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**##FROM SPACE-TIME TO
A-TEMPORAL PHYSICAL SPACE**

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Abstract

In the Theory of Relativity time is an imaginary quantity that cannot be observed; it is a multiplication of a number that indicates the duration of material change and the number i that is an imaginary number, i squared is -1 . Time $t * i$ 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 runs in physical time, change itself is physical time. Distinguishing between imaginary mathematical time and visible physical time opens new perspectives into the understanding of gravitation, cosmic dynamics and evolution of life.

Key words: mathematical time, physical time, space-time, physical space, time dilatation, time contraction, gravitation, EPR experiment, time travel, cosmic dynamics, evolution of life

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 exist. 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 not exist anymore. Here physical time is understood as a stream of irreversible change that runs through physical space (1).

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 the idea of A-Temporal physical space in which physical time runs. With clocks we measure the duration and speed of physical time.

“Time Dilatation” and “Space Contraction” In a fast moving inertial system the duration of physical time is longer for the outside observer. Let us 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 the ball rolling will for him be t' , for the observer on the embankment the duration (time) of the ball rolling will be t , the connection

between the 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 than on the embankment. This would be the exact meaning of "time dilatation": the speed of physical time in a faster inertial system is slower than the speed of physical time in a slower inertial system. That's why the twin-brother who travels in the fast spaceship is getting older more slowly than his brother who has remained on the earth. Coming back to the earth he will be younger than his brother.

There is no experimental evidence for the interpretation that in a 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 a faster inertial system should not exist. 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 also gets slower with increasing gravitational force. Clocks run slower with increasing gravitational force. The duration of physical time far away from the mass is related to the duration of physical time near the mass by the formula:

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

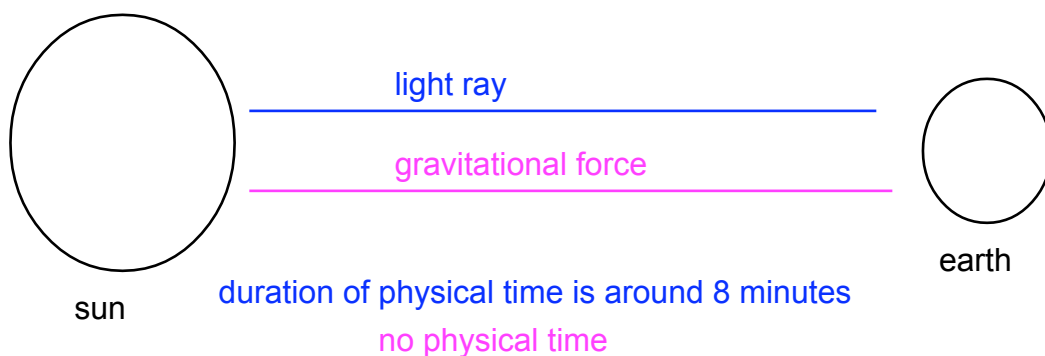
where T is the duration of physical time measured by a clock far away from the mass. By sending the twin-brother for a few years on Saturn he would come back younger than his twin-brother who has remained on the earth.

Density Of Physical Space And Gravitation In his article "Chief Notions and Methods of the Theory of Relativity Presented in its Development" that is kept in the Morgan Library in New York, Einstein says that the general theory of relativity cannot be imagined without gravitational ether which is non-homogeneous, and its state has no autonomous existence but depends on the field generating matter. Since in the new theory, metric facts can no longer be separated from true physical facts, the concept of space and ether merge together (2).

