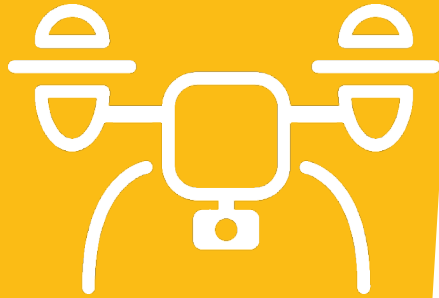




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# Graduate School

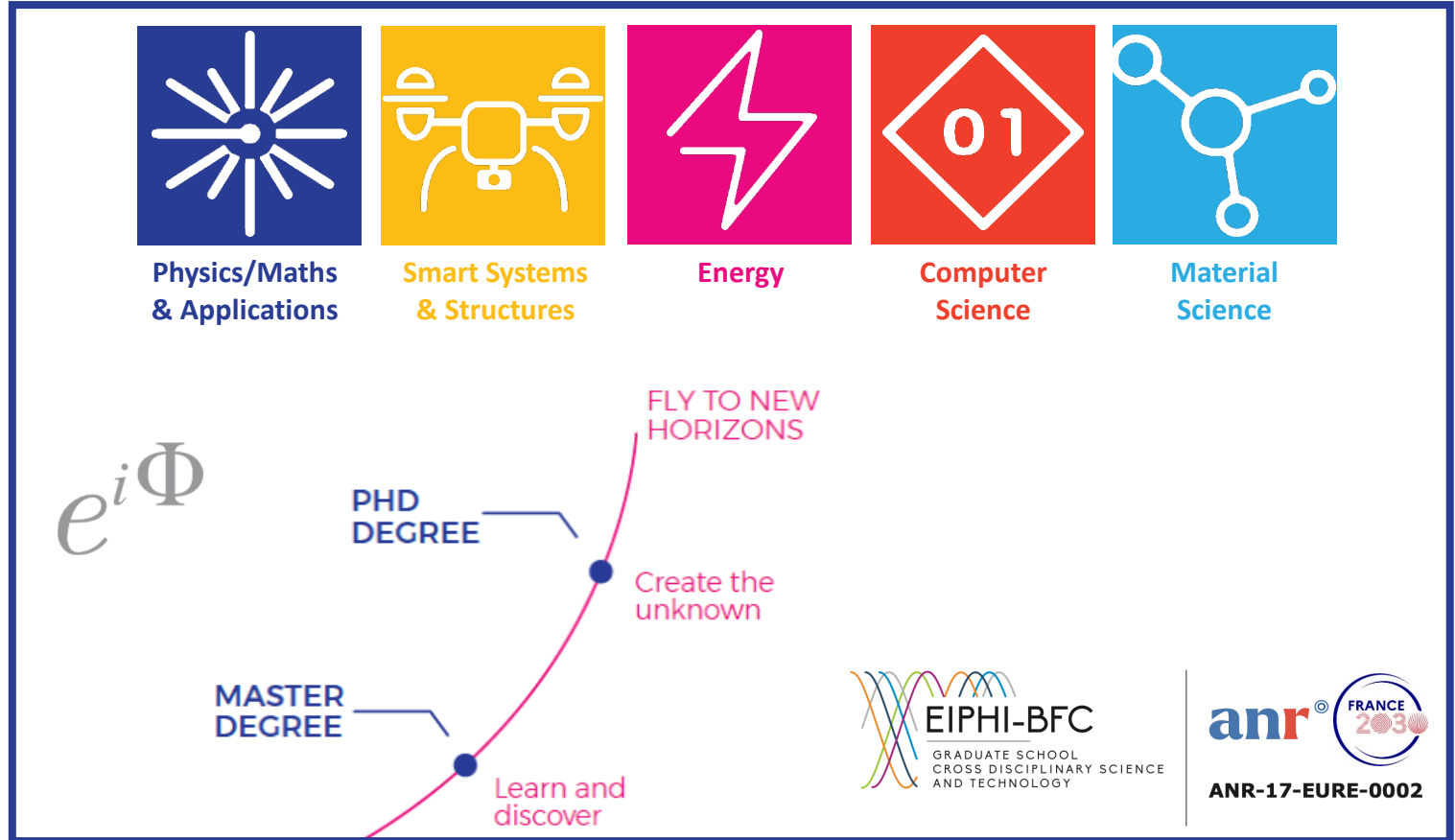
PIA3 Ecole Universitaire de Recherche

2018 – 2028 (13,7 M€)



# EIPHI Graduate School

Engineering and Innovation through Physical sciences, High-technologies, and cross-disciplinary research



ANR-17-EURE-0002



# EIPHI GRADUATE SCHOOL

UBFC priority axis: Advanced materials, waves & smart systems

Engineering and Innovation through Physical Sciences High-technologies and cross-disciplinary research

