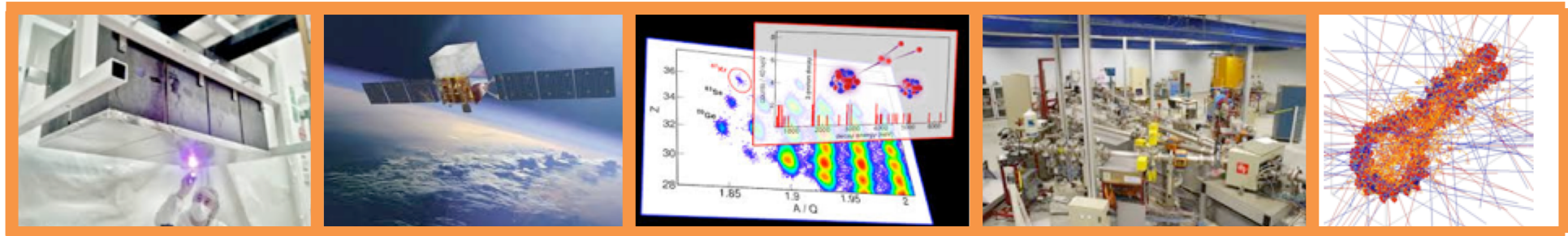


Laboratory of Physique of the 2 infinites



F. Piquemal (CNRS)

FCPPL Meeting
June 2024



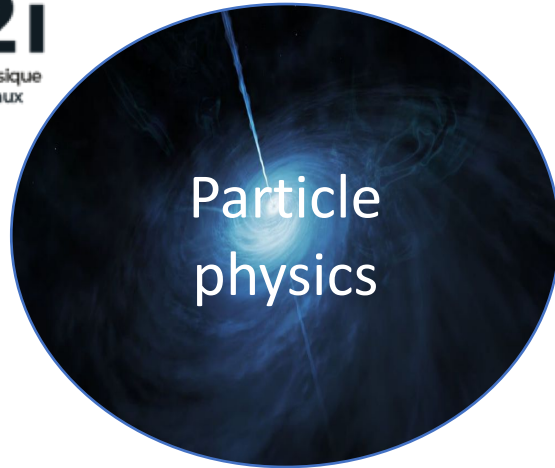
Operated by Bordeaux University and CNRS



About 120 people working at LP2i

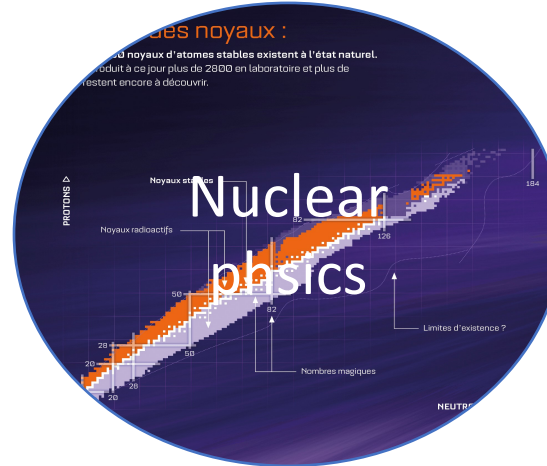
- 39 researchers (CNRS and University)
- 52 Engineers, technicians and administrative staff
- 15 PhD
- 12 Post-docs

LP2I Bordeaux : an interdisciplinary laboratory



Particle
physics

- Properties of particle physics
- High energy gamma-rays



Nuclear
physics

- Nuclear structure
- Exotic nuclei
- Nucléosynthesis
- Weak interaction studies
- Nuclei in extrem conditions



Health -
environnement

- Effect of radio-isotopes and metals on living organisms
- Study of radio-isotopes in the environment

Use of the technics and facilities for nuclear and particle physics

Support of technical and administrative services with strong competences and know-how

Gamma Astronomy

- Origin of cosmic-rays by the detection of high energy gamma-rays
- Study and modelisation of particle acceleration mechanisms (blazars, pulsars, Supernovae)
- Multi-messengers Astronomy

GeV gamma-rays



FERMI Satellite

TeV gamma-rays



HESS(Namibia)

Gamma 20 GeV – 300 TeV



CTA (Cherenkov Telescope Array, Azores)

Neutrino physics

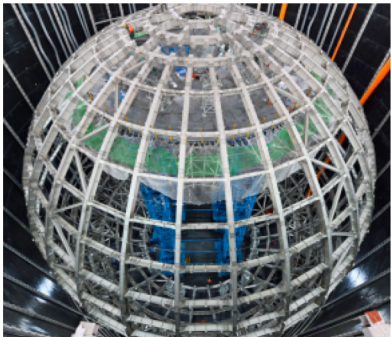
- Nature
- Mass
- Oscillations
- CP violation

Nature and mass



SuperNEMO (Modane, FR)

Oscillations and mass



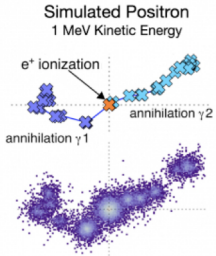
JUNO (China)

Oscillations and CP violation



DUNE (USA)

