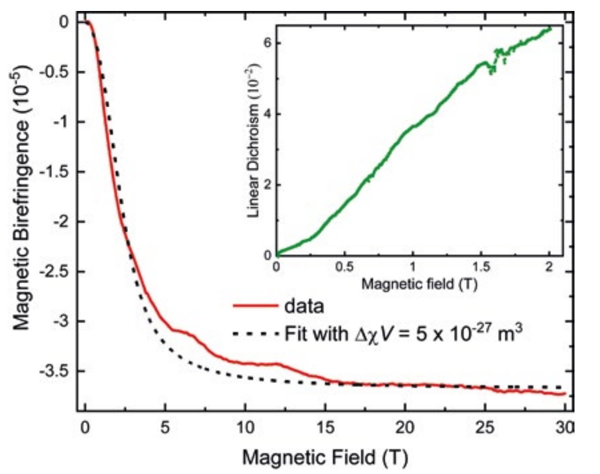
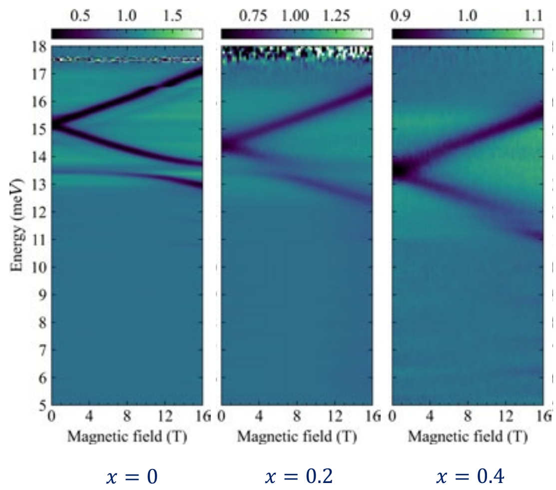
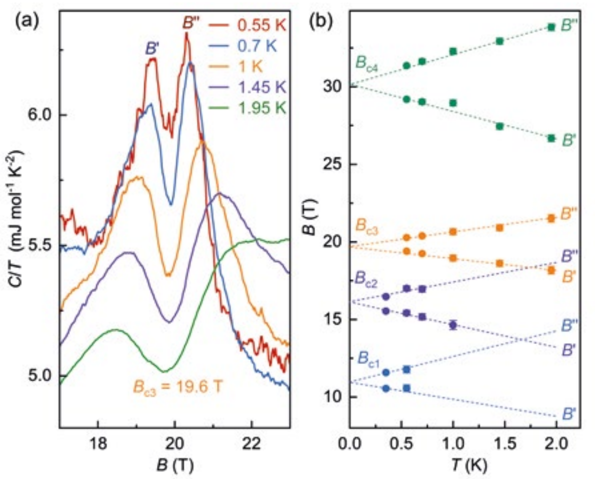
European Magnetic Field Laboratory

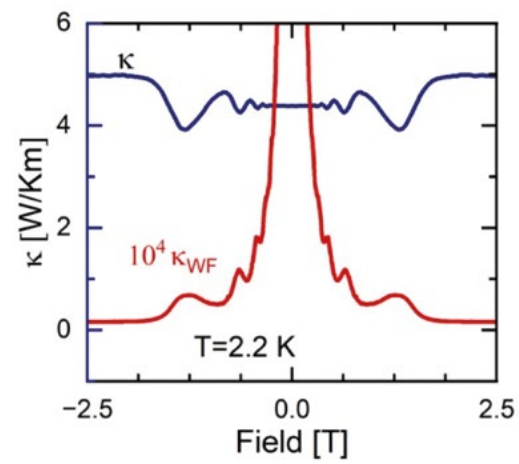
EMFLNEWS

Nº 1/25









CONTENTS

DEAR READER

We are pleased to present you the new spring issue of the EMFLNews. As usual, we highlight four examples of the excellent science that our users produced together with the dedicated support from our EMFL colleagues. We as well feature a new member of our staff: Igor Vinograd, a junior researcher at LNCMI-Grenoble.

At the end of last year, we successfully finished the EU-funded design study SuperEMFL. Coordinated by Xavier Chaud, EMFL together with industry partners succeeded in designing 32+ and 40+ T all-superconducting user magnets.

As mentioned already in the last issue, HFML-FELIX assured structural funding within a large national partnership consisting of Radboud University, NWO – the Dutch Research Council –, and six other Dutch universities. You may find some more information in the news article in this issue.

In our industry section, we feature our cooperation partner Energy Pool, who participates in the EU project FlexRICAN that aims at developing sustainable energy solutions within large research infrastructures across Europe.

Finally, we announce the opening of the new call for proposals and, as a reminder, the date of the next user meeting, **June 17, 2025**, in Lecce, Italy. Please have a look at the EMFL website for more information.

