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Concepts for Powder Diffraction Instrumentation at the European Spallation Source

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Abstract

The European Spallation Source (ESS) is a Large Scale Facility project, currently in the pre-construction phase, with 17 European partners. Construction is planned to begin in 2013 in Lund at the site adjoining the new Max-IV synchrotron, which is also under construction. ESS is scheduled to deliver its first neutrons in 2019 and have its full design complement of 22 public instruments by 2025 at a total cost of €1.5Bn. The ESS will be a 5MW long-pulse spallation source and, as such, will be a unique facility offering new opportunities to all areas of scientific research as well as complementing the existing neutron sources, both reactor and spallation-based, in Europe. With the opportunities presented by a long pulse spallation source, there is a drive towards elaborating and optimising instrument concepts across the whole range of diffraction, from macromolecular crystallography to engineering. Here, an overview of the ongoing work on concepts for a thermal neutron powder diffractometer of medium to high resolution ($\Delta d/d < 5 \times 10^{-3}$) is presented. Three basic concepts are being investigated, optimised and critically compared with existing instrumentation at current facilities for the day-1 instrument.