INSTITUT LAUE LANGEVIN November 2024

ILL newsletter

NEUTRONS FOR SOCIETY

INFO FOR ILL USERS

Subcommittee meetings and Scientific Council

The subcommittee meetings were held at the ILL on 13 November to review the **574 proposals** submitted during the latest call. **353 proposals** have been accepted. The approved proposals will be scheduled for the first cycle and part of the second cycle in 2025.

The ILL Scientific Council (SciCo) met on October 29 and 30. The completion of the Endurance programme, the Marmot project, and opportunities for the development of neutron imaging were presented and discussed with the SciCo. The main focus of the agenda was the Science Strategy, with a special contribution from Robert Feidenhans'l, who presented the recommendations of the science strategy working group. The Science Strategy document and presentations were well received, and provoked a lively discussion. The SciCo evaluated and provided recommendations on the content of the Science Strategy, the proposed scientific directions, and the mechanisms for implementing the strategy.

Celebrating the completion of the Endurance programme

For more than 50 years, ILL has established itself as the world's leading facility for science using beams of neutrons, and has set the gold standard for running a scientific user facility. Following on from the Millennium Programme of instrument upgrades, the completion of the Endurance Programme marks the completion of two decades of continuous investment in ILL neutron instruments and capabilities. Within the last seven years, Endurance has delivered 30 new and upgraded instruments and infrastructures - on time and within budget, resulting in a suite of 43 state-of-the-art neutron instruments which is unique in the world. The completion of Endurance places ILL in the strongest position it has ever been, and sets us up to capitalise on the new capabilities by delivering high-impact science addressing the highest priority societal challenges for the coming decade. Read more

RECENT SCIENCE & TECHNOLOGY NEWS

Spin Ice Age

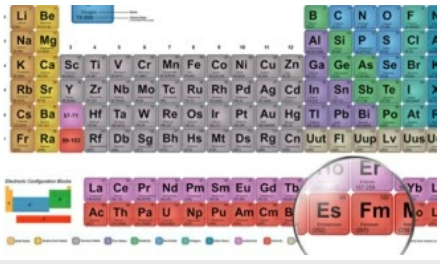
How neutron studies of exotic materials can pave the way towards quantum computers.

At first glance, liquid water and solid inorganic substances do not have much in common. However, a detailed scientific look reveals that inorganic compounds, such as some minerals, can assume states known as spin liquids. This brings them closer to the liquids we know from our everyday life than we may imagine. We are all familiar with the phenomenon of freezing: water self-organises into ordered ice structures when cooled. Similarly, the degree of order in spin liquids is temperature-dependent. In some spin liquids, residual disorder (molecular movement) persists even at very low temperatures. This gives rise to a characteristic diffuse magnetic signal, which is hard to detect with standard experimental methods. However, neutrons - which can be imagined as tiny magnets - can easily interact with magnetic materials and are the ideal probe for detecting this signal. This crucial advantage of neutrons was exploited in earlier studies of the mineral $Tb_2Ti_2O_7$, a quantum analogue of classical spin ices. The results revealed not only the diffuse magnetic scattering mentioned above, but also an additional exotic signal hinting at the presence of novel molecular interactions. Read more

Kick-off meeting for ILL detector project at ESS

The kick off meeting, held on 16-17 October at the ESS in Lund, follows the signing of the agreement between the ILL and the ESS in July this year. Thirteen multitube detectors will be built by the ILL and delivered to the ESS by the end of 2027. Similar to those of the ILL instruments IN5 and PANTHER but slightly bigger, this Helium-3 detector will be made up of 12 multitube modules, plus a spare module, each comprising 32 tubes at a length of 3.5 m long. Each module will be tested and manufactured at the ILL, then filled with the detection gas at the ESS before installation on the instrument. The agreement includes also the training of ESS staff. The ILL holds a leading position in this field and continues to support the other neutron centres in Europe, in particular the members of LENS.

