

Phenomenology of Time and Quantum Gravity

Amrit Srecko Sorli

sorli.bistra@gmail.com

Scientific Research Centre BISTRA, Ptuj, Slovenia

Abstract

With clocks one measures duration, speed and numerical order of material change, and not time. With eyes one can perceive in the universe only material change that runs into physical space. One cannot perceive time as a physical reality into which material change runs. Material change runs into physical space only, and not in time. Time is not a fundamental physical reality like matter, energy and physical space. Time exists only when we measure it; time is an “observer effect”.

Introduction

Human conviction that with clocks one measures time cannot be proved by an experiment, as time cannot be observed by senses (sight).

Human senses confirm that with clocks one measures duration, speed and numerical order of material changes that run into physical space. The smallest unit of duration and numerical order of material changes is Planck time, largest is light year. Material changes itself have no duration, they only have numerical order. A scientist gives material changes duration by measuring them with clocks; time is an epiphenomenon of the measured duration of material change. Time does not run into universe on its own. Universe is an atemporal phenomenon (1,2,3).

One has to distinguish between motion and time. Motion of material objects happens in space only, and time is a scientific tool that allows us to experience motion in the linear sense “past-present-future”. One has to be aware that “past-present-future” are human inventions, that there is no time in the universe as we experience it. With our senses we can observe only motion in space. This motion we are experiencing in time is a mind model.

Albert Einstein was right by saying: »Space and time are modes by which we think, not conditions under which we live«. Time -- the time that we know through clocks and calendars -- was invented
<http://www.britannica.com/clockworks/article.html>

Special of Relativity enriched with the time as an observer effect

The idea of Atemporal Universe is upgrading Theory of Relativity in a sense that space-time is merely mathematical model used in science to describe material change running into physical space that itself is atemporal. Time does not run into space on its own. Material change runs into atemporal space.

In the Theory of Relativity the fourth coordinate $X_4 = c \times i \times t$ 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. The time coordinate allows us to experience irreversible stream of material changes that runs into atemporal space in a linear perspective, namely into "space-time" that is a mathematical model only and, it does not exist as a physical reality.

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 material change is lower than in a slower inertial system. In physical space with stronger gravity the speed of material change is lower than in physical space with a weaker gravity field.

This new understanding of time resolves the problem of twins: 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 Quantum Gravity

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 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 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 (4).

Carlo Rovelli discusses that science has to develop a model of the world where time will not be a fundamental physical reality (5).

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. In 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 (6).

Zeno Arrow Paradox

Zeno argued that the flight of an arrow is an example of motion. At any moment in time, the arrow either is where it is or it is where it is not. If it moves where it is, then it must be standing still, and if it moves where it is not, then it can't be there; thus, it cannot move.

According to atemporal space, the answer for ZENO paradox is: The arrow does not move in time, it moves in space only, which is atemporal. In space there is always NOW, while past, present and future are products of the human mind. Time is an observer effect.

Conclusions

The concept of time as an observer effect is based on elementary perception: time cannot be observed in the universe. With clocks one measures numerical order of the stream of irreversible material change that runs into atemporal physical space. Material change X transforms into material change $x+1$, $x+1$ transforms into $X+2$ and so on. Smallest unit for measuring numerical order of material change is “Planck time”. Numerical order of material change that one measures with clocks is a physical quantity independent of measurement. Stream of material change has no duration on its own; one gives it a sense of duration by measuring them with clocks. Duration of material change is a “man made” physical quantity.

Gravity force is a non propagating force that works between quanta of atemporal physical space. Quantum structure of atemporal space defines its curvature. Curvature of atemporal space creates gravity force between stellar objects.

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