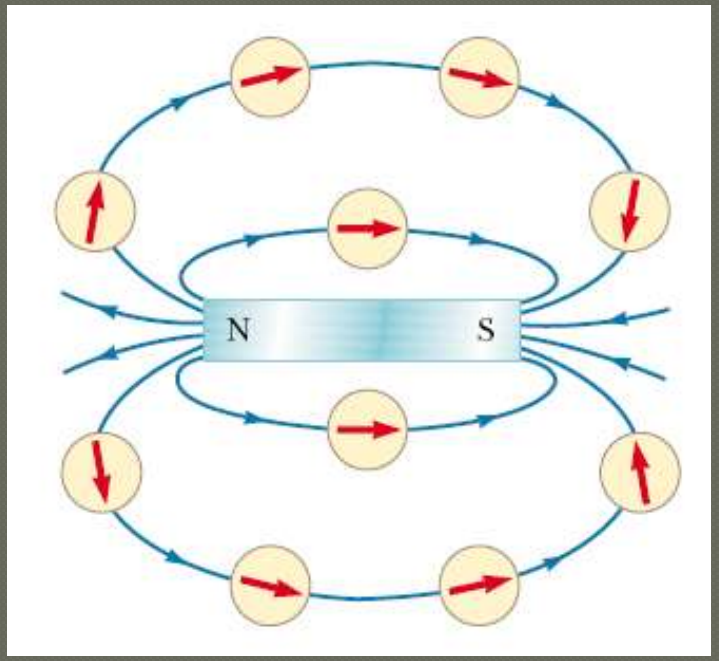
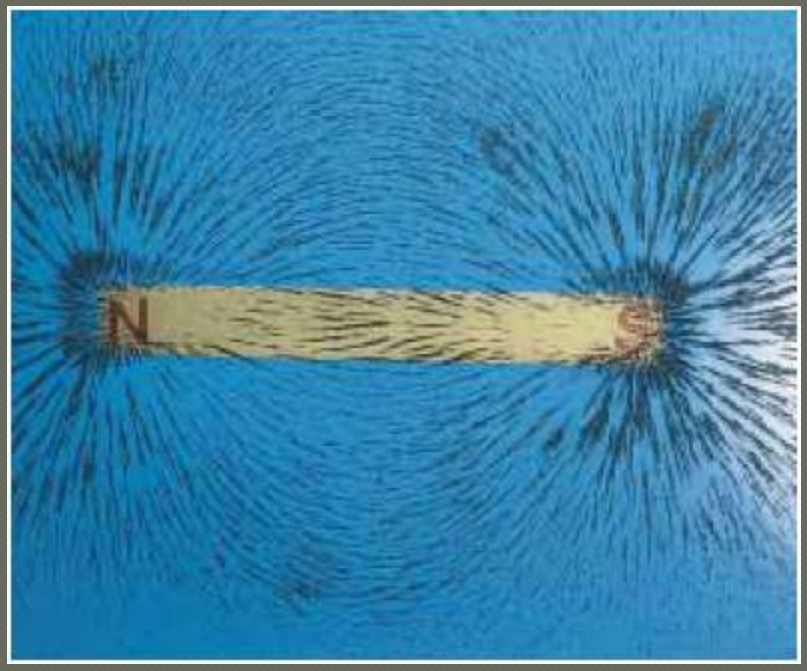
Medan Magnet

- Gaya Magnet pada Muatan Bergerak
- Gaya Magnet Lorentz
- Gaya Magnet pada Penghantar Berarus

