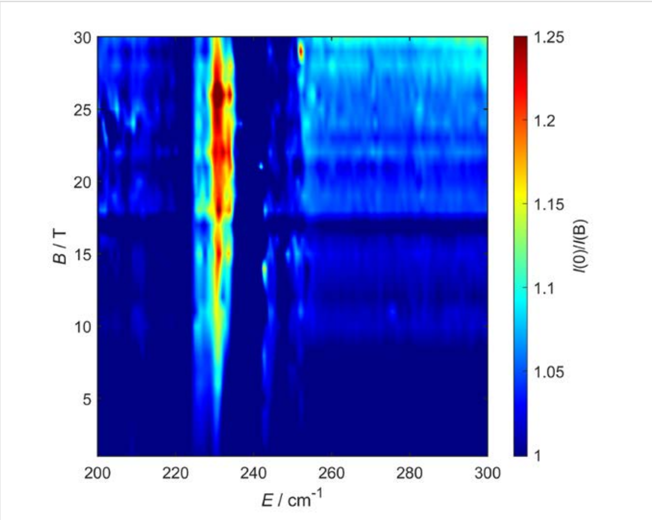
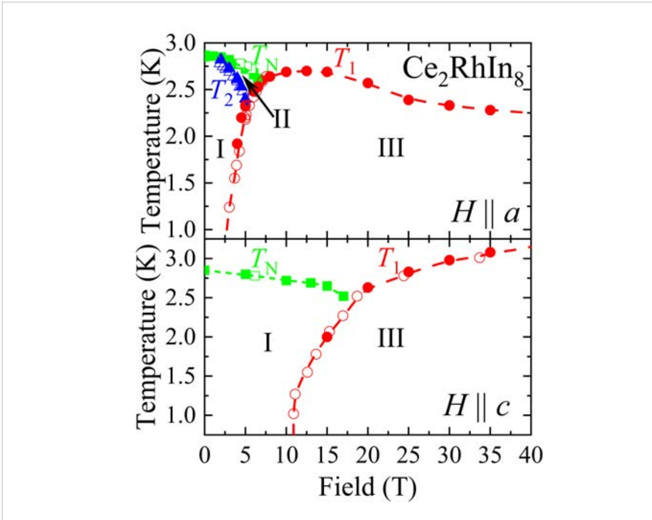
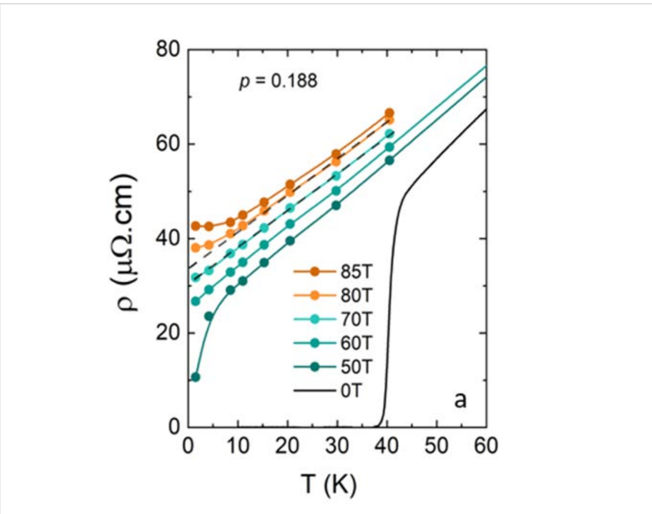
European Magnetic Field Laboratory

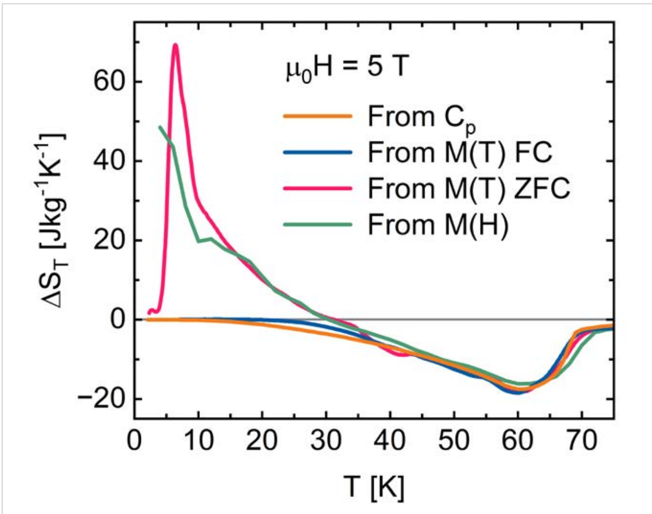
EMFLNEWS

N° 3/25









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DEAR READER

Welcome to the new edition of the EMFLNews after the summer break. Again, we can announce some personnel changes in the EMFL Board of Directors. Beginning of September, Marc Baldus started as the new director of HFML-FELIX. He succeeds Frank Linde, who served as interim director from January 1, 2025. We would like to thank Frank for his great work and the always enjoyable and constructive collaboration within EMFL. We wish him all the best for the future and are looking forward to a trusting and successful cooperation with Marc.

