

Status of the SPIRAL2-DESIR project

J.-C. Thomas, GANIL, on behalf of the DESIR project management and collaboration

- Project manager: Ch. Peaucelle, LPSC (09/14/2026)
- Scientific coordinator and spokesperson: B. Blank, LP2iB
- Facility manager: F. Varenne, GANIL

EAP DESIR

October 20, 2026, LP2i Bordeaux

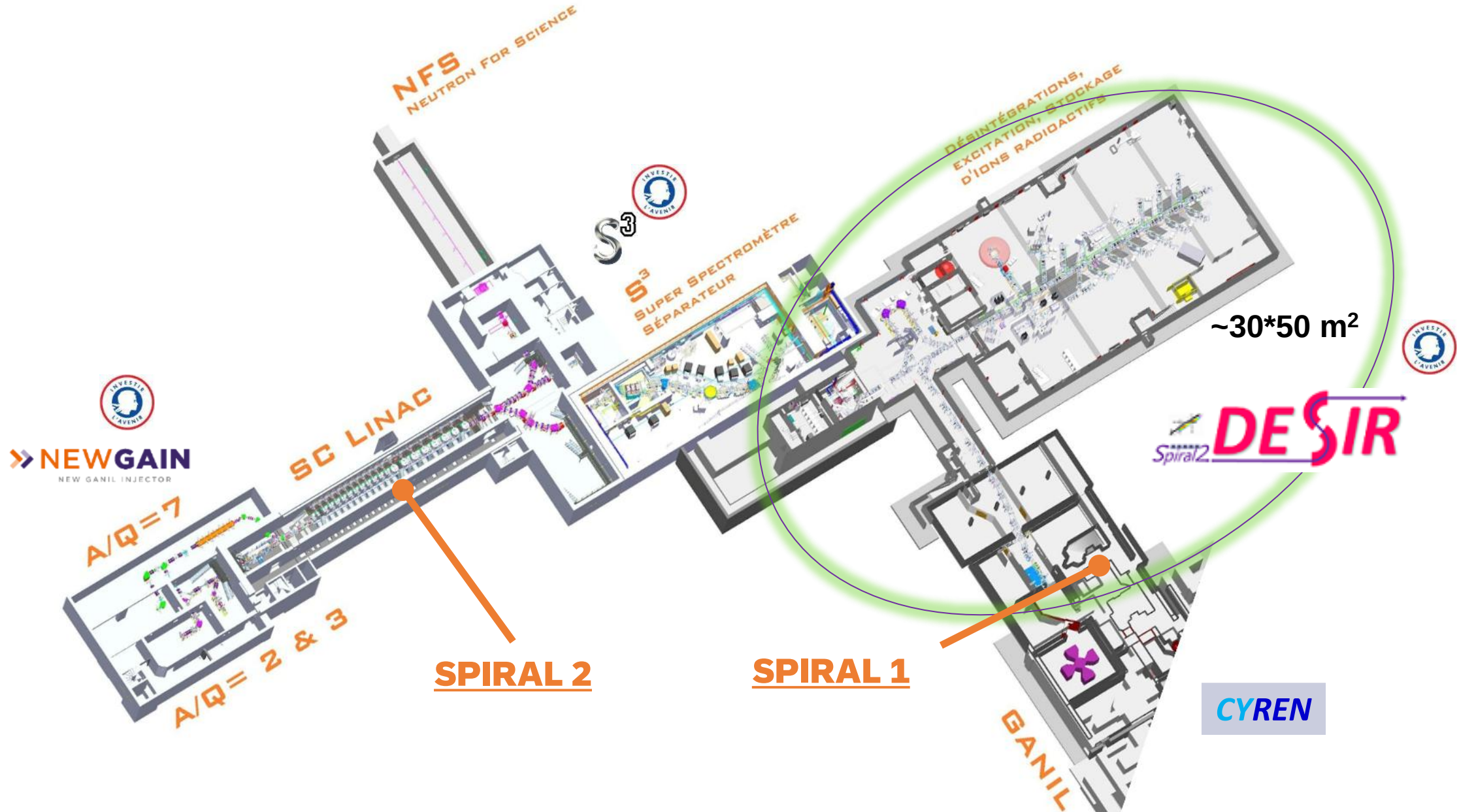


Introduction

- **Scientific program**
- **Buildings**
- **Transport beam lines**
- **Beam preparation and purification**
- **Timeline**

Conclusion

Introduction



DESIR: Experimental equipment

Installation and operation --> >2030

G. Tocabens

BESTIOL

DETRAP

LUMIERE

bSTILED X. Fléchar

WISArD M. Versteegen

anr[®] P. Delahaye

MORA
(2029)

L. Lalanne



LINO-LASAGN
(2027)

S. Naimi

anr[®]

HINA
TORTILA

anr[®]

LRC

.....

COeCO

Decay station

M. Gerbaux

Id. Station
(2028)

GPIB
(2028)

MR-TOF-MS
(2029)

PIPERADE
(2028)

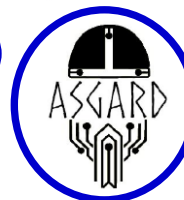
L. Canete

P. Ascher

ARGOS
gSPEC
....

