



nffa.eu
nanoscience foundries & fine analysis

NFFA-Europe: enhancing European competitiveness in nanoscience research and innovation

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The NFFA-Europe initiative is being financed as an **Infrastructure Integration Action** (INFRA-IA) in the context of H2020

- to enhance European **competitiveness** in nanoscience **research** and **innovation**
- by supporting an **ad-hoc distributed research infrastructure** serving the community of **nanoscience and nanotechnology**



The NFFA-Europe key activities

TA

Transnational Access activities

Multidisciplinary research at the nanoscale performed at nano-laboratories and ALSFs

Integration of theory & numerical analysis with advanced experimental techniques

JRA

Joint Research activities

Methods & tools at the frontier in nanoscience research

Improved infrastructures for academic & industrial projects

NA

Networking activities

Interface for different user communities

Industrial exploitation of experimental data



The NFFA-Europe key activities

TA

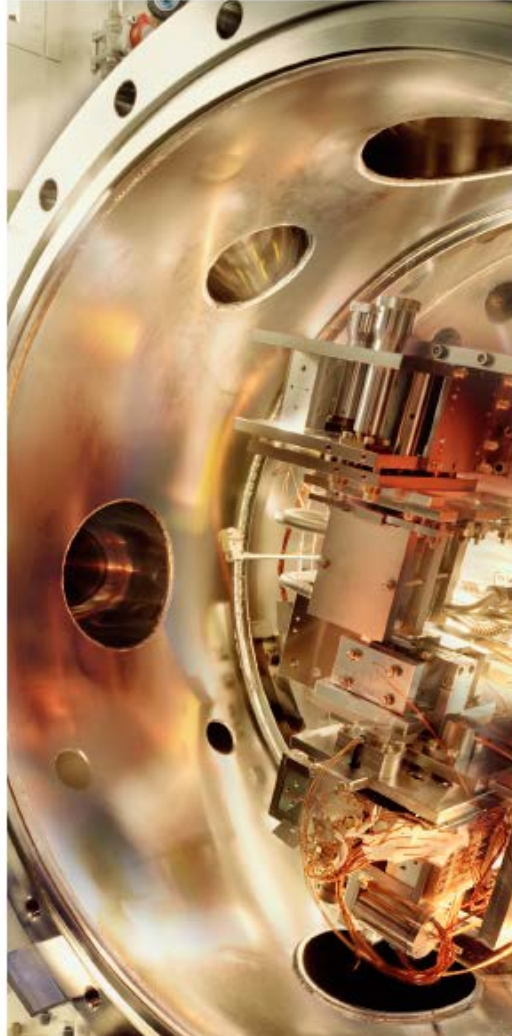
Transnational Access activities

Multidisciplinary research at the nanoscale performed at **nano-laboratories and ALSFs**

