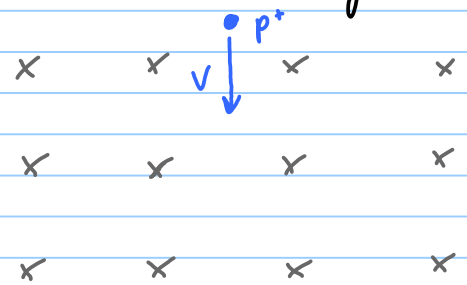
Quiz 3b

Note Title 27/05/2011

A proton enters a 0.50T magnetic field traveling at 5.0×10^5 m/s.



a.) What is the radius of its arc?

b.) Sketch its path while in the field.

c.) If an electron were to enter the same field at the same point traveling at the same speed, explain how its path would differ (2 points)

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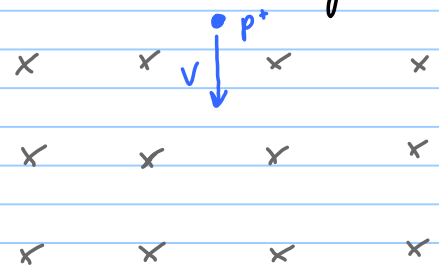


a.) What is the radius of its arc?

$F_c = F_M$ ✓

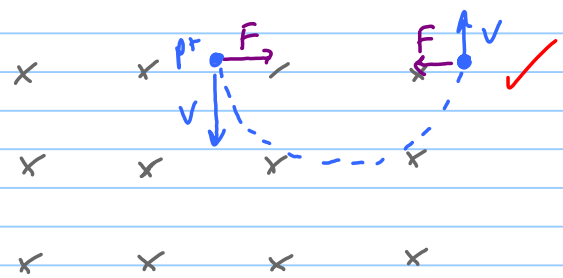
$\frac{mv^{\cancel{2}}}{r} = q\cancel{v}B$

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

$r = \frac{mv}{qB} = \frac{(1.67\times10^{-27}\,kg)(5.0\times10^5\,m/s)}{(1.6\times10^{-19}\,C)(0.50\,T)}$

$= 0.010\,m$ ✓

b.) Sketch its path while in the field.



✓

c.) If an electron were to enter the same field at the same point traveling at the same speed, explain how its path would differ (2 points)

- Since e^- is negative it will move in a clockwise arc ✓
- Since $m_{e^-} << m_{p^+}$ and $r = \frac{mv}{qB}$ $\therefore$ $r \propto m$

The electron's path will have a smaller radius ✓