γ, $(\nu_e, \nu_\mu, \nu_\tau + {}^-)$, $[e, p + \bar{e}, \bar{p}]$

对 $x'^{\mu} = \Lambda^{\mu}{}_{\nu} x^{\nu}$，应升 ν 降 μ

先往全，则 $\Lambda^{\mu}{}_{\nu} x^{\nu} = \Lambda^{\mu}{}_{\nu} g^{\nu\rho} x_{\rho}$

降指标 μ，左乘 $g_{\mu\sigma}$，有

$$x'_{\sigma} = g_{\mu\sigma} \Lambda^{\mu}{}_{\nu} g^{\nu\rho} x_{\rho}$$

则 $\Lambda_{\mu}{}^{\nu} = g_{\mu\sigma} \Lambda^{\sigma}{}_{\rho} g^{\rho\nu}$

$$E^2 - p_x^2 = m_0^2 + p_y^2 + p_z^2$$

$$= m_\perp^2$$

$$\left(\frac{E}{m_\perp}\right)^2 - \left(\frac{p_x}{m_\perp}\right)^2 = 1$$

定义 $\frac{E}{m_\perp} = \cosh\varphi$

$\frac{P_x}{m_\perp} = \sinh\varphi$

于偏 x $m_\perp = m_0$, $P_x = \gamma m_0 v_x$

$\sinh = \gamma v$

能动量守恒

质壳关系

$$\int \delta(E_{cm} - E_1 - E_2)\,\delta^3(p_{cm} - p_1 - p_2)\frac{d^3p_1}{2E_1}\frac{d^3p_2}{2E_2}$$

$$- \int \delta(E - E_1 - E_2)\,dE$$

$$= 1$$

$$= \int \delta(E_{cm} - E_1 - E_2)\frac{d^3p_1}{2E_1 2E_2}\Big|_{p_2 = p_{cm} - p_1 = p_2(p_1)}$$

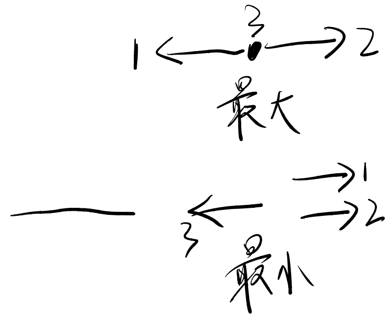
$$= \int \delta(E - E_1 - E_2)\frac{d^3p_1}{4E_1E_2}$$

$$\int \delta(E - E_1 - E_2)\frac{p^2\,dp\,d\Omega}{4E_1E_2}$$

$$\delta\left(E-\sqrt{p^2+m_1^2}-\sqrt{p^2+m_2^2}\right) \qquad \delta = \delta(p-p^*)\,\frac{E_1E_2}{pE}$$

$$\frac{df}{dp} = -\frac{p}{E_1}-\frac{p}{E_2} = \frac{p}{E_1E_2}E$$

—2020


1
3
2
最大
1
2
3
最小

→ 质心系能量

→ 动量转移

$$(i\gamma^{\mu}\partial_{\mu}\psi - m) = 0$$

$$(i\not{\partial}\psi - m) = 0$$

$e^+ e^- \longrightarrow \bar{q}\, q$

e

$\sim$

ν_e有几乎视为ν_μ!

多行

Pee리 - 4

△m² · 틴 리