

# IFAST WP9 INNOVATIVE SUPERCONDUCTING CAVITIES

- Preparation WP9 meeting took place on 25<sup>th</sup> Feb. 2021
  - Transition from ARIES WP15 to IFAST WP9
    - 7 partner organisations are the same
    - 3 new partners were introduced
  - Status of each task reported
    - Is everything ready?
    - If all partners agreed in initial planning?
    - Is there anything missing?

# IFAST WP9 OBJECTIVES

- Define a strategy for innovative superconducting RF (SRF) cavities coated with a superconducting film.
  - Deposition techniques: PVD and ALD
  - Superconducting films: Nb, NbN, Nb<sub>3</sub>Sn, V<sub>3</sub>Si (and others) and SIS
- Optimise and industrialise the production of seamless copper cavities and of the deposition techniques.
- Produce and test prototypes of SRF (single-cell elliptical) cavities:
  - Initially with pre-prototypes with  $f = 6$  and 3 GHz
  - Scaling up for  $f = 1.3$  GHz.
- Test a new laser treatment of Nb coated cavity.
- **MAIN GOAL:**
  - Improving the performance and reducing the cost of acceleration systems
    - production and operation

# IFAST WP9

- **TASK 9.1:** Coordination and strategy for innovative superconducting accelerating cavities
  - *CEA, INFN, HZB, UKRI, USI, JLAB MEPHI, PTI.*
- **TASK 9.2:** Innovative SC accelerating cavity prototype
  - *INFN, PICCOLI, UKRI, USI, CEA, IEE, HZB, PTI, MEPHI*
- **TASK 9.3 :** Optimisation of process parameters and target development for SRF cavity coating with A15 material
  - *UKRI, INFN, USI, HZB*
- **TASK 9.4:** Surface engineering by atomic layer deposition (ALD)
  - *CEA, CNRS*
- **TASK 9.5:** Improvement of mechanical and superconducting properties of RF resonator by laser radiation
  - *RTU, UKRI, INFN, IEE, HZB*
- **TASK 9.6:** Optimization of flat SRF thin films production procedure
  - *HZB, INFN, UKRI, USI, CEA*

## IFAST WP9 Deliverables

**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.*

M35

**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.*

M46

**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.*

M36

**D9.4:** Deposition of superconducting multilayers on cavities.

*1.3 and 3 GHz Nb and Cu cavities coated and tested with multilayers.*

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.*

M45

**D9.6:** Test of thin-film samples.

*Four thin film samples reprocessed by 4 different techniques and tested with QPR.*

M46

# IFAST TASK 10.5 NEG COATING UNDER SR

- **Objectives**

- Build facilities for photon stimulated desorption (PSD) yield measurement on beamlines.
- Obtain and analyse the PSD experimental data from Non-Evaporable Getter (NEG) coated prototypes under conditions similar to future light sources.

- Preparation Task 10.5 meeting took place on 2<sup>nd</sup> Mar 2021

- Short presentation from each partner (DLS, Soleil, DESY, UKRI)
- Discussion
  - Is everything ready?
  - If all partners agreed in initial planning?
  - Is anything missing?