Instrument infrastructures

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Layout

- Introduction
- Examples of international infrastructures
  - NFFA
  - CERIC-ERIC
  - IPANEMA
- Examples of national infrastructures
  - IR-RMN
  - METSA
- Conclusion

Introduction

- Scientists frequently need a large variety of characterization techniques
- Some of them are not available in home labs
- Lack expertise in some of them

  - Instrument networks for
    - Providing access to a portfolio of (large) instruments.
    - Support users in preparation, realization, data analysis
    - Support industry with both free access and proprietary research

nffa.eu
nanoscience foundries & fine analysis

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The mission

NFFA•EUROPE sets out a **platform** to carry out comprehensive projects for **multidisciplinary research** at the **nanoscale** extending from synthesis to nanocharacterization to theory and numerical simulation.

Advanced infrastructures specialized on growth, nano-lithography, nano-characterization, theory and simulation and fine-analysis with Synchrotron, FEL and Neutron radiation sources are integrate

The network

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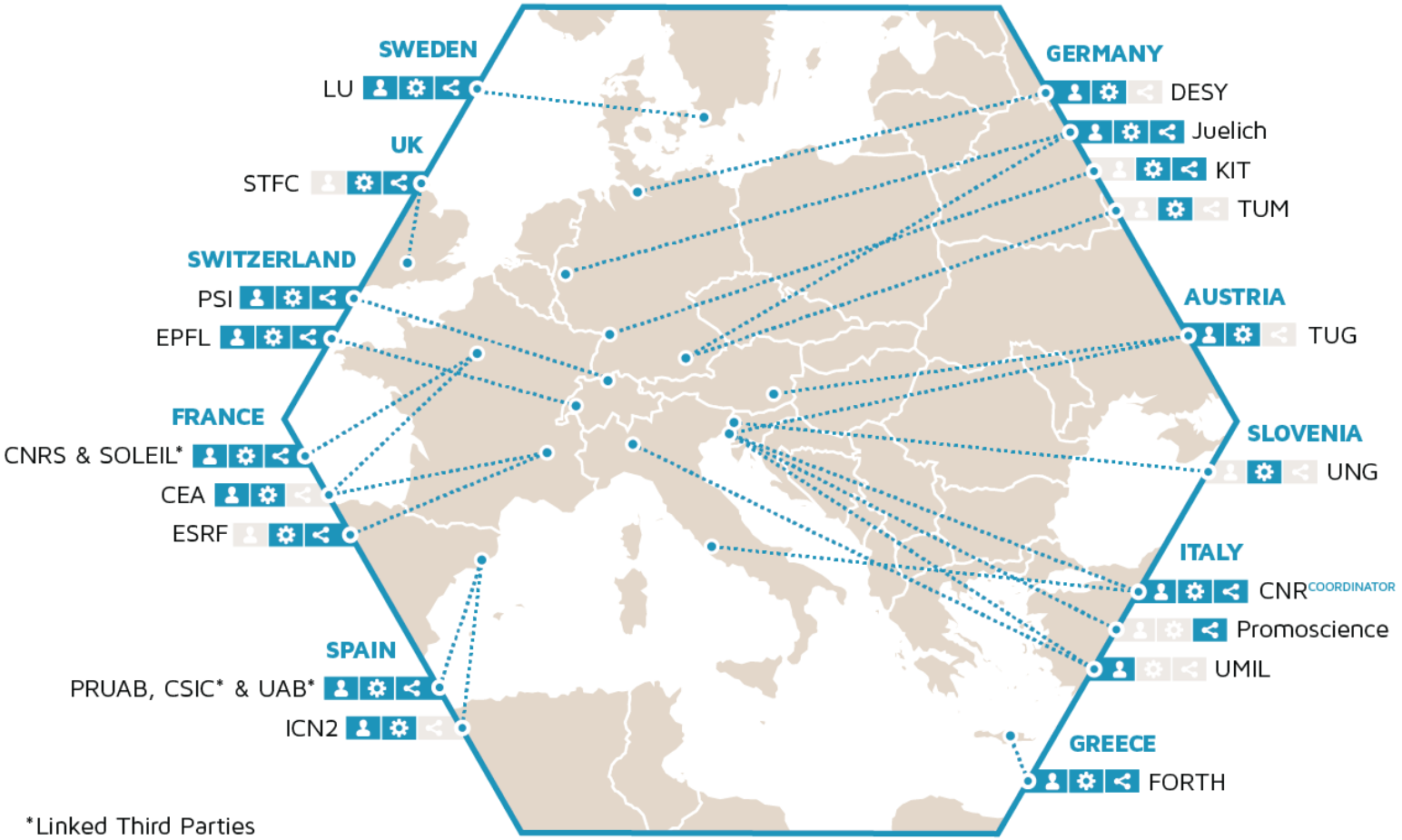


