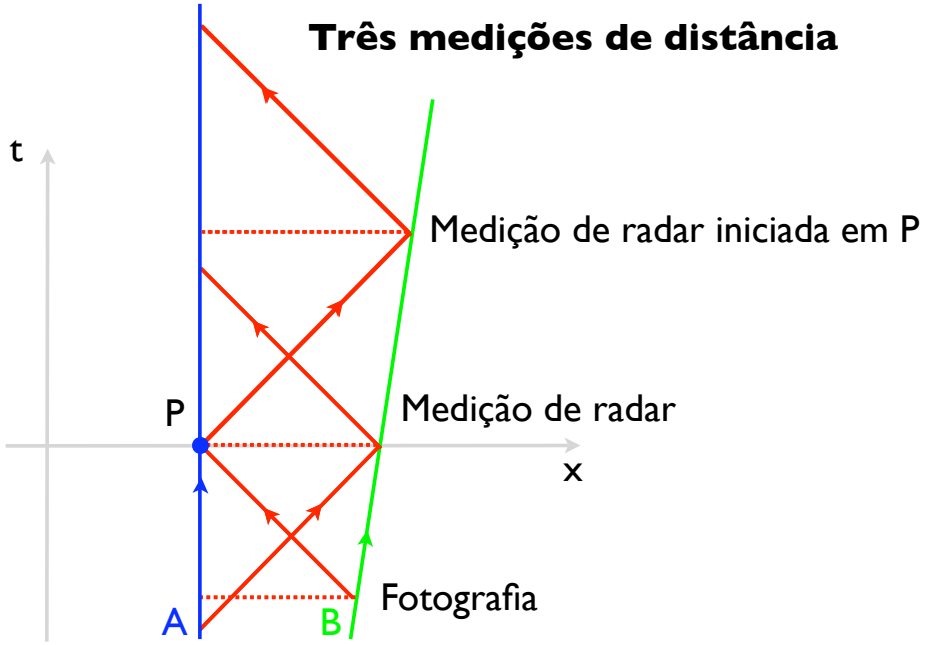
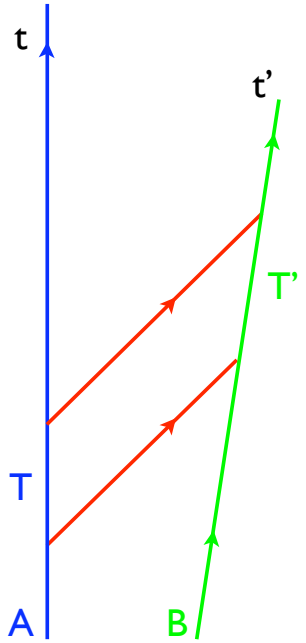


Cálculo K



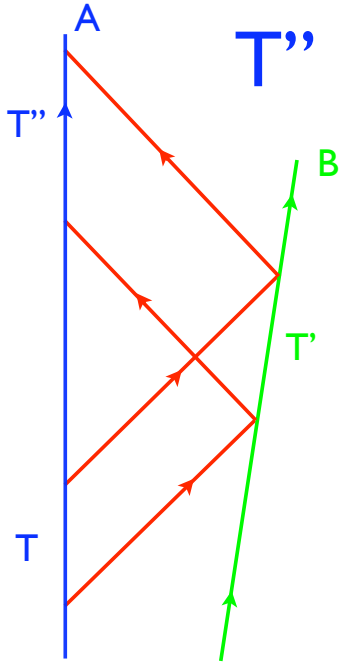
$$T' = K\,T$$

ou, melhor,

$$T_B = K_{BA}\,T_A$$

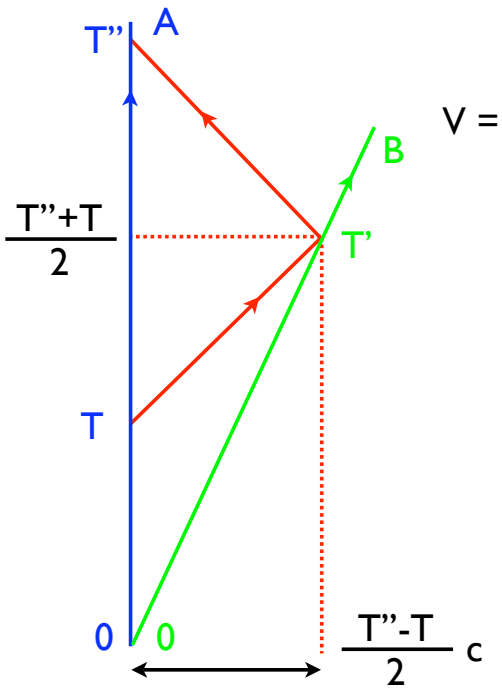
Princípio da Relatividade:

$$K_{AB} = K_{BA} = K$$



$$T'' = KT' = K(K\,T)$$

$$T'' = K^2\,T$$

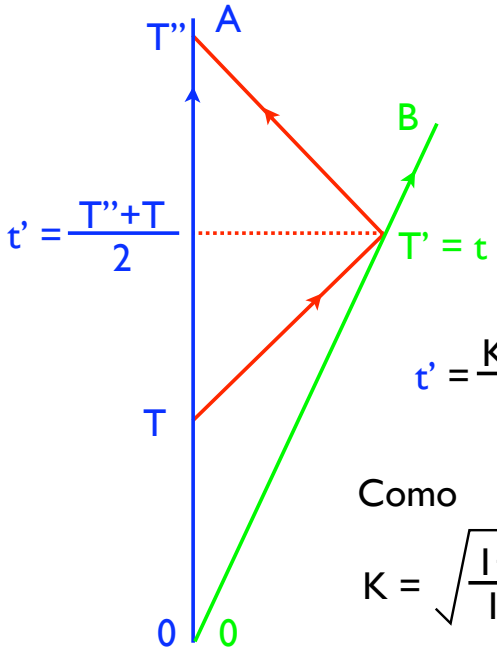


$$V = \frac{\frac{T''-T}{2}c}{\frac{T''+T}{2}} = \frac{K^2T - T}{K^2T + T}c$$

$$\frac{V}{c} = \frac{K^2 - 1}{K^2 + 1}$$

$$K = \sqrt{\frac{1+V/c}{1-V/c}}$$

Dilatação do Tempo



$T' = KT$ OK

$T'' = KT'$ OK

$t' = \frac{K^2+1}{2}T$ OK

$t' = \frac{K^2+1}{2K}t$ nada normal

Como

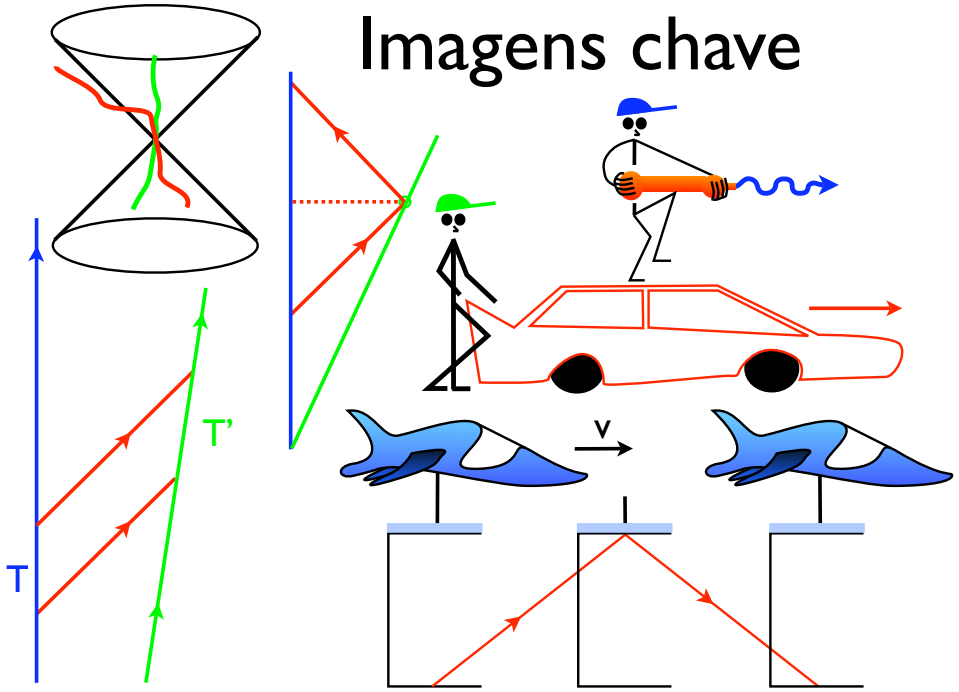
$K = \sqrt{\frac{1+V/c}{1-V/c}}$,

$$t' = \frac{t}{\sqrt{1-\frac{v^2}{c^2}}}$$

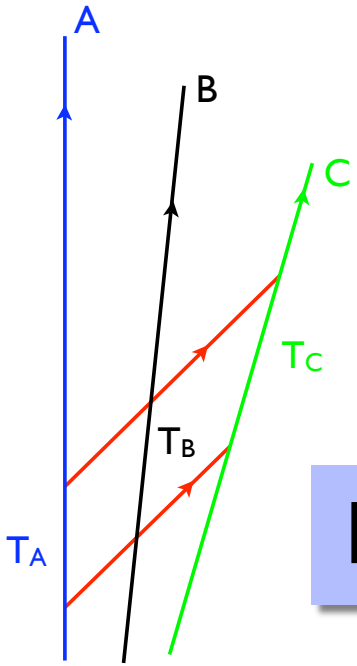
Palavras chave

- Diagramas de Espaço-Tempo
- Velocidade da Luz
- Cone de Luz
- Adição de velocidades
- Postulado