In summer, EMFL participated in various international meetings. Beginning of July, we met with our colleagues from China, Japan, and the USA in Boston for the Global High Field Forum. An important occasion to exchange ideas and future plans in high-field science. We further joined a regional Nordic-Baltic meeting in Estonia in the frame of the ISABEL project. In addition, EMFL members took part in an international conference on high-speed forming, strengthening our connection to industry.

We are happy to announce that LNCMI scientists accomplished the first successful experiments at 42 T in the new Grenoble hybrid magnet. Finally, as usual, four scientific highlights demonstrate the excellent science produced in our facilities.

Enjoy reading,

Jochen Wosnitza
Director HLD, Chairman EMFL

MEET OUR PEOPLE

Marc Baldus, HFML-FELIX

HFML-FELIX director Marc Baldus

As of 1 September 2025, I have started as director at HFML-FELIX, a powerhouse for high-magnetic-field research in Europe and founding member of the EMFL. Recently, HFML-FELIX has become a national research institute in partnership with several Dutch universities and the Radboud medical center. This setting provides an exciting opportunity to shape the future of this internationally renowned research institute and to maintain and further strengthen its international embedding in EMFL.

As a physics student, I was intrigued by the phenomenon of superconductivity. I was fortunate to win a stipend to work at the University of Florida (Gainesville, USA) in the field of heavy fermions. During this time, I also became fascinated by the effect of magnetic fields on molecular systems. I successfully applied to the lab of Richard R. Ernst (ETH Zurich, Nobel prize in 1991) to build and utilize a solid-state nuclear magnetic resonance (NMR) spectrometer. At the later stages of my PhD, I also spent time at the University of Nijmegen on the same topic. After my PhD graduation, I moved to the Francis Bitter Magnet Lab at MIT (Cambridge, USA, postdoc 1997-1999) and the University of Leiden (1999-2000, Lecturer) to continue my research using high-field magnets of increasing strength.

In 2000, I started my own group at the Max Planck Institute for Biophysical Chemistry (Göttingen, Germany), in which we developed methods and applications using solid-state NMR. Eight years later, I eventually returned to the Netherlands to become professor and head of the NMR section at Utrecht University (2008-2025). During this time, I coordinated a national ultra-high-field NMR/MRI consortium for the Netherlands and we were fortunate to obtain funding for one of the first superconducting 28 tesla magnets worldwide.

As a physicist and spectroscopist, I always considered the idea to combine high-field magnet technology and free-electron lasers to explore the properties and structure of materials and matter as realized at HFML-FELIX highly innovative. In fact, such a strategy strongly aligns with my own research mission to combine technological and conceptual advances in fundamental science with broad impact ranging from science to society. An important aspect of my work will be, together with a wonderful team of scientists, technicians, and students, to advance and further strengthen our research activities using high magnetic fields, both in terms of technical development as well as for a broad area of user applications. On a private side, my return to Nijmegen brings me back closer to family and friends, while enjoying my hobbies including swimming and art as well as listening to and making music.

FAR-INFRARED SPECTROSCOPIC STUDIES ON COBALT-BASED SINGLE-MOLECULE MAGNETS

David Hunger and Joris van Slageren, Institute of Physical Chemistry, University of Stuttgart, Germany

Single-molecule magnets are coordination complexes that display bistable magnetization in zero magnetic field. This phenomenon relies on the presence of an energy barrier, generated by magnetic anisotropy between states with positive and negative orientations of the magnetic moment. In principle, the numbers "0" and "1" can be encoded in these (degenerate) states. Because the length scale of molecules is of the order of 1 nm, this would allow magnetic data storage with data densities many orders of magnitude higher than currently available. The drawback of these materials is that they operate at low temperatures only. Recent research has focused on molecules containing single metal ions. However, in spite of impressive energy barriers in the thousands of Kelvin, bistability is often weak due to efficient underbarrier relaxation processes. A solution can be found in the development of molecules that possess several metal ions. The magnetic (superexchange) coupling strength between these ions must be of the order of the anisotropy to prevent generation of low-lying spin-excited states that accelerate magnetic relaxation.