Merging of A-Temporal physical space and gravitational ether introduces "non-homogeneous density of physical space" that corresponds to

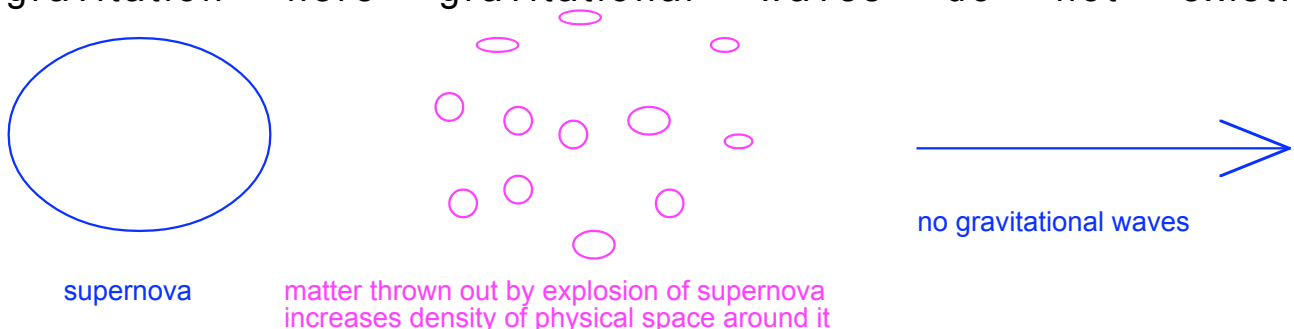
the density of matter. The denser the matter, the denser the physical space. In the General Theory Of Relativity curvature of space is a mathematical description for density of physical space. The "areas" of higher density attract each other.

Gravitational force is A-Temporal in the sense that no physical time (material change) is needed for its acting. For example the physical time taken for light to reach from the sun to the earth has a duration of around 8 minutes. Gravitational force is carried directly by the density of physical space that is around the sun and around the earth. It is not that a particle or a wave is carrying gravitational force as is the case with light. Gravitational force has no physical time and no speed, it acts immediately.



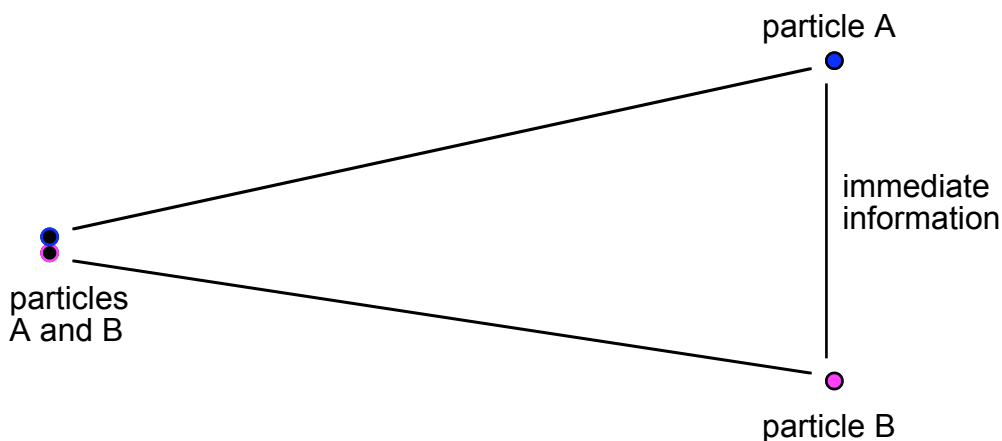
Existence of hypothetical gravitational waves By throwing a stone in the water waves will spread through the water. By throwing a stone (supernova explosion) in the physical space only the density of space around the stone increases, but no waves of physical space are created. Hypothetical gravitational wave is here understood as a big increase of density of physical space that travels through the space. Change of density of space is directly related with change of amount of matter in a given volume of physical space. Matter that is thrown out by the explosion causes only an increase in the density of physical space around it. It is not that wave of high density can travel through the physical space without matter.

It seems that the properties of physical space are too different from the properties of water, they cannot be compared. One cannot suspect that physical space is "waving" as water does. According to understanding of gravitation here gravitational waves do not exist.



Gravitational waves coming from the explosion of a supernova have not been detected yet. Loinger considers that gravitational waves are only fictitious entities generated by purely formal approaches (3).

