

From prospective to realisation

International expert committee for the future of GANIL

Chair by: Michel SPIRO

2020 Call for contributions

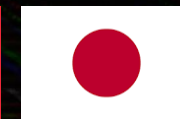
4 detailed scientific reports

Discussions with local actors

1 Final report “Vision for the future of GANIL”

3 main steps

Maria Jose Garcia Borge (CSIC, Spain)
Paolo Giubellino (GSI, Germany)
Ulli Koester (ILL, France)
Hiroyoshi Sakurai (Riken, Japan)
Boris Sharkov (JINR, Russia)
Brad Sherill (MSU, USA)
Michel Spiro (Chair)
Johanna Stachel (U. of Heidelberg)



4 questions to answer:

- What is the position of GANIL in its local and regional landscape in regards to the fundamental and applied science?
- Which place is there for GANIL in a future, regarding to the fundamental and applied nuclear physics research on the scientific world map?
- What place should GANIL fulfil regarding to the associated applied science in France and in Europe?
- Which evolutions are possible ?



4 detailed reports were issued

- Electron scattering on radioactive ions at GANIL
- Post-accelerated radioactive ion beams
- A New Interdisciplinary Irradiation at SPIRAL2 Phase 1
- Needs and recommendations for interdisciplinary research at GANIL

Propositions made:



Step 1

- Deployment of : S3, DESIR, NEWGAIN
- Maintain the cyclotron installation → CYREN project
- Optimal operation of cyclotrons and LINAC
- 2nd beam line in the high energy area –

Step 2

- Increase the energy of Radioactive Ion Beams Re-acceleration
- Construction of a production zone for intense Neutron rich exotic Ions, including a third driver.
- New beam lines for applied science.

Step 3

- Construction of synchrotron or ERL for :
Electron-scattering on radioactive ions (e-RI)

