale Deen is now ESS coordinator for all the spectroscopy instruments and deputy group leader for the neutron instruments division. As a result, Daria Noferini takes up the lead scientist position for CSPEC and Pascale Deen maintains an advisory role in the project.