

GANIL NEWSLETTER

JANUARY 2025

We wish you an excellent year full of success, happiness and achievements!

In 2025, GANIL is speeding up the renovation of its cyclotrons, while staying the course with a number of projects on SPIRAL2. So many opportunities to get together throughout this new year, which we wish will be a happy one for all of you. → Discover the digital greeting card.

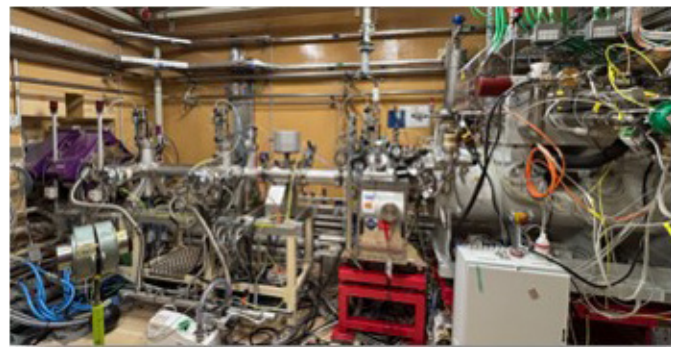
Patricia Roussel-Chomaz and Fanny Farget

HEADLINES

The first beam entered S³

The commissioning of the S³ spectrometer passed a decisive milestone on November 21st, 2024, with the first heavy-ion beam sent to the S³ target station. This important milestone for GANIL mobilised a very large number of people from several groups in the laboratory.

A beam of ⁴⁰Ar¹⁴⁺ with an energy of 5 MeV/u and an intensity of 80 μAe (5.7 pμA, or 3.6.10¹³ pps, or 1.14 kW) was conducted to S³ hall. This intensity is one of the highest ever achieved at GANIL and in facilities worldwide. This first stage enabled the optics of the transfer line from the LINAC exit to the S³ target point to be validated for the first time. A beam spot of 1.1 mm (FWHM) horizontally and 5.1 mm (FWHM) vertically, in line with specifications, was optimised at the target point. Finally, the time structure of the beam was successfully controlled by rotating the wheel, which comprises 18 targets, to avoid irradiating the supports of the individual targets. These initial results are very promising. They will continue in 2025, with the objective to validate the optics of the spectrometer-separator.



Beam time in 2025

Beam time in 2025 will see an increase in parallel operation between the LINAC and the CYCLOTRONS. The 2025 beam schedule is available [here](#).

If you want to make propositions to improve the beam-time experience in GANIL, do not hesitate to contact the GANIL Users executive Committee (GUEC): guec@ganil.fr. The GUEC has now a new member, representing the early career community: Armand Bahini.

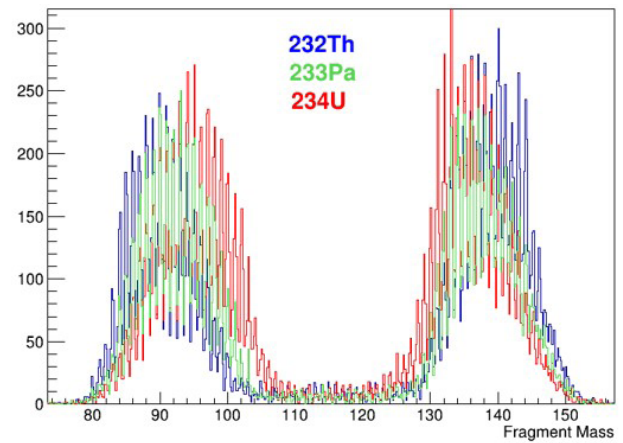
A lot of construction work in the surrounding of GANIL will happen in 2025. In particular in March and April, the access will be difficult...Tramway is an easy way to reach GANIL !!

SCIENTIFIC HIGHLIGHTS

²³²Th: a new beam accelerated at GANIL

Thanks to developments carried out by the GCS, a ²³²Th beam was produced and accelerated for the first time at GANIL, up to an intensity of 10^{10} pps in March 2024 for experiment E849_21.

New fissioning systems could be studied by multi-nucleon transfer reaction. An important step towards understanding the fission process!

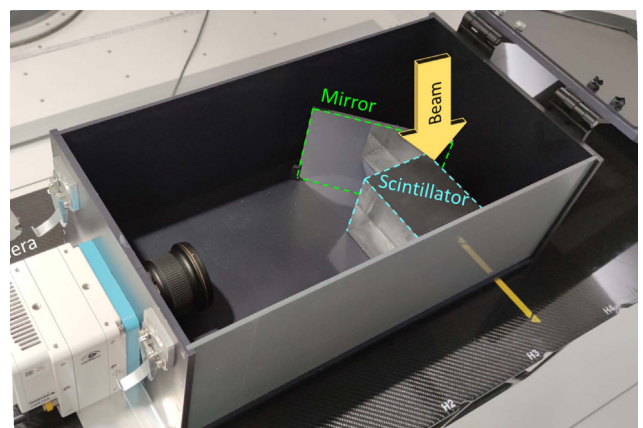


A new dosimeter to verify proton therapy treatments

GANIL activities in the field of research for health is flourishing. A new scintillation dosimeter has been developed for the control of small irradiation fields ($3 \times 3 \text{ cm}^2$) in proton therapy. It is based on a plastic scintillator that converts the dose deposited by the proton beams into visible light. A camera and a mirror make it possible to measure all the characteristics of the beams (position, energy, intensity) in a single acquisition. In the future, the detector will allow the reconstruction of dose distributions in 3 dimensions.

The results were published in the journal Medical Physics.