Casemate for MNT reactions

Medical radioisotope production

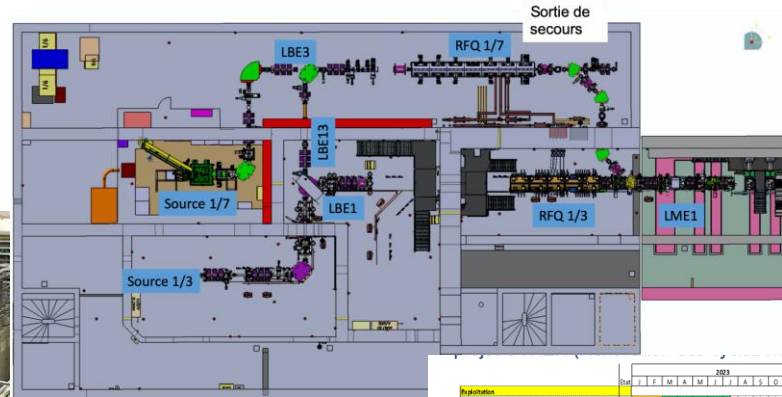
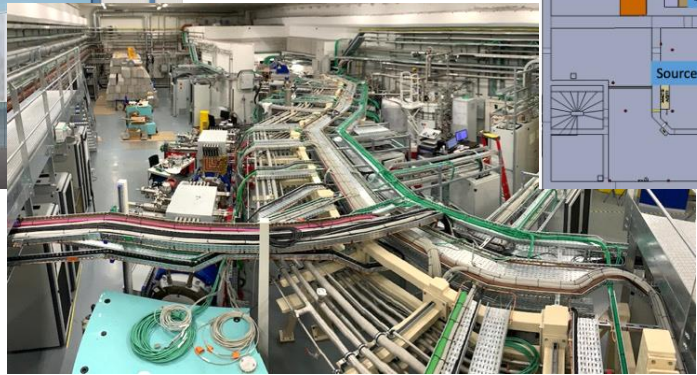
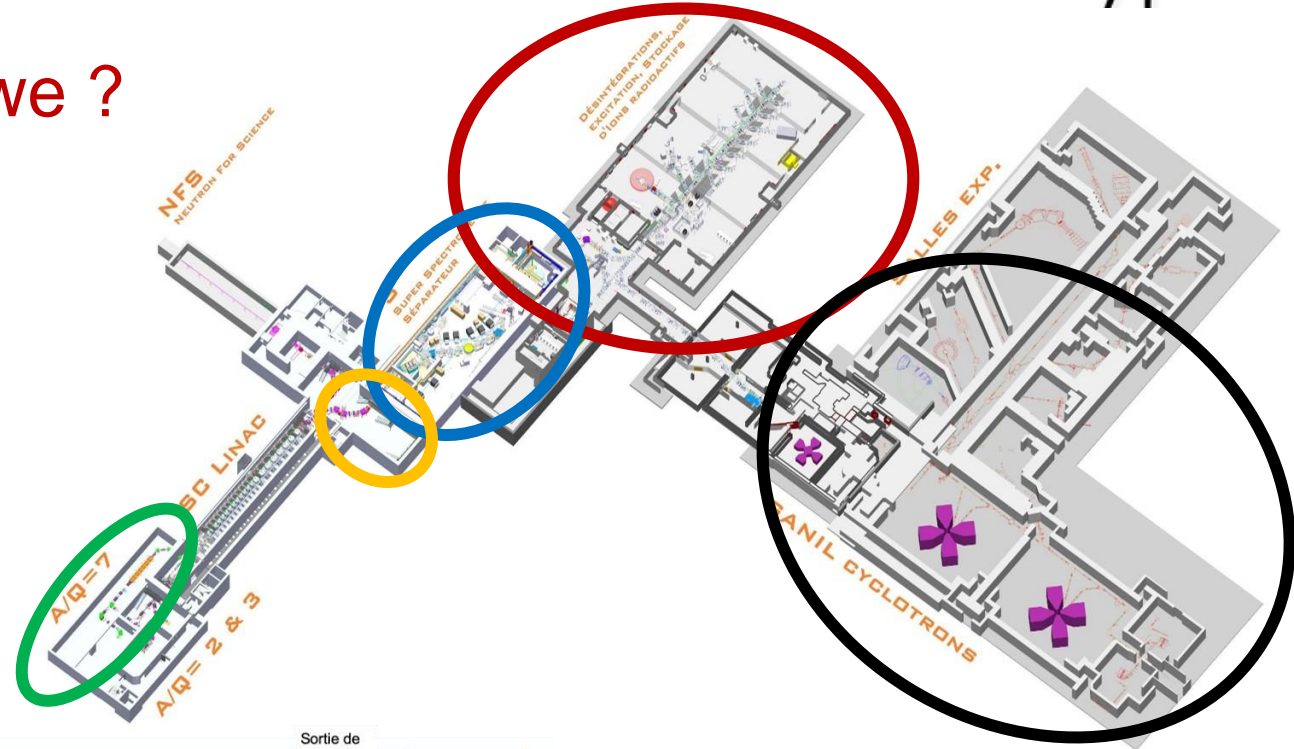
Enlarge the capabilities for interdisciplinary studies:

- more beam time
- new dedicated hall

Step 1

Step 1 : 2023-2030 - Where are we ?

- DESIR – construction to start in spring. First beams in 2027
- S3 – first beams in 2024.
- NEWGAIN 2028/2030
- Going from 7 (4,5/2,5) months operation → 12,5 (6/6,5) months operation.
- Renovation of the cyclotrons:
 - White book in 2021 for cyclotrons and experimental areas
 - Pre-project in 2022 including full cyclotron infrastructure
 - Presentation for budget 2023
- 2nd beam line in LHE



Evénement	2023	2024	2025	2026	2027	2028	2029	2030
Cyclotrons sur la base du calendrier CTM de référence	■	■	■	■	■	■	■	■
LINAC	■	■	■	■	■	■	■	■

