

Plasma sphere

5367

Glass sphere Ø 20 cm, containing a rarefied gas mixture. The central electrode has an alternating voltage of 10.000 volt; for this reason it creates electric discharges which spread toward the outside. If you move your finger close to the surface, the discharges concentrate in proximity to your finger because of the conductivity of the human body. So the sphere can be used to distinguish conducting objects from insulating objects. It can be used to prove the existence and the nature of electromagnetic waves, too. In fact, a neon tube moving close to the sphere lights up because of the energy carried by the electromagnetic waves. If you interpose a paper sheet, the phenomenon goes on, because the waves pass through it. But if you interpose a sheet of conducting metal, such as aluminium, the waves are screened and the phenomenon stops.



5367

Cathode ray tube for magnetic deflection

5222

In this tube a white, fluorescent screen, appropriately inclined, allows you to visualise the deflection of a beam of electrons produced by a magnet.

We suggest the use of the "U" shaped magnet code 5173 and the Ruhmkorff's coil code 5208.



5222

Cathode ray tube with whirl

5223

This tube enables you to show the mechanical effects of cathode rays. In fact a small, fluorescent whirl, which can rotate with little friction, starts spinning the moment the cathode ray beam hits it.

To be used with the Ruhmkorff's coil code 5208.



5223

Apparatus for the measurement of the e/m ratio

5304

The main part consists of a hot cathode Thomson's tube, whose filament must be fed with a voltage of 6,3V ac and whose anode must be fed with a voltage of 1500-5000 V dc. The beam of electrons produced is deflected by an electric field produced by a generator of medium voltage and by magnetic field created by two Helmholtz coils. The measure of the electron specific charge can be determined with a percent mistake of 5%.

Topics

- Nature of the cathode rays
- Electric and magnetic deflection
- Evaluation of the ratio e/m with a percent mistake less than 5%

For the power supply of the apparatus, it is necessary to purchase the following (or similar) generators cod. 5292 e 5324.



5304

Malta cross tube

5224

With this tube it is possible to prove that cathode rays spread in a straight line.

A Malta cross- like metal screen can be placed to intercept the cathode ray beam, producing a shadow zone on the screen which satisfies the laws of rectilinear propagation.

To be used with the Ruhmkorff's coil code 5208.



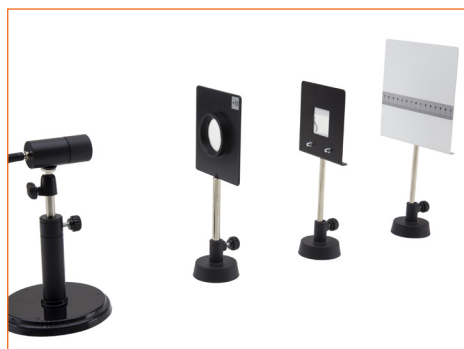
5224

Led light wavelength measurement kit**5392**

The light emitted by a LED, is not monochromatic; it covers a small frequency band. If you want to measure Planck's constant with a LED, it is necessary to know this band medium frequency, which is easy to measure with this kit that exploits the diffraction grating.

Equipment supplied

1 Linear ruler
1 LED projector with power unit
1 Lens +10 with lens holder
1 Filter holder
1 Diffraction grating 500l/mm
1 Base for LED
3 Bases
1 White screen
1 Case

**5392****Photoelectric effect****5435**

Thanks to this apparatus you are allowed to study the photoelectric effect, retracing the fundamental steps that have underlined the unsuitableness of the classic mechanics and have introduced all these new concepts thanks to which the quantum mechanics was born.

The photoelectric effect or photoemission is the production of electrons or other free carriers when light is shone onto a material. Varying the voltage across the phototube, you will be able to check the relation between the energy of the emitted electrons and the wavelength of the incident radiation. Thanks to Einstein notion regarding photoelectric effect, you will also be able to estimate the value of the Planck constant. This instrument is a good starting point to study quantum mechanics. It is basically composed of two parts: a phototube and a control unit (in which is built-in a voltmeter and a nanoammeter). Three LEDs, with average wavelength known, are supplied. The light intensity could be varied from 0 to 100%.

Technical data

Power supply: 24V DC
Voltmeter 4 digits, sensibility: <2mV
Ammeter 4 digits, sensibility < 5nA
Button to cut off current
LED light adjustment 0-100%
Anodic tension adjustment

**Topics**

- How to use it
- Historical notes on the nature of light
- Electromagnetic waves
- Intensity of electromagnetic waves
- Photoelectric effect
- Photoelectric cell
- Work function
- Threshold frequency
- Characteristic graphic of a photocell
- Stopping potential
- Kinetic energy of electrons doesn't depend on radiation intensity
- The number of emitted electrons depends on radiation intensity
- Summary
- Einstein quantum theory
- How Einstein quantum theory explains events
- How to value threshold frequency
- How to measure Planck constant

Equipment supplied

3 LEDs (green, red and blue)
1 Base with phototube
1 Unit control
1 Power supply 24 V DC

**5435**

Planck's constant measurement kit

5410

The measurement of Plack's constant can be obtained also exploiting the quantum properties of the LED diodes. If a LED diode is directly polarized, it starts emitting light the moment the potential energy produced by the electrons, is enough to make them pass from the conduction band to the valence band (Energy gap). As consequence of this energy gap , every electron emits one photon of energy

$hf = eVs$

If you know the potential Vs in correspondence of which the LED starts emitting a weak light , it is possible to go back to the value of h. 3 LED are supplied, red green and blue, in order to verify that the higher the energy gap is, the more intense the emitted light frequency becomes.