Medan Magnet

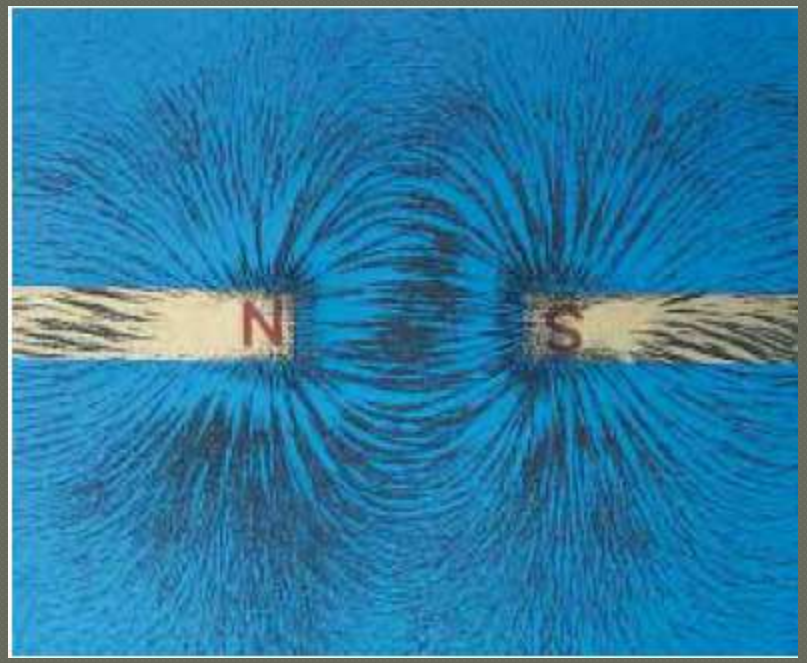


Compass needles can be used to trace the magnetic field lines of a bar magnet

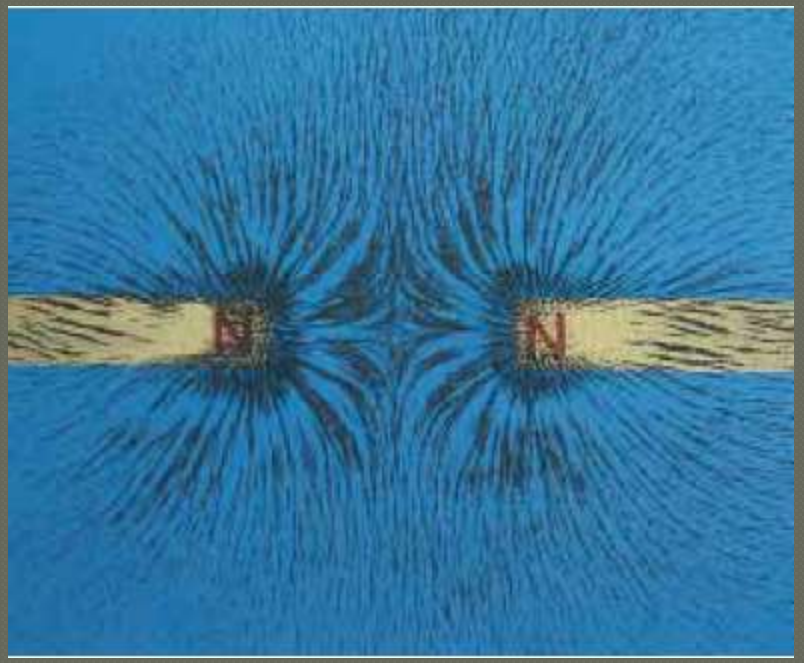


Magnetic field pattern surrounding a bar magnet as displayed with iron filings

