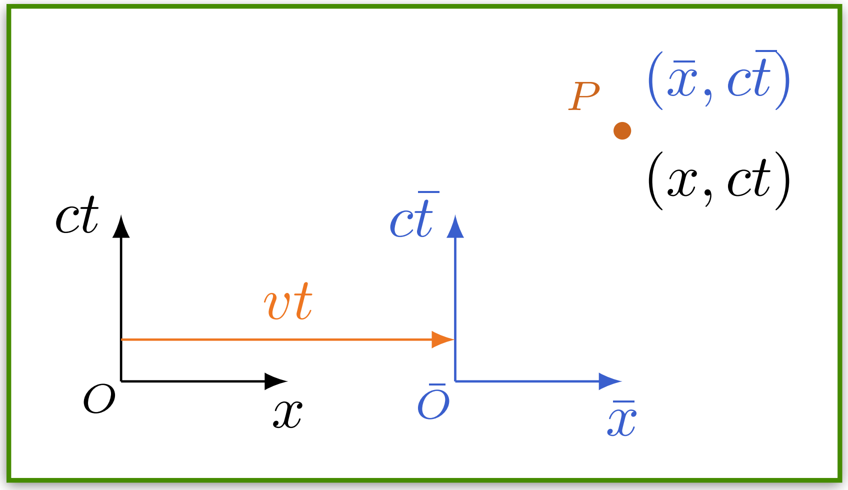
Eletromagnetismo Avançado

4º ciclo
Aula de 17
de dezembro

Princípios da relatividade especial

- **Princípios**

$$\boxed{c^2\bar{t}^2 - \bar{x}^2 = c^2t^2 - x^2}$$



- **Espaço de Minkowski**

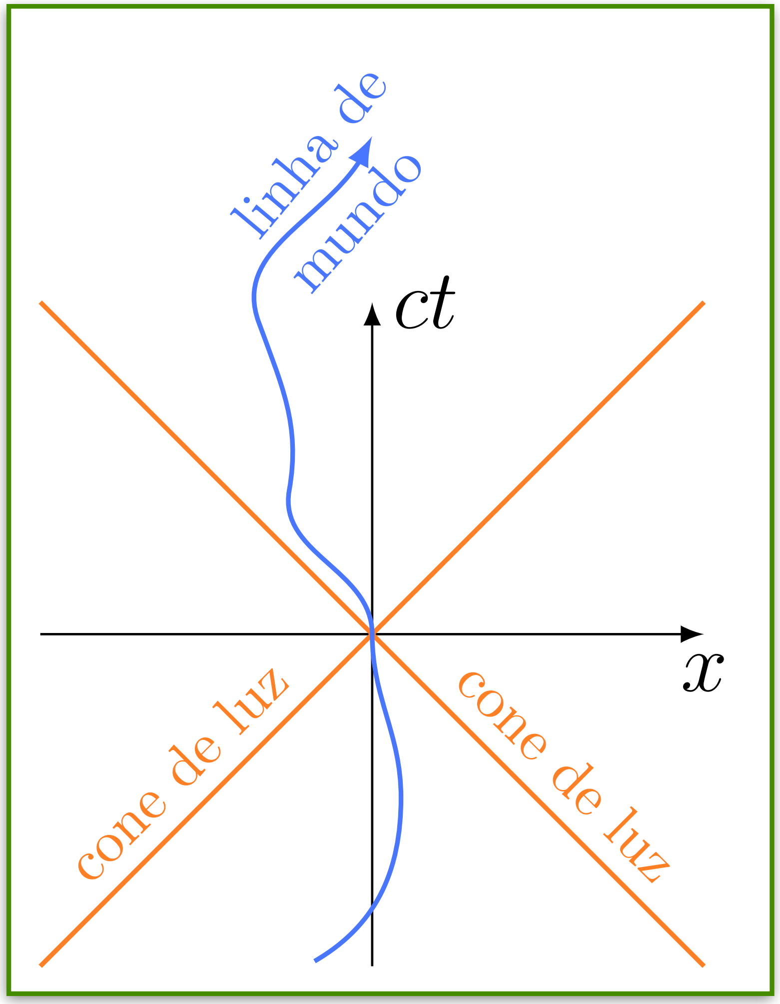
$$x^\mu = \begin{pmatrix} ct \\ x \\ y \\ z \end{pmatrix} \qquad x_\mu = \begin{pmatrix} -ct & x & y & z \end{pmatrix}$$