- Dilatação do Tempo
- Distâncias e Simultaneidade
- Cálculo K
- Dilatação do Tempo

Imagens chave



Adição de velocidades



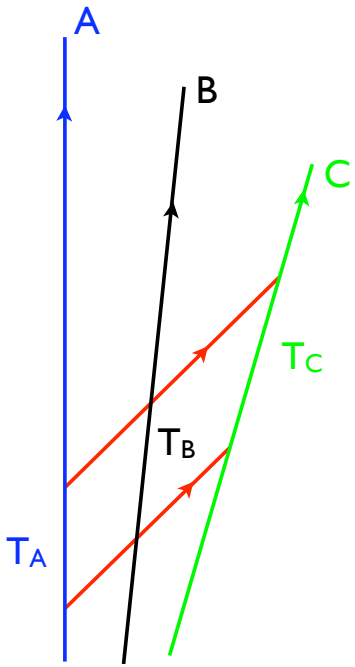
$$T_B = K_{BA}\, T_A$$

$$T_C = K_{CA}\, T_A$$

$$= K_{CB}\, T_B$$

$$= K_{CB}\, K_{BA}\, T_A$$

$$K_{CA} = K_{CB}\, K_{BA}$$

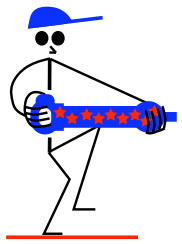


$$(K_{CA})^2=(K_{CB})^2(K_{BA})^2$$

V_{CA} = Velocidade de C vista por A
V_{CB} = Velocidade de C vista por B
V_{BA} = Velocidade de B vista por A

$$\frac{1+V_{CA}/c}{1-V_{CA}/c} = \frac{1+V_{CB}/c}{1-V_{CB}/c}\,\frac{1+V_{BA}/c}{1-V_{BA}/c}$$

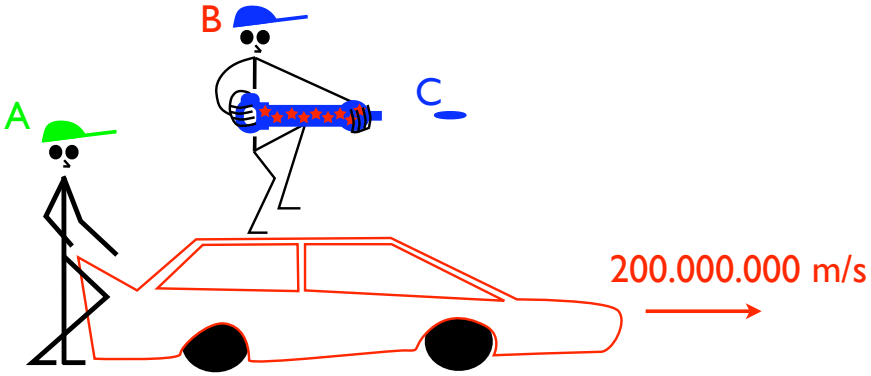
$$V_{CA} = \frac{V_{CB}+V_{BA}}{1+\dfrac{V_{CB}V_{BA}}{c^2}}$$

