

# Institut Pluridisciplinaire Hubert Curien



**IPHC**  
Institut Pluridisciplinaire  
Hubert CURIEN  
STRASBOURG



UNIVERSITÉ DE STRASBOURG

# Multi-disciplinarity at IPHC (1)

□ IPHC is supervised by **CNRS** (French National Center for Scientific Research) and **University of Strasbourg**.



□ IPHC is the progeny of one of the earliest Nuclear Laboratory in France:

- **End of WWII**: Institute of Nuclear Research at University of Strasbourg.
- **1956**: creation of the laboratory of Subatomic Research, (CNRS + University of Strasbourg):
  - Several Cockroft & Van de Graaff.
  - 5 departments, of Nuclear Physics, Biology and Chemistry.
- **2006**: IPHC is one of the first French « common laboratory », based on 3 different laboratories: Biology, Chemistry, Physics.



# Multi-disciplinarity at IPHC (2)



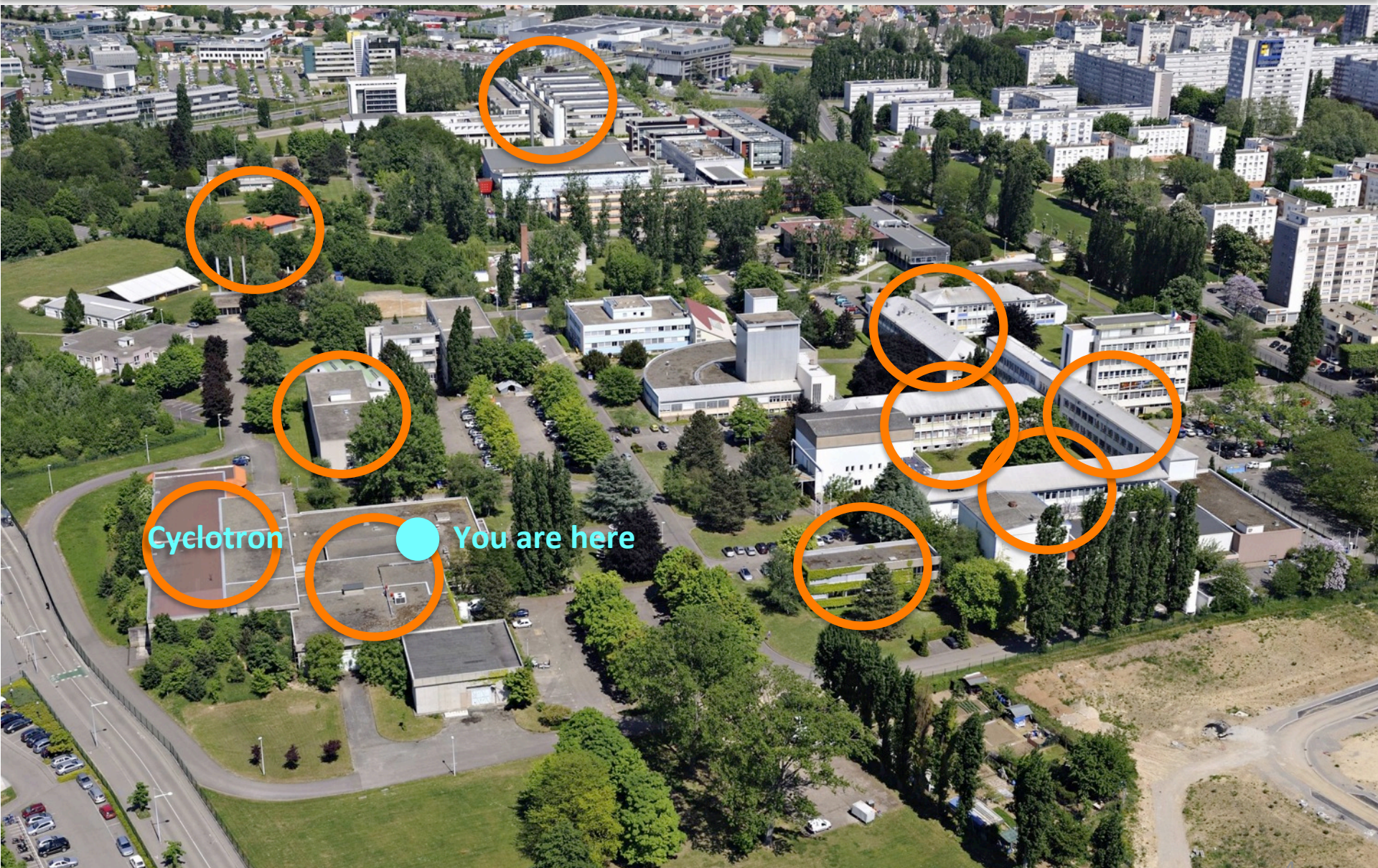
## History:

- 2012: building of the **cyclotron** CYRCE.
- 2016: 4 departments, dedicated to defined scientific fields
  - Subatomic Research
  - Analytical Chemistry
  - Ecology, Physiology and Ethology
  - Radiobiology, Hadrontherapy and Molecular Imaging

→ transversal interdisciplinary projects born from this juxtaposition



# IPHC in the campus of Cronenbourg



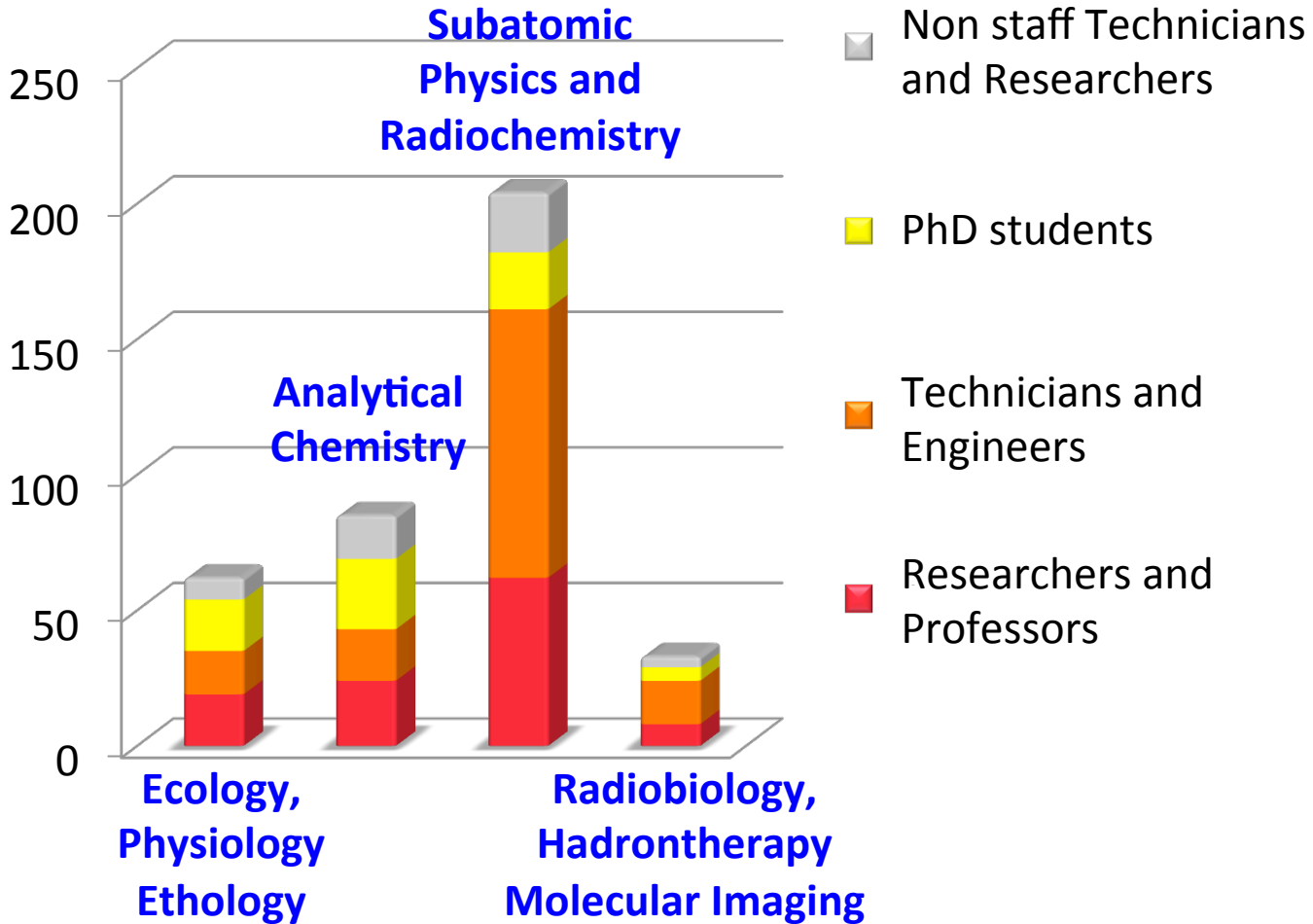
Cyclotron

You are here



# Human resources

IPHC: 380 employees (260 staffs)



