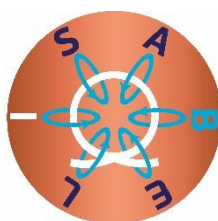


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ISABEL

Improving the sustainability of the European Magnetic Field Laboratory

D2.2 USER COMMUNITY MEETING REPORT - 2



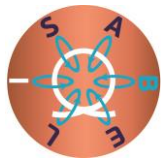
Start date of the project: 1st November 2020

Duration: 48 months

Project Coordinator: Geert Rikken – CNRS LNCMI (P1 - CNRS)

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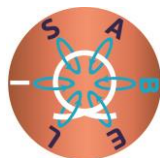


Document abstract

The deliverable is part of the Work Package 2 “Community building and membership enlargement” and Task 2.2 “User Community meetings”. This deliverable is a report of the second Annual User meeting, which took place on the 15th of June 2022 at the LNCMI in Grenoble in hybrid format.

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1. Introduction & User-meeting program

The aim of the yearly user meetings is to exchange ideas and experiences, to present scientific results obtained in the EMFL facilities, and to discuss about possibilities for improving further the performance of the facilities. During the meeting, newest developments of the EMFL facilities as well as invited scientific talks from selected users were presented. In addition, the yearly User Committee meeting took place.

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After the online user meeting 2021, the organizers of the 2022 user meeting were happy to see quite a number of users and staff in reality during the meeting. The EMFL user meeting took place in Grenoble at the LNCMI on June 15 in hybrid format. With up to 90 participants, 35 on site and 55 remotely connected, the meeting was very well attended. The in-person discussions during coffee and lunch breaks were particularly productive in exchanging ideas and experiences between users and EMFL staff.

USER MEETING PROGRAM

08:45 Arrival and registration – LNCMI-Grenoble

09:15 Welcome and introduction

Peter Christianen, Director of HFML, Chair of EMFL Board of Directors

09:35 Announcement of the 2022 EMFL prize winner

Jochen Wosnitza, Director of HLD

09:40 Presentation by the EMFL prize winner

10:10 Presentations by EMFL users – Session 1

1. Stanislaw Galeski (Max Planck Institute CPfS, Dresden) – remote

Signatures of a magnetic-field-induced Lifshitz transition in the ultra-quantum limit of the topological semimetal ZrTe_5

2. Charis Quay (LPS Orsay) – remote

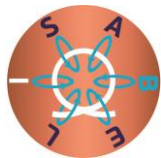
Tunneling spectroscopy of few-monolayer NbSe_2 in high magnetic fields

10:50 – 11:20 Coffee break

10:50 Presentations by EMFL users – Session 2

3. Shravani Chillal (Helmholtz-Zentrum Berlin and TU Berlin) – remote

Magnetic phase diagrams of new three-dimensional quantum magnets



4. Marco Bonura (University of Geneva)

Record high upper critical field in the MgB_2 superconductor

12:00 – 13:30 Lunch break

12:50 Presentations by EMFL users – Session 3

5. Elena Blundo (Sapienza University Rome)

Gyromagnetic factor of k-space direct and indirect excitons in strained WS_2 monolayers

6. Maciej Molas (Warsaw University)

Magneto-spectroscopy of excitons in monolayers of transition metal dichalcogenides alloys

7. Julien Fuchs (LULI)

Recent advances in laboratory astrophysics using laser-driven magnetised plasmas

8. Michael Schmitz (Aachen University) – remote

CVD graphene in high magnetic fields

14:50 – 15:20 Coffee break

15:20 User Committee Meeting (open to all users)

Chair: Raivo Stern

16:20 Report of User Committee to Board of Directors

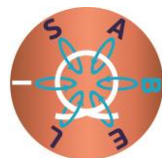
Chair : Raivo Stern

16:35 Wrap up meeting and closure

2. Welcome presentation (Chair EMFL BoD, Peter Christianen)

The meeting started with a warm welcome by Peter Christianen, chairperson of the EMFL Board of Directors and director of the HFML. In his talk, he discussed the situation caused by the Covid 19 pandemic and the Ukraine war, which both influence severely the user operations of the EMFL facilities. Further, he presented recent technical developments of the EMFL infrastructures, summarized the scientific activities, and reported on some selected scientific highlights.

Below, some details of Peter's presentation:



a) Operation facilities & output

After seizing most of the sanitary restrictions, the facilities have resumed “regular” operation. However, the situation is not completely recovered due to a remaining backlog of projects and the large number of proposals executed via mail-in (76 in 2021) that required strong staff support. The regular calls continued, and in 2021, 194 user projects have been performed.

In 2021, 189 peer-reviewed papers were published and 9 PhD theses were defended.

