

## Magnetic Force and Current

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

$\vec{L}$  (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: Am<sup>2</sup>

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

$\vec{\mu}$  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

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

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