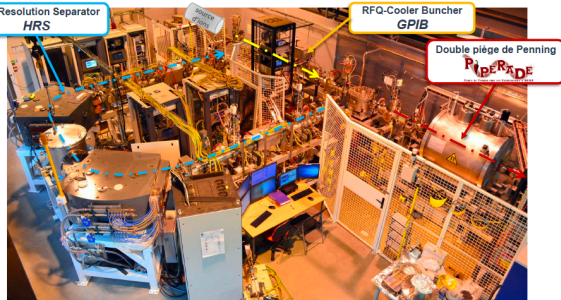
R&D R2D2 et LiquidO Nature and mass



Exotic Nuclei

- Nuclear structure
- 2-proton radioactivity
- Spectroscopy of neutron-rich nuclei
- Study of the weak interaction
- Fission and nuclear astrophysic

Spectroscopy et mass of exotics nuclei



SPIRAL2 - DESIR
(GANIL, France)

Exotic decays Nuclear reactions



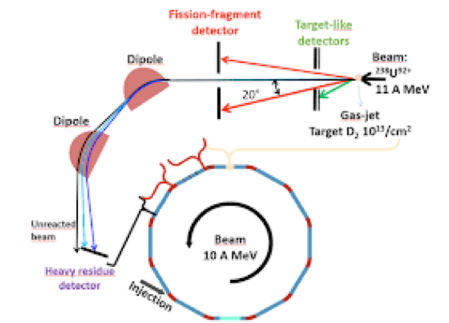
ACTAR TPC

Weak interaction test



WISArD (ISOLD, CERN)

Fission



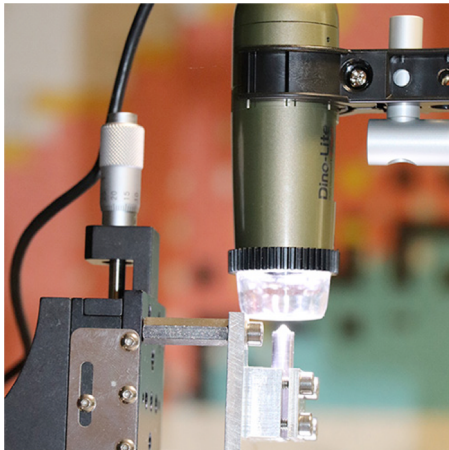
NECTAR (GSI, GE)

Nuclear excitations by laser

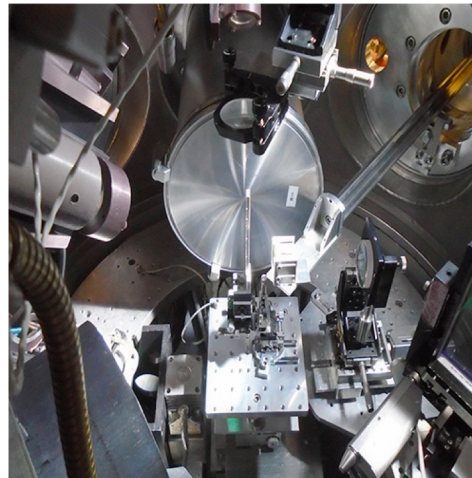
- Nuclear physics in plasma
- Particules beams accelerated by laser

Analysis, simulations, particles detectors(scintillators, CMOS,...), gaseous targets

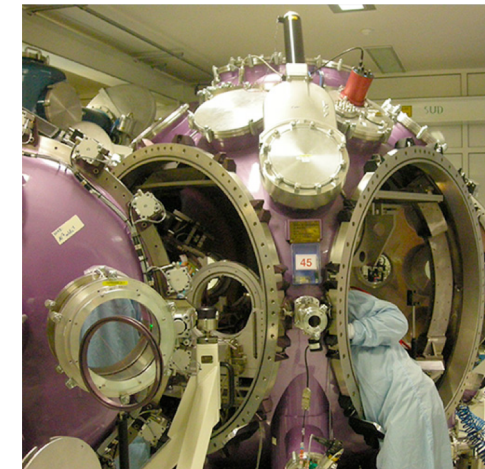
Gaseous target



Formatting gas jets



Experiments with power lasers

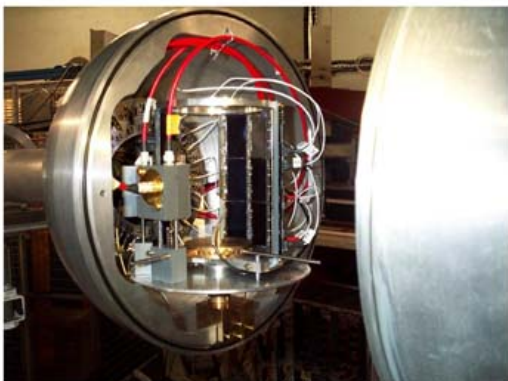


LULLI, GSI, Salamanca,...

