Eletromagnetismo Avançado

20 de outubro
Relatividade restrita

Produto escalar

$$\bar{a}^{\mu}\bar{b}_{\mu} = a^{\nu}b_{\nu}$$

Produto escalar

$$\bar{a}^\mu \bar{b}_\mu = a^\nu b_\nu$$

$$\bar{\Delta} x^\mu \bar{\Delta} x_\mu = \Delta x^\nu \Delta x_\nu$$

$$-c^2 \Delta \bar{t}^2 + \Delta \bar{x}^2 + \Delta \bar{y}^2 + \Delta \bar{z}^2 = -c^2 \Delta t^2 + \Delta x^2 + \Delta y^2 + \Delta z^2$$

Produto escalar

$$\bar{a}^\mu \bar{b}_\mu = a^\nu b_\nu$$

$$\bar{\Delta} x^\mu \bar{\Delta} x_\mu = \Delta x^\nu \Delta x_\nu$$

$$\underbrace{\Delta \bar{x}^2 + \Delta \bar{y}^2 + \Delta \bar{z}^2 - c^2 \Delta \bar{t}^2}_{\bar{I}} = \underbrace{\Delta x^2 + \Delta y^2 + \Delta z^2 - c^2 \Delta t^2}_{I}$$

Produto escalar

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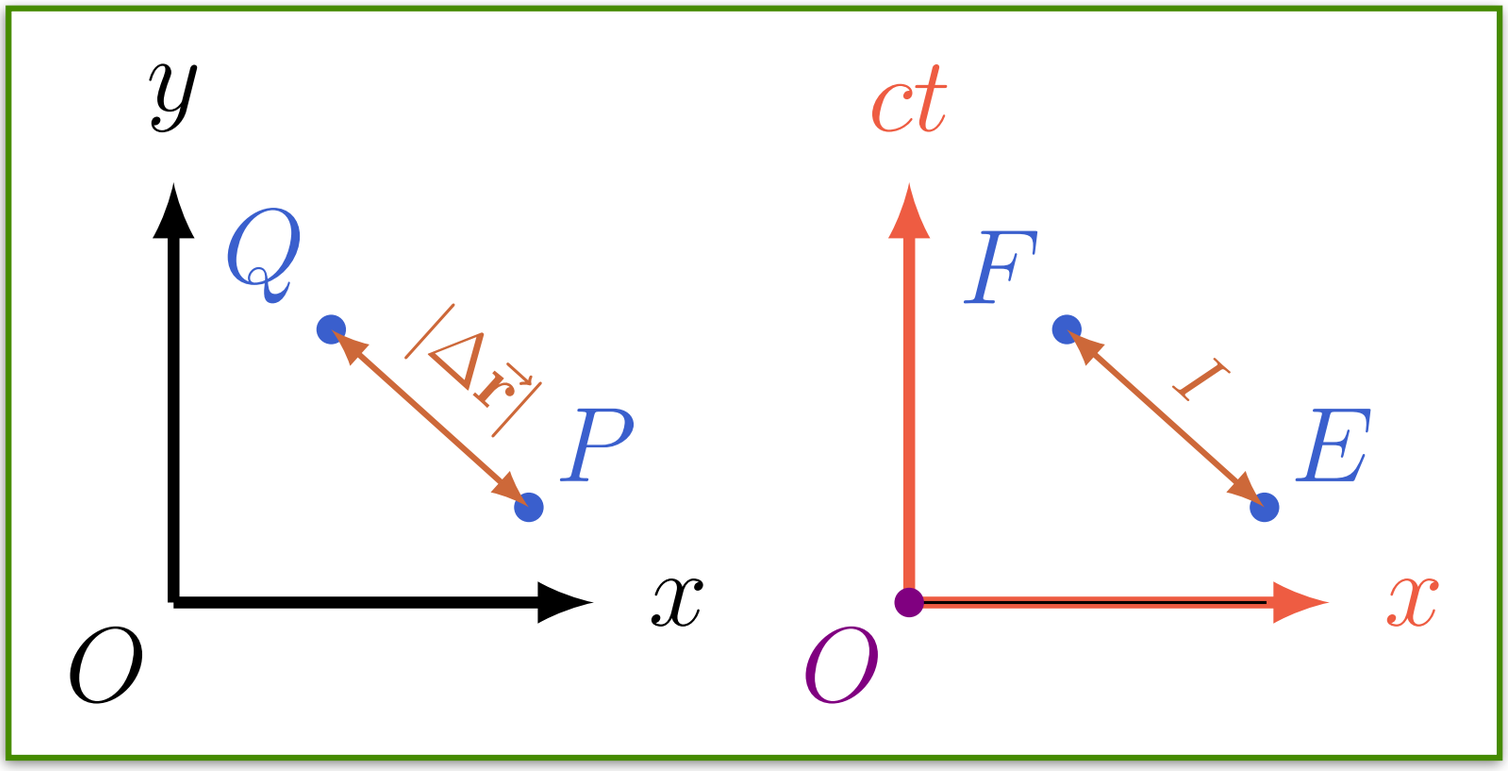
$$\bar{\Delta}x^\mu \bar{\Delta}x_\mu = \Delta x^\nu \Delta x_\nu$$