Medan Magnet

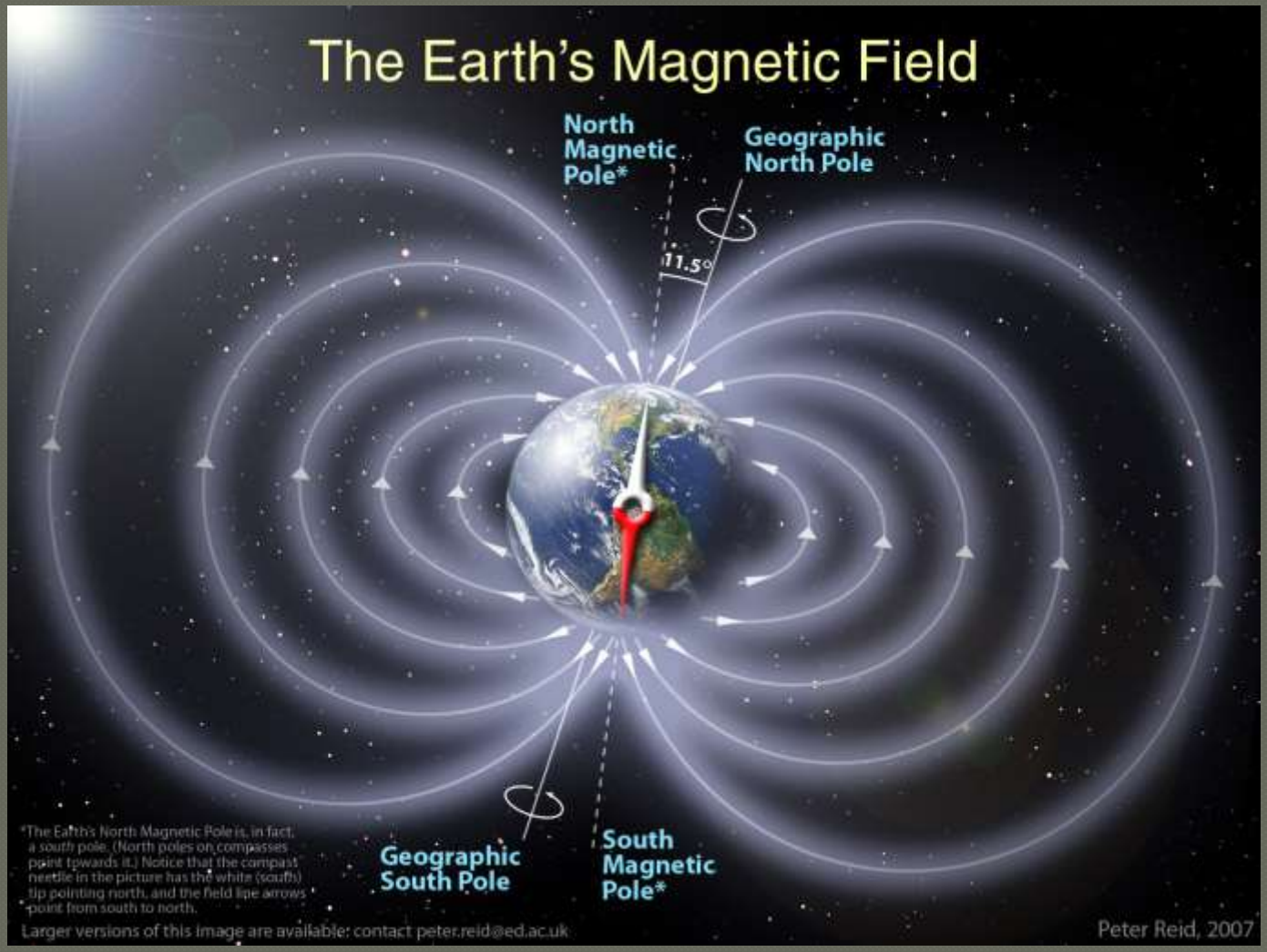


Magnetic field pattern between *unlike poles of two bar magnets*

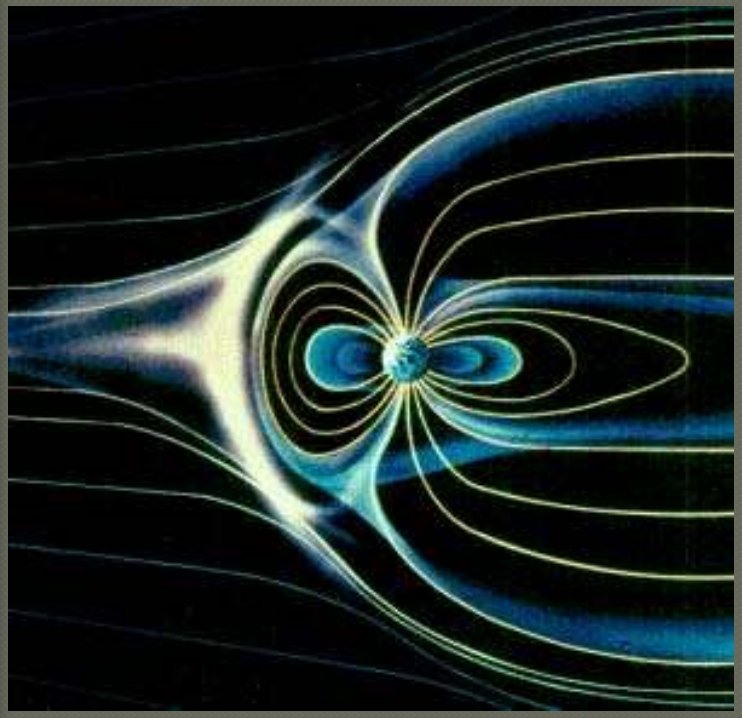


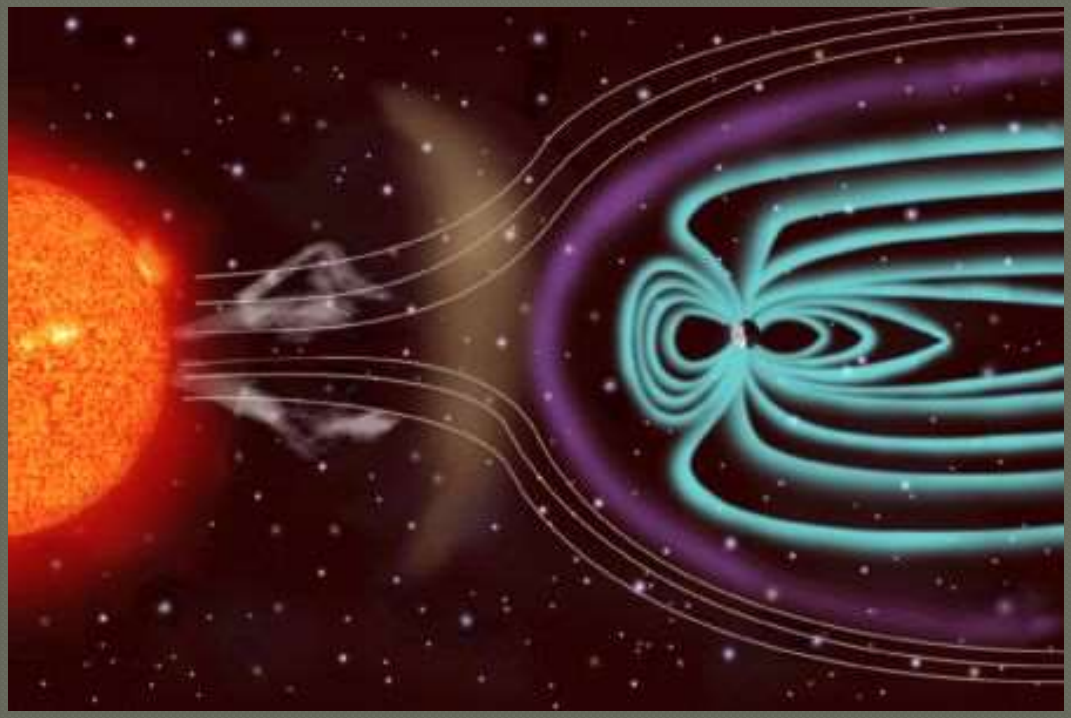
Magnetic field pattern between *like poles of two bar magnets*

