

GANIL

NEWSLETTER

JULY 2024

We are very pleased to send you our first GANIL Newsletter ! The goal of this Newsletter is to give the GANIL users community the latest news on GANIL experiments and technical developments. The first Newsletter gives a few examples of recent achievements, and invites you to send contributions on your latest exciting experimental results.

GANIL projects are progressing : S³ should receive its first beam on target by the end of the year, DESIR construction is in full swing, NEWGAIN officially entered in construction phase last year, plans for the cyclotrons renovation are under preparation, and GANIL is also starting a prospective for its medium and long term future. We will keep you updated on the future developments of these major evolutions of GANIL, but also on smaller scale projects which are important for GANIL future.

We hope this Newsletter will strengthen the link with the users community, and we also encourage you to interact with the GUEC (guec@ganil.fr) in order to give feedback on your latest experiment, or to bring suggestion for improving or adapting the GANIL experimental environment.

Have a nice summer !

Patricia Roussel-Chomaz et Fanny Farget

HEADLINES



GANIL

Visiting scientist program



Visiting scientist 2025

GANIL welcomes international scientists to apply to its new visitor program. The objective of this visiting scientist program is to provide an international venue for research on nuclear physics, interdisciplinary research, accelerator and instrumentation developments. The call for applications 2025 Visiting Scientist at GANIL is open until September 1st 2024.

<https://www.ganil-spiral2.eu/2024/04/05/call-for-visiting-scientist-program-of-ganil/>

Program Advisory Committee (PAC) - 27th to 28th of November 2024

This call is open for experimental proposals to be performed at the GANIL cyclotrons experimental areas and the SPIRAL2/NFS facility.

The deadline for submission of the proposals is October 1st, 2024 (12:00 CET).

<https://www.ganil-spiral2.eu/scientists/running-an-experiment-in-ganil/proposing-an-experiment/call-for-proposals-xpgan/>

UPCOMING MEETINGS AND EVENTS

Aug. 26-29

“Profs au GANIL”,
1st Teacher’s
program (Caen)

Sept. 9-13

NUSYM24 the
XIth International
Symposium on
Nuclear Symmetry
Energy (Caen)

Sept. 25

Scientific Partners
Committee (Caen)

Oct. 14-16

GANIL Community
meeting (Caen)

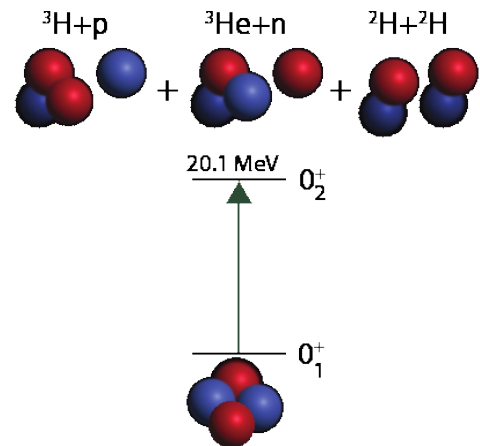
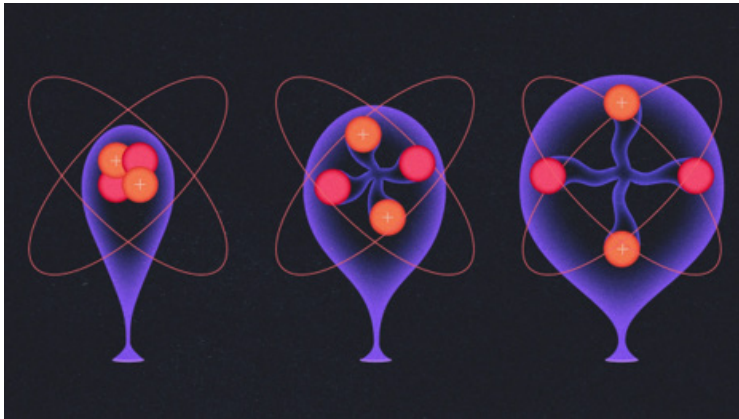
SCIENTIFIC HIGHLIGHTS

New calculations help solve the mystery of the first excited state of the alpha particle

Can the first excited state of ^4He really be interpreted as an inflated balloon?

No! Coupled channel calculations carried out within the framework of the Gamow shell model have clarified the mystery of this hitherto poorly reproduced state. Positioned at the level of the proton and neutron emission threshold, this state in fact corresponds to a coupling between 3 distinct configurations: two associating the weakly bound particle (proton or neutron) and the rest of the nucleus and one associating two deuterium nuclei. Quite a feat! [> Read more](#)

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.131.242502>



The alpha particle is not a closed quantum system, but an open system in which several reaction channel systems are juxtaposed.

Image : Witek Nazarewicz

Is there a dark decay of neutrons in ^6He ?

Can one of the two halo neutrons of ^6He decay in dark matter? If so, the two other pieces of the borromean nucleus would be freed, giving rise to a clear signal of dark matter creation that does not exist in the standard ^6He decay : the emission of a free neutron.

Thanks to the incredible purity and intensity (up to 3.10^8 particles par second, world record!) of the $^6\text{He}^+$ beam produced at GANIL SPIRAL1, a strong branching ratio upper limit for this exotic disintegration mode has been established at 4×10^{-10} , i.e. 5 orders of magnitude lower than required to solve the neutron lifetime discrepancy, further constraining the dark decay model as well as the neutron lifetime discrepancy.

This forms the PhD work of Marius Le Joubiou, 3rd year PhD student at GANIL: Search for a neutron dark decay in ^6He .

