Universidad del Valle de Guatemala
Departamento de Matemática
Licenciatura en Matemática Aplicada

Estudiante: Rudik Roberto Rompich
Correo: rom19857@uvg.edu.gt
Carné: 19857

Física Moderna - Catedrática: Yasmín Portillo
3 de agosto de 2022

Formulario - Parcial 1

Postulados de Einstein

1. The form of each physical law is the same in all inertial frame.
2. Light moves at the same speed relative to all observers.

$$\gamma_v \equiv \frac{1}{\sqrt{1-\frac{v^2}{c^2}}} \geq 1$$

$$x' = \gamma_v(x - vt) \quad t' = \gamma_v\left(-\frac{v}{c^2}x + t\right)$$

$$x = \gamma_v\left(x' + vt'\right) \qquad t = \gamma_v\left(+\frac{v}{c^2}x' + t'\right)$$

$$\Delta t = \gamma_v \Delta t_0$$

Definición 1 (Proper time)**.** *Tenemos*

$$L = \frac{L_0}{\gamma_v}$$

$$p = \gamma_v m u$$

$$E = \gamma_u m c^2$$

Table 2.1 Twin Paradox Analysis

Item	Measured by Frank (remains on Earth)	Measured by Mary (traveling astronaut)
Time of total trip	$T = 2L/v$	$T' = 2L/\gamma v$
Total number of signals sent	$fT = 2fL/v$	$fT' = 2fL/\gamma v$
Frequency of signals received at beginning of trip f'	$f\sqrt{\frac{1-\beta}{1+\beta}}$	$f\sqrt{\frac{1-\beta}{1+\beta}}$
Time of detecting Mary's turnaround	$t_1 = L/v + L/c$	$t_1' = L/\gamma v$
Number of signals received at the rate f'	$f't_1 = \frac{fL}{v}\sqrt{1-\beta^2}$	$f't_1' = \frac{fL}{v}(1-\beta)$
Time for remainder of trip	$t_2 = L/v - L/c$	$t_2' = L/\gamma v$
Frequency of signals received at end of trip f''	$f\sqrt{\frac{1+\beta}{1-\beta}}$	$f\sqrt{\frac{1+\beta}{1-\beta}}$
Number of signals received at rate f''	$f''t_2 = \frac{fL}{v}\sqrt{1-\beta^2}$	$f''t_2' = \frac{fL}{v}(1+\beta)$
Total number of signals received	$2fL/\gamma v$	$2fL/v$
Conclusion as to other twin's measure of time taken	$T' = 2L/\gamma v$	$T = 2L/v$

After A. French, *Special Relativity*, New York: Norton (1968), p. 158.