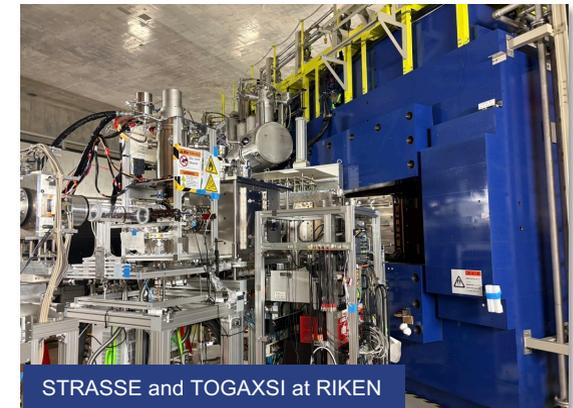
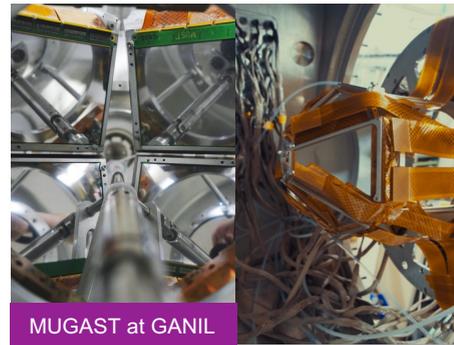
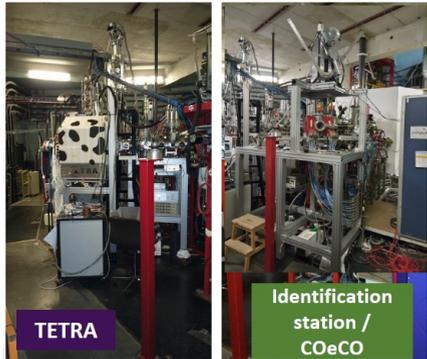
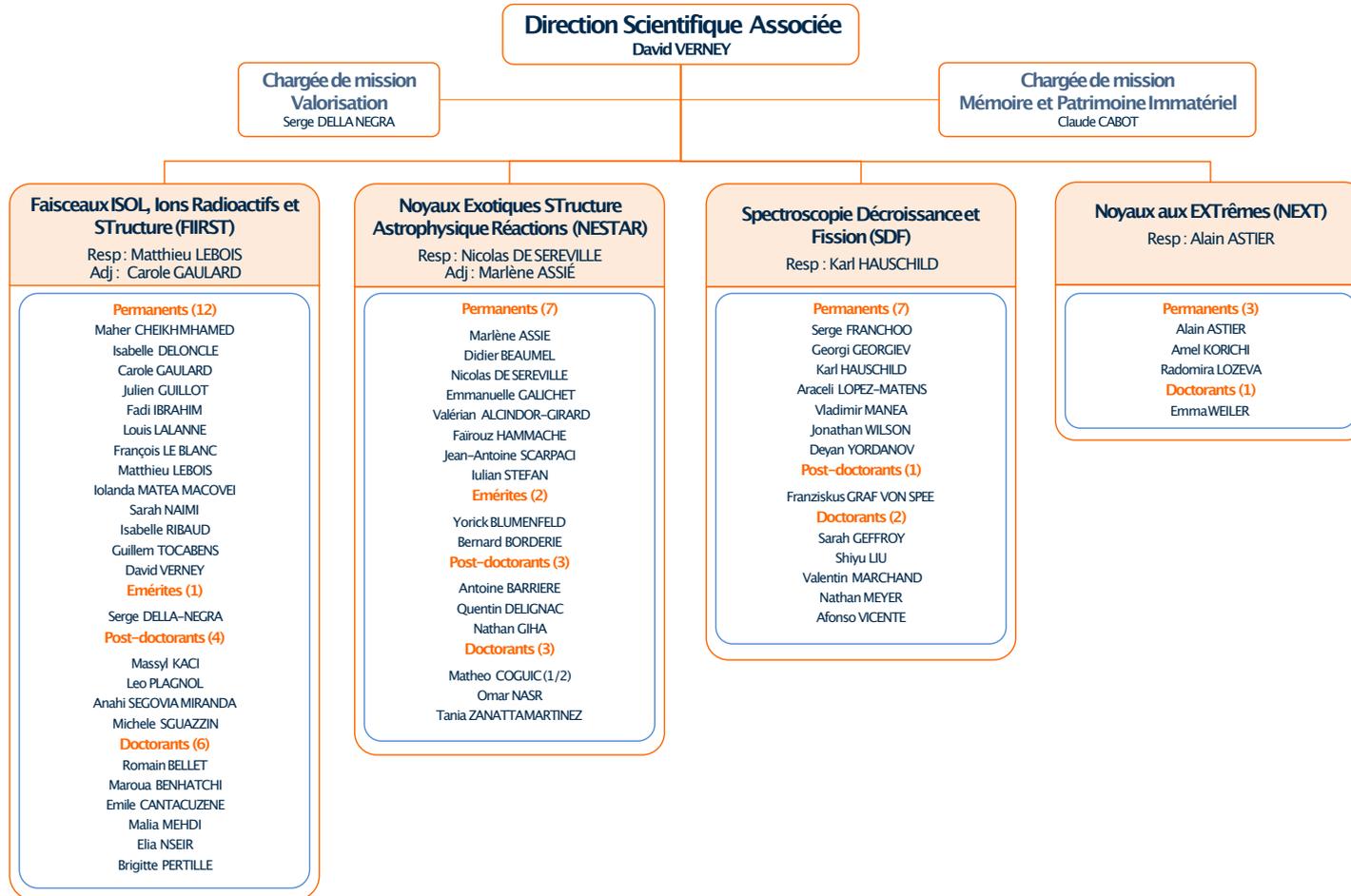