GANIL		LIVRE BLANC DES RENOVATIONS INVENTORIEES POUR LES CYCLOTRONS ET LEURS EQUIPEMENTS PERIPHERIQUES (*)		GANIL-06949-V1
Division Opérations et Développements				Page 1/78
Livres Blanc des Rénovations inventoriées pour les Cyclotrons et leurs équipements périphériques (*)				
(*) Hors servitudes générale				
Ind.	Date	Historique des modifications		
1	10/03/2022	Version initiale		
Rédacteur	Vérificateur	Vérificateur	Emetteur/Approbateur	
DDO	DDO	DDO	DDO	
C. BERTHE Chef de Division Adjoint DDO	PE. Bernaudin / Ph. Robillard Chefs du Groupe DVC	G. Normand Chef du Groupe GPA	H. Franberg-Delahaye Cheffe de Division DDO	
	M.H. Stodel / S. Leclair Chefs du Groupe GEF	M. Dubois Chef du Groupe GCS		

Renovation of the cyclotrons

Statement:

10 years Cyclotrons maintenance and refurbishment reduced to the strict minimum. GANIL manpower dedicated to : SPIRAL2 building then commissioning.

Aging ↗ Reliability ↘ Manpower for curative maintenance ↗

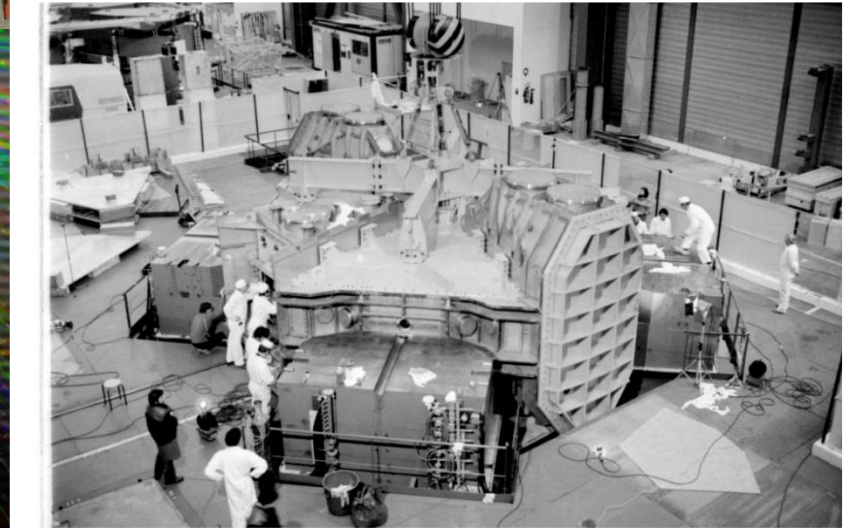
Working Group led by R. Clédassou (IN2P3) and P. Rebougeard (IRFU) :

- Strong recommendation to lead an ambitious refurbishment program to be started *as soon as possible*

Launch of the pre project CYREN : 17th march 2022

1: keep the facility in operational conditions for at least 20 years (Maintenance in Operating Conditions (MOC))

2 : to optimize manpower needed for maintenance after refurbishment



Cyclotrons et experimental caves

Power Supplies and Magnets
RF cavities and systems
Remote control
PLCs
Vacuum systems
Diagnostics
Production targets
Ions Sources

Infrastructures and utilities

Electricity Distribution
Cooling systems
HVAC
Buildings
Various networks (water, air, gas)
Computer Infrastructures

Safety / Security / Radioprotection Systems

Radioprotection devices (*radiation detectors, active dosimeters, gamma spectrometers, ...*)
Access Management System
Fire Safety System

CYREN – Cyclotron Renovation



Methodology

Working groups :
viability → aging → risk analysis → propositions

Scope: Full installation

Cyclotrons and experimental areas:

Conclusion:

2 scenarios - 2 budgets - 2 timelines

Implementation

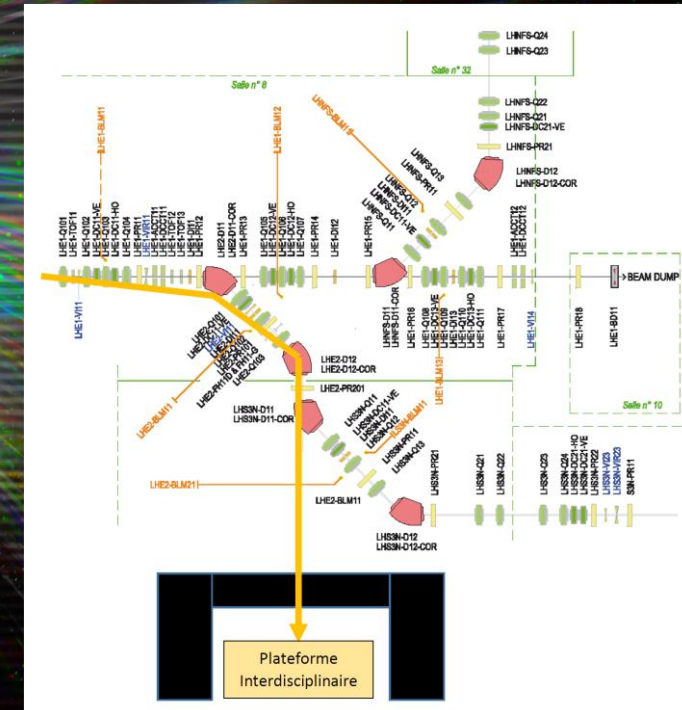
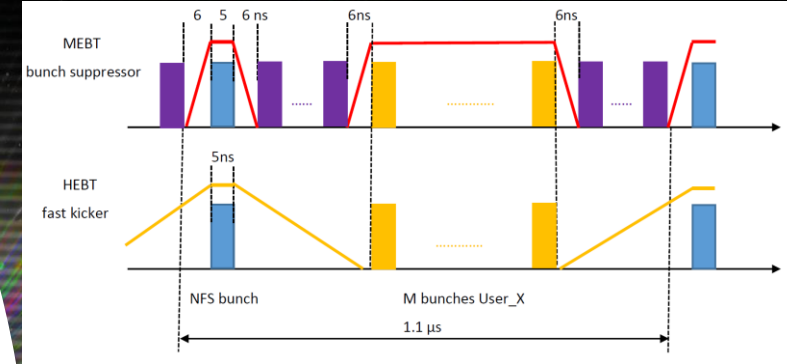
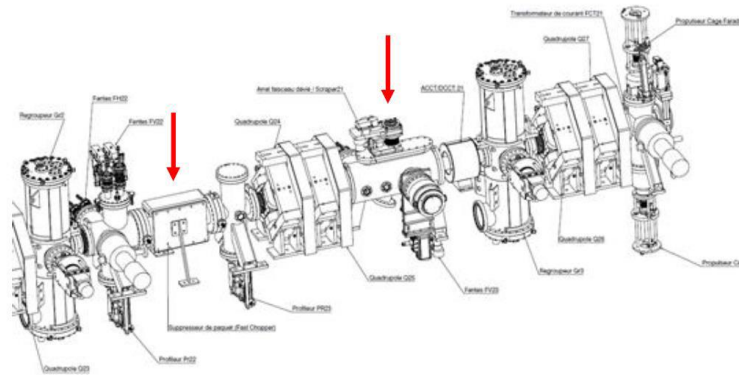
Budget under discussion
Time line: Call for tender to operation : 2024 – 2030
Facility available during renovations, with possible shut down during some phases.

