Future Superconducting Magnet Technology

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DELIVERABLE D 6.5

PROOF-OF-CONCEPT FUNDING PROPOSAL FOR NEW APPLICATION DOMAINS

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1. SUMMARY

All the partners will participate to innovative projects related to superconducting magnet technologies in different application domains (e.g. medical imaging MRI, NMR, and energy applications…). The funding mechanism is a key point of the FuSuMaTech Phase 2 and has been discussed during the FuSuMaTech Phase 1 final workshop.

2. FUSUMATECH METHODOLOGY

The FuSuMaTech methodology is based on activities driven by both Institutes and Companies to make progress in common subjects of interest. In Applied Superconductivity, the applications are very different from Accelerator Magnets, to the so-called Detector Magnets for the large experiments, and from NMR high field magnets to MRI magnets of last generation. The electrical grid, the future airplane motors, the windmill generators are part of this effort. All these subjects require similar progress in the knowledge and know how as listed in the FuSuMaTech tasks. The most efficient way to make progress is to create working Groups of Academia and Industry people on each common subject. This is the FuSuMaTech methodology

3. THE RESULTS OF FUSUMATECH PHASE 1

Apart from the set of Deliverables, the main result of FuSuMaTech Phase 1 is the creation of a core of 12 partners who have signed an Expression of Intention to establish a Scientific Collaboration based on a MOU.

The more active and operational results of FuSuMaTech Phase 1 are the 10 proposals based on the 5 tasks of WP4 and on the 5 tasks of WP5. These proposals are following a template fully compatible with the usual format of European calls. This Table presents a list of identified opportunities for funding of FuSuMaTech Phase 2 projects in H2020 and in Horizon Europe.

Table: Possible funding sources for FuSuMaTech phase 2 :

EU Programme	Work Programme	Instrument	Funding provided for	Focus on
H2020 (2019-2020)	Research Infrastructures	Innovation Pilot on accelerator science and technology	- proof-of-concept (100 k€) - prototyping (500 k€)	Innovation and collaboration with industry
H2020 (2019-2020)	Advanced Materials and Manufacturing technologies	Open Innovation Testbeds	- Support for infrastructures of RTOs and industry, which are open to other academic and industrial users - Support for access to innovation testbeds	Modelling and characterisation of materials
H2020 (2019-2020)	Marie-Curie	European Training Networks	- Recruitment and training of early-stage researchers up to 4 years after their degree (3-4 M€)	Training through research, PhD degree desirable
EU Programme	**Work Programme**	**Instrument**	**Funding provided for**	**Focus on**
European Institute of Innovation and Technology (2020+)	EIT-Health	Innovation Projects	- Development of new products or services that will generate revenue (up to 3 M€, incl. 50 k€ for external partners, i.e. parters not members of the EIT-Health Consortium)	Innovation with a view to market entry in the area of health technologies
H2020 (2019-2020)	EIC Pilot	FET-Open	- Development and testing of early stage breakthrough technologies by multi-partner consortia (up to 3 M€)	Novel ideas and radically new technologies
EU Programme	**Work Programme**	**Instrument**	**Funding provided for**	**Focus on**
Horizon Europe (2021-2027)	European Innovation Council	EIC Pathfinder	- Advanced R&D, validation and demonstration of novel technologies with high-risk approach on breakthrough innovation	Breakthrough innovation: from early technology to pre-commercial TRL
Horizon Europe (2021-2027)	Digital and Industry Cluster	TBC	- Collaborative R&D	New technologies for advanced materials and manufacturing

In addition, an ERC Synergy project could be considered to develop a groundbreaking project in neuroscience (social magnet, brain gauge theory)

4. THE FUNDING MECHANISM OF FUSUMATECH PHASE 2

The funding mechanism of FuSuMaTech Phase 2 relies on two principles:

-For the bridging activities, apply as much as possible to the last calls of Horizon 2020 (cf table).

-For the FP9 "Horizon Europe", write a position paper promoting to the EC and Member states a large Initiative funded by EU as well as by national/regional funds and use all the available opportunities.

5. THE MARKET APPROACH AND PRIVATE-PUBLIC-PARTNERSHIP IN THE FRAME OF HORIZON EUROPE

One of the benefits of FuSuMaTech is the direct participation of Companies as partners of the program and members of the Governance bodies. This will help to find opportunities for building up Private Public Partnership in view of developing R&D&I programs in new application domains and in particular to obtain funding for the 5 Technology pilots which result from the Phase 1.
"Horizon Europe" is opening a new era for innovation and the FuSuMaTech methodology suits perfectly this objective.
In addition to this "technology push" approach, a study of end-users needs in different application areas (heath, energy, transport) will contribute to strengthen the impact of the R&D&I by addressing societal challenges.

6. THE ROLE OF FUSUMATECH IN THE EUROPEAN SUPERCONDUCTIVITY COMMUNITY AND IN THE EUROPEN ROADMAP FOR NEW SUPERCONDUCTIVITY APPLICATIONS

The European Superconductivity community is the most active in the worldwide Superconductivity community. The presence of CERN and of the associated laboratories as well as the presence of ITER on the European ground are a real opportunity to develop competences in applied superconductivity at the highest level. FuSuMaTech has developed a new scheme for collaboration between Industry and Academia. This scheme has been validated by the production of 10 practical proposals: 5 in R&D&I and 5 in Technology pilots.
FuSuMaTech aims to establish a sustainable Cluster for Advanced Superconductivity in Europe, with the support of the EC.

As an example from Knowledge Transfer at CERN:
CERN is developing high intensity current links working at cryogenic temperature based on a promising type of superconducting wire of new generation the MgB_2. Currents up to 150 000 A

will be transported on distances between 300 m and 500 m without any Joule effect. This operational example is opening the way to future applications in local Power GRIDS, which are part of the new "Green Society". In that context, FuSuMaTech is proposing a prototype based on MgB_2 as a contribution to this effort.

7. CONCLUSION

As illustrated during the FuSuMaTech Phase 1 final workshop, the basis for future developments of Applied Superconducting in Europe is established and the present European leadership to be maintained.