Electro-Nuclear Cycle

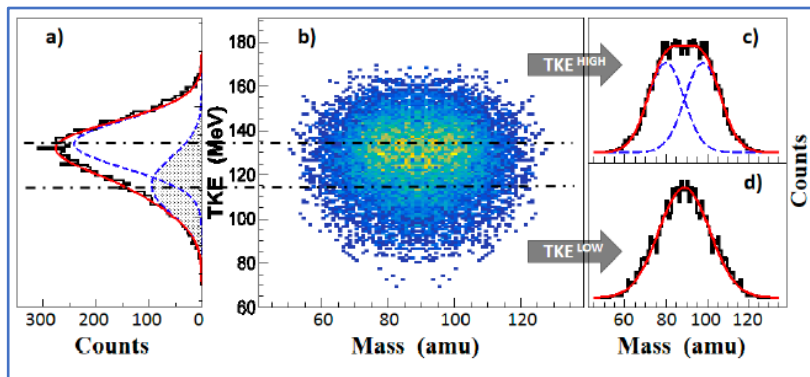
- Cross section of production of minor actinides
- Thorium cycle
- Numerical simulations

Neutron measurements



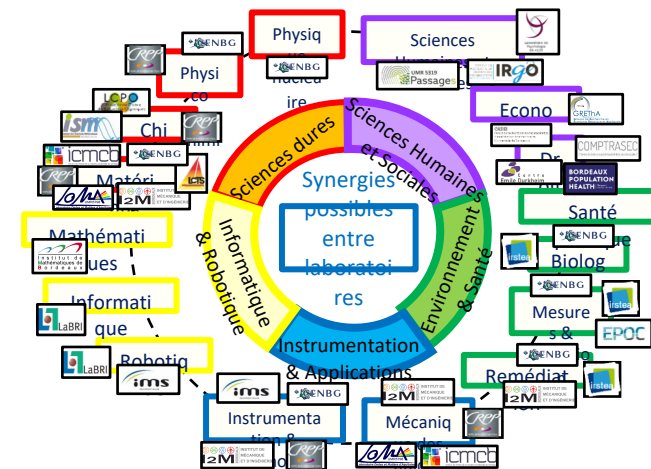
DPR detector

Fission studies



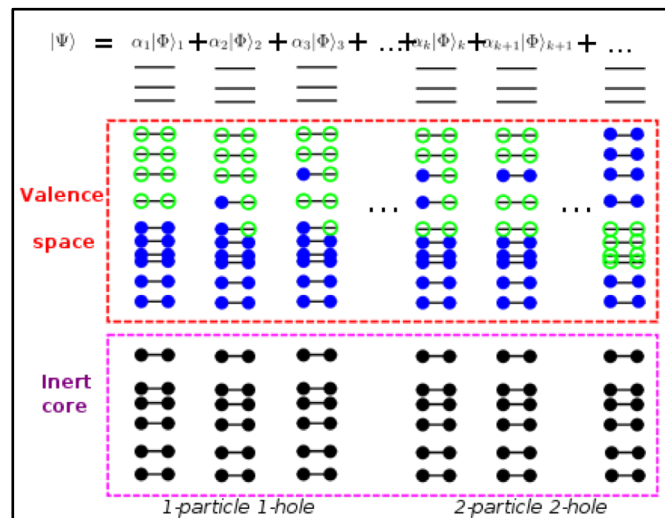
JAEA (Japon)

Dismantling nuclear facilities



Nuclear structure and nuclear astrophysics

- Use of inter-nucleon potentials in mean-field and shell model approaches
- Radiative proton capture reactions
- Studies of isospin breaking and fundamental interactions in heavy nuclei

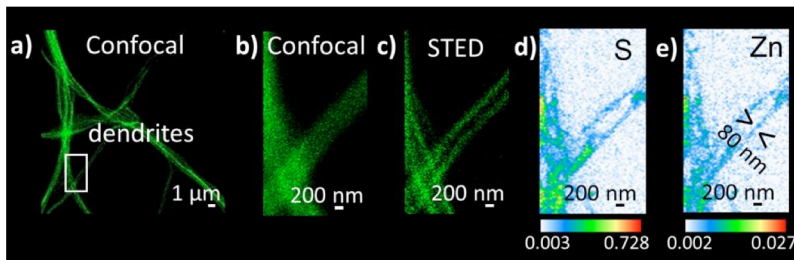


- Nuclear structure models
- Nucleon structure model
- Nucleon-nucleon interaction
- Collective and individual phenomena
- Electromagnetic and weak processes
- Reactions of astrophysical interest

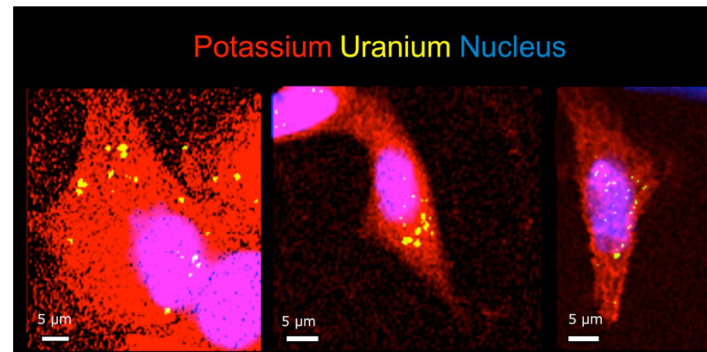
Chemical Imaging and Speciation

- Neurobiology of copper and zinc
- Neurotoxicology of manganese and uranium
- Iron and copper dyshomeostasis in neurodegenerative diseases