TECHNICAL MOTIVATION AND OBJECTIVES

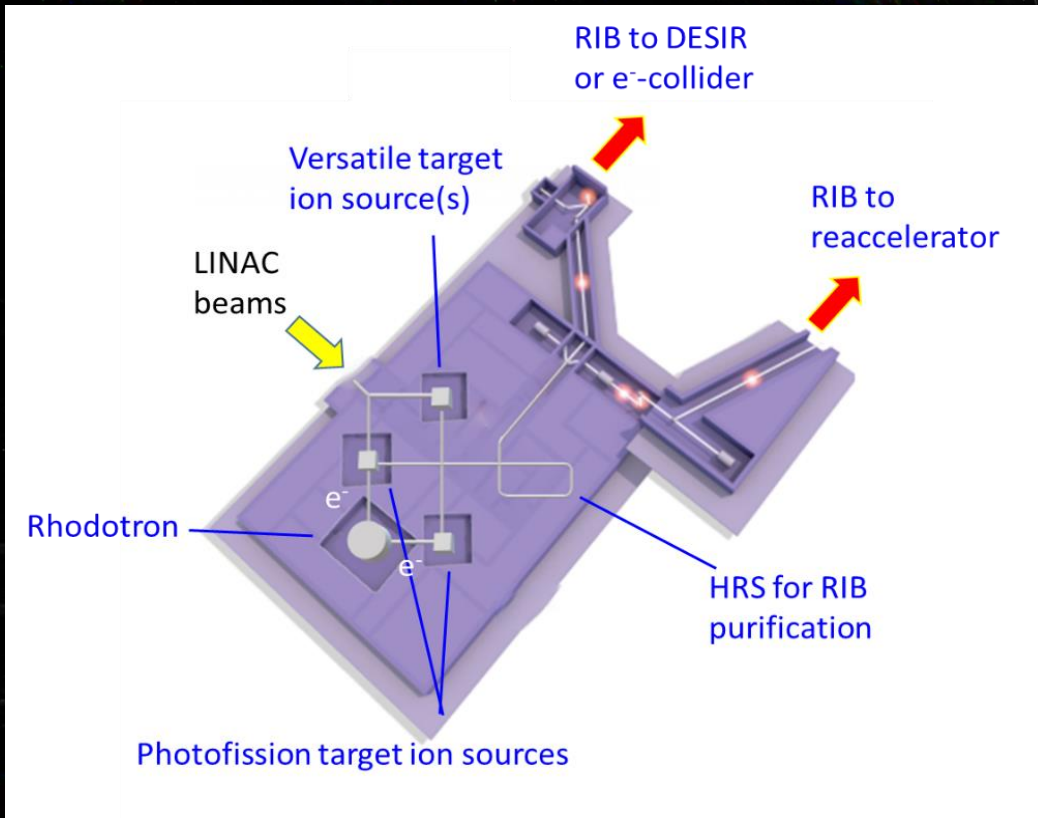
Step 1- Design studies on going.

Second beam line in the high energy area:

- Theoretically possible
- Enlarge the capabilities for interdisciplinary studies
- More beam time due to parallel operation
- new dedicated hall for interdisciplinary research



Step 2 and 3



A DEEPER LOOK INTO THE PRODUCTION BUILDING

Exotic beam production

Make full use of the deuteron beams from the LINAC

- Construction of a production zone for intense Neutron rich exotic ions

Making full use of $A/q=7$ beams (NewGAIN)

- Implementing a gas cell target station.

Rhodotron: a complementary driver

- Electron beam driver → complementary to existing drivers
- Industrial solution or unique design ?

Optimisation for beam time and possibilities for users

Grants the users to dispose intense ion beams of fission fragments.



An extension of the existing facility



Production building (R&D and technical design studies) :

- Target stations, Beam lines, Building design studies and construction

(Detailed design studies made during SPIRAL 2 phase 2)

Electron driver: (R&D and technical design studies) :

