I.FAST WP9 14th Meeting | 12th February 2025

Oleg B. Malyshev (UKRI) / Claire Antoine (CEA)

WP9 coordinators

Today's objectives

To discuss each Task problems and solution towards Task Deliverables

- Deliverables delays
  - New delivery date
- 1.3 GHz Copper cavities (ongoing process)
  - Where from
  - Shape/flange type
- Deposition targets (ongoing process)
  - Working solutions
  - For yourself or to share with partners?
- RF testing
  - Where – HZB, when – July (TBC)

Reporting to IFAST

All milestones achieved and reported

IFAST WP9 Deliverables	Delay justification	
D9.1: Thin-Film SRF roadmap report. Summaries of the results obtained within the workpackage and prospective inspired from WP advances as well as discussions at TF-SRF 2022.	**Report submitted**	~~M35~~ **M45**
D9.2: RF test on coated resonant cavity. Resonant cavity coated and tested with an alternative material to Niobium with a $Q_0 > 10^9$ at 4.2 K and 1.3 GHz.	▪ Direct coating on Cu not possible. Need Nb Bulk-type substrate to achieve nominal T_c of Nb_3Sn (thick Nb buffer layer on Cu cavity, or Bulk Nb cavity). ▪ In house production of Nb_3Sn targets for sputtering is more challenging than expected. Deposition set-ups at STFC and INFN had to be redesigned in order to use planar commercial targets. ▪ Long procurement process for OFE Cu disks (for Cu Cavity production) ▪ New design of the cavity flanges required for high temperature coating process	~~M46~~ ~~**M50**~~ **M53**
D9.3: First 6 GHz cavity coated and characterised. Results from the morphological and SC characterisation of first coated cavity with an alternative material to Niobium.	▪ Technological problems: delamination of NbTiN form 6 GHz cavities ▪ A few possible causes of the problem being investigated ▪ Waiting for two 6 GHz cavities to coat at UKRI ▪ Low power testing facility is being built at UKRI	~~M36~~ **M50**
D9.4: Deposition of superconducting multilayers on cavities. 1.3 and 3 GHz Nb and Cu cavities coated and tested with multilayers.	**Report submitted**	**M46**

D9.5: 1.3 GHz Nb-coated cavity irradiated by laser in Ar atmosphere and RF tested. Increasing of the field of magnetic flux entry in Nb coated 1.3 GHz cavity irradiated by laser in argon atmosphere. Standard RF testing.	▪ **Awaiting for partners to provide a Nb coated 1.3 GHz copper cavity**
	  ▪ copper cavity to be produced at INFN
	  ▪ Then coated coated at INFN or UKRI, and RF tested.
	  ▪ Then sent to RTU for laser treatment, then RF tested again
		~~M46~~
		M51

D9.6: Test of thin-film samples. Four thin film samples reprocessed by 4 different techniques and tested with QPR.	**Report submitted**	**M46**

2025 IFAST Annual Meeting

- In-Person meeting
  - on **8-11 April 2025**
  - in the conference rooms of the Polish Academy of Art and Sciences,
  - located near Main Square in Krakow
  -
  - **15th WP9 meeting is on 8th April**
    - from 9:00 to 18:00
    - **in-person** (preferable) and zoom

  - **WP9 Talks on Thursday 10th April:**
    - Dorothea Fonnesu (INFN/LNL) on Developing thin film coatings (10')
      - covering Tasks 2, 3 and 5
    - Dan Seal (UKRI/STFC) on Evaluation of superconducting thin films with DC and RF measurements (10')
      - covering Tasks 2, 3 and 6
    - Yasmine Kalboussi (CEA) Developing ALD for superconducting thin film coatings (10')
      - covering Tasks 4 and 6

IFAST-2

- Information from Maurizio Vretenar (CERN)

HORIZON-INFRA-2025-01-TECH-02

Implementing research infrastructure technology roadmaps

Expected EU contribution: 10 – 15 MEUR (*funding is still under discussion in Brussels!*)

Total budget for the call: 45 MEUR (between 3 and 4 projects can be supported).

Deadline for submission: **18 September 2025**

For infrastructure and technology communities with already developed research infrastructure technology roadmaps: accelerators, light sources, astronomy, etc.