A promising candidate for such a polynuclear single-molecule magnet is air-stable $[K(18\text{-crown-}6)]_3[Co(bmsab)]_2(\mu\text{-tmsab})]$, abbreviated as Co_2Rad. Co_2Rad and its mononuclear building block $[K(18\text{-crown-}6)]_2[Co(bmsab)_2]$ (Co-mono) were investigated in great detail by a combination of advanced spectroscopic methods (far-infrared, inelastic neutron scattering, and Raman spectroscopies) and quantum chemical calculations. The spectra displayed features, related to the local anisotropy, local electronic excitations, and the superexchange interactions, allowing precise determination of the energies involved. These studies enabled the following conclusions: 1. The strong anisotropy of the cobalt ion is due to first-order spin-orbit coupling between the quasi-degenerate d_{x2-y2} and d_{xy} orbitals of the ion. 2. The superexchange interaction between the cobalt ions and the radical indeed exceeds the anisotropy energy scale. 3. We observed strong signatures of spin-phonon coupling.

These studies profited from the measurements carried out at HFML-FELIX in Nijmegen. In particular, we recorded far-infrared spectra in magnetic fields up to 30 T that revealed excitations assigned to the local anisotropy. The HFML-FELIX setup allowed us to measure at much higher magnetic fields than those available at our institution.

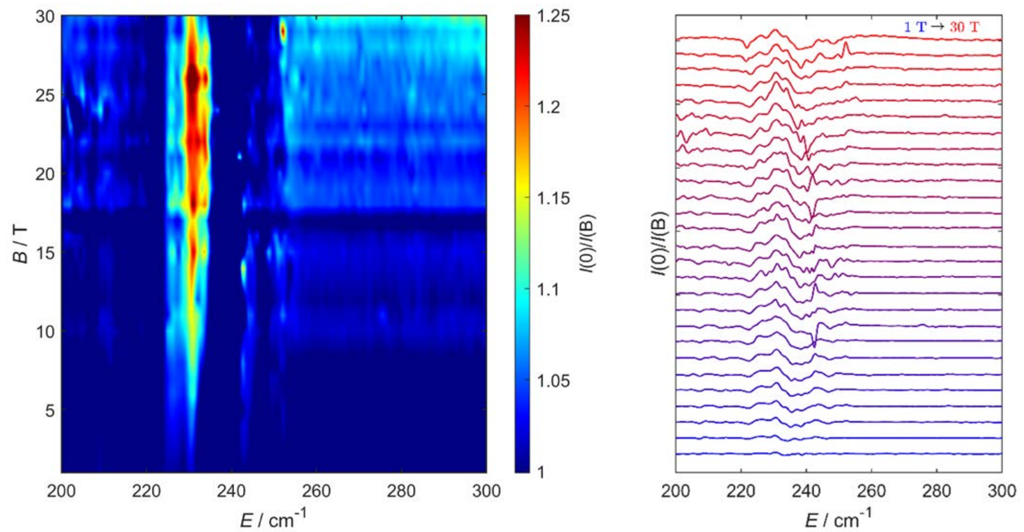

Figure: Far-infrared spectra recorded on a pressed-powder pellet of Co-mono at 3 K and fields as indicated. Measurements were carried out on an 8 mm diameter pressed pellet of 20 percent sample in paraffin. The spectra have been normalized by division by the 0 T spectrum. Spectra were recorded on a Bruker Vertex 80v spectrometer coupled to a 33 T Bitter-type magnet.

Electronic structure of mononuclear and radical-bridged dinuclear cobalt(II) single-molecule magnets, D. Hunger, J. Netz, S. Suhr, K. Thirunavukkuarasu, H. Engelkamp, B. Fåk, U. Albold, J. Beerhues, W. Frey, I. Hartenbach, M. Schulze, W. Wernsdorfer, B. Sarkar, A. Köhn, and J. van Slageren, **Nat. Commun. 16**, 2157 (2025).

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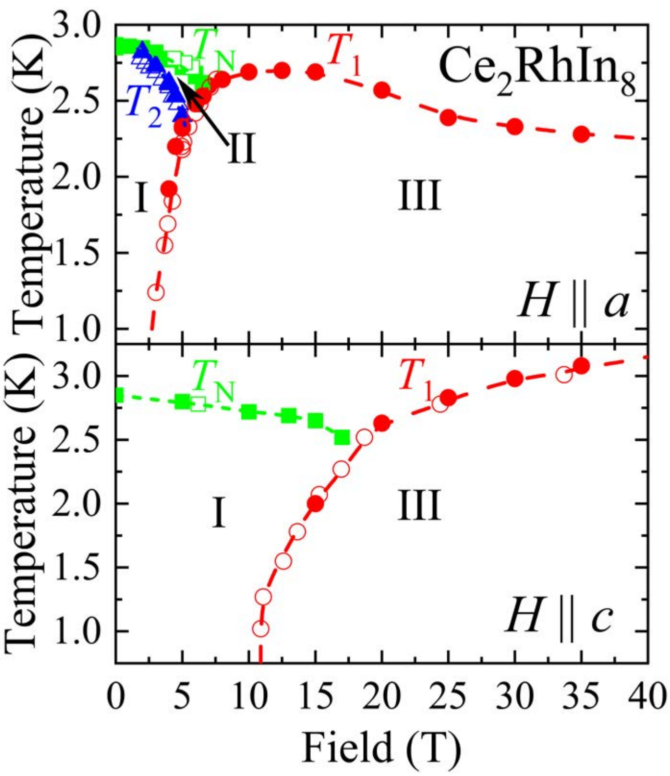
EXOTIC MAGNETIC PHASE DIAGRAM AND EXTREMELY ROBUST ANTIFERROMAGNETISM IN Ce_2RhIn_8

