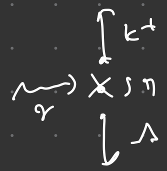
ZADANIE 3 SZYMON CEDROWSKI

a) $v_{SM/LAB}$

b) $E_{K^+/SM}$

c) $E_{K^+/LAB}$,



w LAB przed:

$$\vec{P_1} = (E_\gamma + m_p c^2, p_\gamma c, 0)$$

w SM po:

$$\vec{P_2^*} = ((m_\Lambda + m_K)c^2, 0, 0)$$

$$\vec{P_1}^2 = \vec{P_2}^{*} \Rightarrow (m_\Lambda + m_K)^2 c^4 = (E_\gamma + m_p c^2)^2 - \overbrace{p_\gamma^2 c^2}^{E_\gamma^2}$$

$$= m_p^2 c^4 + 2E_\gamma m_p c^2$$

$$P_1^* = (E_\gamma^* + m_p c^2, 0, 0)$$

$$(E_\gamma^* + m_p c^2)^2 = (E_\gamma + m_p c^2)^2 - E_\gamma^2$$

$$\begin{cases} E_\gamma^{*2} + 2E_\gamma^* m_p c^2 = 2E_\gamma m_p c^2 \\ E_\gamma^* = \gamma E_\gamma - \gamma\beta E_\gamma = \gamma E_\gamma (1-\beta) \end{cases}$$

$$E_\gamma^{*2} + 2E_\gamma^* m_p c^2 = 2m_p c^2 \frac{E_\gamma^*}{\gamma(1-\beta)}$$

$$E_\gamma^{*2} + 2m_p c^2 \left(1 - \frac{1}{\gamma(1-\beta)}\right) E_\gamma^* = 0$$

$$\Rightarrow 1 - \frac{1}{\gamma(1-\beta)} = \frac{-E_\gamma^*}{2m_p c^2} = \frac{-\gamma(1-\beta)E_\gamma}{2m_p c^2}$$

$$\gamma(1-\beta) = \frac{1}{\sqrt{1-\beta^2}}\sqrt{(1-\beta)^2} = \sqrt{\frac{1-\beta}{1+\beta}}$$

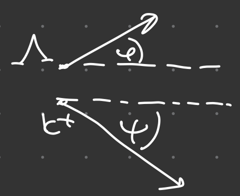
$$\frac{1}{\gamma(1-\beta)} = \frac{\gamma(1-\beta)E_\gamma}{2m_p c^2} + 1 \Rightarrow 1 = \frac{1-\beta}{1+\beta}\frac{E_\gamma}{2m_p c^2} + \sqrt{\frac{1-\beta}{1+\beta}}$$

$$\Downarrow$$

$$\beta = \dots$$

c)

CAB



SM

$$\cos(\varphi+\psi) = \frac{\vec{p}_\Lambda \cdot \vec{p}_K}{|p_\Lambda||p_K|}$$

Pędy w SM:

$$p^*_K = (E^*_K, 0, -p_y c)$$

$$p^*_\Lambda = (E^*_\Lambda, 0, +p_y c)$$