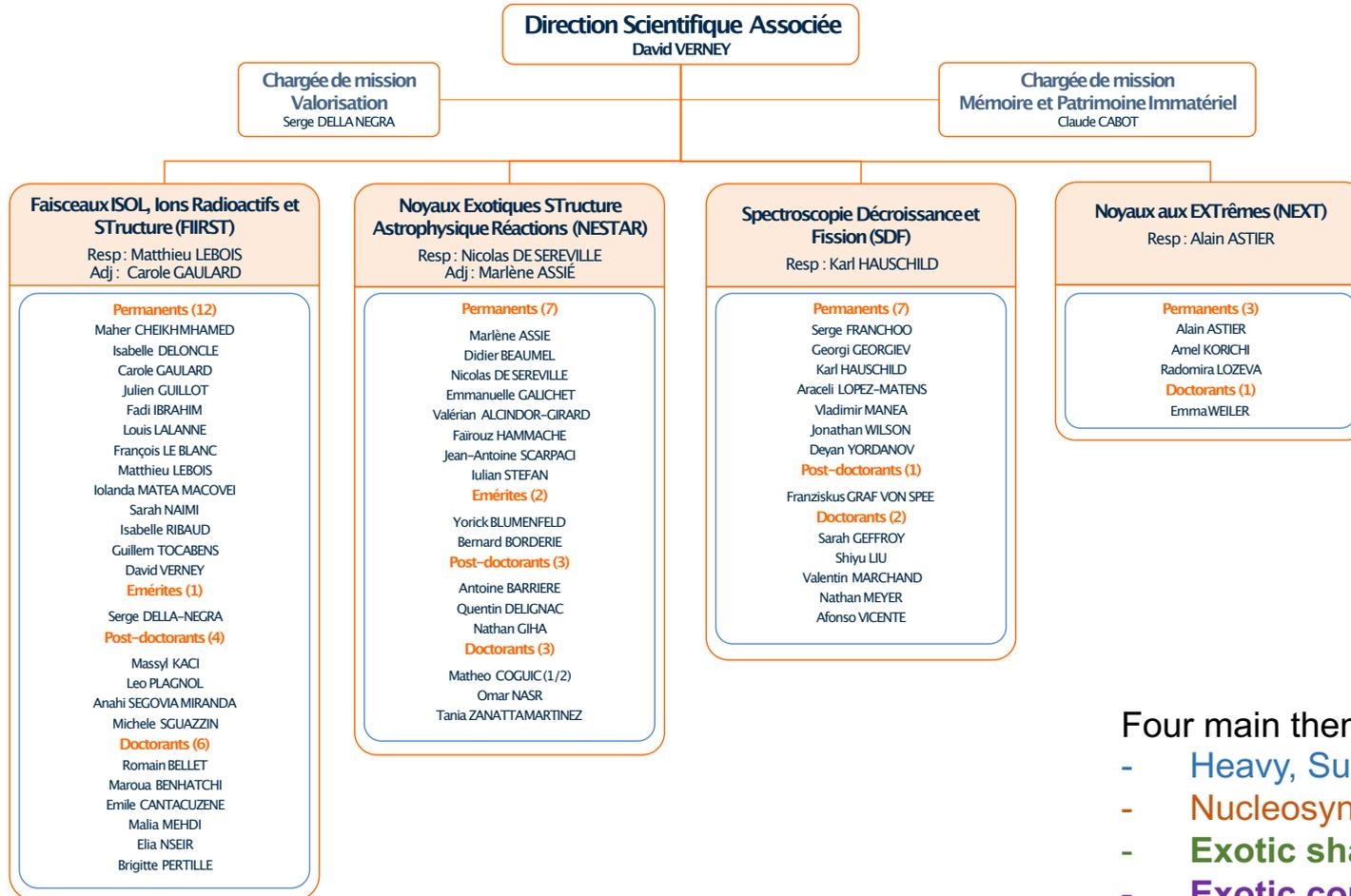
Exotic nuclei studies at IJCLab

-
Oslo - Orsay meeting 2026



Val rian Girard-Alcindor





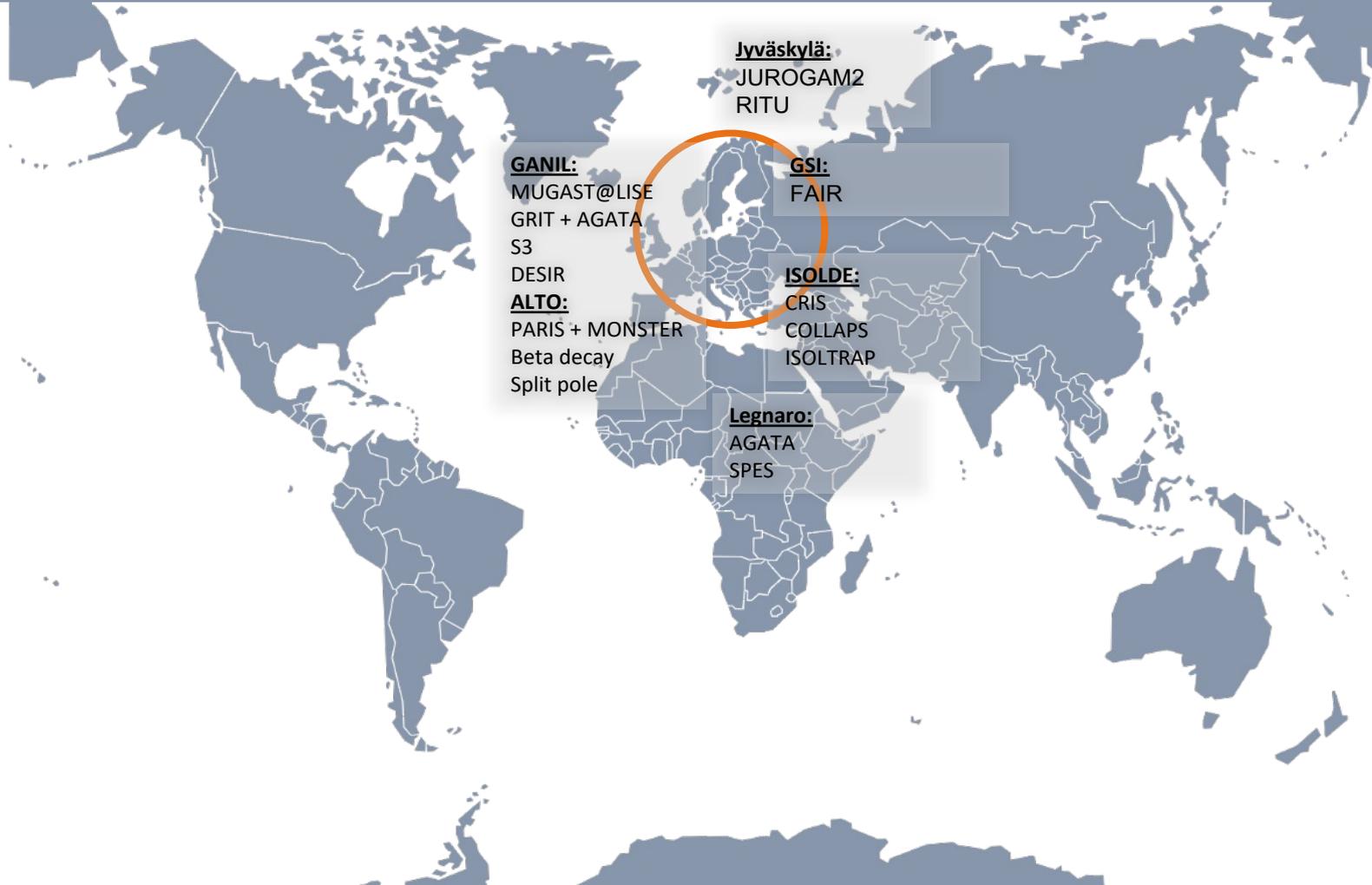
Four main thematics (one team ≠ one thematic):

- Heavy, Super heavy nuclei and fission
- Nucleosynthesis and origin of the elements in the universe
- Exotic shapes and magicity
- Exotic correlations

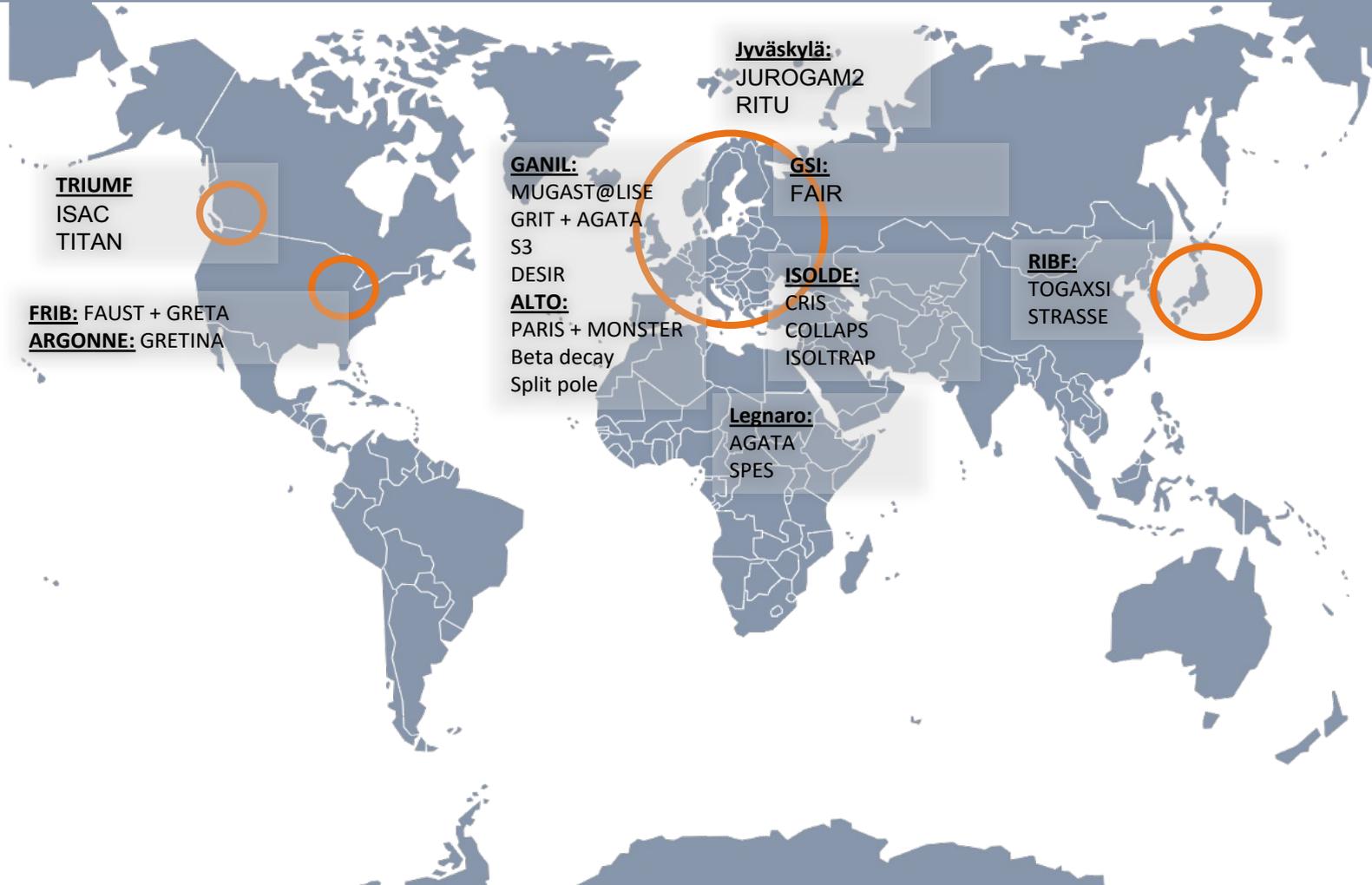
Where are we working?