Enjoy reading,

Jochen Wosnitza
Director HLD, Chairman EMFL

MEET OUR PEOPLE

Igor Vinograd

I have joined the Nuclear Magnetic Resonance (NMR) group at LNCMI-Grenoble as a CNRS junior researcher in October 2024. It is a great privilege to once more collaborate with the colleagues whom I came to know during my PhD.

My PhD project, "Competing Orders in High-Temperature Superconductors", involved high-field experiments at LNCMI-Grenoble and NHMFL Tallahassee, and was supervised by Marc-Henri Julien.

Cuprate superconductors still fascinate me, but currently I am learning about quantum magnetism, which is Mladen Horvatić's area of expertise. While continuing in this research direction, I plan to explore frustrated magnetism and other topological materials in the future, such as Weyl semimetals, for instance. The application of uniaxial pressure for tuning electronic properties is a technique we are developing at LNCMI, and we hope to pair it with high magnetic fields.

I grew up in Germany and studied at the Goethe University Frankfurt. After spending two years in the USA as a postdoc in Nicholas J. Curro's NMR group at UC Davis, I spent three years in Germany – working at the Karlsruhe Institute of Technology (Le Tacon group, X-ray scattering) and at the University of Göttingen (Ropers group, electron microscopy). So, I aim to strengthen ties with our German EMFL colleagues in the coming years. Outside of Europe, the NMR group collaborates actively with the Synergetic Extreme Conditions User Facility near Beijing (SECUF). There, however, I still need the assistance of Duolingo to attain fluency in speaking Mandarin! Zàijiàn!

Igor Vinograd, LNCMI-Grenoble

EXCITING MOMENTS ON THE EDGE

Raj Pandya, University of Warwick, UK, Chris Howard, University College London, UK, Peter Christianen, HFML-FELIX Nijmegen

For the first time, researchers have demonstrated that phosphorene nanoribbons – thin pieces of black phosphorus, only a few nanometers wide (figure 1, bottom) – exhibit both magnetic and semiconducting properties at room temperature. This makes phosphorene nanoribbons a unique class of materials that challenges conventional views on magnetic semiconductors, and could provide a stepping stone to unlocking new quantum technologies.

Scientists have suspected that low-dimensional phosphorene nanoribbons might exhibit unique magnetic and semiconducting properties, but proving this has been difficult. Using a variety of experimental techniques in an applied magnetic field, such as ultrafast magneto-optical spectroscopy, electron paramagnetic resonance, and magnetic birefringence, we were able to demonstrate the remarkable magnetic behavior of phosphorene nanoribbons at room temperature and show how these magnetic properties can interact with light. Under relatively weak magnetic fields (below 1 T), the phosphorene nanoribbons surprisingly stand at attention in solution almost like iron filings, arranging themselves around a magnet (figure 2). Furthermore, when deposited in thin films they can display macroscopic magnetic behavior akin only to that of classic magnetic metals such as iron and nickel.

Most excitingly, we discovered that in addition to these magnetic properties, phosphorene nanoribbons host excited states on the magnetic edge of the nanoribbon, where it interacts with atomic vibrations (phonons) that are normally not allowed by the material's bulk symmetries. This unusual interaction allows the nanoribbons to uniquely couple magnetic, optical, and vibrational properties on its one-dimensional edge (figure 1, top). These findings are particularly significant as they mark the first experimental validation of the predicted, but difficult to observe, magnetic properties of phosphorene nanoribbons, without requiring low temperatures or doping.

What stands out the most about this research is its potential to influence multiple avenues of science and technology. This research could enable new routes to spintronic devices, which use electron spin instead of charge to enable novel computing technologies such as scalable fabrication for quantum devices, flexible electronics, and next generation transistors.

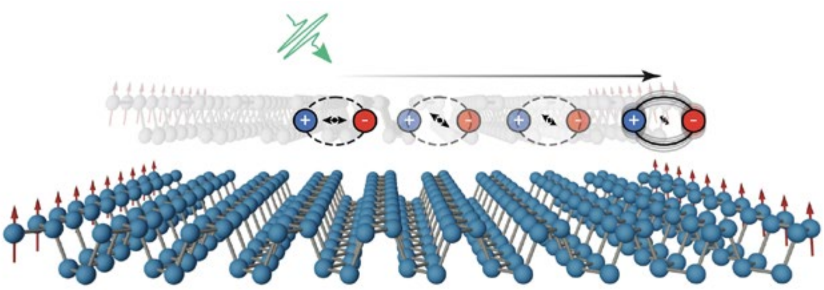


Figure 1: (Bottom) Crystal structure of phosphorene nanoribbons with zigzag-aligned edges along their long axis that host magnetic moments (red arrows). (Top) Schematic of the photoexcited dipole dynamics, where the excited state is initially polarized along the nanoribbon short axis and, on sub-1-ps timescales, relaxes to a dipole polarized along the long axis with significant density along the ribbon edge.

