

Time is a Measuring System Derived from Light Speed

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Abstract

In physics spatial distance d is a product of velocity v and time t : $d = v * t$. Mathematical formalism $x_4 = i * c * t$ confirms that in Special Theory of Relativity fourth coordinate x_4 is spatial too. x_4 is composed out of c light speed, imaginary number i and time t that represents "thick" of a clock. Time t obtained with clocks describes numerical order of material change $t_0, t_1, t_2, \dots, t_n$. Clocks are reference systems for measuring frequency, velocity, numerical order of material changes that run in space. Time t as a component of x_4 is running of clocks in space. This view on time as a measuring reference system sees physical phenomena running exclusively in space and not in time. This view explains some recent experiments which confirm that time t of physical event can be zero.

Key words: time, run of clocks, light speed, numerical order, frequency, velocity, light speed

Introduction

Light speed c is a basis for fundamental unit of time "Planck time": $t_p = \frac{c}{l_p}$

where l_p is a Planck distance: $l_p = \sqrt{\frac{\hbar G}{c^3}} \approx 1.616252(81) \times 10^{-35}$ meters. Planck time t_p is the basic unity for measuring frequency, velocity and numerical order of material change that run in space. Time as a clock run is not a part of space; time/clock run is a reference system to measure material change. In Lorentz transformation time t and t' are running of clocks for two observers Q and Q'.

$$\begin{bmatrix} ct' \\ x' \\ y' \\ z' \end{bmatrix} = \begin{bmatrix} \gamma & -\beta\gamma & 0 & 0 \\ -\beta\gamma & \gamma & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} ct \\ x \\ y \\ z \end{bmatrix}.$$

where $\beta = \frac{v}{c} = \frac{\|\vec{v}\|}{c}$ and $\gamma = \frac{1}{\sqrt{1-\beta^2}}$.

Discussion

Duration of material change has no existence on its own. Duration is result of measurement with clocks. This means that space is timeless, past and future does not exist in space.

Time as a run of clocks in space excludes possibility of time travel. One can travel in space only and not in time.

Physical phenomena happen in space only, time as a clock run is a measuring device for physical phenomena. For certain physical phenomena time is zero, since no measurable time (no run of clocks) elapses for them to happen. For example in the article *Attosecond Ionization and Tunneling Delay Time Measurements in Helium* by Eckle et al, a conclusion is drawn that "an electron can tunnel through the potential barrier of a He atom in practically no time" (1).

Also in EPR experiment elapsed time for quantum entanglement is zero. EPR does not runs in space and time, EPR runs in space only. We consider space being immediate information medium between entangled quanta (2).

Conclusions

Interpretation of time as a fourth dimension of space is not correct. Fourth dimension of space is spatial too. Time as a run of clocks is a component of fourth dimension. Material change runs in space only and not in time. Time as a clocks run is a measuring device for material change.

References:

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