Albin Demuer and Ilya Sheikin, LNCMI-Grenoble, Thierry Klein, Institut Néel, and Dai Aoki, Tohoku University, Japan

Cerium-based intermetallic compounds exhibit a variety of fascinating phenomena including heavy-fermion behavior, quantum criticality, non-Fermi-liquid behavior, and novel states of matter such as unconventional superconductivity. The ground state of some of them, such as $CeIn_3$, $CeRhIn_5$, and $CePt_2In_7$, is antiferromagnetic (AFM). All these compounds can be tuned to a magnetic quantum critical point (QCP) by hydrostatic pressure or magnetic field. The critical fields for the suppression of the AFM order in all three materials are very high, ranging from 50 to 80 T. Such high magnetic fields can be generated by pulsed magnets only, which limits both the number of available experimental techniques and the temperature range of possible experiments. To get further insight into field-induced QCPs, it is important to search for other Ce-based compounds, in which a QCP can be reached at a lower field accessible in static-field magnets.



The heavy-fermion compound Ce_2RhIn_8 belongs to the same family and bears similarities with the well-studied prototypical material $CeRhIn_5$. At ambient pressure and zero magnetic field, Ce_2RhIn_8 undergoes an AFM transition at $T_N = 2.8$ K. Previous specific-heat measurements performed in magnetic fields up to 10 T revealed a monotonic decrease of T_N for fields applied along c. A naive extrapolation of T_N to zero suggests a field-induced QCP at about 30 T.

To verify this hypothesis, researchers from Grenoble, together with their Japanese colleagues, performed high-field specific-heat measurements on a single crystal of Ce_2RhIn_8 in fields up to 35 T applied along both principal crystallographic directions. When the magnetic field is applied along the a axis of the tetragonal crystal structure, two additional field-induced AFM phases are observed (figure). One of them is confined to a small area of the field-temperature phase diagram. The other one, which develops above ~2.5 T, is very robust against the field. Its transition temperature increases with field, reaches a maximum at ~12 T, and then starts to decrease. However, it tends to saturate towards the highest fields measured. For fields applied along the c axis, the Néel temperature initially decreases with field, as expected for a typical antiferromagnet. Surprisingly, an additional phase emerges above about 10 T (figure). This phase most likely has the same origin as its counterpart observed above 2.5 T for the other field orientation. This phase is also unusually robust: Its transition temperature increases all the way up to 35 T, where it exceeds the zero field T_N. Additional microscopic measurements are required to establish the origin of this phase and to comprehend its unusual robustness against magnetic field.

Figure: Magnetic phase diagram of Ce_2RhIn_8 obtained from specific-heat measurements performed as a function of temperature (solid symbols) and magnetic field (open symbols) for a field applied along the a (top panel) and c (bottom panel) axis. Lines are guides for the eye.

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Exotic magnetic phase diagram and extremely robust antiferromagnetism in Ce_2RhIn_8, T. Klein, C. Marcenat, A. Demuer, J. Sarrade, D. Aoki, and I. Sheikin, **Phys. Rev. B 111**, L201110 (2025).

IMPACT OF LOW-ENERGY SPIN FLUCTUATIONS ON THE STRANGE METAL IN A CUPRATE SUPERCONDUCTOR

David LeBoeuf, LNCMI-Grenoble, and Cyril Proust, LNCMI-Toulouse

Strange metals – which exhibit unusual properties such as a resistivity that scales linearly with temperature – challenge our understanding of charge transport in metals. A general and puzzling feature of a strange metal is a linear-in-temperature resistivity existing over a wide region of the phase diagram in the limit of low temperatures. In contrast, a linear resistivity down to the lowest temperature is observed in quantum critical metals, but only at a singular parameter in the phase diagram. A common ingredient for theories of strange metals is often the existence of a low-energy degree of freedom that can effectively couple to charge carriers down to the lowest temperature. In high-T_c cuprate superconductors, the nature and origin of these low-lying excitations remains elusive.