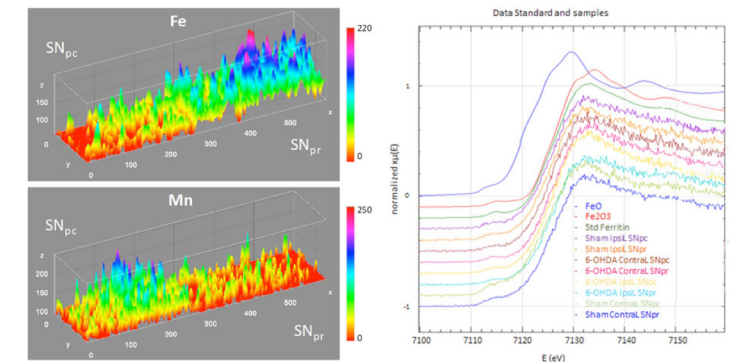
Neurobiology of zinc and copper



Neurotoxicology of environmental metals (Mn, U)



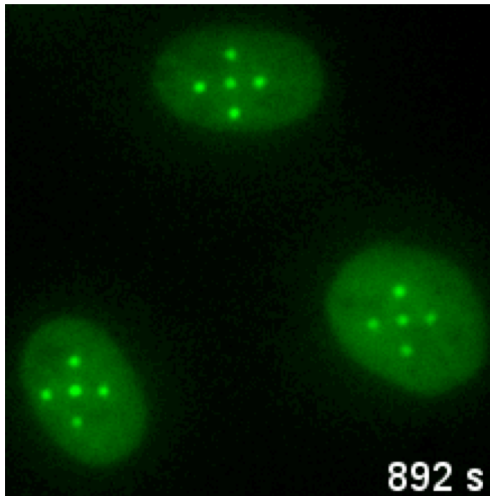
Effect of iron on neurodegenerative diseases



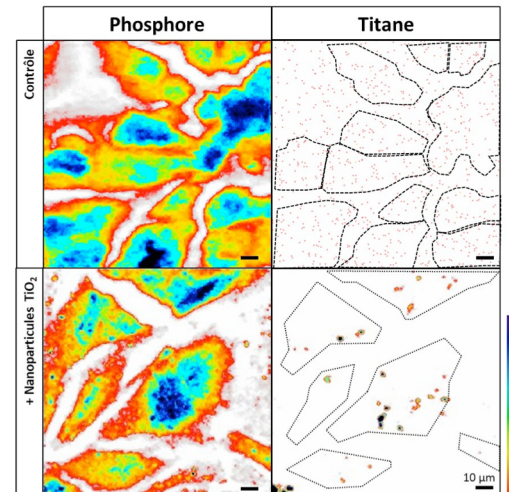
Interaction between Ionising Radiation and Biology

- Cellular micro-irradiation and cancer
- Chemical micro-analysis and nanoparticles
- Mmicro-dosimetry and numerical simulations

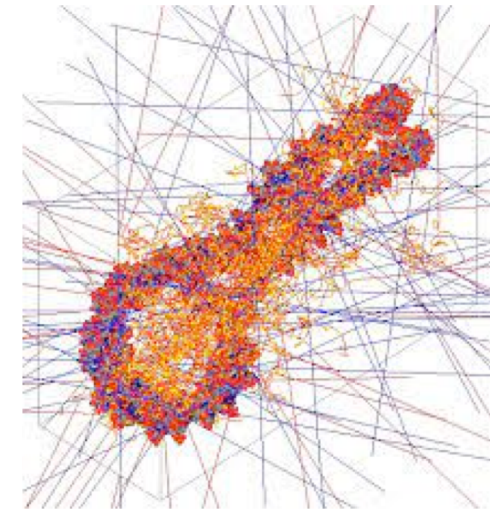
Impact of exposure to controlled doses of ionising radiation on living organisms



Quantitative analysis of nanoparticles

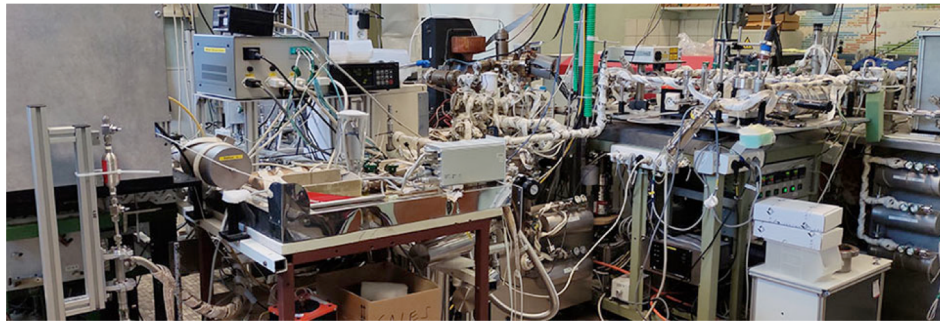


GEANT-DNA development

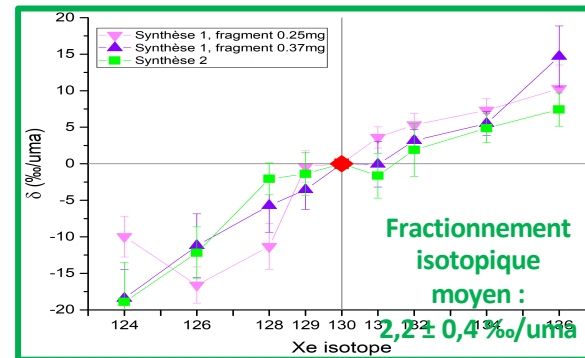


- Noble gas measurement for meteorite studies, geochemistry, nuclear industry and environment
- Radioelement-microorganism interactions in nuclear sites

