

GANNIL

GANIL

Welcome at EuNPC2025



European Nuclear Physics Conference 2025



GANIL

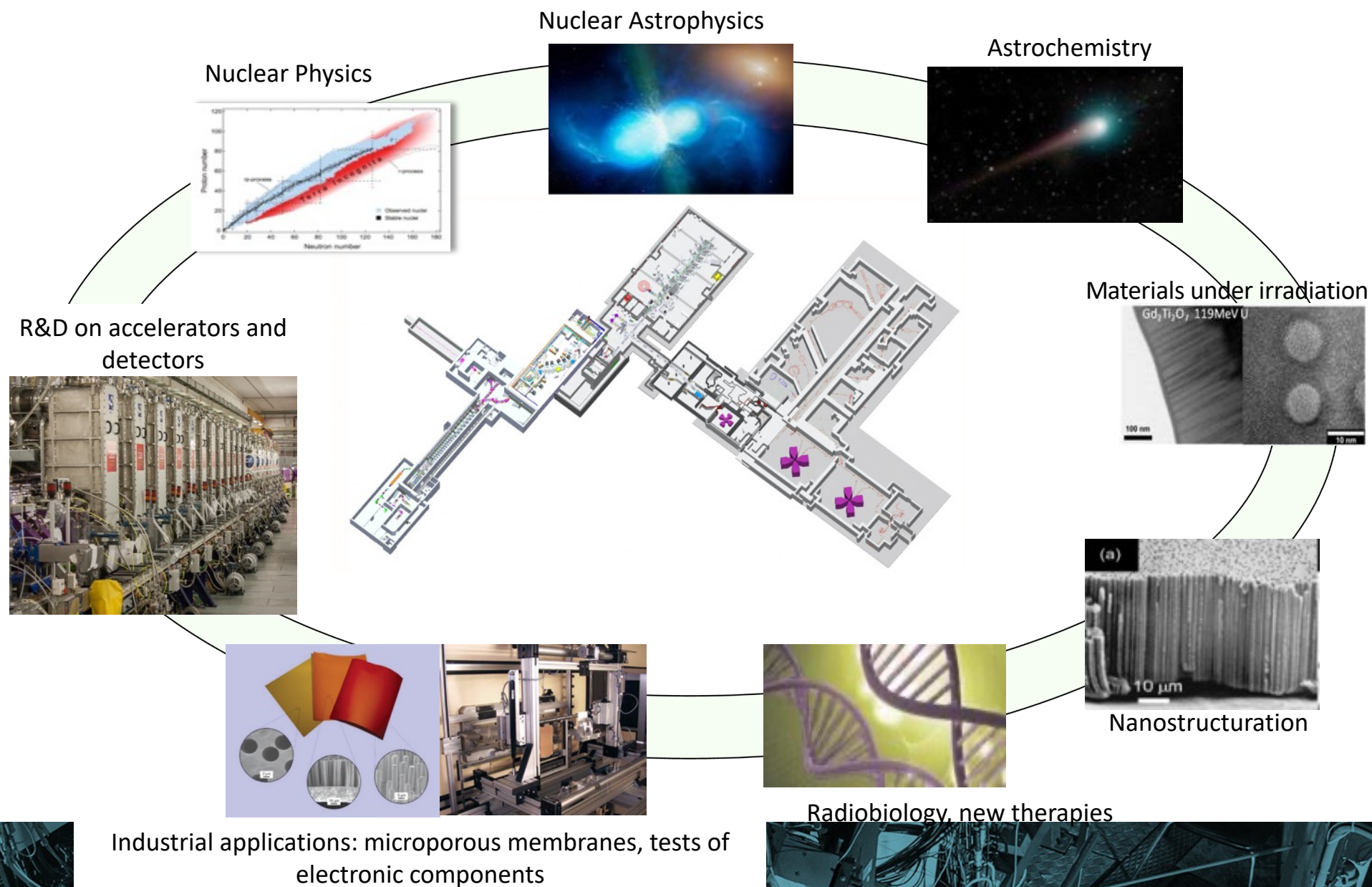
Latest news from GANIL

An aerial, high-angle photograph of a complex scientific facility, likely a particle accelerator or nuclear reactor. The image shows a dense network of metal structures, pipes, cables, and large cylindrical tanks. The entire scene is overlaid with a semi-transparent blue filter. The text 'GANIL' is prominently displayed in the upper center in a white, bold, sans-serif font.

