

GI-MS46-P09 | NMX MACROMOLECULAR DIFFRACTOMETER AT ESS

Aprigliano, Giuseppe (European Spallation Source ESS ERIC, Lund, SWE); Nagy, Gergely (Wigner Research Centre for Physics, Budapest, HUN); Markó, Márton (Wigner Research Centre for Physics, Budapest, HUN); Ferrer, Jean-Luc (Institut de Biologie Structurale, Grenoble, FRA); Pfeiffer, Dorothea (European Spallation Source ESS ERIC, Lund, SWE); Andersen, Ken (European Spallation Source ESS ERIC, Lund, SWE); Oksanen, Esko (European Spallation Source ESS ERIC, Lund, SWE)

The European Spallation Source (ESS) to be built in Lund, Sweden will be the most powerful source of neutrons in the world and will be available to users from 2023. The ESS long pulse source is well suited for structural biology techniques such as macromolecular crystallography or small-angle neutron scattering (SANS). A time-of-flight (TOF) quasi-Laue macromolecular diffractometer NMX is optimised for small samples and large unit cells in order to locate the hydrogen atoms relevant for the function of biological macromolecules. We estimate that NMX at the ESS could be used to collect data from crystals of ~ 200 μm dimension in a few days, which represent an order of magnitude improvement in both crystal size and data collection time over currently available sources. The robotic detector positioning system also overcomes present limitations in unit cell size can resolve cell edges up to 300 Å. This would broaden the range of systems that can be investigated by neutrons to many biologically very interesting molecules, including membrane proteins such as proton pumps and would transform neutron crystallography into a technique that could answer a significantly larger number of hydrogen related questions in biomolecular science than before.