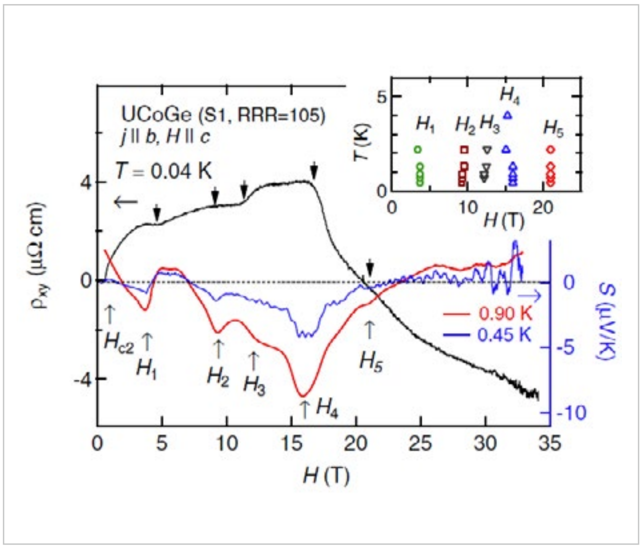
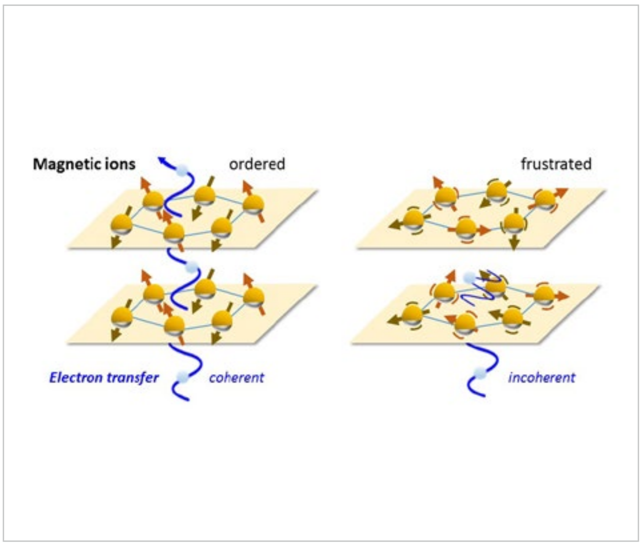
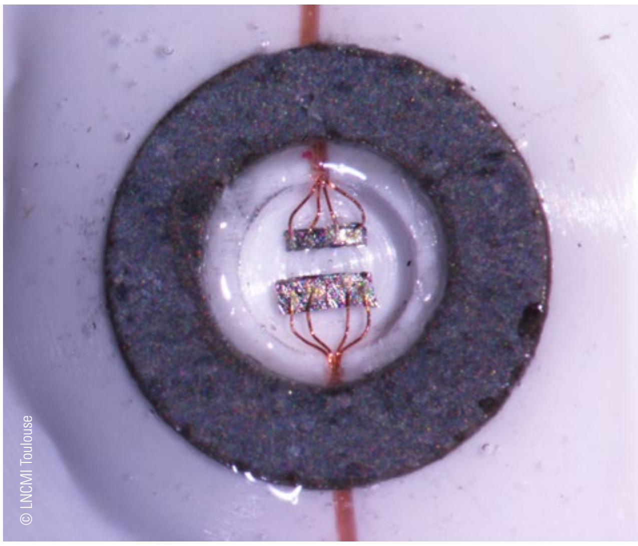
European Magnetic Field Laboratory

