

Part I

A First Course in General Relativity¹

Chapter 1

Special Relativity

On “Principle of relativity (Galileo)”

Galilean invariance

[Newton’s laws of motion](#) hold in all frames related to one another by a [Galilean transformation](#). In other words, all frames related to one another by such a transformation are inertial (meaning, Newton’s equation of motion is valid in these frames).² The proof has been given by the book on page 2.

1.5 - Construction of the coordinates used by another observer

Why would the tangent of the angle is the speed in Fig. 1.2?

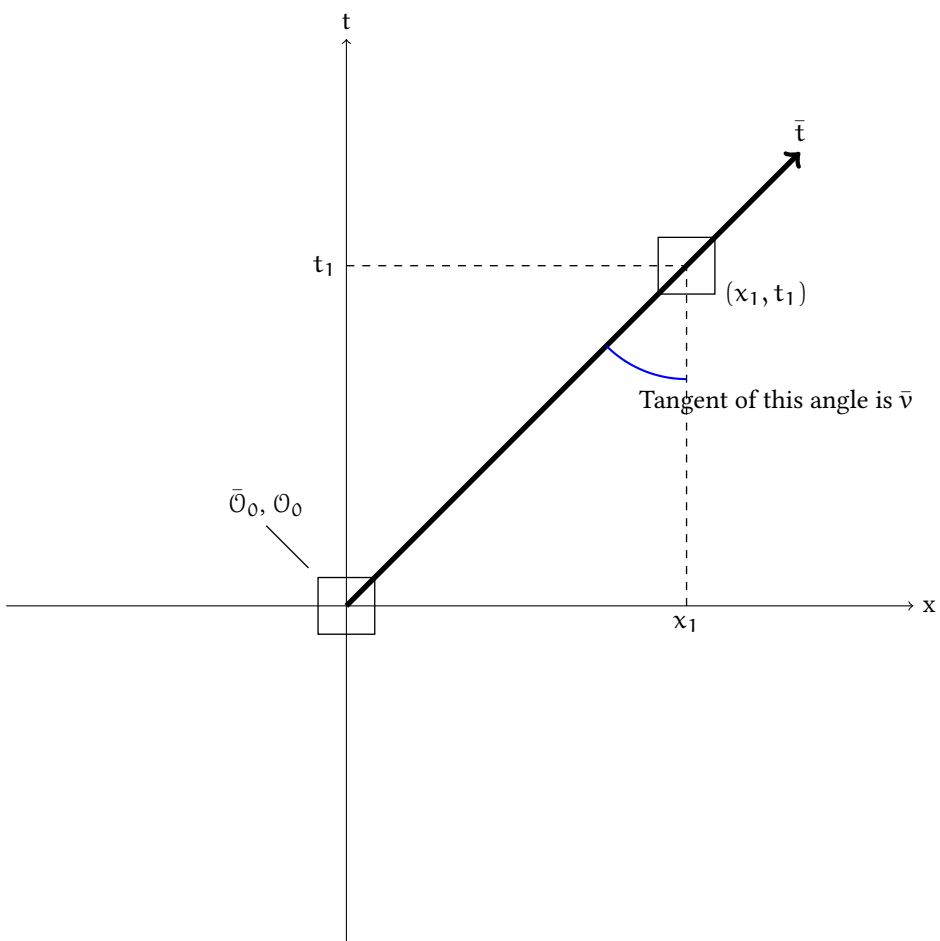
Suppose \mathcal{O} and $\bar{\mathcal{O}}$ both start out at the same position where $\bar{\mathcal{O}}$ moves along the x at some speed. After t_1 , observer \mathcal{O} sees $\bar{\mathcal{O}}$ at position x_1 :

$$\bar{\mathcal{O}}_1 = (x_1, t_1)$$

Observer $\bar{\mathcal{O}}$, however, still sees themselves at $x = 0$:

$$\bar{\mathcal{O}}_1 = (0, t_1)$$

By definition where “ \bar{t} is the locus of events at constant $\bar{x} = 0$ ”, \bar{t} is the straight line that passes the origin and the (x_1, t_1) :



Bibliography

¹ Bernard Schutz. *[A First Course on General Relativity](#)*. 2009.

² Wikipedia. [Galilean invariance](#).