ILLnewsletter

PRACTICAL INFORMATION FOR ILL USERS

New sample management procedure at the ILL

To simplify the current process and enhance the traceability of your samples, a new procedure has been implemented to support you in managing the radiological control of your samples during experiments. This updated procedure applies to all users bringing samples to the ILL, regardless of whether they are shipped or brought on-site personally. We strongly encourage you to familiarise yourselves with this updated procedure before your next visit to ensure a smooth and efficient experiment. For complete details and guidelines, please visit the dedicated page on our website: https://www.ill.eu/for-ill-users/sample-management
We appreciate your cooperation in implementing these new guidelines.

Spring 2025 proposal round

In the latest proposal round, the ILL received a total of 519 proposals through the standard submission procedure. The Subcommittees of the Scientific Council met at the ILL on 8 and 9 April to assess these proposals. The accepted proposals will be scheduled for experiments in Autumn 2025. As usual, the Scientific Council met just after the meetings of the subcommittees, on 10 and 11 April 2025 at the ILL. One of the key topics on the agenda was the Science Strategy: finalising the content and starting implementation
You can find the Reactor Operation Schedule for 2025 and other important dates here.

AWARDS

Regine von Klitzing awarded the Gentner-Kastler Prize 2025

The ILL celebrates Regine von Klitzing, recipient of the 2025 Gentner-Kastler Prize, awarded by the German Physical Society (DPG) and the French Society of Physics (SFP), for her groundbreaking work in soft matter physics and her innovative use of neutrons to study complex interfaces. Her research explores the behaviour of complex liquids and foams at interfaces and in thin films, with major insights gained through neutron reflectometry at ILL's FIGARO instrument. These studies have advanced understanding of polyelectrolyte/surfactant interactions and foam film stability, bridging microscopic structure and macroscopic properties. Using SANS on ILL's D33 instrument, von Klitzing's team has also made key contributions to modelling foam structures, with wide-ranging applications from environmental science to personal care. Read more

Jennifer Graham wins the Don McKenzie Paul Thesis Prize 2025

Jennifer Graham, former PhD student at the ILL and Birmingham University now at PSI, has been awarded on 18 March this year's prize for her "ground-breaking contributions to the study of frustrated magnets using neutron polarisation analysis combined with novel data analysis methodologies, and especially her discovery of a spiral spin liquid phase in LiYbO2." The award was officially announced at the UK Neutron and Muon Science and User Meeting (NMSUM). Jennifer Graham will deliver her Prize lecture at the Theoretical and Experimental Magnetism Meeting (TEMM) 2025, taking place in Abingdon, Oxfordshire (UK) on 23-24 June. Jennifer Graham developed her PhD work at the ILL and Birmingham University, under the supervision of Andrew Wildes (ILL) and Lucy Clark (Birmingham University). Read more

EU PROJECTS

NEXTSTEP | First cohort of PhD positions now open

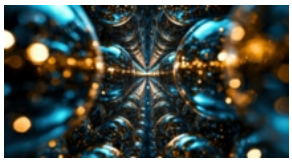
Another milestone this month for the NEXSTEP programme: the first 9 ILL PhD positions have been opened accross a wide range of disciplines including physics, materials science, chemistry, biochemistry and engineering. Similar to InnovaXN, NEXSTEP is a European programme aimed at training 36 young researchers* who are keen to exploit the unique, cross-disciplinary capabilities of analytical research infrastructures to meet the challenges associated with sustainable development and industrial competitiveness in the following areas: 'Health', 'Digital, Industry and Space', 'Climate, Energy and Mobility' and 'Food, Bioeconomy, Natural Resources, Agriculture and Environment'.

* The partner institutes are : ESRF and ILL (France), FZJ (Germany), AREA (Italy), NTNU (Norway).

RECENT SCIENCE NEWS

Grenoble EPN campus: a unique place for structural biology research

The European Photon and Neutron (EPN) campus in Grenoble is a unique site hosting three international scientific research organisations – ILL, EMBL, ESRF – and a French research institute, the IBS. It is also a unique place for structural biology where researchers can find an unpaired set of beamlines, instruments and support facilities allowing for comprehensive investigations. Neutrons play a unique and highly complementary role. A review paper on the current and future perspectives for structural biology at the EPN campus has just appeared on the Journal of Synchrotron Radiation. A feature article on the 50th Anniversary of the Stanford SSRL synchrotron radiation and protein crystallography, the paper provides details on the techniques and infrastructures currently available at the EPN campus in Grenoble. It also describes major contributions and future prospects. Read more