(NA)2STARS
(2029)

M. Fallot



L. Hayen

MLLTRAP

E. Minaya Ramirez

DESIR Project perimeter

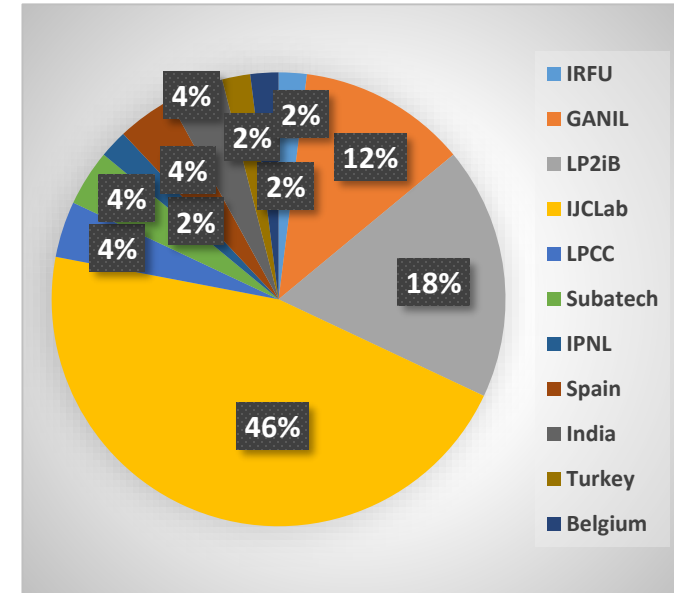
Scientific program

- Preparation of DESIR physics case
 - Workshop DESIR: Spring 2024: 100 participants, 22 institutes (15 from foreign countries)
 - Workshop LUMIERE: July 2024
 - Workshop BESTIOL: Dec. 2024
 - Workshop DETRAP: May 2025
- Brainstorming (IN2P3): Impact of high-precision measurements on BSM physics at DESIR, July 2026
- Letters of intent
 - DESIR LOI workshop: March 2026, > 50 LOIs
 - > Working group to analyze the feasibility (RIBs), propose RIB developments and experiment priorities
 - => *Commissioning and Day-1 exp. strategy: GANIL SC - B. Blank, Nov. 2026*
 - > DESIR collaboration Committee: detailed LOI
- Proposals $\geq$ 2027
- Equipment commissioning: 2028-2029
 - Stable and radioactive beam without going through proposals and PAC
- Routine operation $\geq$ 2030

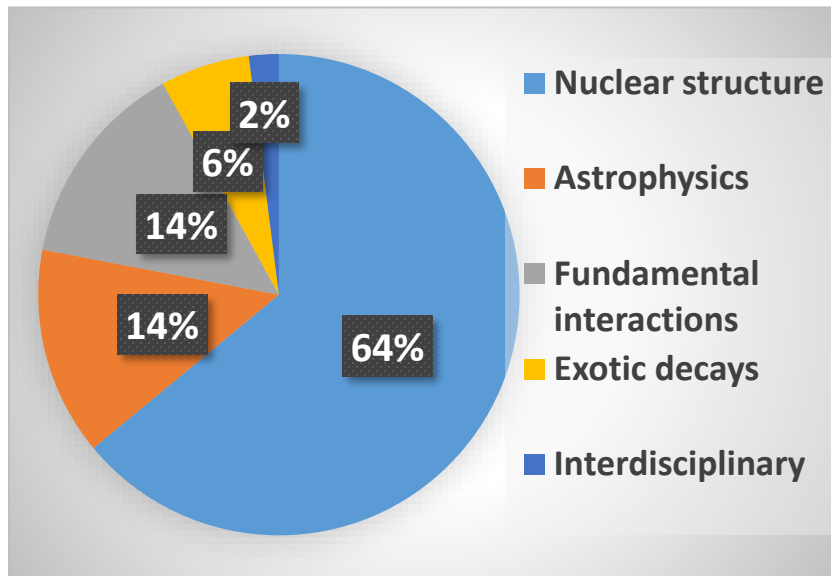
Overview

- 50 Lols, ~2000 UTs, ~300 isotopes from ${}^6\text{He}$ to ${}^{263}\text{Sg}$, from 0.01 to 10^7 pps
- 90% from French labs (46% IJCLab)
- Mainly n-deficient (production sites)
- Using different techniques to probe the same region (e.g. around ${}^{100}\text{Sn}$)
- Combining different setups, e.g. PIPERADE + Decay spectroscopy
- Combining $\text{S}^3\text{-LEB}$ and DESIR studies
- Using beams expected from either $\text{S}^3\text{-LEB}$ (29 Lol) or SPIRAL1 (50 Lol) (overlap)
 - > Feasibility to be checked: *Day-1, Day-2, RIB devpt. priorities*

