1. By symmetry, the field will be tangential. Use the following paths for Ampere's law (\( r \) = radius of path):
\[ \mathbf{B} = \frac{2\pi r \mathbf{I}}{rc} \]
(a) \( I_{\text{enclosed}} = 0 \) \( B = 0 \)
(b) \( I_{\text{enclosed}} = I \) \( B = \frac{2I}{rc} \) Field lines
(c) \( I_{\text{enclosed}} = I \) (but in opposite direction) \( B = \frac{2I}{rc} \) Field lines

2. Conservation of momentum:
\[ |\mathbf{P}_\mu| = |\mathbf{P}_\mu| = P \]
Conservation of energy (\( c = 1 \)):
\[ m_\mu = P + \sqrt{m_\mu^2 + p^2} \]
(Note \( m_\nu = 0 \) \( \Rightarrow E_\nu = P_\nu = P \))
\[(m_\pi - p)^2 = m_\mu^2 + p^2\]

\[m_\mu^2 + p^2 - 2m_\pi p = m_\mu^2 + p^2 \implies P = \frac{m_\mu^2 - m_\pi^2}{2m_\mu}\]

\[\vec{B} = \frac{2\pi I}{cc^2} (\hat{x} + \hat{z}) \quad |\vec{B}| = \frac{2\pi v_2 I}{cc^2}\]

\[S = \text{earth} \quad \vec{V}_B = (0, -0.9c) \quad \vec{V}_A = (0.9c, 0)\]

\[S' = \text{frame of } A', \quad \text{moving with velocity } 0.9c \text{ in } x\text{-direction wrt to frame } S\]

\[\gamma = \frac{1}{\sqrt{1 - \frac{81}{100}}} = \frac{10}{\sqrt{19}}\]

\[V_{Bx}' = \frac{V_{Bx} - 0.9c}{1 - 0.9c V_{Bx}/c^2} = -0.9c\]

\[\vec{V}_B' = \sqrt{(0.9)^2 + \left(\frac{9152}{100}\right)^2c^2}\]

\[V_B' = 0.98c\]