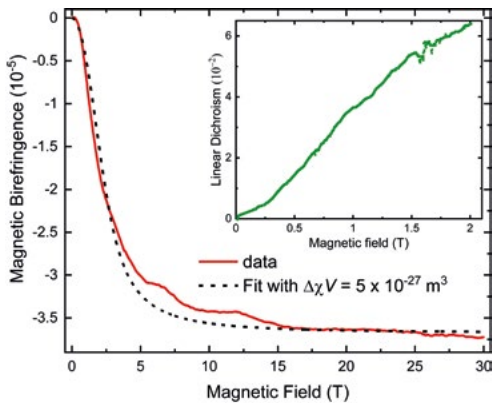


Figure 2: Alignment of phosphorene nanoribbons in solution measured using magnetic field-induced linear birefringence up to 30 T shows saturation at 10 T. Combined with the magnetic linear dichroism (inset), these results indicate that phosphorene nanoribbons align with their short axis along the field direction.

Magnetically and optically active edges in phosphorene nanoribbons, A. Ashoka, A. J. Clancy, N. A. Panjwani, A. Cronin, L. Picco, E. S. Y. Aw, N. J. M. Popiel, A. G. Eaton, T. G. Parton, R. R. C. Shutt, S. Feldmann, R. Carey, T. J. Macdonald, C. Liu, M. E. Severijnen, S. Kleuskens, L. A. Muscarella, F. R. Fischer, H. Barbosa de Aguiar, R. H. Friend, J. Behrends, P. C. M. Christianen, C. A. Howard, and R. Pandya, **Nature 639**, 348 (2025).

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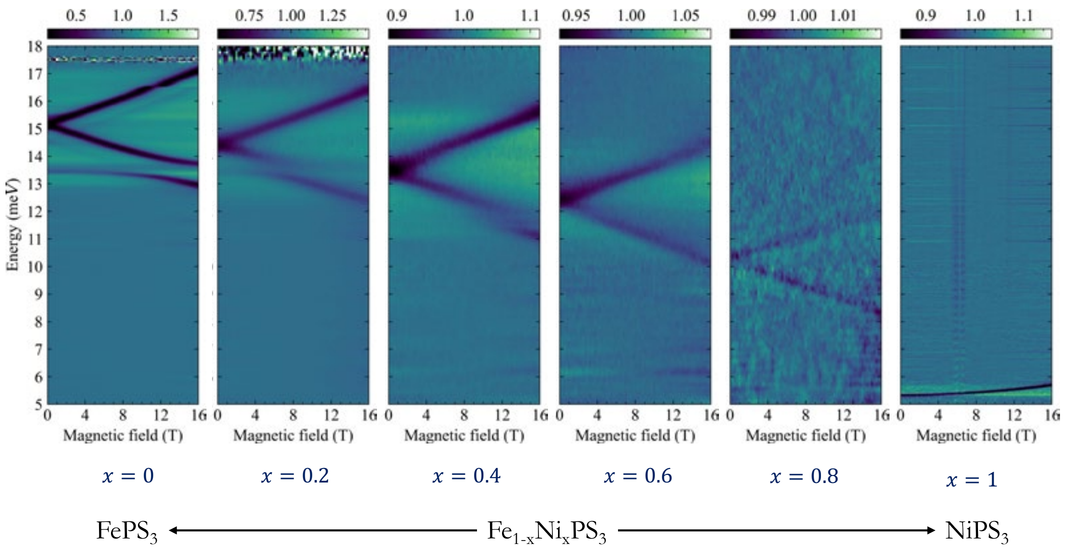
TUNING TERAHERTZ MAGNONS IN A MIXED VAN DER WAALS ANTIFERROMAGNET

Florian Le Mardelé and Milan Orlita, LNCMI-Grenoble

Alloying stands out as a pivotal technological method employed across various compounds, be they metallic, magnetic, or semiconducting, serving to fine-tune their properties to meet specific requirements. Ternary semiconductors represent a prominent example of such alloys. They allow fine-tuning of electronic bands – in particular, the band gap – and offer the possibility to tailor semiconductor heterostructure devices, key elements in current electronics and optoelectronics. In the realm of magnetically ordered systems, akin to electronic bands in solids, spin waves exhibit characteristic dispersion relations, featuring sizeable magnon gaps in many antiferromagnets. The engineering of the magnon gap constitutes a relevant direction in current research on antiferromagnets, aiming to leverage their distinct properties for THz technologies, spintronics, and magnonics.

In a collaborative effort between Grenoble and Taipei, we investigated alloys composed of two currently widely explored van der Waals (layered) antiferromagnets: $FePS_3$ and $NiPS_3$, both known for their magnon excitations in the THz frequency range. These materials share identical in-plane crystal structures, magnetic unit cells, and single-ion magnetic anisotropy directions, differing only in the magnitude and sign of the anisotropy. This implies that $FePS_3$ behaves as an easy-axis antiferromagnet, while $NiPS_3$ is an easy-plane system. To explore how alloying affects magnon energies, we performed antiferromagnetic resonance experiments in the THz range.

