

Charged Particle in Crossed Electric and Magnetic Fields (2)



- Solution for velocity of particle:

$$v_x(t) = \frac{E}{B} \left[\cos \left(\frac{qBt}{m} \right) - 1 \right], \quad v_y(t) = \frac{E}{B} \sin \left(\frac{qBt}{m} \right)$$

- Solution for position of particle:

$$x(t) = \frac{E}{B} \int_0^t \left[\cos \left(\frac{qBt}{m} \right) - 1 \right] dt = \frac{Em}{qB^2} \sin \left(\frac{qBt}{m} \right) - \frac{Et}{B}$$

$$y(t) = \frac{E}{B} \int_0^t \sin \left(\frac{qBt}{m} \right) dt = \frac{Em}{qB^2} \left[1 - \cos \left(\frac{qBt}{m} \right) \right]$$

- Path of particle in (x,y) -plane: cycloid