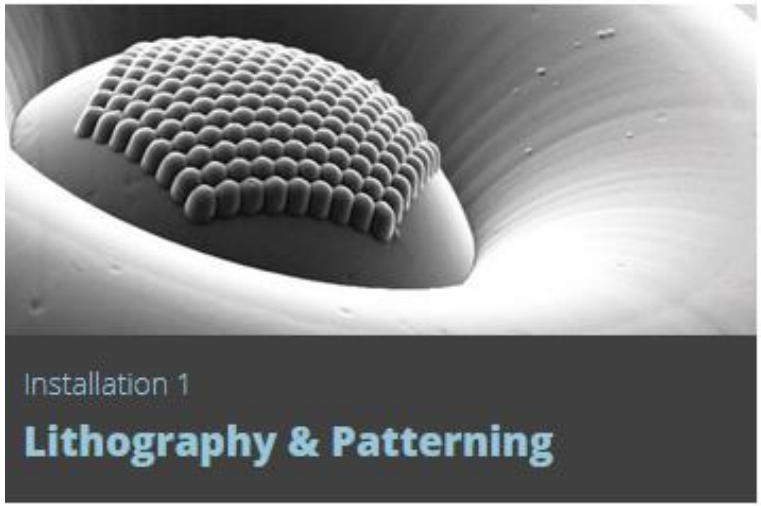
The offer

NFFA-EUROPE provides **free access** to state- of-the art tools for multidisciplinary, frontier research at the nanoscale

NFFA EUROPE **welcomes both industry and academia** researching at the nanoscale. (…)

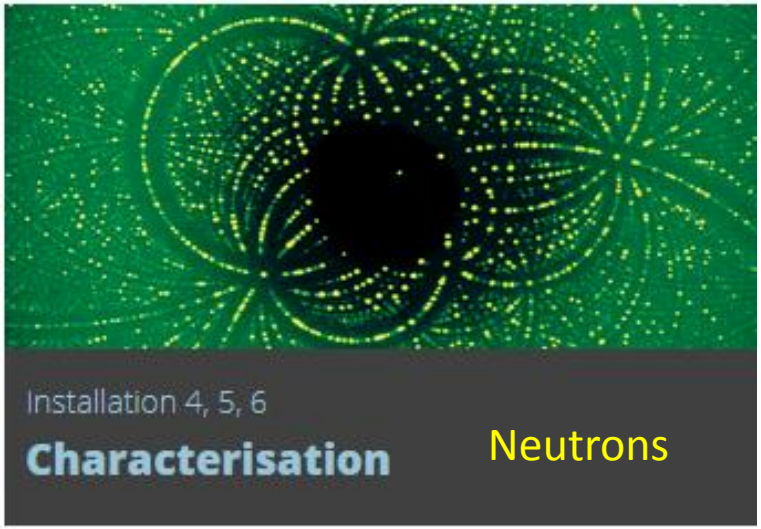
Access is granted free-of-charge provided **results are published** (…)

Industrial users may also opt for a **proprietary access** where all work and results remain confidential, with no external peer review evaluation. Industry interested in such a **fee-based access** is invited to contact TLNet directly (…)