The Earth's Magnetic Field



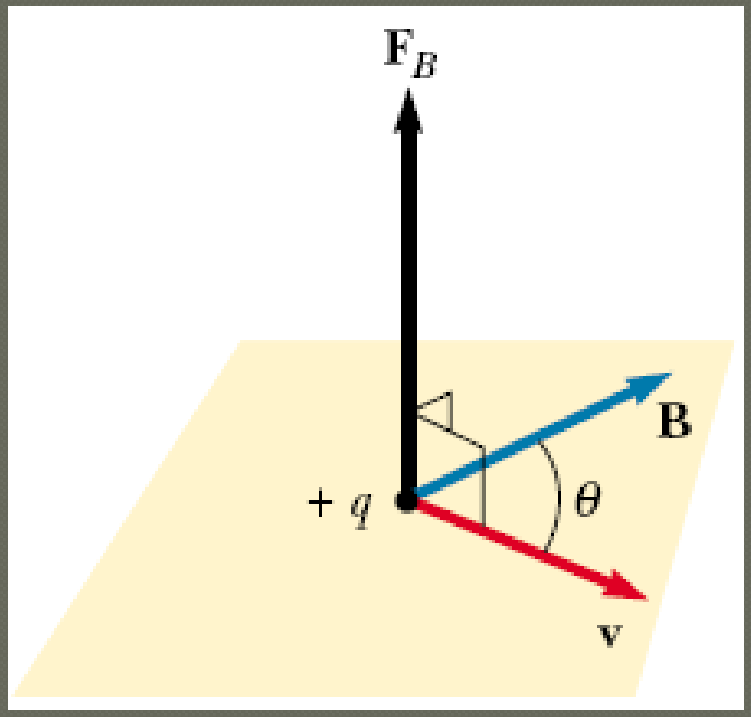
Solar Wind

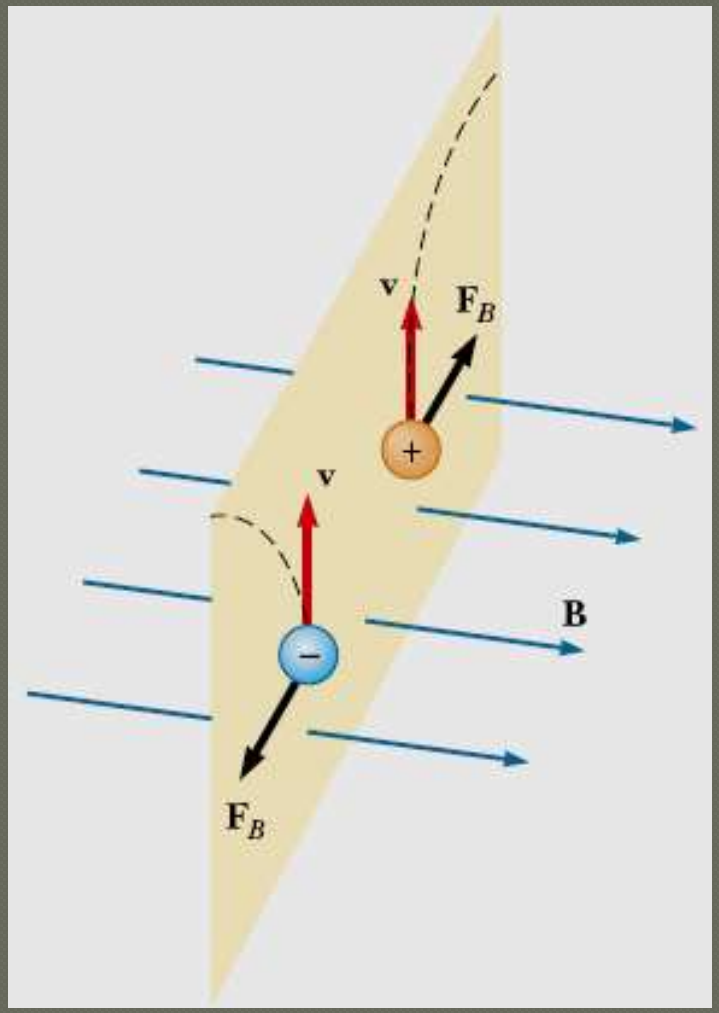




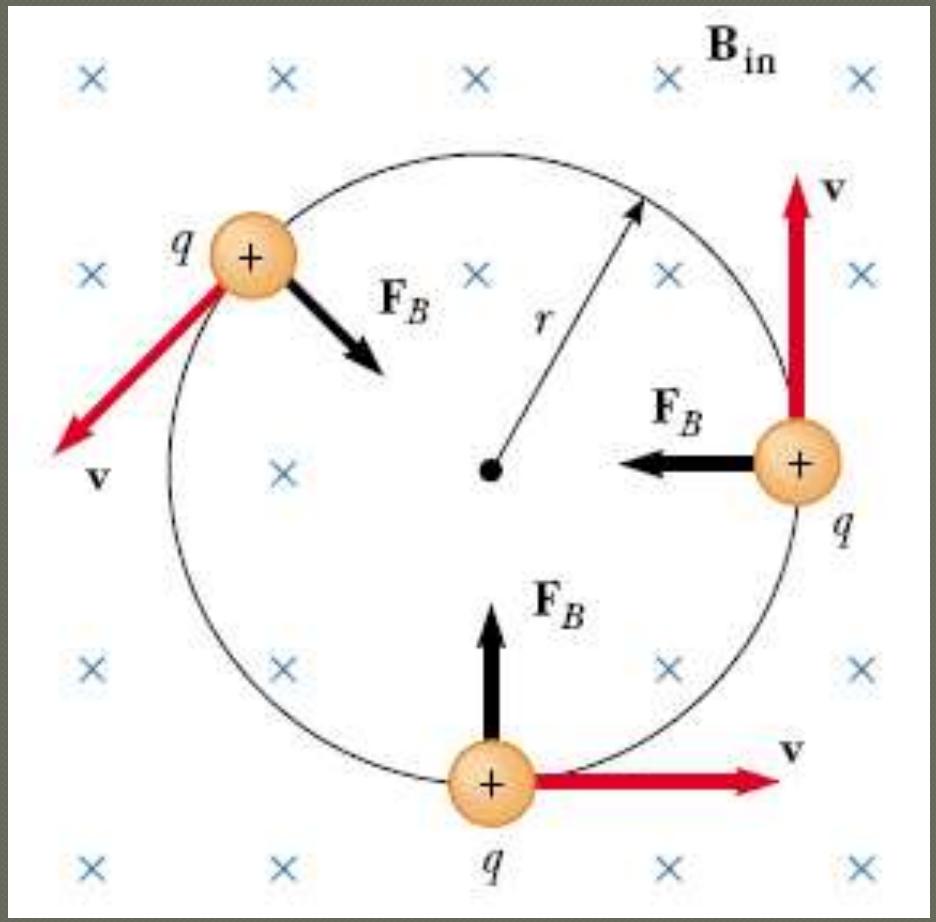
Gaya Magnet pada Muatan Bergerak

$$\mathbf{F}_m = q\mathbf{v} \times \mathbf{B}$$





