



Simulation worksheets

Educational notes on the package



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Educational notes on the package "Electron beam in crossed magnetic and electric fields"

BIGS sees this package as a supplement or extension to teaching/self-teaching, allowing students to learn about determining the specific charge of electrons (q/m) velocity filters and moving charges in fields. As the simulation reflects the real measured values, the package can be used to simulate an entire experiment and to complete activities such as measuring, reporting and evaluation.

Our objective in this teaching package, consisting of a simulation, worksheets and a test, is to allow students to study the topic of an electron beam in crossed fields in greater depth, in order to provide higher motivation leading to sustained learning success. The approach which we envisage is as follows:

- Students prepare the topic individually at home and work on the simulation using the worksheets. In this way, students arrive at quantitative and qualitative conclusions concerning the behaviour of an electron beam in crossed electric and magnetic fields. Among other things, they learn how to determine the specific charge of an electron.
- Having prepared the topic using the simulation, students can now apply the knowledge they have acquired to the real experiment, expanding their knowledge and comparing the simulation model with the real experiment. Thanks to their preparatory work with the simulation, students can immediately engage in an in-depth discussion of the topic.
- The work assignments forming part of the package test students' knowledge, calling for them both to reproduce their knowledge and to apply it to an ion beam experiment.

This package of simulation, worksheets and test assignments, combined with the real experiment is intended to allow students to learn about electron beams in a modern and holistic way, including the preparation, performance and reporting of the experiment.

Special benefits for teachers:

The material is suitable for planning a block of between 1 and 3 double lessons. Students can use it to simulate a real experiment on their own PCs.

Special benefits for students:

The material can be used to prepare for a real experiment and also in revision for exams. Because of its self-explanatory nature, it is also suitable for self-teaching.