

# Density/Curvature of Quantum Space Generates Gravitational Motion

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## Abstract

Clocks measure a frequency, velocity and numerical order of change. Experimental data confirms that changes and clocks do not run time; they run in quantum space only. Time is not a part of quantum space. Quantum space itself is timeless. In the universe as a whole amount of matter energy and amount of quantum space energy tends to be constant. Density of mass and density of quantum space in a given volume of quantum space tends to be constant. Mass here is considered as a compressed energy of quantum space. Presence of mass in a given volume of quantum space diminishes its density. Massive objects move always into direction of lower density of quantum space. Gravitational motion of massive objects is result of change of density of quantum space. In space with no change of density massive object will not have gravitational motion as in centre of stellar objects or in a flat quantum space where massive objects are far away. Change of density of quantum space corresponds in General Theory of Relativity to the change of the curvature of space. Lower is density of quantum space bigger is its curvature. Here is introduced density/curvature of quantum space.

**Key words:** quantum space, space-time, gravity, curvature-density of quantum space

## Timeless Quantum Space

Quantum gravity describes cosmic space as granular. Space is made out of quanta of space QS volume of Planck. Experimental data confirms that with clocks we measure a frequency  $\gamma(s^{-1})$ , velocity  $v(ms^{-1})$  and numerical order  $n..n+1..n+2...$  of material changes that occur in a quantum space. Experimental data confirms that change runs in physical cosmic space not in space-time. We experience stream of changes in a linear concept of the inner space-time that is based in neuronal activity of the brain. Research done in 2003 introduces idea that part of the brain is creating time: "The brain is the "local" creator of time, space, and space-time as our special maps of the reality we "observe" and participate in". Research done in 2005 shows that consequent experience of changes in a "past-present-future" perspective is a result of neuronal dynamics in certain areas of the brain. Physical time that is run of clocks ("thick" of clocks) is not a part of quantum space in which change occurs. The fundamental arena in which changes occur is the quantum space. With clocks we do not measure time as a fourth dimension of space. With clocks we measure frequency, velocity and numerical order of change in timeless quantum space. Space-time is mathematical model merely were fourth coordinate  $X_4$  is a product of imaginary number  $i$ , light speed and number  $t$  that represents "thick" of clock:  $X_4 = i \times c \times t$  (1).

## Gravitational Motion of Massive Objects in Timeless Quantum Space

First law of thermodynamics considers energy cannot be created and not destroyed. In the universe as a whole amount of matter energy  $E_m$  and amount of timeless quantum space energy  $E_s$  is constant.

$$\sum E_m + \sum E_s = K$$

Mass here is considered as a compressed energy of quantum space. Elementary particle that diminishes density of quantum space has a mass. Elementary particle that does not diminish density of quantum space is mass-less. More mass is in a given volume of quantum space less dense is space and more space is curved. Change of density of quantum space corresponds in General Theory of relativity to change of curvature of space. Here is introduced density/curvature  $D/c$  of quantum space.

Universe as a whole follows second law of thermodynamic; distribution of energy of mass and energy of quantum space tends to be homogeneous. Density of mass  $D_m$  and density-curvature of quantum space  $D/c$  tends to be constant.

$$D_m + D/c \approx K$$

Massive objects that are compressed energy of quantum space move always in direction of lower density and higher curvature of quantum space. Earth has tendency to move to the centre of the sun because density of quantum space is lowest at the centre of the sun. "Gravitational motion" of massive objects is result of change of curvature-density of timeless quantum space. In the area where there is no change of density-curvature  $D/c$  material object will not move as for example a centre of stellar objects or in empty quantum space.

presence of mass  $\rightarrow$  change of density-curvature of quantum space  $\rightarrow$  gravitational motion

In a centre of neutron stars and black holes density of quantum space is extremely low, curvature is extremely big and density of mass is extremely high. In centre of neutron stars and black holes matter is transforming back into quanta of space. In a centre of Active Galactic Nucleus (AGN) density of quantum space is extremely high, space is flat and density of mass is extremely low. In AGN quanta of space are transforming into elementary particles that build up matter. Matter created in AGN moves away from the centre into direction of lower density of quantum space. "Gravitational motion" is always into direction of lower density and higher curvature  $D/c$  of quantum space.

Astronomical observations show that the AGN of our galaxy "eats" near stars and galaxies and from time to time throws out huge amounts of fresh gas (2).

Transformation of mass into space and opposite is constant and in a dynamic equilibrium. This transformation is eternal, has no beginning and no end. Universe is a non-created system in a permanent dynamic equilibrium.

$$mass \Leftrightarrow space$$

Relation between mass and energy  $E$  of quantum space is expressed in Einstein formula:

$$E = m * c^2$$

Mass does not emit or absorb some hypothetical gravitational waves in a similar way as electromagnetic waves. Gravitational waves emitted from mass seem to be fictitious entities (3). Gravity does not work between stellar objects on distance. Gravity is result of change of density of quantum space generated with presence of mass.

Gravitational wave as a ripple of timeless quantum space is a change of density  $D_s$  of quantum space. It happens by transformations  $mass \leftrightarrow space$  and expands through quantum space with a light speed. Astronomical observations of diminishing of speed of rotation (orbit time) of binary neutron stars PSR1913+16 is here explained by transformation of mass of stars into quanta of space. It is not that mass transforms into gravitational radiation. Mass transforms into quanta of space that creates increasing of density  $D_s$  of quantum space. This ripple of increasing density  $D_s$  moves through the quantum space with a light speed as a "gravitational wave".

In General Theory of Relativity original solution for gravity is change of curvature of cosmic space. In original papers on General Relativity (1916) Einstein did not mention gravitational waves. This idea arises few months later in order to resolve "action on distance". Here we see that there is no action on distance. Gravitational motion is result of change of density/curvature of quantum space.

### Conclusion

In today's physics the conviction still prevails that gravity works directly between massive bodies. Research here shows that mass diminished density of timeless quantum space and this change generates gravitational motion. There is no direct attraction force between massive bodies. Hypothetical gravitational waves emitted and absorbed by the mass seem to be fictitious entities. Gravity motion is result of dynamics between mass and density/curvature of timeless quantum space.

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