PhD position in Laser spectroscopy – low-energy nuclear physics

First High Resolution In-gas-jet Laser Spectroscopy at S^3LEB

Description:

The Super Spectrometer Separator (S^3) facility at GANIL-SPIRAL2 will extend the capability of the facility to perform experiments with radioactive nuclei produced with extremely low cross sections, taking advantage of the very high intensity stable beams of the superconducting linear accelerator of SPIRAL2. The focus of S^3 physics in the field of nuclear physics is the study of nuclei from medium-heavy mass at the proton drip line up to the super-heavy elements produced by fusion-evaporation reactions. S^3 will investigate the properties and the decays of their ground and isomeric states. These studies will pave the road to unravel the strong and weak interaction at play in the nuclear medium. The interest of the S^3 physics is that the nuclear chart can be studied by different approaches depending on the experimental set-up placed at the end of the spectrometer.

The major attribute of the S^3 Low Energy Branch (S^3-LEB), one of the major instrumentation setups deployed at S^3, is to use atomic physics techniques - more specifically, high resolution spectral measurements of the atomic transitions – in order 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. This state-of-the-art technique will be used at S^3 with rare beams never studied by low-energy measurements.

The objective of this PhD project is to work on the commissioning plan and the first experiment of the S^3 Low Energy Branch. The final goal of this project is to obtain nuclear and atomic physics information of the most neutron deficient erbium isotopes and beyond closer to the $N = 82$ shell closure.

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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