Noble gas measurement
PIAGARA



Geochemistry
Enigm of missing Xenon



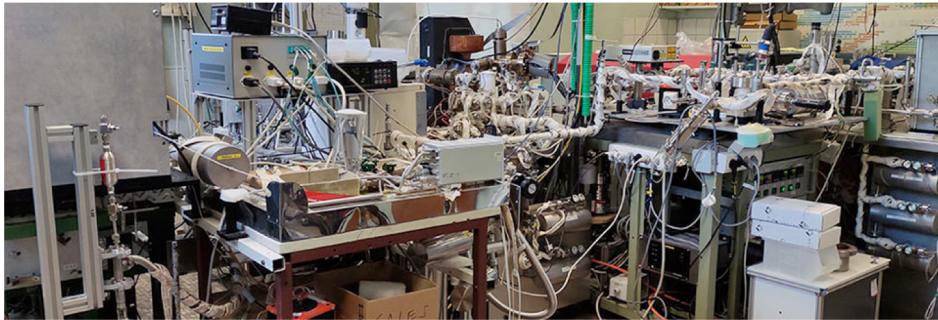
Micro-organisms in
nuclear sites



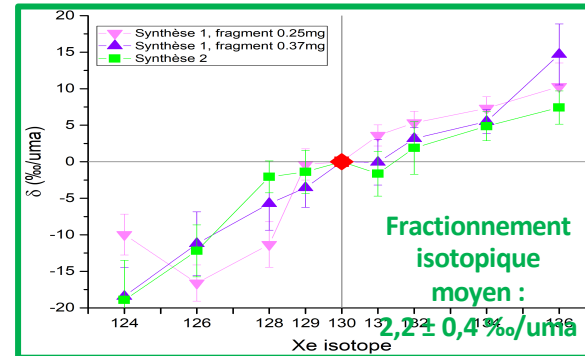
Radioactivity and environment

- Noble gas measurement for meteorite studies, geochemistry, nuclear industry and environment
- Radioelement-microorganism interactions in nuclear sites