GANIL

Scientific programs at GANIL

A multi-user pluridisciplinary laboratory



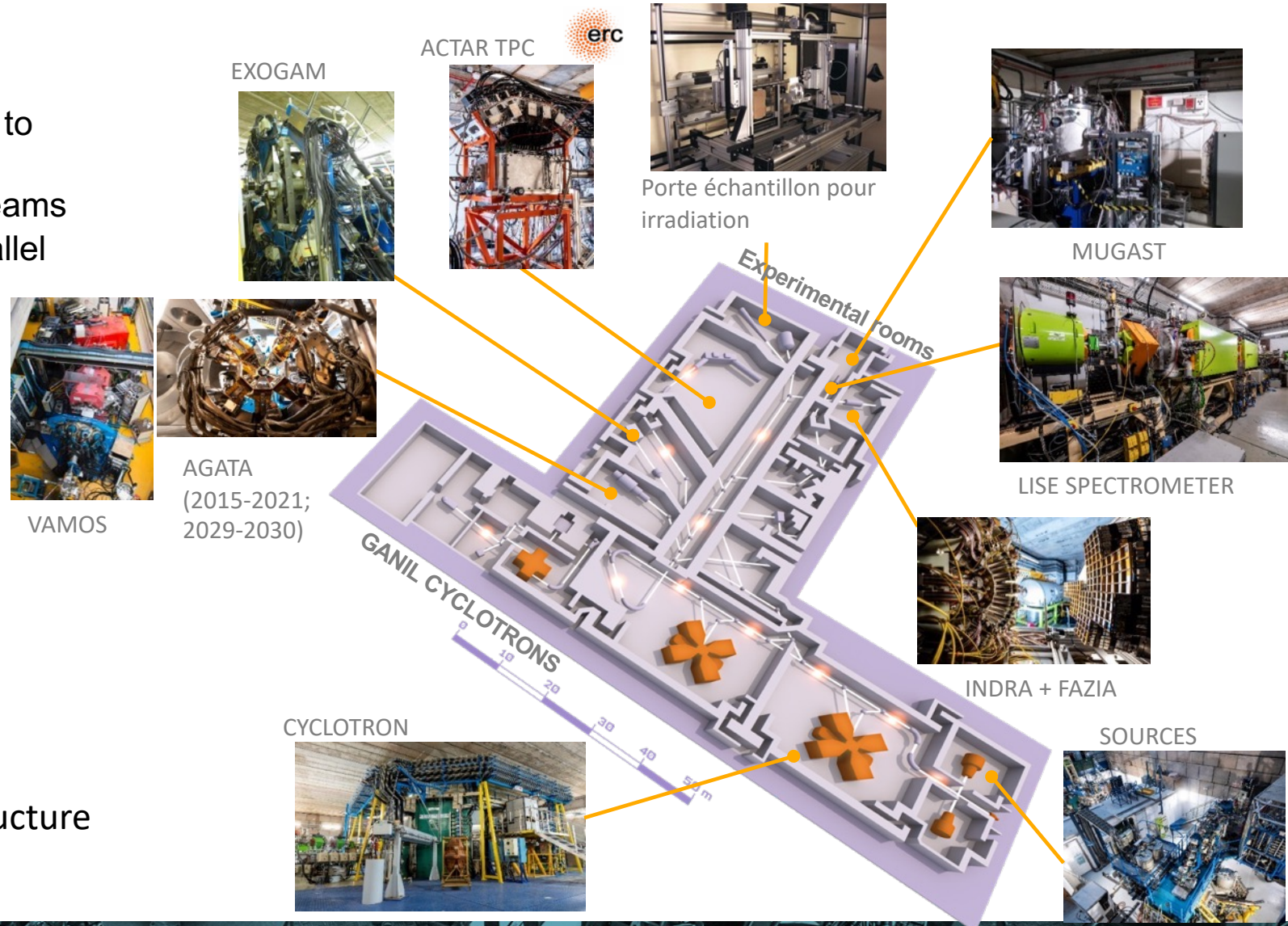
An aerial, high-angle photograph of the GANIL particle accelerator facility. The image shows a complex network of metal structures, pipes, and large cylindrical tanks, all interconnected by a dense web of cables and hoses. The entire scene is overlaid with a semi-transparent blue filter. The text 'GANIL' is prominently displayed in the upper center in a white, bold, sans-serif font.

GANIL

GANIL installations and projects

GANIL cyclotrons and experimental rooms

- 5 cyclotrons
- Stable beams: ^{12}C à U
- Energy : from <1 MeV/u up to 95MeV/u
- SPIRAL1 radioactive ion beams
- Up to 4 experiments in parallel

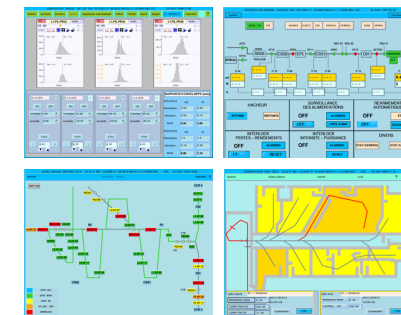


- Fission
- EOS
- Exotic Nuclei clusters
- Exotic Nuclei Shell structure
- Exotic radioactivities

CYREN : a renovation ambition for GANIL to maintain scientific objectives at the best level



- cyclotrons
- Infrastructure
- Safety supervision



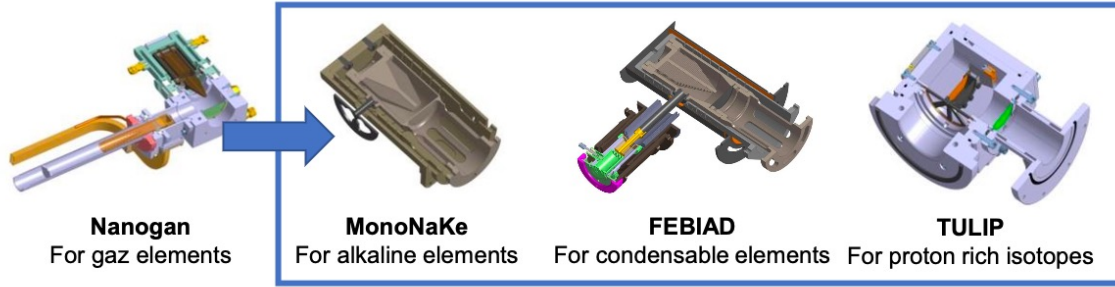
*Minister for Research
confirmed an
endowment of **40 M€**
for GANIL projects:
CYREN, DESIR, NEWGAIN*

- Objective n°1:
Keep the installation in good operational conditions for the next 20 years
- Objective n°2:
Optimise human resources for maintenance and further renovation