The results were straightforward to interpret, yet surprising. With increasing nickel content, the magnon energy gradually redshifts while maintaining the characteristic splitting into two branches, both linear in the applied magnetic field, up to very high nickel concentrations (up to $x \approx 0.9$). This indicates that the easy-axis antiferromagnetic order remains robust across a wide compositional range. Notably, the magnon excitation can be extensively and precisely tuned within the THz spectral range. The persistence of an antiferromagnetic resonance in these alloys also suggests that long-range magnetic order can survive even in highly disordered crystals, where magnetic atoms are randomly distributed and translational symmetry is absent.



Tuning terahertz magnons in a mixed van der Waals antiferromagnet, F. Le Mardelé, I. Mohelsky, D. Jana, A. Pawbake, J. Dzian, W.-L. Lee, K. Raju, R. Sankar, C. Faugeras, M. Potemski, M. E. Zhitomirsky, and M. Orlita, **Phys. Rev. B 110**, 174414 (2024).

Figure: Low-temperature magneto-transmission of $Fe_{1-x}Ni_xPS_3$ alloys for several compositions plotted as false-color plots displaying antiferromagnetic-resonance absorptions typical for an easy-axis antiferromagnet (up to $x \approx 0.9$), tuned across the THz range.

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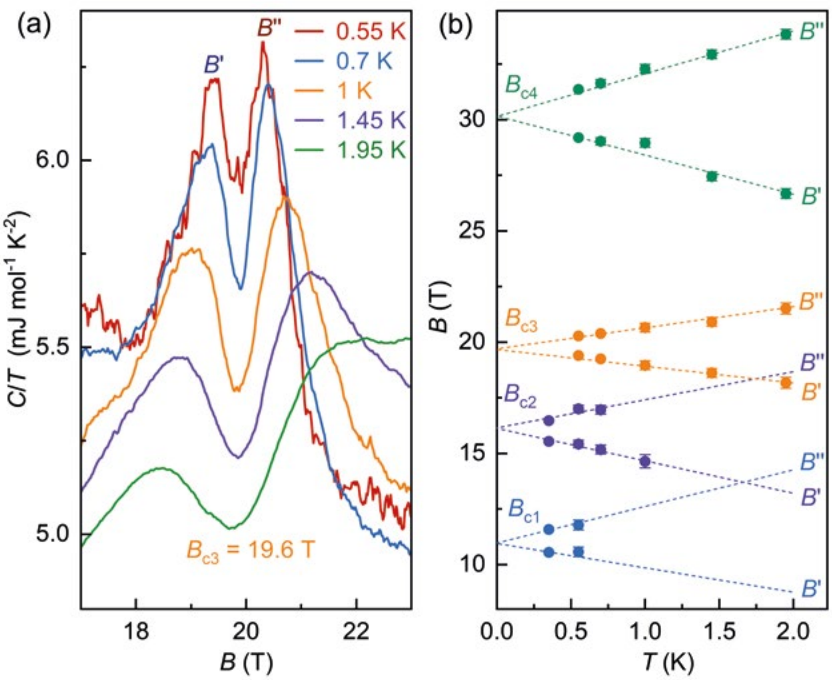
THERMODYNAMIC SIGNATURES OF IN-GAP FERMIONIC QUASIPARTICLE STATES IN A KONDO INSULATOR

Zhuo Yang and Yoshimitsu Kohama, ISSP at University of Tokyo, Japan, Duncan K. Maude, LNCMI-Toulouse, Christophe Marcenat, CEA, IRIG, and PHELIQS, Grenoble

In the mixed-valence compound YbB_{12}, thermal-conductivity measurements at low temperatures reveal highly mobile excitations that carry heat like in a metal but do not conduct electricity. The Wiedemann-Franz law, which relates the thermal and electrical conductivity, is violated in this material by many orders of magnitude. This leads to the fundamental question of whether electrically neutral excitations in an insulator, which nominally do not have a direct orbital coupling to an external magnetic field, can nevertheless display peculiar thermodynamic signatures characteristic of metals.

In this work, we report a sequence of increasingly pronounced singularities in both the specific heat (C) and the magnetocaloric effect (MCE) within the insulating phase of YbB_{12}. These features, characterized by a series of double-peak anomalies in the specific heat suggest an underlying fermionic density of states (DOS). The Hall resistivity evolves smoothly across these field values, ruling out an electronic origin for these anomalies and suggesting a distinct fermionic contribution to the singular DOS in YbB_{12}.