We used fields as high as 86 T to explore the physics of strange metals in the cuprate superconductor $La_{2-x}Sr_xCuO_4$ (LSCO). Close to the critical hole-doping concentration of the pseudogap p = 0.19, we discovered that a temperature-linear resistivity exists down to the lowest temperature over an extended range of magnetic fields, between 60 and 70 T or so, and disappears above (see figure 1a). Indeed, above 70 T, a spin-glass phase gradually appears, as demonstrated previously using ultrasound measurements, and causes the end of strange metallicity, as outlined schematically in the phase diagram of figure 1b. In the region where low-temperature magnetic fluctuations exist, as proven by previous NMR and ultrasound measurements, a linear-in-temperature resistivity appears over an extended range of magnetic field (green area in figure 1b). Thus, the strange metal can be controlled with a field, via spin dynamics, and the strange metal phase is closely linked to low-energy magnetic fluctuations that persist at the lowest temperatures.

Our results show that the field-dependent magnetism drives the magnetoresistance, a mechanism which had been completely overlooked so far. Resistivity upturns, a signature of a metal-insulator crossover of LSCO, appear at low temperatures in the spin-glass phase. This demonstrates that the metal-insulator crossover is linked to the freezing of spins, which elucidate a long-standing mystery of cuprate superconductors.

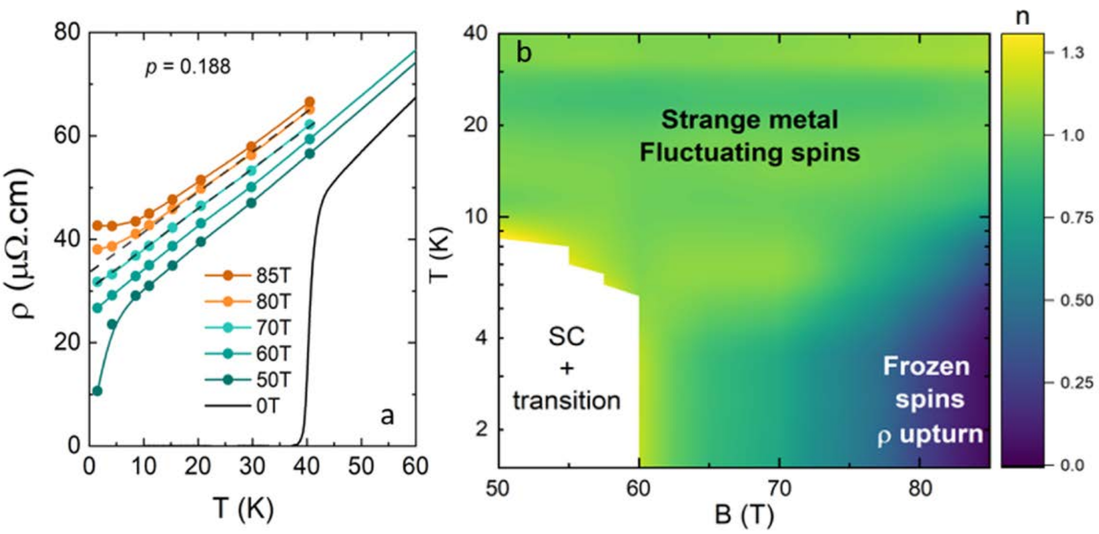

Figure 1: a) Resistivity of LSCO with hole concentration p = 0.188, near the pseudogap critical doping, as a function of temperature at various magnetic fields. Dashed lines are fits to the data. b) False-color plot of the exponent n of the temperature-dependent in-plane resistivity $\rho(T) = \rho_0 + aT^n$. It is obtained from interpolation of $(d\ln(\rho(T)-\rho_0)/d\ln T)$ calculated for different magnetic fields. The white area corresponds to the superconducting phase and the resistive transition. ρ_0 is the residual resistivity extrapolated to T = 0 from linear fits as shown in panel a.

Impact of low-energy spin fluctuations on the strange metal in a cuprate superconductor, D. J. Campbell, M. Frachet, V. Oliviero, T. Kurosawa, N. Momono, M. Oda, J. Chang, D. Vignolles, C. Proust, and D. LeBoeuf, **Nat. Phys. (2025)**.

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INFLUENCE OF HYSTERESIS ON MAGNETO-CALORIC PERFORMANCE AT CRYOGENIC TEMPERATURES

Tino Gottschall, HLD

The magnetocaloric effect – the temperature change of a magnetic material due to the application or removal of a magnetic field – offers an environmentally friendly alternative for refrigeration. In particular for cryogenic applications, there are numerous metamagnetic materials that transform from an antiferromagnetic to a ferromagnetic state. The conventional characterization method, which uses magnetization data and the Maxwell relation, predicts a strong so-called inverse magnetocaloric effect in many of these materials.

An international team of researchers recently used the compound Tb_3Ni as a case study to question and correct this methodology. Through a comprehensive experimental approach, the team uncovered a significant discrepancy between different measurement techniques. While the conventional method predicts a pronounced inverse magnetocaloric effect, specific-heat measurements show no evidence of such an effect at all (figure 1a).

