MODEL 31 AND NEWTON'S FIRST LAW OF MOTION

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Ubiquitous quantum gas is the subatomic world of matter. It fills the outer space and the interatomic space in solids, liquids, and gases. Like any gas, it creates resistance to motion for the objects moving in it. Therefore, it becomes necessary to introduce the zeroth law of motion.

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In nature, objects in motion always encounter a resistance force counteracting this motion. Therefore, Newton's first law of motion has to be modified.

The modified first law of motion reads as follows.

If an object is acted upon by any external forces or a force that acts on the object is in balance with the resistance force counteracting this motion, **the object remains at rest**.

The first law of motion, which is current at the time, reads as follows.

If an object is not acted upon by any external force, or the acting forces are balanced, **the object remains at rest or is moving uniformly straight forward**.

The difference between the two versions is significant. In the modified version, the existence of the force of resistance to motion prevents the object from moving uniformly straight forward if the force is balanced by an external force.

And how the above relates to reality. Nowadays, the first law of motion assumes that in outer space, making a probe move at a certain speed and turning the drive off will cause that the probe will perpetually travel in space at the same speed. According to the modified version of the first law of motion, due to the presence of the resistance force, the above mentioned probe will lose its speed and after a certain time it will come to rest.

Let us see if there is any evidence for it.

In 1972 probe Pioneer 10 and in 1973 Pioneer 11 were sent to space. Both probes explored some planets of the Solar System, and next they were directed outside the Solar System. Everything proceeded as predicted until 1980. In that year, the navigators of the probes noticed that the both probes were slightly slower than it would result from theoretical calculations. The probes were obviously slowing down. Had it not been this mysterious slowing down force, the yearly distance traveled by the probes would be 500 km greater. Having considered all the forces acting on the

vehicles, scientists discovered the existence of the force causing the delay of both vehicles of 8.74 ± 1.33) × 10^{-10} m/s^2. This value means that in a few million years the Pioneer probes will "come to a halt".

In 1977 probes Voyager 1 and Voyager 2 were sent to space in order to complete tasks similar to the tasks of the Pioneer probes. In the case of these probes, the presence of the force slowing down their movement was also ascertained.

In 2006 probe New Horizons was sent to space in order to complete tasks similar to the previous ones. And also in this case, the presence of the force slowing down the movement of the probe was ascertained.

The above mentioned probes provided another spectacular evidence of the validity of the above assumption. When leaving the Sun, the Solar Wind speed is about 700 000 miles per hour. The probes demonstrated that the speed of particles of this wind systematically decreased and, on the outskirts of the solar system, the wind disappeared; its particles stopped. Thus, the resistance to motion force of quantum gas showed its existence simultaneously in macro and micro scale.

On the basis of the above, with a probability close to 1, it can be assumed that every object sent by human outside the Solar System will encounter this "mysterious" resistance to motion force.

It is seen from the formula for the resistance force D

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

that, among others, it is proportional to S_D the area of projection of a body onto a plane perpendicular to the direction of the motion ("the area of resistance"), and to C_D the coefficient of the resistance force ("the shape factor").

As it is known, the shapes of space probes are very far from aerodynamic, so due to various resistance of their various parts (like antennas) not only will they slow down but also deviate from the rectilinear path.

This phenomenon applies to all the objects traveling in space without propulsion. This means that all objects revolving around another body (planets, asteroids, moons, comets) will sooner or later fall on the bodies which they are circling around. For objects not revolving around another body, which are located far enough from each other, the gravitational force is so weak that it is equalized by the above

mentioned resistance force of quantum gas, which in turn causes that the bodies remain at constant distances from each other. This kind of bodies include stars and galaxies created by them.

The obvious fact that ubiquitous resistance force exists has been attempted to be explained by physicists in different ways but none of them was satisfactory.

After these numerous unsuccessful attempts to explain this phenomenon, physicists passed it over.