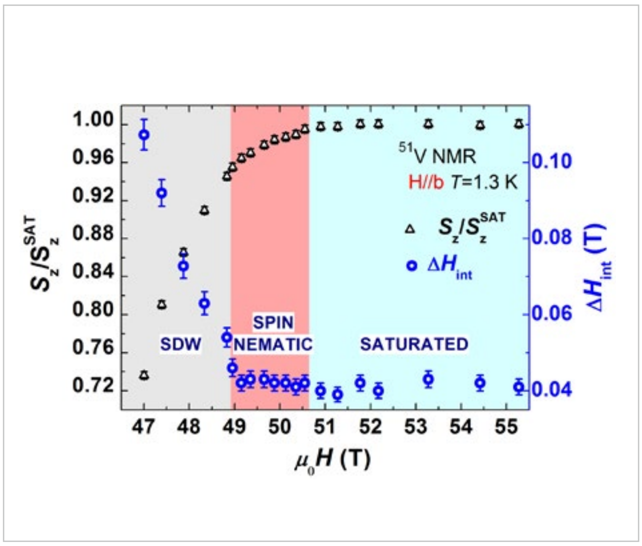
EMFLNEWS

N°2 2017









CONTENTS

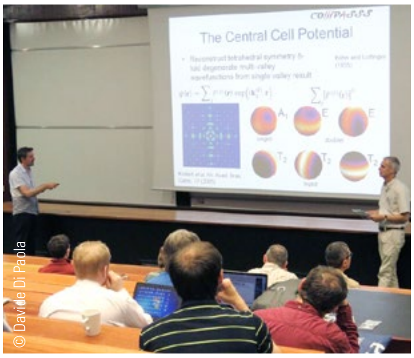
DEAR READER

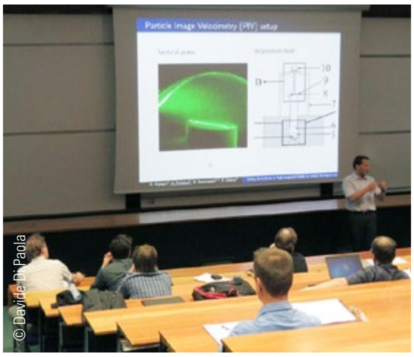
An important mission of the EMFL is to provide the best possible infrastructure for excellent research in high magnetic fields. Our efforts to make the EMFL infrastructure as attractive as possible for research are based on the needs of our users worldwide. For continuously improving our facilities we need the close contact with and feedback from our valued "customers". We, therefore, welcome any criticism pointing out what could be improved in our facilities. That may be suggestions for improving administrative issues, ideas for new experiments, or requests for special magnets and instrumentation. We invite our users to submit such kind of feedback, anonymously if wished, via our user committee. Feedback forms are available on the user page of the EMFL website.

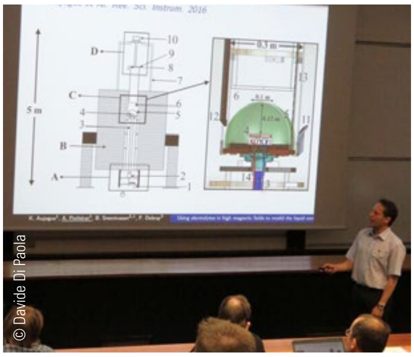
Direct contact with a large number of our users we enjoyed during the User Meeting in Nottingham. This year, the meeting was hosted by Prof. Amalia Patanè (The University of Nottingham, UK) on June 23, 2017. During the meeting the EMFL prize was conferred to Sven Badoux for his outstanding high-field research. You may find more on this as well as on the outcome of the last proposal round and a selection of EMFL research highlights in this issue of the EMFL News.

Have a stimulating reading,
Jochen Wosnitza
Director HLD
Chairman EMFL

IMPRESSIONS OF THE EMFL-USER-MEETING







Read more about the meeting on page 9 and 10.

LIFSHITZ TRANSITIONS IN THE FERROMAGNETIC SUPERCONDUCTOR UCoGe

Alexandre Pourret and Georg Knebel, CEA Grenoble, Gabriel Seyfarth and Ilya Sheikin, LNCMI Grenoble

Lifshitz transitions (LTs) appear, for example, as continuous quantum phase transitions at zero temperature where the topology of the Fermi surface changes due to the variation of the Fermi energy and the band structure of a metal. They were already studied back in the 1960s and can be induced by chemical doping, pressure, or a strong magnetic field. However, only recently have LTs been proposed as the driving force modifying the ground-state properties in strongly correlated electron systems. The interplay of a LT with magnetic quantum phase transitions in heavy-fermion systems has been treated in various theoretical models. The influence of LTs on the appearance of superconductivity is discussed in cuprates, iron pnictides, and sulfur hydride as well as for the reentrance of superconductivity in URhGe.

UCoGe orders ferromagnetically at 2.7 K. Remarkably, the coexistence of ferromagnetism and heavy-fermion superconductivity is observed below 0.6 K. Besides the exceptional superconducting properties, some normal-state features of UCoGe are unique as well. The spontaneous magnetization in the ferromagnetic state is very small, $M_0 \approx 0.05\ \mu_B$/U. For magnetic fields aligned parallel to c, the magnetization increases nonlinearly and shows a broad kink at about 23 T, but even at 50 T it is far from saturation. Another striking point is the detection of well-separated anomalies in the magnetoresistance for this field orientation, while the magnetization data rule out thermodynamic phase transitions as a function of field at least down to 1.5 K.

In order to study the field dependence of the Fermi-surface properties in the highly polarizable heavy-fermion system UCoGe, researchers from Grenoble performed systematic resistivity (ρ), Hall effect (ρ_{xy}), and thermopower (S) experiments. At least five successive anomalies were observed above the superconducting critical field $H_{c2} \approx 0.6$ T in both Hall effect and thermopower (Figure). The transitions get less pronounced with increasing temperature and disappear above 3 K, while their field position does not change. The clear signatures of these transitions in transport properties $\rho_{xy}(H)$ and S(H) and the absence of any marked phase transition in thermodynamic properties suggest that they are related to topological Fermi-surface changes. This was indeed confirmed by quantum-oscillation measurements.

