Internship in nuclear instrumentation

Contribution to the characterisation of a new ion source type

The goal of the internship is to characterise the performances of a new type of ion source dedicated to the atom-to-ion transformation of short-lived isotopes. This work will be realized within the framework of a global project named TULIP, funded by the French National Agency of Research. It will start by September 2019 for a duration of 4 years.
Its goal is to produce short-lived ions from products obtained by fusion-evaporation nuclear reactions. Once produced by collision with nuclei of a solid material, the radioactive nuclei are stopped in a catcher. By heating at high temperature the materials they are in contact with, they propagate up to a source where they are transformed into ions. Due to the low production rate of exotic nuclei and to their short half-life, the atom-to-ion transformation system must be as efficient and rapid as possible to minimize the losses.
An innovative principle is currently under test to address the related issues. Several technical steps are needed to reach the final version, aiming at the production of 100Sn with intensities never produced so far. Due to the interest of the physics community for this nucleus, to the world competition to reach this region of the nuclide chart and to the associated technical difficulty, this goal is a challenge, which the use of advanced technologies should overcome. Presently, promising results have been obtained with the first prototype. To make its principle adapted to the final goal, and so offer to the physics community new beams as soon as possible, a new type of ion source is under study.

After a period of learning and technical training, the candidate will have to contribute to the characterization tests of this new system and deepen the observations up to make it work or explain why it does not work.

The internship will mainly take place at GANIL, within a division of ~15 persons specialised in ion beam production. As developed within a collaboration with IPNO laboratory, the candidate will have to attend meetings held at Orsay, and according to the TULIP project agenda, he (she) will have to participate to experiments performed at ALTO facility.

Expected skills:
Solid knowledge in atomic and nuclear physics. Knowledge in instrumentation techniques: Static electric and magnetic fields calculation, simulation of propagation of charged particles in these fields (knowledge of SIMION code or equivalent), base of electronic, vacuum techniques up to 10-7mbar, mechanic. Fluent French and English.
Know how to be: curious, easy contact, easy self-questioning, strongly involved in his (her) activities, creative, eager to master and lead his (her) activities, pronounced taste for challenge

This internship leads to a PhD thesis.

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