



I.FAST Steering Committee - 25 June 2021

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Technology Infrastructure for Accelerators and Magnets

WP13 General objectives:

- Propose a strategic approach ensuring the long-term sustainability of the TI and the development of its capabilities in view of the construction of future accelerator-based RIs.
- Extend and strengthen the cooperation with industry to exploit opportunities of fostering innovation in related technologies.
- Develop and promote services, within a common approach, for the benefit of RIs, future scientific projects and high-tech industry.

Technology Infrastructure for Accelerators and Magnets

WP13 Tasks:

- **Task 13.1:** Strategy for the development of the AMICI TI(M1-M24)
Partners: CEA, CIEMAT, CNRS, DESY, IFJ-PAN, INFN, KIT, PSI, UKRI, UU
 - **Task 13.2:** Developing and promoting services to industry in AMICI TFs (M1-M24)
Partners: DESY, CEA, CIEMAT, CNRS, DESY, IFJ-PAN, INFN, KIT, UKRI, UU
 - **Task 13.3:** New RF amplifiers based on GaN semiconductors(M1-M24)
Partners: UU, CERN
- ↪ An example of an upgrade of a TP allowing to keep the TF at the forefront of the technology in a Key Technical Area (presentation by D. Dancila)

Task 13.1: Strategy for the development of the AMICI TI

- **Sub-Task 13.1.1 (CEA):** Define the roadmap for the strategic evolution and development of the AMICI TI, in terms of key TPs in key technological areas, required in view of the possible opportunities of engagement in new projects, in and outside Europe.
- **Sub-Task 13.1.2 (CEA):** Optimize the complementarity between the different TFs and maximize the involvement of their industrial partners by defining which interventions are needed to adapt the European TI in order to satisfy the requests from Industry.
- **Sub-Task 13.1.3 (CEA):** Raise awareness about the AMICI TPs and promote their use by external users in particular industry.

Sub-Task 13.1.1: Define the roadmap for the strategic evolution and development of the AMICI TI

- The roadmap for the strategic evolution and development of the AMICI TI will be written by the Steering Committee members for each category of platform
- Taking into account the different fields of applications:
 - Nuclear Physics: G. Bisoffi
 - Fusion (accelerators and magnets): P. Vedrine
 - Light sources: H. Weise
 - Neutron sources: J.M. Perez, T. Ekelöf, G. Bisoffi
 - Hadron therapy: CERN ?
 - Big superconducting magnets for other applications (MRI,...): P. Védrine
- Use of the Accelerator R&D Roadmap under development following the European Strategy for Particle Physics

	Members of the Steering Committee
CEA	P. Védrine
CERN	M. Vretenar
CIEMAT	J. M. Perez
CNRS	W. Kaabi
DESY	H. Weise
IFJ-PAN	D. Bocian
INFN	G. Bisoffi
KIT	O. Baake
UKRI	A. Gleeson
UU	T. Ekelöf

Sub-Task 13.1.2: Optimize the complementarity between the different TFs and maximize the involvement of their industrial partners

- Definition of the categories of TPs : to be finalized at the next WP13 meeting in July
 - For each TF
 1. make an inventory and do it by type of platform
 2. Categorize the different TPs
 3. Find specialists for each category
 4. Update information for each TP keeping only the TPs really open or to be open to external users
 5. Identification of needed adaptation, upgrade, improvement
- Work has begun. Example: 1-3 done, 4 in progress for CEA

Categorization of the TPs

- **Beam/irradiation facilities**
- **Test stations for magnets**
 - Test stations for superconducting magnets
 - Test stations for normal conducting magnets
- **Test stations for RF equipment**
 - Test stations for superconducting cavities
 - Test stations for normal conducting cavities
- **Test stations for high power RF equipment**
 - RF wave guide
 - Circulators
 - High power amplifiers
 - Klystrons
 - Modulators
- **Thermal treatment platforms**
- **Chemical treatment platforms**
- **Test stations for mechanical tests (at cryogenic temperatures)**
- **Characterization, analysis and measurement facilities**
 - Magnetic measurement facilities
 - Surface analysis laboratories
- **Assembly and construction platforms**