# 5

## DOMAINS

- Physics, Maths and Applications
- Smart Systems and Structures
- Energy
- Computer Science
- Material Science

# 16

## MASTER PROGRAMS

15 masters taught in English

# 301

## MASTER STUDENTS

>50% international students

# 2

## DOCTORAL SCHOOLS

- Carnot Pasteur & Doctoral
- School of engineering sciences and microtechnics (SPIM)

# 534

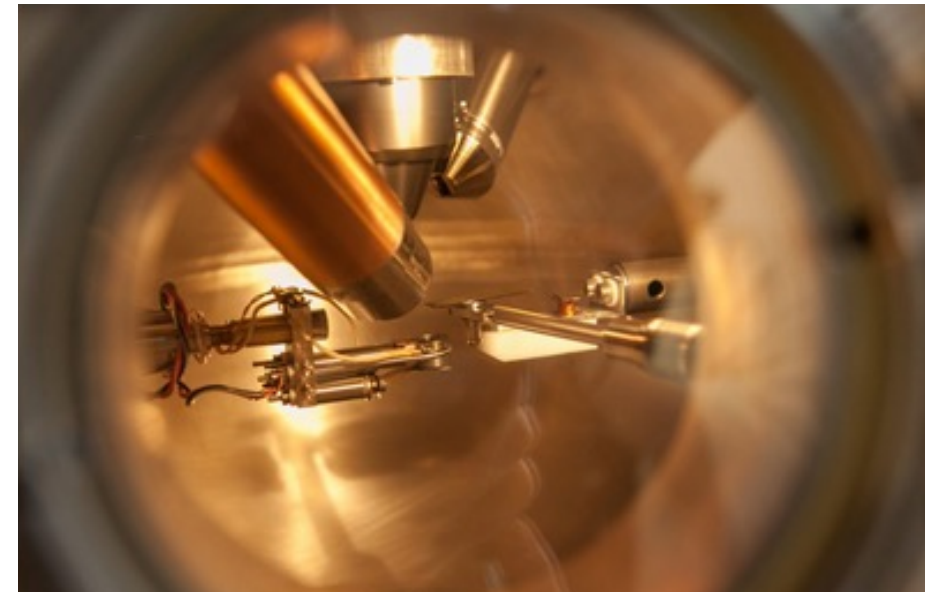
## PhD STUDENTS

>30% international students

# 7

## RESEARCH UNITS

600 researchers



# EIPHI GS research ecosystem from 2021 (85% of the UBFC priority axis 1)



7 CNRS labs,  
13 CNRS Medals  
7 IUF

7 ERC + 3 PoCs  
since 2012  
3 from 2019

26 EU running projects  
(7 ITN)

> 25 Platforms,  
Open Labs



**icb** Laboratoire Interdisciplinaire Carnot de Bourgogne  
Dijon / Chalon-sur-Saône / Le Creusot / Auxerre / Belfort - Sevenans

134

100 D

73 M

- Photonics / Nano-optics
- Quantum control & interactions / Nonlinear processes
- Materials / Metallurgical processes / Energy
- Nanosciences
- Interfaces
- Mechanical design, optimization & modelling

**IMB** INSTITUT DE MATHÉMATIQUES DE BOURGOGNE  
Dijon

53

21 D

36 M

- Geometry & Dynamical systems
- Physics-Mathematics
- Statistics, Probabilities, Optimization & Control