Motion of a Charged Particle in a Uniform Magnetic Field



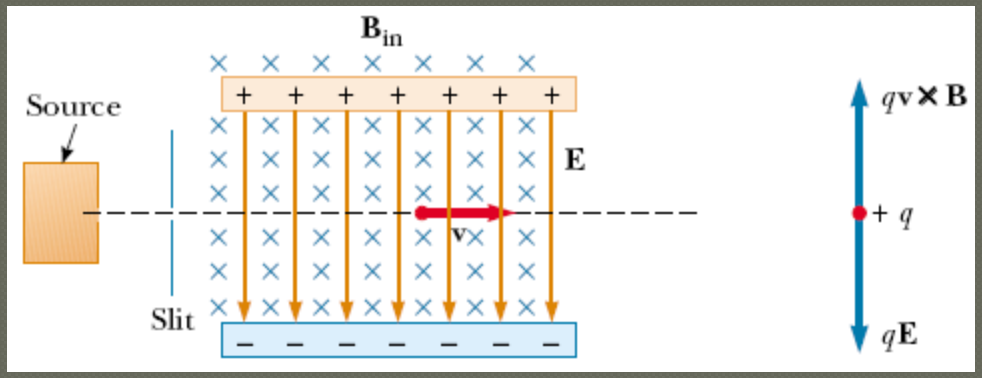
$$\omega = \frac{v}{r} = \frac{qB}{m}$$

the cyclotron frequency

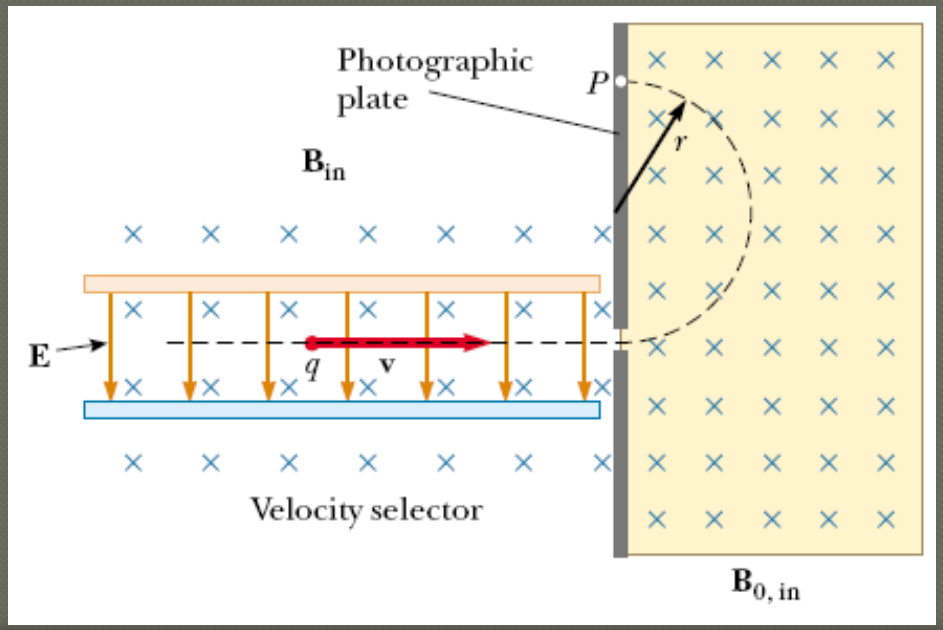
$$T = \frac{2\pi r}{v} = \frac{2\pi}{\omega} = \frac{2\pi m}{qB}$$