Integration of **theory & numerical** analysis with advanced **experimental**



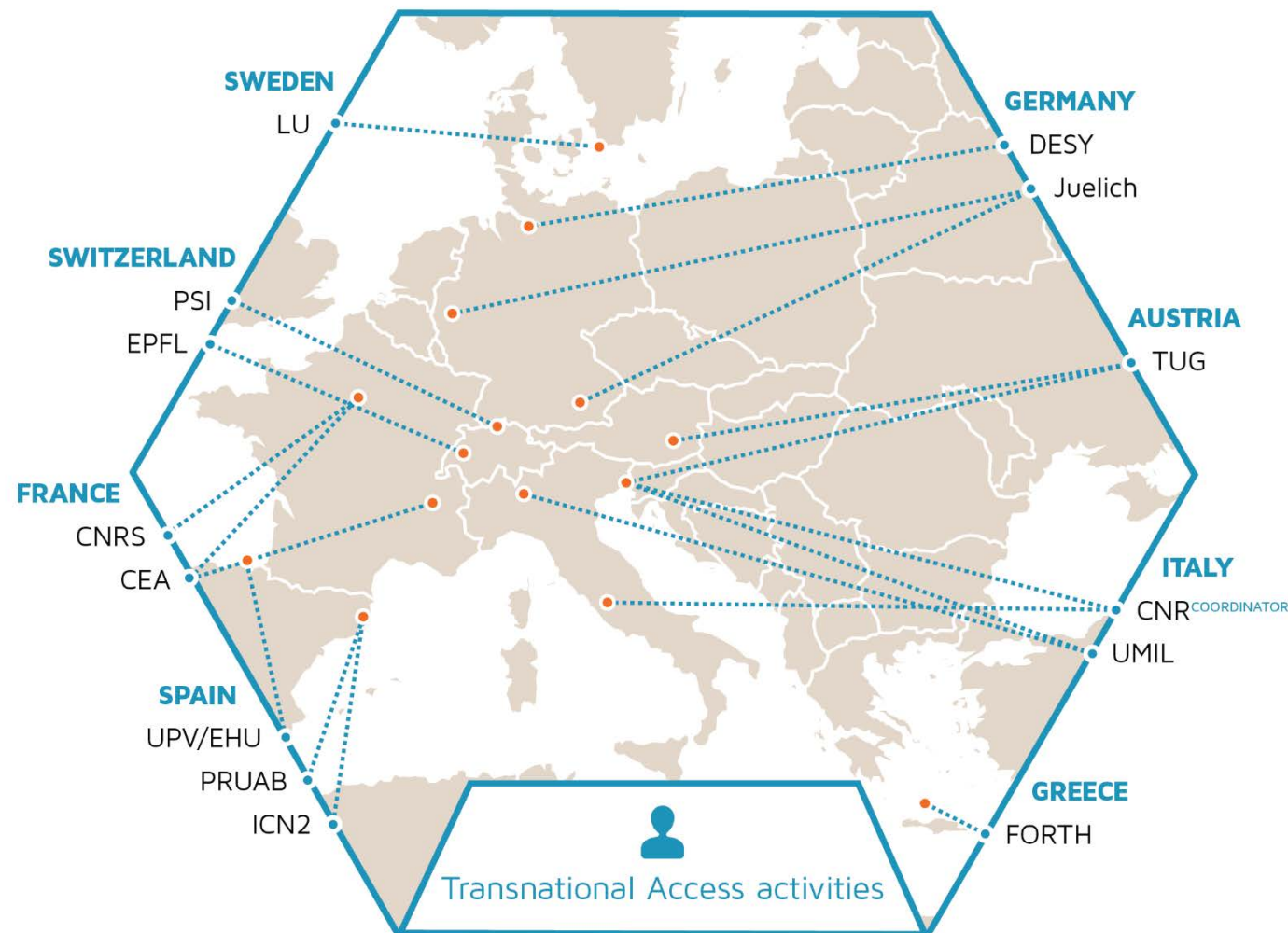
Transnational access



- We offer **peer-reviewed free access** distributed across Europe
- arranged in an **online Catalogue**
 - accessible through a **Single Entry Portal**
 - supported by a **Technical Liaison Network**



Transnational Access

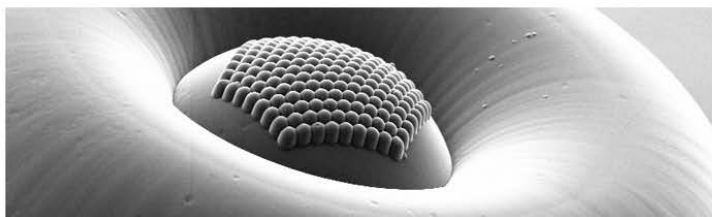


Total of **six hubs** and combining both **nanolab** based techniques and **Large Scale Facilities** techniques



Offer structure

Four main pillars:



**LITHOGRAPHY &
PATTERNING**



**GROWTH &
SYNTHESIS**



**THEORY &
SIMULATION**



CHARACTERISATION



User projects

- Users projects are received every **three months** and checked for:

- 
- **Eligibility** (MGT)
 - **Technical feasibility** (TLNet)
 - **Scientific merit** (ARP)



Action details

- **Academia & industries can apply (independently)**
- **Need of disseminating the results from the access (except for SME), properly acknowledging NFFA support**
- **Free access + partial (but generous) support for travel & subsistence to users**
- **Up to 20% of resources can be devoted to access projects from non-EU countries**



