An overview of the changes of the TG2 documentation for CSPEC.

The CSPEC team thank the technology groups and the advisory panels for the review of the CSPEC tollgate 2 documentation. We have carefully considered the review comments and have made all the required changes, except where stated.

1: High level scientific requirements: ConOps

Specific changes that were requested have all been implemented with the exception of 1 d) Remove SR13 and SR14. SR13 and SR14 in the previous documentation stated:

- SR13: The systems design shall provide the space and flexibility necessary to host and drive future developments.
- SR14: Sample environment for the wide range of scientific cases studied on CSPEC must be consistent with the demands of signal to noise.

The science case for CSPEC is heavily focussed on in-situ and in-operando possibilities that, although can be envisaged, remain under development. As such it is imperative that the CSPEC instrument provides the space and flexibility to allow developments while ensuring that any developments are consistent with our stringent signal to noise demands. We feel strongly that this should be included in the high level scientific requirements. We have altered the wording to clarify these points.

- The systems design shall provide the space and flexibility necessary to host and drive future developments, for instance further focusing optics for smaller sample sizes, possibly integrated into the sample environment, further in-situ sample environment such as secondary characterization (RAMAN or NMR), XYZ polarization analysis.
- Sample environment for the wide range of scientific cases studied on CSPEC must be consistent with the instruments demands of signal to noise.

2: Guide system: Preliminary Design Report, pages 6-14

- The guide has been carefully reconsidered and compared to the guide design proposed by the NOSG group. The overview is provided in the separate document: Overview of CSPEC guide. The evaluation includes comparisons of neutron brilliance transfer, divergence profiles at selected wavelengths with a preliminary comparison of signal to background. The comparisons were performed in collaboration with the NOSG group. It is estimated that the guide, Guide 2, will provide an optimised performance with respect to both signal to and noise. This is the guide presented in the main documentation (pages 6-12).

- The scattering profile on the guide substrates has been re-simulated to provide justification for the use of Borofloat substrates (pages 12:13).

3: Chopper system: Preliminary Design Report (pages 17:20)
The positions of the bandwidth choppers have been reconsidered and studied in more depth, see additional document: Bandwidth chopper system for CSPEC chopper spectrometer. Positions for bandwidth choppers inside and outside the bunker were carefully considered and suitable positions were found for both cases. A solution with the bandwidth choppers inside the bunker is proposed in the main documentation. The CSPEC team agree that no steel blades will be used.

4: Shielding: Preliminary Design Report (pages 21:25)
The documentation has been updated to incorporate shielding that allows a white beam measurement on the sample, that will be in compliance with safety regulations and radiation dose limits. An updated shielding solution in D03 and E02 is provided (page 20).

5: Milestones: Work package specification (pages 13:15)
The milestones have been updated and the Tollgate 5 milestone included. 10 external milestones have been allocated with 40 instrument progress milestones.

6: Risks: Work package specification (pages 17:20)
The risks and specific actions have been revised taking into account both probability and effect. Contingency is no longer considered a mitigation strategy. An additional detailed mitigation strategy is now included in the documentation (page 20).

Additional changes to documentation
In addition to the changes outlined the changes made include:

- Detailed description has been moved from ConOps to the Preliminary System Design.
- The requirement of the signal to noise at the level of 10^5 has been stated and considered with respect to scientific requirements and state of the art instrumentation (ConOps, page 6).
- The decision to use B10 as a detector technology has been stated more strongly (Preliminary Design Report, page 30).
- The expected count rate for the detector have been reconsidered and stated (Preliminary Design Report, page 33).
- The engineering drawings of the detector tank and sample environment pot have been updated (Preliminary Design Report, pages 36-27). An internal decision has been made to extend the detector tank to -27^o in the equatorial plane. This decision is beneficial for (a) the inclusion of the beamstop, which was difficult to incorporate with a very small positive minimum angle, and (b) to satisfy a suitable upgrade path. The extension of the detector tank does not severely impact the space available beside the sample environment pot. No additional cost is envisaged for this change in detector tank angle.

- McStas simulations have been updated to incorporate all changes.
- System requirements have been updated to include all changes recommended by K. Andersen.