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ISABEL

Improving the sustainability of the European Magnetic Field Laboratory

Blueprint for an international governance structure

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Duration: 60 months

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

Contact:

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1.0	First draft	22.10.2024	Peter Christianen
2.0	Final version, after corrections	24.10.2024	Peter Christianen, Geert Rikken

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DOCUMENT ABSTRACT

The ambitious aim of Task 7.3 of ISABEL WP7 was to define a global governance model with clear decision-making, planning, and management structures for future high-field magnet development. It was envisaged that the development of the next generation of high-field magnets would be an increasingly global endeavour and that international collaboration would be key, requiring a unified approach to influence national strategies, secure funding, and monitor the progress. In tasks 7.1 and 7.2 preparatory work has been done to reach this goal. The development of innovative magnet technologies requires substantial advances in our present state-of-the-art, including the development of new materials. Progress in this area has been reported on a number of international workshops and international conferences, as listed in D7.1 and D7.2. The recent developments and concrete plans towards the next generation of high-field magnets on the different continents (East Asia, Europe, and USA) has been analyzed (D7.3). This document summarizes that most of the magnet-technology developments that EMFL is interested in can (and must) be realized without such a global organization. This conclusion partially results from the current political climate, which is such that collaborations involving USA and/or China are highly unrealistic.

The high-field magnet facilities are continuously working on upgrades of their magnets and the associated instrumental infrastructure. The plans for the different high-field facilities around the world differ in the details, but the global roadmap for future magnets consists of the following magnets:

[1] 100 T+ non-destructive pulsed user magnet.
[2] MegaGauss generators (fields beyond 100 T)
[3] 60 T-class DC user magnet (Hybrid)
[4] 40 T-class all superconducting user magnet
[5] Advanced magnets for specific applications (in combination with facilities for neutrons and advanced light sources)

The strategy of EMFL contains plans for magnet types [1], [2], [4], and [5], and EMFL has no mid-term plans for a 60 T-class Hybrid or other types of magnets, such as large-bore superconducting magnets for applications in accelerators and fusion reactors or MRI magnets. Global initiatives exist, in which the further development of high-field magnets is evaluated and discussed, such as the Global High Magnetic Field Forum (HiFF) and the Superconductivity Global Alliance (ScGa). However, the formation of an overarching global organization that governs the decision-making, planning, and management processes towards the new generation of high-magnetic-field infrastructure is unrealistic and is considered to be unnecessary for EMFL because of a number of reasons:

[1] The current political climate is such that multilateral institutional collaborations involving USA and/or China are not possible.
[2] The institutions in the USA and China have indicated that they have the ambition and capability to execute the main magnet developments [1]-[5] on their own, with perhaps the 60 T Hybrid as an exception.

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[3] EMFL has the ambition to realize the magnet developments [1], [2], [4], and [5] and has the capability to do so in collaboration with its European partners and by exploiting unilateral collaborations with partners around the world.

[4] Funding programmes for large-scale investments in magnet technology are entirely driven by national funding agencies and global funding schemes are not foreseen.

The conclusion of Task 7.3 is, therefore, that it turned out to be not possible to define a global organization with clear decision-making, planning, and management structures for future high-field-magnet development.

Informal discussions between engineers and scientists of the different facilities worldwide will continue, as will more structured exchanges of information within the HIFF. EMFL will remain open to global collaboration, and future changes in the global political situation or breakthrough technical developments may make such collaborations possible.