Sub-Task 13.1.3: Raise awareness about the AMICI TPs and promote their use by external users in particular industry

- Website updating and continuous feeding
 - ↳ AMICI website transferred to IJCLab
 - ↳ Updating of the description of the TPs will begin soon
- Participation to workshops, conferences, industry forums

Task 13.2: Developing and promoting services to industry in AMICI TFs

- **Sub-Task 13.2.1 (CEA):** Organization and operation of a central information and contact point for industry and other external partners to access TPs with the aim to ensure the dissemination of information, analysis of requests and contacts to the appropriate TP.
 - ↳ CEA: Project manager + 2 persons identified
 - ↳ Nomination of contact persons in partner labs initiated
- **Sub-Task 13.2.2 (DESY):** analysis of the different procedures in different TFs, corresponding to different cases, and propose a set of standardized rules, making the access simpler and faster for external partners.
 - ↳ Not begun yet
- **Sub-Task 13.2.3 (INFN):** At least two small workshops dedicated to a particular type of TP will be organized per year, which will gather personnel from the labs operating TPs of this type and possible users in particular from industry.

Task 13.2: Developing and promoting services to industry in AMICI TFs

- **Sub-Task 13.2.3 (INFN):** At least two small workshops dedicated to a particular type of TP will be organized per year, which will gather personnel from the labs operating TPs of this type and possible users in particular from industry.
 - End 2021: test benches for SRF cavities organized by DESY
 - ↳ Date and possible content to be defined at the next WP13 meeting
 - Spring 2022: SC magnet workshop organized by INFN (Milano)
 - Autumn 2022: mechanical tests at cryogenic temperature organized by CEA
 - Beginning 2023: ??

Task 13.3: New RF amplifiers based on GaN semiconductors

▪ Objectives:

- Realisation and evaluation of a new RF amplifier based on GaN semiconductors at kilowatt level.
- Identification of the advantages of GaN semiconductor technology for accelerator RF amplifiers.
- Specifications
 - 1000 W combined output power
 - 750 MHz
 - High efficiency >70%
 - High breakdown voltage
 - GaN transistors from e.g. Ampleon, Qorvo, Cree - Wolfspeed, NXP Semiconductors, Infineon, etc.
- D13.3: GaN RF amplifier module at kW level.

▪ Contribution to Task 13.2

- Setting up a discussion with European research institutes and Industry, where solid state power amplifiers technology is being currently developed.
- Create a central contact point and pushing for adopting well-defined procedures, regulations, cost evaluation schemes, quality standards, etc.
- Ensure the availability of the latest developments in the Task 13.3 – GaN amplifiers, as AMICI TP, for internal and external partners.
- Develop and promote services to industry, research laboratories and other technology stakeholders.

Deliverables and milestones

- **D13.1:** Strategy for the development of the AMICI TI
Report on the key TPs that need to be sustained over the long term and possibly developed/upgraded in the future: M24
MS61: Organization of the workshop: **M21** (Indico site)
- **D13.2:** Report on the development and promotion of services to industry.
Report on the organization and operation of the contact point, on the organized workshops and proposition for standardized access rules: M24
MS62: Central information and contact point operational: **M15** (Web site)
- **D13.3:** GaN RF amplifier module at kW level.
Realisation of an RF amplifier module based on GaN semiconductor technology and demonstration of combined power at kW level: M24
MS63: Demonstration of operation with high efficiency and nominal power of the first GaN amplifier: **M12** (Report)

Conclusion

- Work has begun in the 3 Tasks and is expected to progress according to the schedule
- Next WP13 meeting: 1st of July

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Thank you for your attention



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