- **Intervalo**

$$I_{AB} \equiv \Delta x^\mu \Delta x_\mu$$

- **Velocidade própria**

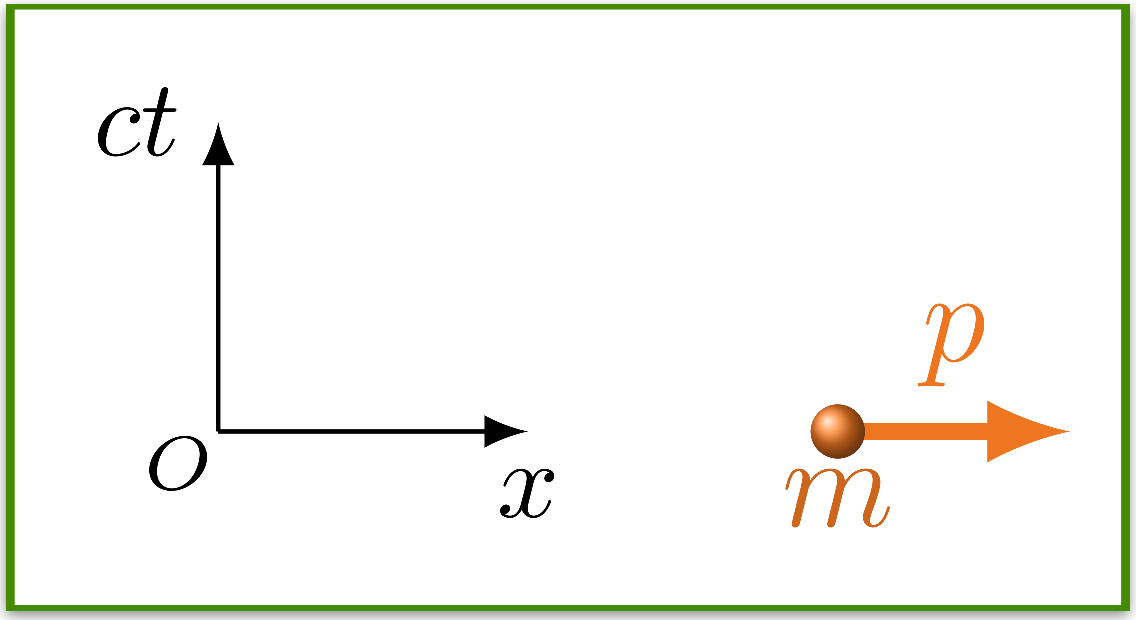
$$\eta^\mu = \frac{1}{\sqrt{1 - \dfrac{u^2}{c^2}}} \begin{pmatrix} c \\ u \\ 0 \\ 0 \end{pmatrix}$$



