QUIZ 8
Phy 2054/3808

1. Two singly ionized isotopes, X and Y, of the same element move with the same speed perpendicular to a uniform magnetic field. Isotope X follows a path of radius 3.35 cm while isotope Y moves along a path 3.43 cm in radius. What is the ratio of the two isotope masses, \( m_X/m_Y \)?

Solution: \( R = \frac{mv}{qB} \) and therefore \( m = \frac{qBR}{v} \)

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\frac{m_X}{m_Y} = \frac{R_X}{R_Y} = \frac{3.35}{3.43} = 0.977
\]

2. A 10-turn square coil of area 0.036 m\(^2\) and a 20-turn circular coil are both placed perpendicular to the same changing magnetic field. The voltage induced in each of the coils is the same. What is the radius of the circular coil?

\( E = -Nd\Phi/dt \) and \( \Phi = BA \) where \( B \) is the field and \( A \) is the area. All other things being the same, therefore the circular loop with twice the number of turns must have half the area.

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A = 0.018 = \pi R^2 \quad \text{or} \quad R = 7.6 \text{ cm}.
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