The clear evidence came from direct measurements of the adiabatic temperature change (ΔT_{ad}) conducted in pulsed high magnetic fields at the Dresden High Magnetic Field Laboratory. These experiments detected significant heating below about 40 K caused by dissipative processes linked to the material's magnetic hysteresis (figure 1b). This dissipative heating is a critical factor for any real-world application, but is completely overlooked by static magnetization measurements. A simple model illustrates that this issue is not limited to Tb_3Ni, but is a fundamental problem that can occur in a wide range of materials with hysteresis.

These findings establish that a multi-technique approach is necessary for a reliable characterization of magnetocaloric materials. In particular, direct measurements of the adiabatic temperature change in pulsed fields are crucial to capture the dynamic behavior and energy losses inherent to magnetocaloric materials, ensuring a realistic assessment of a material´s suitability for cryogenic magnetic refrigeration.

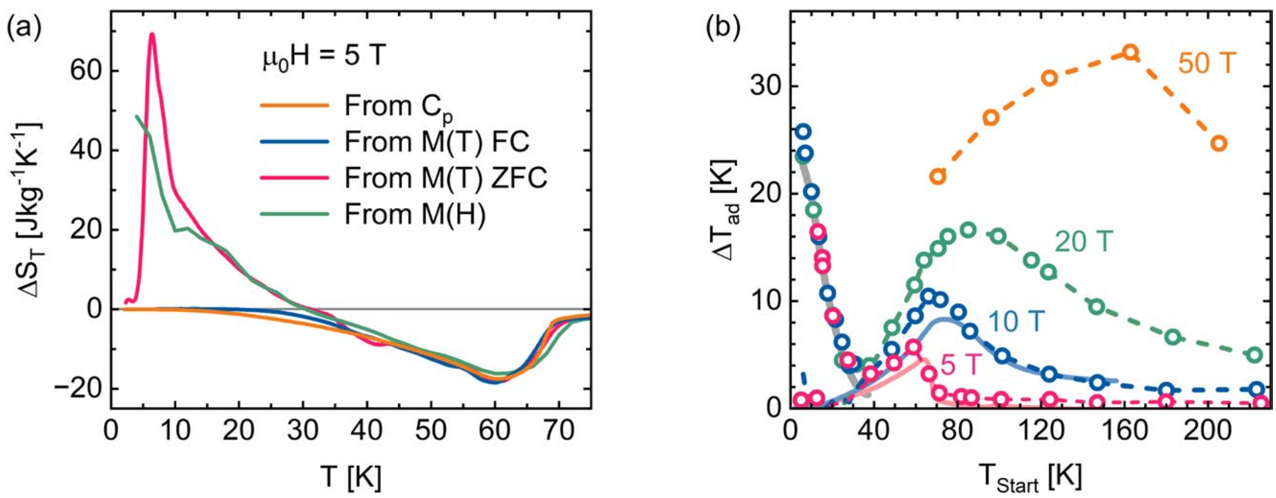

Figure 1: (a) Isothermal entropy change ΔS_T calculated from specific-heat, temperature-dependent zero-field-cooled (ZFC), field-cooled (FC), and field-dependent magnetization data, measured for a field change from 0 to 5 T. (b) Maximum adiabatic temperature change (ΔT_{ad}) as a function of initial sample temperature (T_{Start}) in pulsed magnetic fields. Circles represent the measured ΔT_{ad}. Solid lines (pink and blue) indicate adiabatic temperature changes indirectly determined from specific-heat measurements. The grey solid line (below 40 K) indicates the dissipative heating.

Influence of hysteresis on magnetocaloric performance at cryogenic temperatures: A Tb_3Ni case study, T. Niehoff, B. Beckmann, K. Skokov, A. Herrero, A. Oleaga, E. Bykov, C. Salazar Mejía, M. Straßheim, O. Gutfleisch, J. Wosnitza, and T. Gottschall, **Adv. Funct. Mater. 35**, 2505704 (2025).

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OPENING OF THE THIRTY-FOURTH CALL FOR ACCESS

On October 15, 2025, EMFL launched the 34th 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.
› emfl.eu/SelCom/login.php

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.
› emfl.eu/SelCom/UserCommittee/feedbackform.php

The deadline for proposals for magnet time is November 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.

› hzdr.de/hld
› lncmi.cnrs.fr
› ru.nl/en/hfml-felix

EMFL
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.

REGIONAL NORDIC-BALTIC MEETING

As part of the EU-funded ISABEL project, Raivo Stern organized a regional Nordic-Baltic meeting in Tallinn and Vihula, Estonia. From July 28 until August 1, 2025, EMFL users and representatives joined with participants from Estonia, Lithuania, Latvia, and Sweden to intensify ties between EMFL und their user community, but also to present newest developments in the science possible with highest magnetic fields.

