Laboratoires et Stage de recherche

Lecturers
Barbara CLERBAUX (Coordinator), Juan Antonio AGUILAR SANCHEZ, Gilles DE LENTDECKER, Patricia Maria LOSADA PEREZ, Ioana Codrina MARIS, Simone NAPOLITANO and Simona TOSCANO

Course mnemonic
PHYS-F311

ECTS credits
10 credits

Language(s) of instruction
French

Course period
Second term

Course content

Experiments with several commercial, sealed nuclear sources such as Co-60, Cs-137, Am-241 are conducted. The students measure the radiation using one or more of

- NaI scintillator + bi-alkali photomultiplier tube
- Gas proportional tube
- Semiconductor (CdZnTe) detector

and, using the GEANT4 simulator, explain their observations. Some emphasis on statistical analysis is demanded.

Objectives (and/or specific learning outcomes)

This course is a laboratory study of the fundamentals of radiation detection used in the field of nuclear and particle physics. Students will work with sensor devices, data acquisition equipment, and analysis tools in order to understand the physics which occur in the interaction of nuclear radiation with matter. Additionally, the students will simulate a visualize the underlying processes using a simulation package GEANT4 developed originally for use in particle physics experiments but now deployed widely in academia and industry for topics as diverse as medical dosimetry.

Pre-requisits and co-requisits

Pre-requisites courses

PHYS-F210 | Laboratoires, statistique appliquée à la physique expérimentale et projet | 10 crédits

Co-requisites courses

PHYS-F305 | Physique des particules et Physique Nucleaire | 5 crédits and PHYS-F308 | Soft Matter and Solid State Physics | 5 crédits

Teaching method and learning activities

This is a laboratory course which takes one full 40-hour week. The students are divided into groups (binomes/trinomes) to collectively work with one of the detectors.

References, bibliography and recommended reading

- Glenn F. Knoll, *Radiation Detection and Measurement* ISBN-13: **978-0471073383**
- W. R. Leo, *Techniques for Techniques for Nuclear and Particle Physics Experiments*, ISBN-13: **978-3540572800**

Other information

Contact(s)

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Evaluation method(s)

Other

Evaluation method(s) (additional information)

A written laboratory report is due one week following the completion of the experiment.

Determination of the mark (including the weighting of partial marks)

75% of the grade is based on the quality of the laboratory report. Students are expected to know from BA1 and BA2 laboratory experience how to write lab reports. The remaining 25% is based on the students' performance during the laboratory.

Programmes

Programmes proposing this course at the faculty of Sciences

BA-PHYS | Bachelor in Physics | unit 3