TAP 414-1: Faraday's law

You will be making some general observations about Faraday's law. For each experiment you will seek an explanation of what you see in terms of rate of change of flux. Look for a changing field, a conductor that can move or an area of flux linkage can change. All of these lead to a change of flux linkage.

You will need:

- ✓ large horseshoe magnet
- ✓ large coil of insulated copper wire
- ✓ microvoltmeter

What to do

Connect the coil of wire to the microvoltmeter and place it close to the magnet.

1. Move the magnet next to the coil. What happens? How does it depend on speed and direction of movement?
2. Move the coil next to the magnet. What happens? How does it depend on speed and direction of movement?
3. Gradually unwind the coil in the magnetic field. What happens?
4. Take the coil and crumple it up, keeping it in the field. What happens?

What you have seen

1. An emf is induced if the coil or the magnet (or both) move.
2. The size of the induced emf depends on the speed of movement.
3. The direction of the induced emf depends on the direction of movement.
4. Changing the area or number of turns also changes the flux linkage, and so induces an emf.

Practical advice

Much of this may be revision of pre-16 level work. Since the activity is dealt with in more detail later, it may be worth only a moment now.

Alternative approaches

If it seems appropriate, the following activity can be great fun and make the same point. Have a very long copper wire and connect it to a microvoltmeter. Get the class to take positions along the wire in a circle. As they perform the hokey-cokey an emf should be induced due to the movement of the conductor in the Earth's field. Great fun and memorable.

Another impressive demonstration is to take an 1100-turn coil connected across the microvoltmeter. Rotating the coil in the Earth's field is sufficient to cause significant deflections.

External reference

This activity is taken from Advancing Physics chapter 15, 40E