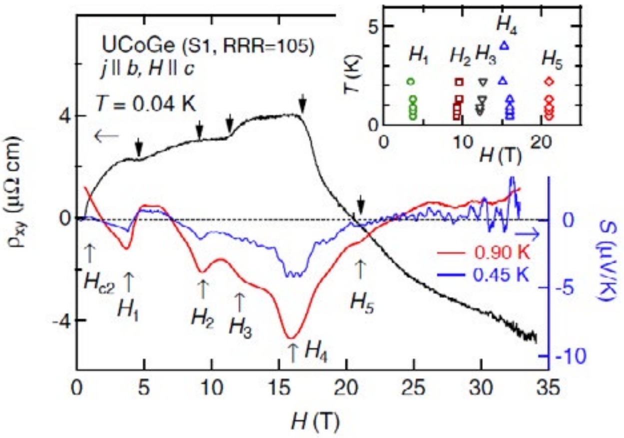


Figure: Hall effect ρ_{xy} at 40 mK (left scale) and thermopower S at 900 and 450 mK (right scale) of UCoGe as a function of magnetic field. A series of transitions can be observed as a function of field. The inset shows the temperature dependence of the anomalies in the thermopower.

Lifshitz Transitions in the Ferromagnetic Superconductor UCoGe, G. Bastien, A. Gourgout, D. Aoki, A. Pourret, I. Sheikin, G. Seyfarth, J. Flouquet, and G. Knebel, Phys. Rev. Lett. **117**, 206401 (2016).

Contact: ilya.sheikin@lncmi.cnrs.fr

FRUSTRATED ELECTRONS REFUSE TO TUNNEL

S. Ghannadzadeh, N. E. Hussey, HFML Nijmegen

Scientists of the European Magnetic Field Laboratory in Nijmegen have shown that decoherence between layers of a metallic system is linked to a loss of long-range magnetic order in the material. It is the first time that the cause of loss of interlayer coherence was experimentally shown.

Many of the most topical and interesting metallic systems, such as the high-temperature superconductors, have a layered crystal structure. As a result, an electrical current flows much more easily within the layers than between them. In certain extreme cases, electrons are prevented from tunneling coherently (i.e., preserving their periodic wave-like motion) across adjacent layers; the electrons essentially become confined to individual layers and their motion between layers becomes diffusive. What induces this loss of interlayer coherence, however, has not been established in any material, though there has been much theoretical speculation as to the possible origin(s).

In a high-field study at the HFML it was now discovered that a key signature of interlayer coherence in the frustrated triangular antiferromagnet $PdCrO_2$ vanishes precisely at the temperature at which long-range magnetic order is lost. Moreover, through comparison with the isostructural non-magnetic $PdCoO_2$, the scientists were able to demonstrate that it is the loss of long-range magnetic order (and the subsequent development of short-range magnetic fluctuations) that destroy interlayer coherence of the conduction electrons and not the loss of interlayer coherence that destroys the long-range magnetic order.

Thus, while the spins on the Cr ions are ordered, the conduction electrons within the Pd-O plane are able to tunnel coherently from one layer to the next. However, above the ordering temperature, the now-fluctuating spins begin to scramble (scatter) the conduction electrons sufficiently to inhibit their ability to move coherently between the layers.

This study represents the first time that the cause of decoherence has been experimentally linked to a fundamental change in a material, in this case the loss of long-range magnetic order. By establishing this link, this study may have major implications for our understanding of interlayer coherence in a host of other low-dimensional metals that lie in close proximity to an ordered phase, be it of magnetic, electrostatic or orbital origin.

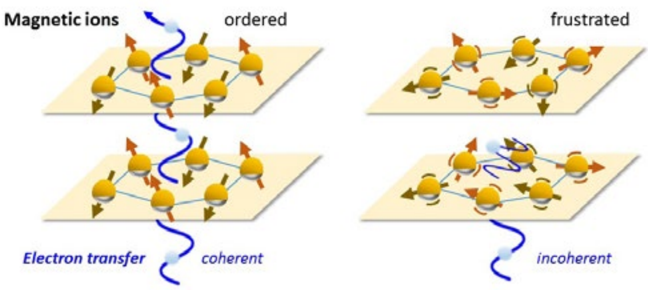


Figure: Schematic of the transition from coherent interlayer tunneling in the ordered state of $PdCrO_2$ below the Néel temperature T_N to incoherent tunneling in the frustrated state above T_N.

Simultaneous loss of interlayer coherence and long-range magnetism in quasi-two-dimensional $PdCrO_2$, S. Ghannadzadeh, S. Licciardello, S. Arsenijevic, P. Robinson, H. Takatsu, M. I. Katsnelson, and N. E. Hussey, Nat. Commun. **8**, 15001 (2017).