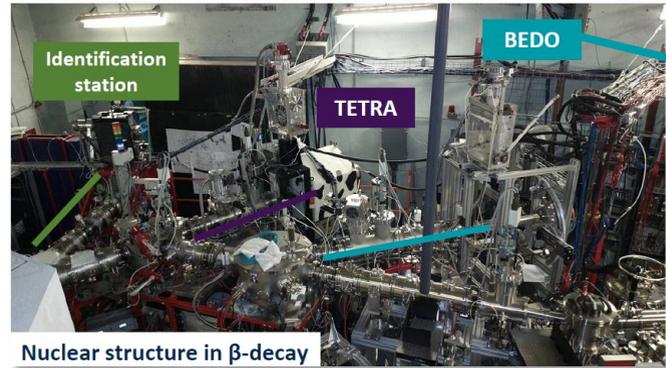
Where are we working?



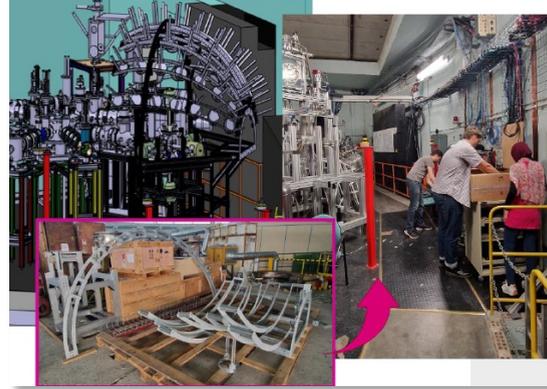
Where are we working?



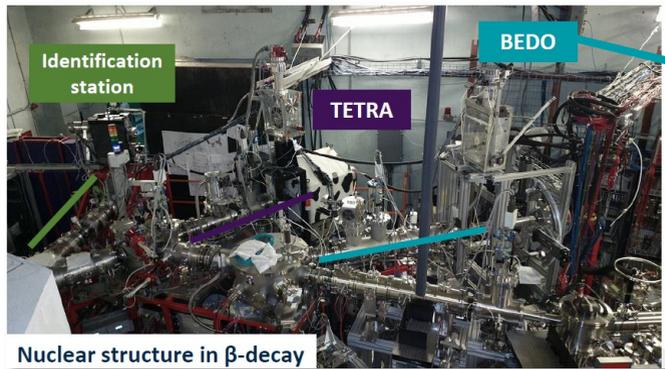
➤ BESTIOL β -decay devices at ALTO – M. Lebois and team FIIRST



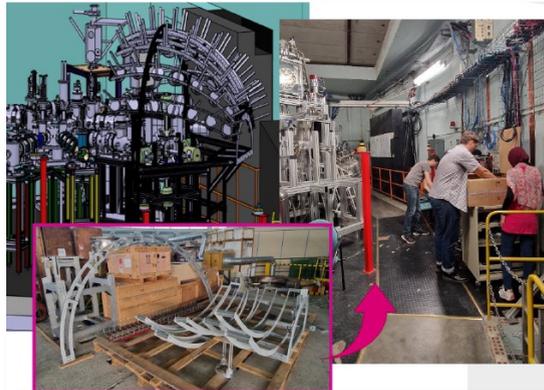
2024: preparation to host
MONSTER@BEDO



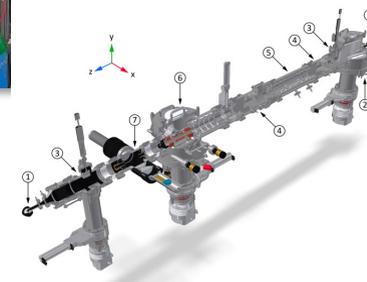
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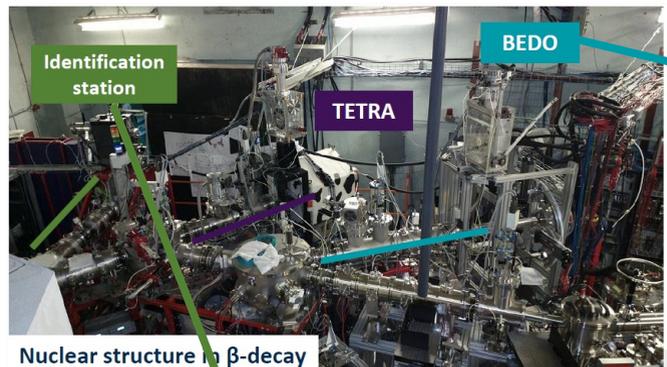
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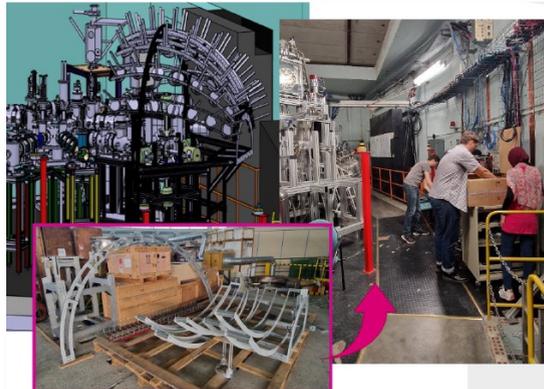
LINO (Laser Induced Nuclear Orientation)
D. Yordanov et al.
1st apparatus to move to DESIR (2025)



➤ BESTIOL β -decay devices at ALTO – M. Lebois and team FIIRST



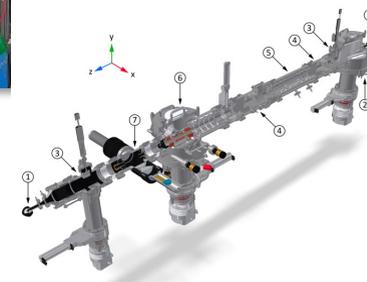
2024: preparation to host MONSTER@BEDO



LINO (Laser Induced Nuclear Orientation)

 D. Yordanov et al.

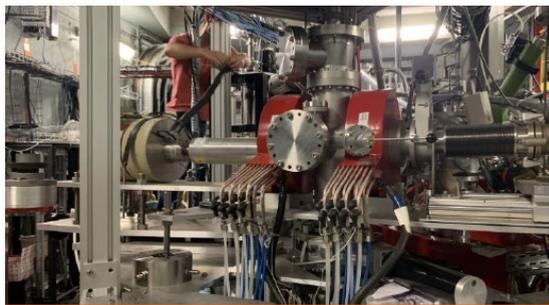
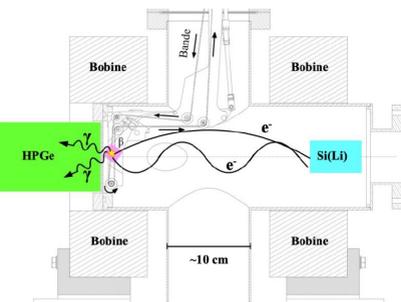
 1st apparatus to move to DESIR (2025)



