



## M1 Internship in Accelerator Physics

[Study of Pressure Variations in the SPIRAL2 Linear Accelerator at GANIL with a  \$^{40}\text{Ar}^{14+}\$  beam.](#)

The GANIL (Grand Accélérateur National d'Ions Lourds) provide stable and radioactive beams since 1983 using a complex of accelerators, which currently includes five cyclotrons, various versatile detection facilities, and its main extension, SPIRAL2 (Système de Production d'Ions RAdioactifs en Ligne de 2e génération).

During the SPIRAL2 linac commissioning, all diagnostic devices have been continuously monitored as part of the beam surveillance program. Analysis of the results obtained during the power ramp-up of proton and deuteron beams has shown pressure variations in the "warm sections" of the linac. Similar variations have also been observed with heavy ion beams such as  $^{18}\text{O}^{6+}$  and  $^{40}\text{Ar}^{14+}$ . These variations are linked to beam losses.

The acceleration of heavy ion beams in SPIRAL2 is expected to increase in the coming years with the planned commissioning of room S<sup>3</sup> (Super Separator Spectrometer). In this context, understanding the pressure variations associated with beam losses is essential. To achieve this, a comprehensive analysis of data collected during the acceleration of a  $^{40}\text{Ar}^{14+}$  beam is necessary.

This internship, hosted by the Accelerator Physics Group (GPA) at GANIL, focuses on studying pressure variations in the "warm sections" of the linac using the  $^{40}\text{Ar}^{14+}$  beam accelerated in 2024.

The student will be introduced to the fundamental concepts of beam dynamics, as well as to the various components and diagnostic devices used along the beamline. This knowledge will be essential for effectively interpreting results and conducting simulations using a transport beam code.

This work will be carried out in collaboration with the vacuum and cryogenics group at GANIL, with regular meetings and discussions planned. In addition, the student will interact with various technical and operational groups at GANIL.

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