

Time is a Measuring System Derived from Light Speed

Amrit S. Sorli
Scientific Research Centre BISTRA,
Ptuj, Slovenija
sorli.bistra@gmail.com

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 "tick" 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, numerical order, frequency, velocity, light speed

Introduction

Light speed c is a fundamental motion in the universe on which is established basis 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 measurement with clocks. This means that space is timeless, past and future does not exist in space. Space-time is merely a mathematical model and not fundamental arena of the universe.

Time as a run of clocks in timeless 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 happen in space and time, EPR happens in space only. Here timeless space is being considered direct information medium between entangled quanta (2).

The timeless physical space as an "immediate information medium" resolves the causality problem of the Fermi two-atom system: "Let A and B be two atoms or, more generally, a "source" and a "detector" separated by some distance R. At $t=0$ A is in an excited state, B in its ground state, and no photons are present. A theorem is proved that in contrast to Einstein causality and finite signal velocity, the excitation probability of B is non-zero immediately after $t=0$ implications are discussed" (3). The excitation probability of B is non-zero because the space in which atoms exist is an "immediate medium of excitation".

More and more modern researchers are challenged with the view that space-time is the fundamental arena of the universe. They point out that the mathematical model of space-time does not correspond to physical reality, and propose a "timeless space" as the arena instead. One recent paper on the subject is *A New Geometric Framework for the Foundations of Quantum Theory and the Role Played by Gravity*. Since quantum theory is inherently blind to the existence of such state-space geometries, the analysis here suggests that attempts to formulate unified theories of physics within a conventional quantum-theoretic framework are misguided, and that a successful quantum theory of gravity should unify the causal non-Euclidean geometry of space time with the atemporal fractal geometry of state space (4).

Conclusions

Interpretation of time as a fourth dimension of space is not correct. Fourth dimension of space is spatial too. Material change runs in space only and not in time. Time as a clocks run is a measuring device for material change. Material changes have no duration no its own. Duration is a result of measurement. Universe is a timeless phenomena as already predicted by Einstein and Gödel.

References:

1. Eckle, A. N. Pfeiffer, C. Cirelli, A. Staudte, R. Dörner, H. G. Muller, M. Büttiker, U. Keller, *Attosecond Ionization and Tunneling Delay Time Measurements in Helium*, Science, Vol. 322. no. 5907, pp. 1525 – 1529 (2008) <http://www.sciencemag.org/cgi/content/abstract/322/5907/1525>
2. Fiscaletti D. Sorli A.S. Non-locality and the Symmetryzed Quantum Potential, *Physics Essays*, December 2008, Vol. 21, No. 4, (2008)

3. Gerhard C. Hegerfeldt. Causality problems for Fermi's two-atom system, Phys. Rev. Lett. 72, 596 - 599 (1994). http://prola.aps.org/abstract/PRL/v72/i5/p596_1

4. T.N.Palmer, The Invariant Set Hypothesis: A New Geometric Framework for the Foundations of Quantum Theory and the Role Played by Gravity, Submitted on 5 Dec 2008, last revised 17 Feb 2009, <http://arxiv.org/abs/0812.1148>