



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Laboratorio di Misure Nucleari e Subnucleari I

2021-1-F1701Q121

Aims

The laboratory course provides an introduction at graduate level of the experimental techniques employed in particle and nuclear physics, including applications to medical and environmental physics.

Contents

The students carry on a full experiment in nuclear and particle physics, including the characterization of the source, detector, front end electronics, data acquisition and analysis

Detailed program

The students work in a team of 3-4 people and carry on a full experiment of nuclear or subnuclear physics. They contribute to the design of the experiment, the characterization of the detectors and front-end electronics, the data taking and analysis.

The experiment that can be built from the laboratory instrumentation are

- 1) Proof of concept of the Positron Emission Tomography (PET)
- 2) Measurement of the lifetime of a unstable state of ^{57}Fe from a ^{57}Co source
- 3) The Compton experiment performed from the annihilation photons of a ^{22}Na source
- 4) Measurement of the lifetime at rest of the muon

Prerequisites

Experimental and analysis techniques from the Bachelor level lab courses. It is strongly recommended to follow the course on Radiation Detectors, which is normally delivered almost completely before the start of the laboratory.

Teaching form

The experiments are performed in the labs of the Department of Physics and the activities are supervised by the teacher. The results are summarized in a final report written in English.

During the Covid-19 emergency period it will be necessary to guarantee social distancing and the use of masks, respecting all the indications that will be provided to us with a special protocol by the supervisors. The use of the laboratory spaces may follow indications regulated by the University.

Textbook and teaching resource

The final reports from the previous years. We also suggest the reading of a few chapter (depending on the experiment) from

G. F. Knoll, "Radiation Detection and Measurement", 4th ed., Wiley & Sons

K. Grupen, "Particle Detectors", 2nd ed., Cambridge University Press

G. Gilmore, "Practical gamma ray spectroscopy", 2nd ed., Wiley & Sons

Semester

First semester

Assessment method

The team that performed the experiment presents the final report and discuss it with the teacher. During the discussion, the techniques that were implemented will be discussed, together with the issues encountered during the run of the apparatus and possible sources of systematic errors in the measurements.

During the Covid-19 emergency period, oral exams will only be online. They will be carried out using the WebEx ____

Office hours

Under request by the team.