Contact: Nigel.Hussey@ru.nl

A BREAKTHROUGH FOR EXTREME CONDITIONS: COMBINED HIGH PRESSURE AND PULSED MAGNETIC FIELD

William Knafo, LNCMI-Toulouse, Daniel Braithwaite, CEA-Grenoble, Rikio Settai, University of Niigata

Combined extreme conditions of high pressure and strong magnetic field are an extremely powerful tool to tune microscopic interactions in order to attain and study new states of matter. While high-pressure measurements in static magnetic fields are a state-of-the-art technique up to the maximum available static fields, specific challenges (eddy currents, small accessible space, etc.) need to be overcome for the combination of high pressures with much higher magnetic fields, i.e., pulsed fields. Up to now, no setup allowed routine measurements of this kind at pressures higher than 1.5 GPa.

A French-Japanese collaboration between the LNCMI Toulouse, the CEA Grenoble, and the University of Niigata recently succeeded to develop a pressure cell allowing resistivity measurements in combined pulsed magnetic fields up to 60 T, pressures up to at least 4 GPa and temperatures down to 1.5 K. The first study permitted to establish the full three-dimensional (T, H, p) phase diagram of an Ising-type antiferromagnetic system ($CeRh_2Si_2$), with a systematic and careful comparison of pressure and magnetic-field-induced quantum phase transitions.

This new tool, unique worldwide, opens many perspectives in a wide range of subjects including the study of itinerant quantum magnets, high-temperature superconductors, and the new and exciting topic of exotic topological states.

Development of Bridgman-Type Pressure Cell for Pulsed High Magnetic Field, R. Settai, W. Knafo, D. Braithwaite, S. Kurahashi, D. Aoki, and J. Flouquet, Review of High Pressure Science and Technology / Koatsuryoku No Kagaku To Gijutsu **25**, 325 (2015).

Pressure cell for transport measurements under high pressure and low temperature in pulsed magnetic fields, D. Braithwaite, W. Knafo, R. Settai, D. Aoki, S. Kurahashi, and J. Flouquet, Rev. Sci. Instrum. **87**, 023907 (2016).

Three-dimensional critical phase diagram of the Ising antiferromagnet $CeRh_2Si_2$ under intense magnetic field and pressure, W. Knafo, R. Settai, D. Braithwaite, S. Kurahashi, D. Aoki, and J. Flouquet, Phys. Rev. B **95**, 014411 (2017).

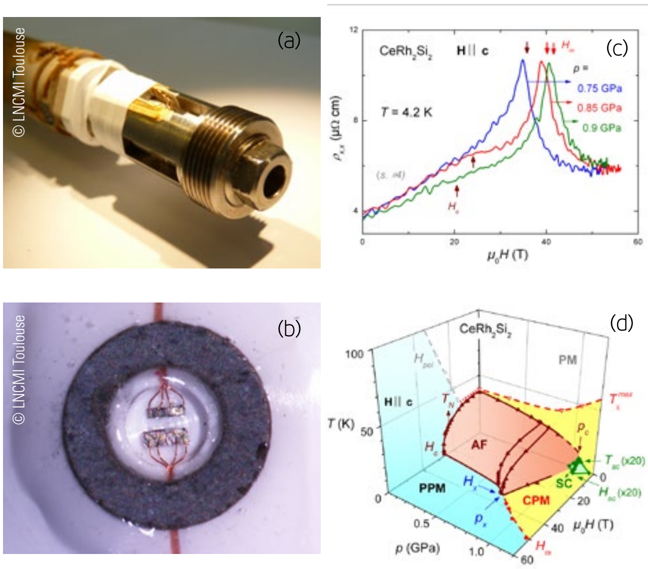


Figure: (a) Pressure cell on the pulsed field probe. (b) A sample in the pressure chamber together with a Pb gauge used as a manometer. (c) Magnetoresistance curves up to 60 T of the antiferromagnetic system $CeRh_2Si_2$ at several pressures close to the critical pressure. (d) Phase diagram of $CeRh_2Si_2$ illustrating how the antiferromagnetic order can be suppressed by temperature, pressure, and magnetic field.

Contact: william.knafo@lncmi.cnrs.fr

EVIDENCE FOR SPIN NEMATICITY IN $LiCuVO_4$

Anna Orlova, LNCMI-Toulouse and Elizabeth Green, HLD Dresden

Frustrated magnetism has generated interest over the years due to the emergence of novel states, most notably when exposed to high magnetic fields. According to theoretical work, bound magnon pairs can condense in cases where competing exchange interactions occur, thus forming a new quantum phase, referred to as a quantum spin-nematic state. Spin nematicity can be compared to the classical nematic order found in liquid crystals. Some years ago, it was proposed that $LiCuVO_4$, a frustrated magnetic compound consisting of spin-½ Cu^{2+} chains, was a good candidate for exhibiting spin-nematic order. However, experimental evidence remained elusive due to the high magnetic fields required and the sensitivity of spin nematicity on sample defects.

