



Doctoral student in Physics; Nuclear Physics

Lund University, Faculty of Science, Department of Physics

Lund University was founded in 1666 and is repeatedly ranked among the world's top 100 universities. The University has around 46 000 students and more than 8 000 staff based in Lund, Helsingborg and Malmö. We are united in our efforts to understand, explain and improve our world and the human condition.

Lund University welcomes applicants with diverse backgrounds and experiences. We regard gender equality and diversity as a strength and an asset.

The research in basic nuclear physics at the Division of Nuclear Physics is carried out at international accelerator laboratories with the help of advanced detector systems, many of which are developed in Lund. The focus of the research is on atomic nuclei far from stability using accelerators for radioactive ion beams, in particular at the ISOLDE experiment at CERN and the NUSTAR experiments at FAIR. Nuclear models and their general application to exotic atomic nuclei are studied together with nuclear properties of interest for nuclear astrophysics and fundamental physics. Research concerning the development of new detector systems for use in the experimental program is also carried out at the division using local laboratories for basic and applied nuclear physics.

Work duties

The PhD student will work within the group's research program at ISOLDE, and potentially FAIR, with the purpose to investigate atomic nuclei far from stability using radioactive ion beams. The group has a longstanding activity at ISOLDE and has been involved in the core team that developed the first post-accelerator for radioactive ion beams at CERN, REX-ISOLDE, as well as in its most recent upgrade, HIE-ISOLDE, to increase the beam energy of the facility. ISOLDE is CERN's radioactive beam facility, where more than 1000 different isotopes of over 70 elements can be produced by bombarding dedicated targets with a 1.4 GeV proton beam from one of the CERN injectors. The radioactive beam is selected via mass separation, e.g., using laser-based methods. The current focus of research group is to perform experiments using short-lived radioactive beams, with an energy up to ~ 10 MeV/u, using scattering, transfer reactions and Coulomb excitation. The PhD student will work with the implementation of new equipment when needed, perform experiment, analyze data and publish the results. The focus of the work will be on:

- Nuclear structure for isotopic chains between shell closures.
- Experiments of interest within nuclear astrophysics.

Experimental data is collected using detectors for charged particles, neutrons and gamma-radiation. Practical aspects of the work are planned to include:

- Experiments with the ISOLDE Solenoidal Spectrometer for transfer reactions.
- Experiments with the MINIBALL-system for detection of gamma-radiation, charged particles, and electron spectroscopy.
- Experiments within the Phase-0 program at FAIR.
- Simulations, e.g., using GEANT4, to optimize detector systems for experiments and as part of data analysis.

The course work, data analysis and thesis writing are planned to be carried out in Lund, while the experimental work is carried out at facilities abroad. It is expected that the PhD student will spend time, up to a few months, stationed at laboratories and institutes abroad for experimental work.

The main duties of doctoral students are to devote themselves to their research studies which includes participating in research projects and third cycle courses. The work duties can also include teaching and other departmental duties (no more than 20%).

Admission requirements

A person meets the general admission requirements for third-cycle courses and study programmes if he or she:

- has been awarded a second-cycle qualification, or
- has satisfied the requirements for courses comprising at least 240 credits of which at least 60 credits were awarded in the second cycle, or
- has acquired substantially equivalent knowledge in some other way in Sweden or abroad.

A person meets the specific admission requirements for third-cycle studies in Physics if he or she has:

- Passed an independent project (e.g. degree project) of at least 30 credits in a relevant subject.

Equivalent knowledge acquired through corresponding programmes will be assessed individually. In order to enable interdisciplinary initiatives and important specialisations in certain areas, students with qualifications in subjects other than Physics may be considered for admission.

Finally, the student must be judged to have the potential to complete the programme.

Additional requirements:

- Very good oral and written proficiency in English.
- The work includes experiments that will be carried out at facilities abroad. It is expected that the PhD student can travel in order to participate in these experiments.

Other assessment criteria

- Knowledge in basic subatomic physics, and experimental methods related to the field, e.g., radiation detectors and real time systems used for data acquisition.
- Practical knowledge of programming languages such as C++, Python etc. and computer simulations are also meritorious.

Basis of assessment

Selection to postgraduate studies is based on the expected ability to perform well in the studies. The evaluation of the ability to perform well is based primarily on the results of studies at the basic and advanced levels, in particular:

1. Knowledge and skills relevant to the thesis project and the subject of the study.
2. An assessment of ability to work independently and to formulate and tackle research problems.
3. Written and oral communication skills.
4. Other experience relevant to postgraduate studies, such as professional experience.

Consideration will also be given to good collaborative skills, drive and independence, and how the applicant, through his or her experience and skills, is deemed to have the abilities necessary for successfully completing the third cycle programme.

Terms of employment

Only those admitted to third cycle studies may be appointed to a doctoral studentship. Third cycle studies at LTH consist of full-time studies for 4 years. A doctoral studentship is a fixed-term employment of a maximum of 5 years (including 20% departmental duties). Doctoral studentships are regulated in the Higher Education Ordinance (1993:100), chapter 5, 1-7 §§.

Instructions on how to apply

Applications may be written in *English or Swedish* and include a cover letter stating the reasons why you are interested in the position and in what way the research project corresponds to your interests and educational background. The application must also contain a CV, degree certificate or equivalent, and other documents you wish to be considered (grade transcripts, contact information for your references, letters of recommendation, etc.).

The applicant is asked to answer the selection questions as the first step of the application process.

The Faculty of Science conducts research and education within Biology, Astronomy, Physics, Geosciences, Chemistry, Mathematics and Environmental Science. The Faculty is organized into nine departments, gathered in the northern campus area. The Faculty has approximately 1500 students, 330 PhD students and 700 employees.

The Department of Physics is one of Lund University's largest departments with approximately 400 employees. The department is shared between the Faculty of Science and Faculty of Engineering. At the department there are seven research divisions and a number of major research centra. The research at the department covers a wide range of modern physics.

www.fysik.lu.se/en/

We kindly decline all sales and marketing contacts.

Type of employment	Temporary position longer than 6 months
First day of employment	As soon as possible
Salary	Monthly salary
Number of positions	1
Full-time equivalent	100
City	Lund
County	Skåne län
Country	Sweden
Reference number	PA2023/67
Contact	Joakim Cederkäll, professor, +46462227685
Union representative	OFR/ST:Fackförbundet ST:s kansli, 046-2229362 SACO:Saco-s-rådet vid Lunds universitet, kansli@saco-s.lu.se
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