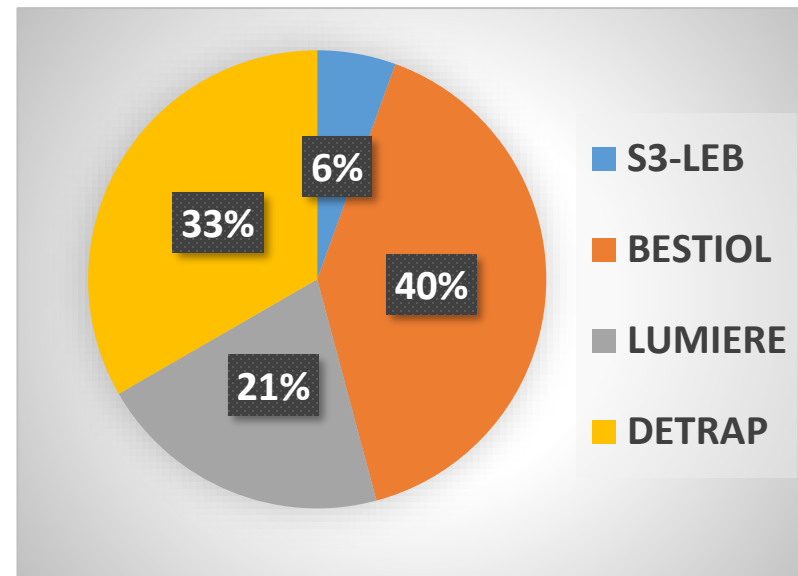
Labs



Physics cases



Setups/Techniques

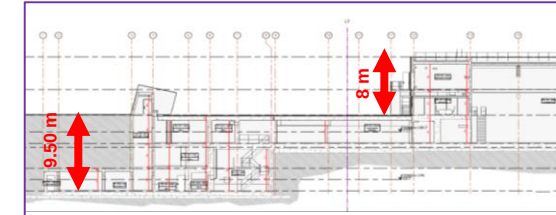
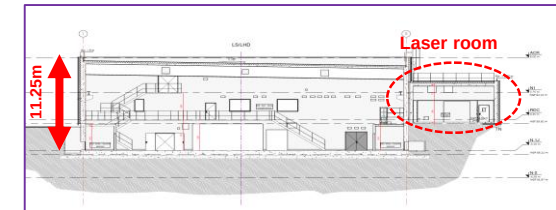
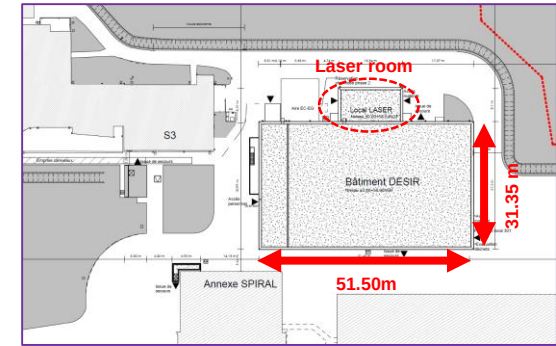


Buildings and Infrastructure

Buildings and infrastructure



- Building delivery: 11/2025
- Building operation (internal licence): 01/2027
- Facility operation (safety licence request)
 - About to be submitted
 - Expected green light: 10/2028?



Laser rooms



RFQ1P + HRS room

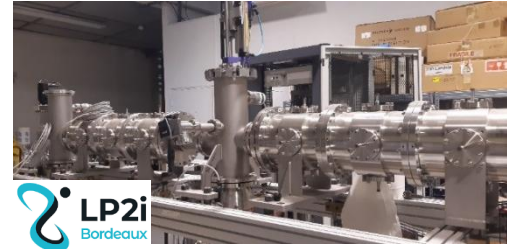


Experimental hall

Transport beam lines

Overview: Transport beam lines

Test bench



Courtesy: Ph. Alfaut, L. Daudin

Level -1
-3.25 m
**DESIR
Hall**

3 keV

Level -3
-9.5 m

S³

- Junction beam lines from SPIRAL1 and S³-LEB to the DESIR Hall: ~100 m
- 1+ ions, < 60 keV, < 80 π .mm.mrad – fully electrostatic

SP1 -> DESIR beam line

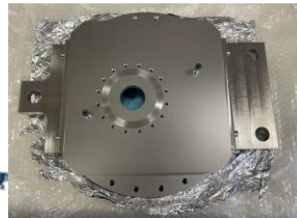


Courtesy: V. Watt-Morel

Level -1
-3.25 m

SPIRAL1

Base assembly



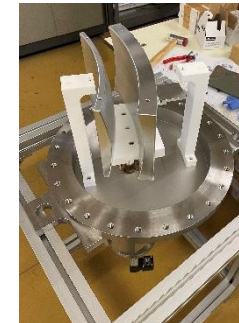
Insertion



Pole assembly



Internal part



Upper part



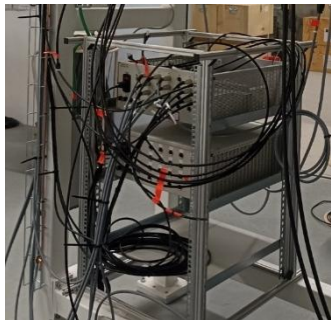
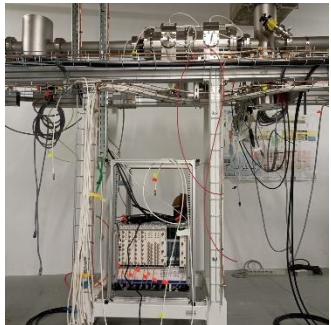
Example: 45° deflector assembly

