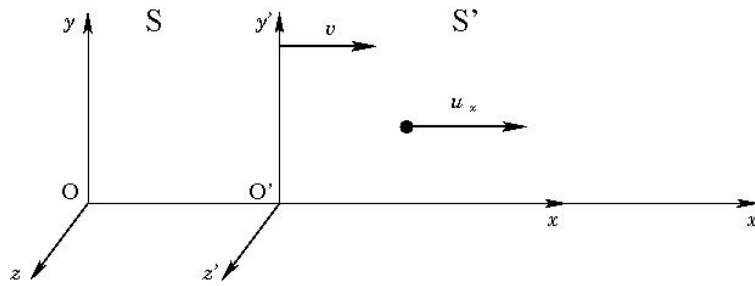


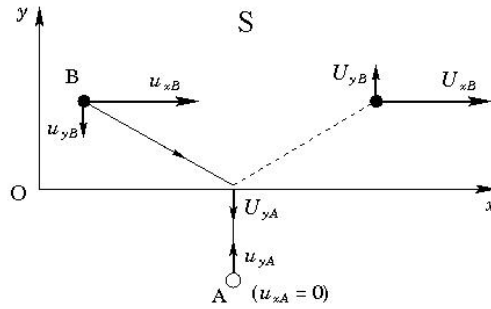
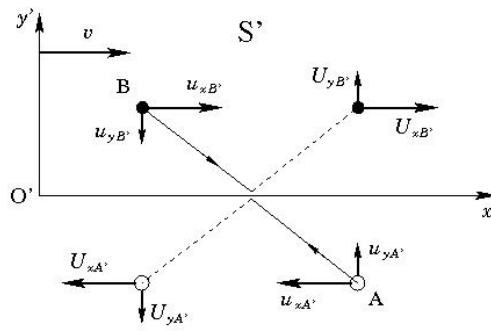
Relatività ristretta

Cinematica



S → S'	S' → S
$x' = \frac{x - vt}{\sqrt{1 - \beta^2}}$	$x = \frac{x' + vt'}{\sqrt{1 - \beta^2}}$
$y' = y$	$y = y'$
$z' = z$	$z = z'$
$t' = \frac{t - \frac{v}{c^2}x}{\sqrt{1 - \beta^2}}$	$t = \frac{t' + \frac{v}{c^2}x'}{\sqrt{1 - \beta^2}}$
$\Delta L' = \frac{\Delta L}{\sqrt{1 - \beta^2}}$	$\Delta L = \Delta L' \sqrt{1 - \beta^2}$
$\Delta t' = \Delta t \sqrt{1 - \beta^2}$	$\Delta t = \frac{\Delta t'}{\sqrt{1 - \beta^2}}$
$dt = \frac{d\tau}{\sqrt{1 - \beta^2}}, \quad d\tau = \text{intervallo di tempo proprio}$	
$u'_x = \frac{u_x - v}{1 - \frac{u_x v}{c^2}}$	$u_x = \frac{u'_x + v}{1 + \frac{u'_x v}{c^2}}$
$u'_y = \frac{u_y \sqrt{1 - \beta^2}}{1 - \frac{u_x v}{c^2}}$	$u_y = \frac{u'_y \sqrt{1 - \beta^2}}{1 + \frac{u'_x v}{c^2}}$
$u'_z = \frac{u_z \sqrt{1 - \beta^2}}{1 - \frac{u_x v}{c^2}}$	$u_z = \frac{u'_z \sqrt{1 - \beta^2}}{1 + \frac{u'_x v}{c^2}}$

Dinamica



$$u^2 = u_x^2 + u_y^2$$

$$m = \frac{m_0}{\sqrt{1 - \frac{u^2}{c^2}}}, \quad m_0 = \text{massa propria o massa a riposo}$$

$$\vec{p} = \frac{m_0 \vec{u}}{\sqrt{1 - \frac{u^2}{c^2}}}$$

$$\vec{F} = \frac{d}{dt} (\vec{p})$$

$$T = \int_0^u F dx = m_0 c^2 \left(\frac{1}{\sqrt{1 - \frac{u^2}{c^2}}} - 1 \right)$$

$$E = m_0 c^2 + T = m c^2 = \sqrt{p^2 c^2 + m_0^2 c^4}$$

$S \rightarrow S'$	$S' \rightarrow S$
$p'_x = \gamma(v) \left[p_x - E \frac{v}{c^2} \right]$	$p_x = \gamma(v) \left[p'_x + E' \frac{v}{c^2} \right]$
$p'_y = p_y$	$p_y = p'_y$
$p'_z = p_z$	$p_z = p'_z$
$E' = \gamma(v) [E - v p_x]$	$E = \gamma(v) [E' + v p'_x]$
$m' = \gamma \left[m \left(1 - \frac{u_x v}{c^2} \right) \right]$	$m = \gamma \left[m' \left(1 + \frac{u'_x v}{c^2} \right) \right]$
$F'_x = F_x - \frac{u_y v}{c^2} F_y - \frac{u_z v}{c^2} F_z$	$F_x = F'_x + \frac{u'_y v}{c^2} F'_y + \frac{u'_z v}{c^2} F'_z$
$F'_y = \frac{F_y \sqrt{1 - \beta^2}}{1 - \frac{u_x v}{c^2}}$	$F_y = \frac{F'_y \sqrt{1 - \beta^2}}{1 + \frac{u'_x v}{c^2}}$
$F'_z = \frac{F_z \sqrt{1 - \beta^2}}{1 - \frac{u_x v}{c^2}}$	$F_z = \frac{F'_z \sqrt{1 - \beta^2}}{1 + \frac{u'_x v}{c^2}}$