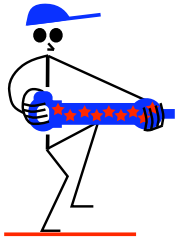


200.000.000 m/s

$$V_{CA} = \frac{V_{CB}+V_{BA}}{1+\dfrac{V_{CB}V_{BA}}{c^2}}$$

V =

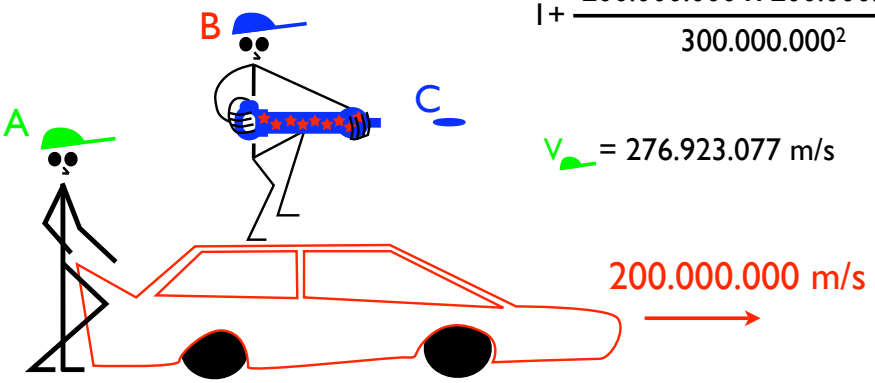




200.000.000 m/s

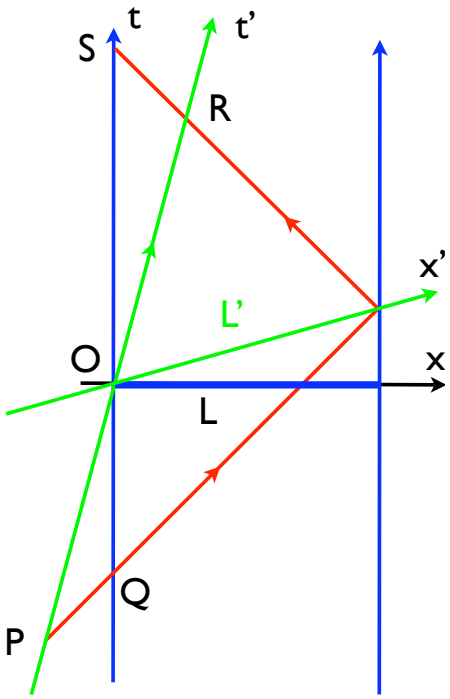
$$V_{CA} = \frac{V_{CB}+V_{BA}}{1+\dfrac{V_{CB}V_{BA}}{c^2}}$$

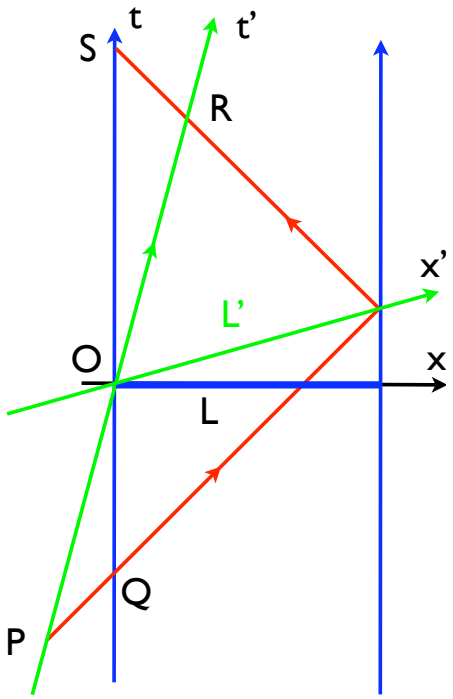
$$V = \frac{200.000.000 + 200.000.000}{1+\dfrac{200.000.000 \times 200.000.000}{300.000.000^2}}$$