**mub** Institut de Chimie Moléculaire  
Dijon

24

15 D

30 M

Molecular chemistry, electrochemistry, organometallics, catalysis

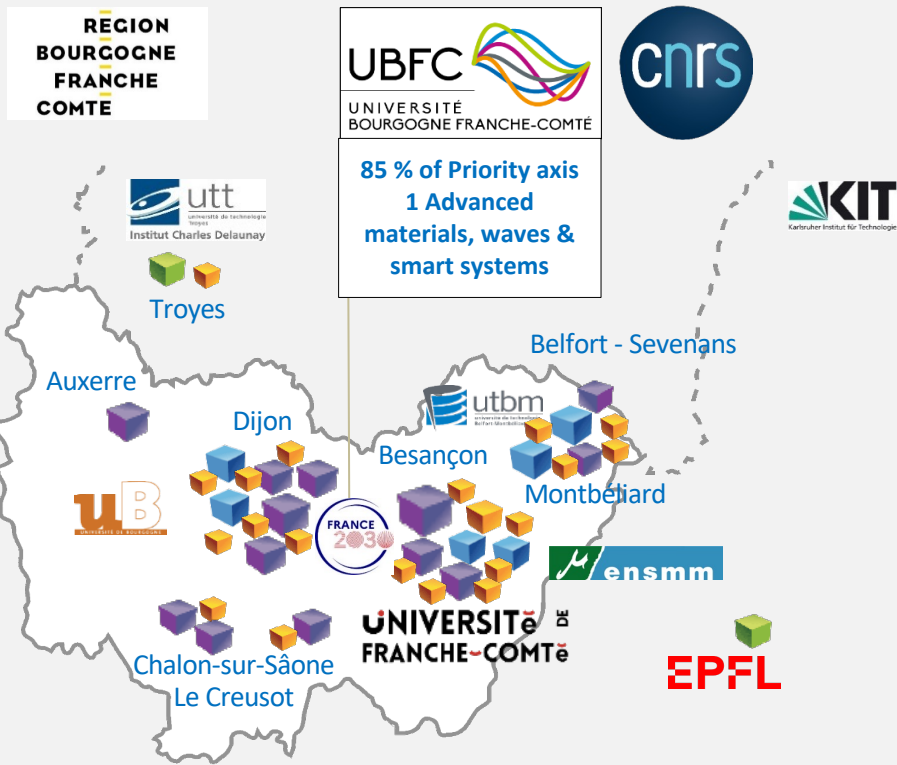
**ImViA**  
Dijon / Le Creusot

28

43 D

46 M

Imaging, vision, robotics, sensors, IA



**femto-st** SCIENCES & TECHNOLOGIES  
Besançon / Montbéliard / Belfort - Sevenans

262

239 D

126 M

- Micro-Nanosystems
- Time-Frequency
- Advanced control
- Mechatronics
- Computer sciences
- Optics & Photonics
- Energy
- Materials & structures
- Social and human sciences
- Phonics & acoustics

**UTINAM**  
Besançon

54

19 D

23 M

- Materials & surfaces physics & chemistry
- Spectroscopy & astrophysics, planetology, atmospheres
- Nanoparticles & membranes

**(Lm<sup>B</sup>)** Besançon

49

25 D

- Algebra & number theory
- Functional & numerical analysis, partial differential equations
- Probability & statistics



