

Magnetic Fields

1 Charged Particles in magnetic fields

Force is always perpendicular to the direction - no change in speed to the electrons.

If electrons are confined to a wire $F = BIl$

The same equation applies for many charges where:

$$I = \frac{Q}{t} \quad l = vt$$

$$F = B \times \frac{Q}{t} \times vt$$

$$F = BQv$$

1.1 The hall probe

This is used to measure the strength of magnetic fields. It consists of a thin slice of semiconductor material with a constant current flowing through it.

The negative charges go to the bottom of the material and so the top is positively charged, this creates a potential difference.

$$F_B = F_E$$

$$BQV = \frac{VQ}{d}$$

$$V = Bvd$$

$$V \propto B$$

By measuring the voltage across the probe the magnetic field strength can be measured.