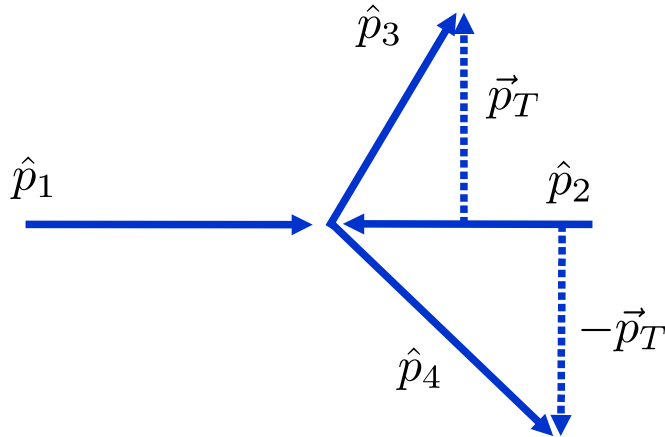


2-to-2 Hard Scattering of Massless Partons



beam energy

$$P_1 = (E, \vec{p}), E \approx |\vec{p}| \approx \sqrt{s}/2, \quad P_2 = (E, -\vec{p})$$

$$\hat{p}_1 = x_1 P_1, \quad \hat{p}_2 = x_2 P_2$$

Bjorken x of the partons

$$\hat{p}_3 = (p_T \cosh y_3, \vec{p}_T, p_T \sinh y_3)$$

$$\hat{p}_4 = (p_T \cosh y_4, -\vec{p}_T, p_T \sinh y_4)$$

Calculate Bjorken x of the two partons (1 and 2):

$$\hat{p}_1 + \hat{p}_2 = \hat{p}_3 + \hat{p}_4$$



$$(x_1 + x_2) \frac{\sqrt{s}}{2} = p_T (\cosh y_3 + \cosh y_4)$$

$$(x_1 - x_2) \frac{\sqrt{s}}{2} = p_T (\sinh y_3 + \sinh y_4)$$

$$x_1 = \frac{p_T}{\sqrt{s}} (e^{y_3} + e^{y_4})$$

$$x_2 = \frac{p_T}{\sqrt{s}} (e^{-y_3} + e^{-y_4})$$

$$y_3 = y_4 = 0: \quad x_1 = x_2 = \frac{2p_T}{\sqrt{s}} =: x_T$$