- Studies and construction

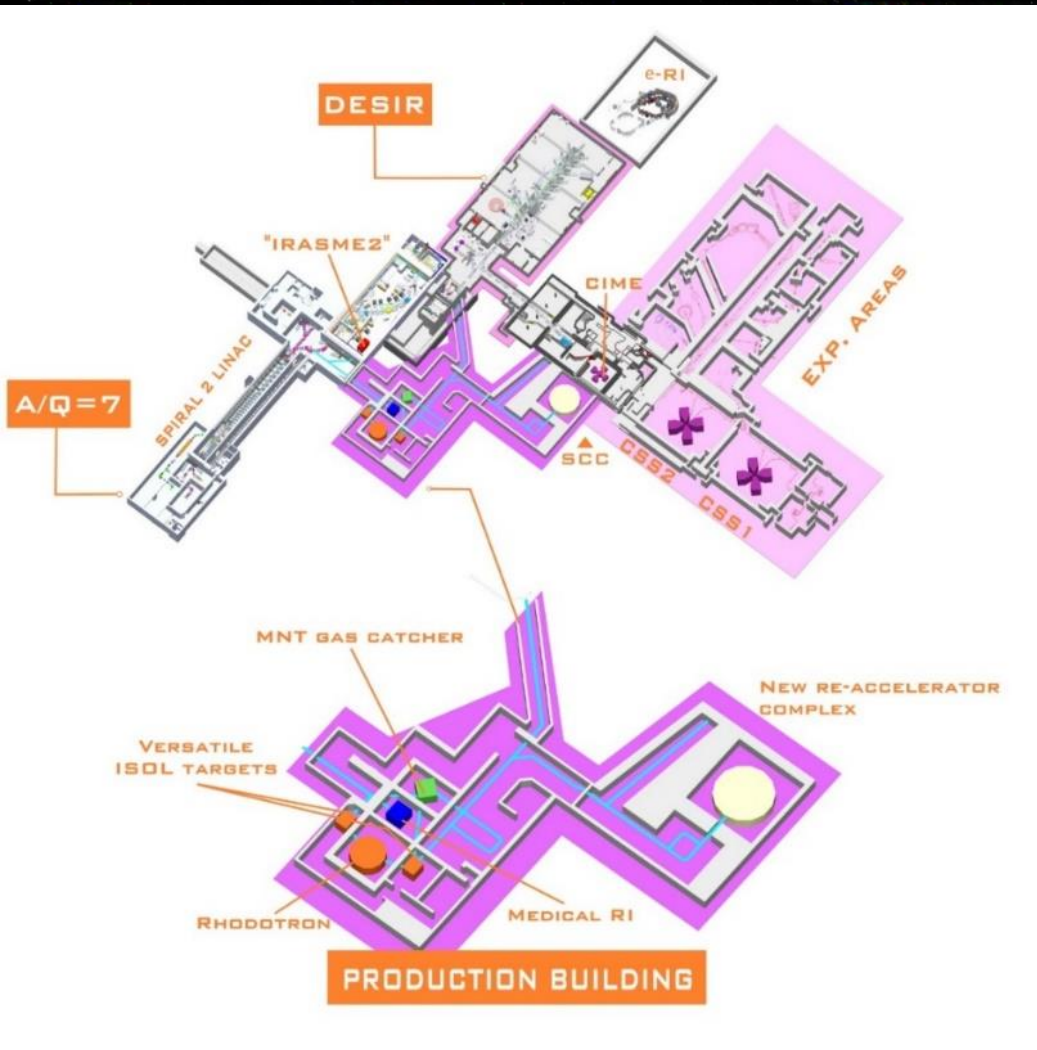
Reacceleration of the beams ~100 MeV / nucleon :

- Choice of technology, Technical design study, Adaptation of existing, experimental halls, Building design

Electron scattering:

- e-RI collider : Synchrotron or ERL for the long term future?
Where to implant it ?

New building/extension/re-use?



Project “vision for the future GANIL”



CEA and CNRS together with the direction of GANIL has given the mission to define the project in terms of:

- Define the priorities among the Scientific strategies presented by the expert committee.
- Define the technical needs, developments and infrastructure necessary to obtain the results.
- Make a budget estimation
- Propose a planning