The scientific part of the meeting took place in Vihula Manor, a place one-hour drive from the capital city of Estonia, Tallinn. The venue, marvelously located in the Lahemaa National Park near the Baltic Sea coast, was well chosen by Raivo Stern, chair of the EMFL User Committee as well as chair of the meeting. Organized by the Estonian Magnetism Laboratory (EstMagLab) and the National Institute of Chemical Physics and Biophysics (NICPB/KBFI), the meeting brought together researchers, students, and professionals in the field of magnetism and materials science across Europe. It was co-sponsored by the EU's first sintered NdFeB magnet factory, NEO NPM Narva.

The three-day event offered engaging talks, poster sessions, and networking opportunities in a historical surrounding. The meeting was devoted to high-magnetic-field research of materials in the field of chemistry, physics, and engineering. It showed the possibilities in high-field research offered by the EMFL facilities and stimulated collaboration between the Nordic-Baltic community and other groups in Europe. Before departure, the participants had the opportunity to visit the labs of NICPB/KBFI.

In various discussions, all participants of the meeting expressed their satisfaction with the scope and results of the ISABEL project. There was a clear desire and willingness to apply for a new EU project with similar priorities – transnational access (TNA), new access modes, expansion of the EMFL partnership, etc. – in the near future.

› **kbfi.ee/?lang=en**
National Institute of Chemical Physics and Biophysics (NICPB/KBFI), Tallinn (Estonia)

› **kbfi.ee/estmaglab**
Estonian Magnetism Laboratory (EstMagLab)

› **neomaterials.com/estonia/**
NEO Performance Materials Narva magnet factory

› A group photo taken in front of the Vihula Mansion picturing 32 of the 36 participants of the regional meeting.

GLOBAL HiFF MEETING IN BOSTON

A GLOBAL HIGH MAGNETIC FIELD FORUM

On 4th of July 2025, leaders of the global high-magnetic-field laboratories joined for a Global High Magnetic Field Forum (HiFF) meeting in Boston, USA, during the MT29 conference. After the first assembly 2014 in Potsdam, HiFF members meet regularly to discuss issues related to the development, scientific use, and promotion of high-magnetic-field user facilities.

In Boston, representatives from China (with Liang Li from the Wuhan National High Magnetic Field Center presiding), Japan (University of Tokyo/Institute for Solid State Physics – ISSP and Tohoku University), USA (National High Magnetic Field Laboratory), and EMFL presented the status of their facilities and discussed future perspectives of the high-field laboratories. Further, the HiFF members addressed organizational issues related to the next International Conference on Research in High Magnetic Fields (RHMF). Yasuhiro Matsuda (ISSP) introduced the planning status with the RHMF scheduled from September 28 to October 2, 2027 in Kashiwa, Japan.

› **globalhighfieldforum.org**
Global High Magnetic Field Forum (HiFF)

› **mt29-conf.org**
2025 International Conference on Magnet Technology (MT29)

FIRST NMR EXPERIMENT AT 42 T IN LNCMI'S HYBRID MAGNET

After reaching 42 T in November 2024, researchers performed a first scientific nuclear magnetic resonance (NMR) experiment at LNCMI's hybrid magnet in June 2025. They achieved two objectives during this test run, despite the short measurement period of only three days. This was possible thanks to the strong involvement of all participants, researchers, and engineers responsible for the operation of the cryogenic plant and the power supplies.

The scientific goal was the investigation of $SrCu_2(BO_3)_2$ by ^{63,65}Cu NMR. This material is a frustrated, two-dimensional spin-1/2 system, which exhibits a series of magnetization plateaus above 27 T. The study of these plateaus by NMR is of high interest in order to distinguish between different theoretical models. For this purpose, the researchers recorded the first ever broadband NMR spectrum above 40 T, namely at 42 T and 0.4 K. The spectrum covers a range from 210 to 700 MHz and provides the local magnetic field values at the copper sites of $SrCu_2(BO_3)_2$ in the 1/3 magnetization plateau.

Prior to the scientific experiment, the scientists recorded the field homogeneity and stability at 42 T by ^{27}Al NMR of a 1 mm^3 sample. Near the center of the magnet, the spatial field profile follows the expected behavior and provides about 10 ppm field homogeneity in 1 mm^3. The standard deviation of the magnetic-field fluctuations, recorded by single scan NMR, was 5 ppm and the long-term drift over 6.5 hours was 10 - 15 ppm. These values are perfectly adequate for solid-state NMR and even slightly better than in pure resistive magnets due to the better field homogeneity and stability of the superconducting outsert. It should be noted that this study also proved that the hybrid magnet can operate at full power for more than 6.5 hours.