As we previously demonstrated for graphite, YbB_{12} shows double-peak structures in C/T (figure (a)) that provides direct evidence for the existence of singularities in the fermionic DOS. We plot the positions of the double-peak structures versus temperature in panel (b). The splitting of the double peak decreases linearly with decreasing temperature, vanishing at T = 0. The central field of the double peaks remains constant and coincides with the entropy maximum observed in the MCE. The overlap of the DOS and the derivative of the Fermi-Dirac distribution (kernel function) features two local maxima at the fields B′ and B′′, which controls the double-peak structure of C/T. The observation of a double-peak structure in C/T that disperses linearly with increasing temperature is strong evidence for the existence of fermionic quasiparticles in the bulk, which is remarkable given the absence of an electronic DOS in the insulating bulk of YbB_{12}.



Evidence for large thermodynamic signatures of in-gap fermionic quasiparticle states in a Kondo insulator, Z. Yang, C. Marcenat, S. Kim, S. Imajo, M. Kimata, T. Nomura, A. De Muer, D. K. Maude, F. Iga, T. Klein, D. Chowdhury, and Y. Kohama, **Nat. Commun. 15**, 7801 (2024).

Figure: Fermionic quasiparticle origin of the double-peak structure in C/T. (a) Specific heat C/T as a function of magnetic field at the indicated temperatures. (b) Measured magnetic field positions of the double peaks as a function of temperature for the anomalies in C/T.

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QUANTUM HEAT DYNAMICS TOGGLED BY MAGNETIC FIELDS

Stanislaw Galeski, HLD and HFML-FELIX

The ability to transport heat is one of the most fundamental properties of matter, crucial for engineering applications. In most materials, at room temperature transport is well understood. Things, however, are not as straightforward under extreme conditions such as temperatures close to absolute zero or in strong magnetic fields, where quantum effects begin to dominate.

When a conventional metal such as silver or copper is exposed to strong magnetic fields at low temperatures its thermal conductivity is expected to exhibit oscillations – a striking example of quantum-mechanical dynamics of charge carriers in metals. This effect arises due to the existence of the Fermi surface, the boundary between occupied and unoccupied energy states of electrons in a metal. On the other hand, in semimetals, there are very few electrons available to transport heat and as such the thermal conductance is expected to be dominated by phonons – emergent quasiparticles that represent crystal-lattice vibrations. As such, quantum oscillations should not appear in the transport of heat here. However, several recent experiments have detected giant quantum oscillations in the thermal conductivity of semimetals, questioning the mechanism of heat transport.

The present study demonstrates that this phenomenon stems from a very counterintuitive mechanism for transport of heat in strong magnetic fields in semimetals. It turned out that indeed thermal transport is by far dominated by lattice vibrations. However, due to the presence of strong magnetic fields the electron energy states become confined into discrete energy levels. This process dramatically enhances the electron-phonon scattering leading to quantum oscillations in the lifetime of phonons and thus to the appearance of quantum oscillations in the thermal conductivity of phonons.

We have corroborated the existence of this unconventional phenomenon through the study of the thermal conductivity and ultrasonic attenuation in the semimetal $ZrTe_5$ in strong magnetic fields and temperatures only a fraction of a degree above absolute zero. In our experiment, we have detected clear thermal quantum oscillations with a frequency characteristic of the electron sub-system (figure). However, the temperature dependence of their amplitude clearly followed the characteristic behavior of the phonons.

Remarkably, our findings are not only applicable for $ZrTe_5$, but as well for a wide class of semimetals with low charge-carrier density, regardless of whether they are topological or not, including famous examples such as graphene and bismuth. They suggest that thermal conductivity of lattice vibrations can serve as a sensitive tool to study subtle quantum effects that could be barely detectable via other means.

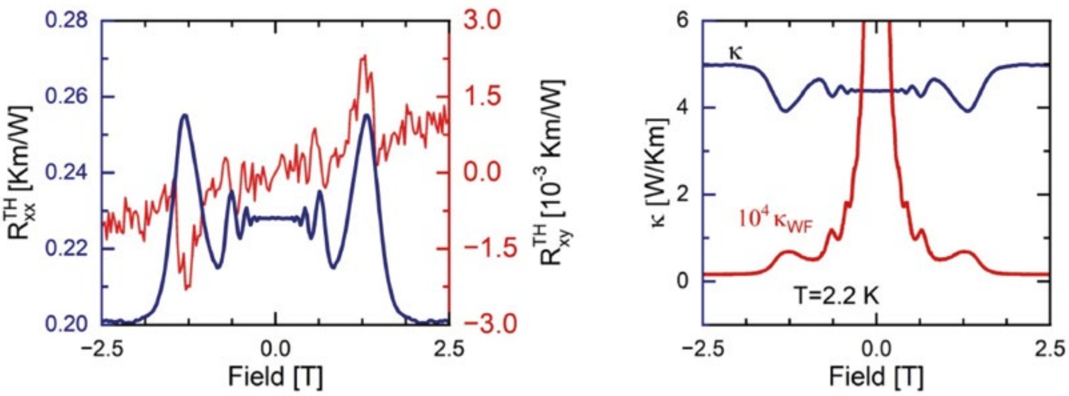

Figure: (Left) Transverse thermal magnetoresistance and thermal Hall effect measured on a $ZrTe_5$ crystal at 2 K. Oscillations of thermal resistance amount to almost 20 % of the total resistance. (Right) Comparison of the transverse magnetothermal conductivity with the estimate based on the Wiedemann-Franz law. Oscillations seen in the measured thermal conductivity appear almost 4 orders of magnitude larger than expected.