Universities, engineering schools

CNRS/UBFC Joint labs

Associated labs

Main high-tech platforms

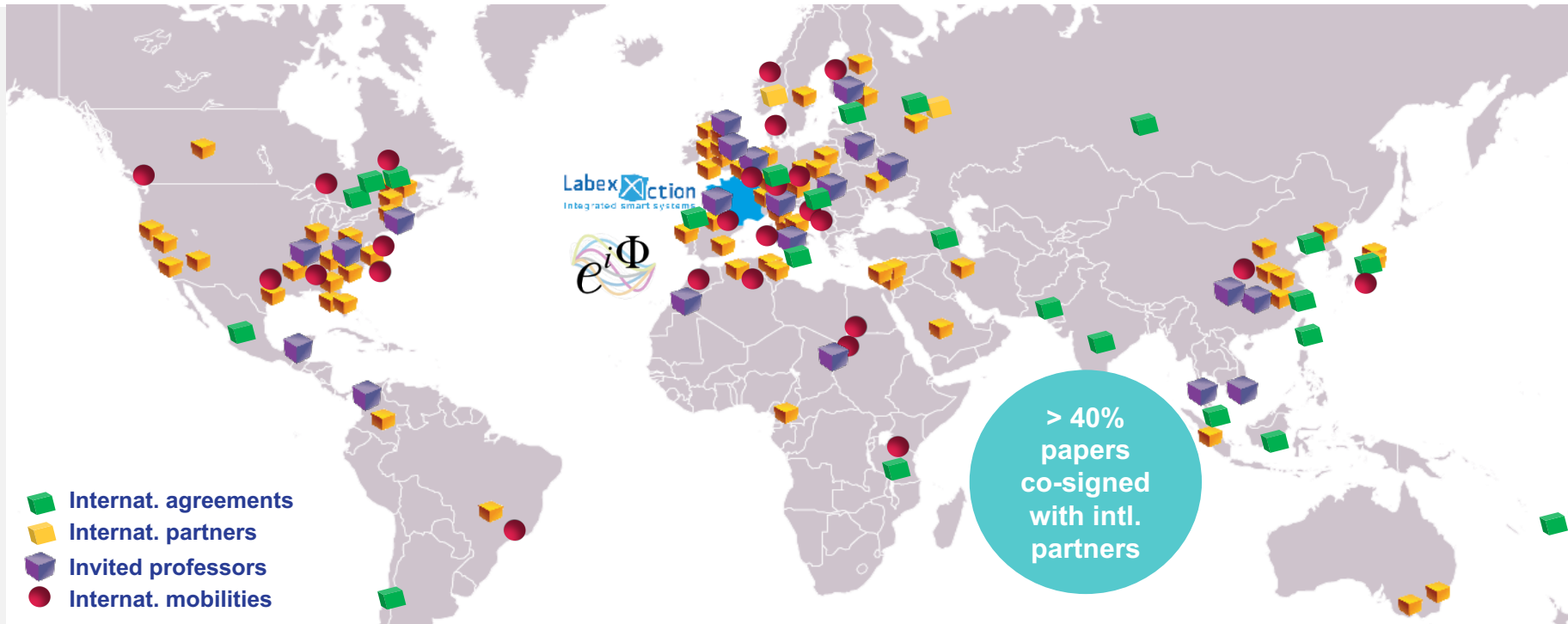
604 Researchers

462 D PhDs

> 350 M Master students



# EIPHI Worldwide environment ... and impact



- **>80 academic partners** (MIT, Harvard, U. Maryland, GeorgiaTech, IBM Almaden, U. McGill, U. Melbourne, NTU Singapore, Caltech, U. Tokyo, U. Shanghai, ITMO, U. Oxford, U. Ghent ...)
- **>20 int. agreements with partner universities** (double-diploma, student exchange, Erasmus+, cotutelles...)
- **24 currently running H2020 projects (4 coord.) incl. 5 MSCA-ITN-ETN + 1 Erasmus Mundus**
- **39 invited professors (2012-2021)**
- **>30 recruited nationalities - 94 incoming/outgoing Master-PhD mobilities from Sep. 2018**



# Training



# Strategic EIPHI vision of Higher Education & Research

Strengthen the attractiveness and the Research-Education connection through the three priority areas of UBFC

## Attractiveness

- **Masters and doctoral** programs compatible with international research universities
- **International** environment: european projects, international mobility, invited professor, ...
- **Innovation:** numerical and experimental education/research involving **data center and technology platforms**
- **Customised follow-up of students (M-D)** through **mentoring and tutoring**
- **Networking:** UBFC Alumni

## Structuring

- Implement a master's program, **integrated with the doctoral schools**
- **Co-construct** the master's program with the **engineering schools**
- **A quality approach for all programs** at the UBFC level

## Professionalisation

- **Professionalise education** from the licence to the doctorate degrees
- Offering new horizons to **socio-economic partners**, via **openlabs, entrepreneurship, work-study and lifelong learning**



# EIPHI GRADUATE SCHOOL

5 DOMAINS

Physics, Maths  
and Applications

Smart Systems  
and Structures

Energy

Computer  
Science

Material Science

16 MASTER  
PROGRAMS

▶ **PPN\*** : *Physics,  
photonics and  
nanotechnology*

▶ **QuantTEEM\*** :  
*Quantum Technologies  
and Engineering –  
Erasmus Mundus*

▶ **PICS\*** : *Photonics,  
Micronanotechnology,  
Time-Frequency  
Metrology, and Complex  
Systems*

▶ **COMPUPHYS\*** :  
*Physics and  
Computational Physics*

▶ **MATH4PHYS\*** :  
*Mathematical Physics*

▶ **Advanced  
Mathematics** (\*half)

▶ **Smart Mechanics** \*  
▶ **SIS** \* : *Smart Integrated  
Systems*

▶ **GreeM** \* : *Control for  
Green Mechatronics*

▶ **VIBOT** \* : *Vision and  
Robotics*

▶ **MAIA** \* : *Medical  
Imaging and  
Applications* **Erasmus  
Mundus**

▶ **Electrical energy** \*

▶ **Thermal energy** \*

▶ **IoT** \* : *Internet of  
Things*

▶ **CDM** \* : *Control and  
Durability of Materials*

▶ **T2MC** \* : *Transition  
Metals in Molecular  
Chemistry*

2 DOCTORAL  
SCHOOLS

Carnot Pasteur (CP)

Doctoral School of engineering sciences and  
microtechnics (SPIM)

\* Masters taught in English



# Master Training Organization\*

## Students are:

- Immersed in the research labs from the first day
- **Totally integrated to the research teams** through the PhD student advising program
- **Monitored throughout their training (Mentors)** to develop their professional network,
- Supported for their **Study Abroad project** (internship, double diploma, etc...)
- **Ambassador of their training:** tutors for Bachelor Students

## Representative Master EIPHI schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
Morning	Scientific Courses in specific programme	Research Project in a lab (FEMTO-ST, ICB, IMB...)	Scientific courses in specific programme	Interdisciplinary courses EIPHI Graduate School topics	Scientific Courses in specific programme
Afternoon	Lab-work		Conference courses / Mentoring / Networking	Soft Skills (foreign languages, digital, transversal, entrepreneurial)	Seminars / Fablab Mentoring / Networking



