**EXAMPLE PROBLEM**

\( K_0 \rightarrow \pi^+\pi^- \) \( K_0 \) has \( \beta = 0.86c \) (\( \gamma = 2 \))

\[ \tan \theta = \frac{P_{\pi^+}}{P_{\pi^-}} \] where \( P_x, P_y \) are in lab frame

Apply conservation laws, also some symmetry

\[ m_{K_0} = 497 \text{ MeV}/c^2 \quad m_{\pi^+} = m_{\pi^-} = 139 \text{ MeV}/c^2 \]

**IN LAB FRAME**

\[ P_{K_0} = P_x\pi^+ + P_x\pi^- \]

\[ m_{K_0} \gamma_{K_0} V_{K_0} = 2 P_x\pi \]

\[ P_{\pi^+} = P_{\pi^-} \]

How to get \( P_{\pi^+} \)?

**FINAL**

First since \( P_y \perp \) direction of motion

\[ \mathbf{P}_{x}\pi \]  in LAB

\[ E_{\pi^+} = E_{\pi^-} \]

\[ m_{\pi}^2 c^4 \]

\[ c_1 = c_2 = m_{\pi^+} = m_{\pi^-} \]

\[ E_{\pi^+} = E_{\pi^-} \]

\[ = (2E_\pi)^2 \]

\[ = 4 (m_\pi^2 c^4 + P^2_\pi c^2) \]

\[ \mathbf{P}_{\pi} \] in COM FRAME

\[ E_{\pi^+} = E_{\pi^-} \]

\[ \mathbf{P}_{\pi} \]

\[ \tan \theta = \frac{\sqrt{\frac{m_{K_0}^2 c^2 - m_{\pi^+}^2 c^2}{4}}}{\frac{m_{K_0} \gamma_{K_0} V_{K_0}}{2}} \approx 67.5^\circ \]