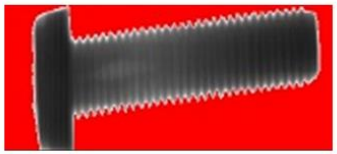

Installation 1
Lithography & Patterning


Installation 2
Growth & Synthesis

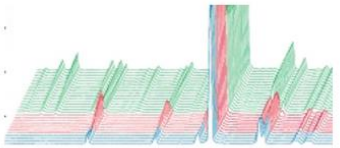

Installation 3
Theory & Simulation



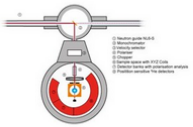
NEUTRON IMAGING



NEUTRON DIFFRACTION

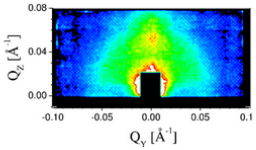


DNS DIFFUSE NEUTRON SCATTERING

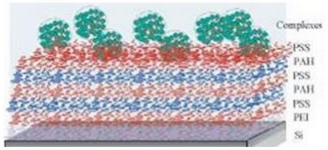


DNS with single-crystal time-of-flight

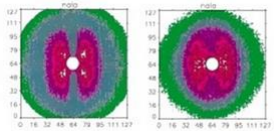
MAGNETIC SANS MAGNETIC SMALL ANGLE NEUTRON SCATTERING



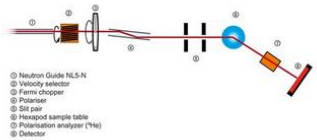
NEUTRON REFLECTIVITY



SANS SMALL ANGLE NEUTRON SCATTERING



MNR MAGNETIC NEUTRON REFLECTIVITY



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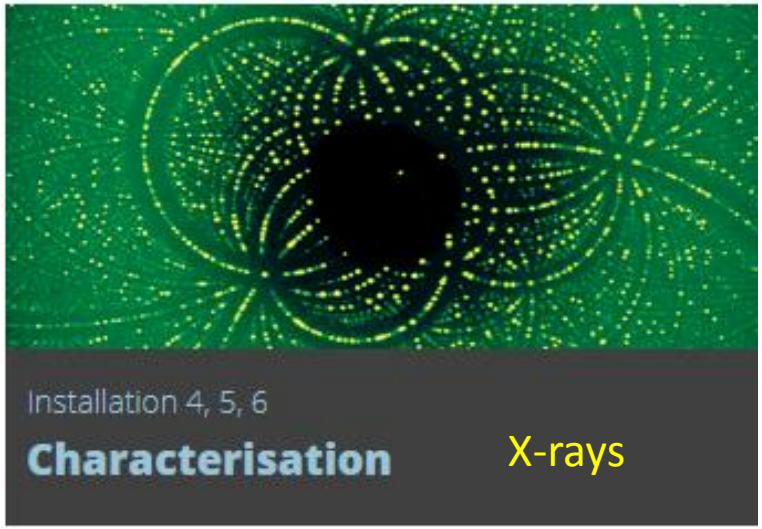
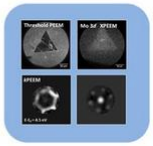
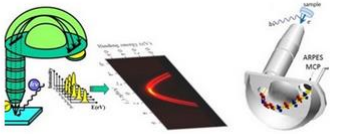


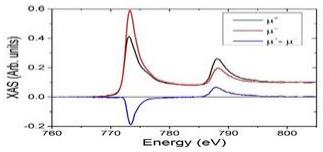
XPEEM/SPEM PHOTOEMISSION MICROSCOPY



ARPES ANGLE RESOLVED PHOTOELECTRON SPECTROSCOPY



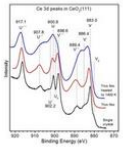
XMCD/XMLD X-RAY MAGNETIC CIRCULAR/LINEAR DICHROISM



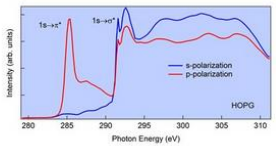
IXS INELASTIC X-RAY SCATTERING

Inelastic X-ray scattering (IXS) permits to analyse several aspects of the dynamics of materials. The techniques involved include Compton scattering, X-ray Raman scattering, and resonant inelastic scattering. In this way electron momentum densities and atomic bonding can be probed and also magnetic excitations or electronic localised or collective states and electronic band-structures.