$$\underbrace{\Delta\bar{x}^2 + \Delta\bar{y}^2 + \Delta\bar{z}^2 - c^2\Delta\bar{t}^2}_{\bar{I}} = \underbrace{\Delta x^2 + \Delta y^2 + \Delta z^2 - c^2\Delta t^2}_{I}$$

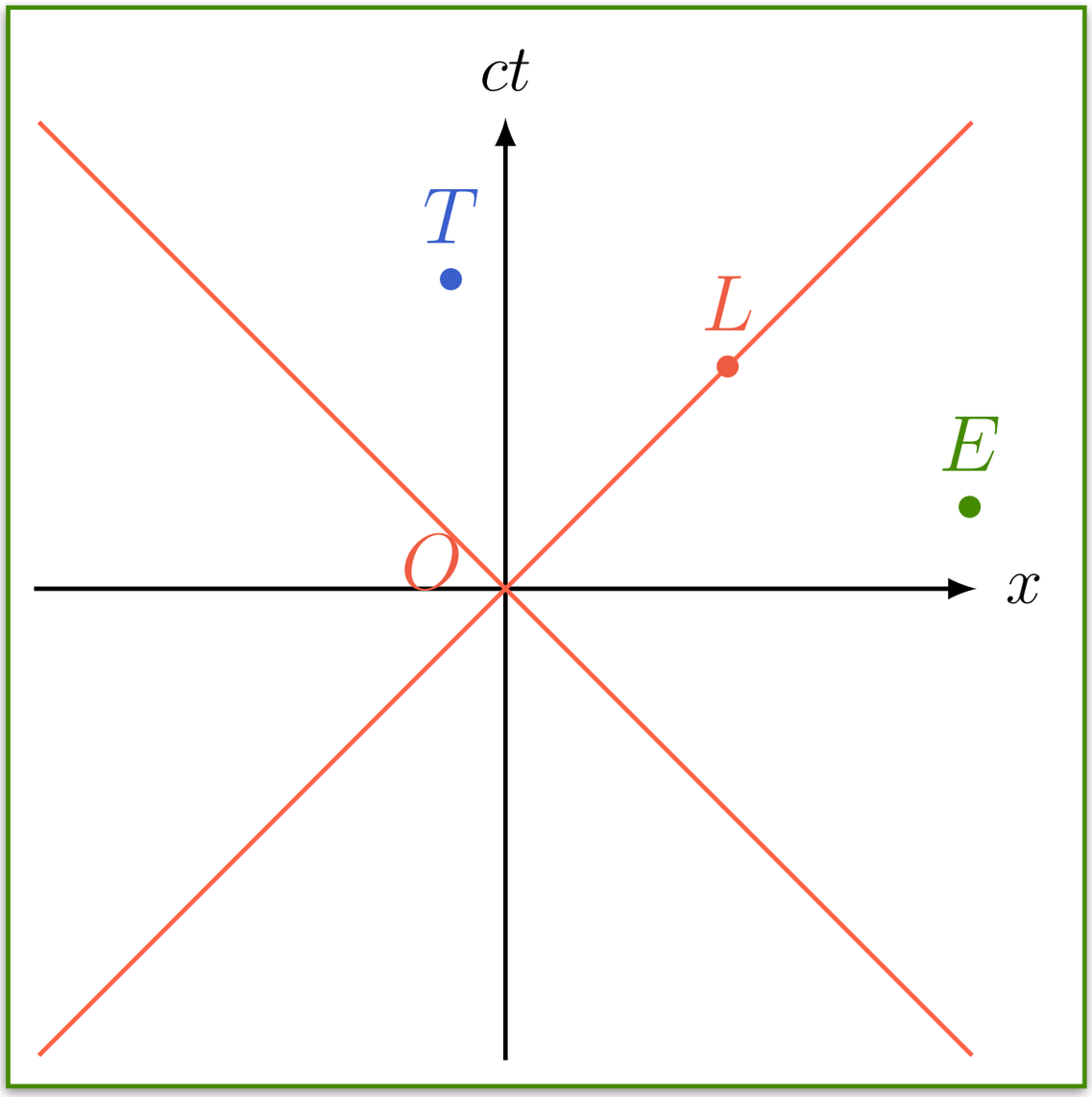


Tipos de intervalos

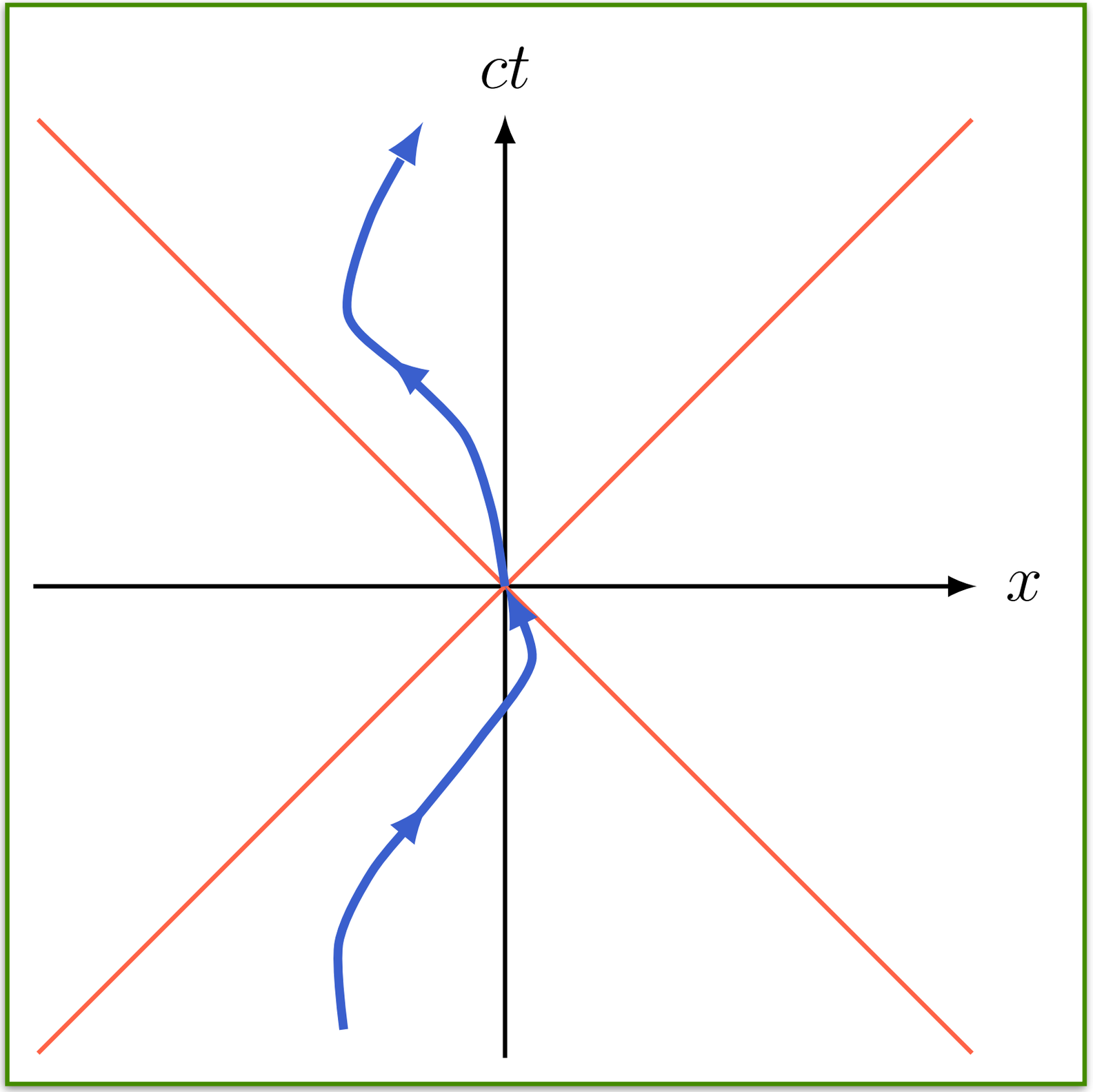
Tipo tempo (T)

