

Two Fundamental Approaches on Time

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Abstract

Today in physics there are two fundamental interpretations of time. First is that clock is running in time as a basic physical reality and second approach is that clock running is time itself. First approach has limitations regarding Einstein-Podolski-Rosen experiment and superluminal phenomena where transfer of energy and information is faster than light speed. Second approach introduces “strange” idea that space itself is an immediate energy and information medium. First approach has no experimental evidence, time as a fundamental physical reality in which material change run cannot be observed, second approach is confirmed with experimental evidence. Each experiment conforms that with clocks we measure duration and numerical order of material change that run in space.

Key words: time, space, duration, numerical order, information

Introduction

As first approach is well known, let's see more about second approach according to which time is what we measure with clocks: with clocks we measure duration and numerical order of material change that run in space. There is no evidence that material change happens in time; we can only observe material change in space.

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 Special Theory of Relativity in a faster inertial system the speed of clocks (time) and material change in general, is lower than in a slower inertial system. In General Theory of Relativity in physical space with stronger gravity the speed of clocks (time) and material change 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 a space only and not in time. With clocks we measure biological changes in their bodies.

Einstein-Podolski-Rosen experiment

This experiment shows that two quanta A and B which have been together and then sent in space in opposite directions, "are aware" for each other in an instant moment. When the spin of particle A is unilaterally changed, an astounding experimental result is that the other (B) particle's spin "immediately" flips of its own accord. Furthermore, the means by which the information of the first spin flip is transferred to the second particle (so that it too can flip) is information which is required to travel faster than the speed of light. While the information transfer may not be simultaneous (limitations on the experimental apparatus prohibit any proof of simultaneity), it nevertheless -- within the time frame of the Planck constant or speeds in excess of the speed of light -- must connect the two particles in some fundamental manner.

Here is considered that in the EPR experiment space is the direct information medium between elementary particles. There is no information signal in form of photon or some other particle traveling between particles A and B. The time of information transfer between particle A and particle B is zero (2).

Some other research also shows that quantum direct communication is a real phenomenon: We show how continuous-variable systems can allow the direct communication of messages with an acceptable degree of privacy. This is possible by combining a suitable phase-space encoding of the plain message with real-time checks of the quantum communication channel. The resulting protocol works properly when a small amount of noise affects the quantum channel. If this noise is non-tolerable, the protocol stops leaving a limited amount of information to a potential eavesdropper (3).

Causality problems for Fermi's two-atom system

Space as an "immediate information medium" resolves the causality problem of Fermi two atoms 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 nonzero immediately after $t=0$. Implications are discussed"(4).

Excitation probability of B is nonzero because space in which atoms exists is an "immediate medium of excitation". There is no time needed for information or excitation to pass from A to B. Time is only a measure for motion of excitation from atom A to atom B in space.

Indirect and Direct Quantum Information and Quantum Energy Transfer

In EPR and Fermi two atoms system space is the direct medium of information (I) and energy (E) transfers between elementary particles. According to quantum gravity, space is made out of quanta of space (qs) size of Planck. Direct quantum information and direct quantum energy transfers run directly over quanta of space. Time (t) of direct quantum information transfer and direct energy transfer between quanta of space (qs) that are in direct contact is zero. The sum of time between n quanta of space is always zero. Velocity (v) of information and energy transfer between quanta of space is infinite.

The time (t) of indirect quantum information and indirect quantum energy transfers via photons or other particles which move in quantum space is more than zero; velocity (v) is of a light speed. Transfer of a photon from “source” to “detector” in space is temporal.

$(I),(E) \xrightarrow{\text{transfer}} 10^{-35} \rightarrow t = 0, v = \infty$ immediate I,E transfer

$(I),(E) \xrightarrow{\text{transfer}} \triangleright 10^{-35} \rightarrow t \triangleright 0, v = c$ temporal I,E transfer

Superluminal Phenomena

According to understanding here physical phenomena where speed of information and energy transfer is higher than light speed exist.

Experiment from which they conclude that an electron can tunnel through the potential barrier of an He atom in practically no time was carried out recently (5).

It is considered here that electron can be understood as a packet of an energy transfer directly via quanta of space (qs) and so its speed is infinite. Time **t** of electron “jump” from one quanta of space to another is zero ($t = 0$), When we calculate sum of jumps on distance **d** time **t** is zero: $t = 0 + 0 + 0 + 0 + 0 + 0 = 0$. Sped **v** of electron transfer is infinite: $t = 0 \rightarrow v = \infty$. Transfer of an electron between “source” and “detector” in space is immediate.

Conclusions

Second fundamental approach of time that we measure with clocks as a measure of material change in space see quantum space is a direct information and energy transfer medium. Transfer of information and energy is immediate. Time (t) of transfer is zero; speed (v) of transfer is infinite. For superluminal phenomena to happen time can be zero. Material change does not run in time, they run in space only. Time and clocks are is scientific tools which measure duration and numerical order of material change that run in space.

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