# Red shift as a characteristic of speed of light from space objects

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**Abstract:** It is accepted in physics that the cosmological red shift in radiation spectrum of distant space objects indicates that the Universe expands and that the reason for this expansion is Big Bang. It is also considered that the gravitational red shift is a result of gravitational time dilation. The explanation given in the paper shows that the gravitational and cosmological red shift is one and the same phenomenon.

The paper shows that light speed in the gravitational field (in the ether flow moving towards the center of an object having gravity) changes. In this case red shift is determined as relation between the value by which the light speed has changed and the value of the changed speed. In doing so the photon frequency recorded at the detector changes. A new physical effect is formulated. It is similar to the Doppler effect, but exists between the stationary source and detector under the condition that there is a medium between them that moves with acceleration and in which wave propagates. This means that Hubble's Law has alternative explanation within which there is no Universe expansion and the Big Bang.

Normally in the experiments for determining the shift of spectral lines we observe the shift of frequency spectrum in accordance with the expression $Z = (v_0 - v^{'})/v^{'} = v_0/v^{'} - 1$. However further we use proportional relationship between frequency and wavelength in which in the relationship $\lambda = C/v$ (C – speed of photon, light, $v$ - frequency of photon) the incontrovertibility of constancy of light speed C is taken on default. Shift coefficient is determined as $Z = (\lambda^{'} - \lambda_0)/\lambda_0$ (index (0) – at the source, index (') – at the detector). However, this expression is erroneous since it was obtained on the basis of the relationships: $\lambda_0 = C/v_0$ and $\lambda^{'} = C/v^{'}$ from the expression $Z = (v_0 - v^{'})/v^{'} = v_0/v^{'} - 1$.

It is known from the general relativity theory (GRT) that light speed changes in the gravitational field. The author has developed a hypothesis which differs from the GRT explanations and explains the mechanism of the light speed change.

It is known that if a wave signal somehow increased in speed by $\Delta V$, the shift of its spectrum is determined as $Z = \Delta V/V$. The increase in the light speed is determined as $\Delta C = C - C^{'}$. Then the coefficient of gravitational red shift with a change in the photon speed between a source and a detector that are stationary with regard to one another is determined as $Z = \Delta C/(C - \Delta C) = (C - C^{'})/C^{'}$, from which $C^{'} = C/(1 + Z)$.

Taking into account the difference between the light speed and the constant the relationship between the wavelength at the source and at the detector will be determined by the expression $\lambda_0 = \lambda^{'}$, i.e. the wavelength does not change when photon moves in the gravitational field.

Thus, the wavelength and frequency at the detector are determined by the expressions: $\lambda^{'} = \lambda_0$ and $v^{'} = v_0 * (C^{'}/C)$ if $C^{'} = C/(1 + Z)$, i.e. the photon frequency recorded at the detector differs from the source frequency. Here if the light speed decreases (photon moves against gravity forces) the photon frequency recorded at the detector decreases $(C^{'}/C)$ times. If the light speed increases (photon moves towards the gravity action) the photon frequency recorded at the detector increases $(C^{'}/C)$ times. In doing so the expression $\lambda^{'} * v^{'} = \lambda_0 * v_0 * C^{'}/C$ will hold true.

Thus we observe the effect which is physically similar to the Doppler effect but differs in the fact that it exists between the wave source and detector that are stationary with regard to one another and is caused by the motion of medium in which wave propagates.

The relationships obtained were checked by comparing the results of calculation experiments with the results of well known researches including the Pound - Rebka experiment, the Mercury radar experiment and the measurement of gravitational red shift of solar spectral lines. These relationships made it possible to explain (in the form of calculation experiments) the "anomalous acceleration" of spacecrafts Pioneer-10 and Pioneer -11 and the mechanism of the red shift emergence from neutron star and quasar.

Besides, the results of Halton Arp's researches are explained. He showed that space objects – galaxies and quasars with different red shift coefficients were visually located in the vicinity of one another.

Considered also is the mechanism of change in the lapse of time in terms of different gravitational potentials. The computational experiment shows that supposedly the difference in lapse of time in the orbit is exactly equal to the difference between the expected time of signal arrival from the orbit to the earth and its real time of arrival (with respect to the time en route) because of the difference of gravitational potentials. Proper account of the relations between the radio signal wave speed and frequency makes it possible to say about independence of the lapse of time from the gravitational potential value.

Hence, the natural question arises. If the light speed from the space objects sizably differs from the universally accepted constant, then why it has not been discovered until now. The answer can be very simple. Representatives of the official science were firmly convinced that the light speed was a constant and therefore did not even put the question in such a statement. It can be explained to some extent by the impossibility to measure the light speed from the extraterrestrial object by the direct method (by means of optical instruments). As soon as the photon lands on a lens, it moves further along the lens material at a rated speed because of the secondary radiation of photons. Therefore, the methods of indirect estimation are necessary.

Experiment on eclipse observation of an object with a red shift (the higher is the shift value, the more noticeable is the effect) by some planet of the Solar System can be considered as a possible method. In this case we observe a kind of object superposition on the planet disk, i.e. the object observation on the background of the planet disk edge. The speed of light coming from the object is determined based on the time of this observation and the known distance to the planet. The speed is to coincide with the light speed calculated by the expression: $C^{'} = C/(1 + Z)$.

The first experiments on measuring the light speed from such objects as quasar or receding galaxy on the basis of the suggested technique will reveal its pronounced difference from the rated light speed.

**Conclusion**

The red shift in the radiation spectrum of space objects is due to variation of the light speed by gravitation of these objects and can be explained by the effect similar to the Doppler effect in a physical sense. The difference is that a new physical effect exists between a source and a detector stationary with regard to one another and is caused by motion of the medium, in which the wave propagates.