Noble gas measurement PIAGARA



Geochemistry



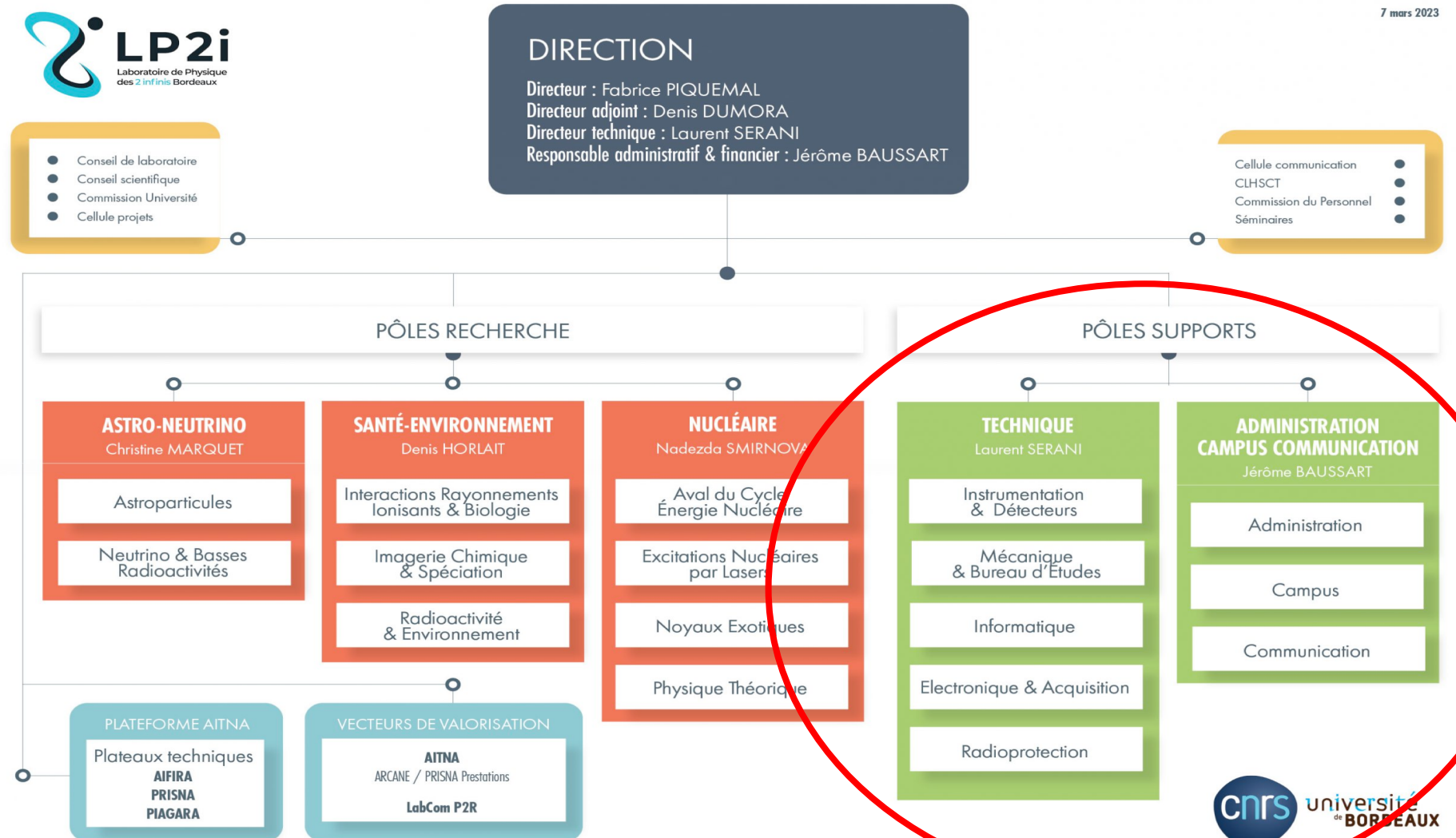
Micro-organisms in nuclear sites



LP2i organisation chart



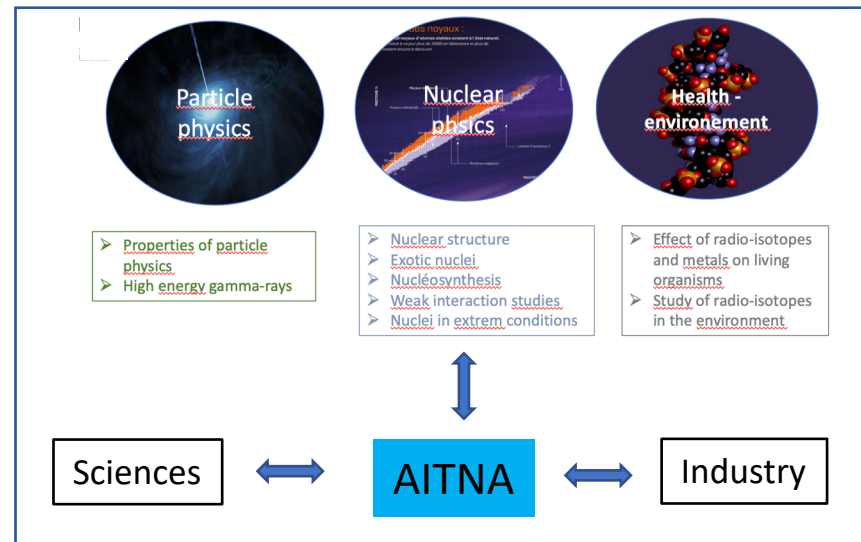
7 mars 2023



AITNA : Analysis, Irradiation et Trace elements in Nouvelle Aquitaine

Support to scientific activities of LP2I

- 3 facilities (AIFIRA, PRISNA, PIAGARA)
- Measure of trace elements for stable or radioactif isotopes for solid, liquid or gaseous samples



AIFIRA



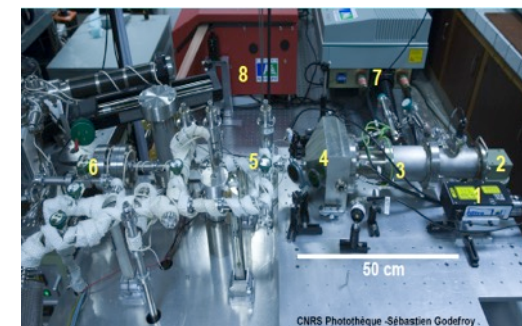
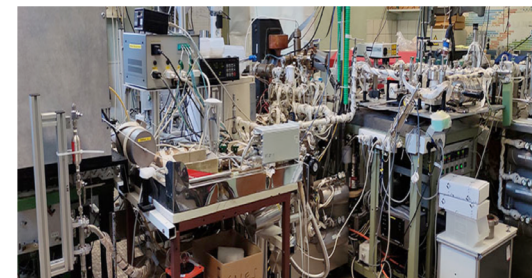
Accelerator 3.2 MeV H^+, D^+, He^+
5 beamlines
Nano/micro beams
Nuclear physics
Neutrons
Biology
Chimistry
Material sciences