Tipo luz (L)

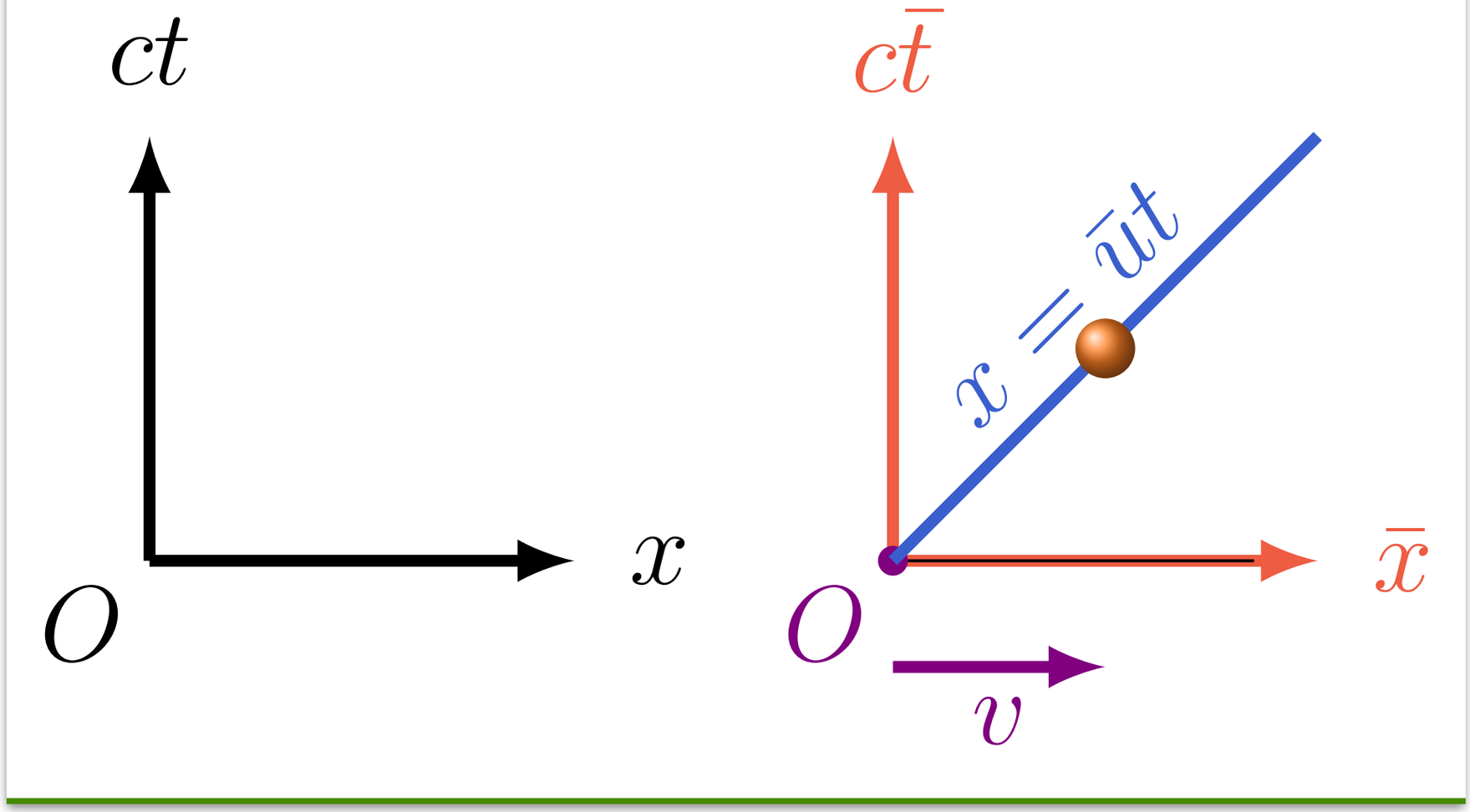
Tipo espaço (E)



