

QUANTUM GAS EXISTS

ABSTRACT.

It has been shown that quantum gas resists macro bodies and what the consequences of this are for long-distance space flights.

In the study "Step by Step to Model 31" there is the following statement. For atoms, the surrounding space is not a vacuum. They are in motion in the ubiquitous quantum gas. Atoms are so small that quantum gas is a significant resistance to their motion, just like the air resists the motion of large bodies. If moving atoms experience resistance to motion, considerations about them should include the resistance force, If quantum gas resists atoms, it would be reasonable to assume that it also resists the bodies made of these atoms. Quantum gas "of the highest purity" appears in outer space, therefore it should be checked whether macro object in outer space (like space probes) experience resistance to motion according to the formula for the resistance force.

$$|\vec{D}| = C_D \frac{\rho |\vec{v}|^2}{2} S_D$$

D – resistance force vector directed opposite to the vector of the speed of the space probe;
 C_D – resistance force coefficient ("the shape factor") depending among others on the shape of the space probe;

S_D – area of a projection of the space probe on a plane perpendicular to the vector of the speed of the probe, simplifying, it is "the resistance area" of the probe.

\vec{v} – vector of the speed of the probe.

ρ – "density" of quantum gas proportional to the temperature of the gas (the current temperature of the outer space quantum gas is 2.725 K and it corresponds to the lowest density of quantum gas existing in the universe).

If it turns out that great bodies experience resistance to motion during a space flight, it will be another experimentum crucis for Model 31 and currently functioning the theoretical physics. It turns out that we do not need to look far. For several decades already, there has been evidence that space probes experience resistance to motion during a space flight. They are so called anomalies of the Pioneer and Voyager probes, that is observed discrepancies between expected speeds of the mentioned above space probes and their measured speeds. Having considered all the forces acting on the vehicles, scientists confirmed the existence of a small, unknown force making the probes, during their travel in an open space, experience resistance to motion systematically reducing their speed.

Thus, launched into space and then unprovided with a propulsion probes will not dash forever into the unknown, as the physicists have planned, in thousands years they will not reach other stars, but after some time they will get stuck in the depths of the space and stay there forever. The above means that for the endless space flight, a probe needs a perpetual propulsion equalizing the resistance of quantum gas.

Is this the end of dreams of intergalactic travel?

It turns out that there is a light in the tunnel. For some time the scientific world has talked a lot about a microwave thruster, called EmDrive, which produces a thrust contrary to the laws of physics. There are already the first positive results of testing of the thruster. This means that a space probe will have a propulsion if it has a power source necessary to produce the EmDrive power source, that is microwaves. Where to get a power source? For over two hundred years, there has been known the Seebeck effect, which allows a direct transformation of heat into electricity. This means that a space probe will have a propulsion if it has a stable source of heat. Presently known heat sources which use nuclear energy are stable but they have a limited durability.

Is this, however, the end of dreams of intergalactic travel?

It turns out that there is another light in the tunnel. In order to build a perpetual propulsion of a space probe, there could be used discussed above the phenomenon of resistance to motion by quantum gas and the heating-up process of a body experiencing resistance to motion. A probe must be equipped with a heat shield and a classic nuclear source of heat. The source of heat will allow to generate electricity which will allow to generate microwaves required to produce a thrust in the propulsion of the probe. The probe will be able to overcome the resistance of quantum gas and accelerate in space. The increase of speed will result in heating-up the heat shield of the probe. At a certain speed, the temperature reached by the heat shield will be so high that it will be able to become a secondary heat source of the probe and replace the primary nuclear source. Since this moment, the probe will be able to continue its endless space flight at constant speed. The speed will be maximum

permissible because its further growth will lead to an increase in the temperature of the heat shield, which will result in a destruction of the shield and successively the whole probe.

It would be fair to ask for the third time whether it is a definitive end of dreams of intergalactic travel. And for the third time it can be said that there is a light in the tunnel. Well, everything will depend on what fraction of the speed of light will be the above mentioned maximum permissible speed of the probe. For example, if it is $0.1 c$, the probe will be able to travel at a maximum speed of about 30 thousand km/h. At present, we only know that at a speed of the order of several kilometers per second, the resistance of quantum gas is already noticeable for the probe, while at a speed of comets and planets of the order of 50 – 60 km/s, no thermal phenomena connected with this process can yet be observed.

From the above considerations the following conclusion can be drawn. A body made of atoms (a probe, rocket or another spacecraft) will never reach the speed of light because it will earlier heat up and burn down, just like a meteor falling into the coat of the Earth's quantum gas.

Therefore, no credence can be given to the school tasks beginning with the words: One of twins is in a space rocket traveling at c speed...