

Setting up the particle accelerator

It takes about 15 min to set up the particle accelerator. You could do it yourself in advance or get the students to do it themselves as part of the lesson.

Materials

Most schools will already have most of the necessary materials, with the possible exception of the CRT and its power supply. For guidance, however, the product numbers of one supplier, PHYWE, are listed. See: www.phywe.com.

If your school is not able to purchase a CRT, you could try a comparable demonstration to activity 3 using an old television screen^{w2}.

- CRT (Braun's tube) with sockets (PHYWE 06987-00)
- 0-600 V DC power supply unit for the CRT (PHYWE 13672-93)
- Power supply unit for the CRT deflection plates (PHYWE 06986-93)
- Two electromagnetic coils with 1200 turns (PHYWE 06517-01)
- Power supply unit for the electromagnetic coils (PHYWE 13531-93)
- Three retort stands with clamps
- Bar magnet
- Connecting leads

Procedure

Setup

1. Clamp the CRT to one of the retort stands.
2. Clamp the electromagnetic coils to the remaining two retort stands. Position the central axis of the coils so that they intersect the CRT between the anode and the deflection plates.
3. Connect the CRT to the CRT power supply unit and the deflection plate power supply unit. Connect the electromagnetic coils to their power supply.

Safety note: Do not touch the CRT or cables during operation as there is a risk of electrocution. Handle the CRT very carefully to avoid it imploding, as there is a high vacuum inside.

See also the general *Science in School* safety note.

Operation

On the CRT power supply unit:

1. Set the voltage of the auxiliary anode – the anode of the control grid or wehnelt cylinder – to 10 V.
2. Set the voltage of the anode to 30–50 V.
3. Set the cathode voltage to 200–300 V.
4. Connect the power unit to a source of electricity.
5. Adjust the voltage of both anodes until a sharp spot is produced on the screen.
6. Increase the frequency and amplitude to build up a time base, ie draw a waveform with the beam