Creation of a distributed
European Magnetic Field Laboratory
FINAL REPORT 2011 - 2014

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EMFL
European Magnetic Field Laboratc

SEVENTH FRAMEWORK PROGRAMME

EMFL
European Magnetic Field Laboratory

Contents

European Magnetic Field Laboratory

On 27th of January 2015, the European Magnetic Field Laboratory (EMFL) was formally founded in Brussels. The founding organisations signed, in front of a notary in Brussels, the deed to create together the legal entity EMFL as an Association International sans But Lucratif (AISBL) under Belgian law. The French CNRS (Centre National de la Recherche Scientifique), the German research center HZDR (Helmholtz-Zentrum Dresden-Rossendorf) and the Dutch RU/FOM (Radboud University Nijmegen and Foundation for Fundamental Research on Matter) thereby created a joint laboratory.

The EMFL mission is to develop and operate world-class high magnetic field facilities, to use them for excellent research by both in-house and external users.

High magnetic fields are one of the most powerful tools available to scientists for the study, the modification and the control of the state of matter, and Europe needs sufficiently large and a dedicated magnet field laboratory (EMFL) which provides the highest possible fields (both continuous and pulsed) for its researchers. Therefore, the EMFL unites, coordinates and reinforces all existing European large-scale high magnetic field laboratories in a single body. These laboratories are the LNCMI (Laboratoire National de Champs Magnétiques Intenses, with its sites for pulsed fields in Toulouse and continuous fields in Grenoble, owned by the CNRS in France), the HLD (Hochfeld-Magnetlabor Dresden owned by HZDR in Germany) and the HFML (High Field Magnet Laboratory, owned by the RU/FOM). Access to the facilities is through a single entry point for users and an independent selection committee ranks proposal for access. Yearly 300 projects are executed involving about 400 external visiting guest researchers. EMFL coordinates magnet technology and research among the facilities, organises networking and communication and represents the laboratories externally.

EMFL is an international non-profit organisation that allows the inclusion of new partners. At present proposals for new paying EMFL members are under discussion in several countries and in 2015 formal new members are expected to be welcomed. EMFL has obtained its goals, however remaining on the ESFRI Roadmap as a sign of quality may help to acquire new members.

EMFL is an essential component of the European research landscape that allows the continent to play a major role in this important area of research at par with the other magnet laboratories in the USA and Asia.

List of Participants

- Participant n°1
  Radboud University Nijmegen
  Comeniuslaan 4
  6525 HP Nijmegen, The Netherlands
  and
  Foundation for Fundamental Research on Matter
  Van Vollenhovenlaan 659
  3527 JP Utrecht, The Netherlands

  High Field Magnet Laboratory (HFML)
  Toernooiveld 7
  6525ED, Nijmegen, The Netherlands

- Participant n°2
  Centre National de la Recherche Scientifique
  3 Rue Michel Ange, Paris, France
  Parent organisation LNCMI Grenoble and Toulouse

  Laboratoire National de Champs Magnétiques Intenses at Grenoble (LNCMI-G)
  25 rue des Martyrs, B.P. 166
  38042 Grenoble cedex 9, France

  Laboratoire National de Champs Magnétiques Intenses at Toulouse (LNCMI-T)
  143 avenue de Rangueil
  31400 Toulouse, France

- Participant n°3
  Helmholtz-Zentrum Dresden-Rossendorf e. V.
  Bautzner Landstr. 400
  01328 Dresden, Germany

  Hochfeld-Magnetlabor Dresden (HLD)
  Bautzner Landstr. 400
  01328 Dresden, Germany

EMFL-project description

The targets of the preparatory phase project (P3): “Creation of a distributed European Magnetic Field Laboratory” were the following:

- To design an administrative, governance and legal structure which allows the EMFL to act as a unified laboratory, while at the same time sufficient space is given to the founding institutions to harvest on previous investments and present exploitation. The structure should allow inclusion of new partners in the process.
- To complete the design for the future investment programs and determine actual costing.
- To draft an agreement that can be signed by the parties involved which forms the basis of the EMFL which takes into account differences in the different national legislation and administrative rules.
- To integrate scientific and technological activities from the different founding laboratories, respecting local and historical differences and specialisation and profiting from their complementary experience.
- To seek additional partners to realise the necessary upgrades both for the investments and exploitation.
- To engage in dialogue with the various user communities for high magnetic fields and react to their most urgent needs.
- To develop a communication strategy for the EMFL addressing different categories of people such as users, general public, schools and policy makers.

To reach these goals, 10 work packages were created with dedicated tasks to fulfil the objectives.

WP 1 Project management: Deals with the overall management of the whole project. The board of directors meets regularly by videoconference and in person to manage the project efficiently.

WP 2 Legal structure and governance: Defines the administrative, governance and legal structure of the EMFL. The legal situation of the laboratories and the legal status of other (international) research organisations are studied. It is decided that an AISBL structure fits EMFL best. This legal structure has been translated into an agreement that is signed by the partners.

WP 3 Financial plan: The current investment or replacement value of the existing installations and running costs were examined. An investment plan and structure for the financial basis were designed.

WP 4 Human Resource Management: The present situation of the employees working for each of the three partners was investigated. A personnel plan defining the EMFL human resource management policy were developed and the possibilities for long-term exchange visits were investigated.

WP 5 Community building: Contact with the user community intensified as EMFL is actively present at high field conferences, workshops and schools. The needs and wishes of the community in terms of magnet design and related infrastructure were mapped and will be acted upon if

possible. The user community is extended with other research groups and dedicated workshops have been organised. Flyers (WP6) for the users with information about the experimental equipment available within EMFL are updated and distributed.

WP 6 Communication, education and training: A communication plan is made for the EMFL. Flyers, banners, brochures, a new website, a logo and movie are developed. High magnetic field science shall be brought to the attention of (future) users, general public and policy makers.

WP 7 Harmonisation and integration: Common experimental approaches to similar scientific projects are mapped to improve sample exchange and standardise methods. Inter-laboratory comparison tests are developed to improve harmonisation and sample exchange between the partners.

WP 8 Roadmaps for European high-field science and technology: An outline of the future EMFL policy is addressed in this work package, not only on a European level, but also in the global framework of the Global High Magnetic Field Forum (HiFF). Focusing on the future of high-field science by improving magnet technology and the experimental needs of the users.

WP 9 High magnetic fields and advanced sources: Has investigated specifically how the collaboration of the EMFL specialised in high magnetic fields with operators of advanced radiation sources (e.g. X-rays, free electron lasers, neutrons, ions, high power lasers) is mutually beneficial and where different goals are pursued.

WP 10 Magnet Technology Development: Technical design studies are made available for improvements on magnets and installation. These technical design studies form the basis of the future investment plans for the EMFL consortium.

The complexity of the project results in a large diversity of tasks within and between the work packages. It is necessary to bring together people with expertise ranging from legal issues, communication issues and scientific issues from three different research organisations and laboratories in three countries. Despite the cultural differences and the physical distances between the facilities there has been excellent collaboration between them. The EMFL project has therefore been able to reach its goals and has founded the EMFL AISBL as a legal entity. At the 27th of January 2015 the deed was officially signed by the founding members: CNRS, HZDR and RU/FOM as the final step after signing an extensive Memorandum of Understanding on the 27th of November 2014 (see picture).

From left to right: Gerard Meijer (RU), Wim van Saarloos (FOM), Peter Joehnk (HZDR) and Gabriel Chardin (CNRS)

EMFL achievements

Summary

The Preparatory Phase Project "European Magnetic Field Laboratory (EMFL): Creation of a distributed European Magnetic Field Laboratory" is executed under the auspices of the FP7 Framework

The three high magnetic field infrastructures in Europe, located in Germany, France and The Netherlands, have already been cooperating for many years within the EuroMagNET I (FP6) and EuroMagNET II (FP7) projects, with a common transnational access programme, networking and joint research activities. They have founded EMFL as a legal entity (Association Internationale Sans But Lucratif, AISBL, legal structure under Belgian law) as a result of the preparatory phase project in order to act as a single body. The laboratories involved are:

- HFML (High Field Magnet Laboratory – Nijmegen)
- LNCMI (Laboratoire National des Champs Magnétiques Intenses – Grenoble, Toulouse)
- HLD (Hochfeld-Magnetlabor Dresden)

This newly formed EMFL AISBL will be able to offer the user community the highest magnetic fields, all relevant expertise and experimental infrastructure. EMFL will continue the network and user coordination activities, coordinate and stimulate advanced magnet technology and will represent the most important activities of science in high magnetic fields in Europe on a political level, which will strengthen the position of this scientific area.

Today, the EMFL partner laboratories have reached agreement on the realisation of its missions, its tasks and governance and on common plans for the future both on the technical and scientific level. During the EMFL launch meeting the 27th of November 2014, the stakeholders signed a MoU and on 27th of January 2015, the statutes were officially signed in front of the notary in Brussels, officially founding the Association Internationale Sans But Lucratif (AISBL).

EMFL kick off meeting 2011

Project management

The consortium has been managed by the board of directors consisting of Nigel Hussey (director HFML, RU/FOM since 1/9/2013), Jochen Wosnitza (director HLD, HZDR) and Geert Rikken (director LNCMI-G and T, CNRS) with the coordinator Jan Kees Maan (HFML, RU/FOM) being the president of the board.

The board is assisted by three assistant managers forming the coordination team consisting of Martin van Breukelen (HFML), Aline Schwoob (LNCMI) and Larysa Zviagina (HLD).

A permanent video link was set up between the four sites of the parties of the EMFL consortium as an efficient way of managing the project. The parties involved in the EMFL consortium are:

- High Field Magnet Laboratory (HFML), Nijmegen, the Netherlands
- Hochfeld-Magnetlabor Dresden (HLD), Dresden, Germany
- Laboratoire National des Champs Magnétiques Intenses (LNCMI), Grenoble and Toulouse, France.