Action details

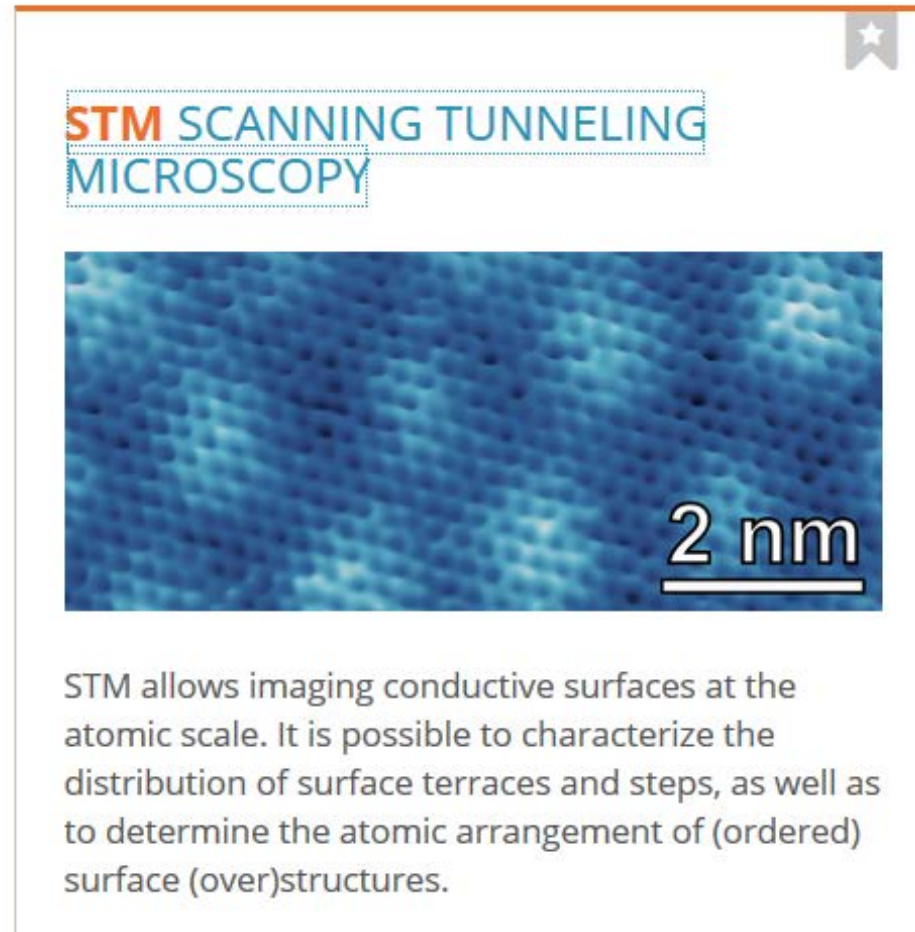
Eligibility criteria

- Transnational access
- Minimum 2 installations (families of techniques)
 - **theory-only possible** (at least two computational methods)
 - **SME can opt for a single installation**
- Not LSF-only proposals possible
 - **Neutrons & synchrotron possible (same sample system)**

Technique selection /Catalogue structure

- Hierarchical levels of technique description

1st
level



<https://nffa.eu/offer/>

nffa.eu



Catalogue structure

- Hierarchical levels of technique description

2nd
level

STM

Scanning Tunneling Microscopy

Characterisation Installation 4

★ add to your wishlist

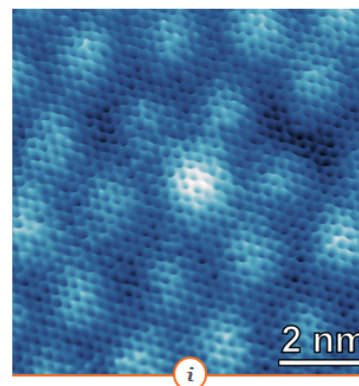
Scanning tunneling microscopy (STM) allows imaging conductive surfaces at the atomic scale. It is possible to characterize the distribution of surface terraces and steps, as well as to determine the atomic arrangement of (ordered) surface (over)structures.