2022 : commissioning of COeCO

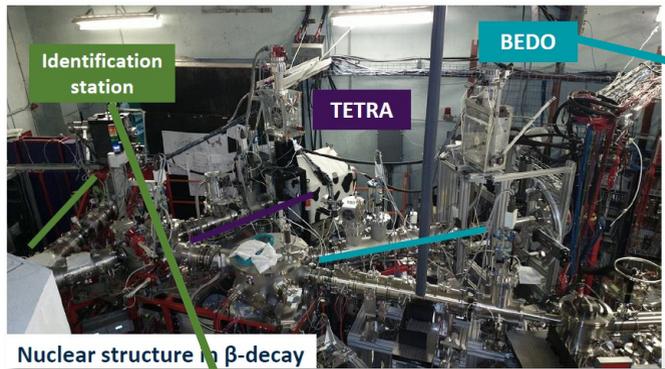
 (CONvergent electron Chaser in Orsay), a

 new β -delayed CE spectroscopy setup

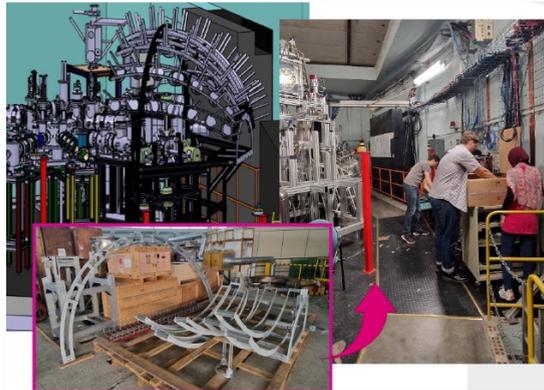


Courtesy of D. Verney

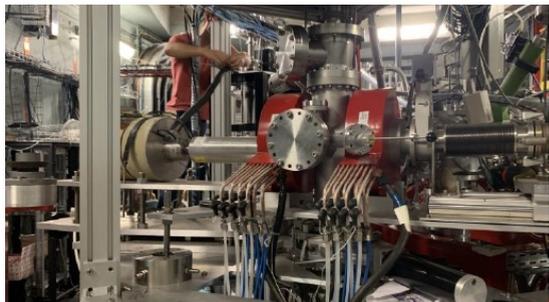
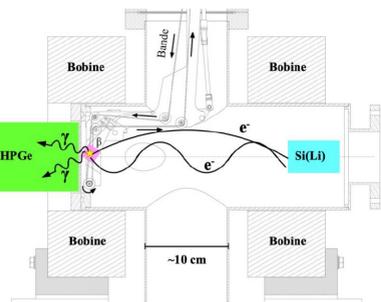
➤ BESTIOL β -decay devices at ALTO – M. Lebois and team FIIRST



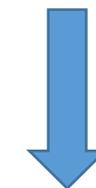
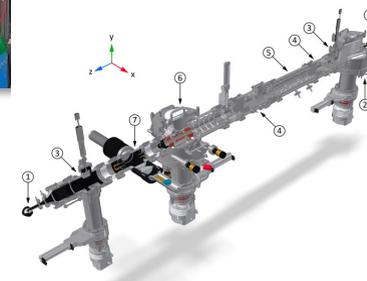
2024: preparation to host MONSTER@BEDO



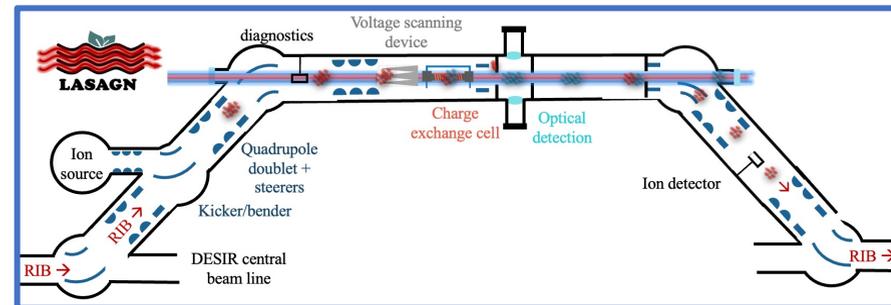
2022 : commissioning of COeCO (CONvergent electron Chaser in Orsay), a new β -delayed CE spectroscopy setup



LINO (Laser Induced Nuclear Orientation) D. Yordanov et al. 1st apparatus to move to DESIR (2025)



DESIR

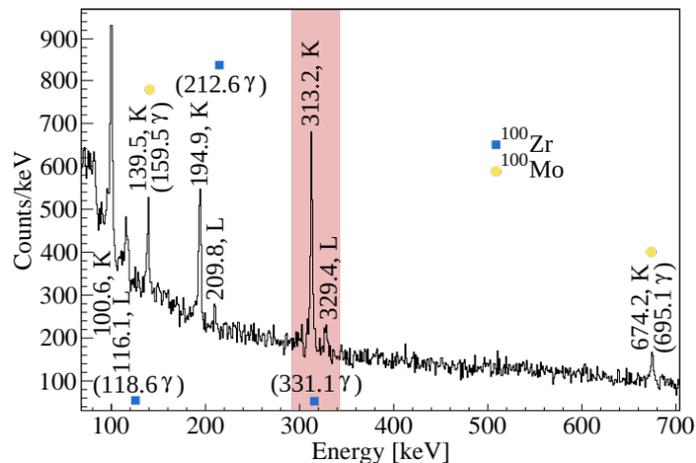
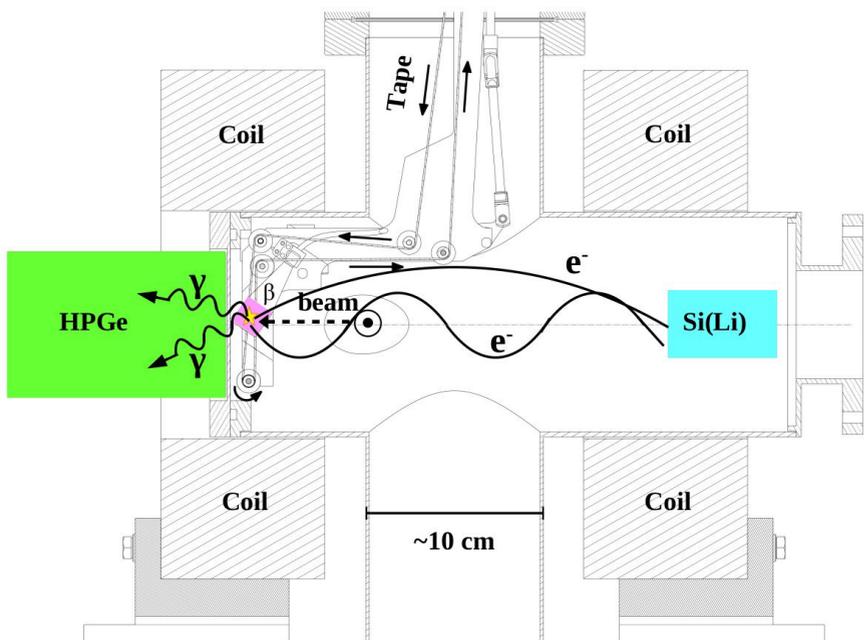


Courtesy of D. Verney

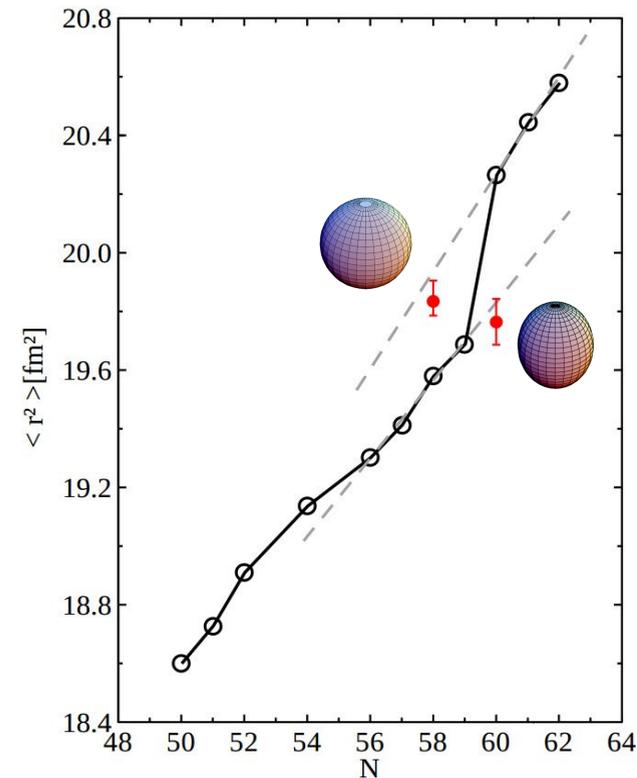
Motivation: Can we say something about the shape of the nucleus from electrons ?