Giant quantum oscillations in thermal transport in low-density metals via electron absorption of phonons, B. Bermond, R. Wawrzynczak, S. Zherlitsyn, T. Kotte, T. Helm, D. Gorbunov, G. Gu, Q. Li, F. Janasz, T. Meng, F. Menges, C. Felser, J. Wosnitza, A. Grushin, D. Carpentier, J. Gooth, and S. Galeski, **PNAS 122**, 2408546122 (2025).

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OPENING OF THE 33rd CALL FOR ACCESS

On April 15, 2025, EMFL launched the 33rd call for proposals inviting researchers worldwide to apply for access to one of the research infrastructures for high magnetic fields collaborating within EMFL.

The four facilities

- LNCMI - Grenoble - France: Static magnetic fields up to 36 T
- HFML - Nijmegen - the Netherlands: Static magnetic fields up to 38 T
- HLD - Dresden - Germany: Pulsed magnetic fields to beyond 95 T
- LNCMI - Toulouse - France: Pulsed magnetic fields of long duration to beyond 99 T and on the microsecond scale to beyond 200 T

run a joint proposal program, which allows full access to their installations and all accompanying scientific infrastructure to qualified external users, together with the necessary support from their scientific and technical staff.

Users may submit proposals for access to any of these installations by a unified procedure. Prospective users are encouraged to contact a staff member of EMFL who will be happy to provide support in preparing the proposals. You may find the online form for these proposals on the EMFL website.
https://emfl.eu/SelCom/login.php

In the frame of the EU-funded ISABEL project, EMFL continues to welcome proposals according to new access procedures, such as **dual access**, **first-time access**, **technical development access**, **long-term access** and **fast-track access**. We explain these new proposal schemes in detail on our website and the EMFL User Portal.
https://emfl.eu/isabel/novel-access-modes/
https://emfl.eu/apply-for-magnet-time/

Please note that after each experiment, we request a progress report and a publication record filled out online on the EMFL website. This information will be available to the Selection Committee.

To improve our user program further, we very much welcome your feedback to the EMFL User Committee.
Please find the form on the EMFL website.
https://emfl.eu/SelCom/UserCommittee/feedbackform.php

The deadline for proposals for magnet time is May 15, 2025.
The EMFL Selection Committee will evaluate the proposals. Selection criteria are scientific quality (originality and soundness), justification of the need for high fields (are there good reasons to expect new results), and feasibility of the project (is it technically possible and are the necessary preparations done). We strongly recommend contacting the local staff at the facilities to prepare a sound proposal and ideally indicate a local contact.

Please do acknowledge any support under this scheme in all resulting publications with „We acknowledge the support of the HFML-RU (or HLD-HZDR or LNCMI-CNRS), member of the European Magnetic Field Laboratory (EMFL)." UK users should, in addition, add "A portion of this work was supported by the Engineering and Physical Sciences Research Council (grant no. EP/N01085X/1)."

- You may find more information on the available infrastructures for user experiments on the facility websites.

https://www.hzdr.de/hld
https://lncmi.cnrs.fr/
https://www.ru.nl/en/hfml-felix

European Magnetic Field Laboratory

The EMFL develops and operates world class high magnetic field facilities, to use them for excellent research by in-house and external users.

HFML-FELIX JOINING FORCES WITH SEVEN UNIVERSITY PARTNERS

HFML-FELIX, known worldwide as a unique research facility, will continue within a large national partnership consisting of Radboud University, Dutch Research Council (NWO), and six other Dutch universities. This means, structural funding is assured for HFML-FELIX for the next 10 years.

The consortium will work towards a shared and strong national research program, which will enable the lab to continue its significant contribution to scientific progress and the solving of societal challenges. Starting this new collaboration 1st of January 2025, HFML-FELIX will move forward as an NWO Institute within the Foundation for **Dutch Scientific Research Institutes NWO-I**. An official signing ceremony took place on the 20th of December 2024 at **HFML-FELIX in Nijmegen**.

At HFML-FELIX, pioneering research is carried out on the properties and behavior of new materials and molecules. This is achieved by exposing them to extreme conditions, including very high magnetic fields and powerful free-electron lasers. In doing so, HFML-FELIX contributes to important research fields, including materials science, medicine, and astronomy. For example, by enabling the early detection of diseases, uncovering the mysteries of atmospheres around other planets, or finding new materials with promising properties such as graphene. The lab also works on innovations needed for the energy transition.

