THE EUROPEAN NEUTRON SOURCE

ILLnewsletter

MAY 2022

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3rd ESS-ILL User Meeting, save the date : from 5 to 7 October 2022, Lund.
Do not wait! Register now at www.neutrons4europe.com

GENERAL NEWS

Update on the ILL20-23 Programme and the 2021-2022 long shutdown work

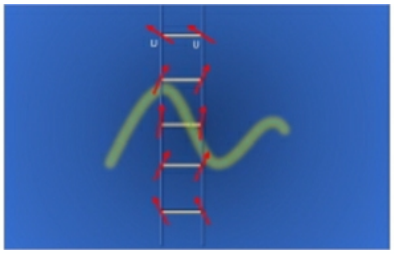
The work to be carried out during our current long reactor shutdown is proceeding as planned in technical terms and remains fully within the budget and schedule of the ILL20-23 Programme. At present, a restart at the beginning of December 2022 remains an ambitious but realistic goal.

The H1-H2 beam tube, which distributes the neutrons to the whole of the ILL7 experimental hall, has been installed in the reactor block. The reactor teams are now preparing the remaining projects, and in particular the safety test which must be performed to ensure that the fuel element remains under water even in the worst-case scenario. Other operations are being carried out in parallel.

As for the instruments, the work is progressing apace. There has been progress on H24. The concrete floors have been laid for future instruments D10+ and XtremD, right on time for the installation of the marble floor slabs. The new H24 guide in ILL7 has been installed and three-quarters of the alignment work has been completed. Things are also going well on the other side of the hall, with H15: the foundations have been laid for future instruments SAM and D11+ and work is proceeding as planned on the future cold guide casemate. And another big guide project is about to be completed on time, namely the replacement of the mechanical system of the eleven ILL5/ILL7 guides which penetrate the reactor wall in order to comply with new seismic requirements.

Last but not least, we have the future neutron imaging station NeXT, which will be taking over from the neutron tomography instrument D50: a tailor-made floor slab is ready and the instrument's mechanical structure has been installed, allowing work to start on the construction of the instrument in May. Read More

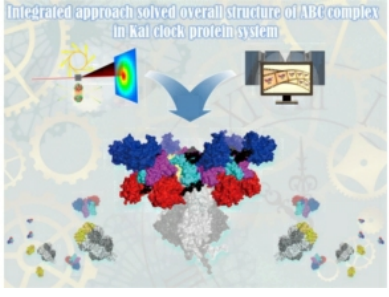
HIGHLIGHTS AND SCIENCE NEWS



Magnetic fluctuations in the UTe2 superconductor

The superconductivity of materials is attracting the attention of fundamental and applied research. In a well understood behaviour, most metals become superconductors at very low temperatures, a state which is incompatible with magnetic properties. However, the discovery of new families of materials is now challenging our understanding of the mechanisms of superconductivity. In fact, researchers have discovered materials such as certain uranium-based alloys that can be both magnetic and superconducting. The compound UTe2 opens a breach in the theory of superconductivity in correlated electron systems. In a recent study, researchers finely analyse the magnetic fluctuations in the core of the material using neutron scattering. These characteristics reveal unusual links between magnetism and superconductivity. Read more

Photo credit: CEA

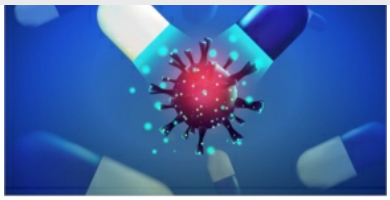


Overall structure of fully assembled cyanobacterial KaiABC circadian clock complex

In the cyanobacterial circadian clock system, KaiA, KaiB and KaiC periodically assemble into a large complex. Here we determined the overall structure of their fully assembled complex by integrating experimental and computational approaches. Small-angle X-ray scattering and inverse contrast-matching small-angle neutron scattering coupled with size-exclusion chromatography provided constraints to highlight the spatial arrangements of the N-terminal domains of KaiA, which were not resolved in the previous structural analyses. The team's integrated approach provides a powerful and generally applicable tool for resolving masked structures of supramolecular complexes harbouring dynamically fluctuating domains or sub-units, such as the KaiABC complex. Read more

Neutrons help COVID-19 research campaign to move from basic science to antiviral drug design

After more than two years of studying SARS-CoV-2 - the virus that causes COVID-19 -



researchers at the Department of Energy's (DOE) Oak Ridge National Laboratory (ORNL), USA, are now designing and testing small-molecule antivirals that block the virus's ability to reproduce. Along with their collaborators at the ILL, the researchers have shown that their antiviral molecules are just as effective as some of the leading drugs on the market today. Experiments were carried out on LADI-DALI at the ILL to measure the molecular binding interactions between the three hybrid inhibitors and the SARS-CoV-2 protease. Neutrons are a powerful tool for studying complex biological processes, such as the very strong binding interactions that the hybrid molecules form with the protease. These specific features of their design could be incorporated into the development of new drugs that are potentially more effective against viral replication. Read more

MORE HIGHLIGHTS HERE !

A SELECTION OF RECENT ILL PUBLICATIONS

NEWS FOR USERS

Proposal round and deadline for applications

The ILL user programme will be **back in full swing in 2023**, with three cycles scheduled before the summer break.
The experiments to be scheduled during the first semester of 2023 will be selected during the **panel meetings on 7-8 November 2022**.
Applications should be **submitted by 7 September 2022** (midnight central European time).

With the upgrade programme well underway, restarting the reactor in early December 2022 is still realistic and will provide **a small amount of beamtime** for selected instruments and for targeted experiments. More information will be provided via the usual channels in due course and will be available on the ILL web site.

Previous issues of the ILL newsletter

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