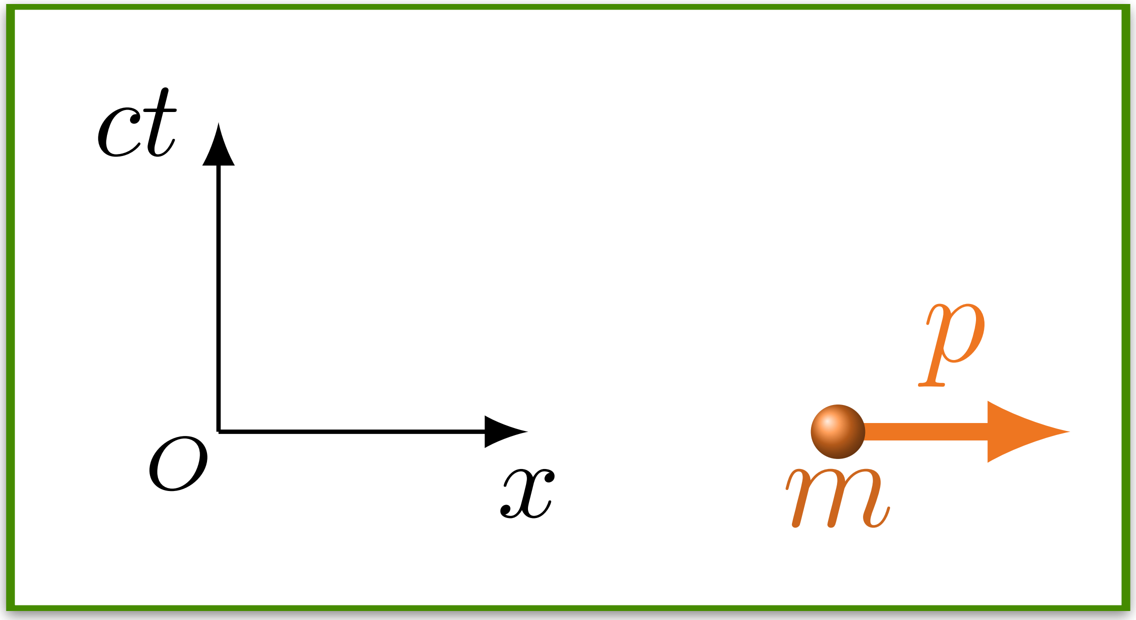
Dinâmica relativística

$$p^\mu = \begin{pmatrix} mc \\ p^1 \\ p^1 \\ p^3 \end{pmatrix}$$

$$\bar{p}^\mu = \begin{pmatrix} m_0 c \\ 0 \\ 0 \\ 0 \end{pmatrix}$$



Dinâmica relativística



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$$p^\mu = m_0 \eta^\mu$$

Dinâmica relativística

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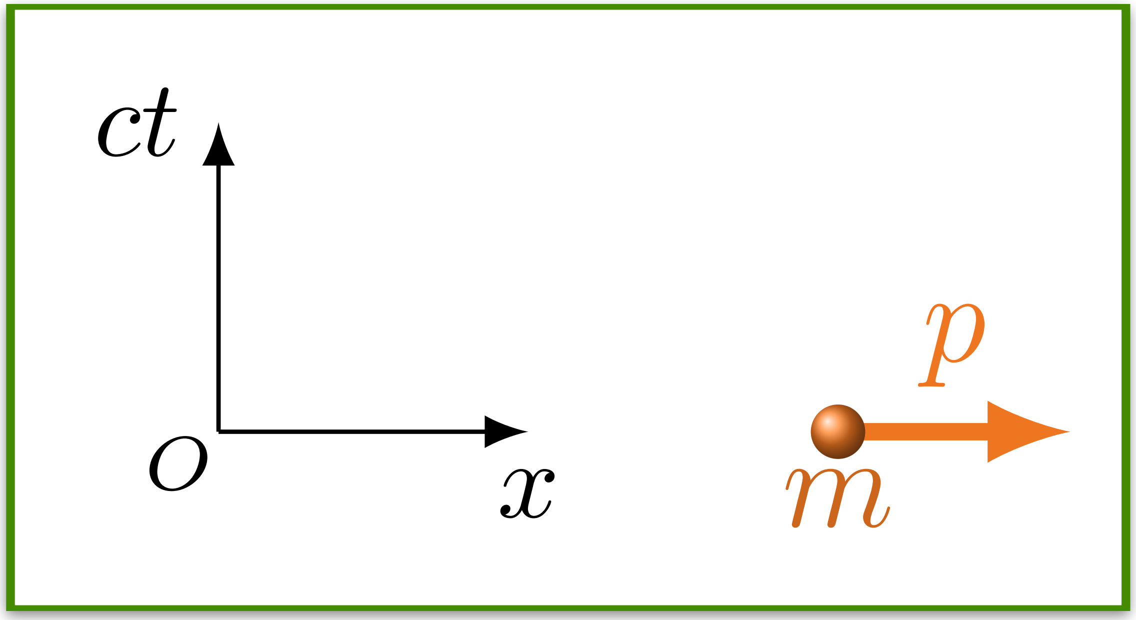

$$\bar{p}^\mu = \begin{pmatrix} m_0 c \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$m = \gamma m_0$$