In STM, an atomically sharp tip is scanned on a surface at a few-angstrom distance, while a bias voltage is applied between these two electrodes, so that a current flows due to the quantum tunneling effect. The intensity of the tunneling current depends exponentially on the tip-surface distance and can therefore be used to reconstruct a morphologic image.

STM is a *local* technique: while high-resolution can be achieved on small (nanometer sized) areas, information on large-scale (micron sized or more) is lost, and measurements have to be repeated systematically on several regions of the sample to get statistically relevant information.

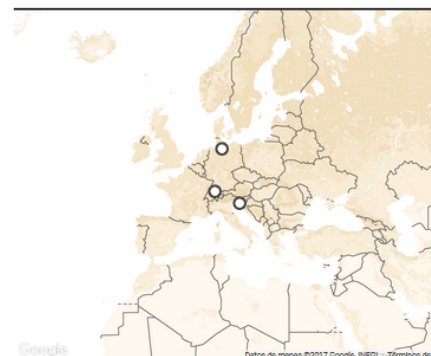
Due to stability performances, STM experiments are typically time-consuming. The technique is applicable both in air and in vacuum. Ultra-high-vacuum (UHV) is required for the characterization of delicate, atomically clean systems.

The STM signal is not purely topographic, but brings also information on the local density of electronic states. Scanning tunneling spectroscopy (STS) is an extension of STM that provides information about the density of electrons in a sample as a function of their energy. Inelastic tunneling spectroscopy (IETS) is a challenging extension for the investigation of vibrational states at liquid helium temperature. The STM tip can also be used to manipulate single atoms and molecules.



provided at NFFA-Europe laboratories by:

CNR-IOM Italy	DESY Germany	PSI Switzerland
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<https://nffa.eu/offer/>





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Catalogue structure

- Hierarchical levels of technique description

3rd
level

 PSI Switzerland Surface Science Lab @ Laboratory for Micro- and Nanotechnology	COMPARE
 DESY Germany Temperature UHV STM/AFM @ DESY NanoLab	COMPARE
 CNR-IOM Italy LT-STM	COMPARE
 CNR-IOM Italy VT-STM	COMPARE

<https://nffa.eu/offer/>

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your wishlist



LITHOGRAPHY & PATTERNING INSTALLATION 1

ELECTROCHEMICAL DEPOSITION ELECTROCHEMICAL DEPOSITION

available at: CNR-IOM,CNRS,PRUAB,PSI



GROWTH & SYNTHESIS INSTALLATION 2

CVD CHEMICAL VAPOUR DEPOSITION

available at: CNR-IOM,CNRS,LU,PRUAB,PSI,UMIL



THEORY & SIMULATION INSTALLATION 3

THERMALLY ACTIVATED PROCESSES AND CHEMICAL REACTIONS THERMALLY
ACTIVATED PROCESSES AND CHEMICAL REACTIONS

available at: CNR-IOM,CNR-ISM,EPFL,ICN2,JÜLICH,UMIL,UPV-EHU



CHARACTERIZATION INSTALLATION 5

MICROLUMINESCENCE MICROLUMINESCENCE

available at: CNR-IOM



LOGIN AND SUBMIT YOUR APPLICATION TO ACCESS THESE TOOLS



A single entry point

1

TECHNIQUE SELECTION

from the online catalogue at: www.nffa.eu

2

FREE SUPPORT

from a team of technical experts (Technical Liaison Network)