Coordinator & Board of Directors
Nigel Hussey, Geert Rikken,
Jochen Wosnitza and Jan Kees Maan

Coordination team
Aline schwoob,
Martin van Breukelen and
Larysa Zviagina

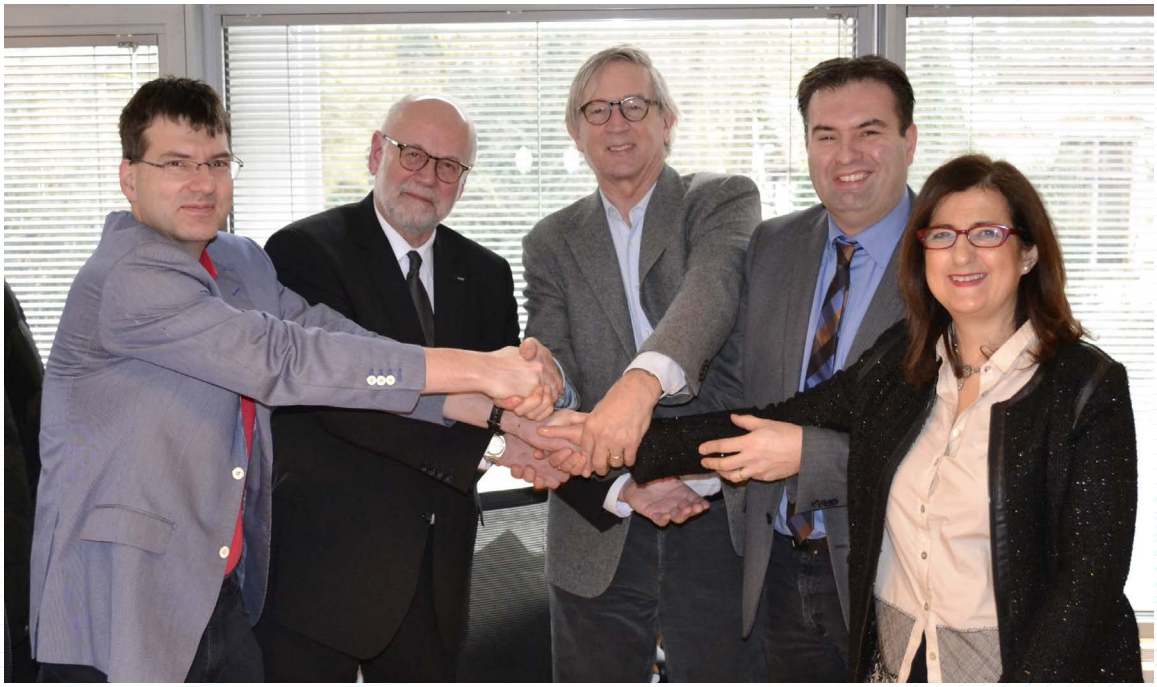
Legal structure and governance

The work package for legal structure and governance was composed of representatives of RU/FOM and HZDR, and a legal expert from CNRS headquarters in Paris, together with the WP leader: the LNCMI Director and Assistant Manager. They met twice a year during the first 3 years of the project, after which their mission was completed. Their objectives were to find together what legal structure would be most suitable for the EMFL, and propose its governance.

EMFLs mission statement was defined:

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

After conducting comparative studies between the legal status of each partner, and with other European research infrastructures similar to the EMFL, the legal structure suggested by WP2 and then adopted by the Board of Directors, was the Belgian international non-profit association (*AISBL - Association Internationale Sans But Lucratif*). Once this choice was made, the group started to work on a governance draft, setting the basis for the statutes of the association. A legal consultancy firm, PWC, was hired to formalise the statutes legally and to organise its official creation in Belgium. Its services were also required to study the tax aspects and to propose scenarios to organise money flows between the association's members. The statutes of the EMFL-AISBL were signed in Brussels on 27th January 2015, after nearly two years negotiations between the stakeholders' legal departments.



Founding ceremony in the notary's office in Brussels on the 27th of January 2015. From left to right: Job de Kleuver (FOM, international affairs and large facilities), Peter Joehnk (HZDR, technical and commercial director), Jan Kees Maan (coordinator EMFL), Iwan Holleman (RU, managing director IMM) and Amina Taleb-Ibrahimi (CNRS, Deputy Director, Institut de Physique).

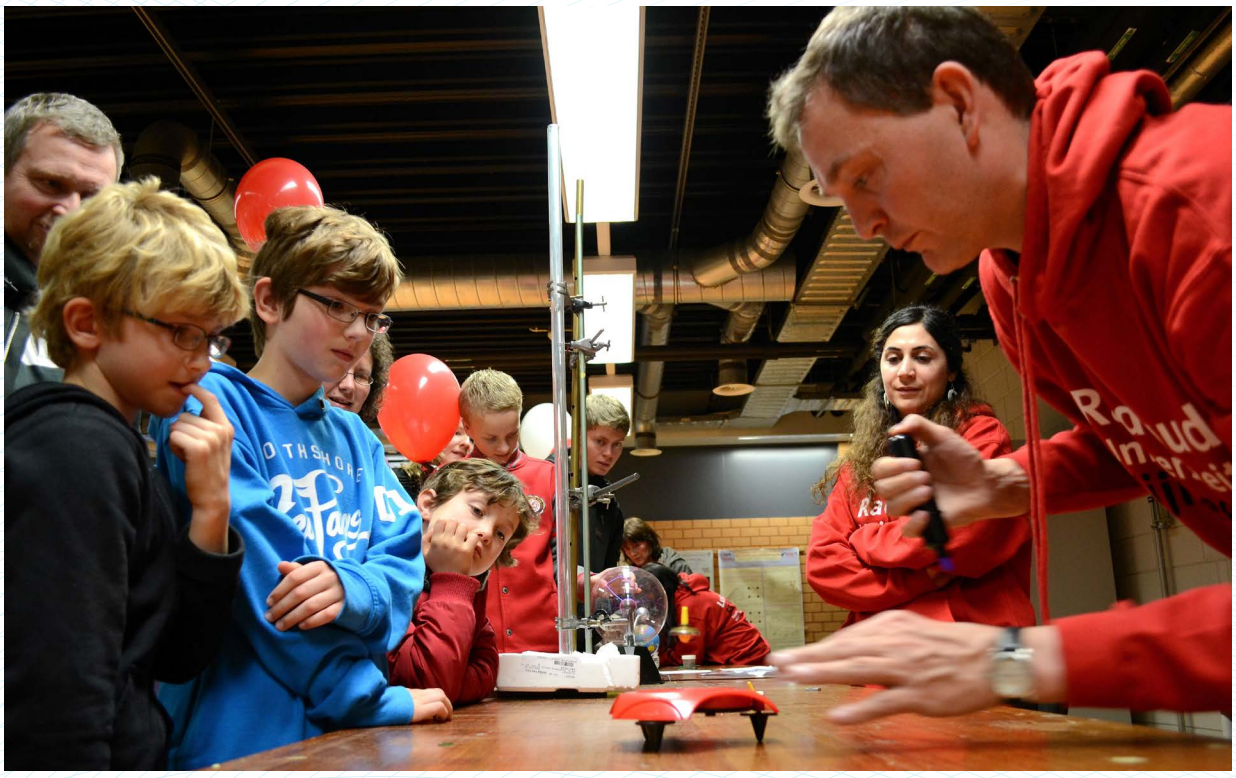
Financial plan

The investments and exploitation costs were collected from the four sites enabling to calculate the costs for the use of the installation. The price per hour for the DC facilities and the price per pulse for the pulsed field facilities were determined this way in different full cost or marginal cost models. To keep the high field facilities at their current competitive state and to answer the continuous demand to higher fields and state of the art scientific equipment investments in the installations, magnet technology programme and scientific equipment remain necessary to stay at the forefront. Accordingly, innovations may be expected in a long-term perspective. The width and interdisciplinary character of the research in high magnetic fields gives perspectives for new insights, both in physics and materials science as well as chemistry and biology. The growth of the high field science community is continuing as new user groups from other disciplines are now joining.

EMFL will focus on the state-of-the art experimental set-ups to be able to perform edge cutting science. The investment budgets for the hybrids currently being developed at Nijmegen and Grenoble are covered. For the next generation 60 T+ hybrid or HT_c superconducting magnets EMFL will look for additional means through other channels.

Concerning the exploitation of the facilities, access is granted through the Selection Committee. All proposals in the highest category (A) will be granted access to the EMFL facilities. In the other category (B) EMFL members will have privileged access and support during their experimental time.

EMFL has a budget to coordinate the user access and organise a User meeting, SelCom meeting, 3 to 1 meeting and execute all administrative tasks, networking, coordination and communication



Human Resource Management

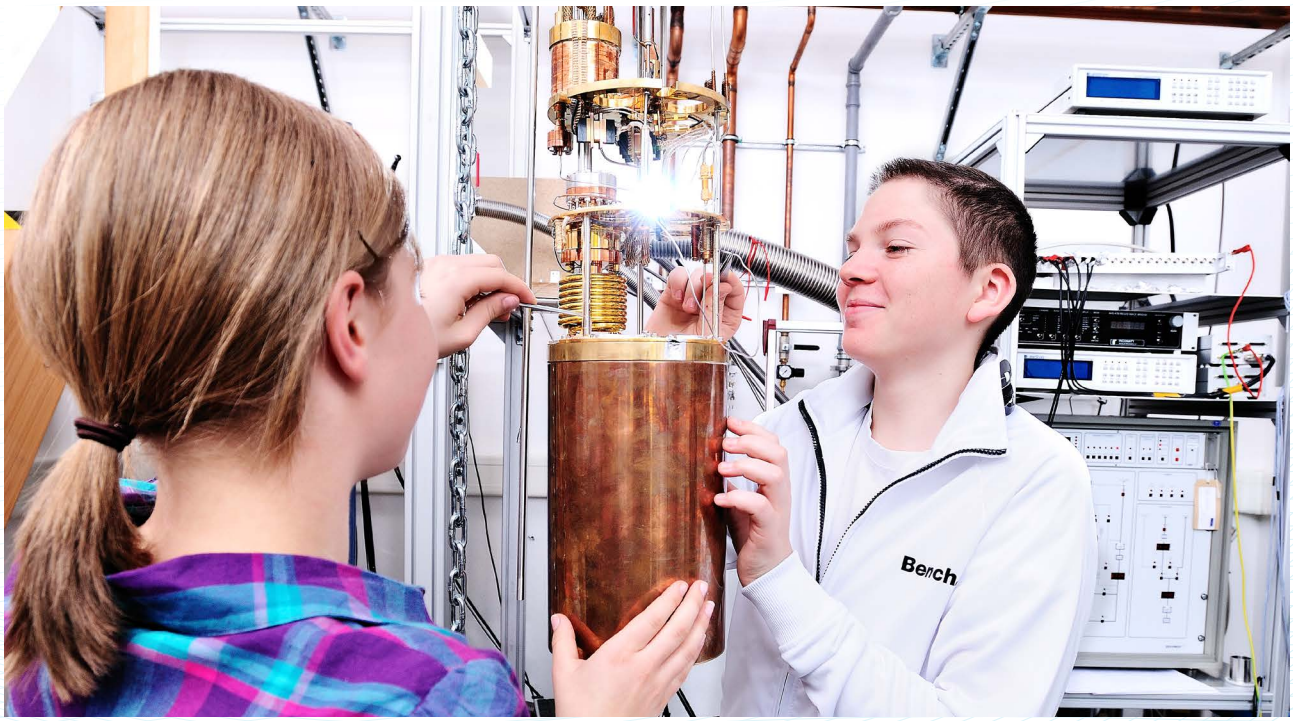
At a relative early stage it was agreed between the three stakeholders RU/FOM, CNRS, and HZDR that an International association without lucrative purpose (French and Belgian acronym: AISBL) is the desired structure for the future EMFL. The EMFL-AISBL will be a common body for the three existing labs (HFML, LNCMI and HLD). In this situation, the current staff of the three labs will remain employed by their national institution. In consequence, the only personnel hired by EMFL-AISBL might be some persons which act as supporting staff of the EMFL executive director, e.g. for coordination, communication and representation activities of the EMFL.

A second aspect of HRM to be considered was that mobility by exchange visits between the facilities might be intensified in the future EMFL. Therefore, long-term exchange visits were discussed both for permanent and non-permanent staff. In all these cases, it was assumed that the home laboratory will cover salary, transportation, and living expenses of staff members during visits at partner labs. Duration of the stays between one month and several years were considered.