Dinâmica relativística

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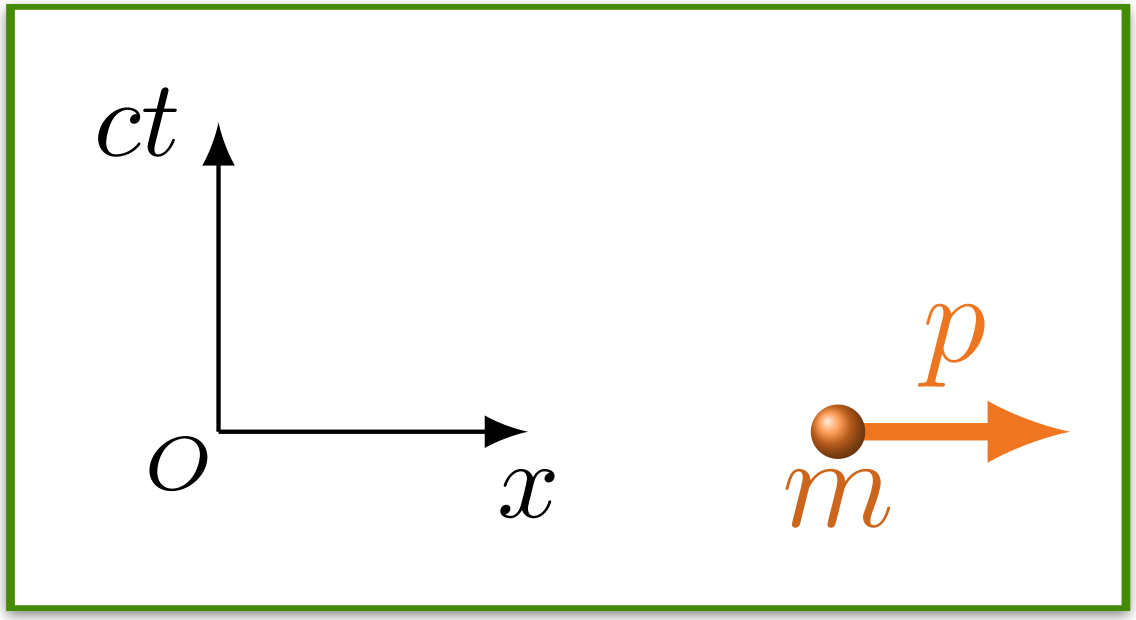
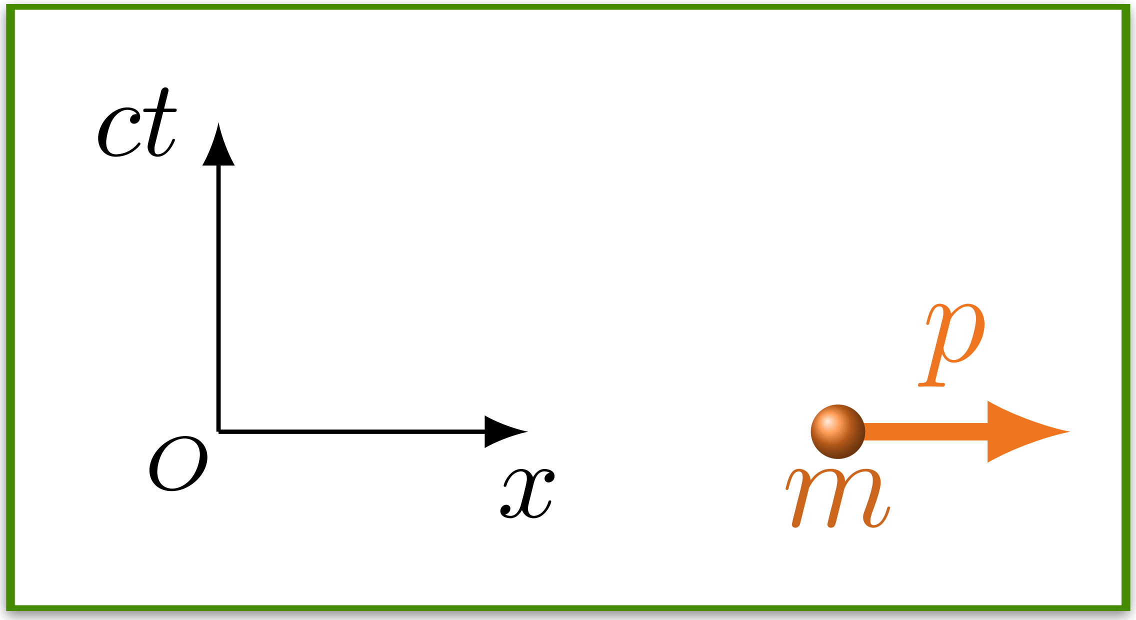


$$\bar{p}^\mu = \begin{pmatrix} m_0 c \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$m = m_0\gamma = m_0(1 - \frac{v^2}{c^2})^{-1/2}$$

