

# A-Temporal Gravitation

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## Abstract

*With clocks one measures duration of material change going on in space. This is what time is: the irreversible stream of material change in space. Space itself is a-temporal, time does not run in space on its own, it exists only as a stream of material change. Space-time exists only as a mathematical model, it does not exist as a physical reality. Space-time is a formal model in which one describes motion of material objects and elementary particles in a-temporal space. Gravity force is a result of curvature of a-temporal space that has a granular structure. Density of grains of space depends on density of mass, the higher the density of mass, the lower the density of space and the bigger the volume of grains. Bigger volume of grains causes stretching of grains that is gravity force. Gravity force is a-temporal: no time, means no material change, no motion of particle or wave is needed to transport gravity force.*

## Introduction

*Time is what one measures with clocks. With clocks we measure duration of material change in space. Space itself is A-Temporal, universe is an A-Temporal phenomena (1). Idea of "A-Temporal Universe" was brought up in the second part of last century by Gödel and Einstein (2).*

*In General Theory of Relativity gravitational force is the result of curvature of space. Stellar objects change geometry of space. The bigger the mass of a stellar object, the more severely space is curved and the stronger is the gravitational force. With "Loop Quantum Gravity", the idea arises that space has a granular structure. Space is made out of "quanta of space" that have a volume of Planck (3).*

*According to the thesis here, space is a "pool of free energy" made out of quanta of space (QS), uncreated basic quanta of energy that have a size of a volume of Planck (4). A new idea here is that the size of QS is flexible. In areas where there are no stellar objects, the density of space  $\Omega_s$  is high and the size of QS is of Planck volume. In areas where density of space  $\Omega_s$  is low, near stellar objects and inside of them, the size of QS is bigger than of Planck volume.*

*QS which build up space are not connected in a rigid way. Space is a dynamic energy system where fluctuation of quanta of space follows motion of stellar objects and elementary particles. Movement of a material object or mass particle in space diminishes the density of space around the material object or mass particle.*

*Density of space  $\Omega_s$  increases with the distance from massive objects. Inside of massive objects, density of space  $\Omega_s$  depends on density of mass  $\Omega_m$ . The higher the density of mass  $\Omega_m$ , the lower is the density of space  $\Omega_s$ . The lower the density of space  $\Omega_s$ , the smaller is the number of quanta of space in a given volume of space. Where density of space  $\Omega_s$  is lower, quanta of space are more "stretched" and have a stronger tendency to "shrink". This "shrinking" force is the gravitational force working between quanta of space that are four dimensional. Gravity force keeps space together and that also keeps together three dimensional objects existing in four dimensional space. For example between earth and moon, the gravity force*

works between four-dimensional “low density space clouds” (LDSC) of earth and of the moon. It does not work directly between material objects, it works in space in which objects are existing.

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

The smaller the density  $\Omega_s$  of LDSC, the bigger is its curvature. In General Theory of Relativity curvature of space is a measure for density of space  $\Omega_s$ . A-Temporal space is the “gravity medium” between stellar objects. In a similar way A-Temporal space is the “information medium” between two elementary particles in an “Einstein-Podolski-Rosen” experiment. Information does not travel between particle A and B, information is contained in a-temporal space in which exist both particles. Light is bent by passing massive stellar objects because of the different density of space  $\Omega_s$  through which it moves. Physical space in which stellar objects exist can not be curved on its own. The physical base of curvature of space is the variable quantum density of space  $\Omega_s$ .

### **Vector of gravity force**

In areas where density  $\Omega_s$  changes, the vector of gravity force is in the direction of decreasing density  $\Omega_s$ . Material objects and elementary particles move in the direction of decrease of density  $\Omega_s$  of space. A mass particle creates a small LDSC around it, mass less particles do not give rise to a LDSC.

In space where there is no change of density  $\Omega_s$  there is no change of rate of curvature. Gravity force as a shrinking force of space is still there, but gravity on a given object there is zero. Such areas are for example at the 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 is there. Such an area is also in the centre of stellar objects where the density of space  $\Omega_s$  is stable, there is no change of rate of curvature, but gravity as a shrinking force of space is there.

### **Gravity acceleration inside stellar objects**

Density of space  $\Omega_s$  going from the surface of the stellar object is increasing with the square of the distance, density of space  $\Omega_s$  is decreasing going inside the stellar object and depends on the density of matter  $\Omega_m$ . Going towards the centre of the earth, density  $\Omega_s$  is decreasing and density  $\Omega_m$  is increasing. According to our understanding gravity acceleration  $g$  inside stellar objects depends on change of density  $\Omega_s$  that determinates strength of gravity vector.