Courtesy: L. Perrot

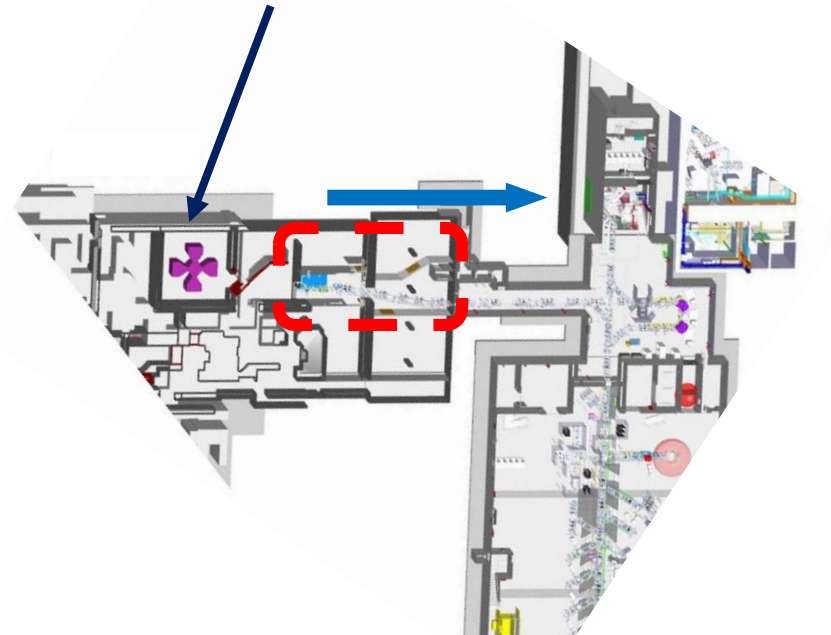
Transport beam lines: Prototype section

Validation of:

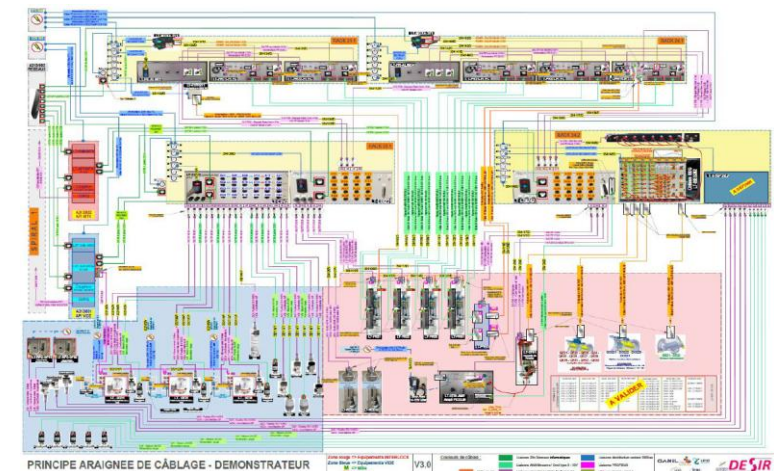
- Assembly protocols ✓
- Vacuum tests ✓
- Cabling principles
- Supplies integration ✓
- Diagnostics insertion ✓
- PLCs
- Interlocks
- Beam tuning software