Read more

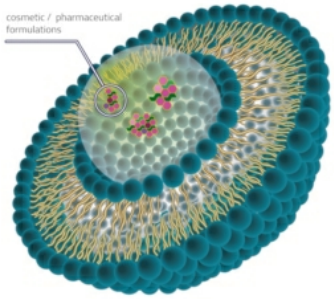


Grenoble's "fermium cow" helps scientists in Mainz (Germany) to study the nuclear properties of fermium (element 100)

Where does the periodic table of chemical elements end and which processes lead to the existence of heavy elements? An irradiation in the ILL's reactor which produced einsteinium-255 that could be used as an on-tap supply of fermium-255 has enabled an international research team to come closer to answering these questions using high-resolution laser spectroscopy. The experiments, which were performed at the GSI/FAIR accelerator facility in Darmstadt and at Johannes Gutenberg University (JGU) in Mainz, allowed the scientists to gain insight into the structure of the atomic nuclei of fermium (element 100) with different numbers of neutrons. The results have now been published in the scientific journal Nature. Read more

Neutrons unveil the dynamics of water in concrete at the nanometre scale

An international research team has used neutrons to study the nanometer-scale dynamics of water inside concrete. This is not only key to concrete strength, but also to the development of green concrete and environment-related applications. The results of this research, published in Cement and Concrete Research, were obtained through neutron scattering experiments conducted on IN1 Lagrange at the ILL and the ISIS neutron source (Oxford, UK). Read more



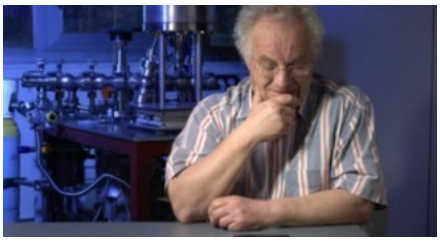
Liposomes caught drunk-dancing in solution

Liposomes - spherical assemblies of amphiphilic molecules called phospholipids - are of great importance for cosmetic and pharmaceutical products. In industrial settings, liposomes are typically produced in the presence of alcohols. A detailed understanding of liposome-alcohol interactions is therefore critical to be able to optimise the industrial processes involved. Using different neutron techniques on ILL instruments D11 and IN15, a team of researchers has revealed that liposome membranes become softer in the presence of certain alcohols. Fernanda Alvarado-Galindo: the first author of the study, is a PhD student at the ILL and Technische Universität Berlin in the framework of the InnovaXN programme. Read more

Licensed To Kill (Bacteria): Fatty Acids against Antibiotic-Resistant Germs

An interdisciplinary team of researchers has established a set of conditions under which sustainable fatty acid complexes can efficiently fight against dangerous, antibiotic-resistant bacteria. The results are encouraging and inspire further research on the development of fatty acid-based antibiotics (LCFA). They further demonstrate the value of neutron scattering in this are of pharmaceutical research. The structure of the LCFA-choline solutions was investigated on a molecular level by performing small-angle neutron scattering (SANS) experiments on D22 at the ILL. Read more

AWARDS



Leszek Ropelewski awarded ILL's Anton Oed Prize

The Anton Oed Prize honours an individual who has made a significant contribution to the development of Micro-Pattern Gas Detectors (MPGDs). The 2024 prize has been awarded to Leszek Ropelewski (CERN). The 2024 prize was presented to the CERN scientist at the 8th International Conference on Micro-Pattern Gaseous Detectors Conference (MPGD 2024) in Hefei, China. With this prize, the ILL honours the memory of Anton Oed, whilst encouraging the development of detector techniques for scientific applications. Recipients are awarded €1,000 by the ILL, along with a plaque bearing their name. Read more

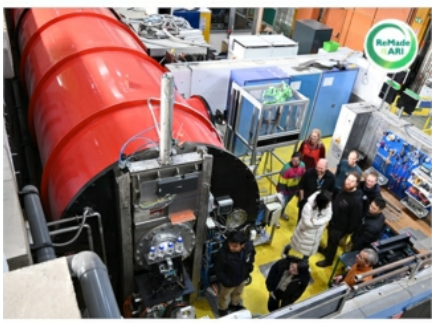
Photo: Anton Oed @: ILL/Artechnique

Celebrating recent Achievements in Crystallography

Juan Rodriguez Carvajal received the prestigious Gold Insignia from the Spanish Crystallographic Association (Grupo Especializado de Cristalografía y Crecimiento Cristalino - GE3C). This award recognises individuals who have made outstanding contributions to the advancement of crystallography. Juan's contributions have significantly shaped the field, particularly through his work in crystallographic data analysis and software development.The official ceremony will take place on 15 January 2025 at the University of Alcalá de Henares in Madrid.