# Institut Pluridisciplinaire Hubert Curien UMR 7178

Assistants de prévention :  
**E. Schaeffer (coord)**, Z. Asfari, I. Chery  
 Communication : **N. Busser**  
 Documentation : **B. Gaillard**  
 Qualité : **S. Suzanne-Ochsenbein**  
 Valorisation : **J. Schihin**

**Directrice : C. Roy**  
**Adjoint : S. Blanc**  
**Assistante : F. Diemer**

**Instances du Laboratoire**  
 Conseil de Laboratoire  
 Conseil Scientifique  
 Cellule de Suivi Technique des Projets  
 Commission Paritaire Locale  
 Commission locale H&S et Conditions de Travail

**MiPHC**  
 (Mission pour  
 l'interdisciplinarité à l'IPHC)

## Ecologie Physiologie Ethologie

**Responsable : F. Criscuolo**

Administration : **C. Gallone**

*Eq. scientifiques    Eq. techniques*

Ecophysiologie et  
 changements  
 environnementaux  
**J-P. Robin**

Métrologie et  
 Instrument. en  
 Biologie et  
 Environnement  
**F. Crenner**

Ecophysiologie  
 évolutive  
**C. Schradin**

### Supports techniques

- Biologie Moléculaire

**S. Zahn**

- Spectro. isotopique

**I. Chery, A. Zahariev**

- Génétique

écologique

**H. Gachot**

- Animalerie

**A. Hranitzky**

Station Guyane

**D. Chevallier**

## Recherches Subatomiques

**Responsable : I. Ripp-Baudot**

Administration : **N. Reinbold**

*Eq. scientifiques    Eq. techniques*

Théorie **H. Molière**

Du big bang aux particules

ALICE **C. Kuhn**

CMS **D. Bloch**

Neutrinos **M. Dracos**

PICSEL **M. Winter**

Du noyau aux étoiles

**L. Stuttgé**

Noyaux exotiques

Noyaux superlourds

Clusters et

nucléosynthèse

Energie, environnement  
 et dosimétrie

Données Nucléaires pour les

Réacteurs **P. Dessagne**

Radiochimie **R. Barillon**

DeSIs **Z. El Bitar**

Systèmes de  
 Mesure et  
 d'Acquisition  
**L. Charles**

Micro-  
 électronique  
**C. Hu-Guo**

Micro-  
 technique  
**M. Imhoff**

Instrumentation  
 des  
 Accélérateurs  
**E. Bouquerel**

RaMsEs\*  
**A. Sellam**

## Sciences Analytiques

**Responsable : L. Sabatier**

Administration : **C. Gallone**

*Eq. scientifiques    Plateformes*

Spectrométrie de  
 Masse  
 BioOrganique#  
**S. Cianférani**

Chimie Analytique  
 des Molécules  
 BioActives  
**E. Marchioni**

Reconnaissance et  
 Procédés de  
 Séparation  
 Moléculaire  
**B. Ernst**

Ingénierie  
 Moléculaire  
 Appliquée à  
 l'Analyse  
**L. Charbonnière**

Analyse  
 inorganique  
**A. Boos**

Protéomique  
 IBISA#  
**C. Schaeffer**

Infrastructure  
 protéomique  
 nationale ProFI#  
**C. Carapito**

## Radiobiologie Hadronthérapie

### Imagerie Moléculaire

**Responsable : M. Rousseau**

Administration : **F. Hamel**

*Eq. scientifiques    Plateformes*

Radiobiologie  
**XXX**

CYRCé/PRECy  
**M. Pellicoli**

Hadronthérapie  
**C. Finck**

AMISSA  
**L. Thomas**

Imagerie  
 Moléculaire  
**F. Boisson**

Animalerie  
**B. Jessel**

[- - -] Création de l'équipe pour  
 le prochain quinquennal  
 2018-2023

**Pôle Administratif commun : J. Schihin**

Ressources Humaines : **R. Sommer**

Logistique : **D. Kissenberger**

**Pôle Technique commun : L. Gross**

Service informatique : **J-M. Gallone**

Service Mécanique : **M. Krauth**

Service de Radioprotection : **D. Oster**

**Plateforme commune**

Grille/Cloud : **C. Carapito, J. Pansanel, Y. Patois**

# Ecology, Physiology and Ethology

FOUR TEAMS GATHERING **60 SCIENTISTS**  
WORLDWIDE RECOGNIZED IN ECOPHYSIOLOGY...