EPR Experiment This new understanding of time and gravitation brings new light to the experiment of Einstein, Podolsky and Rosen (EPR). This experiment shows that the information between quantum A and quantum B which have been together and then sent into space in opposite directions travels between them instantly. One could predict that in the EPR experiment the information medium between two particles is physical space itself. For information to reach from particle A to particle B no physical time is needed (no travel of particle or wave). Like gravitational force, information between particle A and particle B is also instant and A-Temporal.



Time Travel Mathematical time is reversible and allows hypothetical time travel into the past (4). Physical time is irreversible, physical past does not exist, travel into the past is not possible. The contradiction that one could travel into the past and kill one's grandmother is resolved. The past exists only in mathematical time through which one cannot travel with a spaceship.

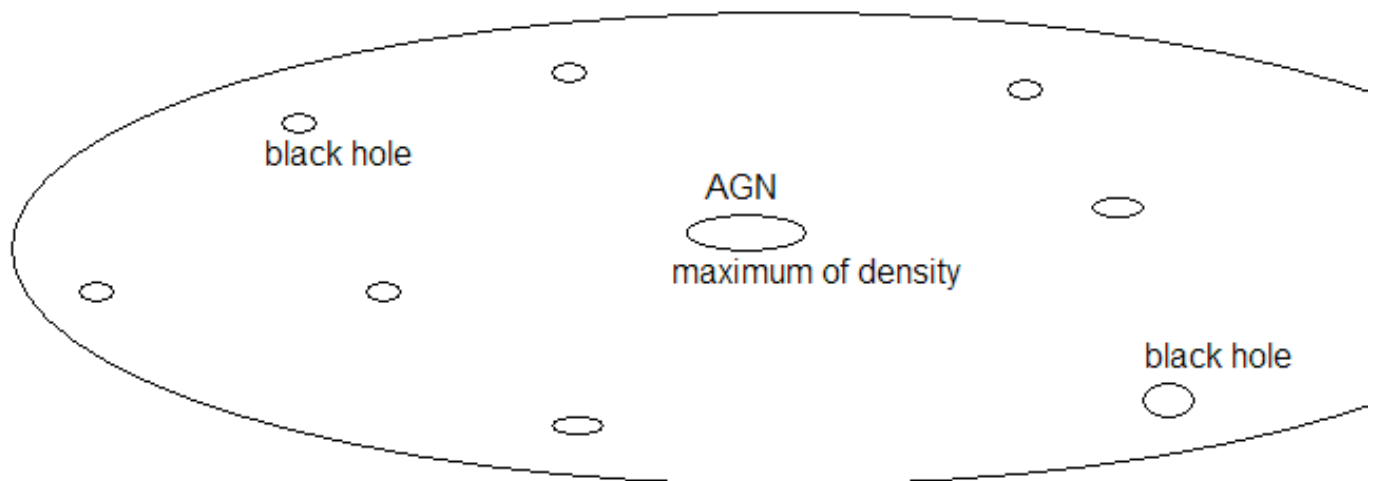
Einstein - Rosen Tunnels And Possible Solutions For Cosmic Dynamics

The original idea of the transportation of the energy of matter through kind of tunnels that connect black holes and white holes is from Einstein and Rosen. With the introduction of the density of physical space, the disappearance of matter into the centre of black holes has a new interpretation: in the centre of the black hole physical space is so dense that gravitational force disintegrates all atomic and subatomic particles into physical space itself. With the

transformation of matter into space the density of cosmic space is increasing. This process increases the gravitational forces between galaxies. The speed of expansion of the universe is decreasing, at a certain point the expansion will stop and the universe will start to collapse into an enormous black hole that then explodes into a new big bang. Big bangs are cyclic.

Other possible dynamics between matter and physical space could be the following: astronomical observations show that the Active Galactic Nucleus (AGN) continuously emits fresh gases. Energy cannot be created or destroyed. Matter cannot simply appear in AGN out of nothing. The idea here is that in black holes the energy of matter transforms into the energy of physical space. This process keeps the density of physical space high in the centre of the galaxy (AGN) where the energy of space transforms back into the energy of matter. Here the AGN functions as a white hole.

