Medan Magnet

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

The Earth’s North Magnetic Pole is, in fact, a south pole. North poles on compasses point towards it. Notice that the compass needle in the picture has the white (south) tip pointing north, and the field line arrows point from south to north.

Larger versions of this image are available: contact peter.reid@ed.ac.uk

Peter Reid, 2007
Solar Wind
Gaya Magnet pada Muatan Bergerak

\[ F_m = qv \times B \]
Motion of a Charged Particle in a Uniform Magnetic Field

The cyclotron frequency

\[ \omega = \frac{v}{r} = \frac{qB}{m} \]

The period:

\[ T = \frac{2\pi r}{v} = \frac{2\pi}{\omega} = \frac{2\pi m}{qB} \]
APPLICATIONS INVOLVING CHARGED PARTICLES MOVING IN A MAGNETIC FIELD

The Mass Spectrometer

\[
m \frac{q}{\nu} = \frac{rB_0}{q}
\]

\[
m \frac{q}{q} = \frac{rB_0B}{E}
\]
Determine the initial direction of the deflection of charged particles as they enter the magnetic fields, as shown in Figure.
A segment of a current carrying wire located in a magnetic field $B$
Sources of the Magnetic Field

THE BIOT – SAVART LAW

\[ dB = \frac{\mu_0}{4\pi} \frac{I \, ds \times \hat{r}}{r^2} \]

\[ B = \frac{\mu_0 I}{4\pi} \int \frac{ds \times \hat{r}}{r^2} \]
Sources of the Magnetic Field

AMP`ERE`S LAW

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

(a) \[ I = 0 \]

(b) \[ \mathbf{B} \]