Two options have been identified to ease working contract issues for the EMFL:

- The first option is that local support staff of the respective laboratory takes over the EMFL support tasks during the term of presidency.
- The second option is that long-dated engaged support staff moves to the respective laboratory site which takes over the duty of presidency.

In both cases, contracts under the respective regulation at the partner sites might serve as working contract of the support staff.



Community building

Contact with the user community has been intensified as EMFL was actively present at high field conferences, workshops and schools. The needs and wishes of the community in terms of magnet design and related infrastructure is mapped and will be acted upon if possible. The user community will be extended with other groups and dedicated workshops have been organised for this. Flyers for the users with information about the experimental equipment available within EMFL are distributed.

The main purpose of the topical meetings was to gain information about the needs of the scientific community and how new researchers can be attracted. To answer these questions, key players have met to present their recent research, to discuss about their needs, wishes, and visions for their future experiments.

Staff members of the EMFL laboratories also participated in international conferences and presented latest scientific results taken in highest magnetic fields in order to attract further users by showing the capabilities of modern powerful high-field installations and to get in closer contact with the community. During the EMFL project the following meetings and/or workshops have been visited or organised for the EMFL user community:

Workshops and conferences: meetings key players

- The 10th International Conference on Research in High Magnetic Fields in Wuhan (CN) from 3rd – 6th of July 2012
- 19th International Conference on Magnetism (ICM 2012), July 8th - 13th, 2012, Busan, Korea
- The 20th International Conference on "High Magnetic Fields in Semiconductor Physics", HMF-20 in Chamonix Mont-Blanc (FR) from 22nd - 27th of July 2012.
- Workshop on Synchrotron and Neutron Applications of High Magnetic Fields (SYNEMAG 2012) in Grenoble on the 17th – 19th of October 2012.
- International Workshop Science and Technology at High Magnetic Fields, Madrid (SP) from 6th -9th of November 2012
- Specialized Colloque Ampère, June 30, 2013 - July 05, 2013
- The International Conference on MagnetoScience, ICMS 2013, Bordeaux (France), 13th to 17th October 2013.
- Workshop "Optical Properties of Individual Nanowires and Quantum Dots in High Magnetic Fields" took place at LNCMI Toulouse from September 24 to 26, 2014.
- 10th International Conference on Materials and Mechanisms of Superconductivity (M2S-X) 29 July to 3 August 2012, Washington, DC, USA
- New magnetic field frontiers in atomic/molecular and solid-state physics, École de Physique, Les Houches, France, May 6-10, 2013
- International WORKSHOP on Strongly Correlated Electron Systems in High Magnetic Fields (SCEF) Ecole de Physique des Houches, France, May 20-25, 2012

EMFL User Meeting 2013

13th of June 2013, Nijmegen

The aim of the meeting was to exchange ideas and experiences, to present scientific results, and to discuss about ways of improving the facilities' attractiveness. The EMFL Prize 2013 went to Benoît Fauqué from the Laboratoire de Physique et d'Étude des Matériaux (LPEM) at the Ecole Supérieur de Physique et de Chimie Industrielles (ESPCI) for his results on "Two phase transitions induced by magnetic field in graphite".

EMFL User Meeting 2014

19th June 2014, Dresden

The EMFL Prize 2014 went to Milan Orlita from the Laboratoire National des Champs Magnétiques Intenses (LNCMI) at the Centre National de la Recherche Scientifique (CNRS) Grenoble. The 35-year old from the Czech Republic was awarded for his outstanding research on electronic properties of Dirac materials.

One of the key issues of user labs is the supply and development of the best possible infrastructure adapted to the requests of the international research community and thereby attracting new scientists in the established research areas, and beyond that, even new scientific communities as additional high-magnetic-field users. For that, it is imperative to keep in close contact with the user community of the future EMFL, both

- to inform the user community on the latest developments of the EMFL and
- to learn the scientific needs from the research community for equipment and type of magnets needed.

In this context, the inventory of activities in materials research and applied superconductivity is one of the key issues.

Communication, education and training

PR professionals from the four sites have joined forces to develop an EMFL corporate identity. The developed communication material is used to address the project relevant communities such as potential users, the general public, schools, science policy makers, and the local staff (internal communication). Various communication materials and tools were used; website, flyer, brochure, movie, open-days, banners, newsletter etc.

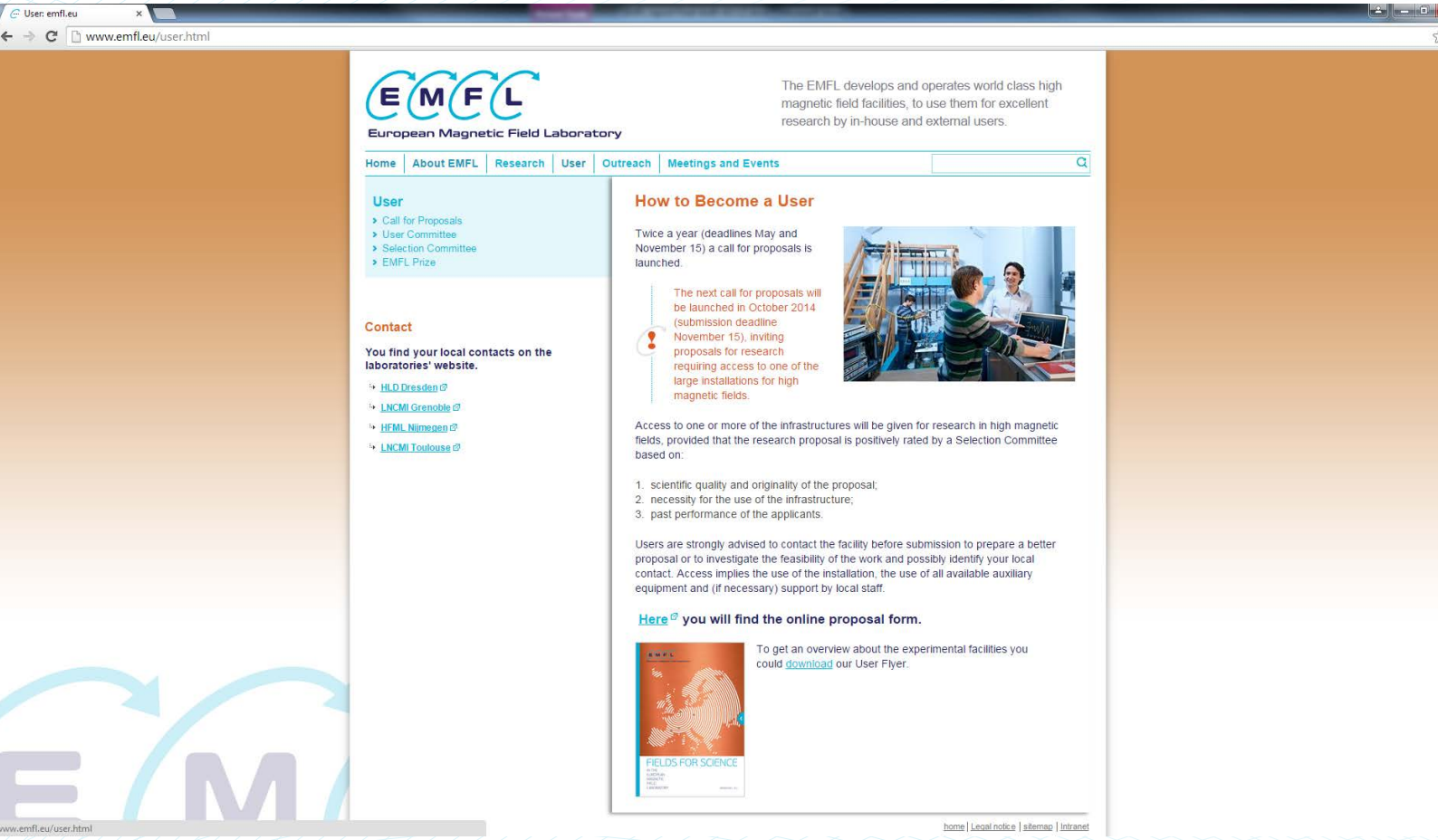
Communication material

Logo

The EMFL logo was developed early in the project and selected from different options in a general comman labs meeting (321) and consequently used on all other communication material, resulting that is widely recognised and associated with the high-field facilities in Europe.

EMFL website

The address www.emfl.eu guides to a website with general and up-to-date information about the project and the partners. The website has a public and a restricted part. The website is regularly updated with news, recent publications, research highlights, and portraits of EMFL staff members



Flyer

A flyer for potential users with technical information was designed.

AVAILABLE EXPERIMENTS

Experimental techniques	Nijmegen	Grenoble	Dresden	Toulouse
Optical spectroscopy and magneto-optics				
PL, PLE, fiber + lens	x	x	x	x
Microscope imaging	x	x		
Birefringence	x	x		x
Micro-photoluminescence and Micro-Raman systems	x	x		
FIR	x	x	x	x
Thermodynamic properties				
AC susceptibility, VSM magnetometer (2–300 K)	x	x		
Specific heat	x	x		
Thermopower and Nernst-Ettinghausen	x			x
Magnetostriction and thermal expansion	x		x	x
Ultrasonic measurements (sound velocity and attenuation)	x		x	x
Compensated-coil magnetometry			x	x
Torque magnetometry	x	x	x	x
Magnetotransport				
Magnetotransport with in-situ sample rotation	x	x	x	x
Critical current of superconductors	x	x	x	x
'Contactless' transport (TDO, PDO)			x	x
Magnetic resonance				
Electronic paramagnetic resonance	x	x	x	x
Cyclotron resonance	x	x	x	x
Nuclear magnetic resonance		x	x	x
Environments				
^{3}He cryostats (1.5–300 K)	x	x	x	x
^{4}He cryostats (down to 300 mK)	x	x	x	x
Dilution refrigerators (down to 50–100 mK)	x	x		x
Thermostats up to 300°C	x	x		
High pressure	x	x		x
Other				
Megagauss facility (semi-destructive fields > 170 T)				x
Mobile 1MJ installation allowing X-rays, laser and neutron scattering under pulsed magnetic fields				x
Levitation	x	x		

EMFL
European Magnetic Field Laboratory

HOW TO OBTAIN ACCESS

Twice a year (deadlines May and November 15) a call for proposals is launched. Access to one or more of the infrastructures will be given for research in high magnetic fields, provided that the research proposal is positively rated by a Selection Committee based on:

- **scientific quality and originality of the proposal;**
- **necessity for the use of the infrastructure;**
- **past performance of the applicants.**

It may be useful to contact the facility before submission to prepare a better proposal or to investigate the feasibility of the work and possibly identify your local contact. Access implies the use of the installation, the use of all available auxiliary equipment and (if necessary) support by local staff. For user groups from EU member states, candidate countries and associated countries (other than the country where the installation is located) support can be given for travel and subsistence costs of the guest-researchers.