Dinâmica relativística



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$$m = m_0 (1 + \frac{v^2}{2c^2}) + \mathcal{O}(v^4/c^4)$$

Dinâmica relativística

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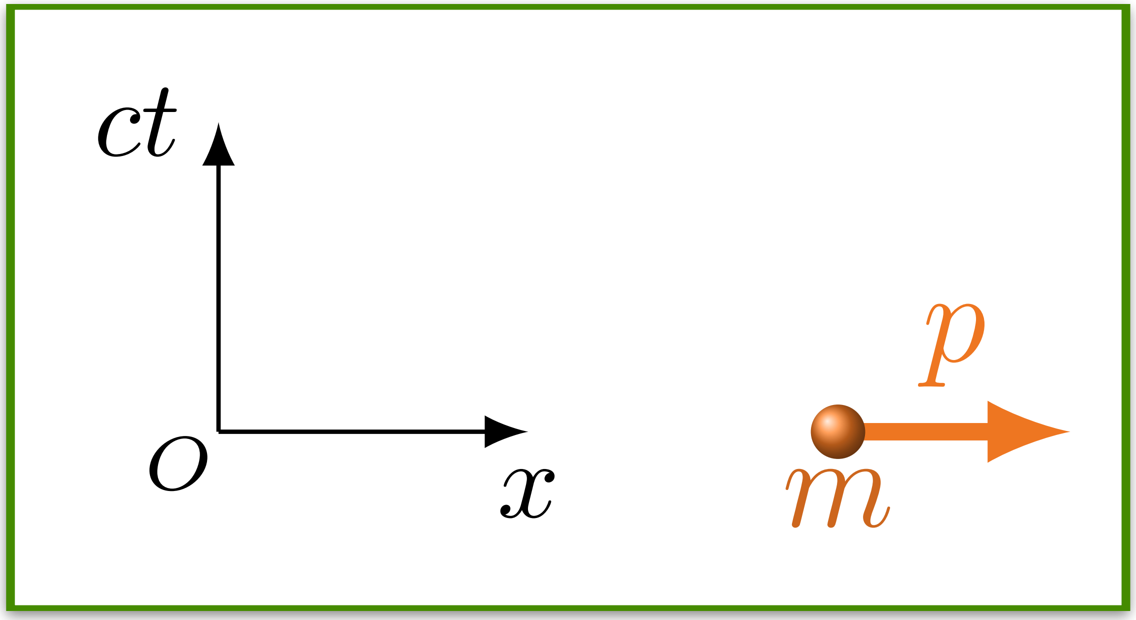

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$$mc^2 = m_0 c^2 + m_0 \frac{v^2}{2}$$

Dinâmica relativística

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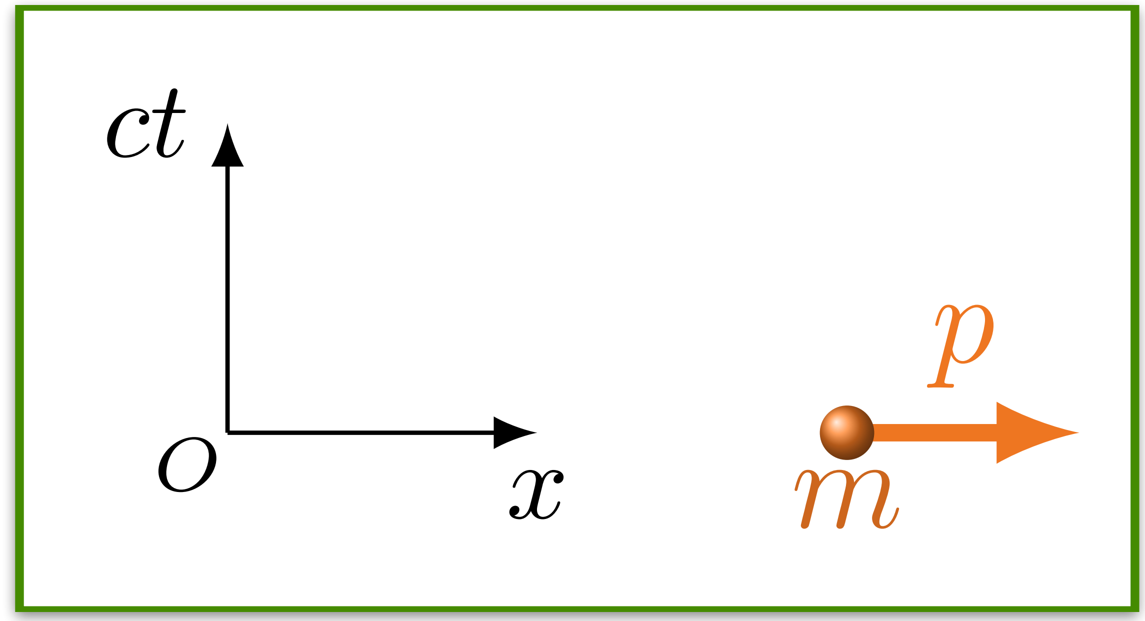

