

I.FAST

Innovation Fostering in Accelerator Science and Technology

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DELIVERABLE REPORT

International thin film workshop organization

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ABSTRACT

This Report is related to achieving I.FAST Milestone 37: TF SRF workshop organization. .
The 11th International Workshop on Thin Films and New Ideas for Pushing the Limits of RF Superconductivity (TFSRF2024) was organised on 16-20 September 2024 at Paris Saclay University (Orsay campus) in France. A special session on European Strategy in this field was run during this workshop.
Thus, the I.FAST Milestone 37 has been met.

I.FAST Consortium, 2024

For more information on IFAST, its partners and contributors please see <https://ifast-project.eu/>

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Delivery Slip

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TABLE OF CONTENTS

1	INTRODUCTION.....	4
2	THE 11TH INTERNATIONAL WORKSHOP ON THIN FILMS AND NEW IDEAS FOR PUSHING THE LIMITS OF RF SUPERCONDUCTIVITY	4
2.1	FORMAT	5
2.2	ATTENDANCE	6
3	CONCLUDING REMARKS.....	7
3.1	CONCLUSION.....	7
3.2	FUTURE PLANS / RELATION TO OTHER IFAST WORK.....	7

Executive summary

This Report is related to achieving I.FAST Milestone 37: TF SRF workshop organization. . The 11th International Workshop on Thin Films and New Ideas for Pushing the Limits of RF Superconductivity (TFSRF2024) was organised on 16- 20 September 2024 at Paris Saclay University (Orsay campus) in France. A special session on European Strategy in this field was run during this workshop.

1 Introduction

As a part of WP9 activity, the Task 9.1 should organize an international workshop on superconducting thin films for SRF applications with IFAST as a main sponsor to enable an access for wide international participations including PhD student, postdocs, ECR, etc.

These type of workshops were originally organised at JLab (US) in 2005, as a spin-off of the SRF conference (1.5 days). In 2006, Enzo Palmieri (LNL/INFN, Italy) organised the 2nd edition under “International Workshop on Thin Films and New Ideas for Pushing the Limits of RF Superconductivity”. Since then, the Workshop has taken place bi-annually, except 2020 due to the Covid pandemic. Only a small virtual edition was held in March 2021. In 2022, the international committee decided to resume live edition on even years in order not to overlap with SRF conference years, 10th edition in JLab and 11th in France, initially foreseen in June and then postponed in September to accommodate teaching constraint of several members of the community. It is the main reason of the delays since the IFAST program was mostly built during 2019, before the pandemic.

The initiators of this workshop were convinced that intensive and coordinated R&D effort is of decisive importance for the scientific community.

The primary aim of TFSRF workshop is to provide a forum for new initiatives in innovative thin films and related technology to advance future generations of superconducting RF accelerators. It gives the opportunity to bring together individuals and institutions working in this effort and infusing expertise of specialists from related disciplines. It aims to offer a collaborative environment as open, inclusive and diverse as possible.

2 The 11th International Workshop on Thin Films and New Ideas for Pushing the Limits of RF Superconductivity

The 11th International Workshop on Thin Films and New Ideas for Pushing the Limits of RF Superconductivity (TFSRF2024) was organised from **16th to 20th September 2024** at Paris Saclay University (Orsay campus) in France.

Web site: <https://indico.cern.ch/event/1376902/>

WP9 coordinators and task leaders were well involved in the Organizing Committees.

International Organizing Committee:	
C.Z. Antoine (CEA, France), Chair	WP9 coordinator
A. Gurevich (Old Dominion University Univ, USA)	
C. Pira (INFN LNL)	Task 9.2 leader
T. Saeki (KEK, Japan)	
A.-M. Valente-Feliciano (Jefferson Lab, USA)	WP9 unpaid partner
R. Valizadeh (STFC, UK)	Task 9.3 leader
W. Venturini (CERN, Switzerland)	WP9 unpaid partner
Local Organizing committee:	
C.Z. Antoine (CEA)	WP9 coordinator
Y. Kalboussy (CEA)	Task 9.4 member
D. Longuevergne (IJCLAB)	Task 9.3 member
A. Miyazaki (IJCLAB)	
T. Proslier (CEA)	Task 9.4 leader

2.1 FORMAT

The usual workshop format is only oral presentations (invited by the scientific committee) with Q&A after each talk and a discussion at the end of the session (including a hot topic discussions).