Here you will find the online proposal form:
www.emfl.eu/research

NETWORKING ACTIVITIES

- Schools
- Exchange Programmes
- Workshops
- User Committee
- User Meeting
- EuroMagNEWS / EMFL NEWS
- EuroMagNET / EMFL prizes
- and many more

CONTACT

- **HFML Nijmegen**
  www.ru.nl/hfml/
- **LNCMI Toulouse**
  www.lncmi.cnrs.fr
- **LNCMI Grenoble**
  www.lncmi.cnrs.fr
- **HLD Dresden**
  www.hzdr.de/hld

EMFL
European Magnetic Field Laboratory

FIELDS FOR SCIENCE
IN THE EUROPEAN MAGNETIC FIELD LABORATORY

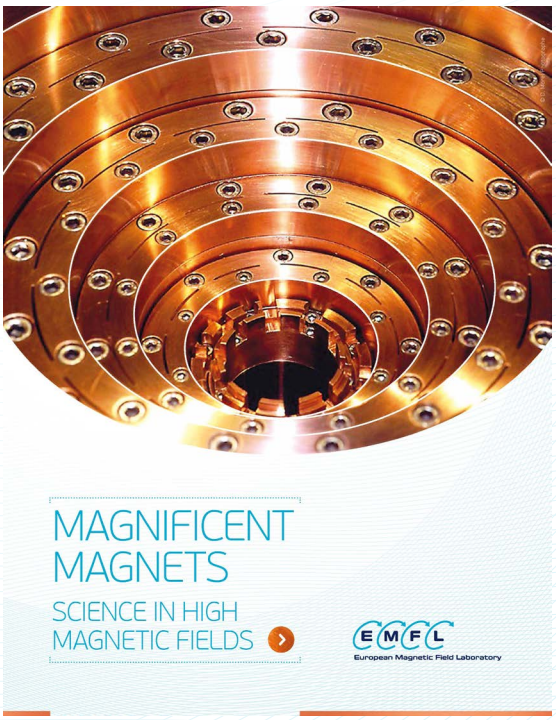
WWW.EMFL.EU

Banner

An eye catching roll up display banner was used during all EMFL events

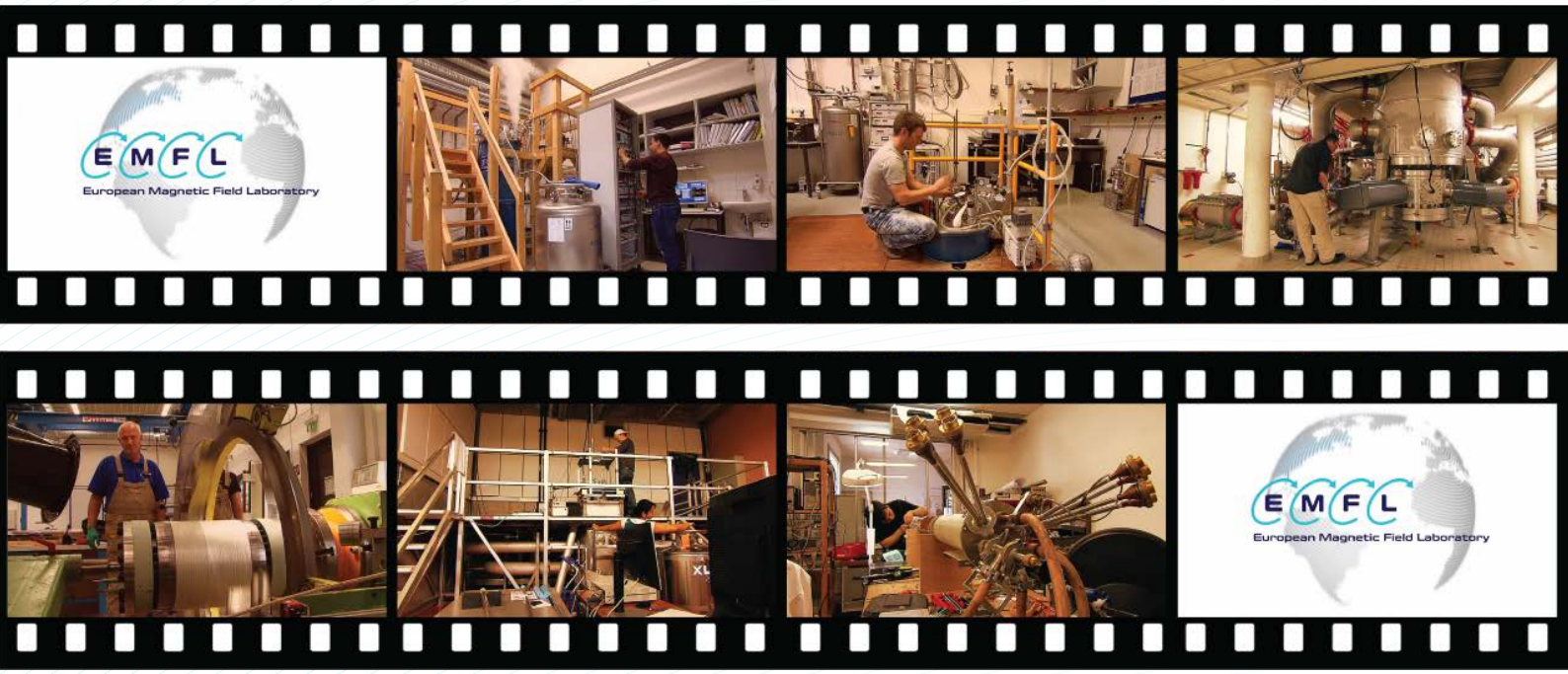
Brochure

A high quality brochure (20 pages) with short appealing texts about research, outreach, benefits, and innovations was created and published in English, French, and German. It addresses policy makers and the general public, and contains high quality photographs from the four sites.



EMFL video

Four different promotional videos in English, Dutch, French, and German were produced. A professional film crew went to all four sites for laboratory shots and interviews with scientists and technicians. This resulted in informative videos about the world-class research that is conducted at the EMFL labs that present the EMFL as a whole as well as the four sites. Impressive pictures and a good story attract both scientists and laymen. The videos are placed on different web pages, e.g. the newly created EMFL YouTube channel, and shown during events and meetings.



EMFLnews

Since the beginning of 2013, EMFLNews have been quarterly published. It was a follow up of the EuroMagNEWS, previously published by the EuroMagNET II project. EMFL news will now be continuous independent of incidental grants. With its modern and appealing design, its informative and short articles about research highlights, events, and general news, the quarterly magazine is not only a worthy successor of the EuroMagNEWS but also a successful advancement. The newsletter is published on different websites, sent via Email to more than 1.500 users, and distributed as printed copy to policy makers, leading scientists, and the EMFL staff.

Harmonisation and integration

The harmonisation and integration of the EMFL laboratories situated at four different sites was performed with two principal objectives in mind

1) Technical harmonisation of the experimental procedures and data-acquisition strategy
2) Creating a common EMFL spirit within all the staff of the EMFL members

Technical harmonisation

The first objective was reached by first inventorying all experimental setups relevant for users of EMFL and comparing them for the different sites. Subsequently we have chosen a few typical experiments which we have benchmarked for the universality at different EMFL sites. Finally we have assessed the data acquisition software of the EMFL labs and have come up with concrete recommendation for future harmonization.

Human integration – creation of an EMFL identity

We have started realizing the second objective by a joint 3 to 1 meeting of all EMFL staff members. 150 participants, representing the majority of the EMFL staff, met in La-Colle-sur-Loup (France) between 3/10 and 5/10/2011. The principal objective of this meeting was to get acquainted to each other, to be informed on the EMFL and to learn to appreciate the different "EMFL cultures" present at the four different sites. This first meeting led to much closer interaction between the facilities, with many more exchange visits and contacts.

A second 3 to 1 meeting, organised in Egmond aan Zee, the Netherlands, took place between 30/9 and 2/10/2014, again with about 150 participants. Workgroups were formed to discuss, in depth, the mutual tasks and objectives of the EMFL as a whole. Magnet technology, scientific projects, experimental techniques, administration, management, acting as a user facility and collaborations were discussed. Thanks to the first EMFL 3 to 1 meeting, the quality of the discussion was at a high level. Everyone was open to share information and willing to provide a commitment to a sustainable EMFL in the future.

3 to 1 meeting at La-Colle-Sur-Loup, France

3 to 1 meeting at Egmond aan Zee, The Netherlands

Roadmaps for European high field science and technology

A strategic roadmap has been developed during the EMFL project. The main recommendations are summarised below:

- EMFL is a leading partner for all developments in high magnetic fields in Europe and is the European representation in international collaborations and on a political level. EMFL strives to involve other partners from different countries with the highest possible involvement and to develop a strategy with respect to all future evolutions described.

- The highest possible DC and pulsed magnetic fields are essential for progress in science. The research fields magnetism, semiconductor and nanostructures, metals and superconductivity, soft matter and magnetoscience and applied superconductivity are the areas where high magnetic fields are expected to make the greatest impact.

- The maximum fields at the facilities will increase only moderately in the near future, although the gap with commercially available fields remains equally big. The facilities should develop their complementary infrastructure to the highest standards since this is what makes them extra attractive for external users (see WP7 deliverables).

- EMFL should work towards the design of a 60 T hybrid magnet. It is clear that this will require an effort where all available technology in Europe should be involved. It is also clear that such a future hybrid will require a global effort. EMFL should foster the necessary contact with other facilities in the world for this purpose (see WP10).

- EMFL should actively be involved in developing magnets at other facilities, such as at ESRF, XFEL, or ILL and help in operating them for experiment (for more details see WP9).

- EMFL should develop practical selection procedures for the combined use of high magnetic-field facilities and advanced radiation sources.

- EMFL should develop formal relations with regional facilities. These facilities are a natural basis for many new users and may also play a role by housing future 30 T superconducting magnets. In its role as also a regional facility, EMFL facilities should also strive to offer these fields next to its record fields.

- The EMFL partners will foresee a minimal support to common EMFL tasks (personnel and basic costs) independent from external sources like EU programs.

High magnetic fields and advanced sources

A first technical work package was set up to develop scientific cases and strategies as to how to perform experiments combining high magnetic fields and advanced sources. This combination showed to be relevant in condensed matter physics and plasma physics, namely in the study of the normal and vortex states of high Tc superconductors, field induced quantum order, magnetic critical fluctuations near quantum critical points (QCPs), magneto-spectroscopy of novel materials; and laboratory astrophysics.

These subjects were identified during discussions with several high level physicists and during dedicated round table sessions organised by EMFL during 3 conferences and workshops:

« SYNEMAG : Workshop on Synchrotron and Neutron Applications of High Magnetic Fields » was organised on 17-19th October 2012 in Grenoble together with ESRF and ILL.