Projects should implement significant parts of, or entire research infrastructure **technology roadmaps** through co-creation with industrial partners from the earliest possible stage. The technology roadmaps should be the result of a community or cross-community effort already undertaken. The technological solutions developed should respond to the needs of several research infrastructures, and in some cases the needs of different types of research infrastructures.

iFAST

Timeline

- The EC Research Infrastructure Work Programme is not out yet, *expected for February – early March*. At that moment, total budget and final requirements will be known.
- The call with all details should be out in May.
- **Deadline** for submission is **18 September 2025**:
  - project structured in May-June,
  - writing during summer (no holidays for those involved…).
- There will be **competition**:
  - 4 communities invited to submit, plus some outsider, for 3 (or 4) projects accepted.

iFAST

6 requirements, from the call description

All R&D topics included in the portfolio must:

1. implement significant parts of a research infrastructure technology roadmap (ESPP, LEAPS, others) or develop new advanced applications.
2. address prototyping of high-performance systems needed to upgrade the involved research infrastructures or construct their next generation.
3. Include co-creation with industrial partners from the earliest possible stage (as beneficiaries, subcontractors, PCP partners, or with letters of engagement) .
4. respond to the needs of several research infrastructures, possibly of different types.
5. possibly build on results from previous projects and avoid overlaps with ongoing projects.
6. consider resource efficiency (e.g. raw material and energy consumption) and environmental (including climate-related) impacts.

Additional conditions

- include at least two research infrastructures (ESFRI infrastructure, or ERIC infrastructure, or International European research organisation).
- Cascade funding admitted, support to third parties in the form of grants.
- when appropriate, make use of large-scale platforms combining R&D, integration and validation for technological developments (technology infrastructure).
- Different ways of involving industry: consortium members, commitment via engagement letters, identified at a later stage, Pre-Commercia Procurement subcontracting, …
- Should build on results from previous INFRAINNOV projects (I.FAST) or INFRA-TECH projects but avoid overlap with them.

Path to the new proposal

I.FAST works well, but is very **dispersed** (48 beneficiaries, 12 partners, 9 Work Packages – average 200 k€/beneficiary). For the next proposal (INFRA-TECH-02), a **more impactful and inclusive approach** is proposed:

1. The topics are divided in two parts: few **top-down** selected topics at higher TRL with larger funding, and the usual **bottom-up** part at lower TRL and lower funding.
2. Involve the **accelerator user communities** and not only the accelerator labs represented in TIARA in the **selection** for the top-down part and in the **evaluation** for the bottom-up part, in coordination with the **roadmaps** of the different communities.

- As usual, TIARA will guide and coordinate the proposal preparation. M. Vretenar in charge of structuring it, waiting to collaborate with a new perspective Coordinator to be nominated by TIARA.
- Initial project structure approved by TIARA on 29.10.24.
- Enlarged TIARA Meeting with accelerator communities (particle physics, light sources, nuclear, neutrons, energy, industry) on 20 January, to coordinate roadmaps and identify priority topics.

General guidelines

- Mixture of top-down and bottom-up: explore recognised critical R&D topics with appropriate funding, while keeping the creativity and innovation dimension.
- Less partners than in I.FAST, avoid beneficiaries with less that 100k or 50k EC funding. Ideal team one or 2 academic, one industry.
- Rate of matching funds (now 50% for academia, 30% for industry) reduced to 30-35% for academia, 20-25% for industry.
- Less space for Networks, possibly only in the frame of defining Technology Roadmaps – with some space in the general part.

Structure

Based on the experience of I.FAST and on our discussions with the EC
Project based on **4 pillars (groups of Work Packages)**:

	Pillar	Content	EC contribution per activity	Total EC contribution (with 15M)
1	**Instruments**	General WP's covering all activities		*3 M€ ?*
2	**Enabling technologies**	6 key technologies, selected top-down, higher TRL	1 M€	*6 M€ ?*
3	**Emerging technologies**	About 10 selected technologies after bottom-up call, lower TRL	200-500 k€	*4 M€ ?*
4	**Innovation Fund**	Internal call after project start	100-200 k€	*2 M€ ?*
				15 M€

Note 1: if the budget is only 10M, all figures will be reduced proportionally (800k for enabling technologies, 200-400k for emerging)
Note 2: EC contribution given as total cost, including 25% overheads