PRISNA



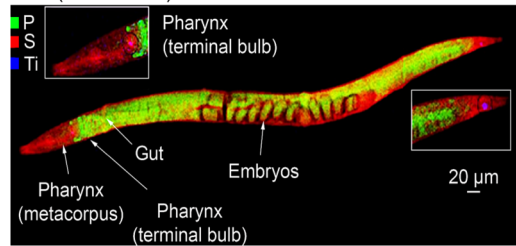
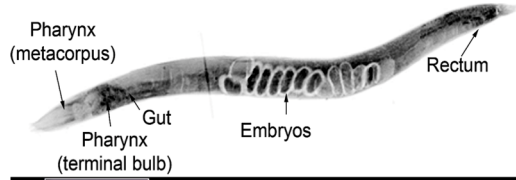
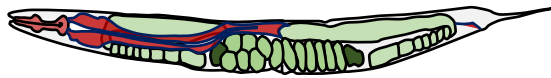
Low radioactivity facility
Material screening
Radon emanation
Environment
Datation (Bordeaux wine)
Applications

PIAGARA

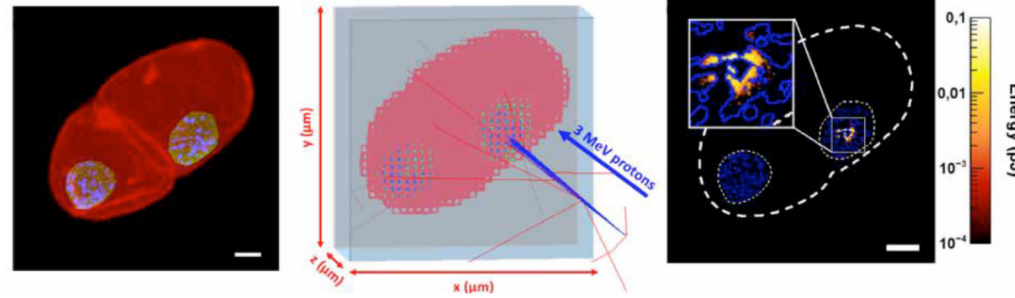


Rare gas measurement
Sensitivity Few thousand nuclei for Kr and Xe
Geochemistry
Datation
Environment

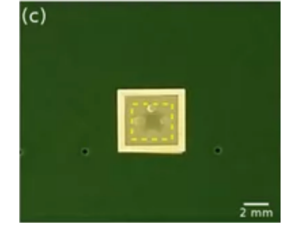
Caenorhabditis elegans



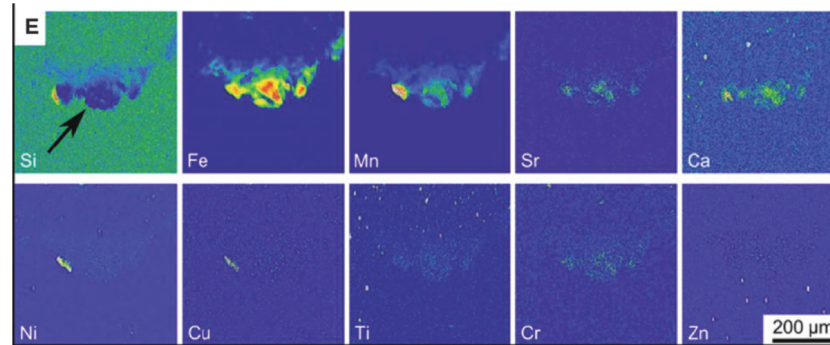
Chemical micro-analysis



Monte Carlo modelling, selective micro-irradiation and real-time monitoring of radiation-induced biological consequences at the organism level. **Groupe IriBio.**



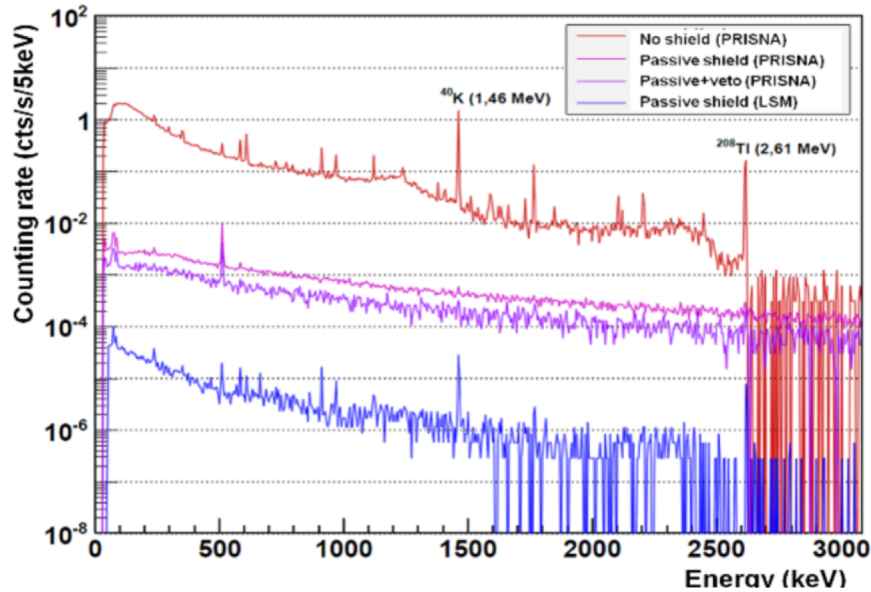
Diamond detector development
LP2i – CEA List - LPSC