APPLICATIONS INVOLVING CHARGED PARTICLES MOVING IN A MAGNETIC FIELD

The Mass Spectrometer



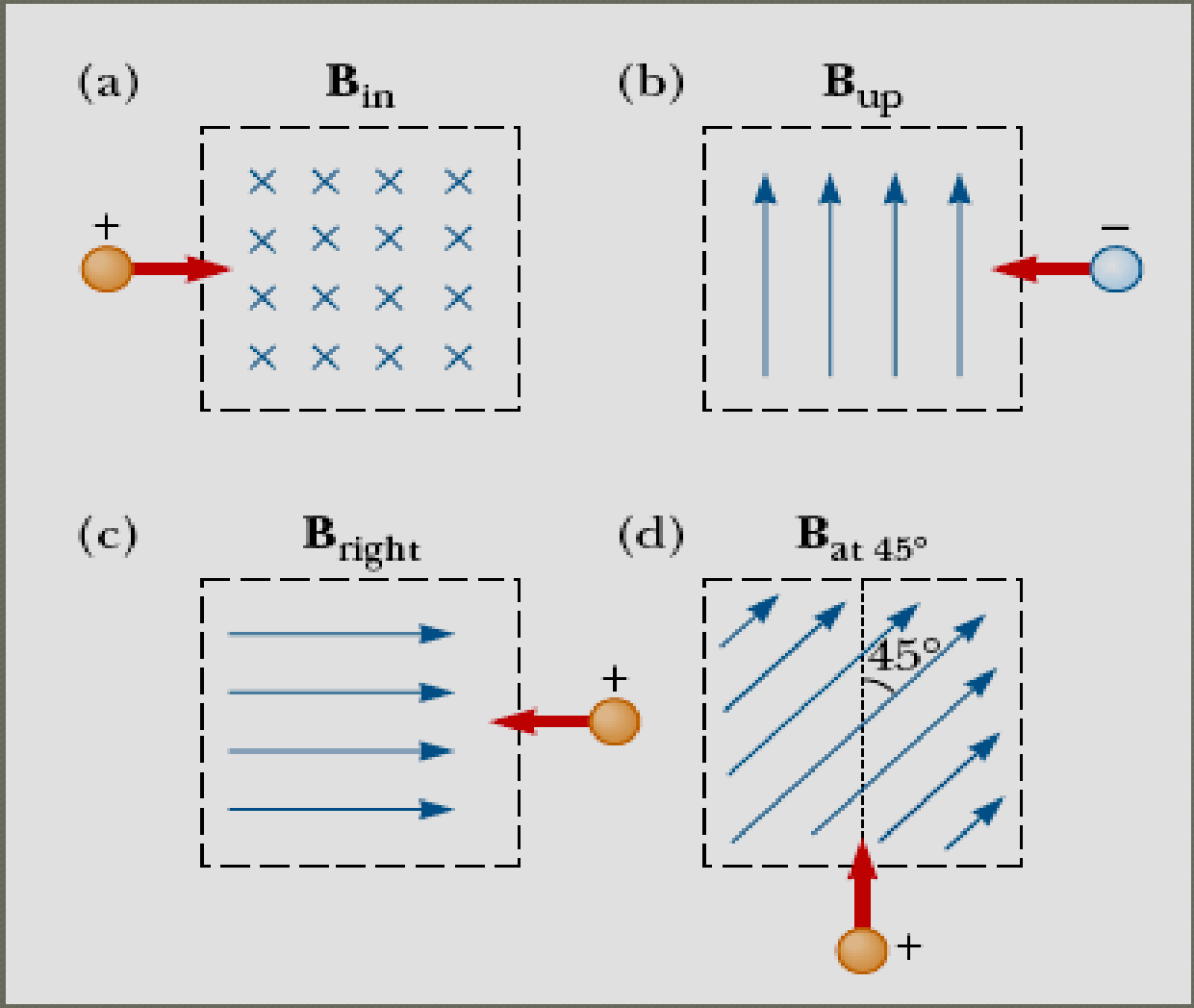
$$\frac{m}{q} = \frac{rB_0}{v}$$



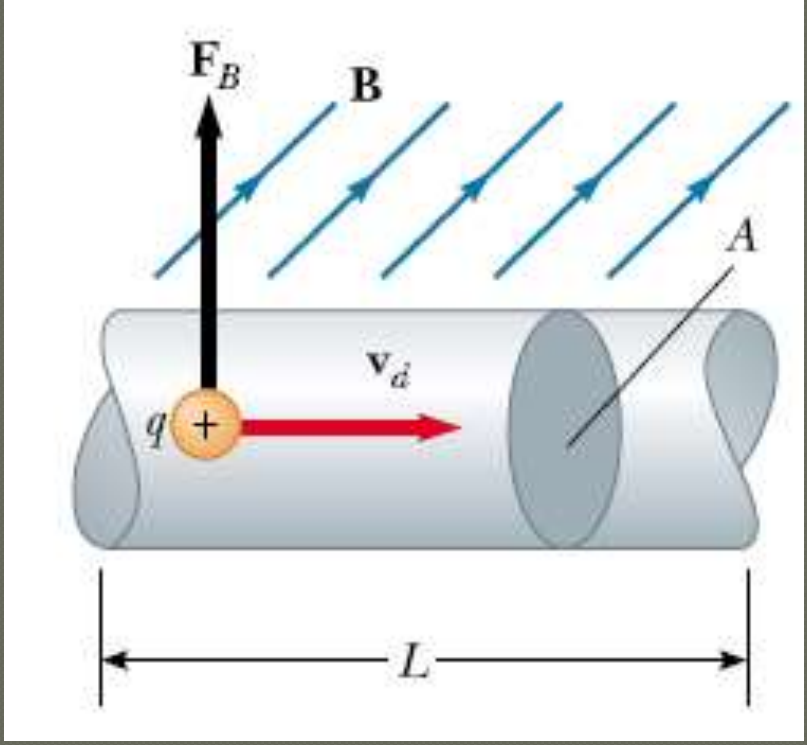
$$\frac{m}{q} = \frac{rB_0B}{E}$$

Quiz

Determine the initial direction of the deflection of charged particles as they enter the magnetic fields, as shown in Figure.