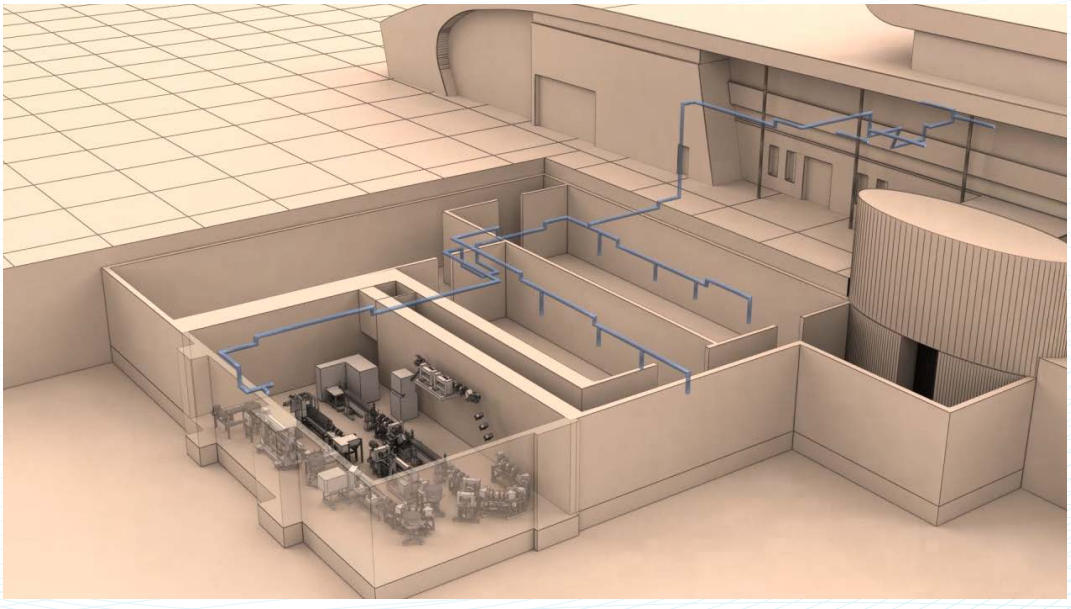
« High Field – FEL operation » took place From 1-3 May 2013 in Nijmegen

« LaB exploring coupling between high magnetic fields and high-power laser pulses » took place on 2nd-5th December 2013 in Paris, in the Ecole Polytechnique, resulting from a large collaboration between LULI, LNCMI, CELIA, CEA, LPP, HZDR and Observatoire de Paris.

The recognition of the scientific potential of such combined operation of advanced sources and high magnetic fields has led to several major efforts within the EMFL;

- The HLD was constructed next to the terahertz FEL ELBE, and a dedicated tunnel feds the terahertz radiation from ELBE to the HLD magnets.
- In Nijmegen, the terahertz FELs FLARE, FELIX and FELICE have been constructed next door to the HFML and their output can also be transported into the HFML magnets.

The LNCMI has further improved its mobile pulsed high field installation and has designed and built several dedicated scattering magnets. A new mobile 6 MJ generator has been commissioned, and will allow generating even higher fields at advanced sources like ESRF, ILL, SINQ, LULI etc.



The established link between HFML and FELIX

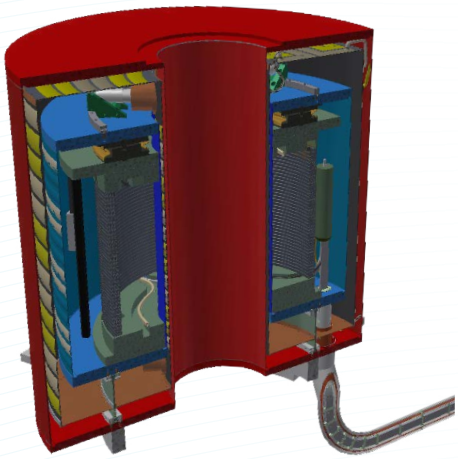
Magnet Technology Development

The magnet technology development work package gathered representatives of each site, in charge of their own magnet development programmes. Their objective was to exchange ideas and realise design studies for engineering plans for the extensions and upgrades of each facility, and exchange ideas for future plans and characterization of a prototype for a new high field magnet.

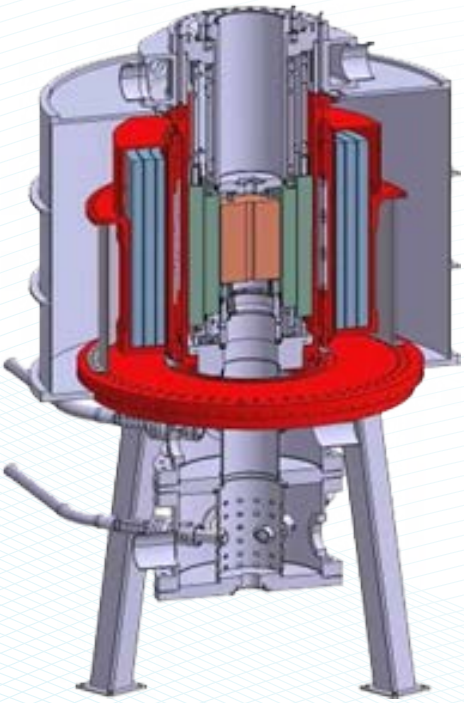
Developments in magnet technology are a key part of the high field installations. The user community always requests higher fields to be able to explore new scientific areas and detect new features or increase its resolution. The DC field facilities in Nijmegen and Grenoble are both developing a hybrid magnet to generate fields up to 45 T, which is currently the world-record for DC fields. Although there is a difference in the superconducting technology used, still many facets of the projects are overlapping (e.g. protection of the magnet, in case of quench and of rapid transient of the resistive central part, cryogenics of the superconducting parts, helium liquefaction, construction of the winding, housing, safety etc…)

- The Nijmegen project uses a Nb_3Sn solenoid at 4.5 K producing 12.6 T in a 600 mm room temperature bore (within a collaboration with NHMFL Tallahassee for the use of Cable In Conduit (CIC) Nb_3Sn technology).
- The Grenoble project uses a NbTi solenoid at 1.8 K producing 9 T in a 800 mm room temperature bore (within a collaboration with CEA for the development of the Cable On Conduit (COC) NbTi technology).

Within the EMFL project several meetings were organised were the teams openly discussed their project and sharing their experience and knowhow. This is essential as they use two complementary technologies that help Europe to maintain the knowledge on both NbTi and Nb_3Sn, the two critical technologies for hybrid magnets.



Hybrid magnet Nijmegen

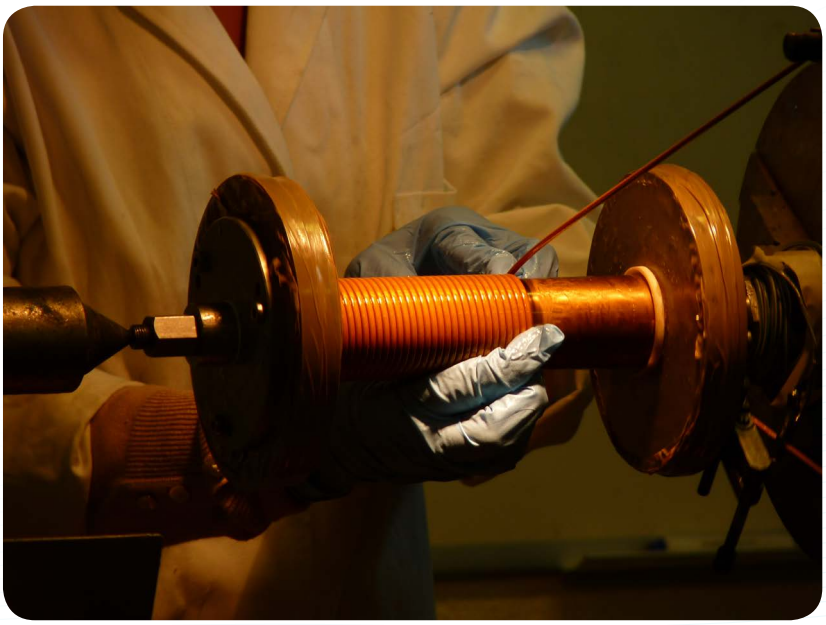


Hybrid magnet Grenoble

The pulsed field installations in Toulouse and Dresden are also upgrading their infrastructure. Dresden already producing fields close to 100 T has investigated the possibility to create flat-top pulses to increase the measuring time (better signal to noise ratio) and therefore improving the resolution of the data taken, at the highest field. Resonant measurement techniques, as ESR and NMR will benefit specifically of this flat-top pulses. The combination of the pulsed power supply of Dresden consisting of its modular 50 MJ and 14 MJ capacitor bank allows to generate flat-top pulses.

Toulouse has invested in an upgrade of its generator and extension of the building. The upgrade of the power supply will enable Toulouse to generate non-destructive pulsed fields up to 100 T. Furthermore a 6 MJ mobile generator was commissioned to be used at experiments at ILL and ESRF beam lines.

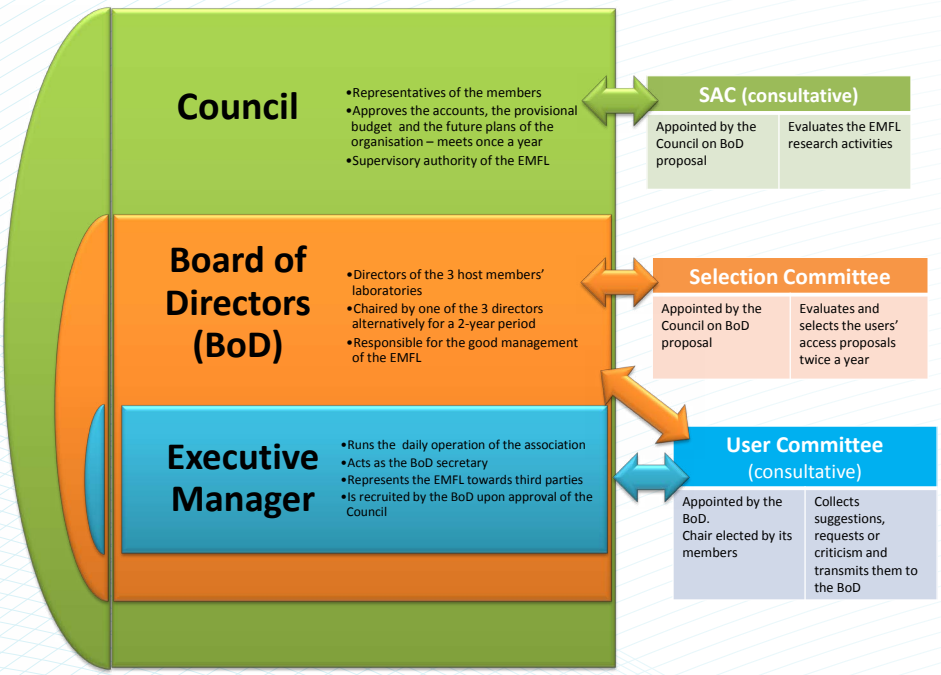
For DC field installations one of the side effects of generating high magnetic fields is that a lot of heat is produced that has to be taken out. Conventional techniques use cooling from the atmosphere or a river, effectively dumping the heat directly into the environment. During the EMFL project, the HFML was connected to the Radboud University Aquifer Thermal Energy Storage (ATES) enabling to reuse the heat produced during magnet operation to heat buildings at the university campus or store it at the ATES for use during periods when additional heat is necessary (winter). In Grenoble a study was done to look for alternative ways to reuse the heat produced there. The connection in Nijmegen reduces the waste of heat to the environment and reduces the cooling costs, resulting in an economical and environmental saving.



EMFL Organisational structure

EMFL's objective, without profit aim, is to unite world-class high magnetic field facilities and to make them available for excellent research by users. More specifically EMFL is responsible for the management of access, networking and coordination activities of high field facilities in Europe.