Britta Redlich, former director at HFML-FELIX, has undertaken great efforts during recent years to make this collaboration possible. "It is great to see how the unique technology developed here has already contributed to scientific breakthroughs and solutions to societal issues," said Redlich. "We are extremely happy to move forward with our new partners. Thanks to this collaboration, we can create a nationally aligned, long-term strategy that will also make us strong internationally."

Marcel Levi, President of the Executive Board of NWO: "It fits into NWO's mission to support unique large scientific infrastructures that are important for the entire national and international research field. It is, therefore, great to join forces with university partners and make HFML-FELIX an institute. With this, we attract researchers from here and abroad to carry out groundbreaking research together that is essential for answering new knowledge questions."

› The representatives of the National Collaboration Network HFML-FELIX at the official signing ceremony. From left to right: Erik van Heumen (University of Amsterdam), Ron Heeren (Maastricht University), Jennifer Herek (University of Twente), Floris Rutjes (Radboud University), Moniek Tromp (University of Groningen), Semonti Bhattacharyya (Leiden University), Britta Redlich (former HFML-FELIX), Mazhar Ali (Delft University of Technology), and Peter Spijker (NWO-I).

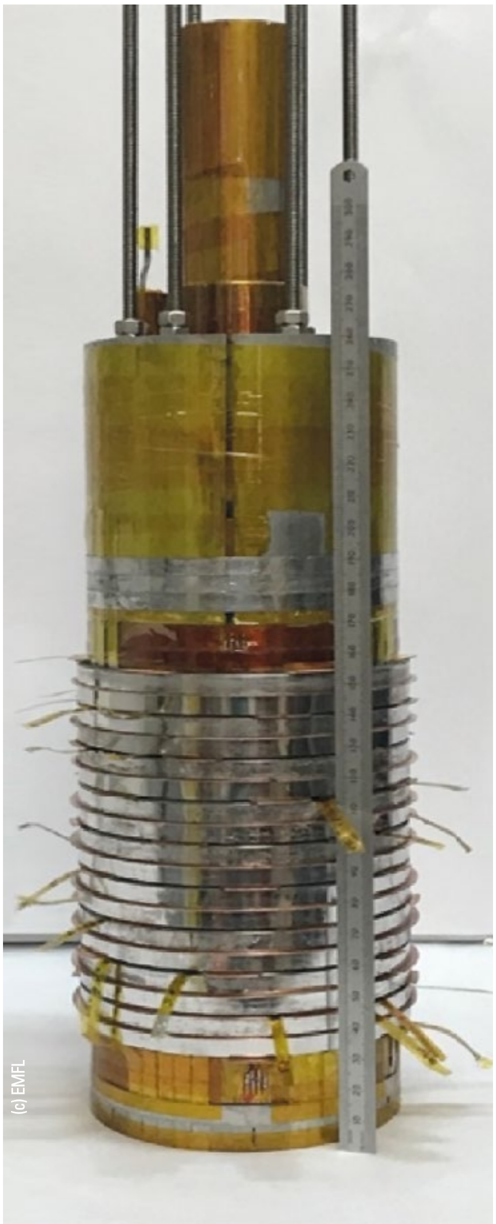
José Sanders, Rector Magnificus of Radboud University: "Thanks to the cooperation between the seven universities involved and NWO, HFML-FELIX in Nijmegen can have lasting significance for fundamental research and innovation."

Radboud University, Delft University of Technology, Maastricht University, University of Twente, University of Amsterdam, Leiden University, University of Groningen, and NWO look forward to working together as partners on the future of this extraordinary research institute.

SuperEMFL SUCCESSFULLY FINISHED

Starting January 2021, the EU-funded design study SuperEMFL finished successfully at the end of last year. According to the initial objectives, the SuperEMFL project has generated specific know-how, models, the design of 32+ and 40+ T all-superconducting user magnets (TRL 7), and a possible scenario for implementing such equipment within EMFL as main outcomes.

The use of HTS (high-temperature superconductor) inserts to generate static fields efficiently introduces a change of paradigm. New experimental possibilities are expected, in particular long duration and very low-noise experiments. The large resulting reduction of operating costs for static high-field experiments will also considerably increase the EMFL capacity to host user experiments. The improvement of the EMFL environmental impact as well as the optimization of resources and energy are some major benefits of the project.



› Prototype of the HTS insert coil

Reaching different communities

The development of HTS technology is now widely competitive with projects aiming at 40 T in Europe, the USA, and China. We are reaching other communities beyond EMFL throughout workshops and conferences, which show their strong interest by submitting their own projects to leverage the HTS technology, i.e., neutron-scattering facilities, CERN with its muon-collider project, and the fusion community.

We expect innovation impacts by opening the magnetic-field range beyond the current limit of commercial superconducting fields, to give the industrial partners a competitive advantage, understanding and modeling the quench events in HTS magnets and opening the high magnetic fields as a research tool to the bio and life sciences. This project serves as a showcase for Oxford Instruments LTS outer coils and for THEVA tapes.