MAGNETIC FORCE ACTING ON A CURRENT-CARRYING CONDUCTOR



A segment of a current carrying wire located in a magnetic field B

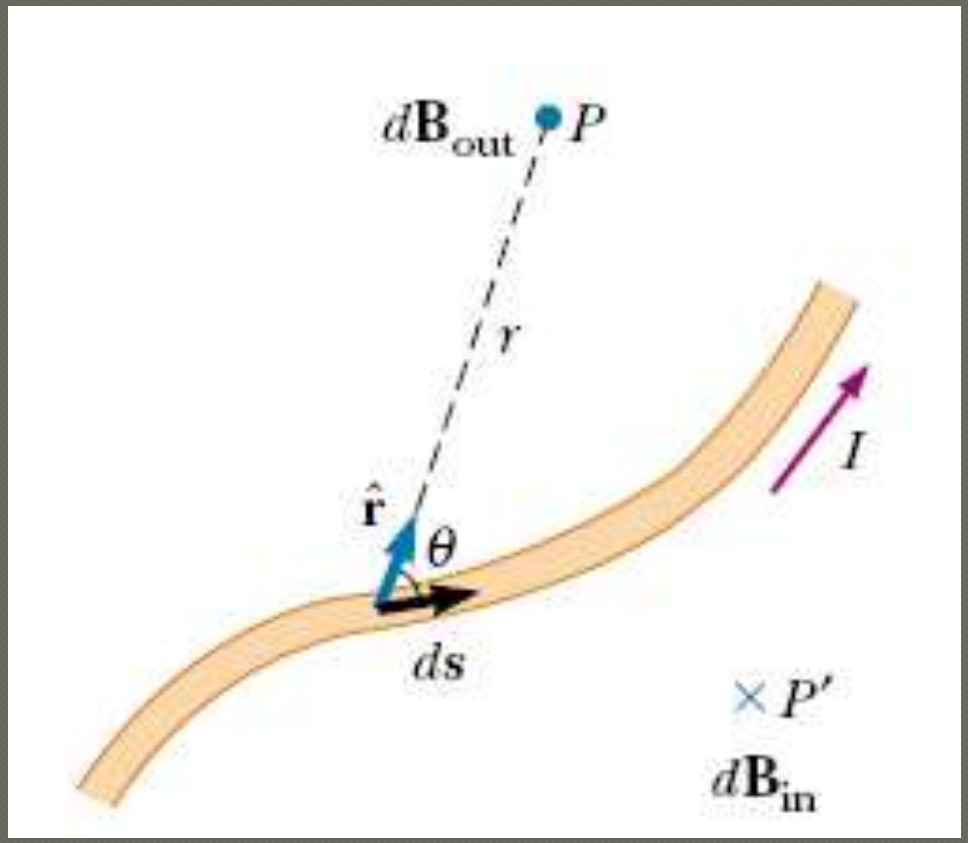
$$\mathbf{F}_B = (q\mathbf{v}_d \times \mathbf{B})nAL$$

$$I = nqv_dA.$$

$$\mathbf{F}_B = I\mathbf{L} \times \mathbf{B}$$

Sources of the Magnetic Field

THE BIOT – SAVART LAW



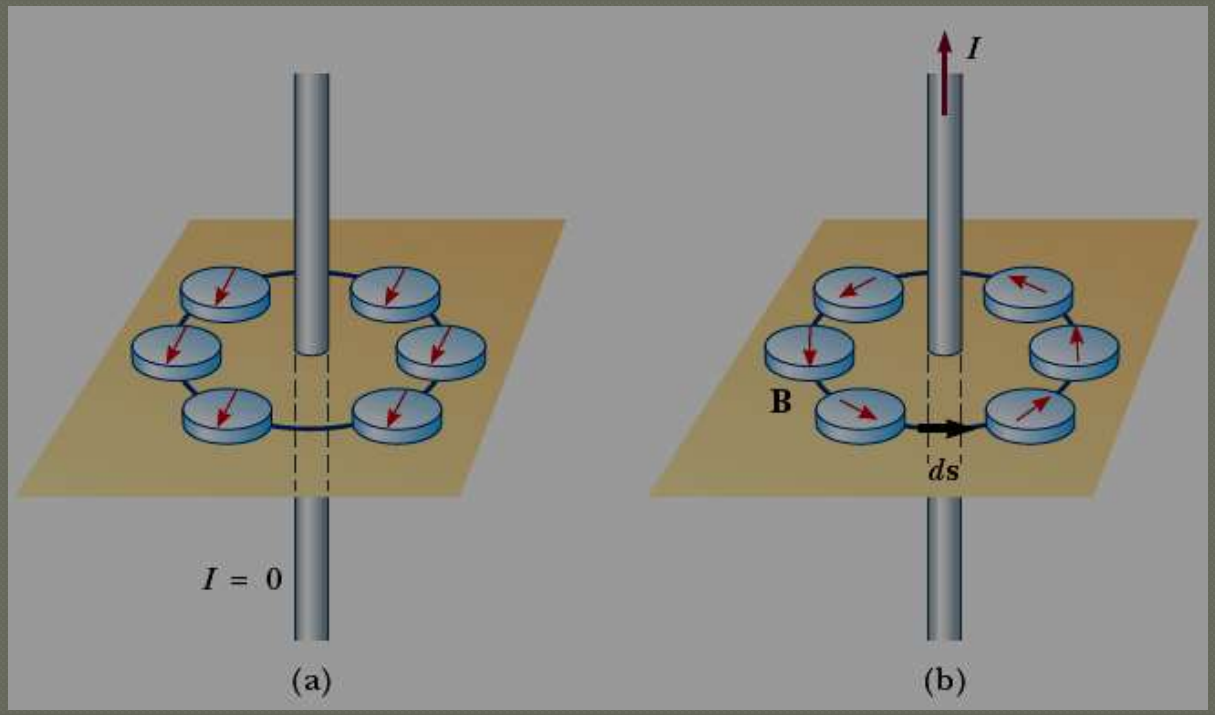
$$d\mathbf{B} = \frac{\mu_0}{4\pi}\frac{I\,d\mathbf{s} \times \hat{\mathbf{r}}}{r^2}$$