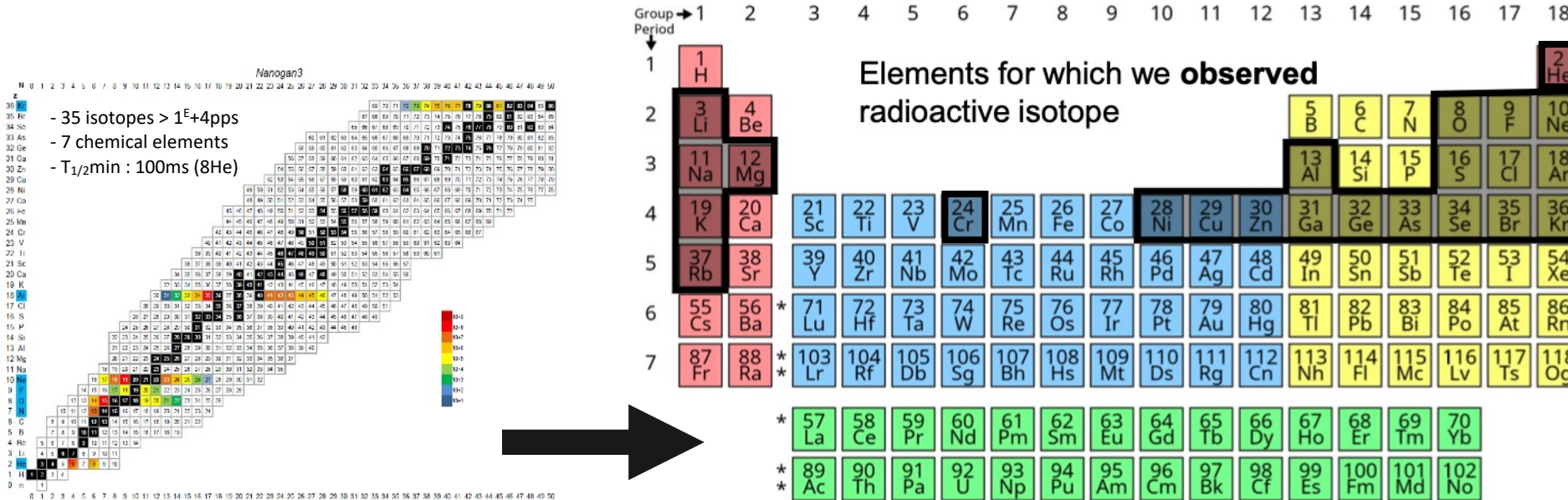
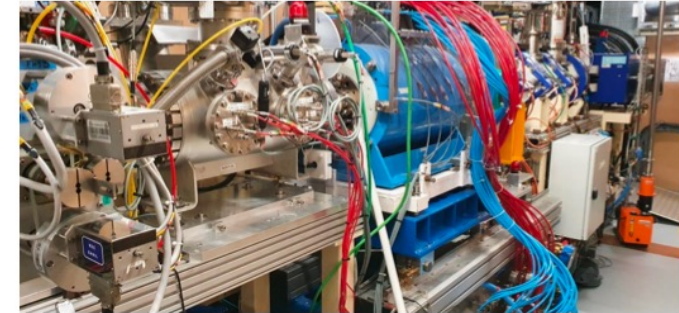
SPIRAL1 upgrade

- New target Ion Source Systems (FEBIAD)

New 1+ sources



- The charge breeder

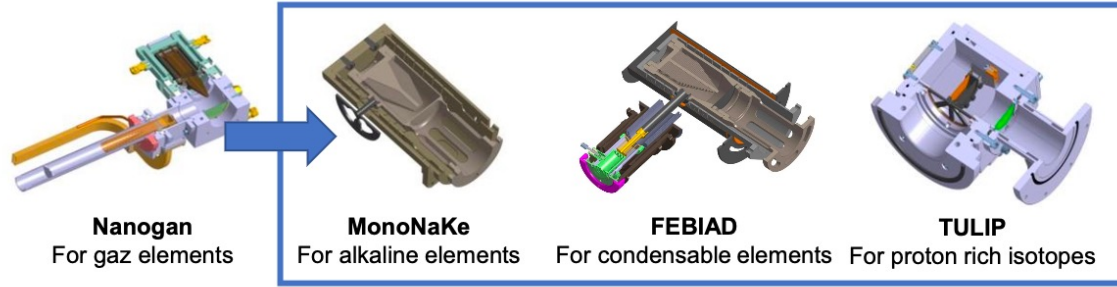


50 new isomers/isotopes
With intensities suitable for
acceleration

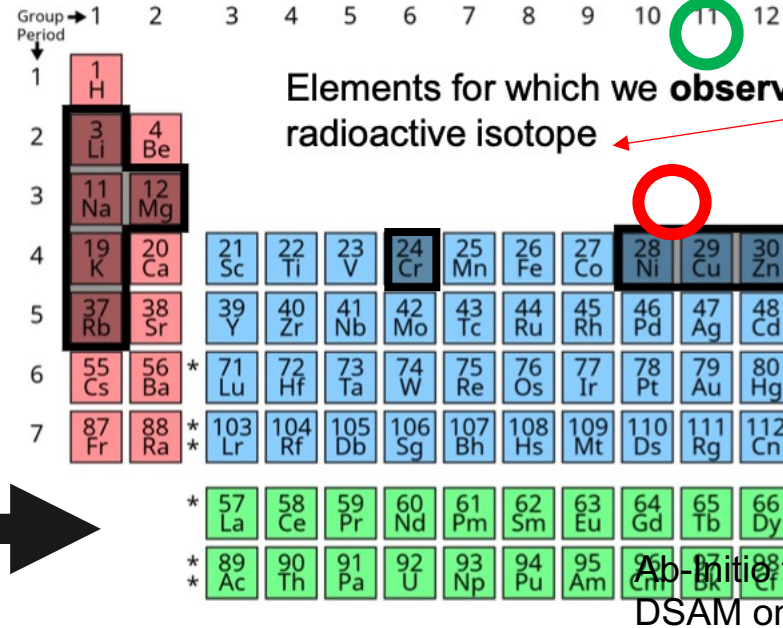
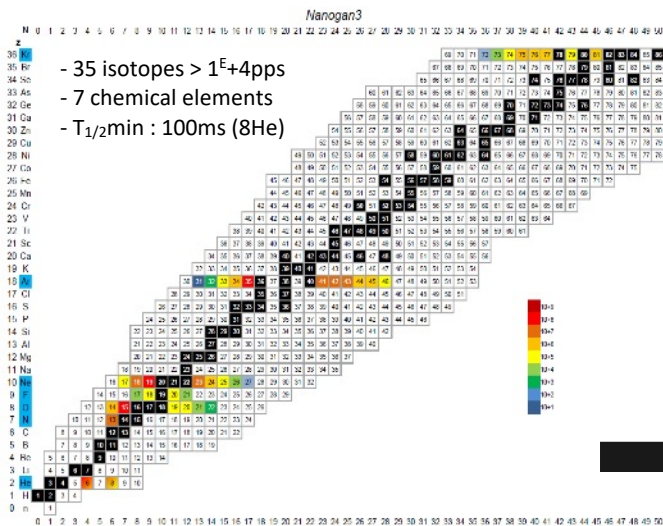
SPIRAL1 upgrade

