

Exercises

$M \rightarrow a \ b$

(1) Prove that

$$M^2 = m_a^2 + m_b^2 + 2(e_a e_b \cosh(\Delta\eta) - a_x b_x - a_y b_y)$$

(2) We have shown that M_T (at fixed and correct m_b) is an observable that is bounded above by M for unsmeared signal events $M \rightarrow a \ b$. Go further than this. Prove that it is ***the greatest possible*** lower bound for the mass of the parent.

(3) It is trivial to demonstrate that MT is invariant under longitudinal boosts. Is it invariant under transverse parental boosts? What about the kinematic endpoint of the MT distribution?