Find $\underline{\underline{B_0}}$ to Balance out E_0

<u>Given values</u>

$\Delta y = 4.12\,[cm] = 0.0412\,[m]$

$E_0 = (1.10 \cdot 10^3)\left[\frac{V}{m}\right]$

$d = 6.00\,[cm] = 0.06\,[m]$

$L = 12.0\,[cm] = 0.120\,[m]$

3 sig figs

<u>Known Equations</u>

① $\Delta y = \dfrac{q E_0 d (d + 2L)}{2 m V_0^2}$

② $V_0 = \dfrac{E_0}{B_0}$

$$\Delta y = \frac{q E_0 d (d+2L)}{2 m V_0^2}$$

$$V_0^2 = \frac{q E_0 d (d+2L)}{2 m \Delta y}$$

$$\frac{E_0^2}{B_0^2} = \frac{q E_0 d (d+2L)}{2 m \Delta y}$$

$$\sqrt{\frac{E_0^{\not{2}} \cdot 2 m \Delta y}{q \not{E_0} d (d+2L)}} = B_0$$

<u>So</u>

$$\sqrt{\frac{(1.10 \cdot 10^3)\left[\frac{V}{m}\right] \cdot 2(9.109 \cdot 10^{-31})[kg] \cdot (0.0412)[m]}{(-1.602 \cdot 10^{-19})[C] \cdot (0.06)[m]\,(0.06 + 2(0.12))[m]}} = B_0$$

B_0 is in $[T] = \dfrac{N \cdot s}{m \cdot C}$

$$\frac{V}{m} = \frac{\frac{J}{C}}{\frac{m}{1}} = \frac{J}{Cm} = \frac{\frac{kg\,m^2}{s^2}}{\frac{Cm}{1}} = \frac{kg\,m^2}{s^2\,C\,m} = \frac{kg\,m}{s^2\,C}$$

$$\frac{\frac{V}{m}\cdot kg\cdot m}{C\,m^2} \Rightarrow \frac{\frac{kg\,m}{s^2\,C}\cdot kg\cdot m}{C\,m^2} \Rightarrow \frac{\frac{kg^2 m^2}{s^2 C}}{\frac{C m^2}{1}}$$

$$\frac{kg^2 m^2}{s^2 C^2 m^2} = \frac{kg^2}{s^2 C^2}$$

But

$$\sqrt{\frac{kg^2}{s^2 C^2}} \neq \frac{Ns}{Cm}$$

Plugging $B_0 = -2.86\cdot 10^{-8}$ into the Hwk

Incorrect as predicted by the units