Gravity vector at the point T under the surface is related with amount of mass under the point T and with distance of T from the centre of earth. Mass of the shell of the earth  $\Delta m$  above point T does not influence density of space  $\Omega_s$  and gravity vector at the point T. According to Newton, gravity force F on a given object with mass m at the point T under the surface is:

$$F = \frac{m \cdot (M - \Delta m) \cdot G}{r_T^2}$$

*m is mass of the object*

*M is mass of the earth*

*$\Delta m$  is mass of the shell above the point T*

*$r_T$  is distance from the centre to the point T*

**Gravitational acceleration  $g$  at the point  $T$  is:**

$$g = \frac{(M - \Delta m) \cdot G}{r_T^2}$$

**When  $r_T$  is equal to the radius  $r$  of the earth  $\Delta m$  is zero.**

$$r_T = r \rightarrow \Delta m = 0$$

**Calculations according to the formulas above are following:**

**$M$  - mass of the earth:  $5.976 \cdot 10^{24} \text{ kg}$**

**$G$  - gravitational constant:  $6.6725985 \cdot 10^{-11} \text{ m}^3 \text{ s}^{-2} \text{ kg}^{-1}$**

**$r$  - radius of the earth:  $6.37814 \cdot 10^6 \text{ m}$**

**$r_T$  - distance from the centre of the earth to the point  $T$ :  $6.37394 \cdot 10^6 \text{ m}$**

**$\Delta m$  - mass of the shell above point  $T$ , density of Shell is counted by  $2.95 \frac{\text{kg}}{\text{dm}^3}$**

**Calculation for the mass of the shell above point  $T$  gives, according to Newton:**

$$\Delta m = \rho \cdot \Delta V = \rho * \left[ \frac{4}{3} \pi \cdot r^3 - \frac{4}{3} \pi \cdot r_T^3 \right]$$

$$\Delta m = \rho \cdot \Delta V = 2,95 \frac{\text{kg}}{\text{dm}^3} * \left[ \frac{4}{3} \pi (6,37814 \cdot 10^6 \text{ m})^3 - \frac{4}{3} \pi (6,37394 \cdot 10^6 \text{ m})^3 \right] =$$

$$\Delta m = 2,95 \cdot \frac{\text{kg}}{\text{dm}^3} * [2,67032 \cdot 10^{19} - 2,66856 \cdot 10^{19}] \text{ m}^3 = 5,192 \cdot 10^{19} \text{ kg}$$

**thus at the point  $T$  the acceleration  $g_T$  according to Newton is**

$$g_T = \frac{(m - \Delta m) \cdot G}{r_T^2} = \frac{[5,976 \cdot 10^{24} - 5,192 \cdot 10^{19}] \cdot 6,6725986 \cdot 10^{-11}}{[6,37394 \cdot 10^6]^2} = 9,81490 \text{ ms}^{-2}$$

**thus according to the prediction of Newton's Shell Theorem, the increase of gravity acceleration  $g$  between the surface and the point  $T$  4200m under the surface is:**

$$g_T - g_{\text{surface}} = \frac{(m - \Delta m) \cdot G}{r_T^2} - \frac{m \cdot G}{r^2} = 9,81490 - 9,80206 = +0,01284 \text{ ms}^{-2}$$

**We are proposing to measure the gravitational acceleration  $g$  in "Gold Mine Shaft" in South Africa on the surface and 4200 m under the surface at point  $T$  in order to**

see how precise Newton's calculation is and to get more experimental data about gravity acceleration  $g$  inside stellar objects.

### **Density of space inside of black holes, binary neutron stars, in the centre of galaxies**

Inside black holes, density of space  $\Omega_s$  is so low that space has an enormous force of shrinking. This shrinking force disintegrates all subatomic particles back into quanta of space. Beyond the Schwarzschild radius, mass transforms back into quanta of space. A black hole "sucks" matter from outer space and transforms it into quanta of space. The transformation "mass - quanta of space" continuously increases density of space  $\Omega_s$  in the centre of black hole that spreads with light speed in 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 our understanding gravitational radiation is a 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). The transformation "mass - quanta of space" increases density of space  $\Omega_s$  in the centre of stars that spreads with light speed in 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 proposition. Some researchers exclude existence of gravitational waves that travel from stellar object A to stellar object B in order to keep them together (5,6).

Astronomical observations show that the Active Galactic Nucleus (AGN) of our galaxy "eats" near stars and galaxies and from time to time throws out huge amounts of fresh gas (7). An AGN transforms matter into quanta of space. This process increases density  $\Omega_s$  of space inside the AGN. As with black stars and neutron binary stars, gravitational waves are spreading into outer space also from the AGN. When a huge amount of matter is entering the AGN, density of space  $\Omega_s$  reaches a certain maximum in a very short time. This sudden increase of  $\Omega_s$  causes a big explosion where quanta of space transform into elementary particles. After density  $\Omega_s$  returns below maximum value, the explosion stops. AGN are "refreshing" the 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 "matter-space-matter-space". The sum of density of matter  $\Omega_m$  and density of space  $\Omega_s$  in a given volume of universe tends to be in equilibrium:  $\Omega_m + \Omega_s = 1$ . When there is an excess of density  $\Omega_m$  matter will turn into space, where there is an excess of density  $\Omega_s$  space will turn into matter. Universe is an A-Temporal system in a permanent dynamic equilibrium, there is no beginning and no end of the universe.

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