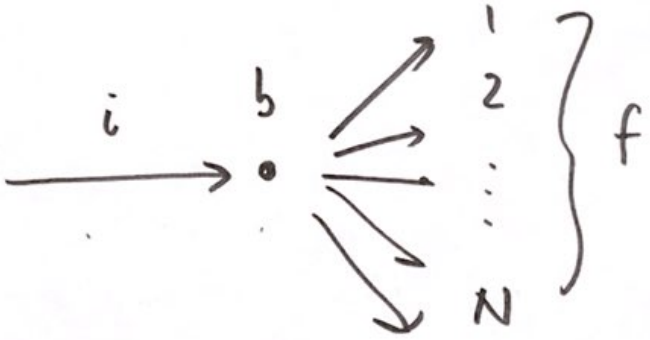
ENERGIA DI SOGLIA



$$\sqrt{s}\Big|_{\substack{\text{s.f.}\\ \text{CdM}}} = \sum_f E_f^* = \sum_f \left(m_f + K_f^*\right)$$

$$\sqrt{s}\Big|_{\substack{\text{s.i.}\\ \text{LAB}}} = \left|P_{TOT}\right| = \sqrt{E_{TOT}^2 - P_{TOT}^2} =$$

$$= \sqrt{(E_i + m_b)^2 - P_i^2} =$$

$$= \sqrt{E_i^2 + m_b^2 + 2E_i m_b - P_i^2}$$

$$= \sqrt{m_i^2 + m_b^2 + 2E_i m_b}$$

$$i: \begin{pmatrix} E_i \\ \vec{P}_i \end{pmatrix} \quad b: \begin{pmatrix} m_b \\ \vec{0} \end{pmatrix}$$

$$\sqrt{s}\Big|_{\substack{\text{s.f.}\\ \text{CdM}}} = \sqrt{s}\Big|_{\substack{\text{s.i.}\\ \text{LAB}}}$$

$$\sqrt{m_i^2 + m_b^2 + 2E_i m_b} = \sum_f \left(m_f + K_f^*\right) \geq \sum_f m_f$$

$$\Leftrightarrow \quad m_i^2 + m_b^2 + 2E_i m_b \geq \left(\sum_f m_f\right)^2$$

$$E_i \geq \frac{\left(\sum_f m_f\right)^2 - m_i^2 - m_b^2}{2m_b} \equiv E_{soglia}$$

$(-m_i)$

$$K_{soglia} = \frac{\left(\sum_f m_f\right)^2 - (m_i + m_b)^2}{2m_b}$$

EX

$$p + p \rightarrow p + p + p + \bar{p}$$

$p \rightarrow p$

$$K_{soglia} = \frac{(4m_p)^2 - (m_p + m_p)^2}{2m_p} =$$

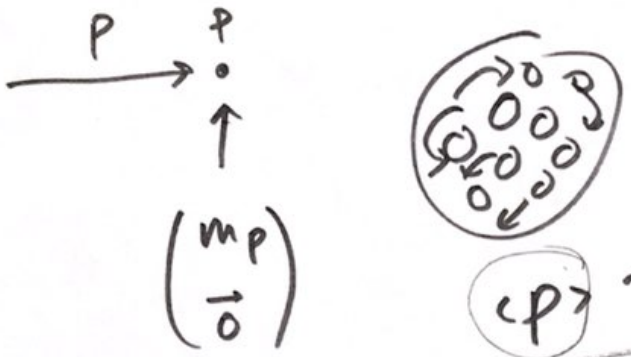
$$= \frac{16m_p^2 - 4m_p^2}{2m_p} = 6\,m_p =$$

~ 5.6 GeV

$E = m + K$

$E_{soglia} \rightarrow K_{soglia} = E_{soglia} - m_i$

$p + p \rightarrow p + p + p + \bar{p}$ 5.6 GeV



È POSSIBILE PRODURRE LO STATO FINALE CON $E < E_{soglia}^{p=0}$?

$$E = m + K$$