Laboratoire de Physique Corpusculaire
CNRS – IN2P3 – ENSICAEN – UNICAEN
UMR6534

PhD position in low-energy nuclear physics

Towards high resolution laser spectroscopy and high precision mass spectrometry measurements of proton emitting Tm and Lu isotopes

The main objective of this PhD project is the preparation and the realisation of high precision mass spectrometry measurements and laser spectroscopy of neutron deficient thulium isotopes towards the $N = 82$ shell closure and beyond.
The Tm isotopic chain is known for the deformation of its ground state. Furthermore, the shape of this ground state is predicted to change when crossing both the $N = 82$ shell closures and the proton dripline. Detailed high precision mass spectrometry and laser spectroscopy measurements throughout both isotopic chains, up to the proton emitting states, will help to understand the nuclear structure evolution of these two chains.
These studies will take place between the LPC Caen and GANIL for the preparation work, and at the accelerator laboratory of the University of Jyväskylä for the measurements. The successful candidate will firstly be involved in stable Tm production tests, which will be followed by mass spectrometry and/or laser spectroscopy measurements of neutron deficient Tm. This work includes the preparation and realization of the experimental campaign in close collaboration with the S^{3}LEB collaboration and the IGISOL group from the University of Jyväskylä, data analysis, presentation of the results to international conferences as well as their publication in international peer-reviewed journals.
In parallel, the candidate will have the opportunity to contribute to the online commissioning of the S^{3}LEB apparatus in GANIL. The Super Separator Spectrometer S^3 facility has been developed to create new opportunities for studies of heavy and super-heavy nuclei, as well as in the vicinity of the $N = Z$ region and at the proton dripline. S^{3}LEB is one of the two major setups coupled to S^3 and is using high resolution spectral measurements of the atomic transitions to provide fundamental and nuclear-model-independent data on the structure of ground and isomeric nuclear states. In this context, this setup will allow the measurements of static properties of exotic nuclei such as charge radii, electromagnetic moments, nuclear spins and atomic masses, giving information on the distribution of the nucleons inside the nucleus and providing information on structural changes throughout the chart of nuclei.

Expected skills:

- Skills in the field of laser physics, atomic physics, ion manipulation and nuclear physics will be developed in the course of the PhD training
- Ability to work in team
- Proficiency in English

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