

Physics 853 Quiz #1 - Friday, Sep. 9, 2011

1. You are designing the Bevatron in the late 1950s to create an anti-proton from the reaction $p+p \rightarrow 3p+\bar{p}$ with a fixed-target experiment. Find the kinetic energy T of the beam. Express your answer in terms of the proton mass m .

- Two spaceships are moving with momenta p_a and p_b , each record two flashes of light, separated in space-time by the four-vector x . Find the separation in time between the two flashes as measured by an observer in the center-of-mass frame. Express your answer in terms of Lorentz invariants involving p_a , p_b and x .

- Two spaceships “a” and “b” are moving with four-momenta p_a and p_b . Find the magnitude of the three momentum \vec{p}_b as measured by an observer on spaceship “a”. Express your answer in terms of Lorentz invariants involving p_a and p_b .