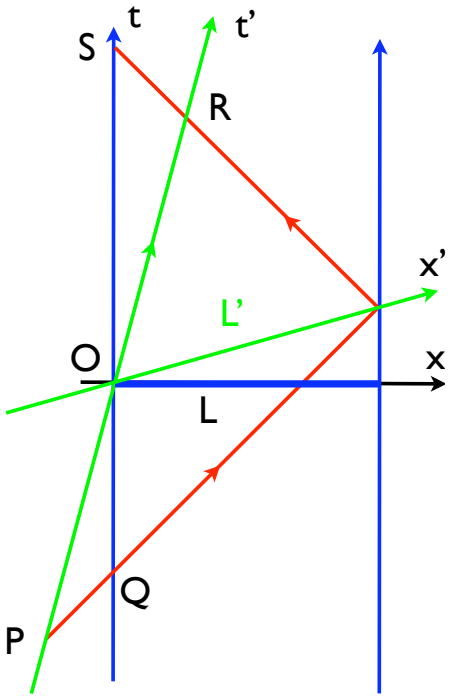
V = 276.923.077 m/s

Contracção do Espaço



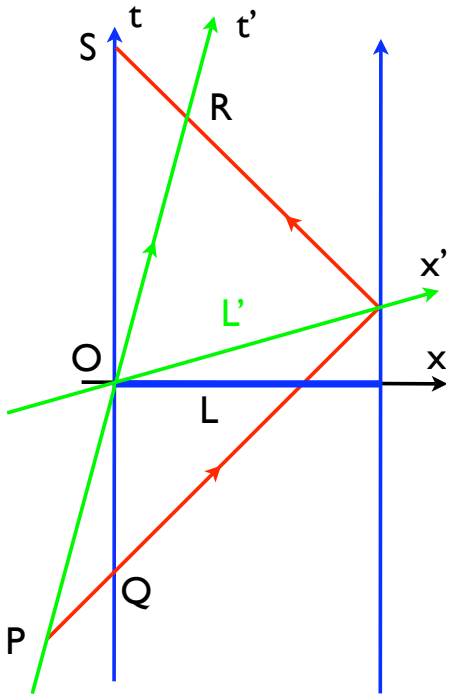


$$L = \frac{t_{QO} + t_{OS}}{2} c$$



$$L = \frac{t_{QO} + t_{OS}}{2} c$$

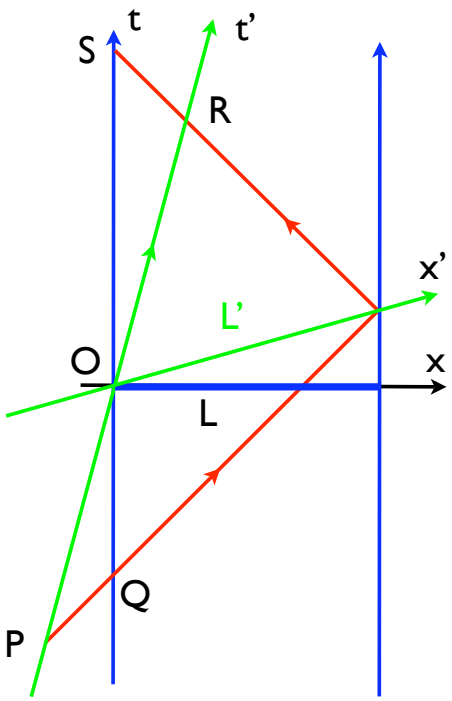
$$= \frac{K(-v)\, t'_{PO} + K(v)\, t'_{OR}}{2} c$$