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b) Infrastructure developments

- At the LNCMI Grenoble facility, the 43 Tesla hybrid system is under development and magnet cool-down is expected for June 2022. At LNCMI-Toulouse, a pulsed magnetic dipole for magnetic birefringence measurements has been designed.
- At the Nijmegen facility (HMFL FELIX): the 45 Tesla hybrid system project is ongoing with final tests of the cryostat planned for summer 2022, as well as magnet cool-down for end of 2022.
- At the HLD facility: New pulsed magnet prototype tested for HIBEF up to 52 T.

c) ISABEL project (Improving the Sustainability of the European Magnetic Field Laboratory)

2020-2024, 18 partners, budget 4,9 M€, started 1 November 2020

Seven regional facilities partner the project and it is planned to organize workshops and trainings. Under ISABEL, the development of new access modes has started (<https://emfl.eu/apply-for-magnet-time/>). A User Survey in 2021 helped to define the user needs in terms of facility access:

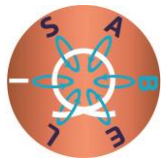
- **Dual access** (since call in April 2021): 10 project proposals so far
- **First-time access** (since call in April 2022): 9 project proposals so far

Other novel access modes (Long-term, Industrial, fast-track, technical development) are in preparation.

ISABEL supports EMFL secondments. In 2021, the call received 12 proposals (37.1 k€), 10 proposals were granted (22.4 k€). A new call will soon be launched.

ISABEL pursues its objective to bridge the gap between EMFL and industry. To carry this action, a new Industrial Liaison officer has joined the project at LNCMI Toulouse - Aimée Savourey. The industry-related developments of ISABEL done recently are:

- IPR and technology transfer trainings in 2021 for EMFL staff
- Opening of innovation call in December 2021
- EMFL skill map completed and downloaded on the EMFL website.
- Participations to exhibition visits (5 planned for 2022).
- Industrial Partner Club to be launched in November 2022.



The project has also begun to develop measures in order to increase the collaboration with other research infrastructures; workshops are under preparation. The first one will be performed at ILL, dedicated to neutrons, in November 2022. Workshops on lasers, FELs, Xrays will be organized in the near future.

The ISABEL team carries out a study on magnet technology and plans to create a user survey. The team further thinks about new design tools based on sustainable principles (energy, efficiency, recycling).

On the international level, strategical external connections are tightening (HiFF, CERN, FuSuMaTech, and the European MRI community).

In order to keep the community informed and to reach out to a wider audience, ISABEL has developed various communication tools – website updates, social media developments, flyers, etc.

d) SuperEMFL (All superconducting magnets for the European Magnetic Field Laboratory)

2021-2025, 11 partners, budget 2,9M€, started January 2021

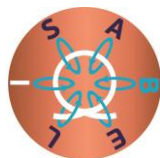
Goal is the design of a fully superconducting magnet consisting of low-temperature superconducting (LTS) and high-temperature superconducting (HTS) materials that allows to realize new static-field magnets integrated within EMFL.

So far, the SuperEMFL project has accomplished the following tasks in reaching its objective:

- March 2022: Critical current measurements of Theva's tape at LNCMI-Grenoble
- June 2022: Complementary critical current measurements at HFML Nijmegen
- End of 2022: Test measurements of 2 double pancake coil configurations at LNCMI-Grenoble
- A set of insert designs computed by WP4 partners according to the existing tape data
- LTS magnet being prepared at HLD Dresden to accommodate HTS inserts, such as the 2 double pancake coils provided by LNCMI
- In April 2022, new tests of the NOUGAT insert showed that levitation of helium bubbles reduces the cooling efficiency. So far, the achievable field under good cooling conditions is limited to about 28 T
- Next SuperEMFL general meeting June 16th in Grenoble
- User questionnaire ready to be launched (June 2022)

e) Leaving of EMFL's Executive Manager

A special thanks was dedicated to Martin van Breukelen, EMFL executive manager since 2013. Martin van Breukelen left his function in June 2022.



f) Announcement of EMFL Prize Winner 2022

Jochen Wosnitza, chair of the Selection Committee, announced this year's EMFL prizewinner, Mateusz Dyksik, who, afterwards, presented highlights of his high-field research in a talk on "Excitonic properties of 2D layered perovskites revealed by magneto-spectroscopy".

3. Users' presentations

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The audience was then able to appreciate the excellent talks of the eight invited speakers who presented their work done as users at the EMFL facilities. Stanislaw Galeski (Max Planck Institute CPfS, Dresden) covered his high-field research on the topological semimetal ZrTe_5 . Charis Quay (LPS Orsay) presented results on tunneling spectroscopy of few-monolayer NbSe_2 in high magnetic fields and Shravani Chillal (Helmholtz-Zentrum Berlin and TU Berlin) on magnetic phase diagrams of quantum magnets. Marco Bonura (University of Geneva) presented more applied results on record high upper critical field in the superconductor MgB_2 . After lunch (for in-person participants), Elena Blundo (Sapienza University Rome) gave a talk on k-space direct and indirect excitons in strained WS_2 monolayers and Maciej Molas (Warsaw University) on excitons in monolayers of transition-metal dichalcogenides. Touching a more exotic topic, Julien Fuchs (LULI) reported on recent advances in laboratory astrophysics using laser-driven magnetized plasmas. Finally, Michael Schmitz (Aachen University) presented results on graphene in high magnetic fields.