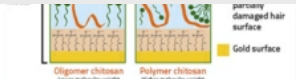


Supersymmetry shows up in condensed matter, not colliders

New findings based on neutron scattering experiments performed at the ILL (ThALES) and ISIS (LET37) reveal supersymmetric behaviour in a quantum material, demonstrating that it can emerge naturally in condensed matter. This has promising practical implications for making stable qubits for quantum computing. The study, led by researchers at PSI, is published in Nature Communications. The theory of supersymmetry tells us that every matter particle (fermion) should have a supersymmetric force-carrying partner (boson). If proven relevant to the physics of our universe, this would provide crucial evidence of physics beyond the Standard Model of particle physics, with implications for unresolved mysteries in physics such as dark matter. Yet, despite decades of searches at large colliders no direct evidence of its existence has been found. In condensed matter, the concept that strong, many-body correlations can produce fractional bosonic and fermionic collective states is well established in low dimensions but possible supersymmetries between these states are rarely invoked. Although supersymmetry has yet to – and may never – be discovered at the high energies where new particles are created, its mathematical structure can still emerge in materials at lower energies, governing the behaviour of quantum states. Read more

Good hair day: how neutrons help understand shampoo-hair interactions

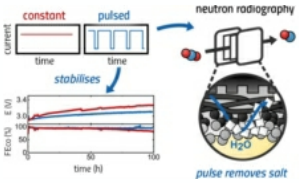
Hair is made of a protein network coated with lipids, which interact with shampoos for cleansing and conditioning. Treatments like bleaching can damage this lipid layer, altering shampoo adsorption. Most studies use models of fully damaged or undamaged hair, ignoring partially treated hair. A new study mimicked partially damaged hair using mixed-



composition surfaces. Researchers tested how SDS (a cleanser) and chitosan (a sustainable ingredient) adsorb to these surfaces. The study was part of Serena Cozzolino's PhD within the EU-funded InnovaXN programme. It involved collaboration between ILL, L'Oréal, and KTH Royal Institute of Technology. Neutron reflectometry was used to study surface changes in real time. The experiments performed by the team demonstrate how neutron science can bridge fundamental research and industrial needs, thereby driving sustainable innovations. Read more

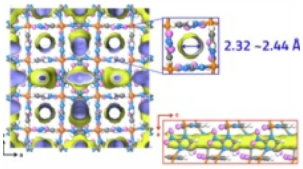
Turning peptides into gold

Nanostructures with spiral-like shapes feature exciting new properties for applications in optics, electronics and catalysis. An important challenge consists in designing them in a way that makes them "smart" - that is, responsive to stimuli such as pH or temperature. So-called self-assembling peptides (SAP) - small proteins which can spontaneously assemble into more or less complex 2D or 3D structures - are promising building blocks for this purpose. So far, the design and assembly of SAP-based structures have been based on rather complex methods. To allow for a larger-scale production, a simpler technology is needed. A possible answer to this quest came from a rather unexpected source: the SARS-CoV-2 virus. A team of researchers from Spain, the UK and the ILL discovered that two peptides, FP1 and FP2, crucial for viral fusion to host cell membranes, display remarkable self-assembling properties. Using a multi-technique and interdisciplinary approach including neutrons (FIGARO), this study provides a deeper understanding of peptide self-assembly. The findings pave the way for easier production of smart, functional nanomaterials. Read more



Understanding water management in CO_2 recycling with neutrons: 'power naps' for electrolysers

Global warming demands urgent action to cut carbon emissions. CO_2 capture and electrochemical reduction (electrolysis) can help defossilize the production of commodoty chemicals. CO_2 electrolysis for carbon monoxide is nearing commercial viability, with high-performance electrolysers. Zero-gap AEM electrolysers are the most promising setup. However, they face operational challenges, including carbonate buildup and electrode flooding. A recent study (published in ACS Energy Letters, and highlight in Nature Catalysis) examines the water transport in a CO2 electrolyser during operation. ILL's instrument NeXT was used to obtain high-resolution neutron images at a pixel size of 4.2 µm of the water content in the cell, coupling the radiographic data with the overall electrochemical performance. Read more



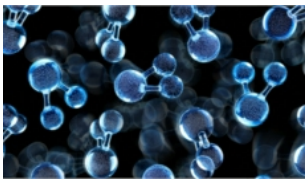
New material for deuterium separation at higher températures

Deuterium (D_2) plays a critical role in several domains, from energy production to the electronics industry. However, separating hydrogen isotopes in industrial processes poses challenges, as traditional methods require extremely low temperatures and are notorious for their high energy consumption and operational inefficiencies. Recently, confined porous systems such as metal-organic frameworks (MOFs) – advanced materials with exceptional porosity and a chemical versatility meeting the requirements of a wide range of applications – have emerged as efficient methods for hydrogen isotope separation (through nuclear quantum effects). However, efficiency tends to diminish significantly as temperature increases. A study published in Nature Communications presents a new, copper-based MOF that shows exceptional D_2 separation performance, even at 120 K (-153°C). Confirmatory in-situ X-ray diffraction (XRD) and quasi-elastic neutron scattering (QENS) experiments were conducted at the ILL (instrument IN5) by a joint team of researchers.