A high-quality $LiCuVO_4$ sample was grown at the Max-Planck-Institute for Solid State Research in Stuttgart and together with scientists from three of the EMFL facilities (Toulouse, Dresden, and Grenoble), clear evidence was provided in support of the presence of the spin-nematic state. The experiment posed a technological challenge due to the short data-acquisition time. For the H || b orientation, magnetic fields above 51 T were necessary, thus precluding the possibility of measurements in DC magnetic fields. A newly constructed homogeneous pulsed-field magnet with a rise time of 70 ms was utilized in combination with a spin-echo sequence with sufficiently short pulses to allow for a bandwidth of 1.2 MHz.

The "tour de force" ^{51}V nuclear magnetic resonance (NMR) measurements were performed in pulsed magnetic fields up to 56 T which demonstrate the developing homogeneous local magnetization without any transverse dipolar (vector-type) order (see Figure), in agreement with theoretical predications for a spin-nematic state. These results not only prove the efficacy of NMR in pulsed magnetic fields, but also highlight the successful scientific cooperation within EMFL.

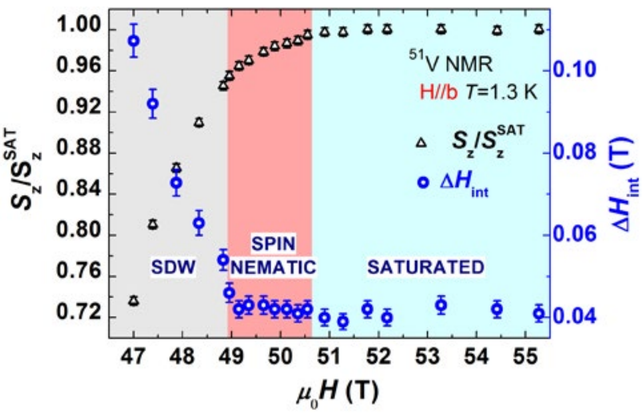


Figure: Open triangles represent the normalized spin polarization, S_z/S_z^{SAT}, up to 56 T for H//b, shifting in accordance with high-field magnetization. However, the NMR linewidth (open blue circles) is not changing around 49 T, as expected in theory.

Nuclear magnetic resonance signature of the spin-nematic phase in LiCuVO4 at high magnetic fields, A. Orlova, E. L. Green, J. M. Law, D. I. Gorbunov, G. Chanda, S. Krämer, M. Horvatić, R. K. Kremer, J. Wosnitza, and G. L. J. A. Rikken, Phys. Rev. Lett. **118**, 247201 (2017).

Closing in on a magnetic analog of liquid crystals, Viewpoint article by Frédéric Mila featured in: Physics **10**, 64 (2017).

Contact: annayuorlova@gmail.com, e.green@hzdr.de

RESULTS OF THE SEVENTEENTH CALL FOR ACCESS

On May 15th, 2017, the 17th call for access ended inviting proposals for research requiring access to the large installations for high magnetic fields collaborating within EMFL.

The four facilities

- LNCMI - Grenoble - France: Static magnetic fields to 36 T
- HFML - Nijmegen - the Netherlands: Static magnetic fields to 37.5 T
- HLD - Dresden - Germany: Pulsed magnetic fields to beyond 95 T
- LNCMI - Toulouse - France: Pulsed magnetic fields of long duration, to over 90 T and on the microsecond scale to beyond 180 T

operate a joint application and evaluation program, which allows full access to their installations and all associated scientific infrastructure to qualified external users, together with the necessary support from their scientific and technical staff.

For this 17th call 159 applications from 23 different countries were received which have been evaluated by the selection committee until July 22nd, 2017. The Selection Committee consists of 18 specialists covering the five types of scientific topics

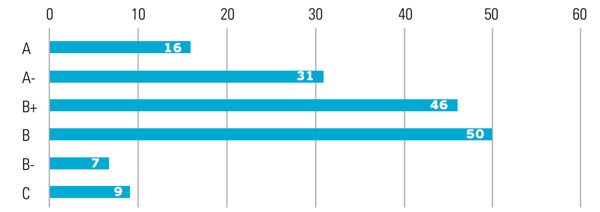
- Metals and Superconductors (36 applications),
- Magnetism (59 applications),
- Semiconductors (46 applications),
- Soft Matter and Magnetoscience (10 applications),
- Applied Superconductivity (8 applications),

Besides of ranking the proposals the committee decides on the number of accepted magnet hours or number of pulses.