Linha de mundo



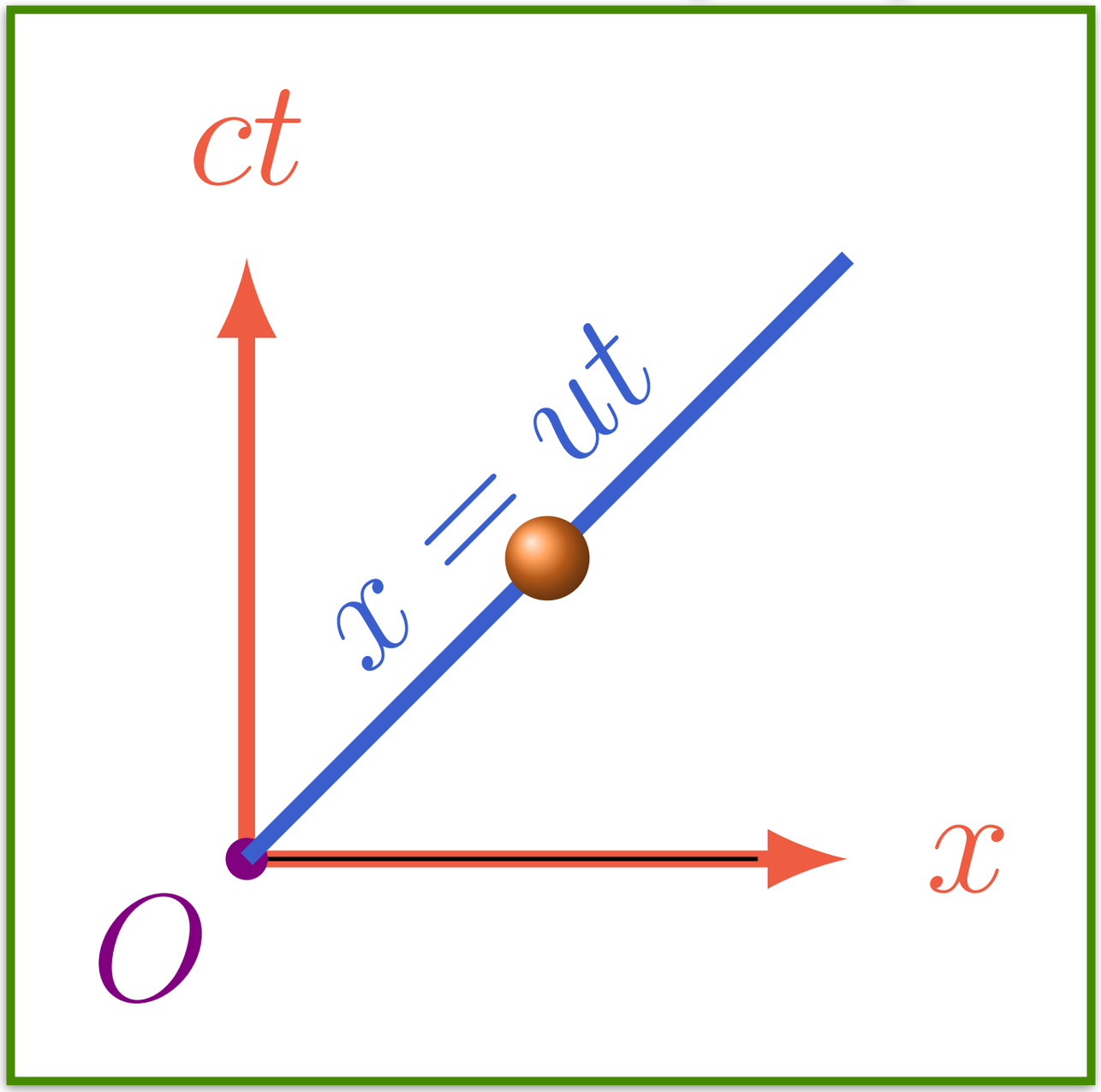
Velocidade



$$u = \frac{v + \bar{u}}{1 + \dfrac{v\bar{u}}{c^2}}$$

Velocidade própria

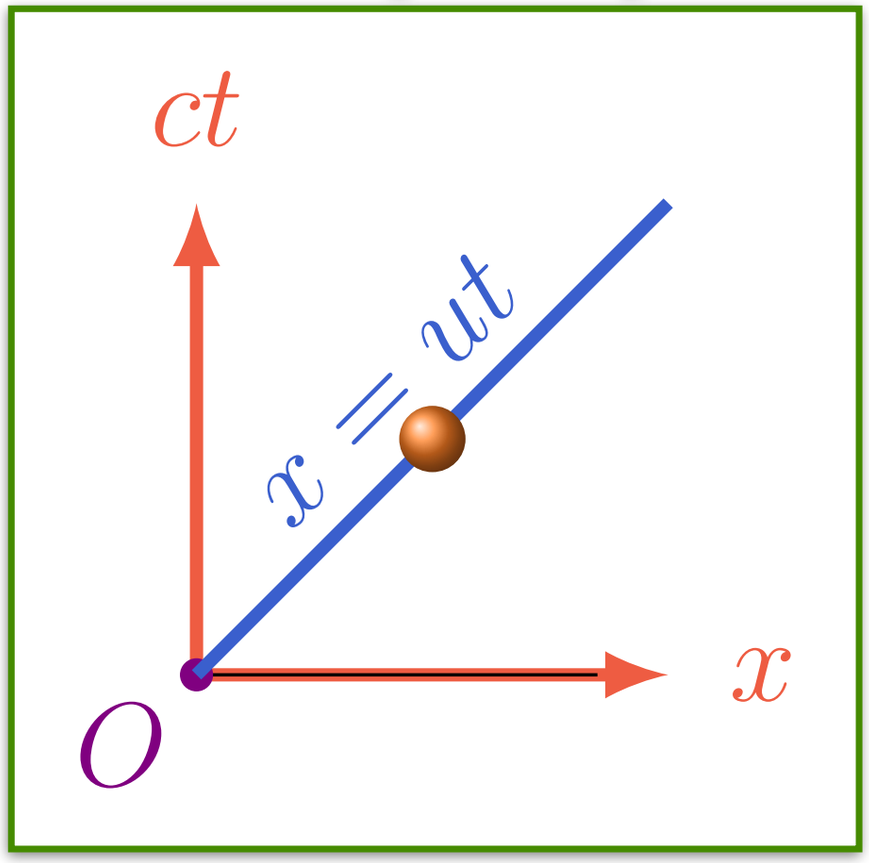
$$\eta^\mu = \frac{\mathrm{d}x^\mu}{\mathrm{d}\tau}$$



Velocidade própria

$$\eta^\mu = \frac{\mathrm{d}x^\mu}{\mathrm{d}\tau}$$

$$\begin{bmatrix} \eta^0 \\ \eta^1 \\ \eta^2 \\ \eta^3 \end{bmatrix} = \frac{1}{\sqrt{1 - \dfrac{u^2}{c^2}}} \begin{bmatrix} c \\ u^1 \\ u^2 \\ u^3 \end{bmatrix}$$