$$L = \frac{t_{QO} + t_{OS}}{2} c$$

$$= \frac{K(-v)\, t'_{PO} + K(v)\, t'_{OR}}{2} c$$

$$= (K(-v) + K(v)) \frac{t'_{PO}}{2} c$$

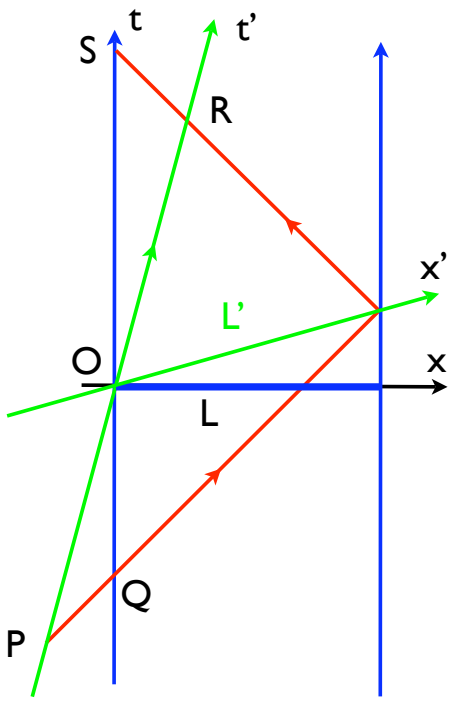


$$L = \frac{t_{QO} + t_{OS}}{2} c$$

$$= \frac{K(-v)\, t'_{PO} + K(v)\, t'_{OR}}{2} c$$

$$= (K(-v) + K(v)) \frac{t'_{PO}}{2} c$$

$$= (K(-v) + K(v))\, L'/2 \quad \text{ou}$$



$$L = \frac{t_{QO} + t_{OS}}{2} c$$

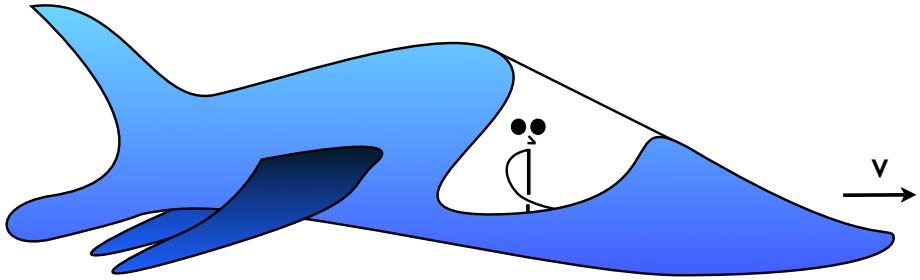
$$= \frac{K(-v)\, t'_{PO} + K(v)\, t'_{OR}}{2} c$$

$$= (K(-v) + K(v)) \frac{t'_{PO}}{2} c$$

$$= (K(-v) + K(v))\, L'/2 \quad \text{ou}$$

$$L' = L\sqrt{1 - \frac{v^2}{c^2}}$$

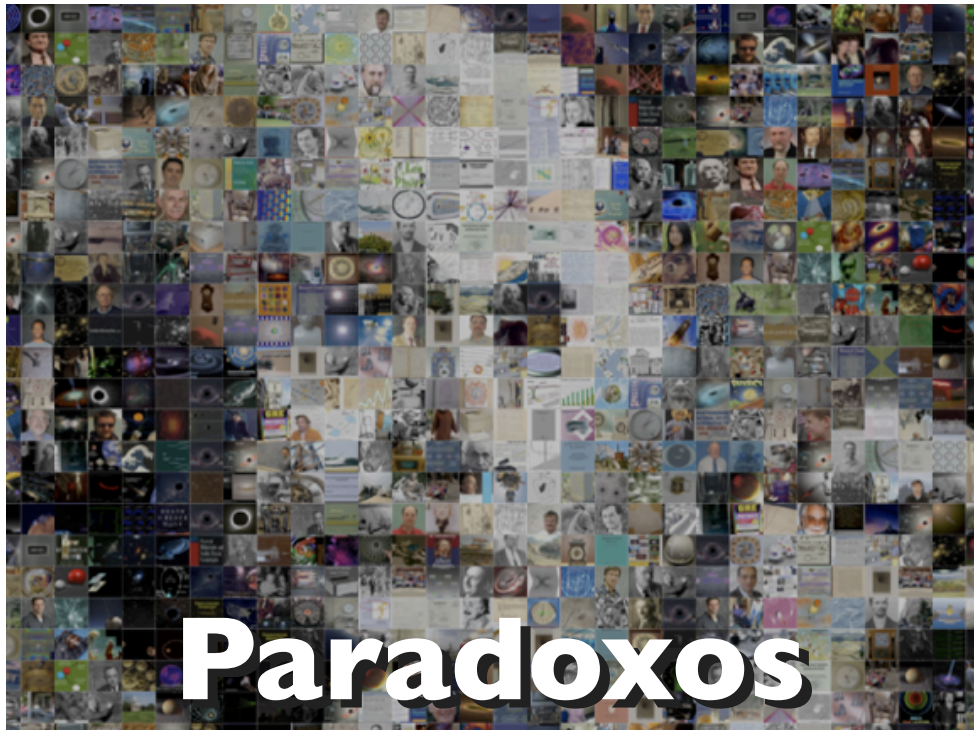
Nota: $t'_{PO} = t'_{OR}$



t' , o tempo medido em **terra**, é **maior** do que t , o tempo medido na **nave.**

L' , o comprimento medido em **terra**, é **menor** do que L , o comprimento medido na **nave.**