PIXE analysis of sediments



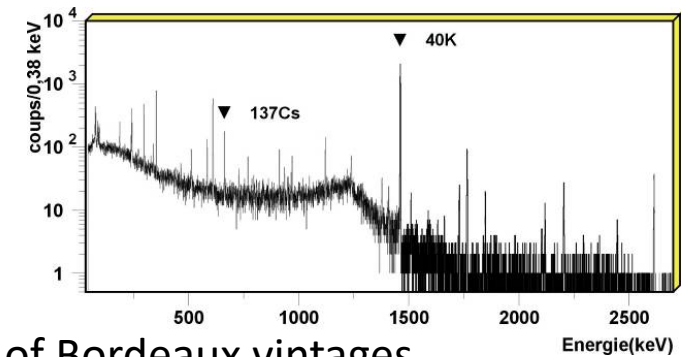
Identification of Bordeaux vintages



Material selection for SuperNEMO



Radon emanation
Measurement of
JUNO PMT



Control of Bordeaux vintages

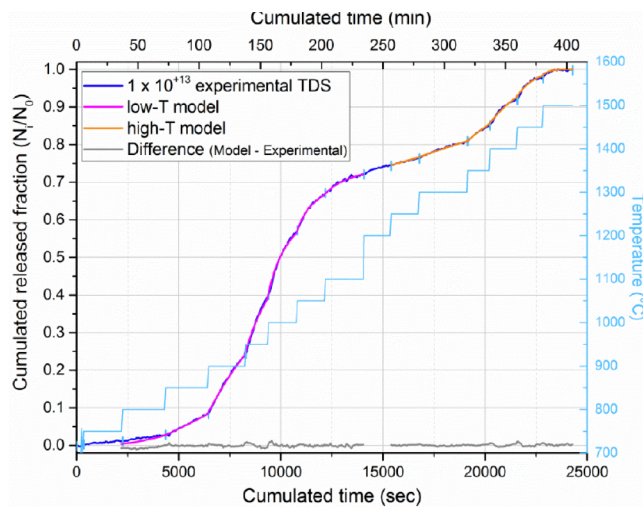


Figure 36 Courbe de relâchement d'He implanté à la fluence de 1×10^{13} at.cm⁻² dans un B₄C larges grains pour des isothermes successives croissantes

He diffusion in boron carbide

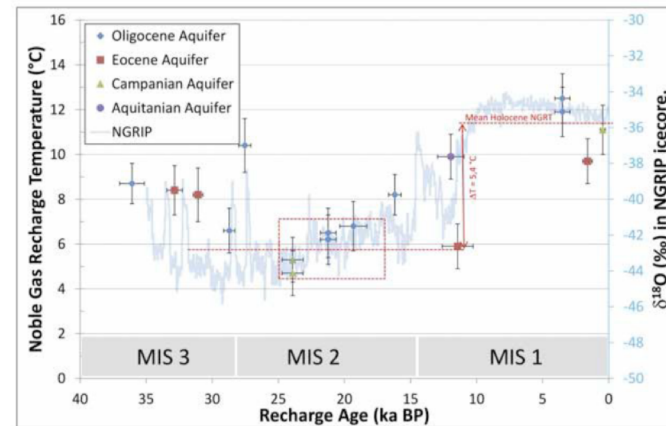
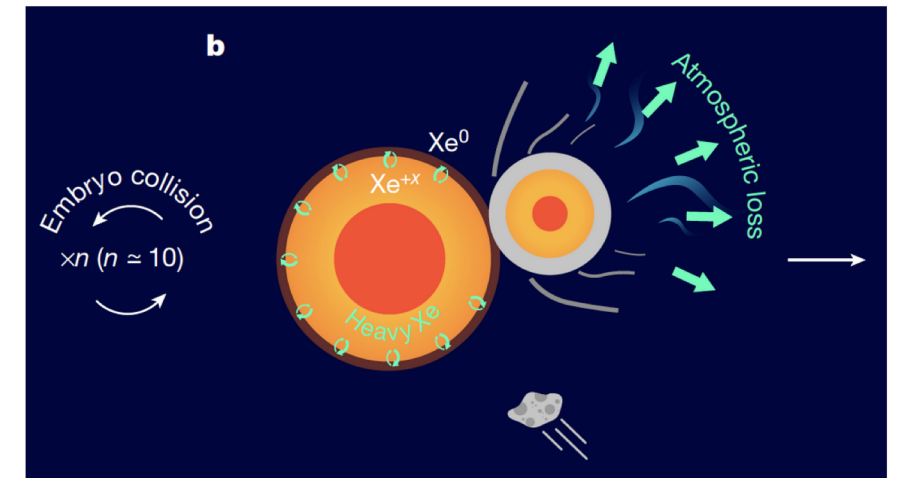


Figure 37: Evolution des paléotempératures au Nord du Bassin Aquitain établies à partir des mesures de gaz nobles. Le profil de référence NGRIP établi à partir des rapports isotopiques de l'oxygène dans les glaces groenlandaises est présenté pour comparaison.

Measuring paleo-temperatures in Aquitaine

L'histoire précoce de la Terre dévoilée grâce au paradoxe du xénon manquant

Jun 29, 2022 | ACTUALITÉS



Enigma of the missing Xenon on Earth

Have a nice meeting

and

Enjoy your stay in Bordeaux