NEXT CALL :

Launch: October 15, 2017

Deadline: November 15, 2017



Evaluation of applications

Projects are classified in three classes:

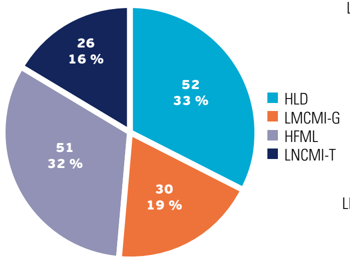
A (excellent proposal to be carried out),

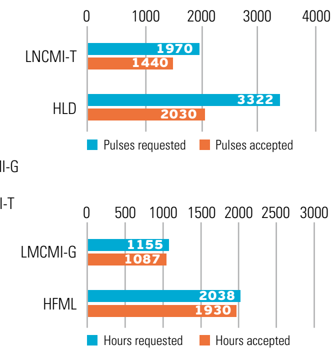
B (should be performed but each facility has some freedom considering other constraints),

C (poor proposal or one that does not need any of the four unique high magnetic field laboratories).

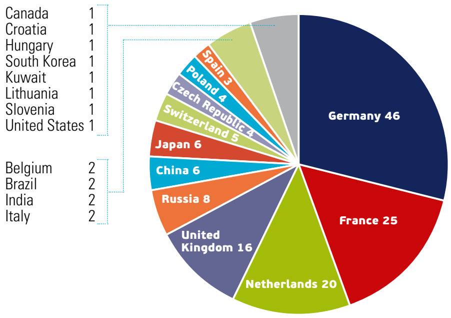
In the B category, the ranking + or - serves as a recommendation to the facility. This freedom within the B category is necessary to allow the facilities to consider other aspects such as, for instance, available capacity and equipment necessary for a successful project.

Distribution by facilities
Number of applications





Distribution by countries
Number of applicants



MEET OUR PEOPLE

Xavier Chaud, LNCMI Grenoble

I am in charge of the development of the high-temperature superconductor (HTS) technology at LNCMI. The HTS are very promising materials known to carry current without Joule dissipation or to levitate small permanent magnets at the temperature of a liquid-nitrogen bath (77 K). What is of special interest for a high magnet field facility is that they can still carry current at liquid-helium temperature well beyond the field limit of low-temperature superconductors such as Nb_3Sn. Thus, HTS insert coils could be used to increase the actual performance of superconducting magnets beyond 25 T.

My activity at LNCMI has two aspects: First, I am acting as a local contact providing support for any proposal related to the characterization of HTS under high magnetic fields in view of their application. Then, I lead the in-house research program for developing HTS magnet technology in the frame of several collaborations. LNCMI provides a unique set of room-temperature magnet-bore configurations allowing to test small samples up to 30 T, but also large coils up to 20 T or even larger dipoles up to 10 T. This special strength of the facility provides a lot of opportunities. I am currently coordinator of the project NOUGAT which has nothing but the name of the confectionary from Montélimar, the capital of nougat. We are aiming at fabricating and testing a 10 T HTS insert into a 20 T background field.

Where do you come from?

My birth place is Manosque, the town of the French writer Jean Giono („Les vraies richesses"). More informative for the research and magnet community might be that the place is close to Cadarache, where ITER is being constructed.

What is your professional background?

Initially, I am a material engineer from the Université de Technologie de Compiègne, 80 km north of Paris. I had the opportunity to make a master of science in materials engineering at the University of Houston. That is where I came into contact with YBaCuO superconductors. During this time, when the HTS activity was blooming, I had the chance to meet Prof. Robert Tournier who convinced me to pursue a PhD in physics in Grenoble. For more than 25 years I am working now with HTS materials, first cooking bulk pellets for levitation purposes, and, since 2010, using and investigation HTS tapes for realizing high-field coils. I like this surprising material.

What do you like about your job at LNCMI and EMFL?

I like to combine local contact and project activities as well as research and engineering. It is a permanent enrichment. I like the human, internationally open environment, the mixture of scientific concerns from our users as well as technical issues requiring support from different backgrounds.

What are your perspectives?

HTS development is not a lonesome race. I already benefited from strong support within existing collaborations with other French labs and organizations as well as with Japanese colleagues. I am happy to strengthen the collaboration with international partners sharing our interest in HTS technology within EMFL projects.

› Xavier Chaud

EMFL USER MEETING

The ninth EMFL User Meeting, organized for the 5th time under the EMFL flag, was held at the University of Nottingham on 23rd June 2017. This was the first time that the User Meeting was held outside one of the EMFL high-field facilities and, with over 50 participants, represented one of the best attended as well. Nottingham was chosen as the venue to underline the increased collaboration of the UK community with EMFL, through the EPSRC mid-range facility grant that is being coordinated by Prof Amalia Patanè, who also hosted the meeting. The User Meeting included two scientific and one technical session, to showcase some of the most recent scientific highlights as well as new technical and instrumentational developments at the high-field facilities, prior to the User Committee meeting.