- New target Ion Source Systems (FEBIAD)

New 1+ sources



AGATA campaign @GANIL
2029-2030



SPIRAL2 LINAC and the new experimental rooms

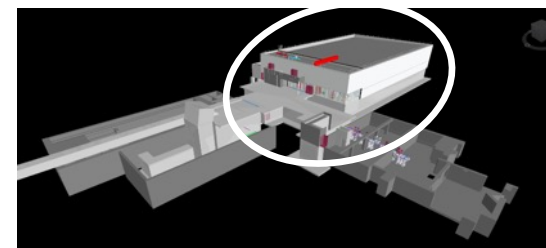
EXPERIMENTAL ROOM NFS
(NEUTRONS FOR SCIENCE)



Convertor room



Time of Flight room



EXPERIMENTAL ROOM
DESIR
(Desintegration,
Excitation and Storage
of Radioactive Ions)

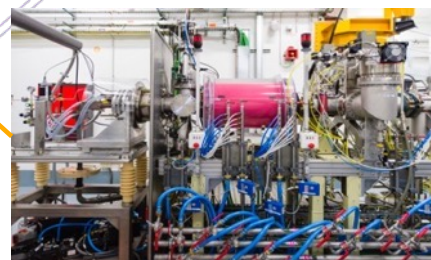


LINEAR accelerator (LINAC)

**LINAC in operation
since 2019**



EXPERIMENTAL ROOM S3
(SUPER SEPARATOR
SPECTROMETER)

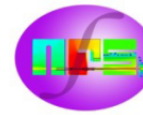


ION SOURCE



High intensity beams :
5 mA, 33 MeV protons
5 mA, 40 MeV deuterons
1 mA, <14,5 MeV/u heavy ions

The Neutrons For Science facility



NFS is the first operational experimental area of SPIRAL2 at GANIL

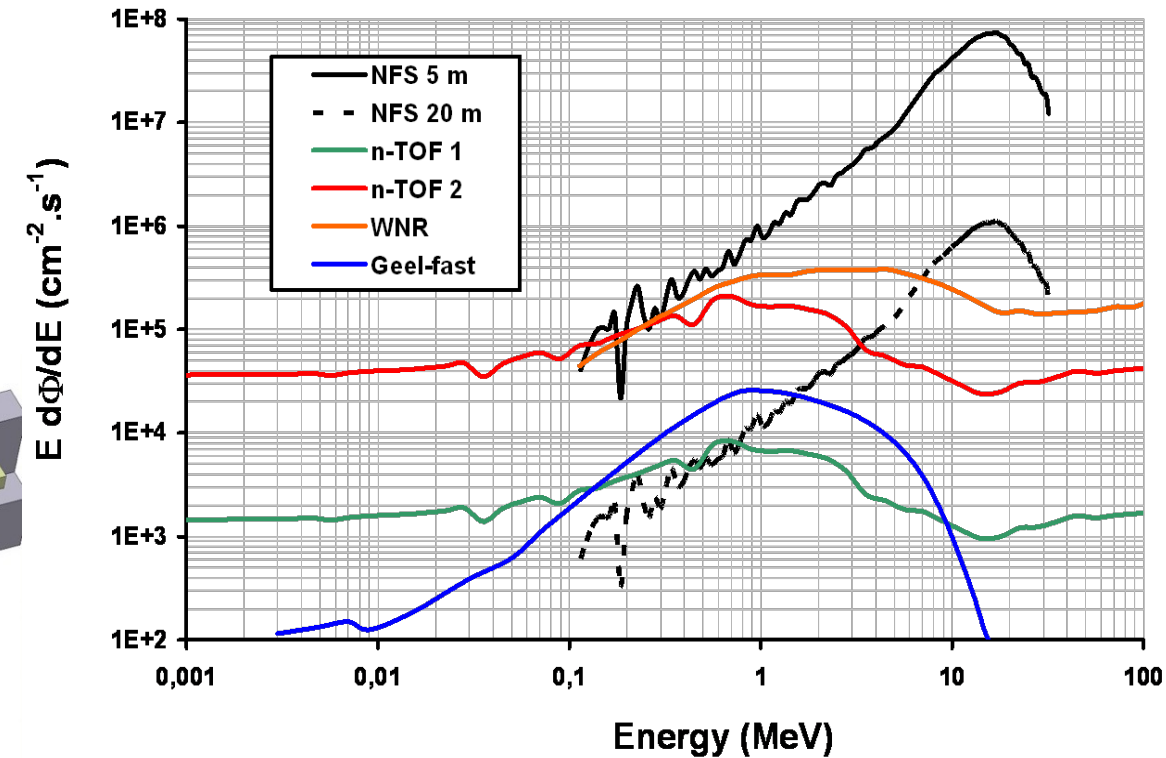
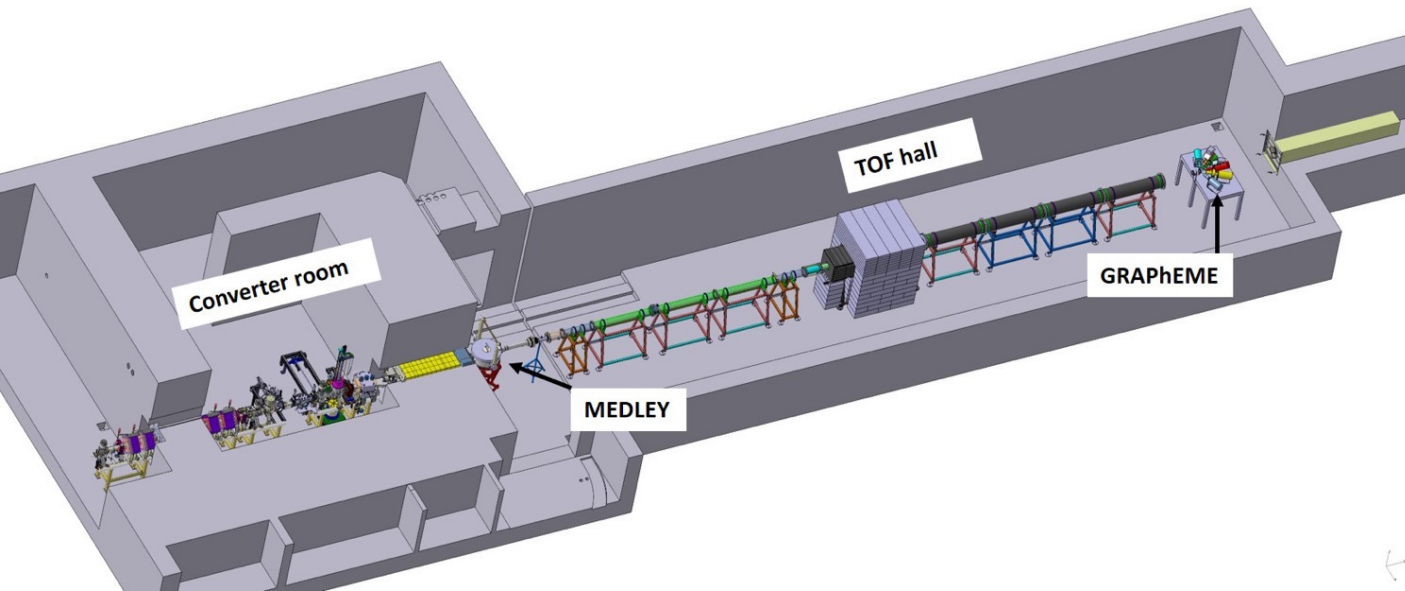