Method: Photo-fission of uranium

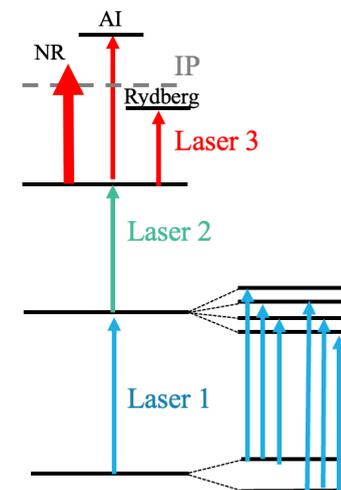
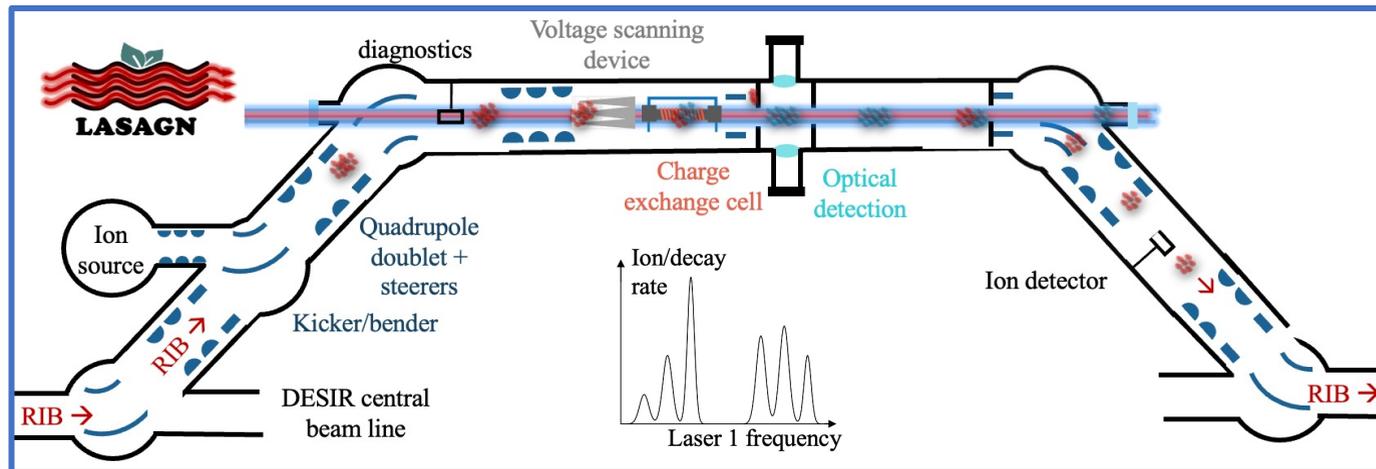
Experimental setup: COeCO at ALTO



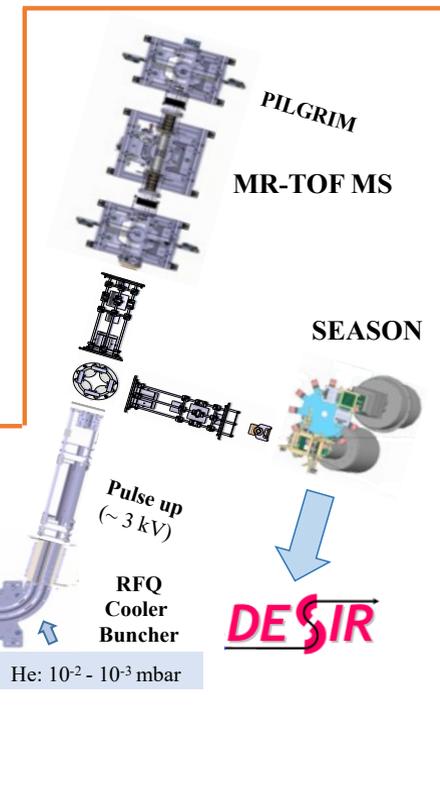
Courtesy of G. Tocabens



- Measurement of E0 transition to the ground-state of ^{100}Zr
- Shows a change in shape from spherical (g.s.) to deformed (excited state)



Courtesy of L. Lalanne



Motivation: Evolution of ground state properties in exotic nuclei

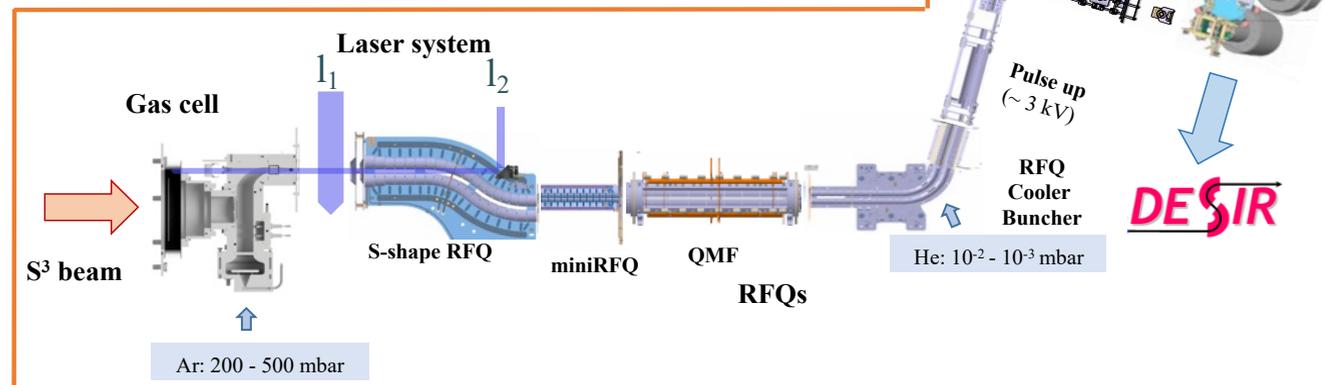
Method: Collinear and In-gas-jet laser spectroscopy

Experimental setup:

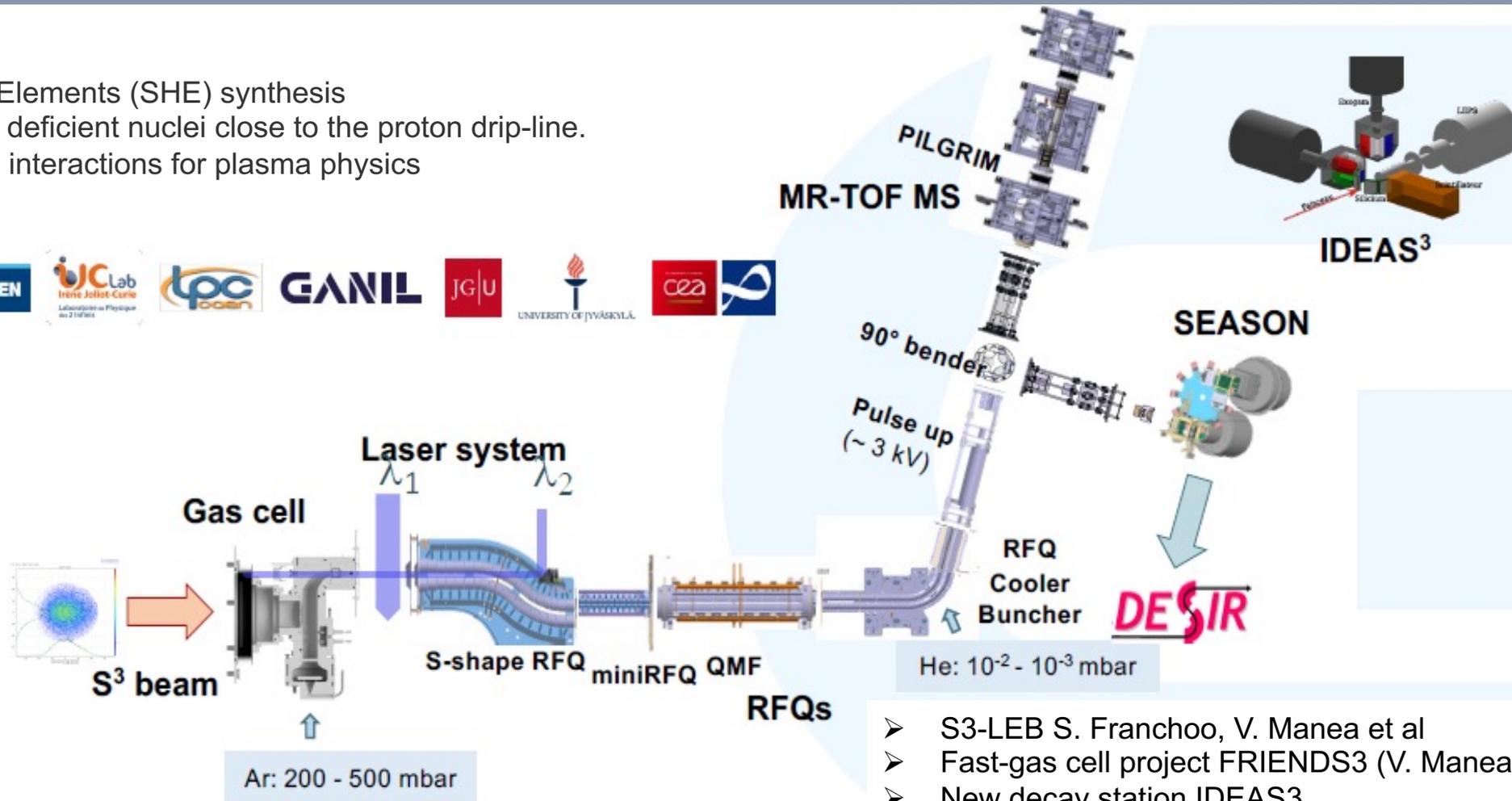
LASAGN at DESIR

S³-LEB at SPIRAL2/S3

→ New experimental program with unique opportunities in light and neutron deficient isotopes



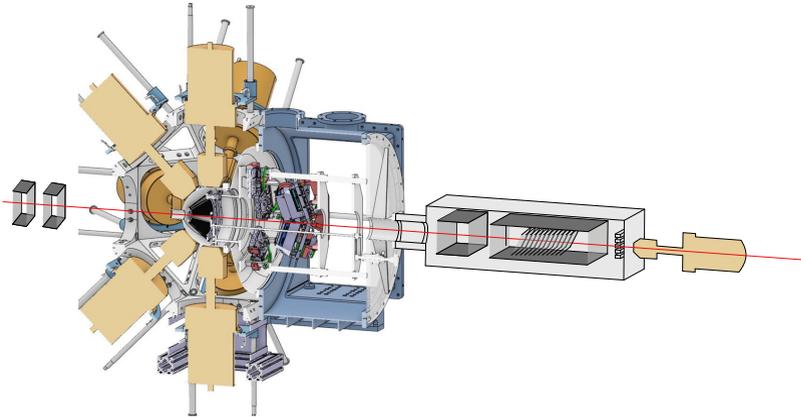
- Super-Heavy Elements (SHE) synthesis
- Study neutron deficient nuclei close to the proton drip-line.
- Ion-ion atomic interactions for plasma physics



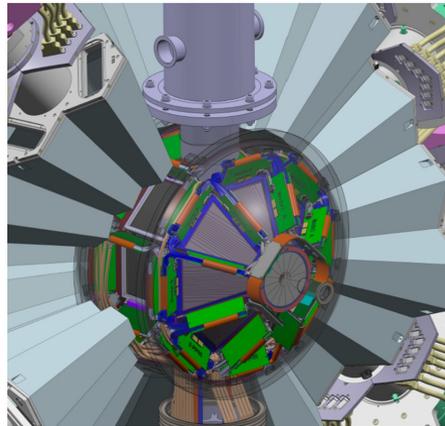
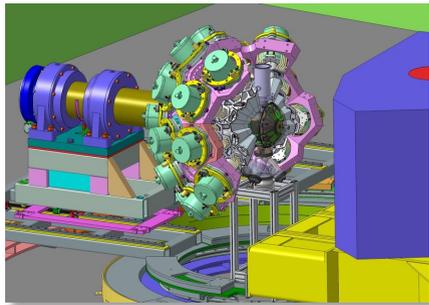
- S3-LEB S. Franchoo, V. Manea et al
- Fast-gas cell project FRIENDS3 (V. Manea)
- New decay station IDEAS3

GANIL

MUGAST@LISE - (2023 -> 2026)

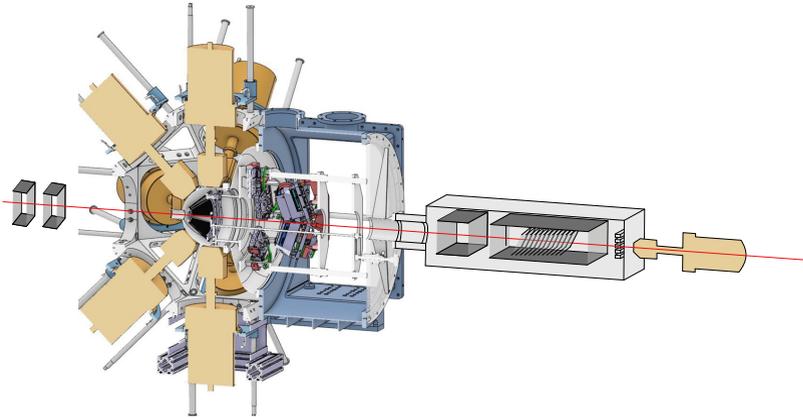


GRIT + AGATA (2029 -> ?)

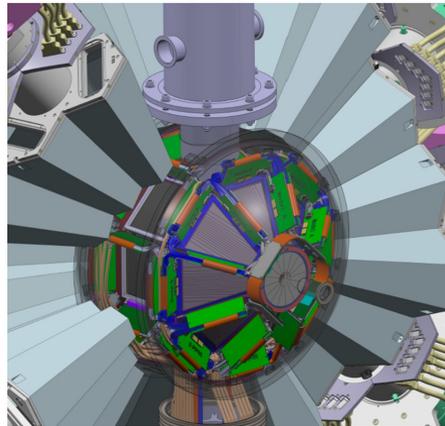
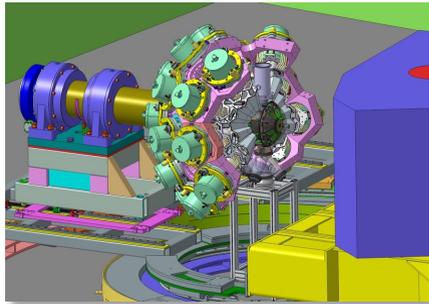


GANIL

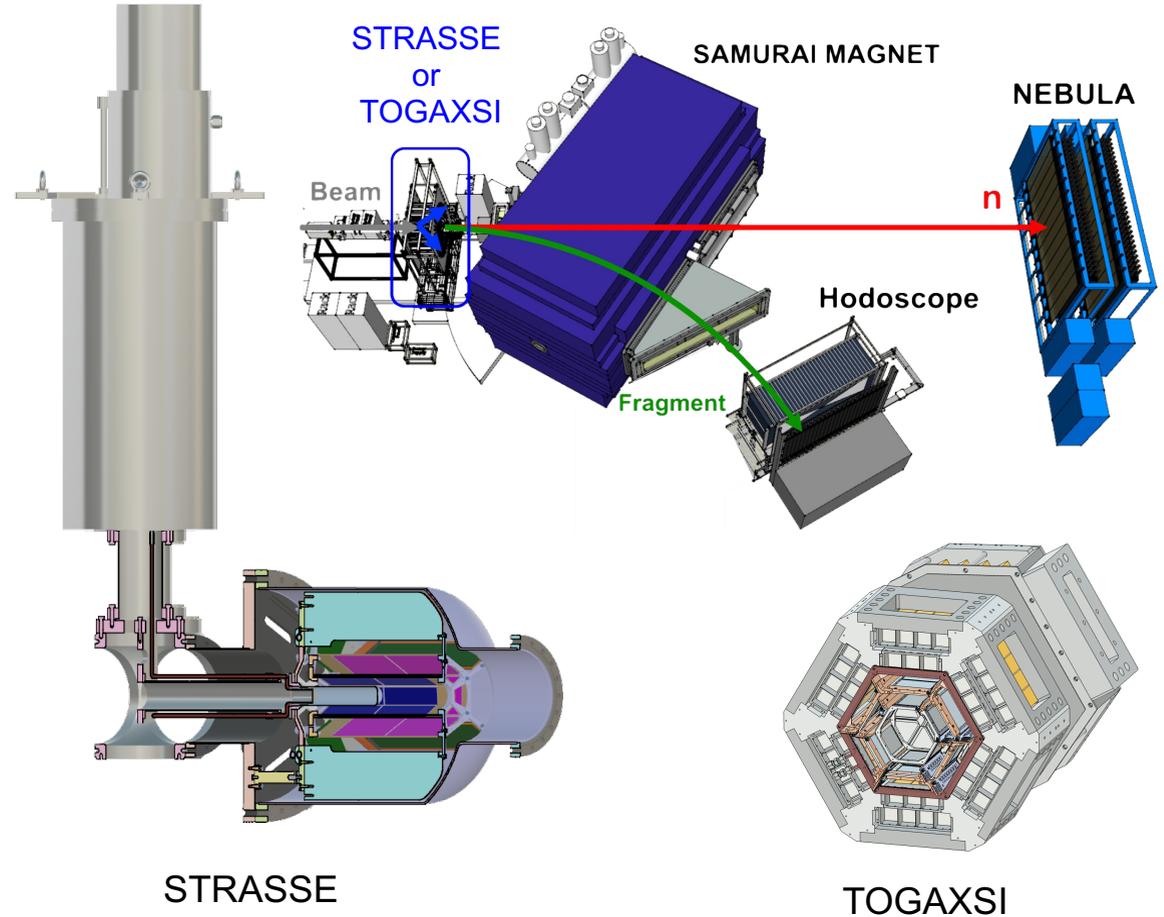
MUGAST@LISE - (2023 -> 2026)



