

# Relativistic effects of relative velocity of material change start above photon scale

Time dilatation and length contraction by atomic clock and by photon clock

Amrit Sorli  
Scientific Research Centre BISTRA  
[sorli.bistra@gmail.com](mailto:sorli.bistra@gmail.com)

## Abstract

Constancy of the light velocity in different inertial systems and areas of space with different gravity implies that relativistic effects of relative velocity of material change start on the scale above photon.

**Key words:** velocity of light, relativistic effects of relative velocity

## Introduction

Special Theory of Relativity and General Theory of Relativity considers light moves through the space with constant velocity regardless upon the velocity of inertial system and strength of gravitation. This implies that at the scale of the photon and below at the scale of Planck relativistic effects of relative velocity of material change does not exist. In all inertial systems velocity of a photon clock is unchanged. Change of gravity does not effect velocity of a photon clock.

Time dilatation starts by atomic clocks. Changes of velocity of atomic clocks on the orbit stations and on the surface of the earth are considered by Global Positioning System - GPR (1).

## Methods and Results

We have a "photon clock" made out of two mirrors A and B. Photon is moving from A to B, back to A and so on. One motion of the photon between A and B is a "tick" of the clock. We take two photon clocks. One photon clock is on the surface of the earth, second is 4200 meters below at the bottom of the mine shaft. Velocity of light is invariant on gravity; both of clocks will "tick" with the same velocity.

We take two atomic clocks. One clock we put beside photon clock on the surface and second beside clock that is 4200 meters deep. According to the relativistic gravitational effect second atom clock will in 30 days "tick" faster as the atom clock on the surface for  $\Delta t = 1,23 * 10^{-6} s$  (2).

Photon clock will also have unchanged velocity in all different inertial systems, because velocity of light is equal in all different inertial systems. Similar experiment with 2 atom clocks an 2 photon clocks can be carried out by putting one atomic and one photon clock in the orbit station and one atom clock and one photon clock on the surface of the earth. Photon clocks on the orbit station and on the surface of the earth will have same velocity. Atomic clock on the orbit will "tick" with slower velocity than atomic clock on the surface of the earth.

## **By photon clock “time dilatation” is in contradiction with “length contraction”**

We have a photon clock in a fast airplane. Mirrors are fixed in a way that photon moves along the direction of motion of the airplane. Distance between the mirrors is shortened by the length contraction. Because of the shorter distance between mirrors a path for the photon is shorter and so photon clock on the airplane “ticks” faster than same construction photon clock on the surface of the earth.

Experimental data show that atom clock in a fast airplane ticks slower than atom clock on the earth. Solution of this contradiction is in a preposition that photon clock in the airplane do not shorten. “Length contraction” is only a mathematical calculation that has no correspondence to the physical world. “Time dilatation” has also no correspondence in the physical world. What really happens by “time dilatation” is that velocity of material change velocity of clocks including slows down. Material change clocks run included in space only and not in time (2).

## **Constancy of light velocity is connecting Special Theory Relativity with General Theory Relativity**

Special Relativity SR is postulated on constancy of light velocity. Equality of inertial and gravitational mass is connecting SR and General Relativity GR. Discussing on possibility that gravity infects velocity of light would put under question connectedness of SR and GR. Gravitational red shift shows that gravity influences only frequency and not velocity of light. This means that “thought experiment” with photonic clock under the surface of the earth is correct: Velocity of photonic clock is invariant on gravity. In stronger gravity photon moving between mirror A and B change only frequency and not velocity. And this means that relativity gravitational effect of relative velocity of material change starts above photon scale.

## **Conclusions**

“Gedanken experiment” with atomic and photon clocks shows that invariance of light velocity excludes existence of relativistic effects of relative velocity of material change at the photon scale and below. Relativistic effects of relative velocity of material change start above photon scale. “Time dilatation” is a relativistic effect of diminishing of velocity of atomic clocks. Time can not shrink as time does not exist in a physical universe. Clocks run in space only and not in time.

## **References:**

1. Neil Ashby, Relativity in the Global Positioning System, <http://relativity.livingreviews.org/Articles/lrr-2003-1/> (2007)
2. Amrit S. Sorli, Davide Fisaletti, Dusan Klinar, Time is a measuring System derived from Light Speed, Physics Essays, Vol 23. Num 2. (2010)  
<http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=PHSESEM000023000002000330000001&idtype=cvips&gifs=yes&ref=no>