**Behavioral Ecophysiology**  
Coevolution of  
sociality & fitness

**Environmental  
Management**  
Understanding animal  
adaptation to promote  
regional biodiversity



... STUDYING EVOLUTIONARY ORIGIN &  
PLASTICITY OF ANIMAL ADAPTATIONS...



**Adaptation of Marine  
Vertebrates**  
Population dynamics  
under  
global changes

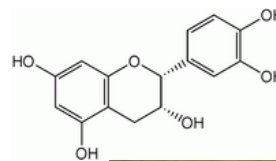
**Adaptation to Gravity**  
Impact on health  
from inactivity  
of animals & humans



...TO BETTER UNDERSTAND **THE FUTURE OF ANIMAL  
BIODIVERSITY** AND ITS STATUS IN MODERN SOCIETY .

# Analytical Chemistry

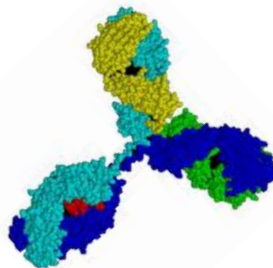
- Study of molecule structure and properties
  - Synthesis of new molecules
  - Characterisation of new complex molecules
  - Study of interactions between molecules



## Food analysis through its chemical components

Search for components possibly inducing human pathologies.

**Macrobiomolecules (proteins)**  
Development of new methods to characterise biomolecules e.g., with proteomics

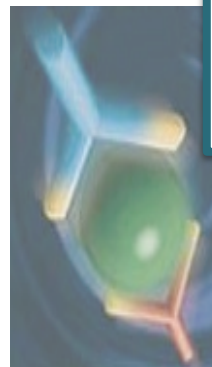


## Physical chemistry and separative sciences

Study of ion complexation. New separation supports.

## Chemical synthesis, coordination chemistry

New complex molecules

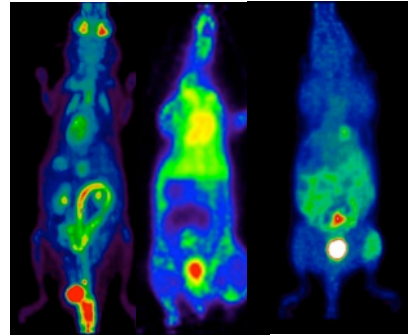




# Radiobiology, Hadrontherapy, Molecular Imaging

## From cell to therapy:

- Molecular imaging
- Hadrontherapy
- Radiobiology



## Pre-clinic technical set around plateforms :

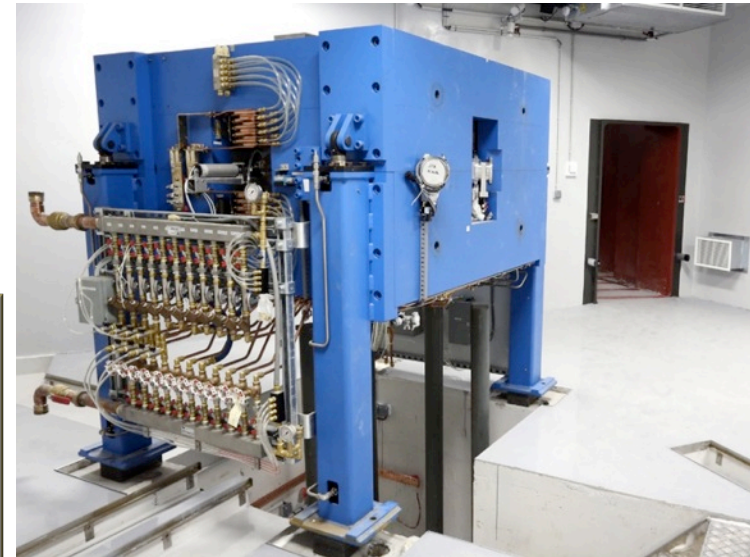
- CYRCé : production of radiotracers
- PRECy : radiobiology at Cyrce
- AMISSA : multimodal imaging of small animals
- Animal house and biology labs



