

Relativistic Addition of Velocities

What do (A) and (B) measure for their relative v ?

(A) \longrightarrow
 $v_A = .99c$

\longleftarrow (B)
 $v_B = .99c$

Galilean relativity: $v_{rel} = v_A + v_B = 1.98c$!?

Einsteinian relativity:
 v_{rel} can never $> c$

$$v_{rel} = \frac{v_A + v_B}{1 + \frac{v_A v_B}{c^2}}$$

Can Use this expression to show that c is the same in all inertial frames:

eg. let (B) be a photon with $v_B = c$

$$v_{rel} = \frac{v_A + c}{1 + \frac{v_A}{c}} = \frac{\left(\frac{v_A}{c} + 1\right)c}{1 + \frac{v_A}{c}} = \underline{\underline{c}}$$

works for (A) as a photon, too

$$v_{rel} = \frac{c + c}{1 + \frac{c^2}{c^2}} = \frac{2c}{2} = \underline{\underline{c}} !$$