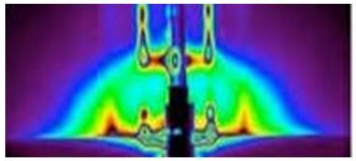
XPS X-RAY PHOTOELECTRON SPECTROSCOPY



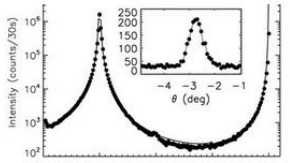
XAS X-RAY ABSORPTION SPECTROSCOPY



SAXS SMALL ANGLE X-RAY SCATTERING



XRD X-RAY DIFFRACTION



XRD provides non destructive information on th

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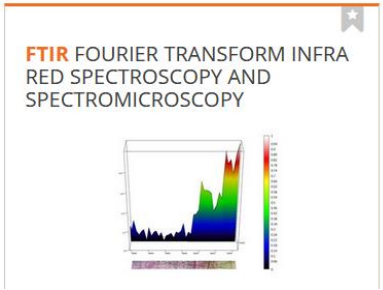

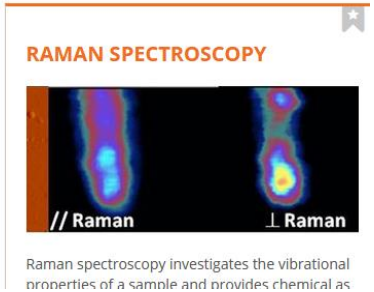

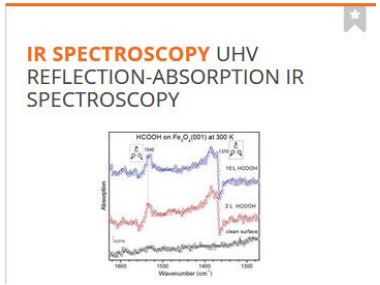

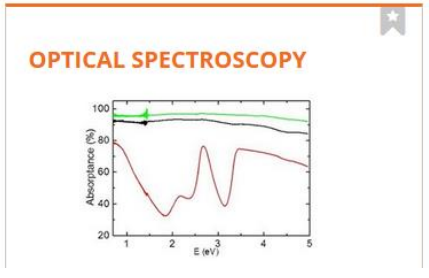

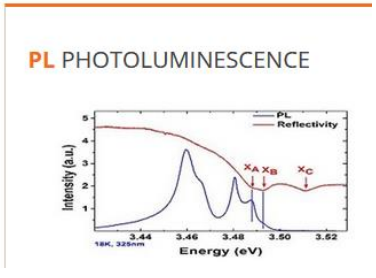

.. and MANY others…

Application rules

Proposals can be **submitted at any time** but will be periodically collected for scientific evaluation.

After submission, the **technical feasibility** of each research step will be assessed by the Technical Liaison Network (TLNet).

Feasible proposals will then be **evaluated and ranked** according to scientific merit by an external panel of reviewers (ARP).

The **best-ranked proposals are assigned** to the most appropriate NFFA-Europe site/sites, guaranteeing free access* to the most appropriate combination of methods and instruments.

CERIC

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https://www.ceric-eric.eu

CERIC is a European Research Infrastructure Consortium (ERIC) integrating and providing **open access** to some of the best facilities in Europe,

to help **science and industry** advance in all fields of **materials, biomaterials and nanotechnology**.

With a single entry point to some of the leading **national research infrastructures in 8 European countries**

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Users: Academia

CERIC is open to **researchers from all over the world**, free of charge for non-proprietary research.

Users: Industry

Services for **commercial users** are offered on **market-based conditions**.
CERIC supports industrial users by providing **access to its (..) instruments** (..).
Commercial users have the possibility to contract CERIC to provide a **solution to their problem**.