3

PROJECT SUBMISSION

on a single-entry point

4

EVALUATION

& ranking by an international peer-review panel

5

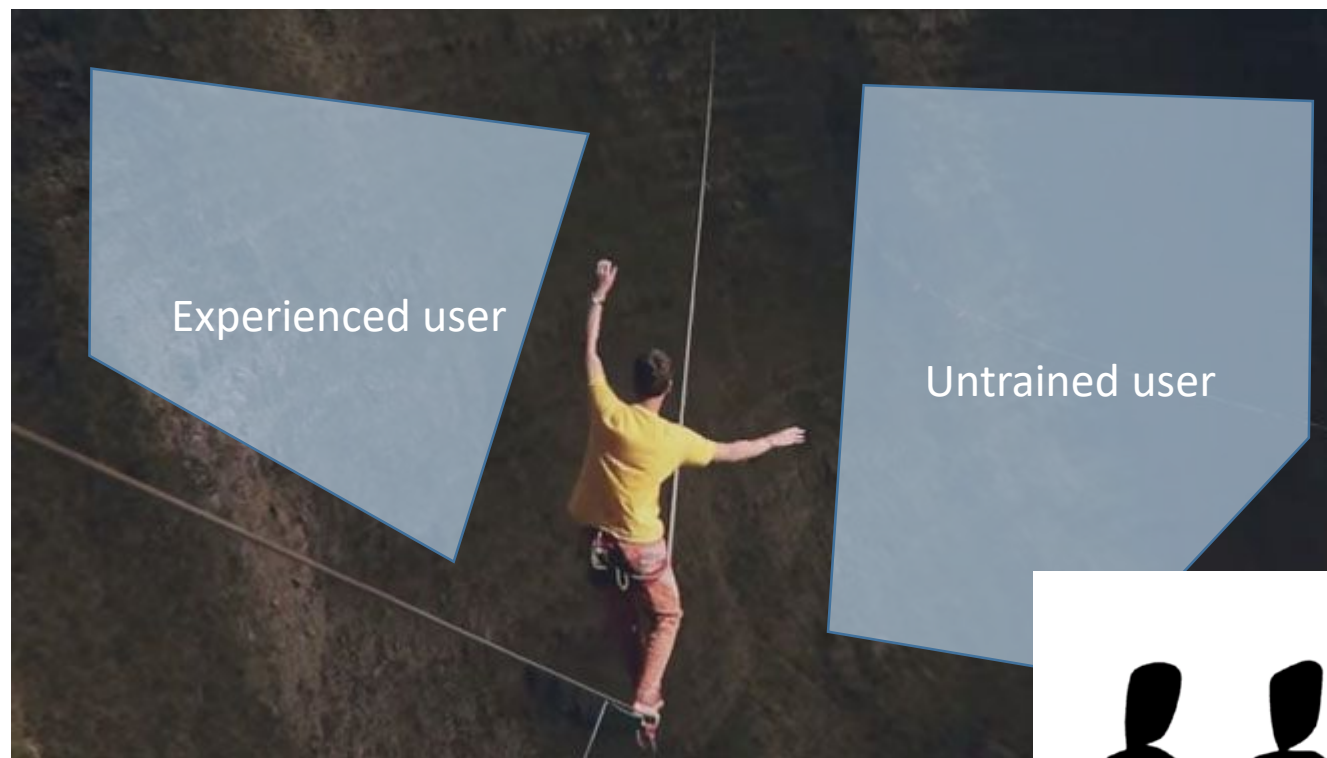
FREE ACCESS

and receive a contribution for travel & subsistence costs

Elegibility
Feasibility
Scientific merit



Web-based submission access



Our web portal is for all users...

nffa.eu

... but Technical Liaison Net will be always there to assist anyone





Calls to date

14 already resolved calls

463 proposals received

298 proposals approved
(64% success rate)

