

Activity Six: Observing Magnetic Effects on Particle Beams ("Hands-On")

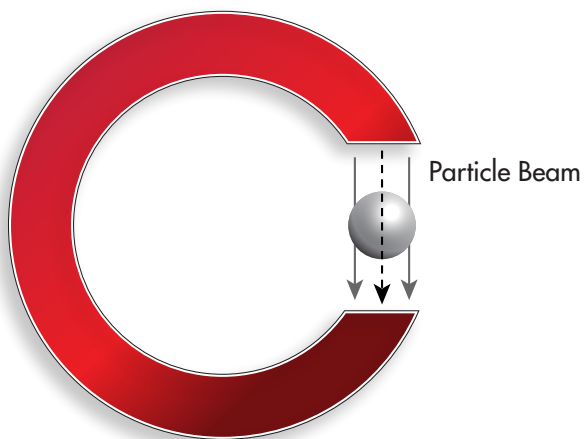
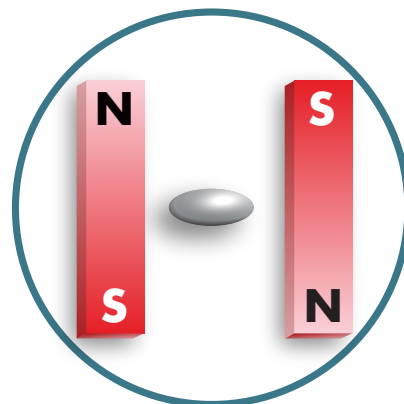
Goal: *To illustrate the role of magnetism in the operation of a particle accelerator through a simulation.*

In this "hands-on" activity, students use an ordinary oscilloscope and two small bar magnets to demonstrate two of the important ways in which particle beams are controlled in accelerators.

Required materials (repeat with each team of students):

- an oscilloscope or any apparatus with a visible electron beam (CRT)
- two bar magnets

Have each group set up the oscilloscope to produce a well-focused spot near the center of the screen. Then have students follow the directions on the activity sheet to show how a magnetic field can deflect a beam of charged particles (as shown in this diagram at right from the activity sheet:)



To explain deflection, use the rule for force on a moving charge in a magnetic field. (Remember that electrons are negative charges.)

Discuss the use of C-shaped "bending magnets" in a circulating accelerator:

Then have students show how a magnetic field can focus a beam of charged particles as described on the activity sheet.

Follow-up activity

After students have demonstrated how a magnetic field can focus a beam of charged particles, have them research how the electron beam in a television set is produced and steered.