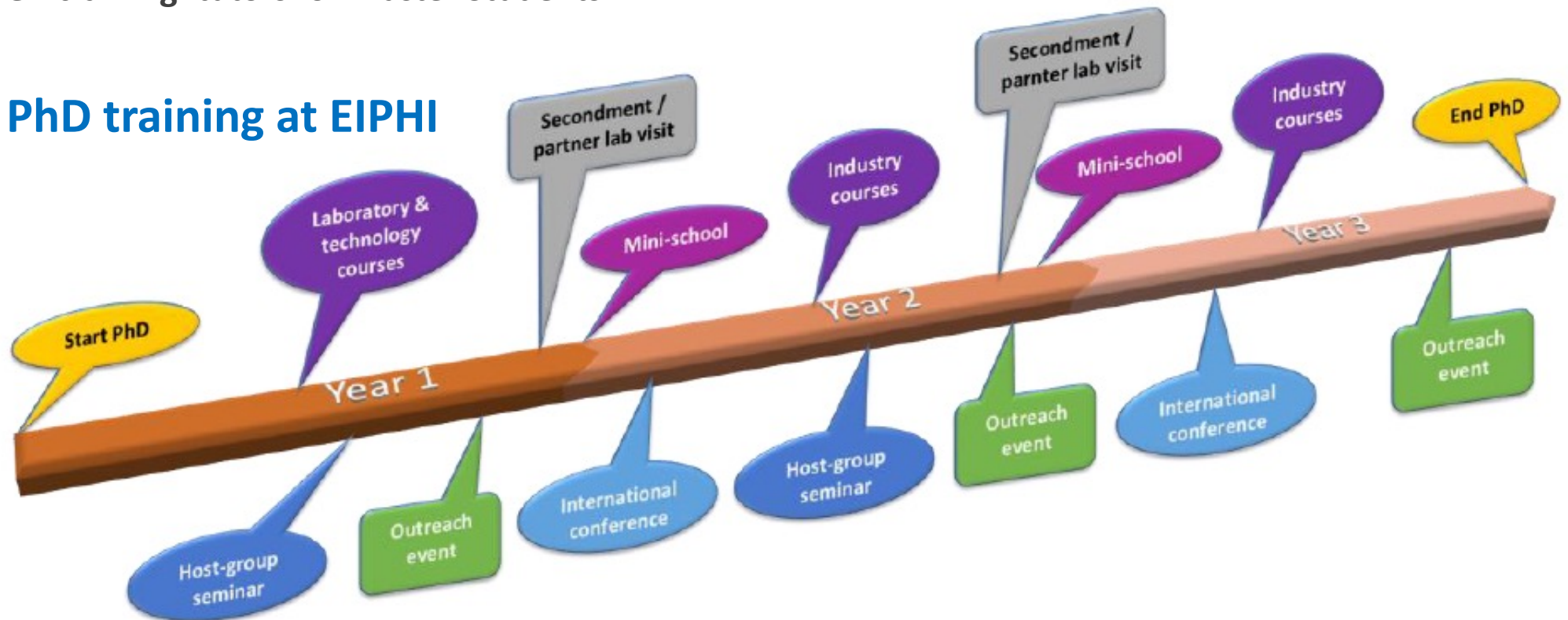
\* Also partly for CMI @ uFC

# PhD Organization in close coordination with the EDs

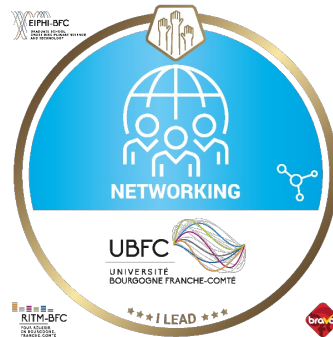
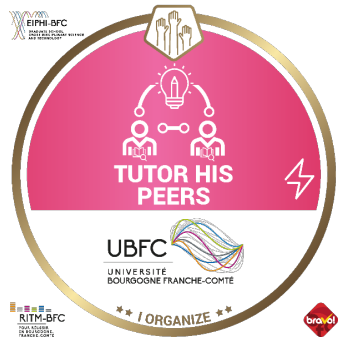
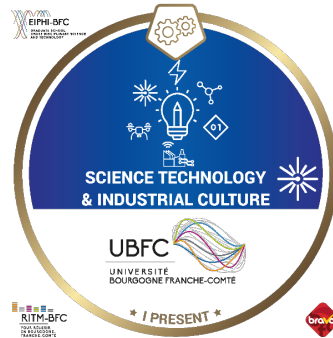
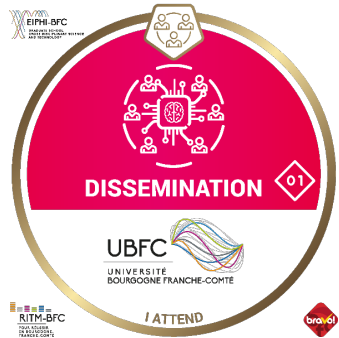
## PhD students are:

- Actors of an enhanced doctoral training course with an **international focus**
- **Monitored throughout their training (Mentors)** to develop their professional network,
- Supported for their **Study Abroad project** (internship, double diploma, etc...)
- **Ambassador of their training:** tutors for Master Students