SPIRAL1 -> ----- (~20 m) -----> DESIR



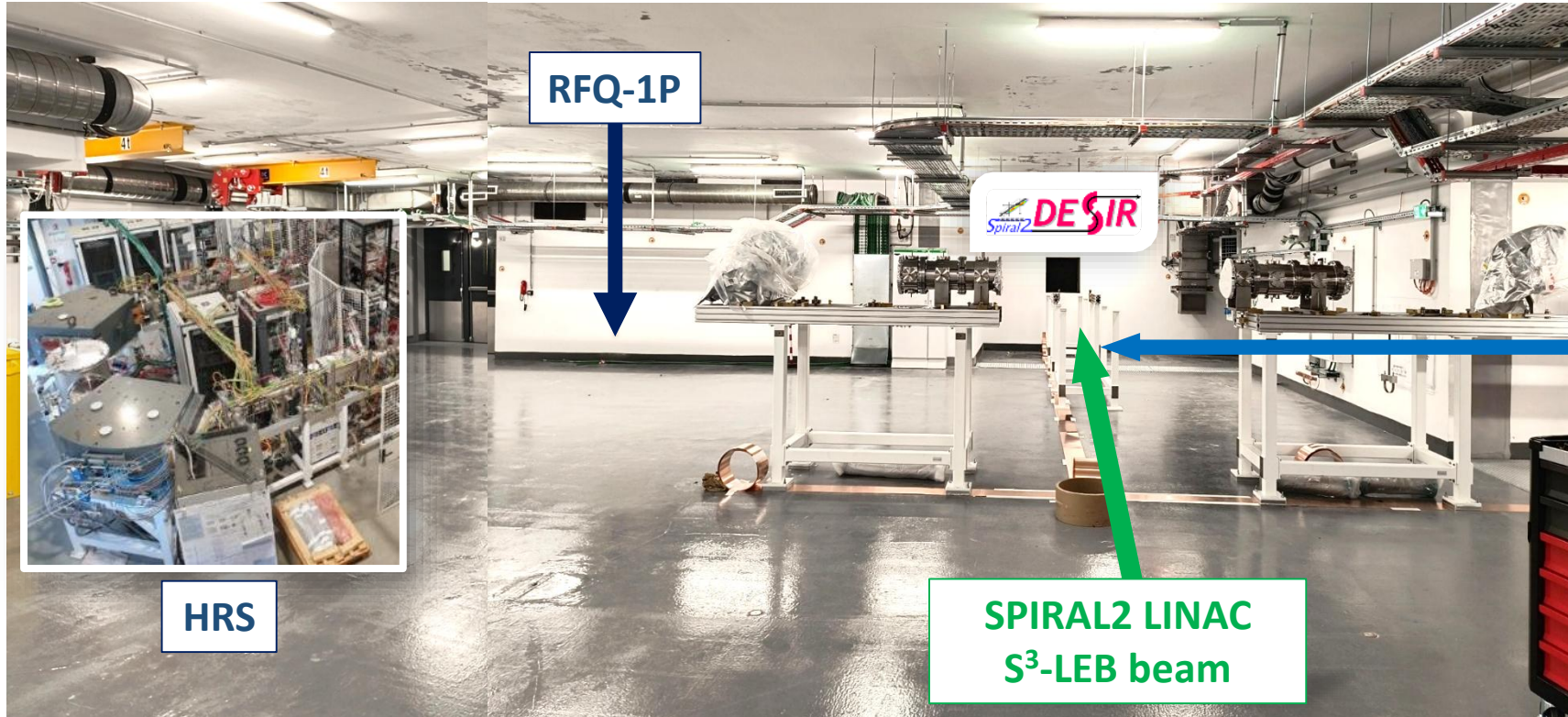
Still a lot to do: e.g., cabling



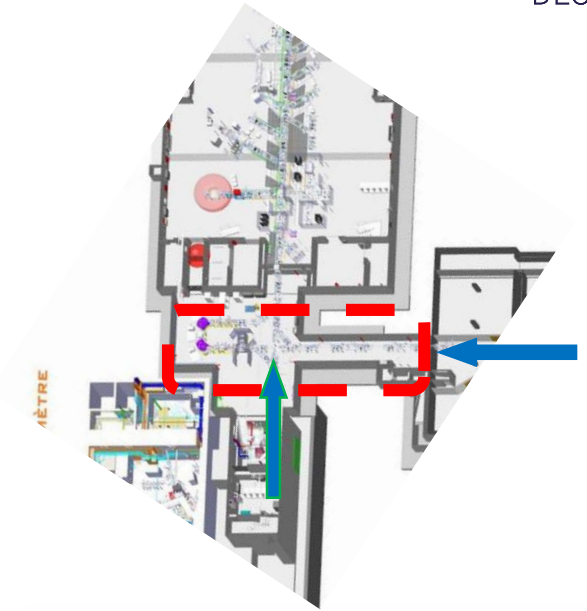
-> offline commissioning in 2027

Transport beam lines: Junction tunnels

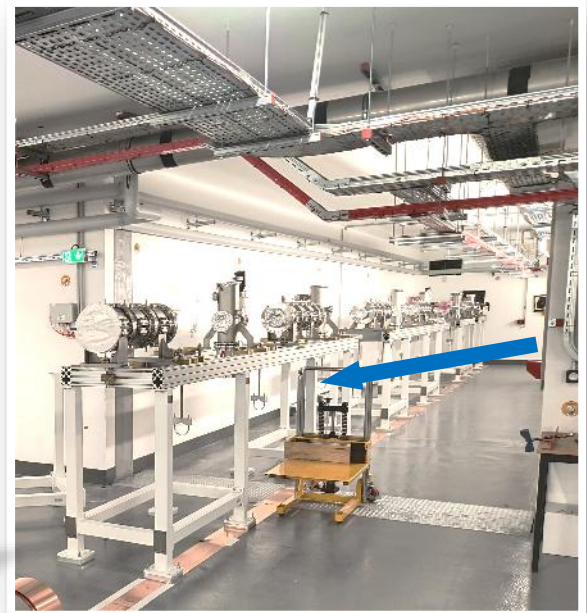
- Installation of the beam line equipment (mechanics/optics): Early 2026 ---->
- Call for tender for the cabling and piping: October 2026



Courtesy: C. Berteloite, GANIL



GANIL Cyclotrons
Spiral 1 beam



Beam preparation and purification

Beam preparation:

