

PhD position for fundamental research in low energy nuclear physics using laser spectroscopy tools:

Heavy Element Laser Ionization Spectroscopy at GANIL

Description : This PhD position is opened in the framework of the Heavy Element Laser Ionization Spectroscopy - HELIOS project. The objective of this project is to develop a new, efficient, high-resolution laser spectroscopy technique that overcomes the present experimental constraints to study the heavy element region. The approach is based on in-gas-jet resonance-ionization spectroscopy using narrow-bandwidth, high-power, high-repetition-rate, pulsed lasers of actinide isotopes produced in fusion evaporation reactions, using intense heavy-ion beams. The regions of interest are the neutron-deficient actinium, thorium, protactinium and uranium around $N=126$, and the actinides with N/Z between 1.47 and 1.49. The final goal is the study of the atomic structure of nobelium and beyond.

Currently, off- and on-line characterization of the whole set-up is ongoing in the KU Leuven home laboratory and, in-preparation of the first experiments in the heavy element region planned for 2019, a new facility is being developed at the SPIRAL-2 facility at GANIL (France); a facility that is on the ESFRI list (European Strategy Forum on Research Infrastructures). This work is performed in a large international collaboration with KU Leuven (Belgium), GANIL, LPC-Caen, IPNO-Orsay (France), the university of Mainz (Germany) and the university of Jyväskylä (Finland).

The final goal of this project is to obtain nuclear and atomic physics information of the heaviest elements in nature. Nuclear properties will focus on charge radii, magnetic and quadrupole moments and spins while atomic properties deal with energies and rates, of so far unknown transitions, ionization potentials, hyperfine parameters, isotope/isomer shifts and atomic F and $MSMS$ factors. These data will be confronted with state-of-the-art nuclear and atomic calculations.

We are looking for enthusiastic candidates who will work full-time at the GANIL site (Caen, France) to set-up in collaboration with the local laser team a new laser laboratory (based on TiSa laser systems representing the core of the new facility) to investigate and characterize efficient, selective and sensitive atomic ionization schemes of the actinide elements (including studies in a gas environment) and to perform the very first high-resolution on-line measurements using nobelium isotopes. After an initial training period in the KU Leuven laboratories (3 months), you will be stationed at the GANIL site and work with the local research groups (laser physics, radioactive ion beam developments).

Regular travels between the different partner laboratories (Caen, Leuven, Mainz and Jyväskylä) will take place.

Required skills : Good knowledge in nuclear and atomic physics, photonics, ion optics, instrumentation, and computing are desirable.

Position offered : We offer a full-time PhD grant for a period of 2 (plus 2) years. After an initial training period at KU Leuven, you will be stationed at the GANIL site (Caen, France) and work in the local physics and technical research groups.

Contact persons :

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