[> Read more](#)

<https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.132.132501>



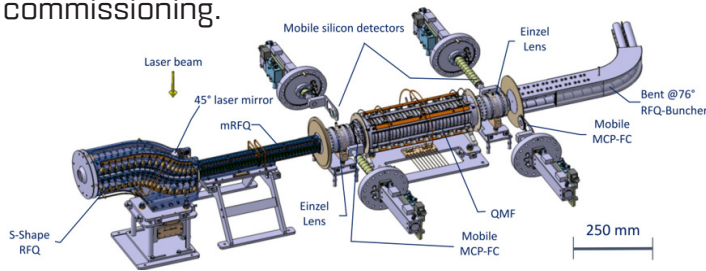
Experimental setup with the neutron detector TETRA at the end of the LIRAT line.

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AROUND THE MACHINE

S³-LEB moved from LPC to GANIL

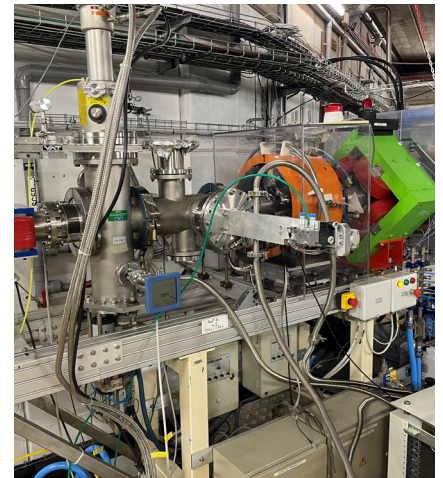
After nearly a decade of construction, testing and commissioning at LPC, Caen, S³-LEB has demonstrated excellent transmission and resolution. It has now been moved to the focal plane. It is an important step for the S³ project and its future commissioning.



A GANIL beamline modified for nuclear astrophysics experiments

The G21 beam line has just been completely overhauled to transport low-energy radioactive beams (1 to 2MeV/u). The new beam line makes it possible to slow down the beams of the CIME cyclotron while measuring the energy of each particle with a great precision. The project took place over 5 months with the contribution of many persons. The first experiment with the new set-up took place successfully in June 2024 with the first accelerated and decelerated ⁸Li beam (see below).

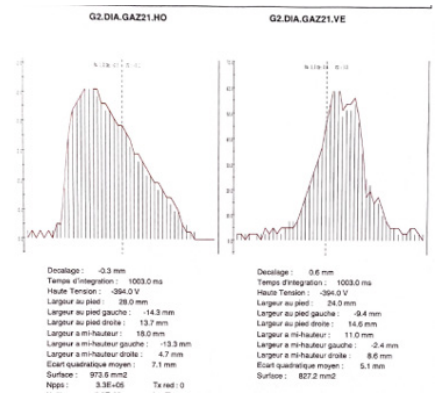
<https://www.ganil-spiral2.eu/2024/06/28/ganil-expands-its-energy-range-to-reach-for-the-stars/>



New post-accelerated beam of ⁸Li+

A new ⁸Li⁺ beam has been produced and sent to the ACTAR set-up at 1.2 MeV/u with an intensity of 5.10^{+5} pps at the entrance to G21. This new beam is the result of 3 years of studies and tests: development of a new Target Ion Source System dedicated to the production of ⁸Li⁺, modification of the G21 beam line to incorporate a degrader and new optical elements, definition of a specific methodology for tuning the very low-energy radioactive beam.

There is no doubt that these technical developments will have other applications for future experiments.

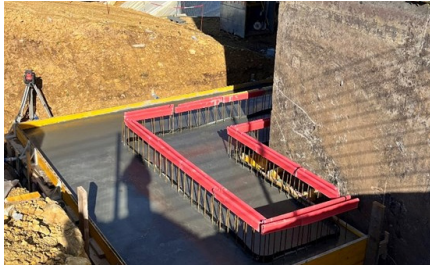


The new LIRAT beamline

The LIRAT beamline has been redesigned to be able to transport beams from SPIRAL 1 to DESIR. This section was put under vacuum in February 2024 for the first time since it was modified. The contributions of the teams in charge of mechanics, vacuum equipment, control & command, and beam equipment enabled this significant progress.



DESIR Construction



02/2024

With the work on the floor of the channels on the S³ side, the foundation work of the junction channel on the SPIRAL1 side goes on.

03/2024

Drilling work on the emergency exit and SPIRAL1 beams

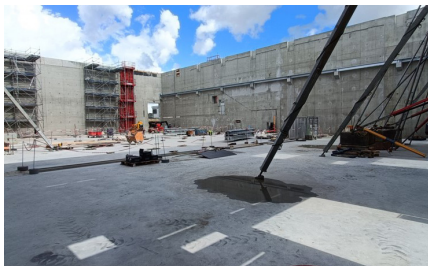


15/03/2024

The junction tunnel from S³ to DESIR is completed (-3 and -2 levels), and the construction of the walls of the DESIR hall has started.

01/04/2024

To the west, the southern embankment of S³ is reconstituted to a depth of -3.5 m, thus definitively burying the -3 and -2 levels of DESIR. To the east, the veil of the experimental hall gradually rises to its final height of 12 m.



15/05/2024

The DESIR experimental hall is now enclosed by its 4 walls. From this angle, with a little imagination, can't you see GPIB straight ahead, MORA on the left and PIPERADE at the very end?

30/06/2024

Installation of the first welded reconstituted beams (30m, 11t), which will support the hall roof and enable the building to meet its static and seismic structural requirements.

