

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

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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. Here is proposed that in all inertial systems velocity of a photon clock is unchanged. Change of gravity does not effect velocity of a photon clock as it effect velocity of an atom clock.

Changes of atomic clocks are well known and calculated by Relativity in the Global Positioning System (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 traveling 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 $\Delta t = 1,23 * 10^{-6} s$ (1).

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.

Discussion

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 put under question relatedness 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 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.

Planck Clock

In this “Gedanken experiment” we use a photon clock that is made out of two mirrors that are on the distance of Planck. Photon moves from one to other mirror into a Planck time. This is so called “Planck clock”. Planck time is a fundamental unit to measure numerical order of material change i.e. motion in a timeless space. “Length dilatation” and “time dilatation” do not work on the Planck clock. Planck distance can not be smaller as it is. Planck distance is a fundamental constant invariant on the “length dilatation”. So by the “Planck clock” there is also no “time dilatation. Length dilatation and time dilatation exist above scale of the photon.

Conclusions

Invariance of light velocity excludes existence of relativistic effects of relative velocity of material change at the photon scale. Experiment with photon clocks and atomic clocks will give us more experimental data.

References:

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