

TIME AS NUMERICAL ORDER OF MATERIAL CHANGE

Essay

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Abstract

Einstein and Gödel speculated that time does not run into the universe as humans experience it. Their proposition seems to be right. Time as a physical entity into which material change runs can not be observed in the universe. One can observe time only as a numerical order of material change. Time is what one measures with a clock. With a clock one measures numerical order of material change that run into universe: material change X1 transforms into X2, X2 transforms into X3 and so on. X3 exists "after" X2, X1 exists "before" X2 as numerical order only. Space-time does not exist as a physical reality, it exists only as a mathematical model, into which we describe irreversible stream of material change into universe.

What is measured with a clock?

Palle Yourgrau book »A World without Time: The Forgotten Legacy of Gödel and Einstein« opens new perspectives regarding scientific definition and experience of time. Both giants of science have been discussing in a second part of last century a possibility that there is no time in the universe as science experiences it. Their scientific vision of "World without time" is not examined yet fully. In this essay will be discussed some evidences that support Gödel and Einstein idea.

Let's start with a question: "What is measured with a clock?" On the base of elementary perception (eyes) one can answer: "With a clock is measured numerical order of material change. Smallest material change that can be observed in the universe is a motion of a photon through Planck distance. The unit of time (of numerical order) that indicates this motion is called "Planck time".

With clocks we measure numerical order of irreversible stream of material change. With the eyes we can perceive material change into the universe only, space-time into which this material change should happen is not perceivable. Space-time exists as a mathematical model into which one experiences universe. Time does not run into universe as an independent fourth dimension of space-time, it runs only as numerical order of material change.

Physical time and Mind time

Einstein and Gödel were right: time as we experience it does not exist into universe; it exists only as a mind concept through which we experience material change into the universe. Let's see the process of experiencing material change: material change is first perceived by senses (eyes) than elaborated into time as a mind concept and finally experienced. Linear time is a "mind prism" through which we experience material change that run into universe. Past, present and future are elements of time as a mind prism. Into the universe there is no past, present and future.

One should distinguish between physical time (numerical order of material change) and mind time (time as a mind concept). One should be aware that material change has no duration on its own; we give it a sense of duration by measuring it. Motion of a clock has no duration on its own. We have been defined duration of motion of clocks regarding to the movements of stellar objects, we are not aware that stellar objects move into universe only and not into time. We "measure" with clocks duration of all other motion that run into universe. Universe does not run into time, time runs into universe as numerical order of events.

Length is a physical quantity to measure lengths of the objects and distances between them. Man has invented "units" of lengths: Planck distance, meter, mile, kilometer.. In the same way time as numerical order of material change is a physical quantity. To measure numerical order of material change man has invented "units" of time: Planck time, second, day, year.

For example a photon is moving from the point A to the point B. Distance between point A and B is 100 Planck distances. A movement of a photon from A to B is described by numerical order of 100 units of Planck time. Photon does not move into time, it moves into space only. Time is numerical order of this movement.

Because of that in Special Theory of Relativity forth coordinate of space-time X_4 is imaginary: $X_4 = c \times i \times t$. c is a light speed, i is imaginary number (i on square is minus 1) and t is a number that indicates numerical order of photon motion. Fourth imaginary coordinate describes numerical order of photon motion into three dimensional space.

Numerical order of change has no arrow

Material change in the universe does not run into linear way in a sense: second material change is after first material change and before third material change and so on. What happens is that first material change transformations into second material change, second into third and so on into universe, where "before" and "after" exists only in a sense of numerical order. Numerical order of change (time) has no an arrow. "Arrow of time" exists as a mind concept only.

Experiencing material change as a "linear stream" is result of experiencing them inside linear concept of time as a mind concept. That mother is born "before" son and "after" grandmother belongs to the experience of life through the "linear mind time". With clocks we only measure numerical order of these three events: grandma has number 1, mother number 2 and grandson number 3.

In the universe material change run into what Einstein called NOW, past, present and

future belongs to the mind. This NOW can be understood also as Eternity. We are born into Eternity, living into Eternity, dying into Eternity. As we experience Eternity thought mind time, we experience it as "infinitely back into past and infinitely into future". Eternity is not linear, Eternity is NOW.

Temporal and Eternal experience into science

Current scientific experience is temporal. Science experiences universe into linear concept of mind time. One first perceives information of a given experiment into senses, then mind elaborates this information into mind time and finally experience occurs.

perception – elaboration into mind time – experience

With awareness that mind time as a "prism" between perception and experience future science will develop also eternal experience. Into eternal experience there will be no mind elaboration, no gap between perception and experience. Eternal experience requires activation of consciousness. Mind creates thoughts, consciousness watch them (witness them). By watching process of temporal experience one becomes aware of how mind elaboration into time as a mind model influences experience. Consciousness as research toll has an important role into future science: it will give awareness of the difference between models of the universe and universe itself. Eternal experience will bridge physics, transpersonal psychology, shamanism, spirituality and religion.

Time as numerical order and General Theory of Relativity

Concept of space-time is here developed into the concept of space where physical time is numerical order of material change that runs into space. In General Theory of Relativity gravitational force is result of curvature of space-time. Here idea arises that the gravity force is a result of curvature of space. Physical base of curvature of space is its quantum structure.

"Loop Quantum Gravity" introduces that space has a granular structure. Space is made out of "quanta of space" that have a volume of Planck. According to the thesis here space is a "pool of free energy" made out of quanta of space (QS), unstructured - basic quanta of energy. QS are flexible, in areas where there is no stellar objects, density of space- ρ_{QS} is high, size of QS is of Planck volume, in areas where density of space- ρ_{QS} is low, near stellar objects and inside of them, the size of QS is bigger than of Planck volume. Space is a dynamic energy system where fluctuation of quanta of space follows motion of stellar objects and elementary particles. With movement of material object or mass particle into the space diminish density of space around material object or mass particles.