794 users involved in approved
proposals



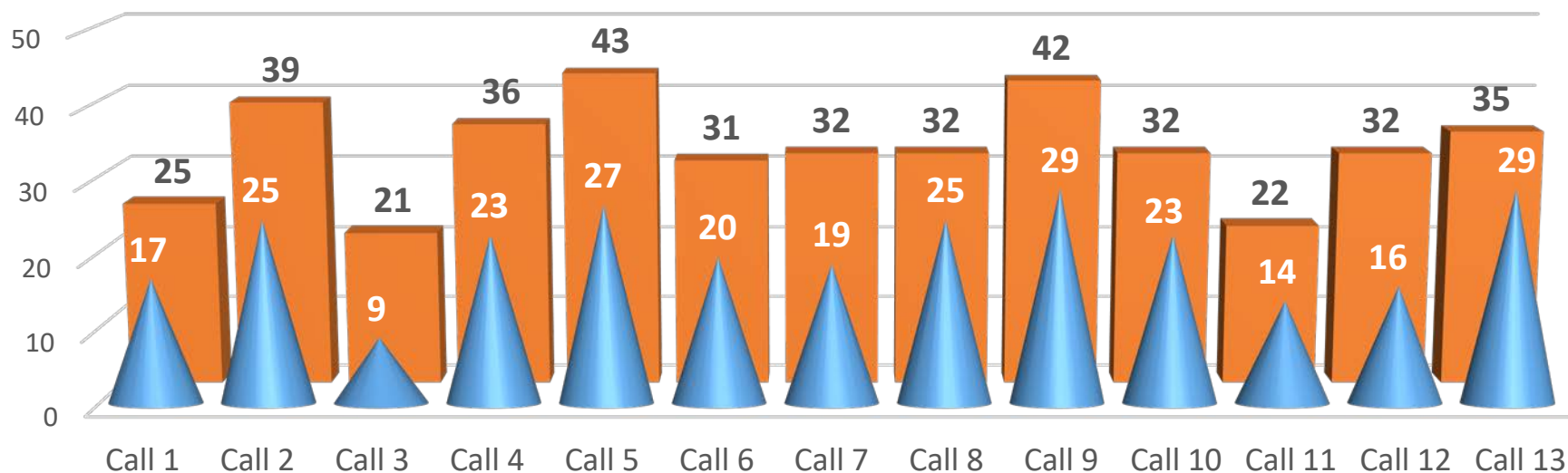
Projects to date

33 submitted proposals per call

21 approved proposals per call

64% success rate

Accepted vs Submitted proposals



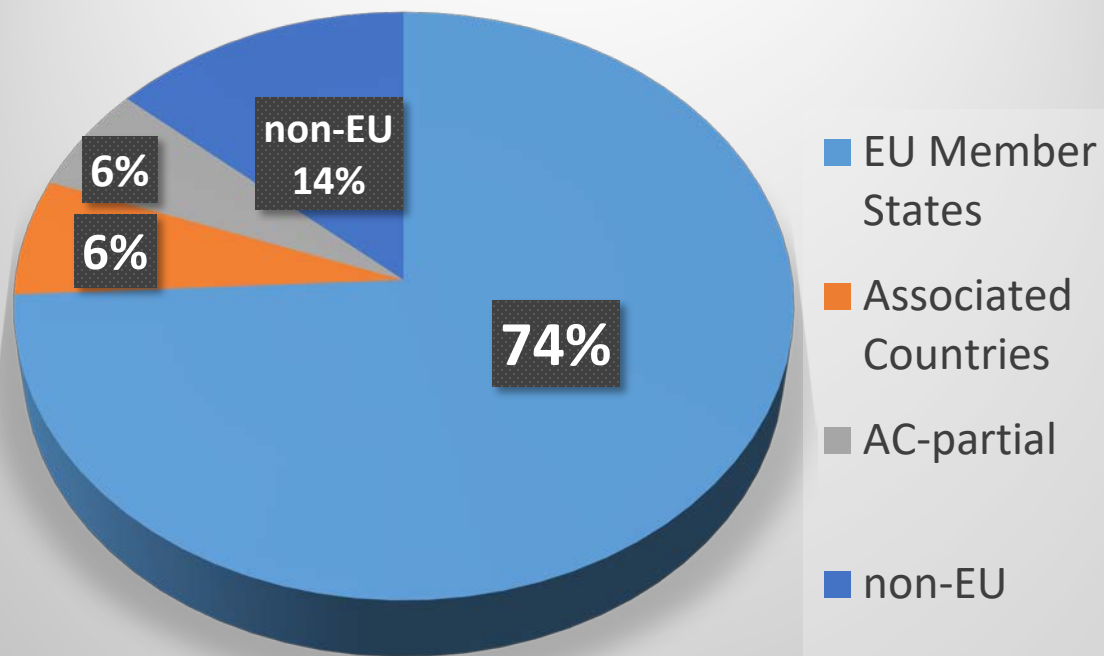


Countries to date



Proposals from **52** countries
(including 22 non-EU)

