



Contribution ID: 51

Type: **Poster**

CSPEC - the cold time-of-flight spectrometer for the ESS

Monday, 17 September 2018 17:45 (15 minutes)

The European Spallation Source (ESS) is expected to be the world's most powerful neutron source. Among the endorsed instruments foreseen for day one instrumentation at ESS, is the cold time-of-flight spectrometer CSPEC, collaboration between the Technische Universität München, and the Laboratoire Léon Brillouin. The high performance cold time-of-flight-spectrometer will serve a broad user community in condensed matter research, life sciences, geosciences or magnetism. The unique pulse structure of the ESS with its long pulse duration (2.86 ms) and a repetition rate of 14 Hz requires new concepts for the instrumentation to make optimum use of the available source time frame. With an instrument length of ~160 m, a wavelength range of $\lambda \leq 1.8 \text{ \AA}$ can be probed within each ESS time period. The energy resolution can be tuned in the range of $\Delta E/E = 6 - 1\%$, and CSPEC will utilize cold neutrons in the range from $\lambda = 2 - 20 \text{ \AA}$ with the focus on the cold part of the spectrum. The guide is optimised to enhance signal to noise and will be able to focus on samples ranging from several mm^2 to several cm^2 in area. The large detector area, with a radius of 3.5 m, 5 -140 degrees and 3.5 m in height, typical on a chopper spectrometer will be designed with optimal energy and Q resolution in mind while maintaining the highest signal to noise ratio. CSPEC is now in the detailed design phase, and we will present the current status and the expected performance.

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Session Classification: Poster session 1

Track Classification: P1 Instrumentation and methods