



## Internship in experimental nuclear physics

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### Testing X-ray detectors for the study of superheavy nuclei

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Superheavy nuclei are currently detected and identified by measuring the alpha decay of known isotopes present in the decay chain of the nucleus produced. As studies progress towards increasingly heavy elements, isotopes appear whose decay mode is no longer alpha emission and/or whose alpha particle energy is not known. For these isotopes, it is necessary to find a marker that can be used for identification. Detection of the X-rays emitted by these isotopes makes it possible to validate the atomic charge of the nucleus produced. The detectors currently in use can only measure K X-rays, the energies of which may be common to other elements. For this reason, we are working in collaboration with IJCLab in Orsay and the IPHC in Strasbourg to develop an X-ray detection system that can detect L X-rays whose energies are distinctive of the chemical element. These detectors will be installed on the S<sup>3</sup> Super Separator Spectrometer. They must be placed as close as possible to the stopping point of the nucleus produced after its separation by S<sup>3</sup> and must be able to measure energies as low as twenty keV.

The aim of the internship is to analyze measurements made with X-ray detectors at the IJCLab in Orsay. The signals recorded will be processed to measure their energy resolution and their ability to discriminate between different particles. It will also be necessary to assess the ability of the detectors to reach detection thresholds low enough to reach the energy of L X-rays.

This internship can be followed by a PhD Thesis aiming to develop the detectors in view of their use on S<sup>3</sup>.

#### **Expected skills**

- Masters 1 in subatomic physics
- Knowledge of scientific programming (C++, ROOT, etc) for data analysis on LINUX mandatory.

This work leads to a [PhD-thesis](#)

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