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Engineering and Prototyping of ESS Neutron Beam Extraction System

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In the development of the European Spallation Source, the engineering phase of the Neutron Beam Extraction System is approaching its end. Currently prototyping is ongoing to verify and increase the understanding of the manufacturing limitations in relation to the engineering aspects and beam extraction requirements from the instruments before the manufacturing of the suite of 16 neutron beam port inserts (NBPI) and light shutter systems (LSS) are phased into final detail design and manufacturing.

The NBPIs have been developed as a close collaboration between ESS' instruments design coordinators and intricately integrate a set of copper optics within a controlled atmosphere within the target monolith pressure vessel. The NBPIs therefore includes not only a processed atmosphere but also enables fine alignment of the optics assemblies within it, but also includes a system for inserting it into a very precisely aligned and measured position.

Outside of to the NBPIs, along the neutron beam paths, sits the Neutron Beam Windows and sequentially the LSS which incorporates an optical bridge beam guide before the beam enters the bunker area and the individual instrument beam transports.

ESS have chosen the concept of LSS, which generates very demanding requirements for alignment of moving shutter parts, these system parts are placed in the bunker area and bunker basement, areas that are partly accessible during maintenance periods.

Authors: LYNGH, Daniel; DORNONVILLE DE LA COUR, Naja (European Spallation Sources ERIC)

Co-authors: BESSLER, Yannick; HALL, Cristopher (Forschungszentrum Jülich); HELDMANN, Patrick (Forschungszentrum Jülich); ÅSTRÖM, Lennart (European Spallation Source ERIC); JÖNSSON, Bengt (European Spallation Source ERIC); KONING, Jarich (European Spallation Source ERIC)

Presenter: LYNGH, Daniel

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