Assigned UoA vs Country Types



EU req:

Italy (42)
Germany (38)
France (34)
UK (28)
Spain (23)

non-EU req:

Russia (19)
India (16)
China (5)
USA (4)
Algeria (4)



Access volume to date

298 approved proposals

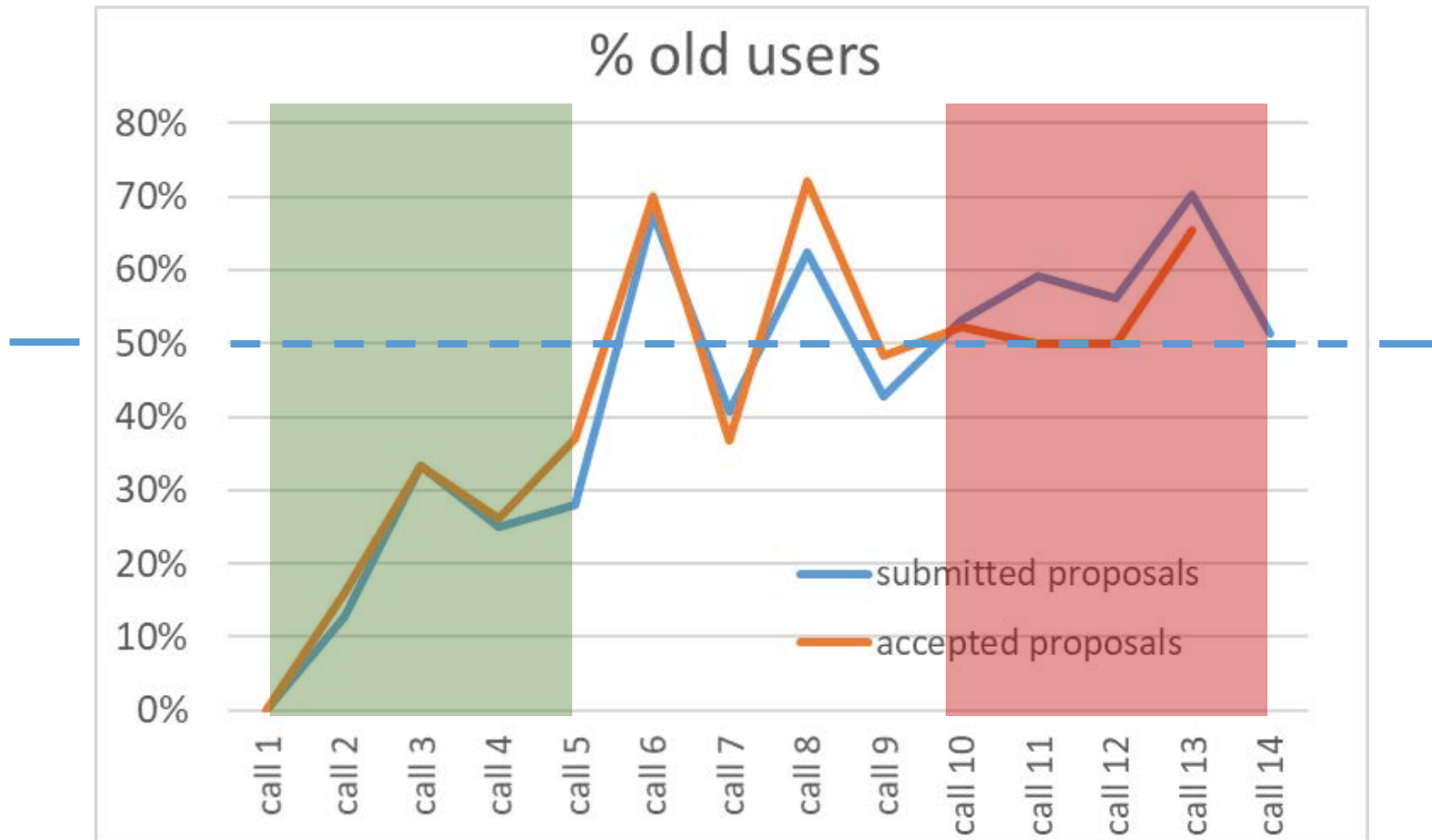
830 accumulated **steps** (techniques)

