UNIVERSITÀ DI PISA

LABORATORY OF FUNDAMENTAL INTERACTIONS

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Anno accademico	2019/20
CdS	PHYSICS
Codice	280BB
CFU	15

Moduli	Settore/i	Tipo	Ore	Docente/i
MODULO A	FIS/01	LABORATORI	225	ROBERTO DELL'ORSO LUCA GALLI MARCO STANISLAO SOZZI
MODULO B	FIS/01	LABORATORI	225	ROBERTO DELL'ORSO GIOVANNI PUNZI

Learning outcomes

Knowledge
The student will learn the basics of the phenomenology of matter and radiation interactions and the principles of single particle detection.

Assessment criteria of knowledge
The assessment of the acquired knowledge will be performed partly through the evaluation of its usage during the laboratory work, partly based on the written reports produced during the course,and partly through the final oral examination for what concerns the basic underlying principles.

Skills
The student will acquire the skills required to perform a complete measurement of a physical quantity in the lab, studying all their aspects related to the evaluation of uncertainties, and learning to cope with the experimental and intrinsic limitations of the measurement itself. He/she will also acquire the skills required to present in public the performed work, and to describe it properly in written form.

Assessment criteria of skills
The student skills will be assessed during the laboratory activities, through the illustration of workk in seminars for students and teachers, and the preparation of written reports on the performed measurements.

Behaviors
The student will learn how to behave in order to deal with the many aspects to be considered and the difficulties to be overcome in performing a complete physical measurement, and how to be proactive in evaluating original solutions to the posed problems.

Assessment criteria of behaviors
The student's beaviour will be evaluated during the laboratory work.

Prerequisites
Classical physics, special relativity, basic notions of quantum mechanics. Statistics.

Syllabus
Interation of matter and radiation, basic notions, cross section, mean free path, relativistic kinematics.
Notions of radioactivity and radioprotection.
Energy loss by ionization, range, ionization chambers, wire and drift chambers, solid state detectors, magnetic spectrometers.
Scintillation process and detectors.
Cerenkov effect and detectors.
Photon interactions, calorimetry.
Notions on electronic detection chain, data acquisition, modular electronics.

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Bibliography
Leo - Techniques for nuclear and particle physics experiments
Fernow - Introduction to experimental particle physics
Grupen - Particle detectors
Particle Data Group - Review of particle physics

Non-attending students info
Performing laboratory experiences in groups during the course is mandatory.

Assessment methods
The exam includes an evaluation of the written reports on laboratory work performed in groups, their oral discussion, and the assessment of the knowledge of basic single-particle interaction and detection principles.

Class web page
https://elearning.df.unipi.it/course/view.php?id=265

Additional web pages
https://elearning.df.unipi.it/course/view.php?id=265

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