25/03/21 Bosso Lucrezia 5°H

$x = 100\ km = 10^5\ m$ $x' = ?$ $v = 0{,}950c$

$t = 200\ \mu s = 2 \cdot 10^{-4}\ s$ $t' = ?$

$$x' = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{10^5\ m - 0{,}95c \cdot 2 \cdot 10^{-4}\ s}{\sqrt{1 - \frac{0{,}950^2 c^2}{c^2}}} = 1{,}37 \cdot 10^5\ m$$

$$t' = \frac{\left(t - \frac{vx}{c^2}\right)}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{2 \cdot 10^{-4}\ s - \frac{0{,}95c \cdot 10^5\ m}{c^2}}{\sqrt{1 - \frac{(0{,}950c)^2}{c^2}}} =$$

$= ?$

2) $v = 0{,}1c$
$v_p = -0{,}56c$

$$v_p' = \frac{v + v_p}{1 + \frac{v v_p}{c^2}} = \frac{0{,}1 - 0{,}56}{1 - (0{,}1 \cdot 0{,}56)} c = -0{,}487c \simeq -0{,}5c$$

3) $t' = 2{,}52 \cdot 10^{-8}\ s$
$v = 0{,}27c$
$d = ?$

$$t = \frac{t'}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{2{,}52 \cdot 10^{-8}\ s}{\sqrt{1 - (0{,}27)^2}} = 2{,}62 \cdot 10^{-8}\ s$$

↓ ce lo aspettiamo maggiore

$$d = v \cdot t = 0{,}27c \cdot 2{,}62 \cdot 10^{-8}\ s =$$
$$= (0{,}27 \cdot 3 \cdot 10^8\ \tfrac{m}{s})\ 2{,}62 \cdot 10^{-8}\ s = 2{,}12\ m$$

4) $\theta = 30°$
$v = 0{,}9c$
$x' = ?\ m\ (\text{rispetto a } 30°)$

4) $\alpha = 30°$
$V = 0{,}9c$
$\ell = 1\,m$

$$\ell_x' = \ell_x \sqrt{1 - \frac{v^2}{c^2}} = (1\,m \cos 30°)\sqrt{1 - (0{,}9)^2} =$$
$$= 0{,}377\,m \simeq 0{,}38\,m$$
$$\ell_x' = 0{,}38\,m$$
$$\ell_x = 0{,}87\,m$$

$$\ell' = \sqrt{(\ell_x')^2 + (\ell_y')^2} = \sqrt{(0{,}38)^2 m^2 + (1 \operatorname{sen} 30°)^2 m^2} = 0{,}626\,m$$
$$\simeq 0{,}63\,m$$

1) $x = 10^5\,m$
$t = 2 \cdot 10^{-4}\,s$
$v = 0{,}95c$

$$x' = \frac{x - vt}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{10^5\,m - (2 \cdot 10^{-4}\,s \cdot 0{,}95c)}{\sqrt{1 - \frac{0{,}95^2 c^2}{c^2}}} =$$
$$= 1{,}38 \cdot 10^5\,m = 1{,}38 \cdot 10^5\,m$$

$$t' = \frac{t - \frac{xV}{c^2}}{\sqrt{1 - \frac{v^2}{c^2}}} = \frac{2\,10^{-4}s - \left(\frac{0{,}95c \cdot 10^5 m}{c^2}\right)}{\sqrt{1 - (0{,}95)^2}} = -3{,}736\,s$$
$$\simeq -3{,}74\,s$$