## A typical 3 years PhD training at EIPHI

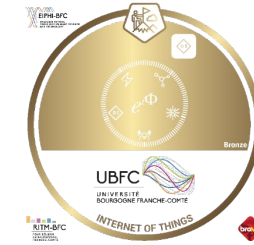
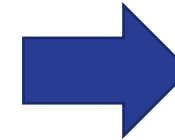


# Open badges (skills recognition)

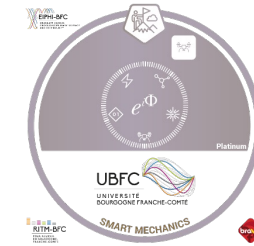


In a given domain:

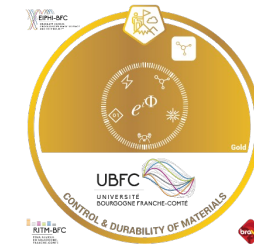
- The Skills (CSTI, dissemination, tutoring, networking)
- The Level (I attend, I present, I organize, I lead)



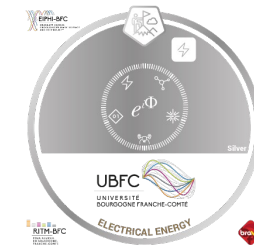
Bronze: 350 PTS



Silver: 500 PTS



Gold: 650 PTS



Platinum: 800 PTS



# Life @ EIPHI: Promoting a feeling of belonging to the GS



Students involvement in **conferences & events** (EIPHI booth @ GdR B2I Days Dijon)



Rentrée 2022  
**Graduate School EIPHI**



Graduate School EIPHI :  
**jours multidisciplinaires**

Multisite cross-disciplinary days: student working group on the **Climate Fresk** and « **safe and just space for humanity**” concept



**Open Badge ceremony** for skill recognition of EIPHI master & PhD students



« **Best PhD 1st year Prize** » contest



# EIPHI Scientific program

A systemic pluridisciplinary and transverse approach on **Smart & Complex Systems**, optimally combining research, technology, industrial development, and societal impact



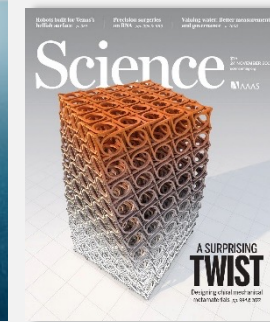
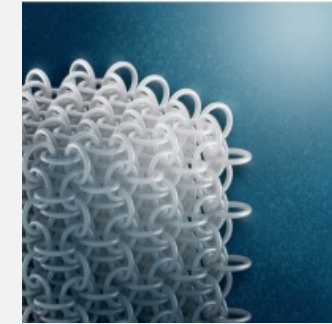
# Axis 1: Adaptive Architectures, Advanced Materials & Processes

Multiphysical, multiscale design & control of materials and (micro-nano)structures for complex functions  
(material science, chemistry, acoustics, mechanics, mechatronics ...)



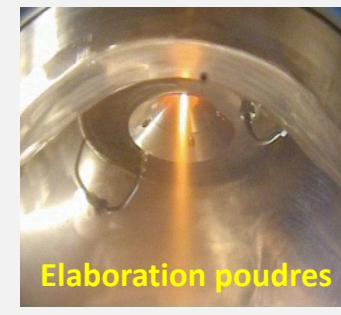
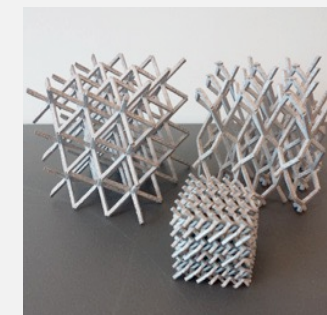
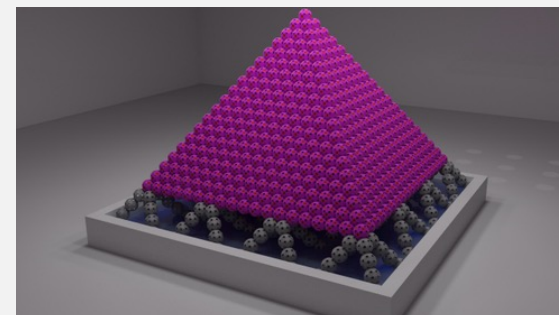
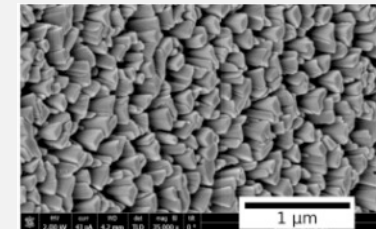
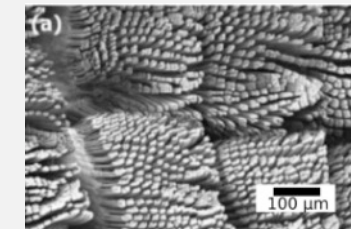
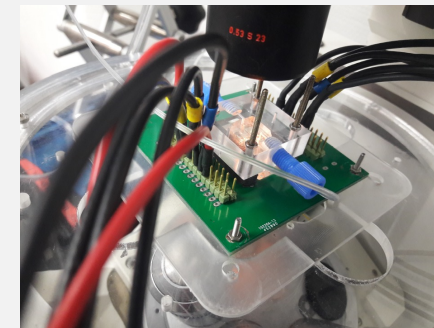
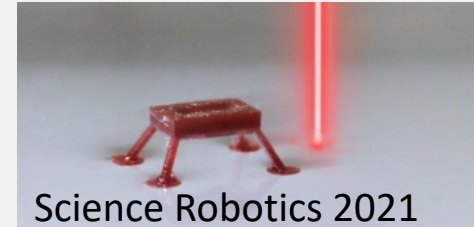
nature  
REVIEWS