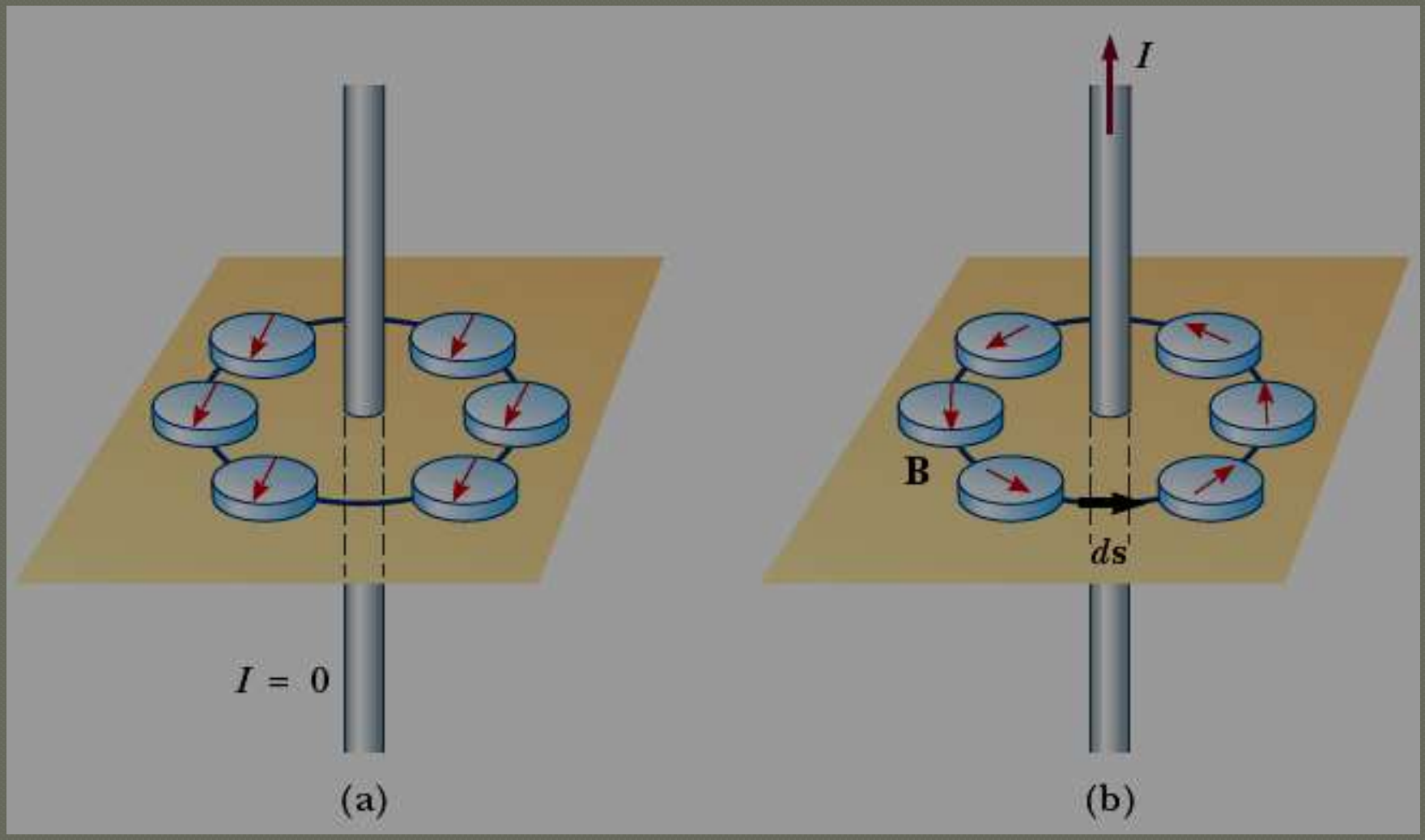
$$\mathbf{B} = \frac{\mu_0 I}{4\pi}\int \frac{d\mathbf{s} \times \hat{\mathbf{r}}}{r^2}$$

Sources of the Magnetic Field

- **AMP`ERE'S LAW**

$$\oint \mathbf{B} \cdot d\mathbf{s} = B \oint ds = \frac{\mu_0 I}{2\pi r} (2\pi r) = \mu_0 I$$




I = 0
(a)
I
B
ds
(b)