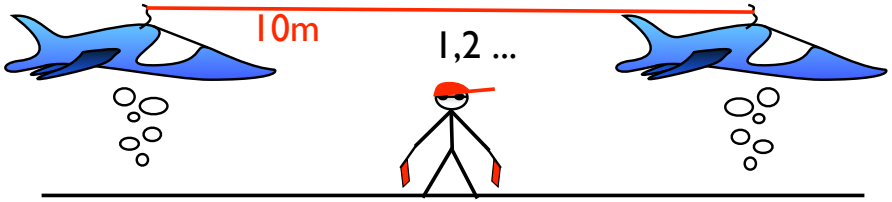
$$L' = L\sqrt{1 - \frac{v^2}{c^2}} \quad , \quad t' = \frac{t}{\sqrt{1 - \frac{v^2}{c^2}}}$$

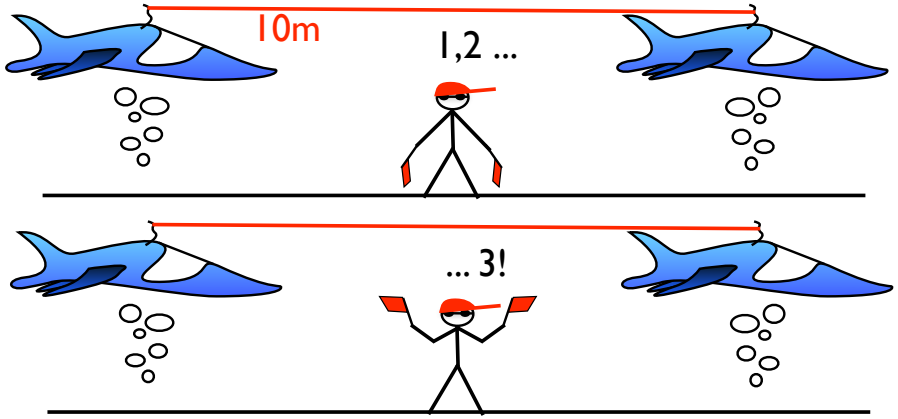


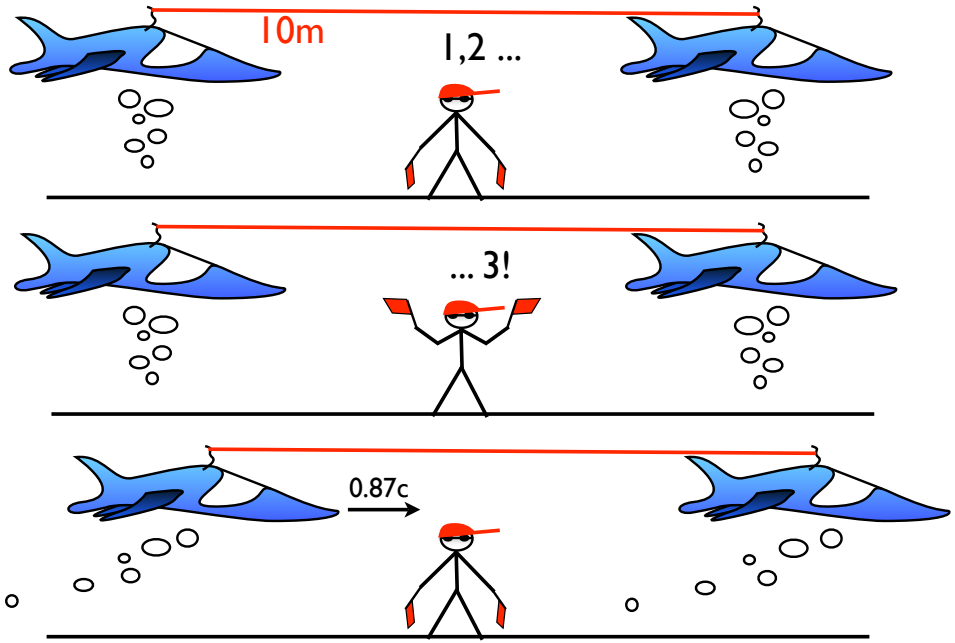
Regras de ouro

Não confiar em frases que incluam "ao mesmo tempo", "nesse mesmo instante" ...

Desenhar um diagrama de espaço-tempo.