3770 accumulated **UoAs** (days)

... average **3 steps** per proposal

... average **13 UoAs** per proposal

Performance: new teams vs old teams



New users become *old users* because they are satisfied



Special cases

Large Scale Facilities

19% of experimental work

30% of proposals

Similar success rate

Industry proposals

10% of received or accepted proposals
(either by SME, large, collab or PPP)

Similar success rate



Satisfaction of users/providers

No big issues neither for users nor providers

- Users overall evaluation [positive (excellent)]

99% (83%)

- Providers overall evaluation [positive (excellent)]

97% (76%)



Final recommendations

- **Keep an eye on NFFA website**
www.nffa.eu
- **... last final call deadline: 15th January**
- **If lucky we will resume activities in 2021
under a more ambitious scheme**



nffa.eu

The widest range of **tools for research at the nanoscale.**
Free of charge access for academia and industry thanks to Horizon 2020.

BROWSE THE OFFER & APPLY FOR FREE ACCESS

Next deadline
23 September 2019 at 17:00 (CEST)

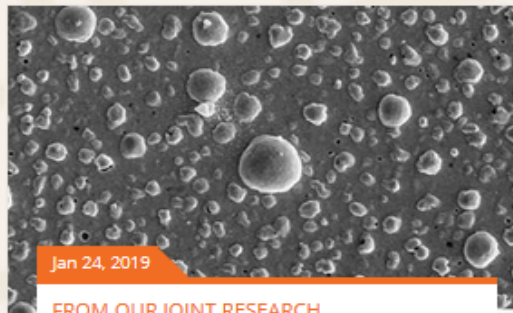
Installation 1
Lithography & Patterning

Installation 2
Growth & Synthesis

Installation 3
Theory & Simulation

Scientific Highlights

[view all](#)

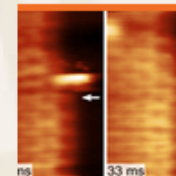


Jan 24, 2019

FROM OUR JOINT RESEARCH

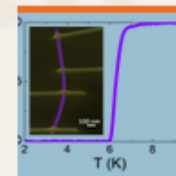
Platinum Forms Nano-Bubbles

Technologically important noble metal oxidises more readily than expected



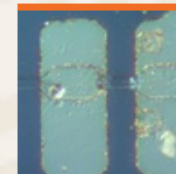
FROM OUR JOINT RESEARCH

Unveiled the catalytic action of single nickel adatoms in the growth of graphene layers



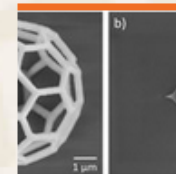
FROM OUR USERS

Direct-write method to grow individual and 3D superconducting hollow nanowires



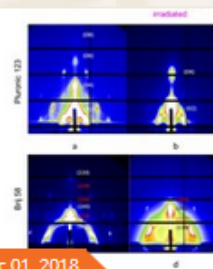
FROM OUR USERS

Current conduction mechanism and electrical break-down in InN grown on GaN



FROM OUR JOINT RESEARCH

Plasma etching and pyrolysis contribute to size reduction of laser polymerized 3D structures

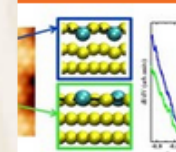


Dec 01, 2018

FROM OUR JOINT RESEARCH

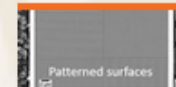
GISAXS alignment aids based on mesoporous silica thin films available for users

Mesoporous silica films, having ordered



FROM OUR USERS

Self-texturizing electronic properties of a 2-dimensional GdAu₂ layer on Au(111): the role of out-of-plane atomic



FROM OUR JOINT RESEARCH

Deep neural networks lead to nanoscience images

Contact us

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