Read more

Resistance is fragmented: how magnets defy disorder

From simple fridge magnets to complex MRI machines, magnets are used in a plethora of everyday applications. Research and development continuously work on optimising and designing novel magnetic materials. In order to tap into future areas of application, a detailed understanding of the fundamental microscopic properties of magnets is required. Some magnetic materials feature particularly interesting peculiar states. Neutron experiments have just revealed that they can be unexpectedly stable with respect to microscopic disorder. The different samples were measured on various instruments, notably ILL's time-of-flight instruments PANTHER and IN5. This study illustrates the importance of neutrons for detailed studies of the molecular properties of materials, in particular including magnets. Such explorations can ultimately pave the way towards the development of novel, tunable materials for a large variety of applications such as quantum computing. Read more



Exotic observations at the ILL

In everyday life, we typically encounter water in one of three familiar states – solid, liquid or gas. But there are in fact many more phases, some of which - predicted to exist at high temperature and pressure - are so strange that they're referred to as exotic . Measurements at the ILL have enabled the first experimental observation of one of these exotic phases, plastic ice VII. The results have just been published in Nature. For the study of these fast molecular motions, Quasi-Elastic Neutron Scattering (QENS) is a powerful tool. The experiments revealing plastic ice VII were performed using the time-of-flight spectrometers IN5 and IN6-SHARP. Temperatures as high as 450 – 600 K and pressures from 0.1 to 6 GPa were required. The success of this study is largely due to the extensive expertise and unique infrastructure built up over the years at the ILL, in particular in terms of complex sample environments and high pressures. Read more

EVENTS & VISITS

Recent meetings in the Neutron Science Community

The 2025 **UK Neutron and Muon Science and User Meeting** (NMSUM) took place in Warwick from 17-19 March, with over 300 participants, including 20+ from the ILL. The event featured a student day, a science day, and a facilities-focused day. ILL scientists gave nine talks, presented posters, co-chaired sessions, and engaged in discussions. Anne Martel and Nina Steinke introduced SANS and neutron reflectometry to students. Ulli Koester gave a plenary talk on radionuclides for cancer treatment. Other ILL researchers spoke in sessions on magnetism, biosciences, catalysis, and more. ILL Director Ken Andersen gave the facility update.

The ILL co-organised the **54th Journées des Actinides** (JdA) from 18-21 March in Annecy. This interdisciplinary forum focused on the physical and chemical properties of lanthanide- and actinide-based materials. The event drew 78 participants from 12 countries, including 29 PhD students. Ahead of the conference, the 15th School on the Physics and Chemistry of the Actinides (SPCA) was held on 16-17 March at the EPN campus in Grenoble. It welcomed 42 international students for 14 lectures covering topics from fundamental physics to biology, with a focus on synchrotron X-ray and neutron techniques.

Read more

The **2025 Neutron Sources Support Laboratory Symposium** took place at the ILL, bringing together 20 in-person participants and a dozen more online. Originally started by ISIS and ESS, the event now includes labs from multiple facilities and has become a key annual meeting. The symposium featured talks, workshops, discussions, and tours, promoting collaboration, training, and safety in support labs.

German Consular visit to the ILL

On 11 February, the ILL was honoured to welcome the highest representatives of Germany in France from the General Consulate of Germany in Lyon, General Consul Jessica Engel and Consul Ulrike Johag. The visitors were hosted by ILL's German Associate Director Andreas Meyer. They attended a series of short presentations by German ILL scientists Anna Grundel, Tobias Jenke and Karin Schmalzl. The presentations introduced the Institute and its research on a wide variety of topics ranging from biology and nuclear and particle physics to materials science and radioisotope production for medicine. This was followed by a tour of the ILL facilities, providing a chance to showcase our unique, state-of-the-art suite of over 40 instruments -

which thanks to the recently completed Endurance modernisation programme is in its best shape ever. German ILL instrument scientists Lukas Helfen, Tilo Seydel and Markus Appel also took part in the visit. Read more

MORE HIGHLIGHTS & NEWS HERE !

9 March - 12 April | Hercules courses
8-9 April | Subcommittee meetings of the Scientific Council
10-11 April | Scientific Council
11 April | 9:00 Scientific Public Talk by Emanuelle Suard - 10 years of In-Situ and Operando Neutron Powder Diffraction on Li-ion batteries at the ILL
5-7 May |7th international symposium on diffraction structural biology 2025
2 June | JDN 2025 - Journés de la diffusion neutronique
3 June | Advanced manufacturing workshop ILL-ESRF

The User-Office is available 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

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