Newton's first law: every object will remain at rest or in uniform motion in a straight line until some force acts at it.

BALLISTIC HYPOTHESIS WITH PHOTON RE-EMISSION AND THE DOPPLER EFFECT

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The ballistic hypothesis is currently mistakenly considered by many researchers as an alternative to the special theory of relativity. Believing that a photon, like any material particle, can move for as long as desired by inertia, this theory could not explain any experiment with the movement of a light source and therefore was easily refuted by supporters of SRT.

And at the same time, this hypothesis is correct and works successfully, but only if it is supplemented with the re-emission of photons by atoms of the medium. **At the moment of emission**, photons always move with speed **C** relative to the laser and with speed **C+V** relative to the inertial frame in which the laser moves with speed **V**. Just like relative to a machine gun at the moment of firing, bullets always move at a speed of **825** m/sec and relative to the terrain at a speed of **840** m/sec if the machine gun is mounted on a tank moving at a speed of **15** m/sec. But this is where the analogy ends. If, due to air resistance, the bullet gradually reduces its speed, then photons almost immediately after emission meet air atoms, are re-emitted and change speed, which is not taken into account by supporters of the ballistic hypothesis.

Re-emission

The analogy with a bullet would be complete if the bullet and the photon were moving in absolute emptiness. But there is no emptiness anywhere in nature. Immediately after emission, the photon moves at speed **C** relative to the source, but only before meeting the first re-emitting air atom, since it is absorbed by it. After some delay, the photon is again emitted by the atom and moves at a speed **C** relative to this atom in the same direction until meeting the next re-emitting air atom. Relative to air, photons move with an average speed **C/n**, which is always less than **C**.

If photons are emitted by a moving source, before the first re-emission by atoms of the gaseous medium they move relative to a given inertial frame with a speed **C+V,** but immediately after the first re-emission their speed changes and also becomes equal to **C/n,** which does not depend in any way on the speed **C+V** , with which the photon moved before re-emission. The **C+V** velocity can only be judged by the Doppler frequency change that occurs at the moment the photons meet the first re-emitting air atoms.

In our first articles in **1987-1990,** we called this process of light propagation in air or in any other transparent medium re-emission of photons.

Doppler effect

Developed by Doppler in 1842, the effect determines the frequency seen by a receiver approaching a stationary light source at a speed V, or when a source moves at a speed V relative to a stationary receiver.

1. In wave theory

In the wave theory, a light source with a frequency ν_0 creates oscillations of the ether. These oscillations relative to the source propagate at a speed **C** and pass the wavelength $\lambda_0 = CT_0 = \frac{C}{\nu_0}$ during the time $T_0 = \frac{1}{\nu_0}$.

When the light source and the receiver are stationary relative to the ether, the oscillations move relative to the receiver at a speed C and with a wavelength $\lambda_0 = \frac{C}{\nu_0}$ and the receiver receives $\frac{C}{\lambda_0} = \nu_0$ oscillations in one second, that is, it sees a frequency ν_0.

When **only the receiver moves** with speed **V,** oscillations move relative to it with wavelength $\lambda_0 = \frac{C}{\nu_0}$ and at speed **C+V** and receiver in one second receives $\frac{C+V}{\lambda_0} = \frac{C}{\lambda_0} + \frac{V}{\lambda_0} = \frac{C}{\lambda_0} + \frac{CV}{\lambda_0 C} = \nu_0(1+\frac{V}{C})$ oscillations, that is, the receiver sees an increased frequency $\nu_1 = \nu_0(1+\frac{V}{C})$. **(1)**

When only **the source moves** with speed **V**, the wavelength changes, since relative to the ether the oscillations move at speed **C** (and, therefore, with speed **C-V** relative to the source) and in time $T_0 = \frac{1}{\nu_0}$ the source shifts at distance $VT_0 = \frac{V}{\nu_0}$, as a result of which the wavelength decreases from $\lambda_0 = \frac{C}{\nu_0}$ to $\frac{C}{\nu_0} - \frac{V}{\nu_0} = \frac{C}{\nu_0} - \frac{CV}{\nu_0 C} = \lambda_0(1-\frac{V}{C})$. **(2)**

With wavelength $\lambda_0(1-\frac{V}{C})$ and speed C, oscillations come to the receiver and it sees a

frequency $\nu_2 = \frac{C}{\lambda_0(1-\frac{V}{C})} = \nu_0 \frac{1}{(1-\frac{V}{C})}$, greater than ν_0. **(3)**

Thus, in accordance with the Doppler effect developed in ethereal wave theory, the frequency is determined

when the receiver moves according to the formula $\nu_1 = \nu_0(1+\frac{V}{C})$,

when the source moves according to the formula $\nu_2 = \nu_0 \frac{1}{(1-\frac{V}{C})}$

These formulas confirm that the frequency of the signal does not change in the case when the source and receiver move at the same speed **V** and the distance between them is constant. In accordance with the generally accepted ethereal wave theory, if a source creates ν_0 oscillations per second in the ether, a receiver stationary relative to the source cannot receive more or less than ν_0 oscillations in one second. If the source and receiver are moving at the same speed **V** and the source sends a signal back towards the receiver, photons come to the receiver at a reduced frequency $\nu_3 = \nu_0 \frac{1}{(1+\frac{V}{C})}$, **(4)**

but when they meet a moving receiver, the photons increase the frequency to ν_0, that is, in accordance with the ethereal Doppler effect, the receiver sees the same frequency ν_0.

