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Black Holes without General Relativity

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Abstract: *It is emphasized that black holes (BH) are not a specific consequence of general relativity. According to relativistic gravidynamics the frequency (energy) photons decreases at their emission in a gravitational field. As a result (in the limit), very massive bodies – BH lose an ability to radiate light signals.*
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Relativistic gravidynamics. According to the special theory of relativity and taking into account the Newton formula to the potential energy, we have

$$\nu_g=\nu(1+\Phi/c^2) \tag{1}$$

for the photon frequency radiated in a gravitational field (GF) (see, e.g., [1]). Here, ν is the photon frequency in the absence of GF (Φ=0). Emphasize that this equation is a consequence of relativistic gravidynamics or the Lorentz-covariant theory of gravity (see, e.g., [2]). A 4-vector potential Φ^i, the time component which represents the Newton potential, is its base. As a result, we have for the 'potential' 4-momentum

$$p_g^{\,i}=m\Phi^i \quad , \tag{2}$$

describing the GF influence on a particle with mass m. Hence it directly follows that ***the photon is gravitationally neutral*** since its mass is zero.

As clearly seen from eq. (1), the stronger the GF, the smaller the frequency of a radiated light. At the limit, when $|\Phi|\to c^2$ then $\nu_g\to 0$. Thus, atoms (nuclei) being part of a massive body (star) lose a radiation ability [3]. Such a formation that sends no signals in the surrounding space and interacts with the external world only by its static GF, is named the black hole (BH) or collapsar. On the other hand, the BH atoms, evidently, also lose an absorption ability since their energy levels amalgamate. Besides, the interaction of photons with electrons, nuclei and other BH surface micro-objects (accompanied by energy exchange) becomes, it would seem, impossible since their total energies are zero.

Based on the limiting relation $|\Phi|=c^2$ and the explicit expression for the potential of mass M, we obtain for the gravitational radius

$$r_g=kM/c^2 \quad , \tag{3}$$

where k is the gravitational constant.

Let us consider now the equation of the relativistic law of energy conservation for a trial body with mass m in a GF:

$$mc^2\gamma+m\Phi=mc^2 \quad . \tag{4}$$

Here, the Lorentz-factor $\gamma=(1-v^2/c^2)^{-1/2}$. Leaning on the limiting relation, we find that $\gamma_{max}=2$; whence for the limiting velocity (named the second cosmic velocity) we obtain

$$v_2=\sqrt{3}c/2 \quad . \tag{5}$$

Since $r_g\approx1.5$ km for the Sun, then the mean mass density of the corresponding 'ball' BH is $\rho_s\approx0.3\cdot10^{15}$ g/cm^3, i.e., it exceeds considerably the nuclear density. Only bodies with mass greater than 5 Sun masses have a mass density smaller than the nuclear one after collapse.

If we suppose that the relic radiation is the usual light radiation of a quasi-BH we get $|\Phi|\approx0.9997c^2$ *for the corresponding gravitational potential.*

General relativity (GR). Earlier, the failure of this theory was proved (see, e.g., [4]) and in particular, it was shown that GR contradicts directly the experiments on "gravitational time slowing down" [5]. As we see below, this theory gives contradictory results also in the case of the discussed problem.

Recall that the horizon of events in GR is defined by Schwarzschild's radius $r_S=2r_g$. This quantity stipulates the reducing of light velocity to zero, which depends on the gravitational potential in GR according to the formula:

$$c_g=c(1+2\Phi/c^2) \quad . \tag{6}$$

Thus, if the velocity of material bodies increases as it approaches a massive object, the velocity of photons decreases according to (6**). *The effective repulsion of light takes place!*** As a result, material bodies pass photons running up to BH (beginning from $r\approx4.5$ r_g).

On the other hand according to (6), the light velocity on the Earth surface must be

$$c_E=0.9999999986c \tag{6E}$$

This means that protons with energy greater than $E_p=18$ TeV and electrons with an energy $E_e>9.6$ GeV pass the light. The electrons of the Stanford linear accelerator answer the latter condition. Thereby, the light velocity loses its fundamental property of the limiting velocity of interaction transmission.

Conclusion: Relativistic gravidynamics predicts a gravitational red shift. Its consequence is a possible existence of black holes that cannot emit electromagnetic radiation.

References

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