GRIT + AGATA (2029 -> ?)



RIKEN

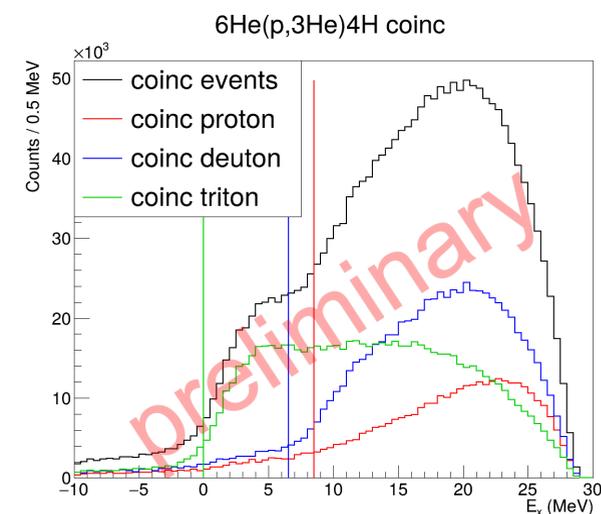
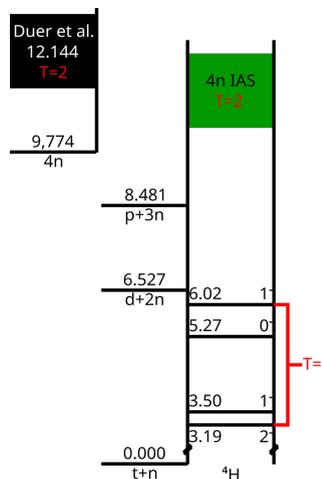
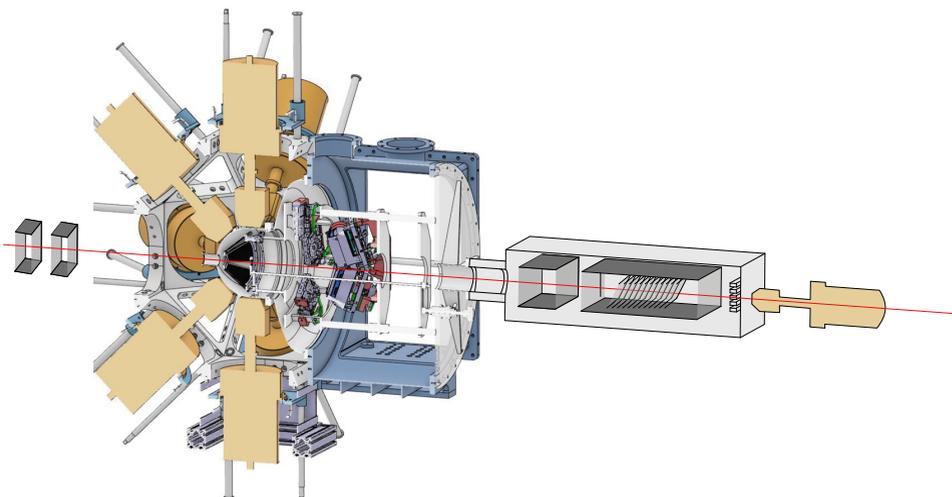


Courtesy of Q. Delignac

Motivation: Understanding the tetraneutron through the study of ^4H IAS

Method: $^6\text{He}(p,^3\text{He})^4\text{H} - 3n$ transfer

Experimental setup: MUGAST@LISE



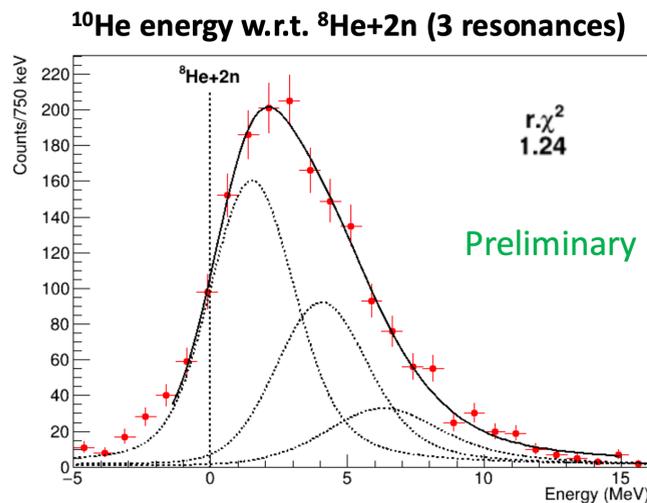
- Experiment performed in July 2025
- ^4H resonance g.s. is clearly visible!
- A hint of the IAS in the d channel!

Courtesy of O. Nasr

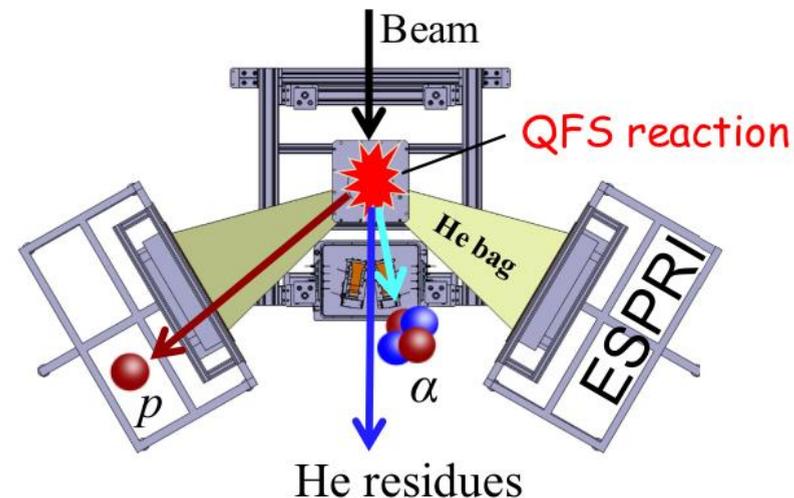
Motivation: Is there such thing as an hexaneutron?

Method: $^{14}\text{Be}(p, p\alpha)$ - alpha knockout

Experimental setup: ESPRI and SAMURAI at RIKEN

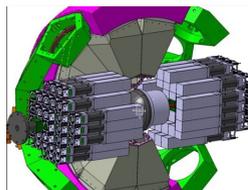


- Measurement of ^{10}He through $^{14}\text{Be}(p, p\alpha)$ reaction.
- Extraction of $6n$ spectra ongoing!
- PhD defence in May 2026!