Density of space- ρ_{QS} increases with the distance from massive objects. Inside of massive objects density of space ρ_{QS} depends on density of mass ρ_{M} . Higher is the density of mass- ρ_{M} , lower is the density of space- ρ_{QS} . Lower is the density of space- ρ_{QS} ; smaller is the number of quanta of space in a given volume of space. Where density of space ρ_{QS} is lower quanta of space are more

"stretched" and have stronger tendency to "shrink". This "shrinking" force is gravitational force that works between quanta of space. Gravity force keeps space together and that keeps together also objects that exist into space. For example: between earth and moon gravity force exists between "low density space clouds" (LDSC) of earth and of moon. It does not act directly between material objects; it exists in the space where an object exists.

earth – LDSC of earth – gravity force – LDSC of moon – moon

Smaller is density ρ_s of LDSC, bigger is its curvature. Light is bend by passing massive stellar objects because of different density of space ρ_s through which it moves. Space into which stellar objects exist can not be curved on its own. Physical base of curvature of space is variable quantum density of space ρ_s .

In General Theory of Relativity curvature of the space is a measure for density of space- ρ_s . Space is "gravity medium" between stellar objects. In a similar way Space is "direct information medium" between two elementary particles by "Einstein-Podolski-Rosen" experiment. Information does not travel between particle A and B, information is in the space where both particles exists. Space somehow "knows", it is conscious about particles spin. When we measure spin of particle A and is "left" a spin of particle B will be always "right". Might be that space carries not only gravitational force but also consciousness itself. Quanta of space (QS) change their electrical charge from positive to negative in a Planck time $(5.39 \cdot 10^{-44})$. They "vibrate" at the "basic frequency" $\gamma = 0.19 \cdot 10^{44} \text{ s}^{-1}$. This "basic frequency" of space is consciousness itself. According to Penrose consciousness is a result of quantum gravity acting on the brain neurons.

Evolution of life is a continuous process of matter developing into more complex organisms that develop towards consciousness. Space plays an active role into evolution of life.

Vector of gravity force

In areas where density- ρ_s changes, vector of gravity force is directed into the area of decreasing density- ρ_s . Material objects and elementary particles move into direction of decreasing of density- ρ_s of space. A mass particle creates a small LDSC around it; mass less particles does not create LDSC around itself.

In space where there is no change of density- ρ_s there is no change of rate of curvature. Gravity force as a shrinking force of the space is still there, but gravity on a given object there is zero. Such areas are for example at a Lagrange point between earth and moon where density of space is stable. Object there will not move but gravity force as a shrinking force between quanta of space exists. Such an area is also in the centre of stellar objects where density of space- ρ_s is stable, there is no change of rate of curvature, but gravity as a shrinking force of the space is there.

Density of space inside black holes and neutron stars

Inside black holes and binary neutron stars density of space- ρ_s is so low that space has an enormous force of shrinking. This shrinking force disintegrates all subatomic particles back

into quanta of space. Beyond Schwarzschild radius mass transforms back into quanta of space-QS. Black hole "sucks" matter from outer space and transforms it into quanta of space. Transformation "mass - quanta of space" continuously increases density of space- Ω_S in the centre of black hole that spreads with the light speed into outer space as a "gravitational waves".

Astronomical observations of diminishing of speed of rotation (orbit time) of binary neutron stars PSR1913+16 is explained by transformation of mass of stars into "gravitational radiation". According to the understanding here, "gravitational radiation" is result of transformation of mass of stars into quanta of space in the centre of binary stars (similar as in the centre of black holes). Transformation "mass - quanta of space" increases density of space- Ω_S in the centre of stars that spreads with the light speed into outer space as a "gravitational waves".

Existence of gravitational waves that are emission of mass and are absorbed by mass in a similar way as electromagnetic waves might be a wrong preposition. Research of Prof. Loinger from Milan excludes existence of gravitational waves that travel from stellar object A to stellar object B in order to keep them together.

Astronomical observations show that Active Galactic Nucleus (AGN) of our galaxy "eats" near stars and galaxies and time by time throws out huge amount of fresh gas. AGN transforms matter it into quanta of space-QS. This process increases density- Ω_S of space into AGN. As by black stars and neutron binary stars "gravitational waves" are spreading into outer space also from AGN. When a huge amount of matter is entering AGN, density of space- Ω_S reaches certain maximum in a very short time. Such sudden increasing of- Ω_S cause a big explosion where quanta of space transform into elementary particles. All elementary particles are different structures of quanta of space, we could say also different "vortex" of quanta of space. Quanta of space QS has a "basic energy" that is given by relation: $E_{qs} = h \cdot \gamma$ ($h = 6.626069 \cdot 10^{-34} J \cdot s$). h is Planck constant, γ is "basic frequency of quanta of space".

After density- Ω_S turns below maximum value, explosion stops. AGN are "refreshing" fabric of the universe, they transform "old" matter into "fresh" matter and keep entropy of the universe constant.

In the universe there is a permanent fluctuation of energy "energy-matter-space-energy-matter-space". Sum of the density of electromagnetic energy- Ω_E , matter- Ω_M and density of space- Ω_S in a given volume of universe tends to be in equilibrium: $\Omega_E + \Omega_M + \Omega_S = 1$. When there is an access of density of matter- Ω_M it will turn into energy- Ω_E , where there is an access of density of space- Ω_S will turn into matter and so on. Universe is a system in a permanent dynamic equilibrium, there is no beginning and no end of the universe.

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