The success of this first NMR experiment, based on the excellent magnetic-field quality of the hybrid magnet, is the result of years of development by the hybrid team consisting of experts at LNCMI, CEA, and various external partners, as well as the NMR team and other technical groups at LNCMI responsible for magnet development, high-power current sources, and scientific instrumentation. It marks a milestone towards regular user operation in the near future.

› lncmi.cnrs.fr/en

› NMR probe, ^{3}He insert, and ^{4}He bath cryostat installed on the user platform of the LNCMI hybrid magnet.

JOINT PRESENTATION BY BMAX/I-CUBE RESEARCH AND EMFL

The International Conference on High Speed Forming is the largest gathering of experts in the field of impulse-based metalworking. At the 2025 edition in Dortmund, Germany, EMFL shared a booth with Bmax/I-Cube Research, one of our industrial partners within the ISABEL project.

From August 26 to 27, 2025, EMFL as well as Bmax/I-Cube Research representatives presented their latest findings on the conference. Simon Tardieu of LNCMI-Toulouse explained his research on the impact of high-strain rate and high pressure on mechanical properties and microstructure of copper single-turn coils generating megagauss fields. For I-Cube Research, Jean-Paul Cuq-Lelandais shared his work on magnetic-pulse crimping of power cables with respect to process simulation and performance characterization. His colleague Nicolas Mrozowski talked about the determination of high-strain-rate behavior of a CuCrZr alloy using an electromagnetic forming test bench, focussing on the challenges of dynamically characterizing flat and thin metallic conductors used in pulsed magnets. The results he presented are outcomes of the collaboration between Bmax/I-Cube Research and LNCMI-Toulouse.

Metal forming under dynamic loading

The significant benefits offered by high strain rates in the field of metal forming being well established, accurately modeling material behavior under dynamic loading is crucial. To address this issue, I-Cube Research has designed an electromagnetic forming test bench to calibrate the behavior of ductile metallic materials under dynamic conditions. Easier to operate than split Hopkinson pressure bars, this test bench can achieve strain rates of 1,000 times per second.

The method involves using a flat specimen as a short circuit. A very fast discharge of electrical energy in the system generates Lorentz forces that rapidly deform the specimen. The displacement and speed of the specimen center is measured by photonic doppler velocimetry. Measuring the speed of the specimen center enables to determine the mechanical loading. Once the main deformations reach the center, a deceleration is observed. The speed measurements during the deceleration phase are used in an inverse method to calibrate the behavior such as described in the Johnson-Cook, Zerilli-Armstrong, and Cowper-Symonds models. The study focused on a wrought CuCrZr alloy and aimed to highlight the numerous technical advantages of this methodology, as well as its limits.

Overall, the conference was a great opportunity to showcase the potential of the EMFL high-field laboratories and to promote our collaboration with industry.

› The two teams from I-Cube Research and EMFL at the conference booth: Simon Tardieu – EMFL, Eric Giraud, Benoit Lagain, Jean-Paul Cuq-Lelandais, and Nicolas Mrozowski – Bmax/I-Cube Research, Florence Lecouturier-Dupouy and Inès Dupon-Lahitte – EMFL (from left to right).

› **ipulse-group.com/our-businesses/i-cube**
Bmax/I-Cube Research

UPCOMING EVENTS

Evening view of Stuttgart (Germany)

1 DPG Spring Meeting of the Condensed Matter Section, Dresden, Germany, March 8-13, 2026.
dresden26.dpg-tagungen.de

2 Joint March Meeting and April Meeting (APS Global Physics Summit), Denver, USA, March 15-20, 2026.
summit.aps.org

3 International Magnetics Conference (INTERMAG 2026), Manchester, UK, April 13-17, 2026.
intermag2026.org

4 11th International Conference on Superconductivity and Magnetism (ICSM2026) & 4th International Conference on Quantum Materials and Technologies (ICQMT2026), Ölüdeniz-Fethiye, Turkey, April 19-26, 2026.
icsmforever.org

5 The European Conference Physics of Magnetism (PM'26), Poznań, Poland, June 22-26, 2026.
ifmpan.poznan.pl/pm26

6 27th International Conference on Science and Technology of Synthetic Electronic Materials (ICSM 2026), Rio de Janeiro, Brazil, July 19-24, 2026.
icsm2026.com

7 Materials and Mechanisms of Superconductivity (M2S 2026), Stuttgart, Germany, July 19-25, 2026.
m2s-2026.org

8 International Conference on Strongly Correlated Electron Systems (SCES 2026), Toyama, Japan, September 27 - October 2, 2026.
smartconf.jp/content/sces2026

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The ISABEL project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 871106.

IMPRINT

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

Printing:
reprogress GmbH

Layout:
Anita Kluge . machzwei

EMFLNEWS, the newsletter of the European Magnetic Field Laboratory, is published quarterly. Printed on FSC-certified paper.
ISSN 2196-0909 3/2025

www.emfl.eu

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