→ Read the article



Experimental device composed of a scintillating cube of $10 \times 10 \times 10 \text{ cm}^3$, a mirror oriented at 45° relative to the cube and a fast camera.

NFS shaped to applications linked to the dismantling of medical accelerators

Around 4,000 accelerators are used in Europe for radiological treatment. Photonuclear reactions in medical linear accelerators produce neutrons that activate materials. EURATOM and the IAEA are recommending better estimates of induced radioactivity, in order to improve the management of radioactive waste during the dismantling of medical accelerators, as well as the protection of patients and operators.

A recent publication shows that NFS neutron spectrum at 90° from the beam is very similar to the neutron spectrum induced by a medical electron accelerator, and perfectly shaped to assess the precision that can be achieved in the simulation codes used for the dismantlement methodology.

→ Read the article

UPCOMING MEETINGS AND EVENTS

February 4th-5th

Scientific council of GANIL

<https://indico.in2p3.fr/event/35151/>

March 10th-13th

Workshop on R&D for new ISOL beams (SPIRAL1 and ALTO)

<https://indico.in2p3.fr/event/34404/>

June 11th-13th

GRIT-AGATA-VAMOS workshop

<https://indico.in2p3.fr/event/34661/>

September 22th-26th

European Nuclear Physics Conference

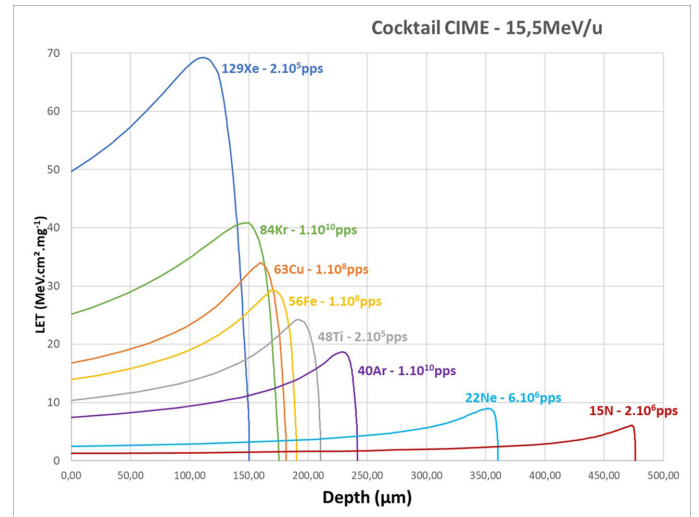
<https://indico.in2p3.fr/event/30430/>

Cocktail beams for industrial applications

Engineers of the Operation and Development Division have been conducting a machine study to test the CIME accelerator ability to produce and tune a 'cocktail' of several stable beams for industrial applications.

Twelve different beams from ^{15}N to ^{129}Xe were tuned to the same energy in three days!

GANIL industrial users (CNES, AIRBUS, THALES ALENIA SPACE) were present to define with the GANIL teams the reference cocktail beams for their needs.

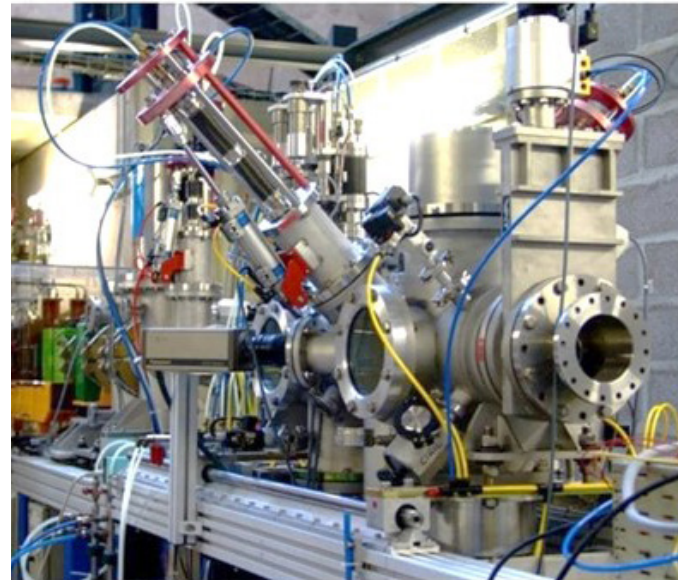


First cool down of the superconducting magnets of S³

A crucial step has been completed with the cooling of 6 SMT (Superconducting Multipole Triplets) of S³. The 66 superconducting coils have been immersed in liquid helium at 4.2K. This cooling validates the functioning of the entire cryogenic system (liquefier, cryogenic distribution line, cryostats). This is a big step towards the future commissioning of S³.

A broader energy range available on the IRRSUD beamline

The energy range available on the IRRSUD beamline used to be limited between 0.250 and 1 MeV/u. The radiofrequency harmonic of the C01 cyclotron has been modified in order to accelerate a $^{22}\text{Ne}^{2+}$ beam to 0.1 MeV/u. This tuning was coupled with an irradiation test conducted by the CIMAP laboratory to validate the use of these low energy beams. The success of this study thus allows the energy range of the different beams available on the IRRSUD beamline to be extended from 0.1 to 1 MeV/u.



A new operating range for BPM

The Beam Position Monitors (BPM) are the key elements in the beam control of SPIRAL2 linear accelerator. Designed for LINAC's high-intensity light-ion beams, the BPM had to be optimised to control the first heavy-ion beam for S³. Thanks to improvements in low-level measurements and in the way RF cavity disturbances are taken into account, as well as to a new tuning and monitoring application, an 80 μAe Argon beam at 5 MeV/u was successfully sent into the S³ hall.