CERIC

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Open Access Offer

Austria

SAXS
Lab Small Angle X-ray Scattering

Croatia

PIXE/RBS/PIGE
Particle-Inducted X-ray Emission and Rutherford Backscattering

Czech Republic

RNAA
Neutron Activation Analysis
PSD
Neutron Diffractometer

Hungary

SANS
Small Angle Neutron Scattering
TOF
Time-of-flight Diffractometer
PGAA
Prompt Gamma Neutron Activation Analysis

CERIC

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LISA

Poland

SOLARIS
Synchrotron
Cryo-EM
Cryo Transmission Electronic Microscope

Slovenia

Aska, Lara, Magic, David
Nuclear Magnetic Resonance Spectometers

Romania

HRTEM
High Resolution Transmission Electron Microscopy

Italy

ELETTRA
Synchrotron

CERIC

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How to apply

Access to CERIC is open to scientists from all over the world and free of charge. Proposals should be submitted online through the Virtual Unified Office (VUO).

The best projects will be selected by peer review through an independent and international panel of experts.

IPANEMA | ARCHAEOLOGY CONSERVATION SCIENCES PALAEONTOLOGY PALAEO-ENVIRONMENTS | ANCIENT MATERIALS RESEARCH PLATFORM

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http://ipanema.cnrs.fr/

IPANEMA is a **joint laboratory** from CNRS, the French Ministry of Culture, University Versailles Saint-Quentin-en-Yvelines and MNHN (USR 3461).

IPANEMA is a centre for the **development of advanced methodologies** of material characterization in archaeology, paleo-environments, paleontology and cultural heritage, and the support of synchrotron-based research through external users hosted on the platform.

To this aim, IPANEMA **develops and provides a set of techniques** for preparing specimens, to study artifacts and samples, and statistically analyze collected datasets.

IPANEMA | ARCHAEOLOGY CONSERVATION SCIENCES PALAEONTOLOGY PALAEO-ENVIRONMENTS | ANCIENT MATERIALS RESEARCH PLATFORM

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IPANEMA, as a scientific and technical interface, **can support your synchrotron project** by supporting, according to your needs, the drafting of beamtime **proposals**, the **preparation of samples**, the development or adaptation of **experimental setups** in conjunction with beamlines, the data collection and/or the **analysis of data**.

IPANEMA support to the research on ancient materials is carried out in the framework of **synchrotron projects** of a duration of a few days. Beamtime proposals must be submitted within the **SOLEIL calls** that are organised every six months.

- **Transnational access** support from European countries and associated states through the IPERION CH programme of the European Commission,
- **Dutch users** can benefit from the NWO/IPANEMA agreement.

The PUMA BL

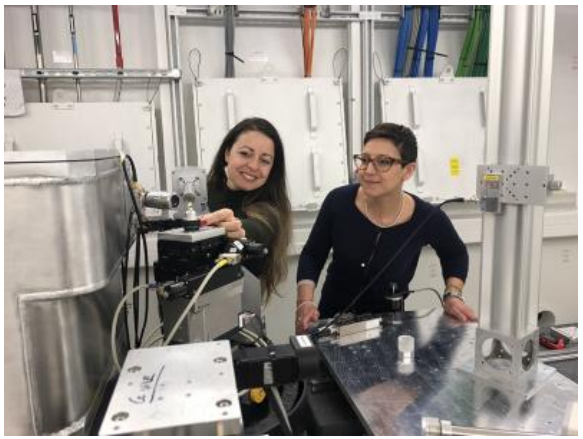
Technical specifications

PUMA is a hard X-ray beamline using photon energies between 4 and 60 keV. A double crystal monochromator (DCM) will be used to select the wavelength.

Full field experiments will be possible with the white or monochromatic beam, giving a field of view of up to 10 mm (vertical) x 20 mm (horizontal). The horizontal coherence length of the beam can be matched to the vertical one with a set of slits. This is an important feature for phase contrast experiments.

