The main possible objections against the hypothesis of the Effect of Soloshenko-Yanchilin (ESY) and the arguments for the protection of the hypothesis

The main points (formulas) of the ESY model	The main possible objections	The arguments for the protection of the hypothesis
1. $c^2 + \Phi = 0$ c – is the speed of light; Φ – is the gravitational potential of the Universe. Φ – is a negative scalar function, which depends on the distribution of matter in the whole Universe and tends to zero away from all the masses. This formula leads to a conclusion that the speed of light is increased near a large massive body.	1. In modern physics, the meter is determined by the speed of light. If this speed will be changed - the value of the meter will be changed also. As a result, we will find no difference.	This is true. We will not find anything, if we measure the speed of light locally. But if we measure the coordinate speed of light, we find out (according to the ESY model) that it increases near a large mass.
	2. According to the General Theory of Relativity (GTR) the coordinate speed of light decreases near a large mass. This relativistic effect was repeatedly confirmed by the measurements during the radar experiments with Mercury. That's why the formula 1 is false.	As to the radar experiments with Mercury (The experiment measured the time dilation (The Shapiro Time Delay Effect) of the radar signal reflected from Mercury and passing near the Sun). This experiment did not measure the coordinate speed of light. It confirmed the square of the interval describing the motion of light in the weak gravitational field (that the square of the interval is correct in the gravitational field of the Sun with the accuracy to 0,1%). But the square of the interval might be derived from the formula 1 also and its value will coincide with the GTR's at the same level of accuracy.
2. $\hbar^2\Phi = \text{const}$ $\hbar$ is Planck's constant (Planck's reduced constant, $h/2\pi$ - Dirack's constant). Planck's constant decreases near a large massive body.	1. This formula implies that the atomic oscillation frequency of an atom on the Sun should be increased. But the spectrum of sunlight is shifted toward the red.	Atomic oscillation frequency of an atom on the Sun is higher than on the Earth. But while the photons travel from the Sun to the Earth, they lose energy and come "reddened". According to the GTR, the frequency (and the energy) of the photon does not change during the motion of the photon in a static gravitational field. According to the ESY model, the frequency (and the energy) of the photon change. There is no experimental data proving that the photon's energy and the photon's frequency are not changed during the motion of the photon in the gravitational field.
	2. It follows from this formula (2), that the spectrum of atoms on the far galaxies must change dramatically. In this case, we would not be able to identify these atoms.	Yes, the spectrum of the atoms is changed. There is an additional redshift. Problem with the identification of atoms does not occur. In this case, one third of cosmological redshift is caused by the formula 2.
3. $m^2\Phi = \text{const}$ m – the rest mass of the electron or other elementary particle. The masses of all particles and	1. In this case, the rest mass energy of a body (mc^2) will depend on the height of the body's rise above the ground. This contradicts the well-known formula for the potential energy: $U = mgH$.	That's right. According to the ESY model the correct formula for the potential energy will be: $U = 2mgH$. This energy is exactly 2 times more. At the fall of the body, only half of the potential energy of the body is converted into the kinetic energy, and the other half – is converted into the rest energy. This coincides with the well known physical effect – mass effect (it was not known

atoms are reduced near a large massive body.		in the times of Newton).
4. $\Delta\Phi = -2GM/r$ G – gravitational constant; M – mass of a body; *r* – a distance to the point of mass *M* Using the above formulas 1-4 it's possible to derive all relativistic gravitational effects.	1. The value of Newtonian gravitational potential is 2 times less. But the Newton's law was tested with high precision.	The formula 4 is fully consistent with Newton's law at low speeds, because only half of the potential energy is converted into kinetic energy. But at ultra relativistic speeds the rest energy can be neglected, and consequently, almost all potential energy is converted into the kinetic energy. That is why a photon, travelling close to the Sun, is deflected by value of a double angle.
5. $\Delta T/T = -gH/c^2$ g - free fall acceleration; H – height; T – time. The rate of time course of the atomic clock decreases when you put up this clock to the top. This is a major prediction of the ESY model. ESY states that gravitational time acceleration is true.	1. The rate of time course of the atomic clock increases when you put up this clock to the top. This is a fundamental conclusion of the GTR. More over it was confirmed in different experiments.	We insist that till now there is no a verified valid physical evidence of the gravitational time dilation. Only the direct comparison of the atomic oscillation frequencies (by the atomic clocks readings) at different gravitational potentials will provide a necessary physical evidence. Gravitational time dilation is the hypothesis without a valid physical evidence. We are ready to pay $ 100 000 prize to any expert if this expert proves the gravitational time dilation by presenting any scientific article describing a verified physical measurement as an absolute evidence that the gravitational time dilation is true.
	2. The laser frequency of the laser located at the bottom is always lower than the laser frequency of the laser located at the top.	When the light comes upwards from the bottom laser, it loses energy, and gets "red". We do not know (without additional measurement with clocks) what the frequency of the laser was at the beginning.
	3. The GTR states that the photon's frequency is not changed (stays constant) during the motion of the photon in the gravitational field.	Yes, the GTR states that the photon's energy and the photon's frequency are not changed during the motion of the photon in the gravitational field. This statement is incorrect because it is based on a comparison of light (quantum) wave with a usual (classical) wave. We point out that there is no experimental data proving that the photon's energy and the photon's frequency are not changed during the motion of the photon in the gravitational field.
6. ESY model let us calculate the change of «meter» and «second» near a large mass and as a result we derive an expression for the square of the interval:	1. The GTR gives the following expression for the square of the interval in a week gravitational field: : $ds^2 = \left(1 - \frac{2GM}{r\,c^2}\right)c^2dt^2 - \left(1 + \frac{2GM}{r\,c^2}\right)(dx^2 + dy^2 + dz^2)$	The GTR's equation coincides with the formula 6 up to members of the second-order term of smallness. But the precision level, with which the GTR's formula was tested, is low: a share of percent. Therefore, all the gravitational experiments, confirming the GTR's equation, also confirm the formula 6. And, hence, all the gravitational experiments confirming the GTR's square of the interval, also confirm (at their precision level) the equations 1-4 that lead to the

$ds^2 = \frac{c^2 dt^2}{(1+\frac{2GM}{rc^2})} - (1+\frac{2GM}{rc^2}) d\ell^2$	This equation was tested in numerous physical experiments.	formula 6.
	2. This experimentally confirmed equation for the square of the interval in the GTR implies that the coordinate speed of light is decreased near a large mass and the time slows down (the rate of time course is decreased) in the field of gravity – the gravitational time dilation.	This is not true. Because almost the same expression (the formula 6) is obtained based on the assumptions that the coordinate speed of light is increased near a large mass (1) and the time goes faster (the rate of time course is increased) in the field of gravity – the gravitational time acceleration (2).
	3. The formula 6 in ESY model almost coincides with the corresponding equation for the square of the interval in the GTR. Why are these two equations interpreted in different ways?	According to the ESY model, the formula 6 (for the square of the interval) does not include separately time and the speed of light. The formula 6 includes only the product (multiplication) of these values – that is the value proportional to the «meter».