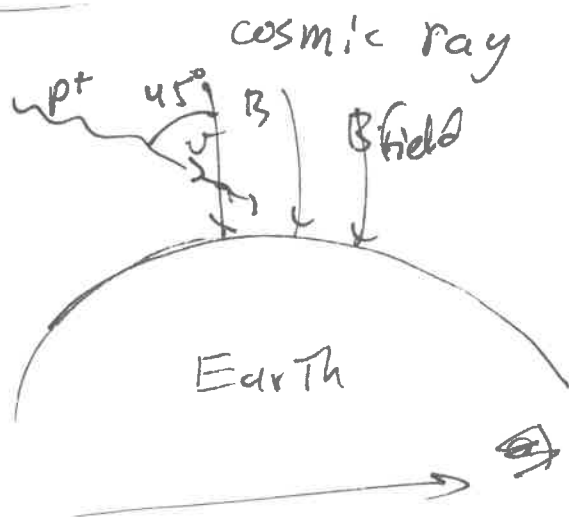


ch. 11 Prob 22



$$v = 5.00 \times 10^7 \text{ m/s}$$

$$F = 1.70 \times 10^{-16} \text{ N}$$

$$q = 1.6 \times 10^{-19} \text{ C} \quad (\text{charge of proton})$$

a)

Find the strength of the earth's magnetic field.

$$\vec{F} = q \vec{v} \times \vec{B}$$

$$F = q v B \sin \theta$$

$$B = \frac{F}{q v \sin \theta} = \frac{1.70 \times 10^{-16} \text{ N}}{(1.6 \times 10^{-19} \text{ C})(5.00 \times 10^7 \text{ m/s}) \sin 45}$$

$$B = 3.0 \times 10^{-5} \text{ T}$$

b) Is this consistent with the earth's magnetic field?

$$\vec{B}_{\text{earth}} = 2.5 \times 10^{-5} - 6.5 \times 10^{-5} \text{ T}$$

This falls within that range.