Physics case

- ☐ Fundamental physics
- ☐ Astrophysics
- ☐ New generation of reactor
- ☐ Fusion technology
- ☐ Radioisotopes production for medical applications
- ☐ Biology (cells irradiation..)
- ☐ Development and characterization of new detectors
- ☐ Study of the single-event upsets

International collaboration

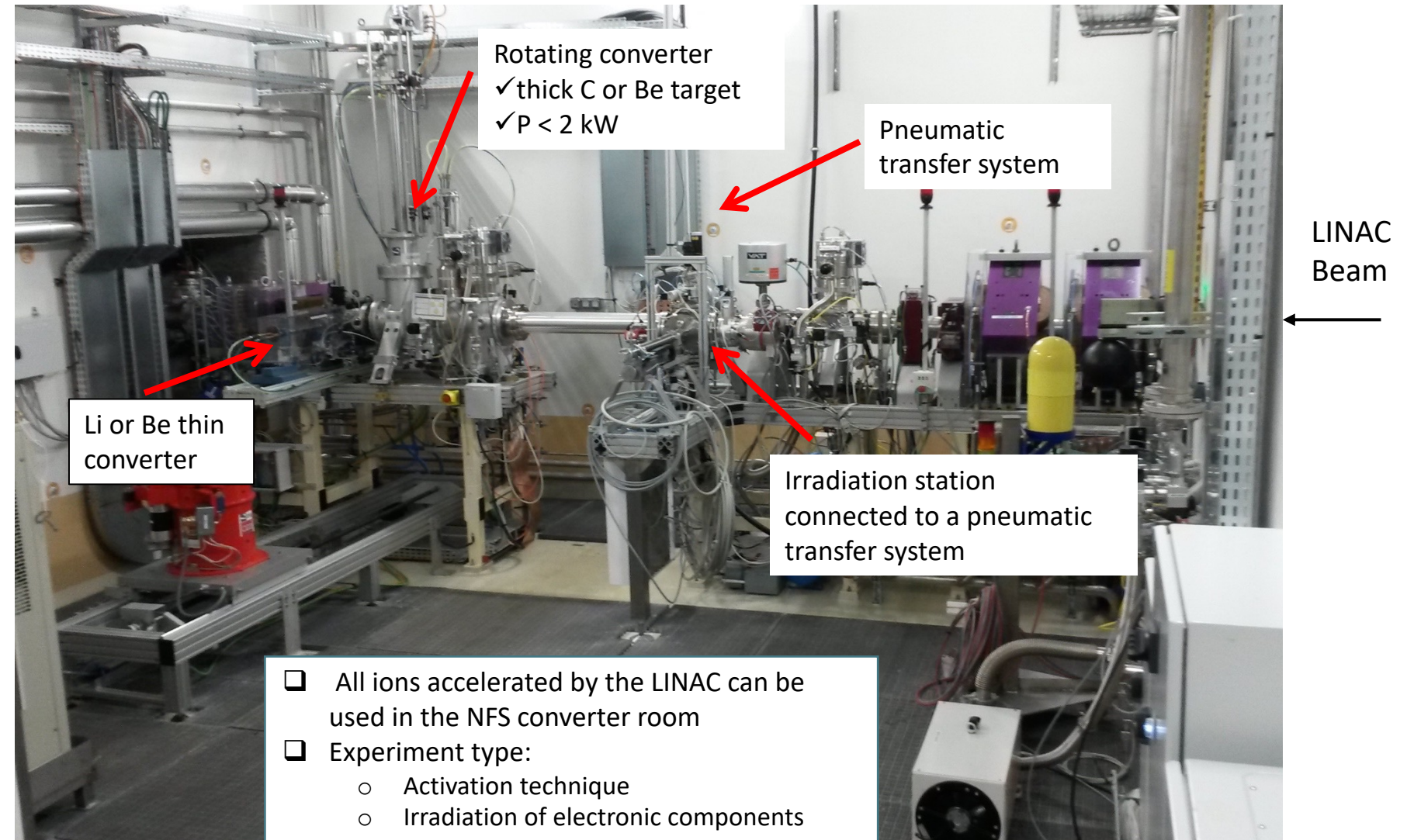
50 physicists
15 laboratories
6 partners