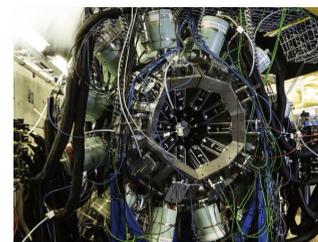


Work	Er(g.s)	Γ (g.s)	Er(1)	Γ (1)	Er(2)	Γ (2)
<i>H. T. Johansson et al. Nuc. Phys. A 842(2010)</i>	1.54(11)	1.91	3.99(26)	1.64	-	-
<i>A. Matta et al. Phys. Rev. C 92(2015)</i>	1.4(3)	1.5	6.3(7)	3.2	-	-
This work	1.40(22)	0.88	4.00(52)	1.49	6.3	3.2

- AGATA: A. Korichi et al.
 - Phase 2 MoU (2022-2030) goal 180 capsules



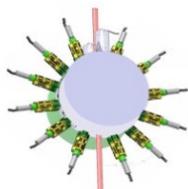
- PARIS: I. Matea et al.
 - MoU Amendment 2 (2022-2026)
 - ~ 91 phoswichs (~50% CeBr3 + ~50% LaBr3)



- Nu-Ball 1 & 2 at ALTO (Euroball+Paris+Fatima+...)

 temporary devices at ALTO

 M. Lebois & J. Wilson et al.



- g-SPEC/DESPEC GSI/FAIR: R. Lozeva et al.

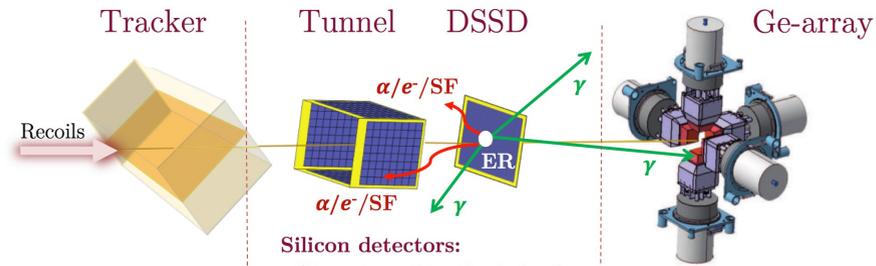
- MUGAST towards **GRIT** (current MoU 2020-2024)

 M.Assi , D.Beaumel, VGA, et al.



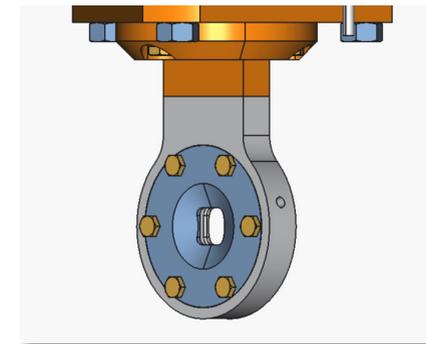
- **SIRIUS**: the detection system to be installed at the focal plane of S3 @ GANIL for heavy element spectroscopy

 K. Hauschild, A. Lopez-Martens et al.
 - S3-SIRIUS upgrade → SHEXI

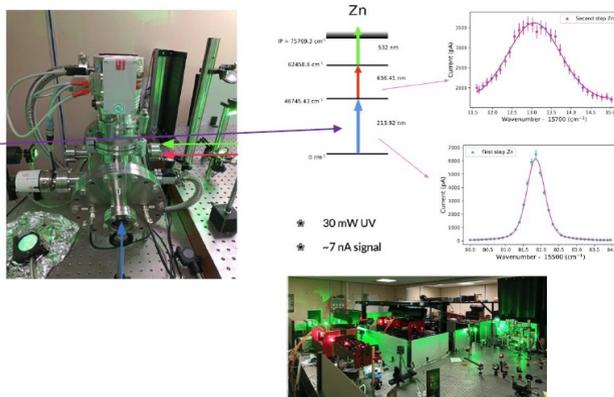
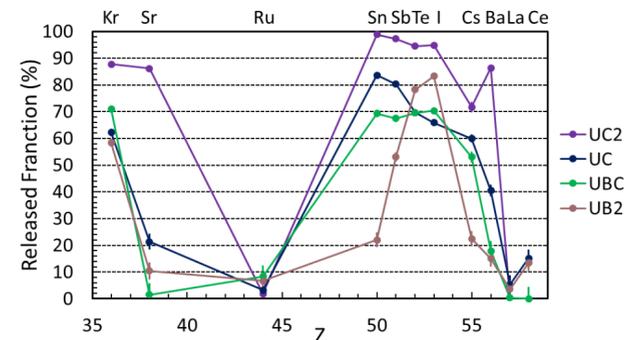


- **ATTRACT**: Development of new cryogenic target

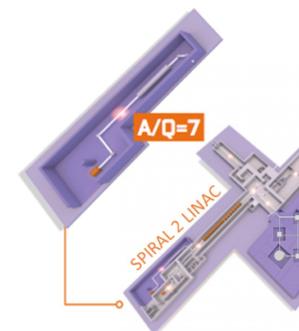
 M. Assi , A. Barri re (postdoc), VGA, et al.



- STUC (Studies of Uranium Compounds) – J. Guillot et al.
 - Solid state targets optimizations
 - Study of the relaxation of uranium-dense alloys UC2 , UB2 , UBC, UC
- Molecular beams – B. Roussi re et al.
 - fluorination, sulfurination ...



- RIALTO ALTO laser ion source (LIS) – F. Le Blanc et al.
 - New laser ionization schemes and operation of the LIS

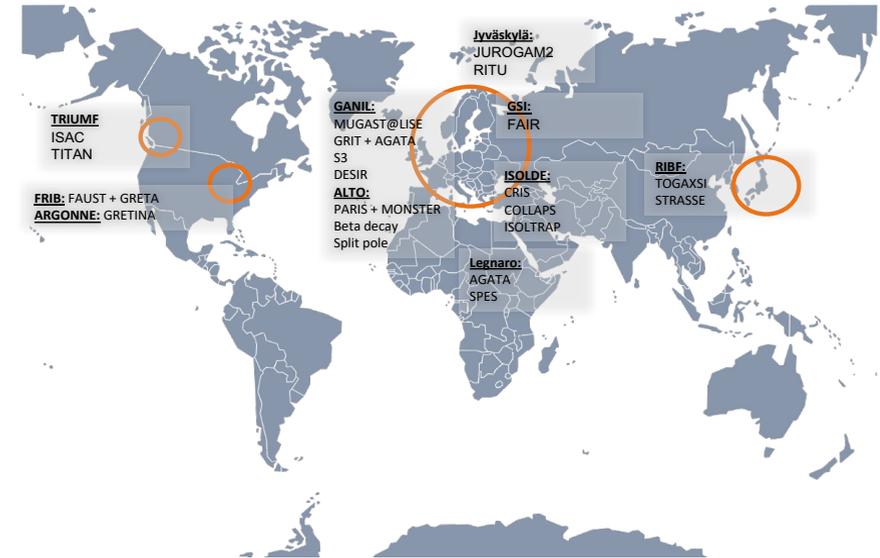


- Early-stage research on Target-ion-source devices that could sustain SPIRAL2's NEWGAIN expected beams - I. Stefan et al.

Courtesy of D. Verney

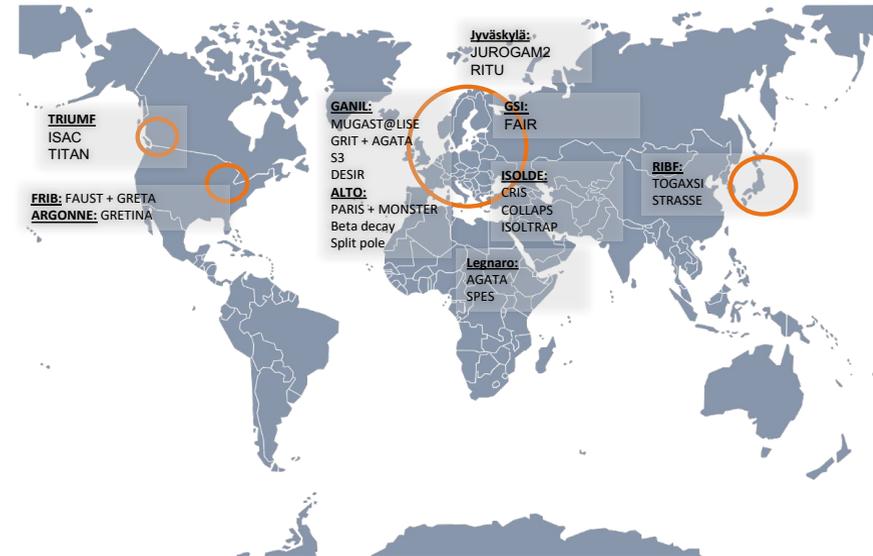
In the context of exotic nuclei, the nuclear physics division at IJCLAB:

- Is involved in many facilities around the world
- Works at all nuclear physics energy scales
- Is involved in the development of:
 - Modern state of the art detection systems
 - New beams for different installations



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Thank you for your attention!