On this specific workshop edition, as it was sponsored by IFAST, the workshop was an additional day to accommodate a special session was organised on Friday 20th September: “Elaborating a thin film European road map”, that was also open to international collaborators, since we have already

started our coordinates efforts, notably during the elaboration of a Snowmass white paper in 2021¹, which was then integrated in the AF7-rf report². This session was chaired by C.Z. Antoine and O.B. Malyshev, coordinators of WP9. The synthesis of this session will be published in M45 (January 2025) and constitute the deliverable D9.1.

2.2 ATTENDANCE

For budget constraints, we had only 70 slots available. In July, there were 77 applications, 7 being on a waiting list. After several withdrawal we were able to invite all waiting applicants and ended up with 69 participants.

The participants represent the following countries:

Canada, China, France, Germany, Italy, Japan, Slovakia, Switzerland, UK, USA,

Gender balance: 80% male / 20% female

IFAST delegates: 21 people (30%)

There were 55 contribution talks (3 remote), 11 discussion sessions (10 of them during the road map session). The discussed topics were the following:

Thin film developments:

- Niobium on copper
- Nb₃Sn on copper and niobium
- Other superconductors on Cu and Nb
- SIS structures
- Surface functionalization

Key activities:

- Cu cavities production and surface preparation
- General characterization/surface science
- Prototype cavities preparation and testing
- Theory
- Industrialization.

¹ A.- M. Valente-Feliciano, et al., "Next-Generation Superconducting RF Technology based on Advanced Thin Film Technologies and Innovative Materials for Accelerator Enhanced Performance & Energy Reach", in Letter of interest Snowmass 21. 2021 <https://arxiv.org/abs/2204.02536>

² S. Belomestnykh, et al., "RF Accelerator Technology R&D: Report of AF7-RF Topical Group to Snowmass 2021". arXiv preprint 2022. [2208.12368] <https://arxiv.org/abs/2208.12368>



Figure 1: A photo of workshop participant in front of event venue: building 100 at Paris Saclay University (Orsay campus) in France.

3 Concluding remarks

3.1 CONCLUSION

The 11th International Workshop on Thin Films and New Ideas for Pushing the Limits of RF Superconductivity (TFSRF2024) was successfully organised and run. A special strategy session “Elaborating a thin film European road map” was organised as a part of the workshop. Thus, the I.FAST Milestone 37 (TF SRF workshop organization) has been met.

All topics covered during the workshop have a direct relevance to the WP9 programme and deliverables.

3.2 FUTURE PLANS / RELATION TO OTHER IFAST WORK

The results of special strategy session “Elaborating a thin film European road map” will be analysed and reported in Deliverable D9.1.

Annex: Glossary

Acronym	Definition
AFM	Atomic Force Microscope
CEA	Saclay Nuclear Research Centre - Commissariat à l'Energie Atomique
CERN	European Council for Nuclear Research
EDS	Energy Dispersive X-ray Spectrometry
EP	Electropolishing
HIPIMS	High power impulse magnetron sputtering
HZB	Helmholtz-Zentrum Berlin
IEE	Institute of Electrical Engineering Slovak Academy of Sciences, Bratislava
INFN-LNL	Italian Institute of Nuclear Physics - Legnaro National Laboratories
OFE	Oxygen Free Electronic copper
OFHC	Oxygen-Free High thermal Conductivity copper
PPMS	Physical Property Measurement System
QPR	Quadrupole Resonator
QWR	Quarter Wave Resonator
RF	Radio Frequency
RTU	Riga Technical University
SC	Superconductivity
SEM	Scanning Electron Microscope
SRF	Superconducting Radio Frequency
SUBU	Chemical Polishing of Cu with a solution of Sulphamic Acid and Butanol
UKRI/STFC/DL	United Kingdom Research and Innovation / Science and Technology Facilities Council / Daresbury Laboratory
T _c	Critical temperature of superconducting transition (thermodynamic)
TF	Thin films
XRD	X-Ray Diffraction