ILLnewsletter

ILL in focus

From busy instruments to very warm summer days, **Cycle 200** will certainly be one to remember. Over the course of this milestone cycle, **733 users from 34 countries** carried out **558 experiments.**
More than a round number, Cycle 200 is a reminder of what makes the ILL special: an international community coming together in Grenoble to ask ambitious questions, share expertise and turn beam time into new knowledge.

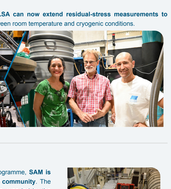
User Programme Calendar

15 September | Standard Proposals Deadline
DDT and EASY proposals: open year-round

3 - 4 November | Subcommittees Meeting (ILL)
5 - 6 November | Scientific Council Meeting (ILL)

Check 2026 Reactor Cycle Dates

Canada establishes a 'Neutron Partnership' with ILL



Canada is joining the ILL user community through a new scientific partnership. This agreement gives researchers based in Canada access to the instruments and expertise of the Institute, while strengthening the ILL's international network.The contract, which will run for six years (until 2032), will be officially signed by the end of the year.

Researchers from Canada can now apply for neutron beam time to perform experiments at ILL (next deadline 15 September). Learn more

SALSA goes cryogenic

Following the first successful installation of a cryostat, **SALSA can now extend residual-stress measurements to temperatures down to 10 K**, including controlled cycling between room temperature and cryogenic conditions.

This new capability broadens the range of *in situ* and operando studies possible on SALSA and opens new opportunities for investigating materials whose behaviour changes significantly at low temperature.

Interested in low-temperature measurements? Contact the SALSA team to discuss feasibility and experimental requirements.

Meet SAM: a new window onto the nanoworld

Installed in a record nine months under the Endurance 2 programme, **SAM is one of the newest instruments available to the ILL user community**. The project, including the instrument development and installation, was led by the Laboratoire Léon Brillouin, which previously operated at the Orphée reactor before its closure in 2019.

This compact **Small Angle Neutron Scattering** (SANS) instrument now uses the new H151 neutron guide to probe structures on the scale of roughly **1 to 100 nanometres**, revealing how proteins, polymers, colloids, magnetic nanoparticles and other complex materials organise at the nanoscale. Its detector tube can move sideways to extend the accessible momentum-transfer range, giving SAM impressive flexibility within a relatively small footprint.
One of SAM's defining strengths is its exceptionally **high neutron polarisation**, which supports advanced studies of magnetic and hard matter and opens new possibilities for polarised-neutron experiments in soft matter.

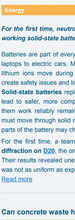
As a **French CRG instrument**, SAM is accessible through ILL proposal calls and dedicated access for French laboratories. It also contributes to training the next generation of neutron users through HERCULES, FANs and, since 2026, the JCNS Neutron School. Learn more

Recent science news

The hidden role of water

Energy | **Environment**

How neutrons help decode ion transport membranes essential for energy transition devices.



Many devices that are central for the energy transition depend critically on materials able to efficiently transport ions. Improving the performance of this key component is thus critical to bridge the gap between promising sustainable energy technologies and their practical, large-scale applications.
Anion exchange membranes (AEM) transport hydroxide ions (OH^-) between the cathode and anode while separating gases and maintaining the conditions required for efficient reactions.

Optimising these systems requires a fundamental understanding of the relationship between membrane structure and ion transport under realistic operating conditions. However, a detailed microscopic description is lacking.
To address this challenge, researchers **combined neutron scattering experiments with molecular simulations**. They used four different neutron spectrometers at large scale facilities to probe complementary timescales. By connecting molecular-scale dynamics with macroscopic conductivity, this work provides a framework for designing improved membranes for fuel cells, electrolysers and other electrochemical energy technologies. Read more

A new route towards smaller devices and ultrafast information processing

Quantum materials

Polarised inelastic neutron scattering on IN20 directly revealed, for the first time, opposite-handed magnons in an altermagnet and showed that their chirality can be reversibly switched

Today's electronics rely on electric currents, which generate heat as they move through ever-smaller circuits. This heat is becoming a major obstacle to making devices more compact and powerful. Researchers are therefore exploring another way to carry information: magnetic waves called magnons.
Some of these waves have a defined chirality, with atomic spins rotating clockwise or anticlockwise as the wave travels. These "chiral magnons" can transport spin information without an accompanying flow of electric charge, and thus less heating.
The challenge is to control these magnetic waves in materials that do not produce large stray magnetic fields, which could interfere with nearby components. This is why altermagnets, a newly recognised class of magnetic materials, are attracting attention: they could combine controllable ultrafast magnetic waves with better compatibility for densely packed devices.
Using **polarised inelastic neutron scattering on IN20** at the ILL, researchers have for the first time seen these rotating magnetic waves directly inside an altermagnet. Moreover, they also showed that the direction of rotation can be switched by cooling the material in a small magnetic field.
This is the first unambiguous demonstration that chiral magnons in an altermagnet can not only exist separately, but also be controlled, an important step towards smaller devices and ultrafast spin-based information processing. Read more