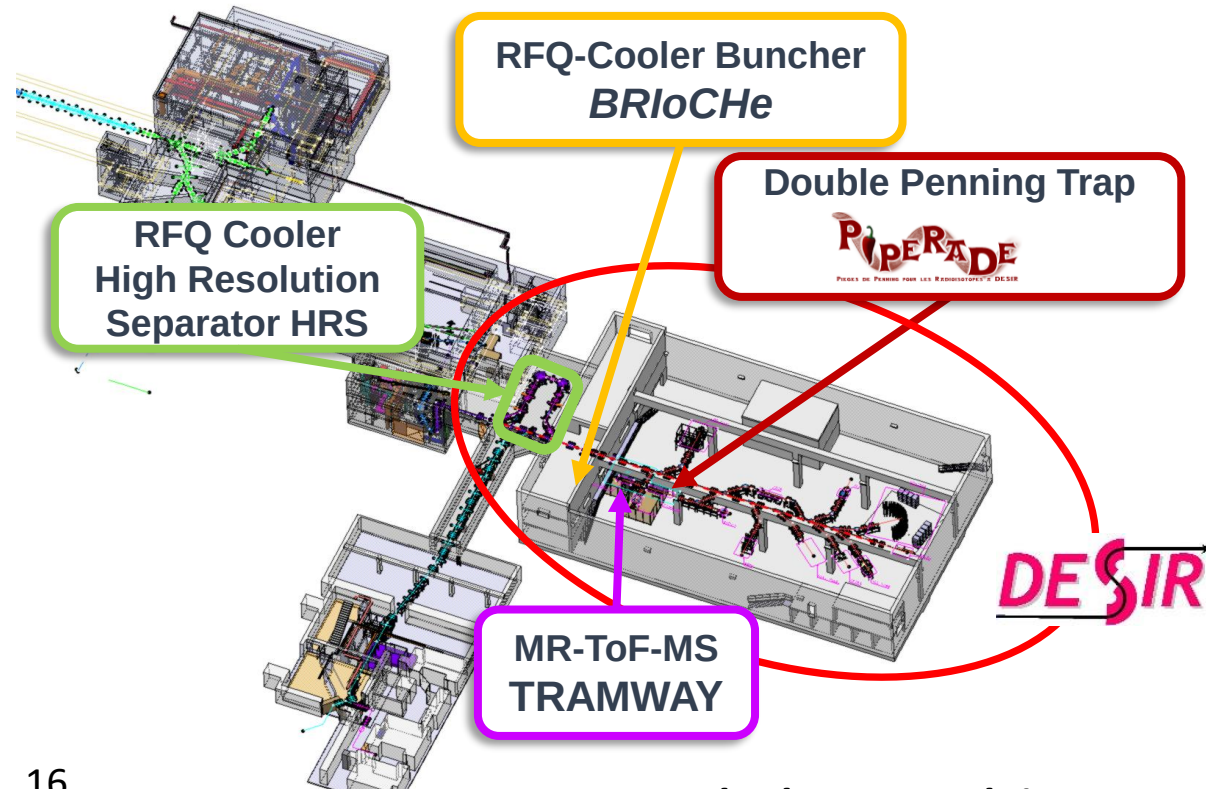
GPIB

- Cooling and bunching

MR-ToF

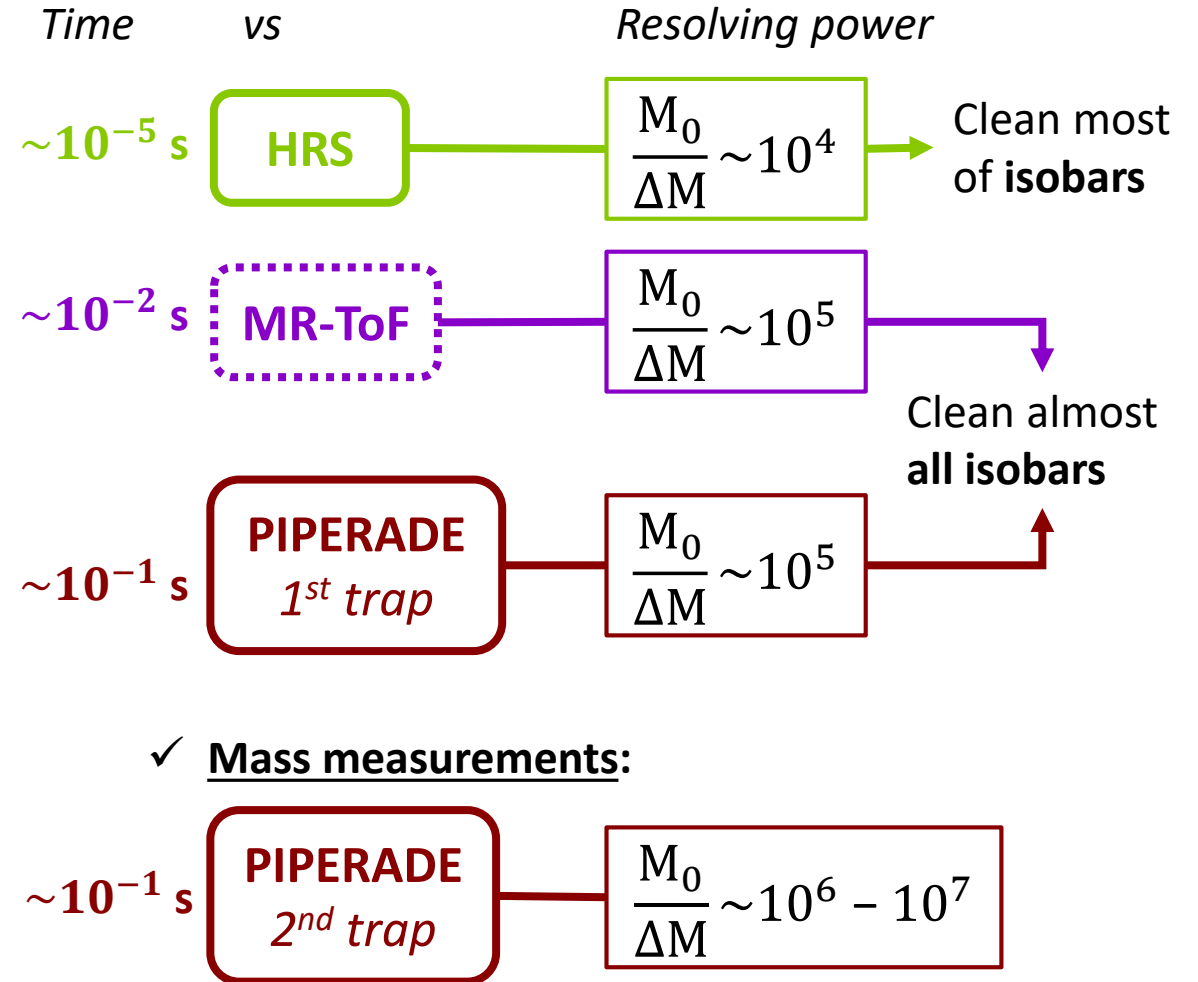
PIPERADE

- Accumulation trap



Courtesy: B. Blank, C. Berteloite

Mass separation/beam purification:



Clean **isomeric states** separated by a few 10 keV

Mass precision: $10^{-8} - 10^{-9}$ **Trap-assisted spectroscopy**

Beam preparation and purification: RFQ cooler

Based on the SHIRAC RFQ studied within SPIRAL2-Phase 2 and an upgraded version for SPES

R. Boussaid et al., JINST 9 (2014) P07009

- Construction and tests at LPC Caen
 - technical commissioning: end-2026
 - offline commissioning: early 2027
 - > transfer to GANIL: mid-2027

Material: J.-F. Cam, LPC Caen



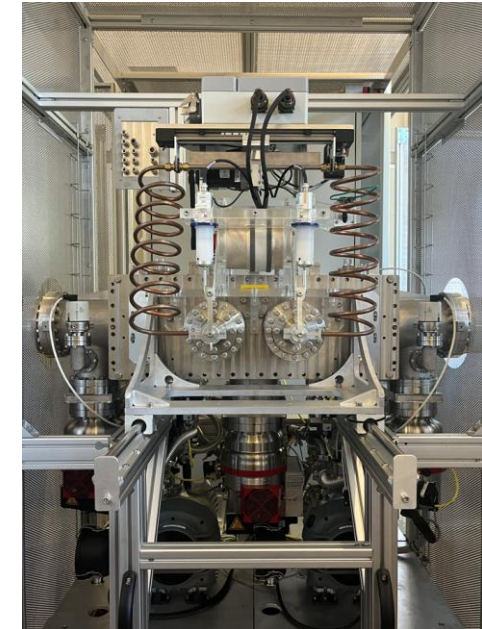
Quadrupole



RFQ1P test bench at LPC Caen (w/o the HV cage)

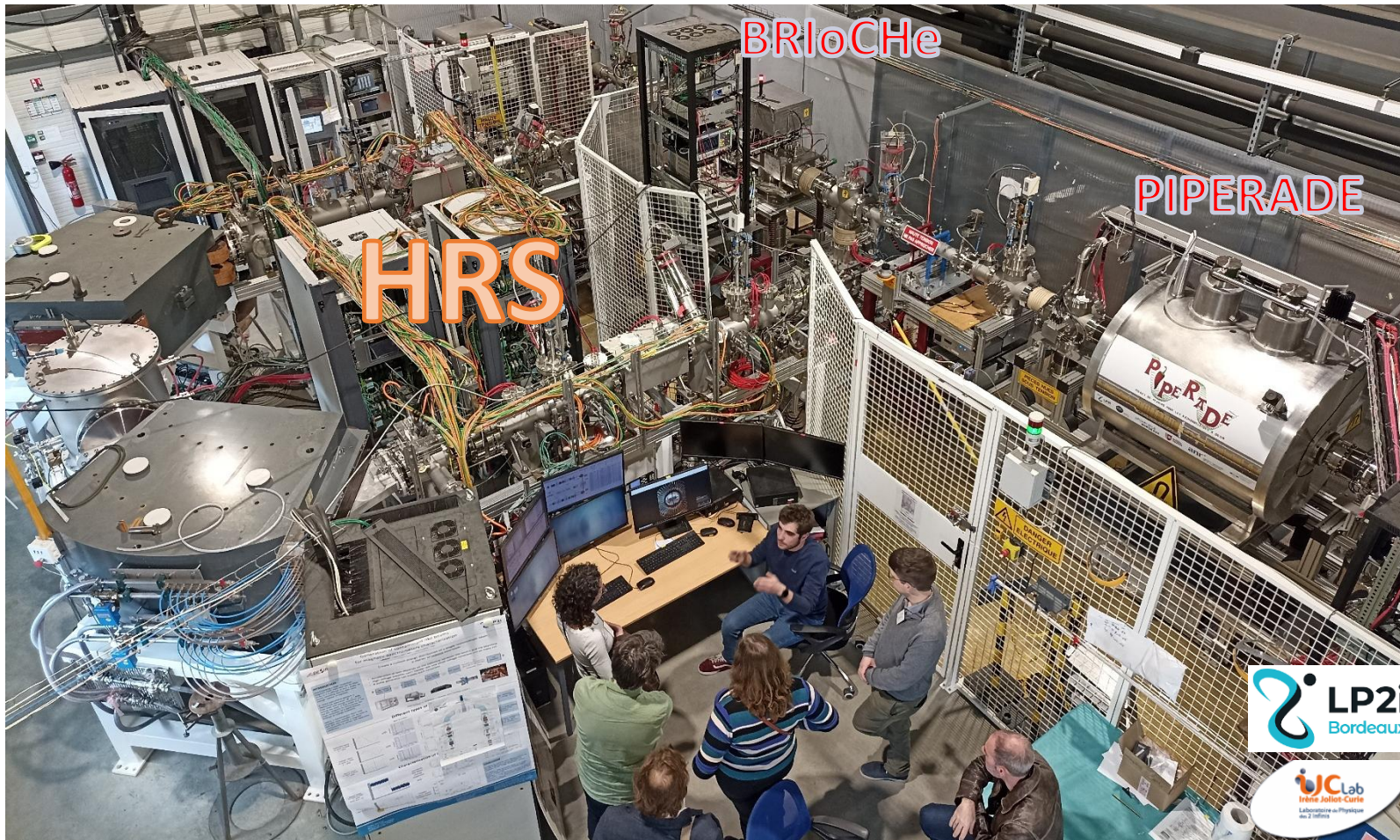


HV cage



RF circuit

- *Fully commissioned at LP2iB - J. Michaud, A. Balana, B. Blank, L. Daudin*
-> transfer to GANIL: end-2026