PHYSICS



## CHALLENGES

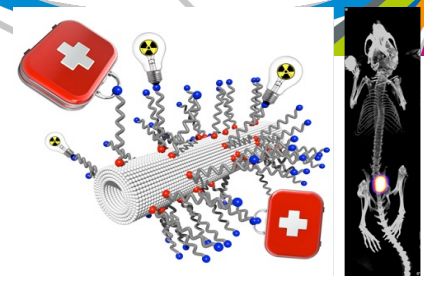
- Adaptive metamaterials and structures
- Active micro-nano-mechatronics and robotics
- Numerical modelling and programmable matter
- Reactive, bio-inspired/sourced and multifunctional (nano)materials & surfaces
- Sustainable processes and hybrid (micro)manufacturing



## Axe 2: Monitoring & Prediction of complex systems

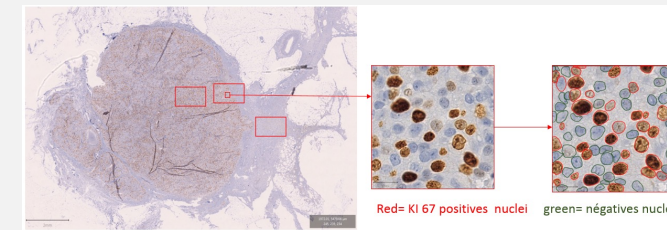
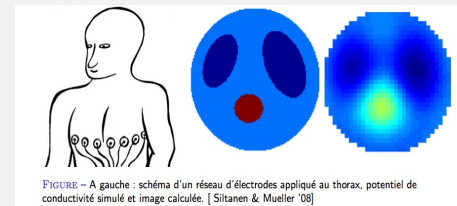
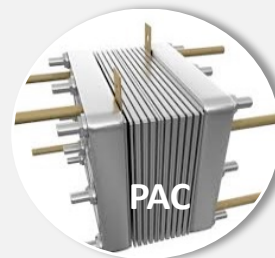
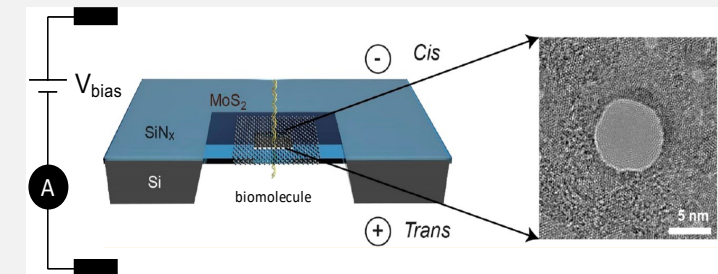
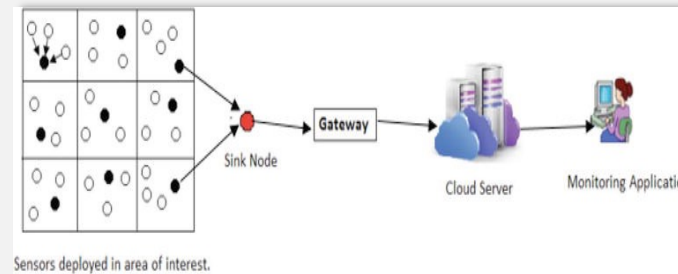
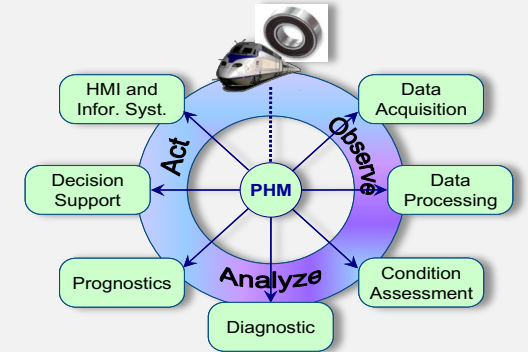
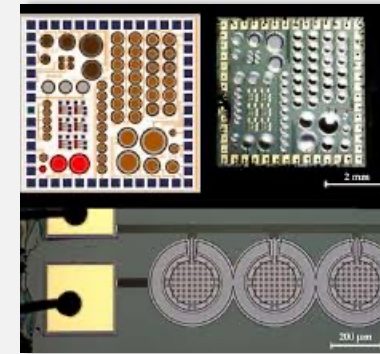
Strategies for measurement, diagnosis, prognostic, forecast of unpredictable & variable systems ... from human to industrial structures and environment