The situation with the movement of the source and receiver occurs when two GPS satellites move in the same orbit with a strictly constant distance between them and exchange signals. In accordance with the ethereal Doppler effect, the frequency of signals cannot change and therefore each of the satellites must see the frequency ν_0.

A more interesting situation is when the light source and receiver are stationary, but some kind of transparent re-emitter moves between them.
According to wave theory, the frequency of light in this case should also not change.

Note:

The attentive reader will note that this is the same situation as discussed above, but it is too important for further analysis and therefore, we consider it again, but from a slightly different perspective.

The ethereal Dohler effect explains the situation with a moving re-emitter as follows.

From a stationary light source, oscillations go out with frequency ν_0 and speed **C**. The oscillations meet with a re-emitter, for example, with a glass plate, as with a moving receiver, with a speed of C + V and in the glass glass plate, in accordance with formula (1), they increase the frequency to $\nu_1 = \nu_0(1+\frac{V}{C})$,

Coming out of the glass, which should now be considered as a moving source, the oscillations according to formula $\nu_3 = \nu_0 \frac{1}{(1+\frac{V}{C})}$ (4) lower the frequency to bb and as a result the receiver sees that the frequency has not changed and is equal to ν_0.

2. В баллистической гипотезе с переизлучением фотонов

In the ballistic hypothesis, light is not oscillations of the ether, but a flow of photons. The light source does not oscillate the ether, but emits real elementary particles - photons, just as a machine gun fires bullets. A photon is a neutral particle whose energy is proportional to its rotation frequency. A photon is emitted by an electron of an atom with a speed **C** and with such a speed **in emptiness it moves by inertia** for as long as desired.

If the source moves in the void relative to the inertial frame with speed **V**, the photon moves relative to this frame with speed **C+V**. Entering any transparent medium (air, glass, water, interplanetary rarefied gas), the photon is re-emitted and moves relative to the medium at a speed of **C/n**.

Since there is no ideal void anywhere in nature, an emitted photon with a speed **C** or **C+V** passes a very short distance, since it almost immediately encounters atoms of the medium, is re-emitted and changes speed to a speed **C/n**, the value of which does not depend on **V**.

The fact that in all situations, due to re-emission, the speed of light turns out to be independent of the speed of the source, **relativists** consider as confirmation of the postulate of the constancy of the speed of light.

At the same time, the fact that almost immediately after emission photons move at a speed of **C/n** does not mean that the ballistic hypothesis does not apply to photons. Absolutely applies. Since immediately after emission, photons relative to a moving source move with the same speed **C** as relative to a stationary source, and, therefore, relative to an inertial frame in which the source moves with a speed **V**, their speed is equal to **C + V**.

3. Extended Doppler effect

The laser does not "oscillate the non-existent ether", but emits photons of frequency ν_0, which move relative to the laser with speed C. If the laser moves with speed **V**, the same photons of frequency ν_0 move relative to the laser with the same speed **C** and relative to the inertial frame with speed **C+V** .

Note:

Since in the ethereal theory oscillations relative to the inertial system go with speed **C**, relative to the source their speed turns out to be equal to **C-V**.
- see the derivation of formulas **(2)** and **(3)**

That is, photons move at a speed **C** relative to a stationary laser, and if the laser starts moving, photons move at a speed **C-V** relative to it.
Interesting, isn't it?

When the laser moves at speed **V**, the wavelength of the photons does not change, since the photons do not move at speed **C**, as in the ethereal theory, but at speed **C+V,** and during the time $T_0 = \frac{1}{\nu_0}$, while the laser is displaced by a distance $VT_0 = \frac{V}{\nu_0}$, they pass a distance equal to the wavelength $\lambda_0 = \frac{C}{\nu_0}$. Photons travel at a speed of **C+V** and with a wavelength $\lambda_0 = \frac{C}{\nu_0}$ until they meet air atoms, are re-emitted by them and change the frequency from ν_0 to $\nu_1 = \nu_0(1+\frac{V}{C})$, and not to $\nu_3 = \nu_0 \frac{1}{(1+\frac{V}{C})}$, as in the ethereal theory.

When the receiver moves at speed **V** and the laser is stationary, relative to the receiver the oscillations move at speed **C+V** and with wavelength $\lambda_0 = \frac{C}{\nu_0}$ and it sees an increased frequency $\nu_1 = \nu_0(1+\frac{V}{C})$.

