Translation of Curriculum Statement for Graduate Level (Third-level) Education

Physics with specialization in Nuclear Physics

Swedish title: Fysik med inriktning mot kärnfysik

TNFYSI07

Swedish Curriculum adopted by the Board of the Faculty of Science and Technology (Board for Third-level Education) on 2008-07-02. Translation approved on 2010-08-10.

The Curriculum Statement for Third-level Education consists of three parts: a general part, a subject-specialized curriculum statement, and each doctoral student's individual study plan.

Objective
Assuming prior knowledge of Quantum and Subatomic Physics, Third-level education is intended to give additional insights into the more important parts of the general subject, as well as deeper knowledge within at least one specialized area. Guidance and thesis work should make the student well prepared for independent, critical research activities as well as for other professional activities, with high requirements concerning depth of knowledge and research experience.

The doctoral student should also be able to present her/his own goals and results orally and in writing to different target groups in English, and, in the case of Swedish-speaking doctoral students, in Swedish.

Subject description
Nuclear physics comprises a description of the structure, dynamics and general properties of systems held together by the strong nuclear force, ranging from individual hadrons (strongly interacting particles) to atomic nuclei. Within the special area Hadron physics one studies how the smallest constituents of matter, i.e., quarks and gluons, interact to form of different hadrons. The special area Nuclear structure physics is directed towards studies of how the hadrons form complex many-particle systems, like atomic nuclei. Both experimental and theoretical research is included.
Knowledge about the dynamics and structure of nuclear systems is largely obtained from complex scattering experiments, where accelerated light and heavy ions are allowed to interact with individual atomic nuclei. The experimental research normally takes place at large international research laboratories.

Eligibility

Basic Eligibility
The basic eligibility for Third-level education is described in the general part of the curriculum statement.

Special Eligibility
A student has special eligibility for a Third-level program in Nuclear physics if she/he has passed examinations in physics courses corresponding to within areas of relevance for Nuclear physics, containing a minimum of at least 90 university credits, or if she/he has acquired the equivalent knowledge abroad.

Admission
Applicants for Third-level programs in Nuclear physics must submit an application to the Department of Physics and Astronomy. Admissions to openings in Third-level programs are normally announced once or twice per year.

For admission, a financial plan is required covering both the personal subsistence and the research.

Program structure
The Third-level education program contains laboratory and theoretical courses, literature studies, seminars and lectures, as well as research work leading to a thesis. The doctoral student should normally also take part in department work, within education, research and administration at a level up to 20 %.

In connection with the admission, each doctoral student and her/his supervisor should present an individual study plan, after consultation with the professor in charge of The Third-level program. This plan must be approved by the head of the department (by delegation of the Faculty Board).
The individual study plan should be reviewed annually, jointly by the doctoral student and her/his supervisor and provided with a summary of the achieved results as well as with plans for the coming year. Significant changes and any disagreement on the individual study plan shall be reported to the head of the department or, if deemed necessary, to the Board for Third-level Education.

Courses
Within the Third-level program there may be different kinds of courses, such as lectures, literature studies, practical training, field studies, etc. The courses are meant to give broader knowledge of the subject, as a complement to the specialized competence acquired in the research activities. Most of those included in the individual study plan are normally selected from the list of Third-level education courses given by the Department of Physics and Astronomy. They are chosen in agreement with the supervisor. Courses which are included among those giving special eligibility cannot be chosen. The course list as well as the content of the literature courses is continuously revised. A selection of the following courses should be included in the study:

- Relativistic quantum mechanics
- Quantum field theory
- Nuclear few-body systems
- Hadron physics
- Nuclear structure physics
- Nuclear astrophysics
- Accelerator physics and technology
- Ionizing radiation and detectors
- Statistical and Monte Carlo methods in physics

Requirements for doctoral degree
The requirements for the doctoral degree consist of passed examinations in the courses included in the approved individual study plan, as well as passed public defence of the doctoral thesis. The program leading to the doctoral degree amounts to 240 university credits (four years of full-time studies), of which the thesis part amounts to a minimum of 120 credits and the course part to a minimum of 60 credits.
Requirements for licentiate degree
A stage of at least 120 university credits (two years of full-time studies) in the Third-level program may be completed with a licentiate degree. The corresponding requirements are that the doctoral student has passed the examinations included in the program stage, and has successfully submitted a scientific paper amounting to a minimum of 60 credits. The course part amounts to a minimum of 30 credits.

Miscellaneous
Research in Nuclear physics is often carried out in large international collaborations. It is necessary for the doctoral student to be able to communicate in English, both orally and in writing.