Madeleine Geers, who conducted her PhD research at the ILL has been awarded the 2024 Malvern Panalytical Thesis Prize. This prestigious recognition is given to outstanding doctoral theses in the field of crystallography. Madeleine was invited to present her work, focused on innovative methodologies in crystallographic analysis, at the annual Crystallography Winter Meeting, held on 28-29 October at Milton Hill House. Read more

CONFERENCES AND EVENTS



Energy Materials in circular Economy Meet X-Rays & Neutrons

Last week, 70 participants immersed themselves over three days in cutting-edge developments in energy materials. The workshop explored how neutrons and X-rays can characterize materials with promising potential for applications such as solar panels, batteries, fuel cells, electrolysers, and catalytic processes. The event brought together instrument scientists and users of advanced research infrastructure to discuss their pivotal roles in driving innovation within the circular economy. Hosted by ESRF - The European Synchrotron, and jointly organized with ILL - Institut Laue Langevin and PSI Paul Scherrer Institut, the workshop received overwhelmingly positive feedback from Day 1 (see the video here!). Participants appreciated not only the funding opportunities available through the EU project ReMade@ARI but also the lively atmosphere fostering exchange, collaboration, and knowledge sharing. As part of the program, attendees had the opportunity to tour the world-class facilities at ILL - Institut Laue Langevin and ESRF - The European Synchrotron, gaining firsthand insight into the advanced instrumentation and techniques available for energy material characterization.

MDANSE School

The MDANSE school (Molecular Dynamics Applied to Neutron Scattering Experiments) took place at the ILL on 5 -7 November, focusing on the use of numerical simulation (molecular dynamics, DFT, neutron observables calculations, etc.) to support the analysis of data from neutron and X-ray scattering experiments. This three-day school, locally organised by the Computing for Science department in collaboration with ISIS, ESS, and SOLEIL centres, consisted of morning lectures followed by practical and tutorial sessions in the afternoons. Around 40 participants attended and benefited from high-quality lectures covering the full range of excitations measured through neutron scattering techniques: phonons, molecular vibrations, atomic diffusion, and magnetic excitations.

SAS2024

The Small Angle Scattering 2024 (SAS2024) conference was held on 3-8 November in Taipei. It was preceded by a one-day workshop organised by the canSAS network, providing the small-angle scattering community with an opportunity to share information and tools. The ILL was particularly well represented at the conference, with 8 oral presentations, including 4 invited talks. The ILL was also prominently featured in several plenary presentations, such as S. Disch's study on magnetic nanoparticles conducted on D33 and R. Lund's study on lipid interactions performed on D22. Beyond conventional small-angle neutron and X-ray scattering techniques, emerging approaches such as real-time XFEL methods, SAS imaging, and artificial intelligence for modelling complex structures were also highlighted.

OUTREACH - *Fête de la Science*

Our participation in this year's edition of the Fête de la Science, which took place on Saturday, 12 October in front of MINATEC, was a resounding success! Alongside our colleagues from the EPN campus, we welcomed almost 1400 visitors, a return to pre-Covid attendance levels. A big thank you to all the volunteers for making this event possible and for helping - thanks to their enthusiasm and expertise - to bring science to a wider audience.

MORE HIGHLIGHTS & NEWS HERE !

PUBLIC SESSION - *La science des neutrons au service de notre avenir*

The ILL is hosting a public session (in French) on 11 December at Minatec, coinciding with the Grenoble meeting of our scientific users (ILL/ESS User Meeting). This session, aimed at the general public interested in science and innovation (ages 15 and up), offers an opportunity to learn more about the ILL and meet the scientists, engineers, and technicians who work there. We invite you to join us and kindly share this information with anyone in your network who might find this opportunity interesting! For the programme and more details see here (registration via email at UMsessionpublique@ill.fr).

27 November | Celebrating the completion of the Endurance programme
2 December | General Seminar organised by College 3 - S. Scorza
10 - 11 December | ILL& ESS European Users Meeting / Open session

The User-Office is avilable from Monday - Friday 8am - 4.30pm on the first floor of the new ILL50 building.
You can also use the telephone available near to the ILL50 reception to call your Local Contact, or the User Office in case of problems

Previous issues of the ILL newsletter

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