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PhD position in Nuclear Physics

Study of Short-Range Correlations in exotic nuclei

The nuclear structure group of the Nuclear Physics Department (IRFU/DPhN) of CEA Saclay (France) is looking for a candidate for a PhD Thesis in experimental nuclear physics.

Project Description

The atomic nucleus is a quantum system of interacting fermions, protons and neutrons, bound by the nuclear force. Understanding how the nuclear force emerges from the basic constituents of matter is one of the challenges of contemporary physics. The nuclear interaction is most poorly known at short range (≈ 1 fm, much smaller than the average inter-nucleon distance) and configurations where nucleons are coupled at short range, called short-range correlations, offer us a unique opportunity to study it.

Experiments to characterize short-range correlations have been done on stable nuclei, but the experimental technique used up to now does not allow access to unstable nuclei, where the imbalance between protons and neutrons may affect these correlations. A new technique allowing studying short-range correlations in exotic nuclei with a proton target is under development.

The candidate will analyze data from the first experiment that was performed in March 2018 using stable beams from the JINR accelerator in Dubna (Russia). He/she will be then strongly involved in the program proposed by the group with the radioactive beams produced by the GSI accelerator (Germany) and a liquid hydrogen target that we are currently developing thanks to a grant from the French National Research Agency.

In parallel to the experimental program, he/she will perform simulations to design a new detection system based on tracking of charged particles in a magnetic field. The goal is to increase acceptance for identification and momentum measurement of charged particles in future experiments at GSI.

The thesis will be done at CEA in close collaboration with MIT (USA), GSI and TU Darmstadt (Germany) teams. A long stay in Darmstadt can be envisaged.

The proposed project will allow the candidate to develop a strong knowledge in nuclear physics and to master analysis and simulation tools. Close interaction with the technical divisions of CEA will also allow the candidate to develop competences in most technical aspects (cryogenics, vacuum techniques).

Candidate profile

A Master (or equivalent) degree in physics is required. The candidate should have an interest in experimental and theoretical nuclear physics, programming skills and speak English.

Interested candidates should send a CV and a letter of motivation to acorsi@cea.fr as soon as possible and by end April 2018. The contract can start from October 2018.