The technical session focussed on recent progress and developments in magnet technology: François Debray (LNCMI-G) reviewed reaching the highest fields using HTS materials, Sergei Zherlitsyn (HLD) novel possibilities with non-destructive and Atsuhiko Miyata (LNCMI-T) with semi-destructive methods. Jonathan Buhot (HFML) also presented recent advances to the high-field Raman spectrometer that is now available to users. The scientific highlights were of very high quality and covered many areas of topical interest including 2D materials, high-temperature superconductivity, hybrid photovoltaics, quantum computation, and frustrated magnets. The talks illustrated the wide variety of research topics that can be performed using intense magnetic fields.

The User Committee meeting was chaired by Prof Raivo Stern (NICPB, Tallinn, Estonia) who reported the outcome of the meeting and the suggestions of the Committee back to the Board of Directors at the end of the meeting. The written report of the EMFL User Committee can be found on the next page in this issue.

A tour through the unique facilities of the University of Nottingham, including the magnetic levitation facility and the Molecular Beam Epitaxy facility for the growth of graphene was offered by Prof Laurence Eaves and Dr Richard Hill.

We would like to thank all the staff at the University of Nottingham for their excellent organisation and for the diverse and inspiring meeting. The next EMFL meeting will be held at HFML in Nijmegen, the Netherlands in June 2018.

Geert Rikken gratulates the EMFL-prize winner Sven Badoux.

Amalia Patanè as a host of the EMFL user meeting welcomes the guests.

All participants of the EMFL user meeting come together for a group picture.

REPORT FROM THE ANNUAL EMFL USER COMMITTEE MEETING - UNIVERSITY OF NOTTINGHAM 23RD JUNE 2017

The EMFL User Committee meeting was held on the 23rd June 2017 at the University of Nottingham as part of the annual EMFL User Meeting. Six of the nine members of the User Committee (R. Stern, M. Doerr, C. Putzke, K. Prokes, S. Tozer, V. Skumryev) and several users attended the meeting with Prof. Stern chairing the committee. The meeting was followed by a discussion meeting with the Board of Directors of the EMFL and the user community. Several matters were discussed and recommendations made to the Board of Directors, as outlined below.

Members of the User Committee and its Mandate

Currently, the User Committee consists of 9 members, 3 new members (A. Arora, A. Pourret, V. Skumryev) started in 2017. With the user community of EMFL steadily growing, the new User Committee is asking for a renewed, much stronger mandate to represent the interests of the high-field users better. To allow users a more effective magnet use and to advise the Directors on all issues affecting users of the facilities the User Committee relies on more detailed information about the weaknesses and plans at the laboratories and, in particular, on continuous and informative user feedback.

User feedback

Following earlier recommendations of the User Committee, the EMFL has adopted an online user feedback form for all the laboratories of the EMFL. While on the first years this has facilitated a larger number of users providing feedback and comments on their experience at the installations of the EMFL, this year's outcome was close to nothing. To resolutely improve the amount and quality of feedback forms, the User Committee has requested:

a) all EMFL facilities to stimulate the users to provide their feedback to the User Committee;

b) to implement a feedback-request procedure with reminders within the next 6 months.

A revised and improved feedback form should include additional questions centered on scheduling experiments with the local contacts and assignment of magnet time.

EMFL membership

There are still various opportunities for new members to join the EMFL. Members of the EMFL are able to shape the EMFL policy, including future developments and user access. In December 2015, the UK has officially become a member of the EMFL with the support (2015-20) of The Engineering and Physical Sciences Research Council (EPSRC), the UK's main agency for funding research in engineering and the physical sciences. Other users from other countries (in particular Spain, Poland, and Estonia) should engage with their research councils to discuss a possible membership first to strengthen the EMFL and further to lay the basis for future funding opportunities within Horizon2020, which has identified high magnetic fields as a topical area for development of research infrastructures.

Finally, the User Committee acknowledged the Board of Directors for arranging an excellent user workshop where both users and representatives of the EMFL reported on recent developments of high-magnetic-field infrastructures/equipment, Raman spectroscopy in high magnetic fields, and research in topical areas ranging from transition-metal dichalcogenide (TMDC) monolayers to frustrated magnets and novel material systems of fundamental and technological interest. The user community received this rich program very well.

STUDENT EXCHANGE BETWEEN EMFL LABORATORIES: A SHORT REPORT

Roemer Hinlopen, HFML Nijmegen

In September 2016, I started my bachelor internship at the HFML Nijmegen working with Alix McCollam. In the months afterwards, I learned a lot about experimental research at the HFML and worked on understanding and analyzing de Haas-van Alphen measurements. As part of the Honours program of Radboud University, Nijmegen, my internship was extended, and part of it was spent abroad. In spring 2017, this eventually brought me to both HLD Dresden as well as LNCMI Grenoble.

During the last decades, a lot of scientific interest has been focused on quantum critical points (QCPs) and their frequent appearance in heavy-fermion compounds. Fermi-surface dimensionality is considered a key factor in understanding the electronic correlations in the vicinity of QCPs. Measuring these effects is the overall topic of my internship.