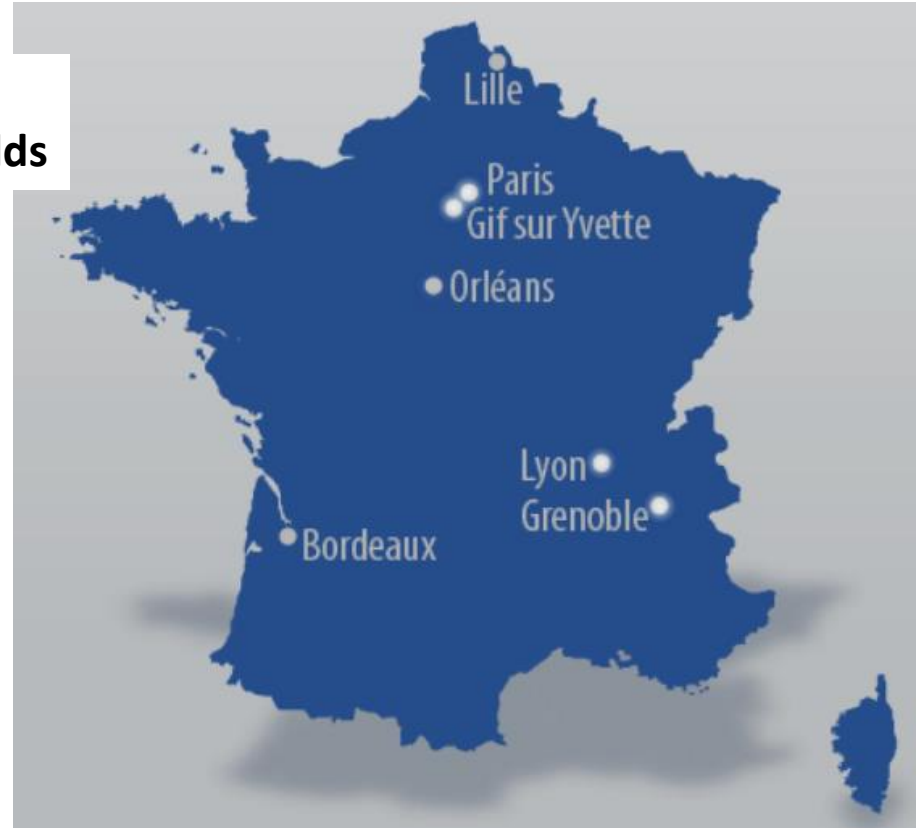
A Kirkpatrick-Baez (KB) mirror system can focalize the beam into a 3 μm x 3 μm spot on the sample. X-ray absorption (XAS) and fluorescence (XRF) spectroscopy and diffraction (XRD) and small angle scattering (SAXS) experiments will be possible.

13 Feb 2019
First users @ PUMA



https://www.ir-rmn.fr/

Research Infrastructure
Nuclear Magnetic Resonance, Very High Fields



Infrastructure dedicated to **national users**
Network of instruments on different sites
Scientific support to users
Economic support for users
Access via peer-reviewed **proposals**

An example…

Spectromètre 750MHz

Probes

- ***RMN Haute Résolution Solide (statique - 65kHz)***
- ***RMN Haute Température Solide/Liquide***
- ***Imagerie - Diffusion Solide/Liquide***

Spectromètre 850MHz

Probes

- ***RMN Haute Résolution Solide (statique - 111kHz)***
- ***RMN Haute Température Solide/Liquide***

http://metsa.prod.lamp.cnrs.fr/

- **TEM and Atomic Probe**
- Open to **French** academia and industry (partly also to international users)
- **8 sites**
- **Free access**
- **Economic support** to users
- Availability: **20-50 days/year** per instrument

CEMES - Toulouse

FEI-SACTEM
Hitachi I2TEM

- Imagerie haute résolution quantitative
- Holographie magnétique
- STEM-EELS/EFTEM
- Interfaces
- Oxydes
- Matériaux pour l'énergie
- Matériaux magnétiques
- Matériaux semiconducteurs
- Matériaux 2D

Conclusion

- Several Networks offer instrument to users
- Free / commercial access
- International and national communities
- Single/multiple techniques
- Support in the experiment design, realization and data analysis

- .. so don’t be shy !