

Physics 221L
Intermediate Physics Laboratory
(0.4; 2 credits)

Textbook: Departmental Laboratory manual.

Content:

One 4-hour laboratory session per week. Students will have to perform a total of eight experiments (4 introductory and 4 advanced) selected from the following list:

Introductory experiments (one per session):

- 1- Rays and particles diffraction.
- 2- Measurement of the charge to mass ratio of electrons.
- 3- Magnetic fields.
- 4- RC, RL and RLC Circuits.
- 5- Ohmic and Non-ohmic devices.
- 6- Atomic Spectroscopy.

Advanced experiments (one per two or three sessions):

- 1- Millikan's Oil Drop: Measurement of the force on a charged oil drop is used to measure the charge of the electron.
- 2- Frank-Hertz experiment: Determination of the excitation potential of mercury is performed using a Franck-Hertz tube and a graphic recorder that plots the plate current vs the accelerating potential.
- 3- Speed of sound measured by supersonic waves: The method of Debye and Sears for the measurement of the grating spacing in a liquid, caused by the ultrasonic vibrations of a quartz crystal, is used to deduce the speed of sound in heptane.
- 4- Measurement of the gravitational acceleration: Two photocells are used to measure the time-of-flight of a falling steel ball using a crystal oscillator and a counter. Statistical analysis of the data is used to investigate the precision and accuracy of the results.
- 5- Planck's constant: Determination of h by the photoelectric effect. Data of the amplified photo current and retarding potential are acquired by a P.C. that plots I vs V for the lines of Mercury, separated by means of a prism.
- 6- Physical Optics: Quantitative study of single slit, double slit and edge diffraction patterns; measurement of coherence length.