Neutrons catch lithium in motion inside a solid-state battery

Energy

For the first time, neutron diffraction experiments at the ILL have tracked lithium movement in real time inside a working solid-state battery, revealing hidden structural complexity and new clues for smarter battery design

Batteries are part of everyday life, powering everything from phones and laptops to electric cars. Most rechargeable batteries use a liquid to help lithium ions move during charging and discharging. But this liquid can create safety issues and limit how far battery performance can improve.
Solid-state batteries replace the liquid with a solid material. They could lead to safer, more compact and more powerful batteries. But making them work reliably remains a challenge. Unlike in a liquid, lithium ions must move through solid materials and if this movement is uneven, some parts of the battery may charge faster than others, reducing performance.
For the first time, a team at the ILL and its partners have watched the lithium movement in real time using **neutron diffraction on D20**, the only technique sensitive enough to track lithium deep inside a thick, working battery.
Their results revealed unexpected structural complexity in the electrode, showing that lithium movement inside the battery was not as uniform as expected. Understanding this hidden behaviour could point the way toward smarter battery designs. Read more

Can concrete waste help store CO_2?

Environment

Operando neutron and X-ray tomography reveal how water transport and cracking shape carbonation in cement paste

The construction sector faces two problems at once: it emits large amounts of CO_2 and produces vast quantities of concrete waste. But what if part of that waste could be used to trap carbon instead of ending up as rubble? That is the idea behind **accelerated carbonation.**
Crushed recycled concrete can be exposed to CO_2-rich gas, allowing carbon dioxide to react with the old cement paste and become locked into stable mineral compounds. In principle, this could help reduce the environmental impact of construction while giving demolition waste a second life.
The challenge is that concrete does not behave like a simple sponge for CO_2. Inside the material, the reaction depends on a fragile balance between gas, water, pores and minerals. If the pores are too dry, carbonation slows. If they contain too much water, CO_2 struggles to move through them.
At the ILL, researchers used **neutron imaging on NeXT** to follow water inside cement paste during carbonation, while X-rays tracked structural changes and cracking. This real-time view showed that carbonation actively reshapes the material as it progresses: it releases water, changes the pore network, slows CO_2 transport and creates cracks that later partly close.
The result is a clearer picture of what controls CO_2 storage in recycled concrete. This is an important step toward designing better carbonation treatments for recycled concrete and turning a major waste problem into a more circular route for lower-carbon construction. Read more

ILL Alumni Community

Join the ILL Alumni Community

Our community aims to build a dynamic, international community that is useful to everyone, encouraging exchanges, collaboration and lasting connections within the network.

Why join?

- **Keep in touch** with the international ILL community.
- **Take part** in professional and scientific exchanges.
- **Share** your background, experiences, news, and career opportunities.
- **Participate** in the network's initiatives (events, Alumni portraits, webinars, etc).

Who can join?

- **Former Staff** – Anyone who has worked at the ILL, in any role.
- **Regular Users** – Researchers who have visited the ILL at least **10 times in the past 10 years**, as well as other frequent Users who are active ILL ambassadors.
- **Current Staff** – All current ILL staff who wish to connect with the Alumni Community.

Ready to join?

Join on LinkedIn | Join by email

Events

Early bird registration open until 31 August for the fifth ESS ILL Joint User Meeting

Early bird registration is now open for the 5th ESS ILL Joint User Meeting in Lund, Sweden, on 18 – 20 November 2026.
Submit your abstract within one of this year's scientific topics:

- batteries and energy materials,
- quantum materials,
- liquid-liquid phase separation,
- advanced manufacturing.

Register now

Another successful FullProf School at the ILL

Around 30 researchers took part in the latest FullProf School, held from 27 July 2026 to 1 August 2026 at the ILL. The School was dedicated to the qualitative and quantitative analysis of multiphase samples, including *in situ* and operando data sets. The participants, mainly Ph.D. students and postdoctoral researchers, came from institutions across Austria, Canada, France, Germany, Ireland, Italy, Poland, Spain, Sweden and the United Kingdom.
Combining lectures with hands-on tutorials, the course provided participants with the methods and practical tools needed to use the FullProf Suite efficiently.
The programme also included dedicated sessions on battery-material data analysis using FullProfApp and FAULTS, with contributions from Olef Arcelus and Marine Reynaud of CIC energiGUNE in Vitoria-Gasteiz, Spain.
The second FullProf School of the year, focusing on magnetism, is scheduled to take place towards the end of the year.

Calendar

31 August - 14:00 (UTC) | College 3 Seminar: **$BaCo_2(AsO_4)_2$: Strong Kitaev, After All** presented by Sasha Chernyshev (University of California) Join online

12 - 16 October | **10th International Topical Meeting on Neutron Radiography** (ITMNR-10) Registration open

18 - 20 November | **ESS ILL User Meeting** Early-bird registration open until **31 Aug**. Registration closes on **31 Oct.**

Connect with the Global Neutron Community on LinkedIn!
Join the Neutronsources LinkedIn page and keep up-to-date:
- News from neutron facilities and research around the world
- Info on job openings, event announcements and more (including a digest from the neutron mailing list https://lists.neutronsources.org/mailman/listinfo/neutron)

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