Physicists, chemists, biologists, clinicians grouped within a same departement

## Cyclotron TR24 (ACSI)

- Proton energy: 16 ro 24 MeV
- Current: 300  $\mu$ A
- 2 extracted beams







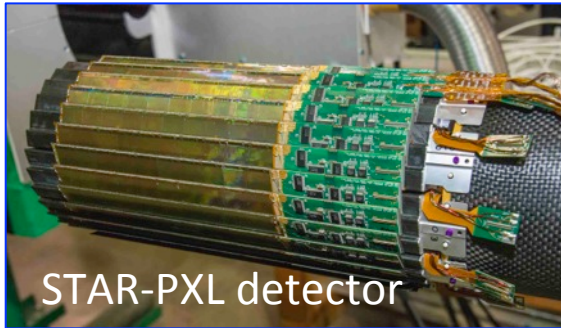
# Particle and Heavy Ion Physics at IPHC



- ❑ **ALICE:** upgrade of the Si tracker, heavy flavour production.
- ❑ **CMS:** upgrade of the Si tracker, Higgs and top properties, susy searches.
- ❑ **Neutrinos:** Double Chooz, JUNO (Top Tracker), Antares and KM3NeT.
- ❑ **PICSEL:** ILC, Belle II, CMOS sensor and vertex detector R&D.
- ❑ **High energy theory:** scalar potential, supergravity.