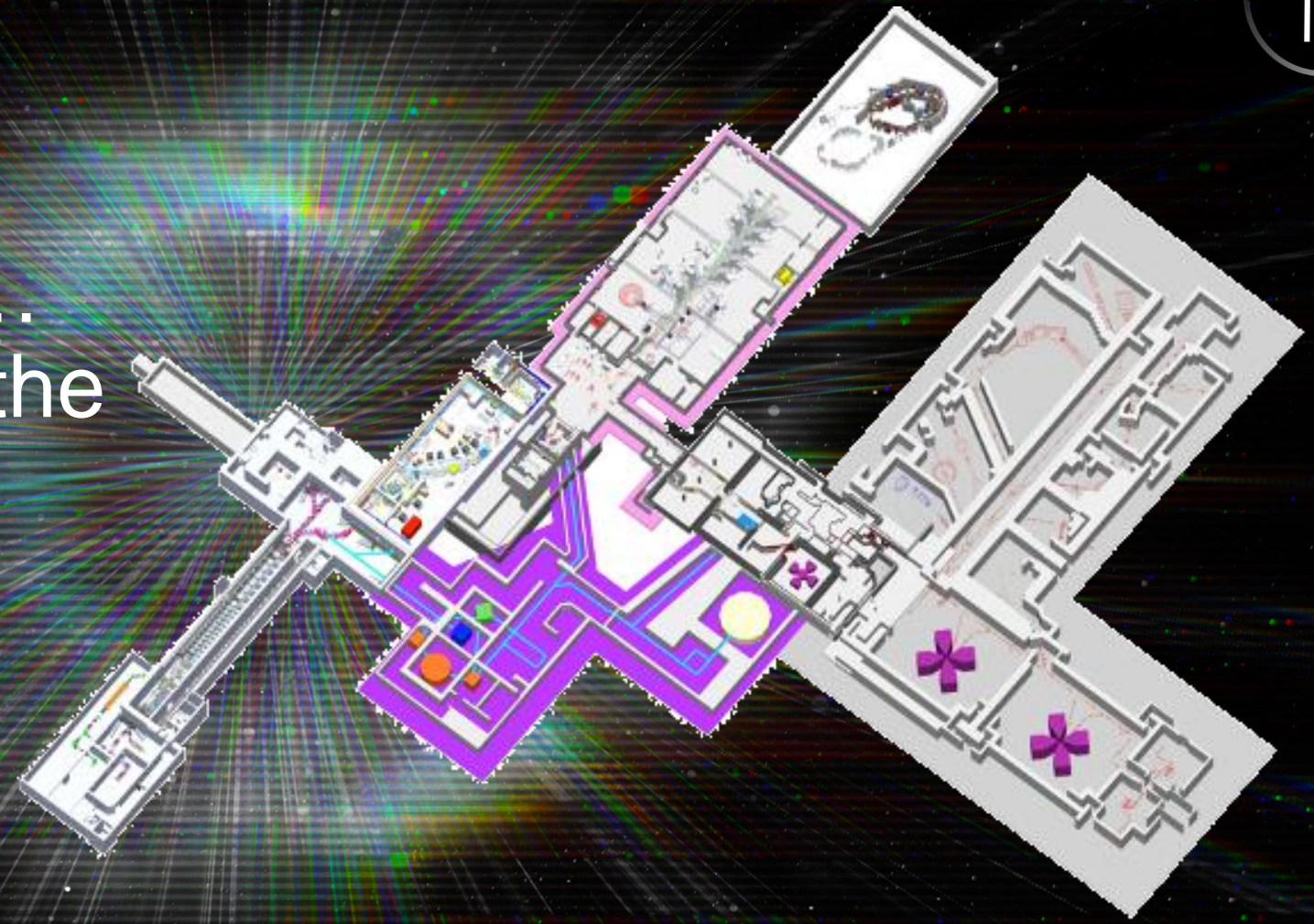
Project leader:

Hanna Franberg Delahaye

Scientific leader

Stéphane Grévy

“The projects ... are unique on the international scene... and keep GANIL at the forefront of nuclear science globally for many decades to come”





GEANIL

Technology uses science to solve problems, and science uses technology to make new discoveries.



**ANS DE RECHERCHE
UNE AMBITION
POUR LE
FUTUR**

Merci !