Answer on Question #57195, Physics / Electromagnetism

An electron moves in a circular orbit with a uniform speed v. It produces a magnetic field B at the center of the circle. What is the radius of the circle proportional to?

Solution

Electron with charge e moves with velocity v will experience a Lorentz force

$$\vec{F} = ev\vec{B}.$$

At the same time centripetal force F acting on an electron moving along a path with radius of curvature r , is given by:

$$F = \frac{mv^2}{r},$$

$$\frac{mv^2}{r} = evB.$$

The radius of the circle equals to

$$r = \frac{mv}{eB}$$

Answer: $r = \frac{mv}{eB}$