The Council is the highest governing body of EMFL and consists of the EMFL Member representatives. The council does:
- appoint and dismiss the Directors and approve the candidacy of the executive manager,
- admit and dismiss EMFL Members,
- approve the progress report, annual accounts and the budget presented by the Board of Directors,
- amend the Statutes and approve the vision, mission and definition of values of the Association,
- discuss and develop strategic, scientific and technical plans of the EMFL.



The board of directors, composed of the laboratory directors, where needed seconded by an executive manager has the following tasks:
- define the vision and mission,
- execute the strategic operation,
- prepare the budget, the annual accounts and the progress report.

A scientific advisory board appointed by the council will evaluate the functioning of the EMFL. The BoD will be assisted by a selection committee which evaluates user proposals twice per year and

advises on their execution. A user committee will represent the users' interest.

The user committee, the SelCom and the BoD are already in place since they were already active in the EMFL P3 project which acted as a BoD of EMFL "avant la lettre".

The Council exists of:

Roland Sauerbrey (HZDR, chair)
Gerard Meijer (RU/FOM)
Amina Taleb-Ibrahimi (CNRS)



The Board of Directors exists of:

Geert Rikken (LNCMI, chair)
Nigel Hussey (HFML)
Jochen Wosnitza (HLD)

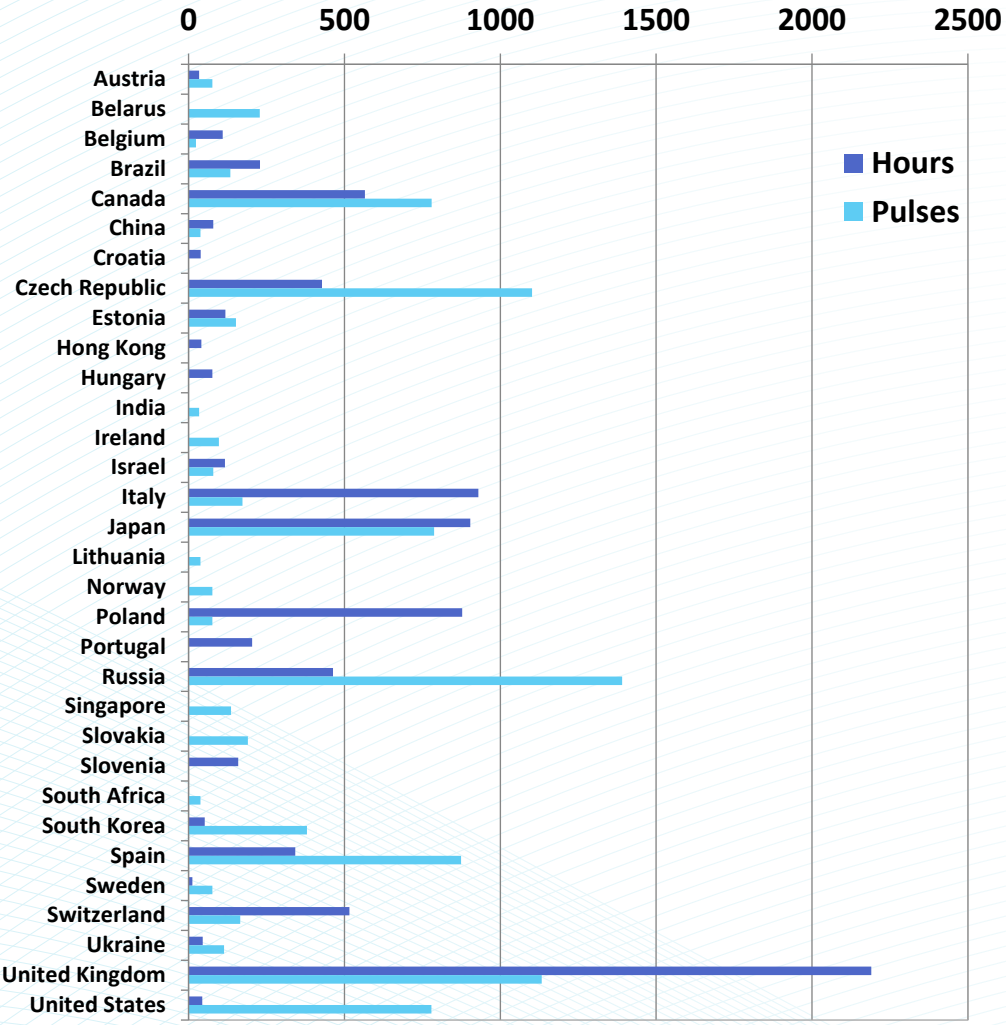


The executive manager is:
Jan Kees Maan (HFML)

Socio-economic impact

EMFL's core activity: providing access to the facilities for external Users

Over the past five years, the EMFL facilities altogether granted access to 1554 user proposals, from 35 countries in and outside Europe, proving its attractiveness and usefulness for the global science community.



Access provided per country from 2009-2013 (excluding France (6042 hrs & 6103 pulses), Germany (1902 hrs & 6097 pulses) and The Netherlands (3578 hrs & 28 pulses))

Granting access to the best scientific proposals

The EMFL is by far the only large high magnetic field laboratory in Europe, available for all researchers in the world. In order to get the best research projects implemented within its facilities, the EMFL launches a global call for proposals twice a year, to which any researcher can respond. This call is

published on the EMFL website, but also on the local websites. After the call is closed, an expert selection committee (composed of internal and external high field researchers) evaluates the proposals submitted. The proposals are then ranked according to the following criteria:

- scientific quality and originality of the proposal;
- necessity for the use of the infrastructure;
- track record and past performance related to the proposal

The proposals fulfilling these criteria are systematically granted access to one of the facilities.

In this way, only the best scientific proposals are carried out inside the EMFL. In return, the local scientist (called "local contact") who helped the external user in his/her experiment is quoted as co-author of the resulting publication, and the EMFL laboratory is acknowledged. The EMFL laboratories are then recognizable in the scientific community as leaders in high-level physics research.

External users, with their variety of projects, also bring knowledge and practice exchanges inside the laboratory through their collaboration with the local scientists - this interactivity can only stimulate the internal research of the EMFL.

Human exchanges inside this international environment, also favour a positive atmosphere triggering more easily new collaborative projects, again for the benefit of the EMFL.

This is why the EMFL must continue to host external users, to always profit of these fruitful exchanges; the users and the facilities share a win-win relationship that can only be strengthened with the newly formed EMFL and new formal members.

Widening the scope of the user community

To continue to improve this work frame, the EMFL is also eager to attract new users from additional research fields. Through different channels, such as the EMFL Newsletter, the website, scientific events and innovative collaborations, the EMFL opens up to a wider scientific community, ranging from the most fundamental physics, to biology, chemistry and applied sciences.

Regular users of other research infrastructures, such as neutron or synchrotron radiation facilities, come to collaborate with the EMFL facilities for specific projects. For example, transportable pulsed magnets and generators allowing fields of up to 40 teslas to be combined with large neutron, X-ray, or laser sources have been developed at the EMFL labs. Neutron and synchrotron experiments in pulsed fields are conducted jointly between the EMFL and a number of large facilities that are leaders in their field, such as the Institut Laue-Langevin and the European Synchrotron Radiation Source in Grenoble, France, both of them European research facilities.

In order to welcome external users in the most suitable conditions, the EMFL laboratories work hard to continuously improve the quality of the technical and scientific support for the experiment, but also on the accommodation and subsistence conditions near the lab.

What users bring to the laboratory

Hosting external users is the core mission of the EMFL facilities, and thus represents an important share of the laboratory's work, for each staff member at different levels.

Each research team has at least one local contact that interacts directly with the user, at every stage of his/her visit. The interaction between the local contact, its research group and the visiting group or visitor leads to new ideas, projects and scientific challenges for both parties.

The technicians and engineers working towards the development of magnet technology are essential for the implementation of always more innovative research projects submitted. Reversely, the specific needs of external users to perform their experiment challenges the technical teams, and stimulates them for new developments; another illustration of the win-win relationship.

The management and administrative support are here to make sure all the procedures are respected for the user's visit, and further work together with scientists to attract more users.

Hosting conditions

A safety training is always given to the first-time users of the facilities and they are invited to participate to the laboratory's activities (social events, regular seminars, ...). They are considered, during their stay, as an integral part of the laboratory.

High field users generally stay between one or two weeks for their experiment in the EMFL labs.

When there is no guest house available inside or organised by the labs, the users stay in hotels close to the facility. The tendency is to build guest houses on site, like in Grenoble and Dresden, since the facilities are usually far away from city centres. In Nijmegen the lab rents an apartment all year-long for its users. For DC field facilities like Grenoble and Nijmegen, having accommodation possibilities outside traditional hotels is very practical for outside users – they are not bothered by housekeeping in the morning and they can rest quietly in the day without being disturbed, when they perform their experiment at night.

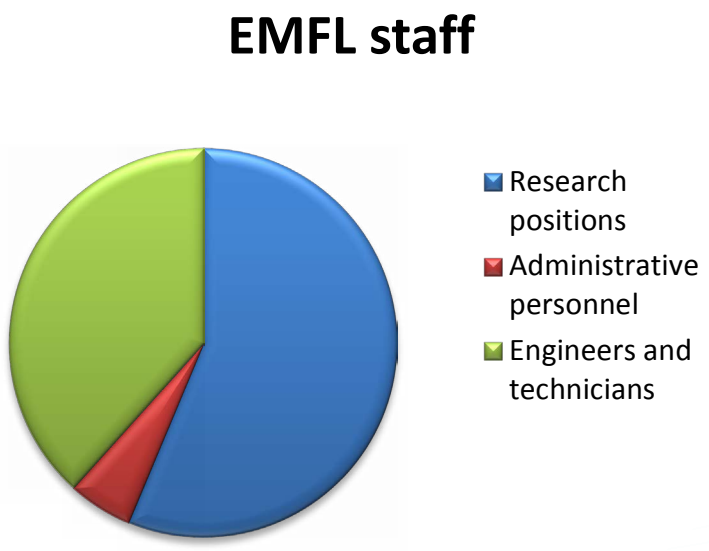
All the modern comfort is available in these guest houses (wifi, kitchen, cafeteria..) to make their visit as pleasant as possible.

How to pursue this task

Until now, thanks to the EuroMagNETII project funding, the four facilities had partial support to host external users in the best technical and scientific conditions, and reimburse users from the European Union for their travel and subsistence costs. Each facility covered these expenses according to their home institution regulations. The target the EMFL is now aiming at, is to continue to be able to provide the best access conditions for external users thanks to new members. The user access management is centralised inside the EMFL's legal structure, and each facility will follow the policies that will be developed within the EMFL association to improve the users' access conditions.

"In view of the transition from EuroMagNET to EMFL, it is essential that the users will be active in attracting funding within their own countries. It was encouraged that users start networking to coordinate discussions with national councils with the aim of exploring/applying for funding for travelling/ magnet time at the EMFL."[1] The users are well aware of the importance of keeping open access for the global community to the European high field facilities, and are willing to get involved and attract the attention of their national government, so that the EMFL can fulfill its mission.

Doing research, excellent research



Distribution of position types within the EMFL – Research positions (including researchers with or without teaching duties, post-docs, PhD students, trainees and directors) hold the most important share in the EMFL labs overall, showing the importance of excellent research as a main goal of the EMFL.