High neutron flux and good complementarity with other facilities

NFS : Converter room

- Neutron production
- Light-ion irradiations



NFS : TOF Hall



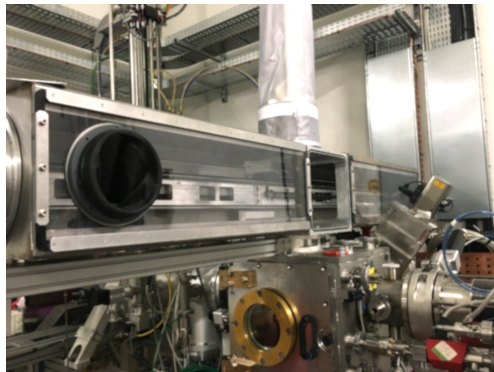
Some NFS Experiments



- Pygmy dipole resonance in ^{140}Ce using the $(n,n'\gamma)$ reaction, Marine Vandebrouck et al
- Light ions production studies with MEDLEY at the NFS facility, Diego Tarrio et al
- $(n,xn\gamma)$ reaction cross section measurements for nuclear energy, M. Kerveno et al
- REPARE project: production of ^{211}At for alphatherapy, Gilles de France et al



- Shedding new light on the structure of ^{56}Ni using $(n,3n)$ reaction at NFS, E. Clement et al



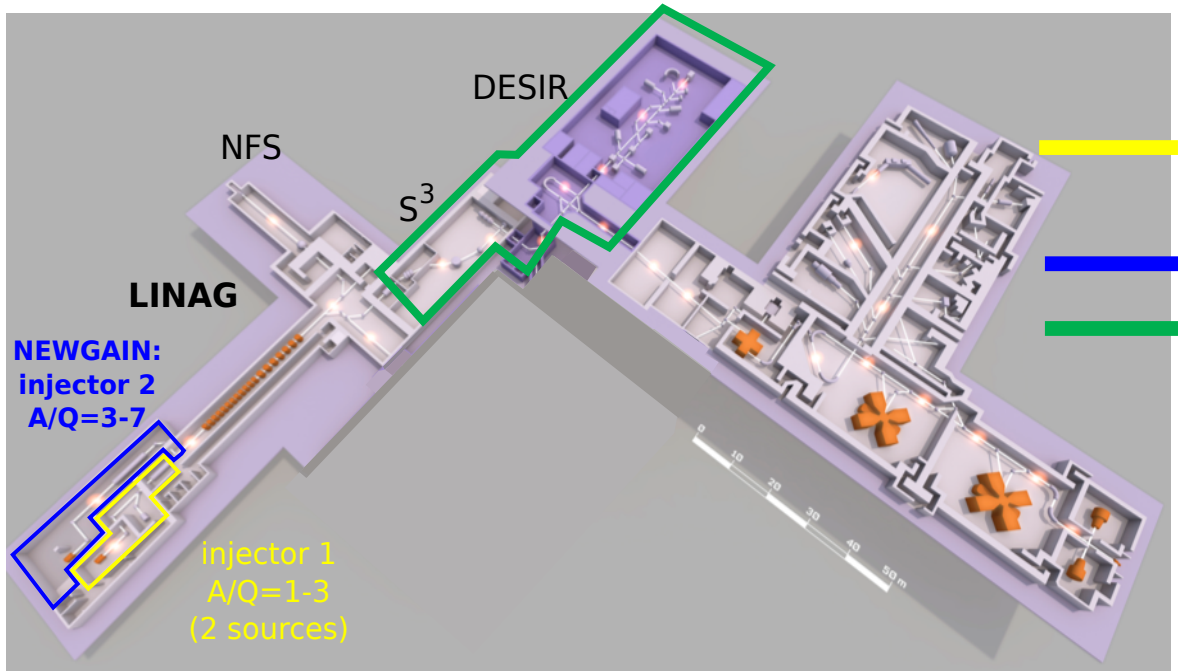
REPARE



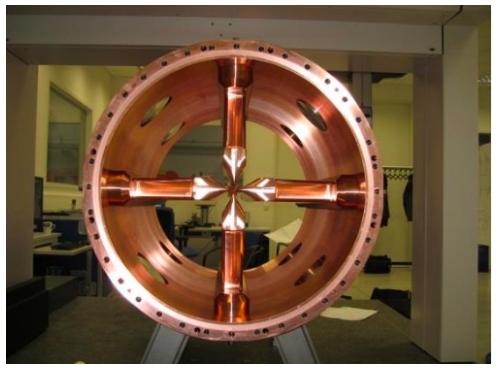
MEDLEY

- ^{235}U fission fragment study with FALSTAFF at NFS, D. Doré et al.

NEWGAIN : New GANIL Injector



Existing
NEWGAIN
Main User



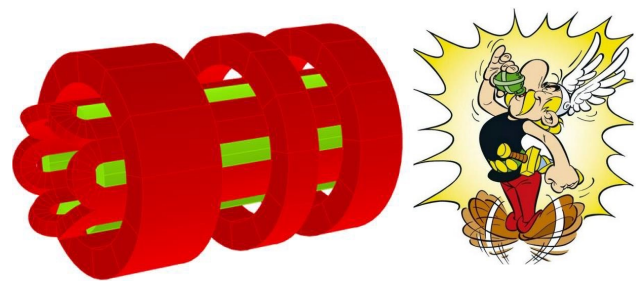
	beam intensities	injector1 2023	2028	(injector2) ≥ 2030
Ions	Intensity (pμA) Phoenix V3 RFQ A/Q≤3	Intensity (pμA) Phoenix V3 RFQ A/Q≤7	Intensity (pμA) SC Ion Source RFQ A/Q≤7	
¹⁸ O	80	*	375	
¹⁹ F	>15	>40	>40	
³⁶ Ar	16	70	45	
⁴⁰ Ar	3.6	70	45	
³⁶ S	2.3	*	*	
⁴⁰ Ca	2.9	10	20	
⁴⁸ Ca	1.2	10	20	
⁵⁸ Ni	1.1	4	8	
⁸⁴ Kr	0.1	10	20	
¹³⁹ Xe	0.001	7	>10	
²³⁸ U	<<0.001	0.1	6	