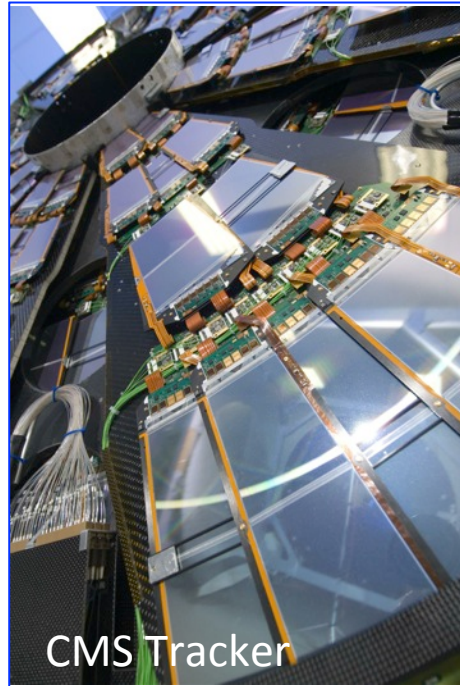
ALICE



STAR-PXL detector



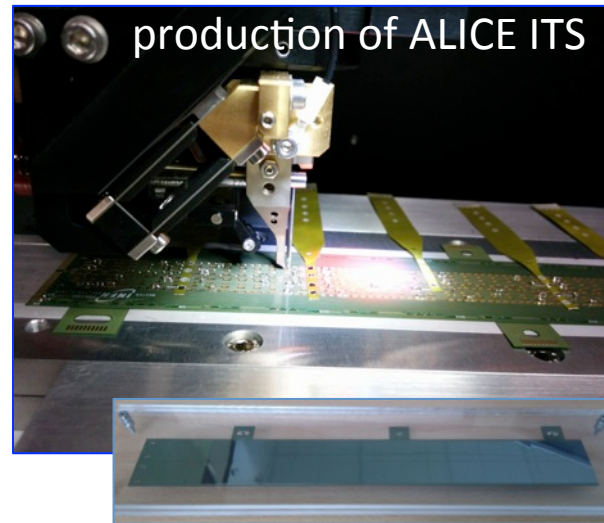
Top Tracker JUNO



CMS Tracker



DOM ORCA

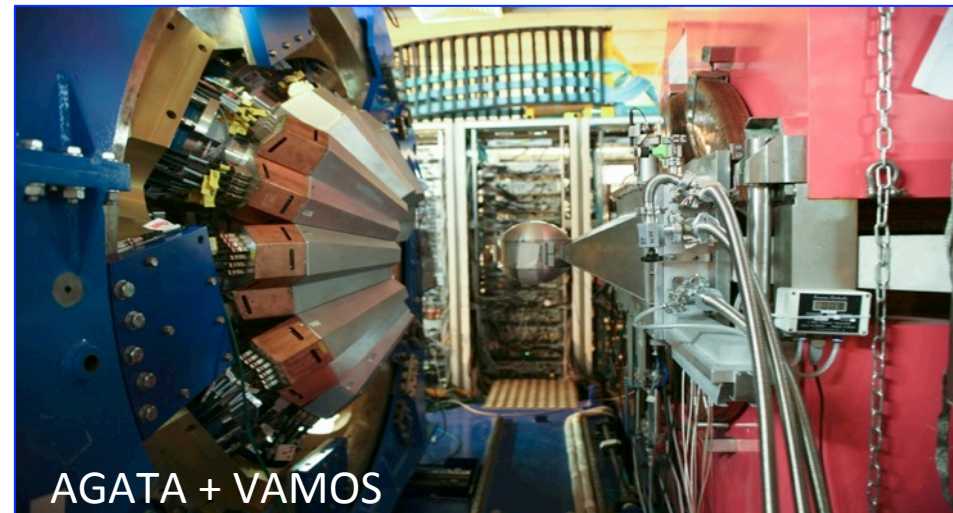
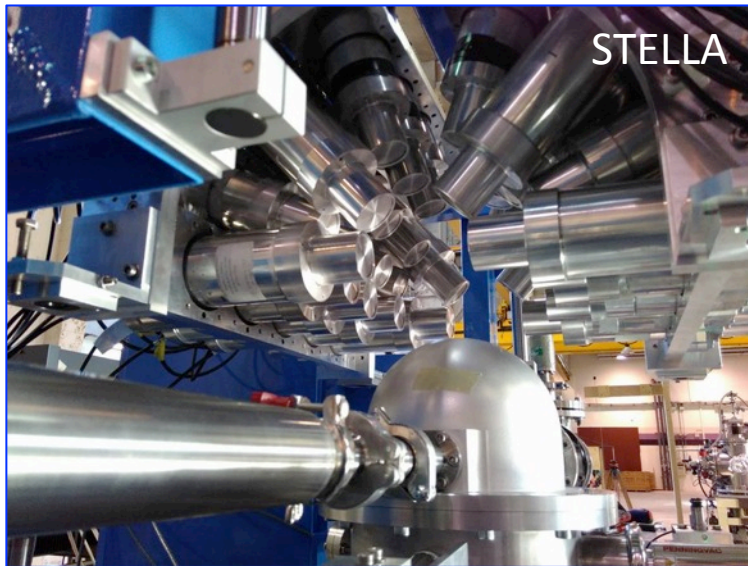
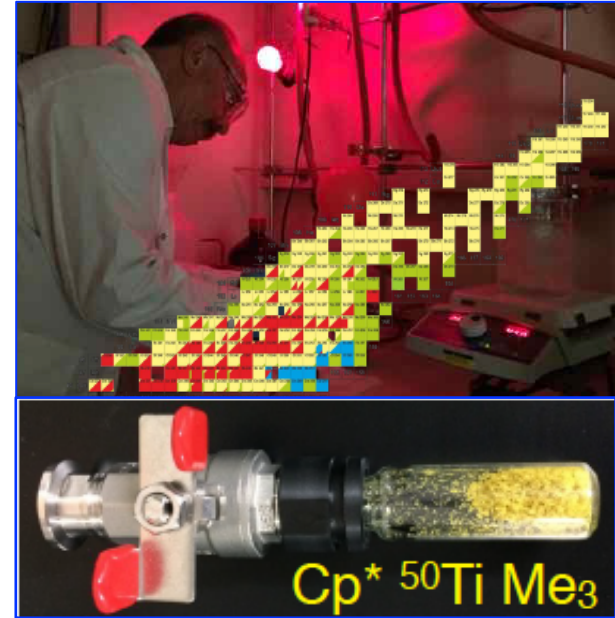


production of ALICE ITS



# Nuclear Physics at IPHC

- ❑ **Exotic nuclei:** AGATA (SPIRAL2, SPES).
- ❑ **Superheavy nuclei:** MIVOC beams (SHE factory, GARIS II, ...).
- ❑ **Stellar nucleosynthesis:** STELLA (ALTO, Andromede, ...).
- ❑ **Low energy theory:** shell model and ab initio calculations, support to experiments (SuperNEMO, GBAR, SPIRAL2, FAIR, ...).



# Applications to societal challenges at IPHC

- ❑ **Nuclear data for reactors:** U-Pu and Th-U nuclear fuel cycle optimization (data campaign at JRC-Geel, IFIN-HH-Bucarest, NFS-SPIRAL2).
- ❑ **DESI:** dosimetry and micro-dosimetry, radiation metrology and simulation.
- ❑ **Radiochemistry:** chemical speciation and radiation induced chemical modifications (ground and river pollution, impact on organic matter).