The Instruments Pillar

4 Work Packages, supporting all other activities

WP	Task	Title	Content
1	1	Management, coordination	
	2	Dissemination	
	3	Risk Management ?	
2	1	Training	
	2	Communication, outreach	CBI, Acc. News, Social media
3	1	Industry	Support to AIPF
	2	Technology transfer	Support start-ups
	3	Societal applications	Medical industrial
4	1	Future accelerators	Exploratory work
	2	Sustainability	Methodologies (LCA)
	3	Roadmap follow-up	Contact with communities.

iFAST

The Enabling Technologies pillar

Breaking news (this morning) – the consultation of the communities gave priority to the following 4 topics:

1. Superconducting thin films for RF cavities
2. Additive manufacturing of accelerator components
3. Superconducting magnets at High Temperature (HTS)
4. Surface treatments for Superconducting RF cavities

The remaining 2 topics will be selected by the TIARA management in a list of priorities identified by the communities:

Permanent magnet dipoles and quadrupoles
Laser driven accelerators
High intensity proton and ion injectors (sources and linacs)
High-power targetry,
Beam dynamics and stability
High precision diagnostics
Artificial intelligence/Machine learning

6 thematic Work Packages

Proposals for these WP's must include production of high-level prototypes (TRL to be clearly specified) with some engagement of industry (as beneficiary, partner, user)

The Emerging Technologies Pillar

Proposals to be submitted based on a template in preparation, to be approved by TIARA on 6 March and widely distributed within the accelerator community.

Will be selected by an Evaluation Committee nominated by TIARA.

Selection Criteria (giving points to the proposal):

1. Scientific and technological excellence, methodology and innovation.
2. Coherence with accelerator roadmap or application.
3. Quality of the prototyping.
4. Involvement of technology infrastructure.
5. Involvement of industry.
6. Covering needs of several research infrastructures.
7. Connection with previous projects (ARIES, I.FAST,...).
8. Reduce resource efficiency and environmental impact.

Full cost EC contribution (including overheads) 200-500k plus some matching funds from partners.
Minimum 2 participants from different countries.
Industry participation not mandatory but recommended (gets more points in the selection).

iFAST

Timeline for the new proposal

Tentative Timeline: Enabling technologies

- **January 2025:** define common roadmap with other accelerator communities, with priority topics and guidelines for internal call.
- **Early February** nominate WP Coordinators for enabling technologies and invite to set up collaborations.
- **March** deadline for presenting WP's to TIARA, first reactions.
- **30 April** content and budget approved by TIARA.
- **May** start writing.

Tentative Timeline: Emerging technologies call.

- **Early March 2025** send letter and submission form to all institutes having participated in previous programmes.
- **15 April** submission deadline, nominate selection committee.
- **30 April** pre-analysis and classification of submissions completed.
- **31 May** selection of projects completed, start writing.

What we are going to do for IFAST-2

- The total cost of the Work Package on TF SRF (full cost, including the 25% Horizon Europe overheads): **1 M€**
- WP conveyers are nominated by TIARA:
  - Claire and Oleg.
- By 6th March we should write 1 page proposal:

I. A **preliminary list of Tasks** (recommended: 3 to 5) to be executed and a description of the prototype(s) to be built within the allocated budget
   - Goals
   - Deliverables