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$$m = m_0(1 + \frac{v^2}{2c^2}) + \mathcal{O}(v^4/c^4)$$

$$mc^2 = m_0c^2 + m_0\frac{v^2}{2} \qquad \Rightarrow \quad E = mc^2$$

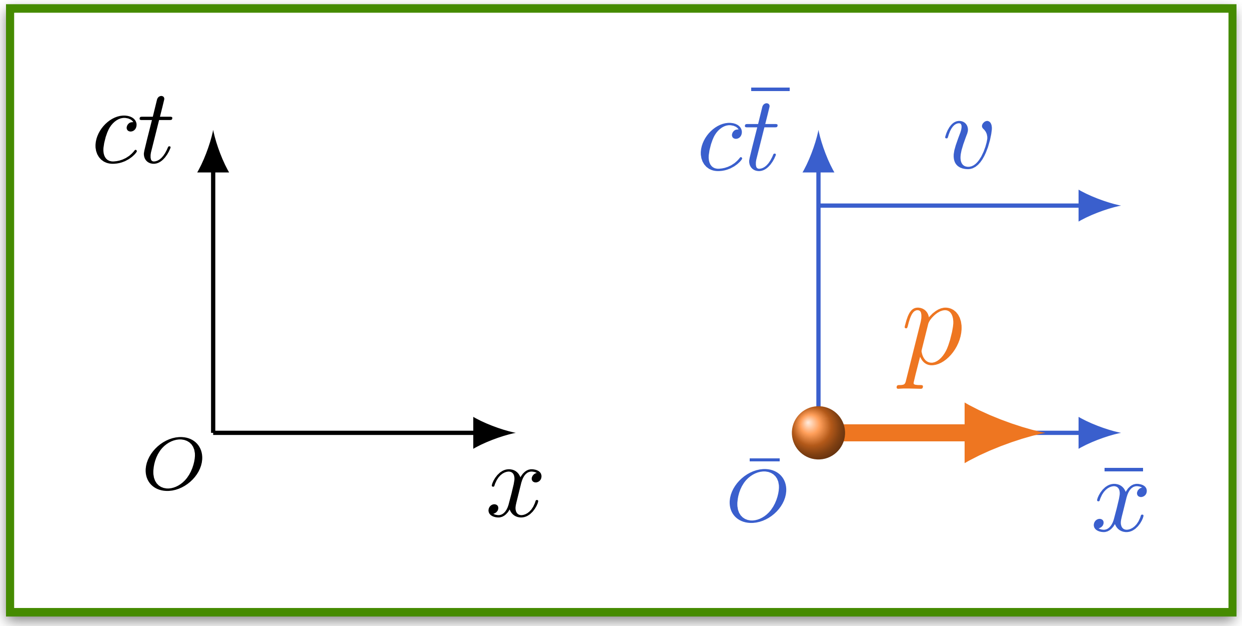
$$\boxed{p^\mu = \begin{pmatrix} \frac{E}{c} \\ p^1 \\ p^1 \\ p^3 \end{pmatrix}}$$

Quadrivetores

$$\vec{\mathbf{r}} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} \longrightarrow x^{\mu} = \begin{pmatrix} ct \\ x \\ y \\ z \end{pmatrix}$$