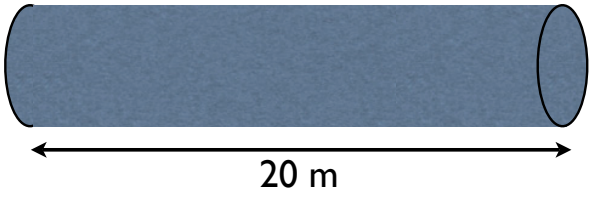






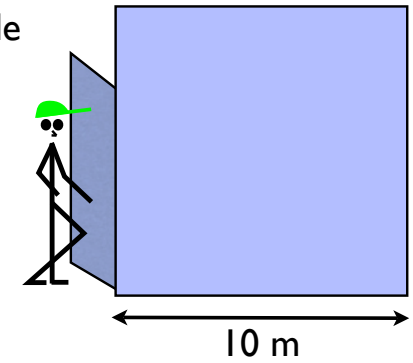
Sim

Queremos colocar

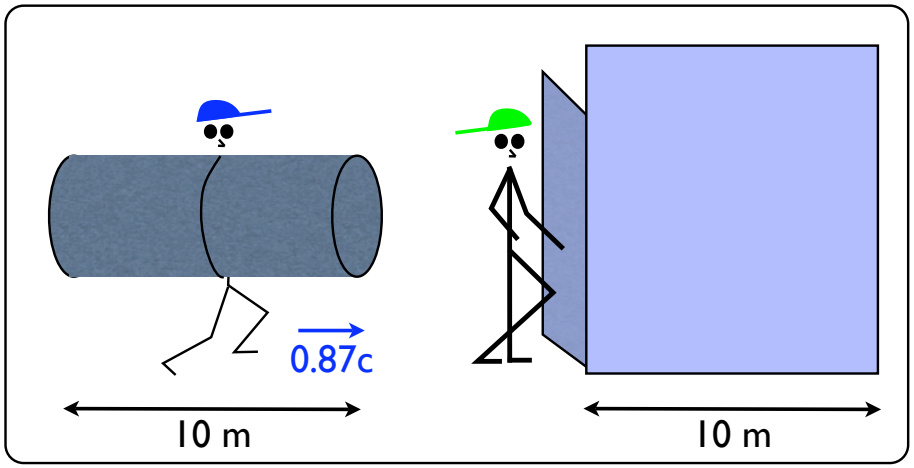


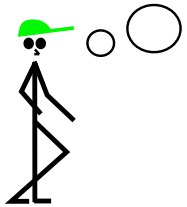
Barra de borracha

dentro de

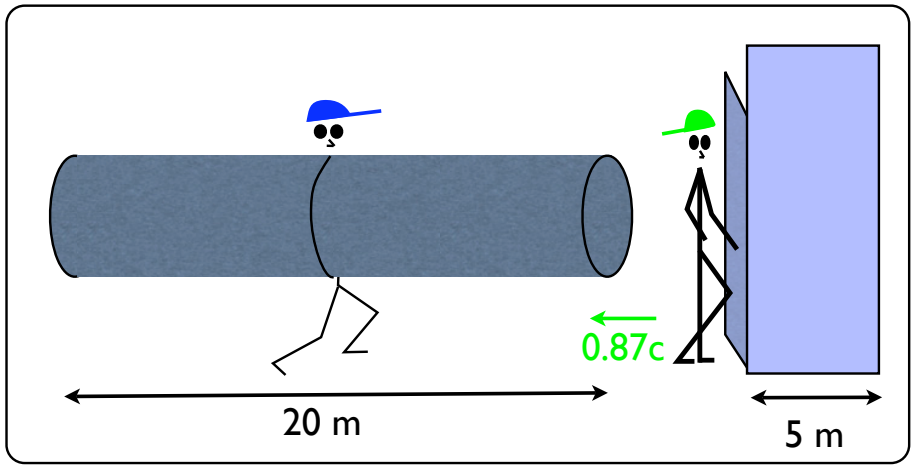


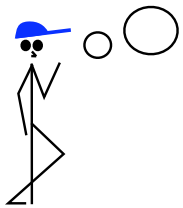
Garagem





Facil, basta correres a 260.000.000 m/s para a barra ficar com 10 metros. Depois, assim que entrares na garagem, eu fecho a porta.





Calma!, para mim é a garagem que vem em minha direcção a 260.000.000 m/s por isso ela é que fica mais pequena, com apenas 5 metros!

Conseguimos colocar a barra na garagem?

Sim