Time is what is measured with clocks

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Abstract

With clocks one measures duration and numerical order of material change that run in space. This is what time is: the duration and the numerical order of irreversible material change that run in space. Time does not run in space on its own, space itself is atemporal. Space-time is not a physical reality into which material change run. Space-time is a math model in which one describes stream of material change into atemporal space. Time exists only when measured.

Introduction

For describing position of an object regarding another object in space one needs three coordinates. For describing motion of a third object between this two objects one needs fourth coordinate that is time.

In the Theory of Relativity the forth coordinate **X4 = c x i x t** is called the "time coordinate", whereas **c** is light speed, **i** is an imaginary number and **t** is the number representing duration of material change. With "time coordinate" one describes motion of objects in atemporal space. With clocks one measures intervals between material change X and material change X + n, where n represents number of units of time. The smallest unit of time is Planck time, the largest is light year. Time is a measure of intervals of stream of material change.

Lynds defines time as: »Time enters mechanics as a measure of interval, relative to the clock completing the measurement" (1).

Relativity of Time

According to this understanding of time in the Theory of Relativity it is not time that is relative but the speed of material change; in a faster inertial system the speed of clocks and material change in generally is lower than in a slower inertial system. In physical space with stronger gravity the speed of clocks and material change in generally is lower than in physical space with a weaker gravity field.

This understanding of time resolves the problem of twins. We do not live in time, we live in space only. A brother in a high-speed spaceship is getting older slower than his brother on Earth, but both are getting older in an

atemporal physical space. The brother living on the Moon is getting older faster than his brother on Earth because gravity is stronger on Earth.

Contradictory, hypothetical travel into past is possible according to the Theory of Relativity but out of question according to the theory of atemporal space. No one can travel through space-time, as space-time is merely a mathematical model. One can travel into atemporal physical space only.

Atemporal Space and the Einstein-Podolski-Rosen experiment

The Einstein-Podolski-Rosen experiment confirms the idea of atemporal space according to which material change runs into space only and not into time. Into the EPR experiment atemporal space is the direct information medium between elementary particles. There is no information signal traveling into time between particles. Atemporal space is the "immediate information medium" between elementary particles (1).

Zeno Arrow Paradox

Zeno argued that at the present moment arrow is still. Motion of the arrow is a consequence of present moments; thus arrow should not move at all. According to atemporal space, the answer for ZENO paradox is: The arrow does not move in time, it moves in atemporal space only. Time is a duration and numerical order of arrow motion. Humans experience atemporal space as the present moment. Arrow moves in the present moment only.

Atemporal space and the General Theory of Relativity

In General Theory of Relativity 3-dimensional objects exist into a 4-dimensional space. Gravity force is the result of a curvature of 4-dimensional space. As 4-dimansional space is atemporal, one can see the gravity force as a non-propagating force working directly into space and indirectly between material objects.

According to the Loop Quantum Gravity, space has a granular structure; it is made out of quanta of space. A curvature of atemporal space is the result of its quantum structure. Gravity force as the result of a curvature of space is a non-propagating force; it works directly between quanta of space in a 4-dimensional atemporal space and indirectly between 3-dimensional material objects. 3-dimensional material objects are somehow captured inside a 4-dimensional atemporal space.

Claus Kiefer discusses that in quantum gravity there is no time as a fundamental physical reality (3).

Carlo Rovelli discusses that science has to develop a model of the world where time will not be a fundamental physical reality (4).

Conclusions

With clocks is measured time as a duration and numerical order of material change that run into space. Material change does not run space-time, it runs into space only. Time is not a fundamental physical reality as mater, energy and space are. Time exists only when one measures it. This understanding of time gives deeper explanation of "twin paradox", "time dilatation", EPR experiment and gravity force as a result of curvature of space.

References:

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