Fundamental research

The EMFL's mission is to develop and operate world class high magnetic field facilities, to use them for excellent research by in-house and external users. This mission was built upon the objectives of the three founding member laboratories, who are all dedicated to host external users, to provide them with the highest possible magnetic field, and to perform excellent research. Every innovative and excellent research field is encouraged by the EMFL labs, as long as these objectives are respected.

The EMFL labs currently work on the following research themes:

In the continuous fields facilities of Grenoble and Nijmegen

- Semiconductors and nanophysics
- Nuclear Magnetic Resonance
- Strongly correlated systems
- Soft condensed matter
- Molecular magnetism
- Applied superconductivity
- Magneto-science

1 Amalia Patanè, Member of the User Committee, in the report of the fourth meeting of the EuroMagNETII User Committee in June 2012

- Mesoscopic physics
- Magnet Technology

In the pulsed fields facilities of Dresden and Toulouse

- High temperature superconductors
- Nano-objects and semiconducting nano-structures
- Heavy-fermion systems
- X ray and neutron scattering
- Advanced magneto-optics
- Disordered systems
- Organic conductors

1012 publications from Jan. 2009 to June 2014

16 Nobel prizes linked to research in high magnetic fields

Over 300 scientific projects implemented per year

A few applied research themes are conducted in the EMFL, such as testing of superconducting wire & cable and studies under magnetic levitation conditions in Grenoble, or nanotechnologies and new materials in Nijmegen. There are no concrete applications yet for this research.

Valorising the research of the EMFL

Fundamental research is the core activity of the EMFL, however the facilities tend more and more to exploit their research, through contracts with industry. Further, companies or private institutions also have the possibility to buy magnet time from the EMFL when they do not want the results to be published. This was not done often in the past, but shall be an activity to promote in the future.

Moreover, a few patents have been developed inside the EMFL facilities, but so far none are being commercially exploited. This is not a priority for the EMFL, being a not-for profit structure. Nevertheless, spontaneous staff members' initiatives for spin-off creations are strongly encouraged by the EMFL management.

Of course, as all scientific results are published, private companies, just as the global society, have access to the scientific outcomes of the EMFL and can use it as they want. In this way, the EMFL contributes to innovations in the field of nanotechnologies, renewable energies etc.

How to ensure scientific and technical cooperation within the EMFL

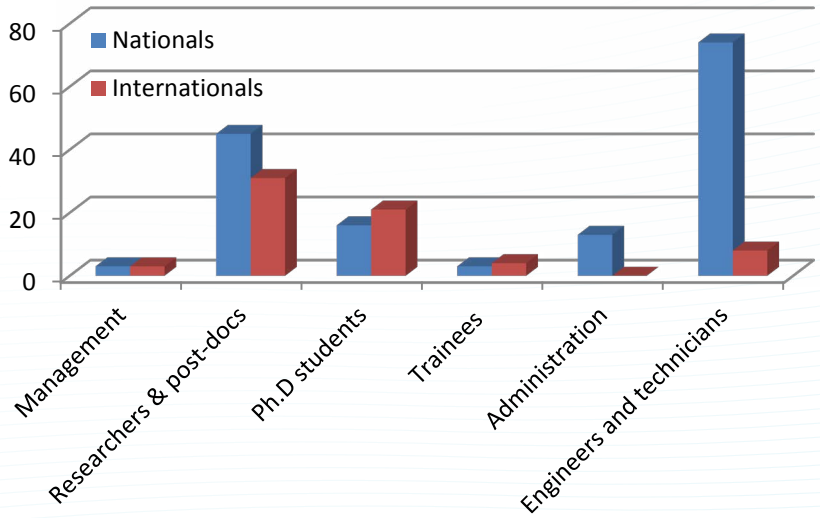
With the creation of the EMFL, the already existing cooperative projects between the researchers and engineers of the four sites are being continued and strengthened. Additional collaborations should emerge from this newly created organization. Regular meetings are organised for all the staff members of each facility, named the "EMFL 3 to 1 meetings" that trigger a sense of common identity and belonging to one organization.

Several other options are being considered by the facilities, such as specific grants for scientific or technical projects involving a minimum number of different members, or similar encouragement measures.

The EMFL and its diversities

European and international work environment

Three different national laboratories getting together not only means three different cultures - the French, German and Dutch cultures - getting to know each other and work together, which is already a big step. But each lab brings its own share of international work environment which in the end represents altogether a very important part of co-workers from different parts of the world. Element of richness, diversity among the staff is a big asset for the EMFL, resulting in a practice and cultural exchange inside each lab and between the 3 labs.

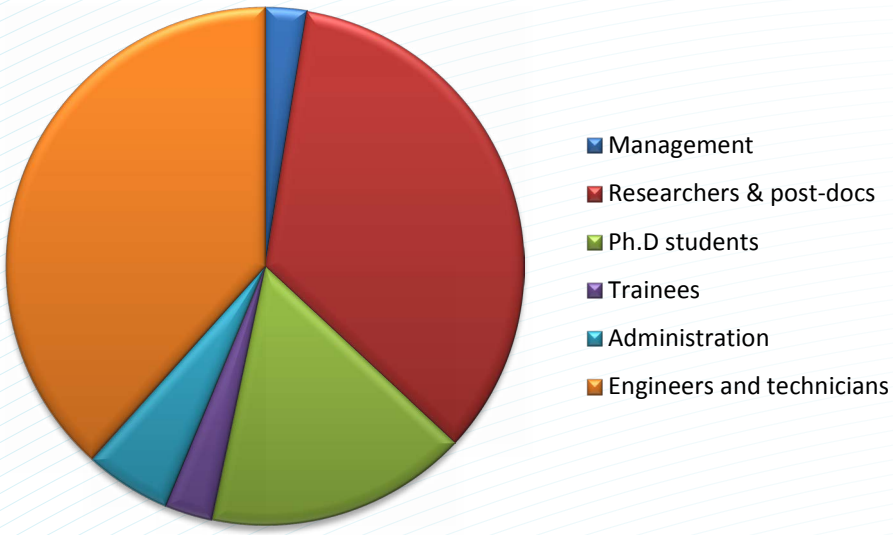


EMFL Personnel January 2015– ratio nationals/internationals

In total, the ratio of internationals (non-national residents of the lab's country) represents 30.3% of the staff members – they come mainly from the European Union, but also from Eastern Europe and Asia, which brings a high diversity and international environment inside each lab.
The above diagram also shows that foreign PhD Students are more numerous than nationals in the same category – this is very significant in relation to the high quality of education and training available inside the EMFL. Students from all over the world want to graduate their thesis in one of the EMFL labs.

Skills diversity

In university research labs you mostly encounter scientists and a minority of support positions, contrary to the high magnetic field laboratories where many skilled technicians are needed. As a large research infrastructure, large installations are necessary to produce the high magnetic field – therefore an important share of the staff do not do research, but make sure that the installations operate. Many engineers and technicians, each of them being an expert in his or her specific field, work every day with the scientists to run and use the magnets. Thus the EMFL presents also an important diversity amongst its professions and skills, which is a precious asset as well for the scientific community.

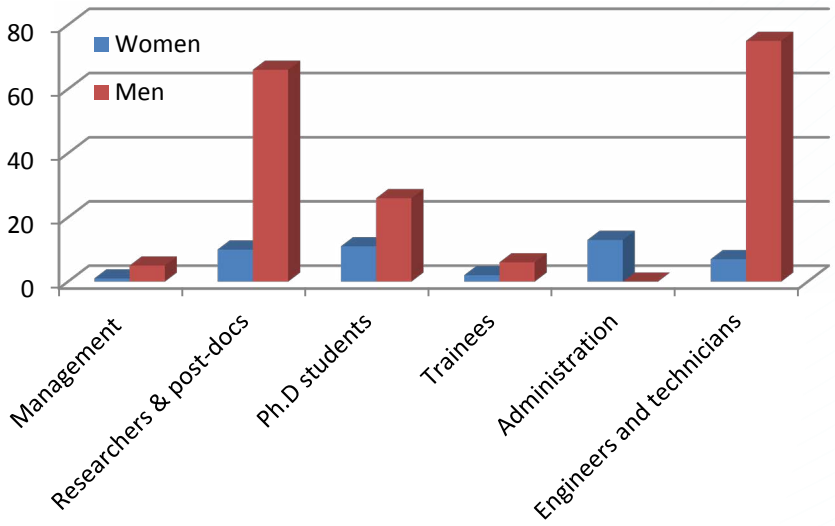


EMFL Personnel 2014

In the diagram above, it shows that technicians and engineers represent the most important part of the staff members (38%); they are essential for the running and development of the installations. The EMFL could not otherwise respect its first mission to provide high magnetic field environments to users, and to follow this mission, many high-level technical and technological skills are needed.

Nevertheless, a closer look at the diagram shows that research positions at all levels constitute a little more than half of the total manpower. Indeed, researchers, post-docs, PhD students and trainees, altogether with the management positions which are occupied by researchers, represent a majority of all the staff members of the EMFL (56%). This element shows the importance given to excellent scientific research and also to education, given the high percentage of PhD students and trainees (19%).

Gender policy



EMFL Personnel 2014 – ratio men/women

It is a fact that physics is unfortunately not a scientific discipline widely chosen by women, thus it is difficult for the EMFL to reach parity among its staff members. Studies show that in scientific curricula, women tend to choose rather human sciences and biology than physics.

However, parity policies at national and/or institutional level, in all three countries encourage the recruitment of women at all types of positions, even though only competences are a selection criteria for any position.

Some initiatives already in place in the EMFL labs, such as participating in events such as the "Girl's Day" in Dresden, exclusively dedicated to women interested to work in sciences, or advertising fellowships for female scientists, are meaningful in relation to the EMFL's wish to improve parity among its staff members. The EMFL will strive to reach a higher share of women employed in other positions than administration.

The richness of skills and cultures can only be heightened with the collaboration between the four EMFL sites. A few collaborative projects are already in process between scientists and engineers of the different EMFL sites. It is the EMFL target to promote a human resource policy to be established and shared between the four facilities of the EMFL. Exchanges of staff members on a short-term or long-term basis, and the possibility to follow a career path within the EMFL are options that are currently being explored by the EMFL. This strategy will enable the EMFL to raise the level of its scientific and technical excellence even more, thanks to fruitful interactions and exchanges.

Education and training

Studies in the EMFL

In 2015, the PhD students represent 16% of the EMFL staff members; they are 35, 21 out of which are internationals, and every year, about 12 PhD theses are completed. This number is quite important and highlights the strong educational capacity of the high field laboratories and its international reputation.

All these students are affiliated to several universities that are either stakeholders of the laboratories themselves or in relation with them. The rate of employment and the type of positions that PhD students obtain after they complete their thesis is not thoroughly verifiable. However, it is known informally by each facility that most of their former students find high-level positions in or outside Europe in various fields, such as public fundamental research or private high-technology industries. Therefore, the EMFL is undertaking the task to build an "alumni book" with testimonials from former students and statistics that will be available on the EMFL website: this will be a tool to attract more students, as it will show that being educated at the EMFL is a true asset in today's competitive labour market.

Training the staff members and the users

Each facility can profit from its national stakeholders' training curricula provided to their staff members, in various fields ranging from specific technical or scientific subjects to languages, IT or team management skills. The obligatory training each staff member has to go through at its own level is the health and safety training, as in every large research infrastructure.

