

Magnetic Force and Current

$$\vec{F}_m = I(\vec{L} \times \vec{B})$$

\vec{L} (length of cylinder) vector points parallel to current (I)

Closed loop of current

Magnetic Dipole Moment

let $\vec{\mu}$ = magnetic dipole moment

$\vec{\mu}$ units: Am²

$$|\vec{\mu}| = IA$$

$\vec{\mu}$ direction from RHR, curl fingers in direction of current

Torque and magnetic dipole moment

$$\vec{\tau} = \vec{\mu} \times \vec{B}$$

Potential Energy and Magnetic Dipole

E-field

$$\vec{\tau} = \vec{p} \times \vec{E}$$

$$U = -\vec{p} \cdot \vec{E}$$

B-field

$$\vec{\tau} = \vec{\mu} \times \vec{B}$$

$$U = -\vec{\mu} \cdot \vec{B}$$