

Phenomena of electrical conduction

Conduction phenomena in the vacuum

Deflection of electron beams in an electric field

Perrin tube

Object of the experiment

1. Investigating the deflection of electron beams in an electric field

Setup



Safety note:

The Perrin tube can be destroyed by incorrect connection and by voltages and currents that are too high.

Regarding the connection and technical data heed the instruction sheet 555 622.

Apparatus

1 Perrin tube	555 622
1 tube stand	555 600
1 high-voltage power supply 10 kV	521 70
1 Power supply 450 V	522 27
2 safety connecting leads, 100 cm, red.....	500 641
2 safety connecting leads, 100 cm, blue.....	500 642
2 safety connecting leads, 100 cm, black	500 644
1 safety connecting lead, 50 cm, red	500 621

Carrying out the experiment

- Switch the high-voltage power supply on, and enhance the voltage until the luminous spot of the electron beam is visible on the screen of the Perrin tube.
- Slowly increase the deflecting voltage (connectors A +, X -) at the power supply 450 V from 0 V to 350 V, and observe the deflection on the screen.
- Change the polarity of the deflecting voltage (connectors A -, X +), and repeat the experiment.

Observation

When the voltage is applied to the deflection plates, the electron beam is deflected to the left.

The higher the voltage applied to the plates, the greater the deflection of the electron beam.

When the polarity of the voltage is changed, the electron beam is deflected to the right.

Evaluation

Electrons that move in an electric field are subject to a force.

The action of the force is seen by the deflection of the electron beam from the centre of the screen.

As the electrons carry a negative charge, the force acting on the electrons is directed towards the positive deflection plate.

The force acting on the electrons depends on the strength of the electric field.