We have trained several PhD students and post-doctoral fellows throughout the design study SuperEMFL, increasing their skills and value on the labor market, but also helping to prepare a future generation for HTS technology that will allow Europe to play an important role in this strategic technology.

SAVE THE DATE

The EMFL User Meeting 2025 will take place in Lecce, Italy, on **Tuesday, June 17th**. We look forward to seeing you there. For more information and to register, please visit the EMFL User Meeting conference website:
https://indico.imapp.ru.nl/event/316/

ENERGY POOL

Energy Pool is a leading company in Europe for demand-side energy-flexibility aggregation, as well as a key-player in the European energy-flexibility market. As such, the company is one of the industrial partners in the Horizon Europe-funded **"Flexibility in Research Infrastructures for global CArbon Neutrality" (FlexRICAN) project**. Three major research partners have joined forces in FlexRICAN. In addition to the EMFL, who provided significant input, these are the two research infrastructures ELI – Extreme Light Infrastructures and ESS – European Spallation Source, with the latter leading the project.

At the heart of the smart grid revolution, Energy Pool manages and optimizes complex energy systems – including industrial sites, distributed generation, renewable energy sources, and storage assets – for a more reliable, affordable, and sustainable energy. The company has been one of the pioneers of the French electricity flexibility market since 2009, providing demand-side management solutions to support grid stability during peak hours.

Members of the FlexRICAN consortium in front of the Energy Pool building at Bourget-du-Lac, France, during the 3rd consortium meeting in April 2025.

Beyond providing grid services, the company's flexibility solutions deliver multiple benefits: They reduce CO_2 emissions, facilitate the seamless integration of renewable energy, and help to achieve significant cost savings.

Marion PERRIN, Energy Pool's Research Director, points out: "The development of our business sector has accelerated over the past two years, encouraged by the European Union and the definition of ambitious objectives to increase flexibility in electricity consumption and to improve energy efficiency. On an international scale, many emerging countries are considering integrating consumption flexibility to avoid costly over-investments, which often use hydrocarbons. Moreover, the targets in the reduction of greenhouse-gas emissions require the electrification and decarbonization of part of the production chains, which is opening up some excellent prospects for the coming decade."

The company has now more than 400 employees. While its headquarters remain in France, it has established a strong presence in Japan and Turkey since 2015, the Netherlands since 2018, and is actively driving projects in around 10 other countries, including Germany, Malaysia, Saudi Arabia, and Thailand. The company is committed to working with both clients and governments to achieve carbon neutrality by 2050.

Saving energy when operating infrastructures

Energy Pool brings its knowledge of the flexibility markets, as well as its experience in activating the industrial sites on those markets to the FlexRICAN project. This will allow to draw parallels between these electro-intensive industries and large research infrastructures, such as the high-field labs of the EMFL that are also consuming very large amounts of electricity, and improve the CO_2 impact of these different users. In return, FlexRICAN opens up the opportunity to learn more about research infrastructures as potential suppliers of flexibility for the markets and to dig deeper into new markets outside of their actual scope.

UPCOMING EVENTS

View from the venue of the Les Houches school.

1 13th International Conference on Highly Frustrated Magnetism, Toronto, Canada, May 25-30, 2025.
https://conference.physics.utoronto.ca/event/18/

2 International Conference on Magnet Technology (MT29), Boston, USA, July 1-6, 2025.
https://mt29-conf.org/

3 International Conference on Strongly Correlated Electron Systems (SCES 2025), Montréal, Canada, July 6-11, 2025.
https://sces2025.org

4 30th International Conference on Low Temperature Physics (LT30), Bilbao, Spain, August 7-13, 2025.
https://www.lt30.es/

5 50th International Conference on Infrared, Millimeter, and Terahertz Waves (IRMMW-THz 2025), Espoo, Finland, August 17-22, 2025.
https://www.irmmw-thz.org/venue/

6 Joint European Magnetic Symposia (JEMS), Frankfurt, Germany, August 24-29, 2025.
https://jems2025.eu/

7 17th European Conference on Applied Superconductivity, Porto, Portugal, September 21-25, 2025.
https://eucas2025.esas.org/

8 16th International Symposium on Crystalline Organic Metals, Superconductors and Magnets (ISCOM 2025), Toyohashi/Okazaki, Japan, September 28 - October 3, 2025.
https://registration.ims.ac.jp/iscom2025/home

9 WE Heraeus School on New Phases, Superconductivity and Emerging Electronic Properties of Quantum Materials, Les Houches, France, September 28 - October 3, 2025.
https://fermi-sces2025.grenoble.cnrs.fr/

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The ISABEL and SuperEMFL projects have received funding from the European Union's Horizon 2020 research and innovation programme under grant agreements No 871106 and No 951714, respectively.

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