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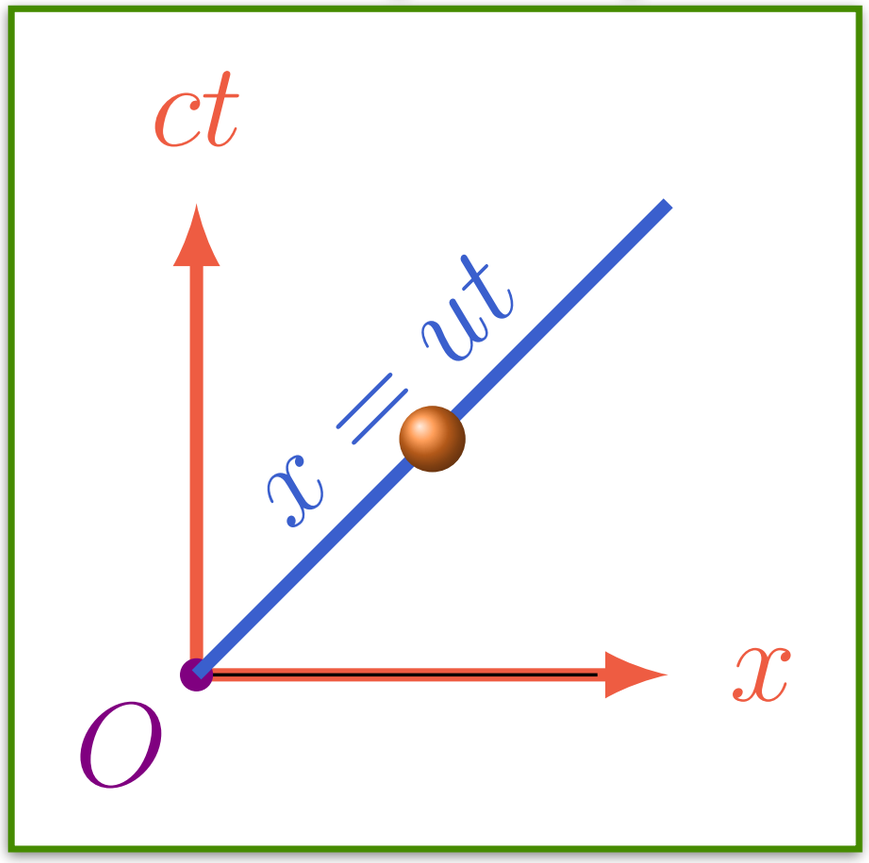

$$\eta_\mu \eta^\mu = -c^2$$

Velocidade própria

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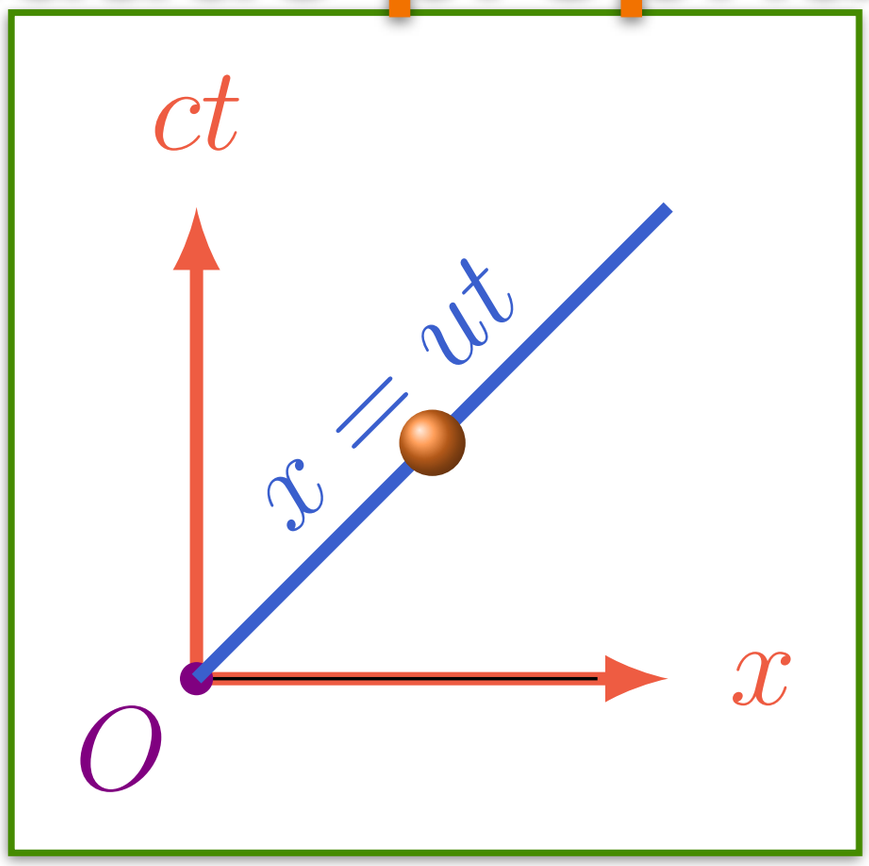

$$\Rightarrow \quad \vec{\eta} = \frac{\vec{u}}{\sqrt{1-\dfrac{u^2}{c^2}}}$$

$$\eta_\mu \eta^\mu = -c^2$$

$$\vec{\eta} = \frac{\vec{u}}{\sqrt{1 - \dfrac{u^2}{c^2}}}$$

Pratique o que aprendeu

$$\vec{u} = ?$$