4. User-Community meeting

After the cancellation of the user meeting in 2020 due to the worldwide pandemic related shutdown, and the "new reality" online user meeting in 2021, the EMFL and its user community gathered in hybrid format for its annual user meeting for 2022 in Grenoble. The high participation of up to 90 participants (35 on site, 55 remotely) showed the genuine desire for a meeting to exchange on current developments and scientific progress. With the high attendance, the user community reacts very positively to the adjustment in the meeting format and encourages the EMFL Board of Directors (BoD) to consider a hybrid format for future meetings.

The EMFL User Committee (UC) joins the community in congratulating Dr. Mateusz Dyksik for the 2022 EMFL prize. His works demonstrate the high-quality research carried out within the EMFL facilities in cooperation with the project partners of "ISABEL" and their dedication to driving new scientific development.

During the annual meeting of the UC, which is open to all users to attend and provide feedback, recommendations from the user community were discussed and presented to the BoD. Currently, the UC consists of 10 members. With the user community of EMFL steadily growing, the UC repeats their request for a renewed, much stronger mandate to better represent the interests of the high-field users. The UC wants to stress that the first priority should be the satisfaction of users' needs and the goal of performing world-class research. This priority implies a scientifically active staff with a significant amount of time dedicated to their in-house research and developing cutting-edge methods. We are happy that this priority is well



recognized and adopted by the BoD. In addition, the development of new techniques should be driven by the collaboration of user support staff with users.

A key part of the UC's work is to review prior feedbacks and how the EMFL BoD has incorporated it. A point of review this year was the availability of information for users on accessible magnets, cryogenic infrastructure, and experimental techniques. The UC together with the attendees concluded a very slow if any progress in this area, particularly on the new EMFL website. Those users who requested a more detailed description with available resolution and documentation are asked to specify their needs with local contacts in the labs. The UC encourages the users to also address these comments and requests via email to one of the UC-members such that progress in this regard can be monitored and reviewed.

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Another example of continuous and steady progress is aimed at the users themselves. Without their feedback and clear communication of the needs for their experiments, the UC cannot help. We still emphasize our call here for all users to give substantive feedback via the EMFL website.

Further issues which were discussed include general data protection rules (GDPR), open data strategy, and online safety trainings. Many of these activities are currently being run under the project "ISABEL". Proposals were made for part-week test experiments and/or for testing new perspective samples in advance of full proposals. Such programs are available at other facilities in the field of synchrotron and elsewhere and help to attract new principal investigators. Feedback from the users is very welcome on this matter to discuss the implementation of such a system with the BoD.

The user community is still concerned about the shortage of "workhorse" equipment. To get a better understanding of the most widely used magnets, we ask the user community to get in contact with the UC and name the magnet they would find most suitable for their experiments, and participate actively in the respective survey from "ISABEL". The UC will then combine this input and discuss strategies with the BoD on how to meet the needs of the community.

The UC welcomed two initiatives at the EMFL. First, the secondment activity allows scientists and technicians from member states to visit other laboratories and teams. This is greatly strengthening the collaboration between the different members and helps shape a stronger EMFL. Second, travel support for early-stage scientists from Europe and developing countries for attending the EMFL User Meeting and learning about the EMFL and experimental possibilities there.

To improve dissemination activities, it was suggested that EMFL would be present with a booth at various European Physical Societies meetings whilst also organizing topical sessions and giving talks on recent research achievements. Postings on additional social media platforms (ResearchGate, Instagram, YouTube) might also boost the visibility of the EMFL; presence on Twitter and LinkedIn is already quite active.

Finally, the UC acknowledged the organizing team from LNCMI-G and the BoD for arranging an excellent user workshop where both users and representatives of the EMFL reported on recent developments of high-magnetic-field infrastructures/equipment, 2D materials in high magnetic fields, magnetocaloric materials in pulsed magnets, and research in topical areas as



well as novel material systems of fundamental and technological interest. This rich program was well received by the user community.

Last but not least, the UC on behalf of all users would like to thank the EMFL laboratories and their staff for the help during the past years in carrying out experiments on a remote basis. This new operational scheme has challenged both the users as well as their local contacts on finding new ways to communicate, long extra hours in the laboratory, as local contacts had to carry out experiments themselves and logistics to get samples to the laboratories safely.

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We believe that the desire of EMFL to return to a full on-site experience for the users as fast and as safely as possible confirms the excellence obtained in the laboratory and is further strengthened by the implementation of the project "ISABEL" to ensure that this expertise is widely available. It does, however, necessitate this expertise not only to be developed but also maintained in-house and hence a significant increase in the number of permanent staff members is required to safeguard a smooth and reliable operation now and in the following years.

After not being able to meet in person for 2 years, the hybrid meeting in Grenoble was a big success. It was a great pleasure to renew and deepen contacts in person and to include the participants in remote mode. We hope to be able to maintain this format as well in the future. The next user meeting will take place in Nijmegen, again in June.