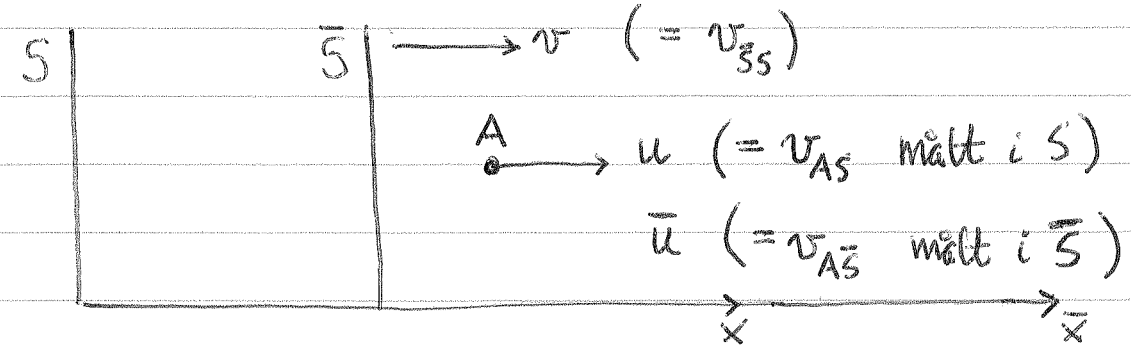
Relativa hastigheter (LL 12.3, TM 39.5)



Galileo: $u = \bar{u} + v \quad (v_{AS} = v_{A\bar{S}} + v_{\bar{S}S})$

Einstein: $u = dx/dt$

$$\bar{u} = d\bar{x}/d\bar{t}$$

der $d\bar{x} = \gamma(dx - v\,dt)$

$$d\bar{t} = \gamma\left(dt - \frac{v}{c^2}dx\right)$$

$$\Rightarrow \bar{u} = \frac{\gamma(dx - v\,dt)}{\gamma\left(dt - \frac{v}{c^2}dx\right)} = \frac{\frac{dx}{dt} - v}{1 - \frac{v}{c^2}\frac{dx}{dt}} = \frac{u - v}{1 - \frac{uv}{c^2}}$$

Eller:

$$u = \frac{\gamma(d\bar{x} + v\,d\bar{t})}{\gamma\left(d\bar{t} + \frac{v}{c^2}d\bar{x}\right)} = \frac{\frac{d\bar{x}}{d\bar{t}} + v}{1 + \frac{v}{c^2}\frac{d\bar{x}}{d\bar{t}}} = \frac{\bar{u} + v}{1 + \frac{\bar{u}v}{c^2}}$$

$$\left(v_{AS} = \frac{v_{A\bar{S}} + v_{\bar{S}S}}{1 + \frac{v_{A\bar{S}}\,v_{\bar{S}S}}{c^2}}\right)$$