Measured

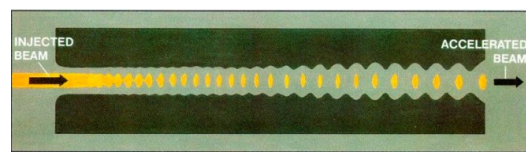
Estimated

* -> no estimation

World-record intensities



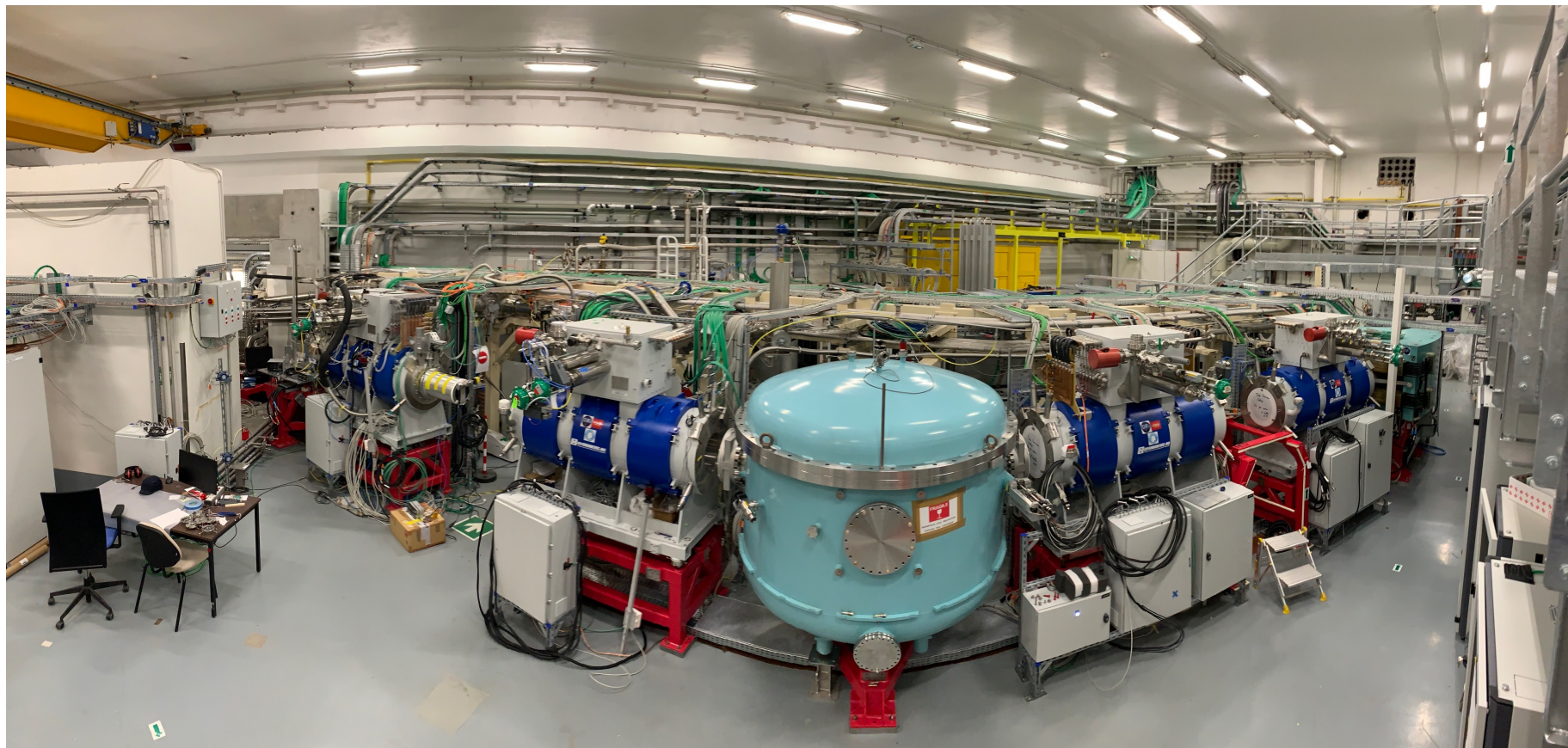
Source supraconducting ASTERICS



RFQ for heavy ions



S³ : Super Separator Spectrometer



A spectrometer with state-of-the-art performances dedicated to rare event studies in nuclear physics

Dripline of protons and N=Z nuclei
Nuclear structure
 π - ν interaction
Shape coexistence
Exotic decay
Rp processes in astrophysics
Fundamental interaction

S³-LEB

S³-LEB
SIRIUS

Fusion-evaporation
(Multi-)nucleon Transfer

Heavy and super-heavy elements
The limits of nuclear existence
New Shell closure
Nuclear structure
Isomers, shapes and moments
Octupolar deformation
Reaction mechanisms
Atomic properties
Relativistic effects and position in the periodic table



First beam on target, November 2024



On 21 November 2024, the first milestone in the commissioning of GANIL's new spectrometer, the Super Spectrometer Separator S3, was successfully achieved.
Beam $^{40}\text{Ar}1^{4+}$ intensity 80uAe (close to the world record)



BPM successfully optimized

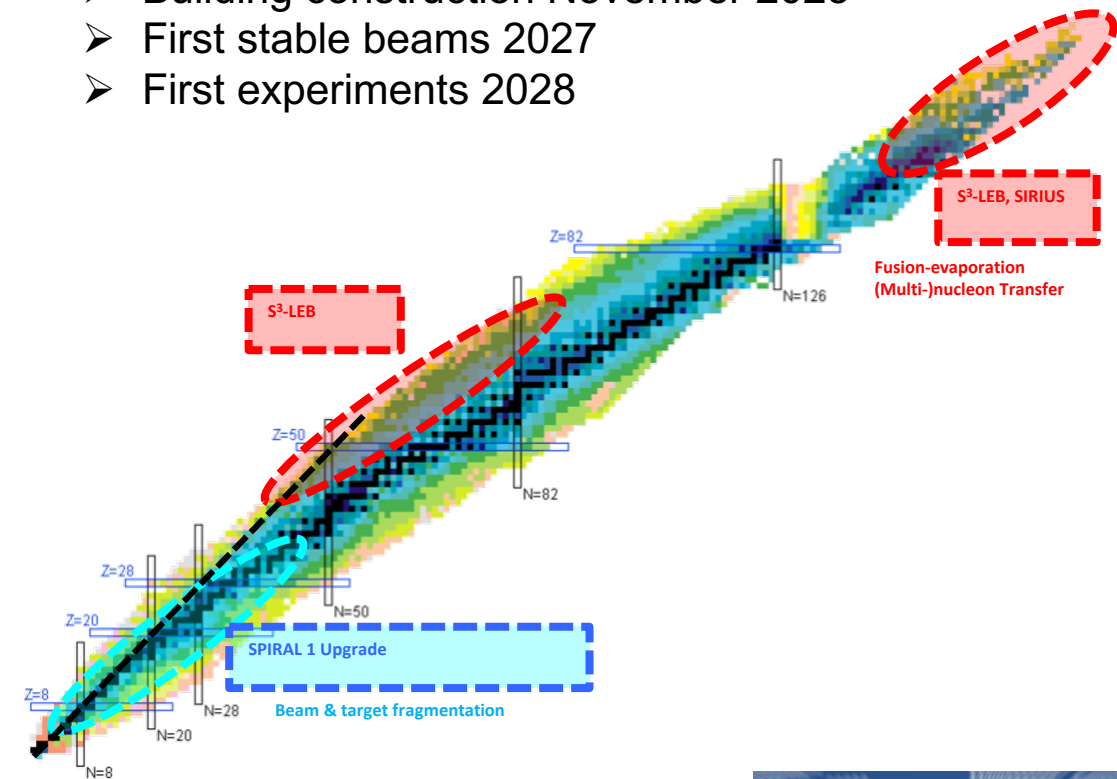
Preparation for the spectrometer's 'optical' commissioning in December 2025
First experiment 2026