That is, the Doppler effect, extended to the ballistic hypothesis with re-emission of photons, both **when the receiver moves** and **when the source moves**, determines the frequencies **not by two different formulas**, but **by the same formula** $\nu_1 = \nu_0(1+\frac{V}{C})$.

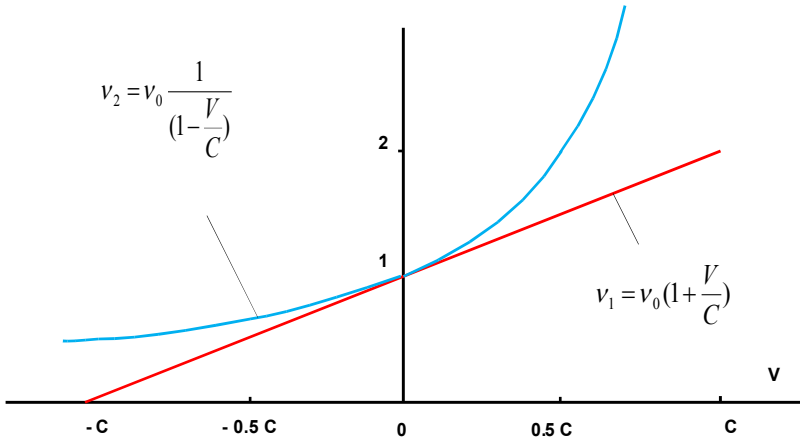
4. What practically gives the transition to the extended Doppler effect

The transition from the ethereal Doppler effect to the extended effect, in addition to eliminating the historical error, makes it possible to accurately determine the frequency in the case when the source of the electromagnetic signal is moving. But simple calculations show that at real speeds of movement of sources, the error is so small that it can almost always be neglected.

For example, a laser radar with a source speed V = **72** km/h
and frequency = **600** THz (**600,000,000,000,000** Hz)

using the formula $\nu = \nu_0(1+\frac{V}{C})$ instead of **600,000,040,027,694.094** Hz,
gives the value **600 000 040 027 691. 423** Hz,
that differs by only **2.67** Hz, that is, by **0.000 000 000 0004 45 %.**

But at cosmological speeds, the difference turns out to be so large that it cannot be neglected and will have to be taken into account. From the figure presented here it is clear that at negative speeds V, that is,when the light source is removing, the ethereal formula for the same values of V gives much higher frequency values (and, therefore, erroneous redshift values), which in any case should lead to probably has already led to erroneous cosmological conclusions.



Refusal of the ethereal Doppler effect and transition to the extended effect makes it possible to prove that the cosmological redshift, although actually explained by the Doppler effect, arises in a stationary Universe without its “expansion” and “scattering of galaxies.”

The cosmological redshift occurs without the “scattering” of galaxies in the following way.

From a galaxy stationary relative to the Earth, light travels through a rarefied interstellar gaseous medium with a speed **C/n** almost equal to **C**. On the way to the Earth, photons encounter the atmosphere of a moving star or a gas cluster moving at a speed **V**.

If the cluster moves towards the photons, the photons entering the cluster increase their frequency from ν_0 to $\nu_1 = \nu_0(1+\frac{V}{C})$ and pass through the cluster with this frequency. Coming out of a moving gas cluster, photons reduce their frequency to $\nu = \nu_1(1-\frac{V}{C})$ and travel in the interstellar medium with a frequency $\nu = \nu_0(1+\frac{V}{C})(1-\frac{V}{C}) = \nu_0(1-\frac{V^2}{C^2})$, **less than** ν_0.

If the cluster moves in the direction of the photons the photons entering the cluster, decrease in frequency from ν_0 to $\nu_2 = \nu_0(1-\frac{V}{C})$ and pass through the cluster with that frequency. Coming out of a moving gas cluster, photons increase their frequency and travel in the interstellar medium with a frequency $\nu = \nu_2(1+\frac{V}{C}) = \nu_0(1-\frac{V}{C})(1+\frac{V}{C}) = \nu_0(1-\frac{V^2}{C^2})$ also less than ν_0 .

That is, **in both cases**, when the gas accumulation moves towards the photons and when it moves in the same direction, the photon frequency will decrease from ν_0 to $\nu = \nu_0(1-\frac{V^2}{C^2})$, that is, **in both cases** a red shift occurs.

With one re-emission, even at high speeds of movement of clusters or atmospheres of stars, the frequency of photons decreases slightly, but over thousands and millions of years, while photons move from distant stars to the Earth, the number of re-emissions turns out to be sufficient for the cosmological red shift to arise in the stationary Universe, which astronomers are now observing.

Since photons with each re-emission in a moving gas cluster, exchange energy with re-emitting atoms and lose energy, the described process of decreasing the frequency of photons can be considered as “aging of quanta”, by which a hundred years ago many researchers tried to explain the rise of the cosmological redshift.

10.22.23