ACTIVE GALAXY



However, in both the models the Dynamic Equilibrium between matter and physical space is a basic universal law. The universe is a "perpetual" system with a permanent transformation of energy "matter - physical space - matter - physical space". The Universe does not need energy to move with. It cannot be compared to the machines created by man where "for some work to be done some energy is needed". The second law of thermodynamics cannot be applied to describe universal dynamics. It is valid only for machines. The total energy of the universe and of a single active galaxy sums to zero. An increase in the entropy of gas being produced in the big bang or in an AGN does not influence its total entropy.

Also for the movement of a stellar object, no energy is needed. For example, the force of attraction between physical spaces of the earth and moon is equal to the centripetal force, which pulls the moon from the earth [$F_{\text{attraction}} (F_a) = F_{\text{centripetal}} (F_c)$]. For the movement of the Moon around

the earth, no energy is needed [$F_a - F_c = 0$]. By moving the stars and planets the universe does not get "tired".

Movement is an intrinsic property of the universe, physical time (material change) has no beginning and will have no end. There was no creation of the universe and there will be no end.

A-Temporal Physical Space And Evolution Of Life In the universe one can observe only entropy of matter, there is no experimental evidence for entropy of physical space. Physical space does not follow the second law of thermodynamics, it has no entropy.

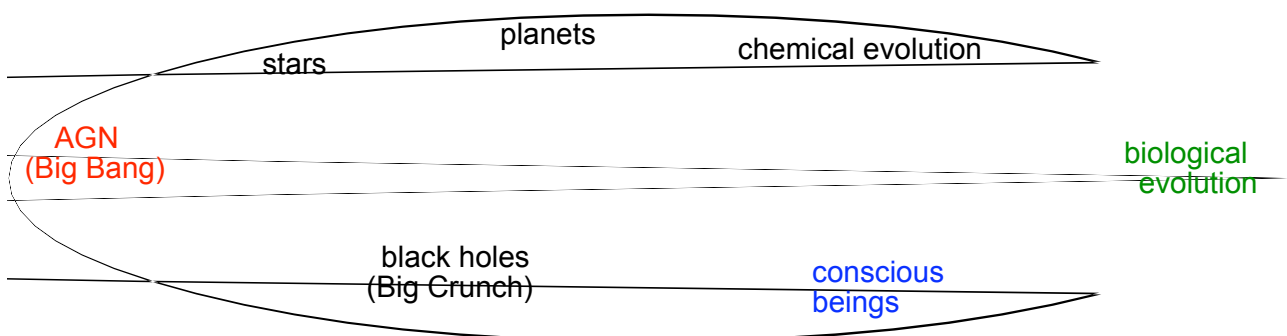
Several experiments show that the functioning of living organisms is directly related to the gravitational force of physical space (5, 6).

Experiment with earthworms shows that the density of physical space around a living organism is higher than around the same dead organism. The weight of a living organism is bigger than the weight of the same dead organism (7).

Research done by Penrose and Hameroff suggest that the force of quantum gravity acting on the mass of neurones within the brain may be responsible for the emergence of consciousness. The process is fundamentally related to the influence of quantum gravity on microtubule networks within the neurones (8,9). Human consciousness is directly related to the physical space.

Physical space plays an active role in the functioning of living organisms and in the development of life as well. Matter has an intrinsic tendency to develop into life because it is contained in physical space that has no entropy. The evolution of life is a negentropic process that is growing towards non entropy state of physical space.

Basic organic molecules needed for the development of life have been discovered in the whole of observable physical space. The universal physical space is in the phase of chemical evolution (10). One can predict that on planets similar to ours chemical evolution has developed into biological evolution. Maybe we are not alone in this vast universe.



Conclusions The theater or "stage" of the universe is A-Temporal Physical Space. Gravitational force is carried directly by physical space. Matter and physical space are in a permanent dynamic equilibrium. The evolution of life and of human beings is a consistent part of cosmic dynamics.

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