DESIR

Decay, Excitation, Storage of Radioactive Ions



- Site inauguration Novembre 2023
- Building construction November 2025
- First stable beams 2027
- First experiments 2028



- Beams from SPIRAL1 and S3
- Important beam preparation and purification capabilities
- High resolution and high precision experiments
- Studies of fundamental properties of nuclei: masses, lifetimes, decay modes, spin, quadrupolar moments...
- Nucleosynthesis, Fundamental interactions, study of weak interaction

- Scientific aperture Contribution to ESPPU



DESIR

Decay, Excitation, Storage of Radioactive Ions



Experimental hall



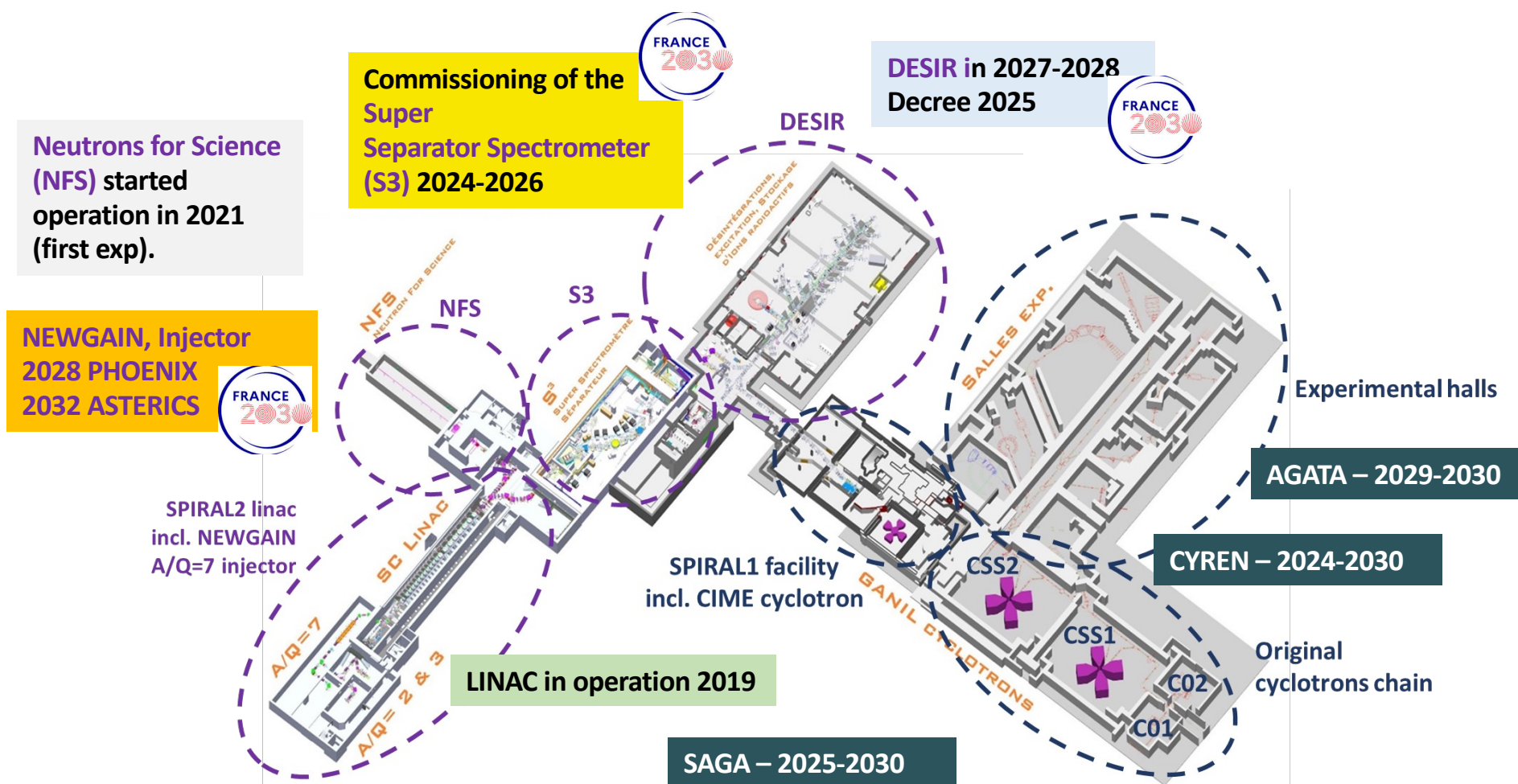
Acquisition room



High resolution spectrometer room



GANIL Horizon 2030



International conferences



Deauville 17-22 may 2026 : 1500 participants
<https://www.ipac26.org/>



European Nuclear Physics Conference 2025

Caen 25-30 september 2025 : 400 participants
<https://indico.in2p3.fr/event/30430/>

And INPC 2028 in Deauville !!!!



Thank you for your attention