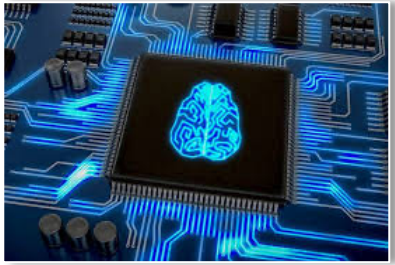
(signal processing, vision, control science, computer science, AI, nanosciences, thermal & electrical energy, appl. maths ...)



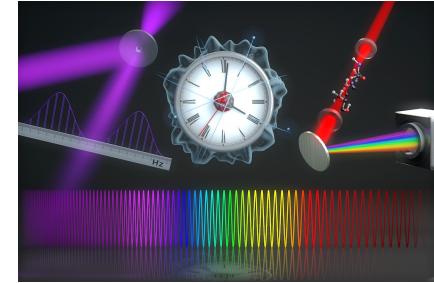
### CHALLENGES

- Prognostic & Structural health monitoring/management
- Multifunctional nanoparticles, (bio)sensors & (wireless) networks
- Complex control and computing, modeling & security, imaging
- Bioinformatics
- Clean (Green) Hydrogen energy, safe and efficient energy & harvesting





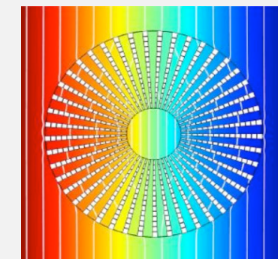
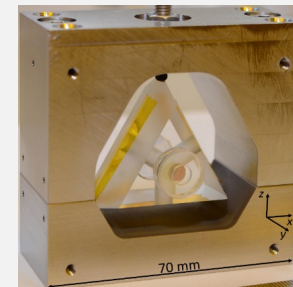
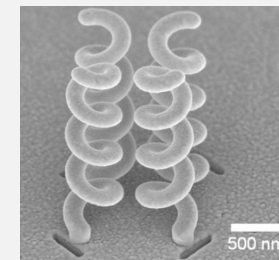
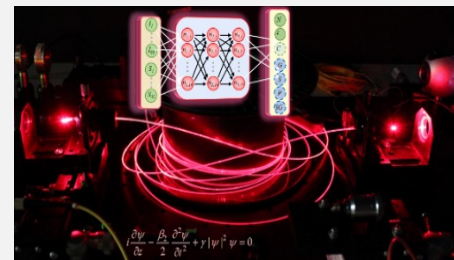
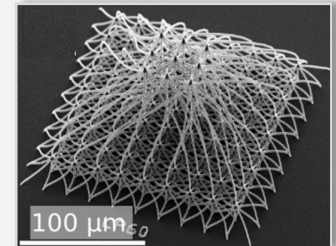
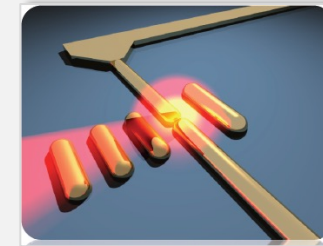
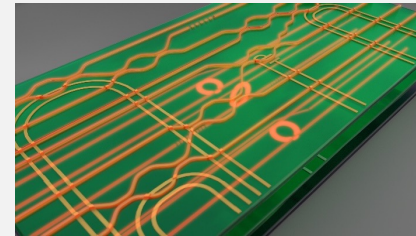
## Axis 3: Active and agile compact systems



Miniaturized & integrated concepts and devices based on wave & quantum physics and matter-wave interaction for information processing, (embedded) sensing, spectroscopy, TF metrology, material processing (electromagnetism, optics & photonics, plasmonics, acoustics & phononics, maths ...)

### CHALLENGES

- Integrated (micro-nano) -photonic and -phononic components
- Smart nonlinear and quantum systems at micro-nano-scale
- Ultrafast control
- Photonic neuromorphic computing
- Time-Frequency (micro)devices







<https://gradschool.eiphi.ubfc.fr/>

# Thanks for your attention!!



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ANR-17-EURE-0002

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