

Homework Assignment #5

PS303 Modern Physics

Due Date: None Do this on your own and report the answer.

Mass $\rightarrow MeV/c^2$ not kilograms !!

Momentum $\rightarrow MeV/c$ not kilograms·meters/sec !!

Energy $\rightarrow MeV$ not joules !!

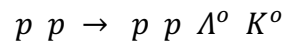
unless otherwise specified.

When you are asked for velocities, always quote your answers in units of “c,” the speed of light.

$$\text{velocity} = \beta c$$

Problem:

A proton is moving towards a fixed target (containing protons at rest) producing the following reaction:



Calculate the minimum kinetic energy required to make this reaction occur.

Hint: this problem is easier if you use the relativistic invariant: $P^\mu \cdot P_\mu$ in the appropriate inertial frames.