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Mathematical Time and Physical Time in the Theory Of Relativity

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Abstract: In the Theory of Relativity time is an imaginary quantity that can not be observed; it is a multiplication of a number that indicates duration of material change and number i that is an imaginary number. i on the square is -1. Time $i * t$ is a mathematical time that describes the speed and the duration of material change. In the Universe one can observe physical time only as a stream of material change. It is not that change run in physical time, change itself is physical time.. Distinction between imaginary mathematical time and visible physical time opens some new perspectives into interpretation of Theory of Relativity.

Keywords: Mathematical time, Physical time, Physical space, Time dilatation, Time contraction, Gravitation
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1. Introduction

In the universe the passing of time cannot be clearly perceived as matter and space directly; one can perceive only irreversible physical, chemical, and biological changes in the physical space – the space in which material objects exists. On the basis of elementary perception (sight) one can conclude that physical time exists only as a stream of change that runs through physical space. The important point is: Change does not "happen" in physical time – change itself is physical time. This is a different and more correct perspective than the conventional view in physics, in which space-time is the theater or "stage" on which physical change happens. The terms "physical time" and "material change" describe the same phenomenon.

Physical time is irreversible. Change A transforms into change B, B transforms into C and so on. When B is in existence A does not exist anymore, when C is in existence B does

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not exist anymore. Here physical time is understood as a stream of irreversible change that runs through physical space. Theoretically in physical space without material change physical time does not run. Physical space itself is A-Temporal. The idea of space-time is developed into idea of A-Temporal physical space in which physical time run. With clocks we measure duration and speed of physical time [1].

"Time Dilatation" and "Space Contraction". In the fast moving inertial system the duration of physical time is longer for the outside observer. Lets imagine that a train is passing a station with the speed v. The observer on the train throws a ball that is rolling on the floor of the corridor. The duration of physical time of ball rolling will be for him t′, for the observer on the embankment the duration (time) of the ball rolling will be t, the connection between two durations is:

$$t' = t\sqrt{1 - \frac{v^2}{c^2}}.$$

For the observer on the embankment the clocks on the train run slower than the clocks on the embankment because the speed of physical time is slower on the train then on the embankment. This would be the exact meaning of "time dilatation": the speed of physical time in faster inertial system is slower than the speed of physical time in slower inertial system. That's why the twin-brother that travels in the fast spaceship is getting older slower than his brother that has remained on the earth. Coming back on the earth he will be younger than his brother [3].

There is no experimental evidence for interpretation that in faster inertial system there is dilatation of time as a fourth coordinate of space-time and that the coordinate of the space in the direction of travelling is contracting. Experiment proves only that the speed of physical time is slower. According to this understanding "space contraction" in faster inertial system should not exists. The golf stick lying on the floor of the corridor in the direction of the train moving will have the same length for the observer on the train as for the observer on the embankment.

The duration of physical time is also getting slower with increasing of gravitational force. Clocks run slower with increasing of gravitational force. Duration of material change far away from the mass is in relation with the duration of material change near by mass with the formula:

$$T = \frac{T_0}{\sqrt{1 - \frac{2GM}{Rc^2}}}$$

where T is the duration of change measured by a clock far away from the mass. By sending twin-brother for a few years on the planet where gravitation is weaker as on the earth he would come back older than his twin-brother that has remained on the Earth.

Gravitation Has Zero Speed. In General Relativity gravitational force is carried directly by physical space and acts immediate. Gravitational force does not travel from one material object to another as light does. Gravitational force is present in the same way as physical space is present. In this sense the hypothetical gravitational waves should act immediately and have zero speed. As the physical space also the gravitational force is a-temporal.

The speed of hypothetical gravitational waves should not be faster of the light speed as suggested by Tom Van Flandern [2]. The principle stating that the speed of light is the maximum velocity is preserved here.

Time Travel. Mathematical time is reversible and allows hypothetical time travel into past. Physical time is irreversible and excludes possibilities of time travelling; physical past does not exists. Past exists only in mathematical time that is a creation of the scientific mind through which one can not travel with a spaceship.

Ideas of travelling into past have no experimental evidence. According to the understanding of time here presented travel into past should be not considered even as hypothetical possibility [3].

2. Conclusions

Mathematical time is only a description of physical time. Mathematical models of the world are not the world itself.

References

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The Space-Time Continuum of the Speical Theory of Relativity Considered as a Euclidean Continuum. Albert Einstein. 3. 27. The Space-Time Continuum of the General Theory of Realtivity is Not a Euclidean Continuum 28. Exact Formulation of the General Principle of Relativity 29.Â The present book is intended, as far as possible, to give an exact insight into the theory of Relativity to those readers who, from a general scientific and philosophical point of view, are interested in the theory, but who are not conversant with the mathematical apparatus of theoretical physics. The work presumes a standard of education corresponding to that of a university matriculation examination, and, despite the shortness of the book, a fair amount of patience and force of will on the part of the reader. The mathematical constructions, physical structure and manifestations of physical time are reviewed. The nature of insight and mathematics used to understand and deal with physical time associated with classical, quantum and cosmic processes is contemplated together with a comprehensive understanding of classical time. Scalar time (explicit time or quantitative time), vector time (implicit time or qualitative time), biological time, time of and in conscious awareness are discussed. The mathematical understanding of time in special and general theories of relativity is critically analyzed. The independent nature of classical, quantum and cosmic physical times from one another, and the manifestations of respective physical happenings, distinct from universal time, are highlighted. Einstein's theory of relativity is a famous theory, but it's little understood. Learn all about the concepts that make up the theory of relativity.Â Over time, however, the predictions of special relativity have been shown to be true. For example, clocks flown around the world have been shown to slow down by the duration predicted by the theory. Origins of Lorentz Transformations. Special relativity is a physical theory that states that the laws of physics are the same for all observers moving at a constant speed. This seemingly simple assertion has several non-intuitive consequences, as we will see next. It was developed by Albert Einstein, and others, in 1905.Â Poincare noticed that the transformation constituted a mathematical group, and gave it its name. Einstein reformulated it in 1905 with his Special Theory of Relativity, and is credited with showing that relativity was not about how things behaved but about how space and time themselves behave. The velocity addition formula[edit | edit source]. An interesting application of the Lorentz transform is in the addition of two velocities.