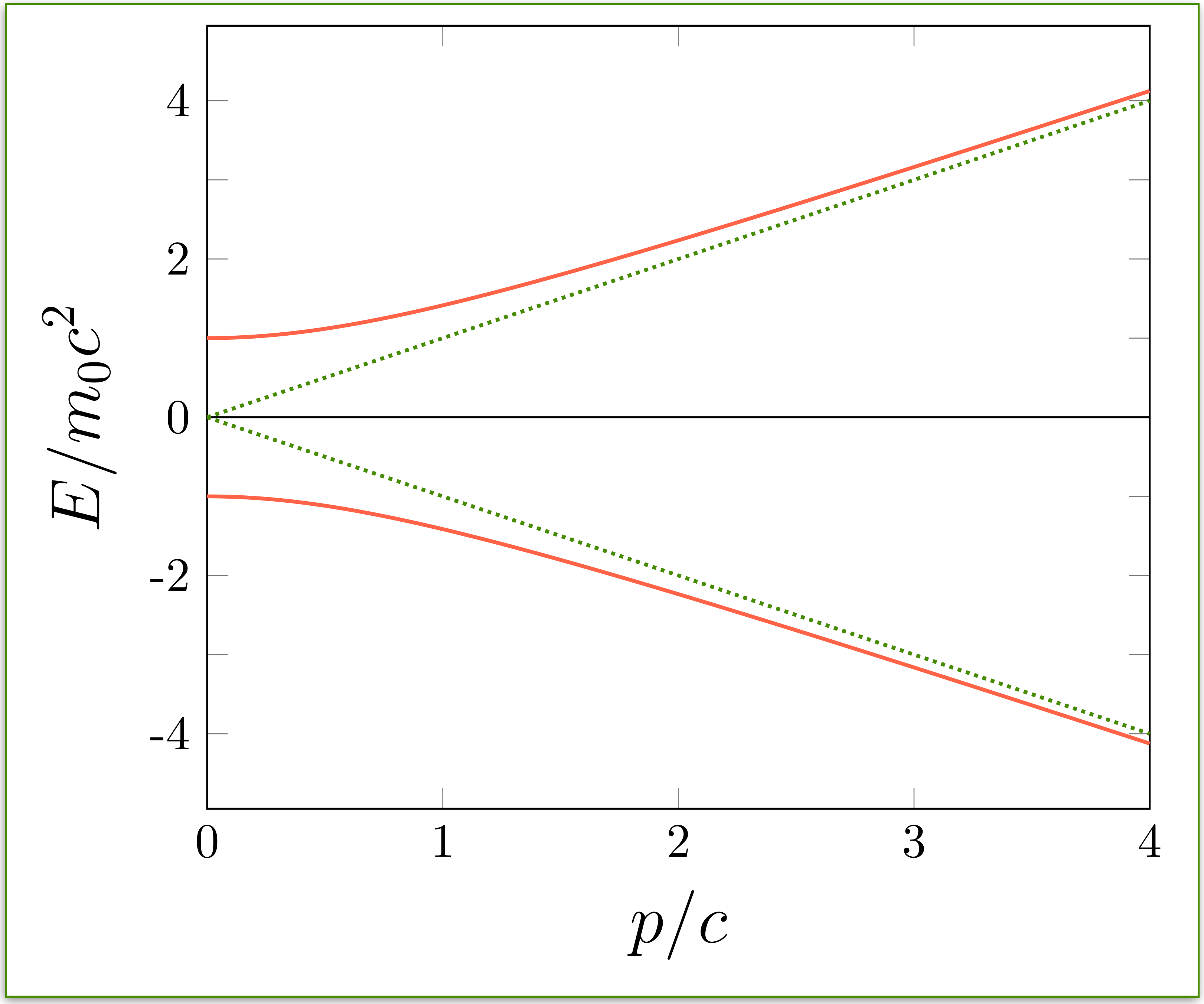
Dinâmica relativística

$$p^\mu = \begin{pmatrix} E/c \\ p^1 \\ p^2 \\ p^3 \end{pmatrix} \Rightarrow \quad E^2 = m_0 c^2 + p^2 c^2$$



Dinâmica relativística

$$E = \pm\sqrt{m_0c^2 + p^2c^2}$$



Dinâmica relativística

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