invariant yield

roppon picha

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unit derivation:

$$\begin{aligned}
\frac{d^3N}{dp^3} &= \frac{d^3N}{dp_x dp_y dp_z} \\
&= \frac{d^3N}{p_t dp_t d\varphi dp_z} \\
&= \frac{d^2N}{2\pi p_t dp_t dp_z} \\
&= \frac{d^2N}{2\pi p_t dp_t d(m_t \sinh(y))} \\
&= \frac{d^2N}{2\pi p_t dp_t m_t \cosh(y) dy} \\
&= \frac{d^2N}{2\pi E p_t dp_t dy} \\
\frac{dp_t}{dm_t} &= \frac{d\sqrt{m_t^2 - m_0^2}}{dm_t} \\
&= \frac{2m_t}{2p_t} \\
dp_t &= \frac{m_t}{p_t} dm_t \\
\frac{d^3N}{dp^3} &= \frac{d^2N}{2\pi E m_t dm_t dy}
\end{aligned}$$

The invariant yield is

$E\frac{d^3N}{dp^3} = \frac{d^2N}{2\pi m_t dm_t dy}$