My first real experience with high-field measurements was in March at HLD Dresden, when I worked together with Tobias Förster, Ilya Sheikin, Matthias Raba, and Alix McCollam measuring $CePt_2In_7$. Here, I learned a lot about cooling, magnets, and general practice for pulsed-field experiments.

In April, I performed measurements at the HFML Nijmegen in order to measure the magnetic susceptibility of $CeIrIn_5$ with 1% Cd doping on the In sites. From earlier work, it is suggested that Cd doping tunes this material towards a potential QCP, expected at around 5% Cd. The measurements went well and the resulting data have inspired us to plan future measurements in the fall of this year.

During the entire month of May, I was at the LNCMI Grenoble working with Ilya Sheikin. In the first two weeks, I successfully performed angle-dependent de Haas-van Alphen measurements on $PrPt_2In_7$. During the remaining three weeks, I helped a group of external users to perform ^3He, high-pressure measurements up to 30 T, and analyzed all the data from my measurements on $PrPt_2In_7$, the results of which are summarized in the figure. The three principal branches in the figure closely resemble a 1/cos shape, which shows the two-dimensionality of the Fermi surface. These data are in very similar to data of $CePt_2In_7$, leading to the conclusion that the Ce 4f electron must be localized, as it is in the Pr compound.

Overall, I am very grateful that I had this unique opportunity for my bachelor internship. Travelling to several facilities of the EMFL changed my perspective on many levels, both as a physicist and as a person.

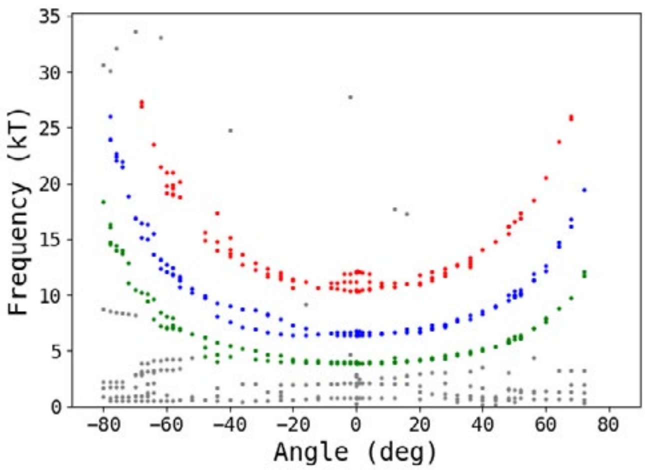


Figure: $PrPt_2In_7$ de Haas-van Alphen frequencies as a function of the sample orientation with respect to the crystallographic c axis. Negative angle corresponds to rotation from [001] to [110] and positive angle from [001] to [100].

Roemer Hinlopen is a 3rd year physics bachelor student at Radboud University, Nijmegen. His visits to HLD Dresden and LNCMI Grenoble were the first time I have organized such a student exchange within EMFL, and the experience has been both enjoyable and scientifically rewarding for everyone involved. EMFL is keen to encourage more student exchanges and short internships in our laboratories, from bachelor through to PhD level, and funding is available within EMFL to support this. Please contact your supervisor to take advantage of these opportunities.

Alix McCollam, HFML Nijmegen

Contact: a.mccollam@ru.nl

HFML
Radboud Universiteit Nijmegen
Toernooiveld 7
6525 ED Nijmegen
The Netherlands
www.ru.nl/hfml

CNRS – Centre National de la Recherche Scientifique
3, rue Michel-Ange
75794 Paris cedex 16
France
www.lncmi.cnrs.fr

LNCMI Toulouse
143 avenue de Rangueil
31400 Toulouse
France

LNCMI Grenoble
25 rue des Martyrs, B.P. 166
38042 Grenoble cedex 9
France

Helmholtz-Zentrum Dresden-Rossendorf (HZDR)
Dresden High Magnetic Field Laboratory
Bautzner Landstrasse 400
01328 Dresden
Germany
www.hzdr.de/hld

IMPRINT

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

Editorial Staff:
EMFL Board of Directors, Christine Bohnet, Martin van Breukelen, Caroline Obermeyer, Benjamin Piot

Responsible for the content:
Nigel Hussey (n.e.hussey@science.ru.nl), Geert Rikken (geert.rikken@lncmi.cnrs.fr), Joachim Wosnitza (j.wosnitza@hzdr.de)

Printing:
reprogress GmbH

Layout:
Pfefferkorn & Friends, www.pfefferkornundfriends.de

EMFL News, the newsletter of the European Magnetic Field Laboratory, is published quarterly. Contact: contact@emfl.eu

printed on FSC-certified paper

ISSN 2196-0909
2/2017
www.emfl.eu