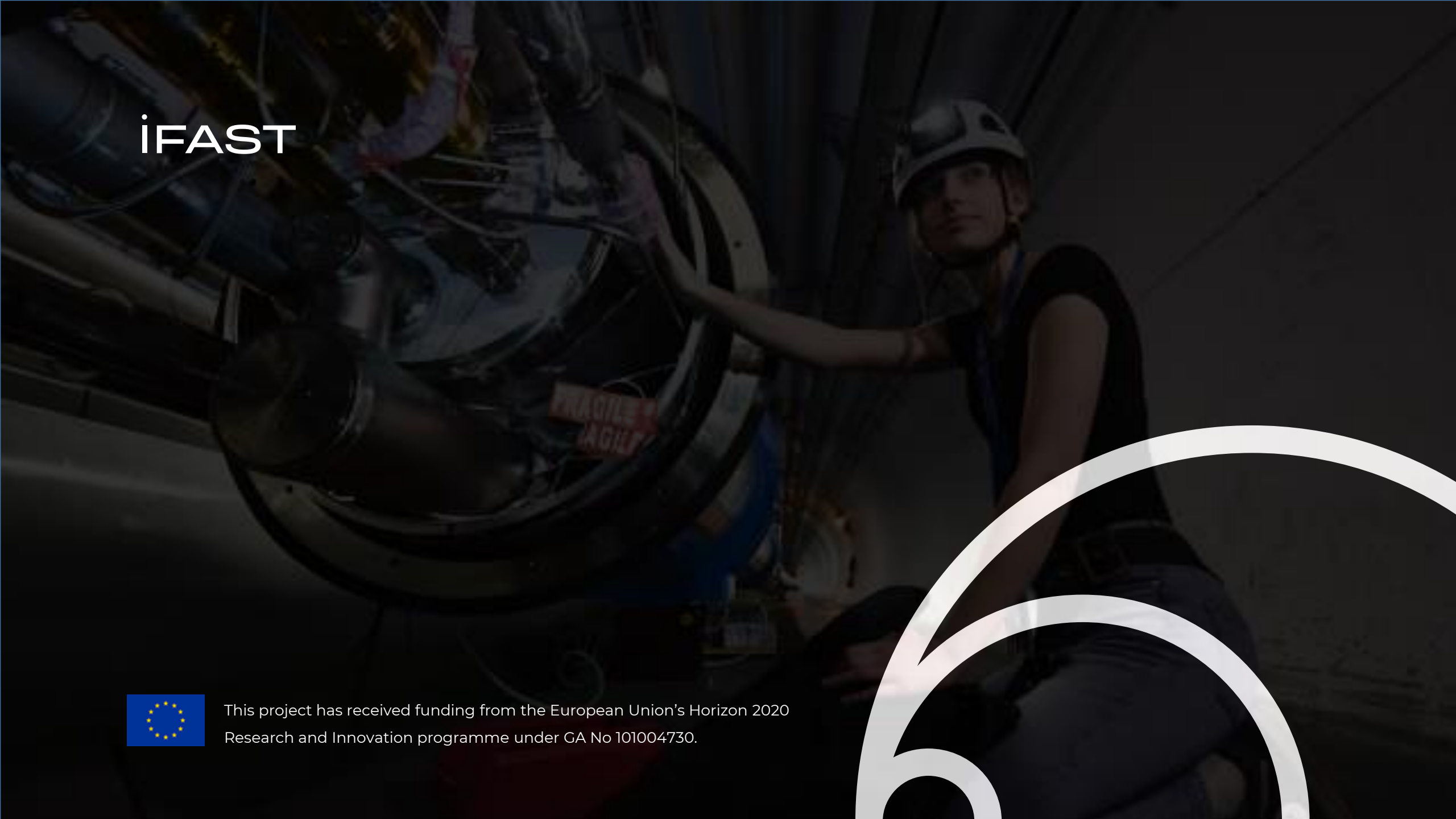
II. A **preliminary list of the partners** to be involved in the Work Package

What we are going to do for IFAST-2

I. A **preliminary list of Tasks** (recommended: 3 to 5) to be executed and a description of the prototype(s) to be built within the allocated budget
   - Goal of the WP must be construction of some full-scale prototype (TRL4 or higher), not only R&D at lower TRL – although some fraction of R&D is allowed.
   - Deliverable for each task

II. A **preliminary list of the partners** to be involved in the Work Package
   1. as **beneficiaries** (about 5 that will be paid directly) and
   2. and **associated partners** (paid by one of beneficiaries), if possible with their estimated budget share.
      - The WP must include minimum **3 partners from 3 different countries**, and no partner should receive an EC contribution lower than 100 k€.
      - Internal matching funds (e.g. in the form of costs for personnel made available to the project) on top of the EC contribution, but at much lower level than in I.FAST: 1/3 for academic partners, 20-25% for industry partners.

III. The WP must include **industry participation** as "co-innovators", with different options (again, much lighter than in I.FAST):
   1. as beneficiary, as in I.FAST;
   2. as "associated partner", participating in the meetings and signing the Consortium Agreement, but without receiving direct EC funding;
   3. providing engagement letters;
   4. participating in Pre-Commercial Procurement;
   5. if no other options, a Task on "industrialization" could be included, to identify ways to engage industry



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.