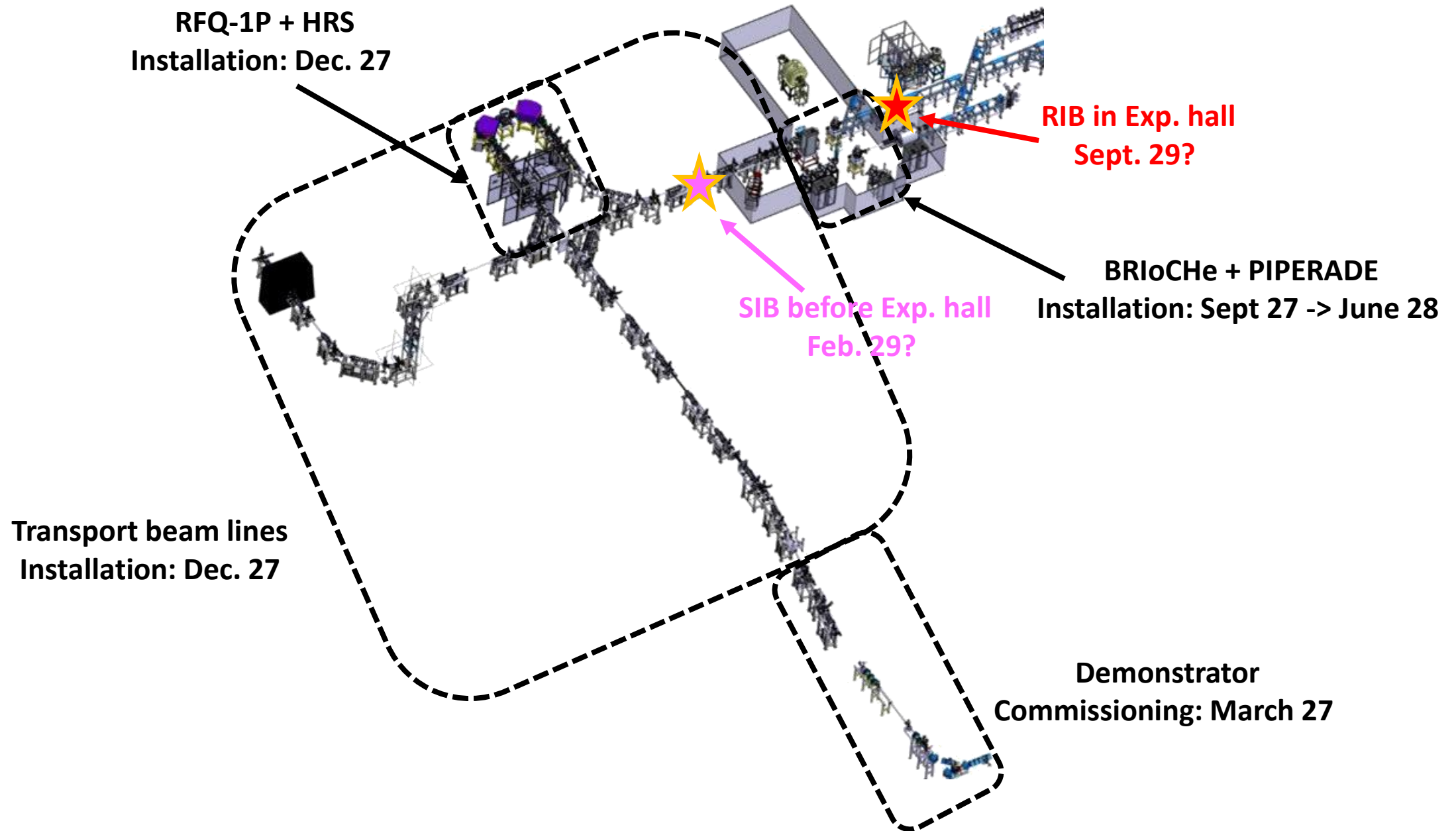
J. Michaud et al., NIM B 541, 161 (2023)

T. Kurtukian Nieto et al., NIM B 317, 283 (2013)

Timeline



Tentative timeline (preliminary)



Tentative timeline (preliminary)

Tentative planning (DESIR COPIL and CAF – Oct.-Nov. 2026)

-> To be consolidated

Principaux jalons

Dates Reprévues

Jalons clés du projet

J5b. Réception bâtiment	01/12/2025
J5c. Transfert du bâtiment à l'exploitant	01/01/2027
J6a. Jalon PRO-F (installation RFQ1P+HRS)	01/12/2027
J6b. Jalon PRO-E (installation PIPERADE+GPIB)	01/06/2028
J6c. Jalon PRO-SNC (installation UGA)	15/06/2027
J6d. Faisceau stable dans setup expérimental (CF92)	01/02/2029
J6e. Mise en service démonstrateur (CF31)	01/03/2027
J6f. Installation équipements lignes transport (CF92)	01/12/2027
J7a. Dépôt du dossier de DMES	01/11/2026
J7b. Mise en service en faisceaux radioactifs	01/09/2029

Conclusion

❖ Critical points

- Stable ion source for experimental equipment commissioning
- 1st laser room operation
- *Upgrade of the maximal B_ρ value of SPIRAL1 RIBs*
- Transfer of technical developments to the GANIL staff



Thanks for your attention