5410

Kit to study the solid state

5413

In 1948 when the american physicists h. Brattain, w. And j.Bardeen shockley discovered the transistor effect, the electronic technique has implemented an extraordinary evolution. This kit has been designed to make it easier for students to grasp concepts which are not very intuitive. It consists of a series of explanation charts to be applied on a magnetic board. The interactive feature of the kit allows the teacher to simulate some processes of interaction between photons and matter, showing the passages from a situation to the following one. For performing these experiences, you must have a magnetic whiteboard and a low voltage regulated power supply. We recommend code 5360.

Topics

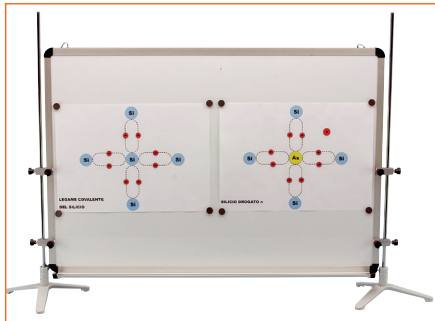
- Atomic energy levels
- The metals crystal lattice
- Energy bands
- Allowed bands and forbidden bands
- Insulators, conductors and semiconductors
- The Ohmic conductor
- The PTC thermistor
- The NTC thermistor
- The photoresistor
- Semiconductors doping
- The junction diode
- The Led
- How to measure the Planck's constant
- The reversibility of the Led
- The photovoltaic cell
- The solar panels

Equipment supplied

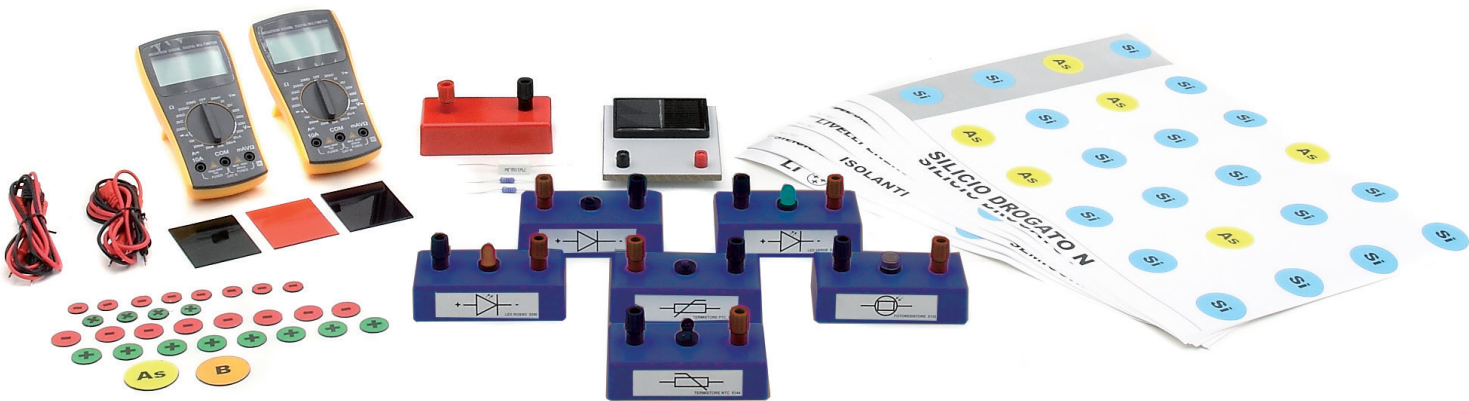
- 1 Red filter
- 1 Green filter
- 1 Purple/blue filter
- 1 Resistor holder base
- 1 Photoresistor on base
- 1 Thermoresistor NCT
- 1 Silicon Diode on base
- 2 Portable digital multimeters
- 1 Photovoltaic panel
- 1 PTC thermistor
- 1 Red led on base
- 1 Green led on base
- 1 Resistor 10 Ω 7W
- 1 Resistor 1 KΩ 2W
- 1 Resistor 100 Ω 2W
- 1 Set of 11 Tables
- 1 Small case for tables
- 1 Set of magnetic tokens
- 1 Box



Silicon N-doped



Silicon P-doped



5413