On the EMFL level, training activities such as summer schools and workshops around physics and other technical fields are regularly organised by the EMFL members, to which the users and internal staff members concerned can participate. The latest was the Summer School in Rügen, Germany, organised by the HLD, which gathered about 50 students and young researchers during 7 days in October 2012.

The EMFL facilities also often participate in the organisation, or organise themselves important conferences that gather top-level scientists. The most recent and important one was HMF20 – High Magnetic Fields in Semiconductors Physics, in Chamonix, in the French Alps, organised by the LNCMI, Grenoble in July 2012. The conference gathered around 200 participants from all over the world, and featured top-level scientists such as Nobel laureates Prof. Klaus von Klitzing and Prof. Andre Geim.

The important participation in many events where the EMFL is involved shows the interest the scientific community has in the European laboratory, and is reversely, the opportunity to communicate about the EMFL at the same time.

Public relations and cooperation

External communication

With the same objective of attracting new users, but also students, visitors and promote its activity amongst the general public, the EMFL has a two level communication strategy.

At local and national level, each facility has its own website and additional communication channels (leaflets, open-house days, annual reports, press releases...).

At European and international level, communication from the four sites is centralised via the EMFL, with the EMFL website www.emfl.eu , the EMFL newsletter "EMFLNews" which is sent quarterly to an e-mail database of more than 1500 e-mail addresses throughout the world, a leaflet addressed to users with technical and scientific details of the four sites, distributed occasionally during scientific events, and a brochure addressed to the general public and policy makers. All these documents are available on the website. The EMFL logo is present on every power-point presentation made by a staff member for a public presentation, and the EMFL has its own power-point presentation framework and letter header.

In the future the tendency will be to centralise a more important part of the external communication of each national lab, to present a more integrated European infrastructure. From 2016 onwards, the EMFL will produce a global annual report. The corporate identity of the EMFL shall eventually be adopted by every lab in accordance with the national stakeholders. A more integrated EMFL communication strategy will be worked out and established on the long term.

Internal communication

For the EMFL very special configuration, multi-site and multi-institution, there are two levels of internal communication. There is the intra-EMFL communication, and the intra-laboratory communication.

Basically, each laboratory has the same "classical" internal communication means: online intranet or servers to share working documents and information, e-mails, meetings and events, open seminars etc.

On the EMFL level, internal communication requires special attention, since it is a distributed facility in 3 different countries and 4 sites, but efforts are being made to improve this communication.

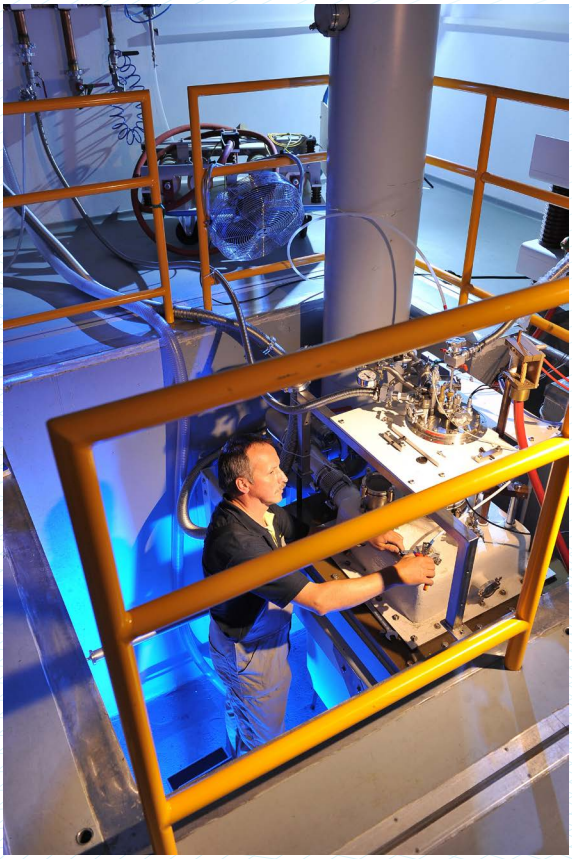
Most of the communication between the three host members is done via the now classical mean of e-mail. However, to be able to coordinate the EMFL project and the EMFL organisation, the three host members invested in a videoconference system – the directors meet via this system once or twice a month, and their assistant manager every week. Other staff members involved in the EMFL use this system on a regular basis for meetings to avoid travel.

The future EMFL-AISBL staff members will have the important mission to be the messenger and informer of its members, and implement the above mentioned communication means.

Communication leads to cooperation

The host members not only bring to the EMFL their skills, their knowledge, their facilities and their culture, but they also bring with them their respective partners with whom they have been collaborating on different levels and fields.

For example, the EMFL lab in Nijmegen has been collaborating with the US American NHMFL for the design of their resistive magnets; this collaboration led to the idea to create a global platform to exchange ideas and set a roadmap for the high field community. Leading representatives of the world's most important institutions for high magnetic field research met in November 2014 in Potsdam, Germany, to establish the "Global High Magnetic Field Forum" (HiFF). With the National High Magnetic Field Laboratory (NHMFL, USA), the Chinese laboratories in Hefei and Wuhan, the Japanese facilities in Sendai and Kashiwa and the EMFL this global cooperation will unite the leading high-magnetic-field facilities worldwide. The goal is to stimulate worldwide activities that promote scientific research and technology development using the highest magnetic fields. More specifically, essential information on the high field labs, such as key data on available magnets, installations or project selection procedures will be exchanged.



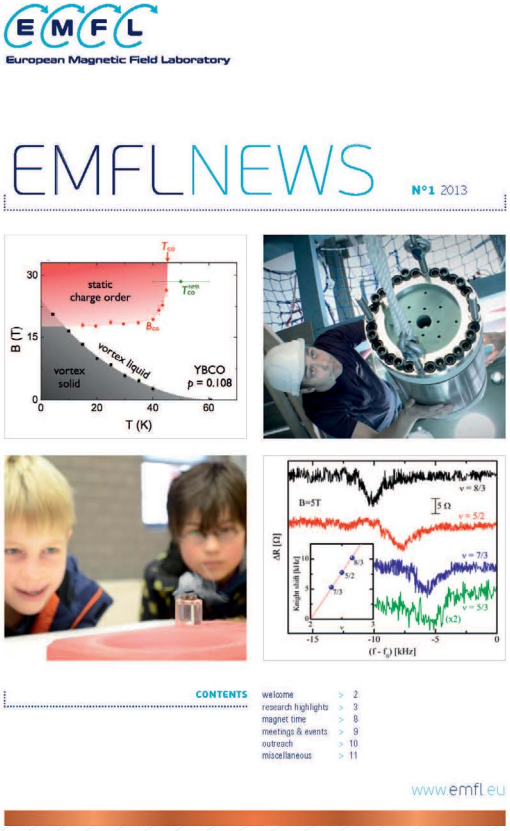
Outlook

The EMFL AISBL, with CNRS, HZDR and RU/FOM as founding members, is governed by the same board as the EMFL project. The AISBL will continue and intensify the current activities to improve the quality of existing instrumentation and to create unique instrumental possibilities to better serve the current users and to further attract new users. This includes:

- Coordinating and stimulating the transnational access to European large infrastructures for high magnetic fields in order to optimally use the capacity and optimally satisfy the users' needs.
- Structuring and expanding the high field user community by stimulating the exchange of information between high field user groups, the high field facilities and other potentially interested scientific communities, by organising schools, thematic networks and secondments.
- Developing new and advanced experimental possibilities as well as improving the magnet performance at these infrastructures by joint research activities involving facilities and user groups.
- Representing the European high field facilities on an international level and increasing the visibility of high field research in Europe.
- Establishing a permanent forum to share knowledge and expertise, coordinate structural collaboration (magnet technology and scientific experimentation) and represent Europe within the global High Field Forum (HiFF). This will improve the magnet technology resulting in stronger fields, better homogeneity and ultimately better scientific results for the high field community.
- Attracting and associating other partners and manage their financial contributions to run the EMFL.

EMFL not only guarantees that the achievements of the past FP6 and FP7 projects (EuroMagNET I and II) are preserved, it also is the representation of the most important activity of science in high magnetic fields in Europe. EMFL is a legal entity that can accommodate future partners. It represents this activity on a political level (EU and local) and strengthens the position of this scientific area.

EMFLnews 2013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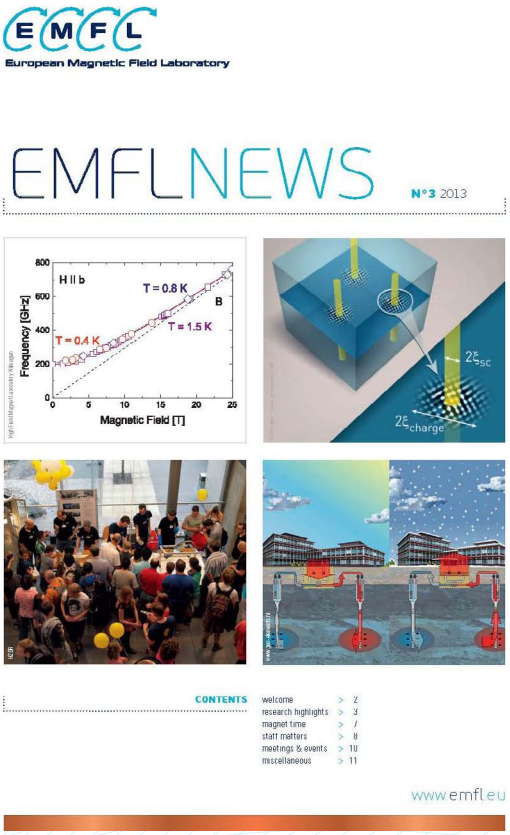
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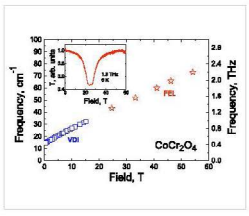

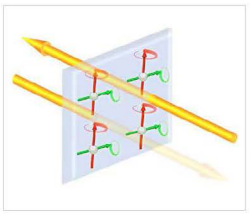


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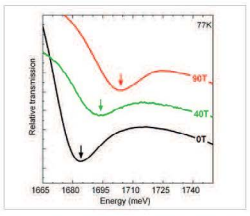


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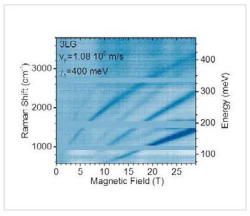


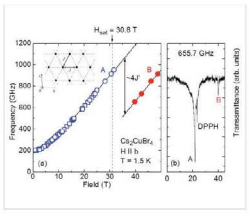

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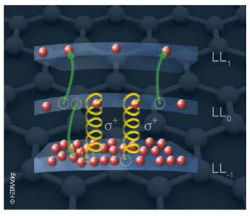

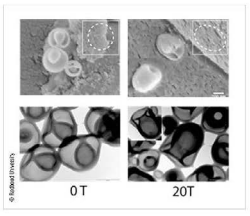

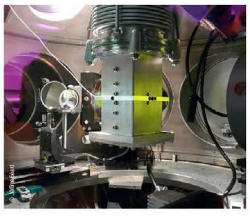

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