About Presumptions of Physics

Ilgaitis Prūsis[1], Peteris Prūsis[2]

Abstract

There are many essential presumptions in modern physics without sufficient reasoning untested by scientific processes. Some of them are presupposed for consistency of a particular theory. Some theories are based only on presumptions. In some cases the successful particular theory is converted to a general theory by using additional presumptions. This leads to inexplicable paradoxes. The article discloses an analysis of basic presumptions and their alternatives allowing to avoid the paradoxes.

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[1] Independent researcher;

[2] Independent researcher

Basic Principles of Physics

Discard excess (parsimony principle)

The principle is known as Occam's razor, i.e., "Entities should not be multiplied without necessity." [1]

Completeness

The completeness of theory means that all constituents of the theory are in equilibrium, i.e., the sum of items is zero [2]. The incompleteness of a physical law leads to paradoxes.

The consequences of completeness are the symmetry of constituents and conservation laws are in force.

Symmetry

All complete systems are symmetric, but this does not mean that all symmetric systems are complete. It complements the Noether theorem that states: "every differentiable symmetry of the action of a physical system has a corresponding conservation law" [3].

Conservation laws

Conservation laws are fundamental laws of nature. Therefore any valid physical theory and its entities should match all conservation laws.

Complete conservation laws are in equilibrium [4], i.e., the sum of all items is zero.

Experimental proof

Only experimental testing is sufficient evidence of the correctness of theory. Mathematical analysis of theory as well as logical conclusions are a powerful tool for proof of theory but is not sufficient for verification of theory.

Observations

Observations may stand alone or be part of experiments. All observations involve both perception and cognition. This means that they are affected by one's underlying understanding of nature, i.e., presumptions. Observations may be distorted by illusions. Therefore observations can be only additional arguments to experimental results.

Basic presumptions

Space

Presumption:

Contemporary physics presumes that space is the boundless, three-dimensional extent in which objects and events occur – a large container [5]. The notion of space is based on Isaac Newton's concept that the size of space is unlimited, it existed permanently and independently from all matter it includes inside [6]. There is no experimental or logical basis for this assumption.

Alternative:

Space is equal to a force field, i.e., the space and force field are synonyms [7]. The basis of this assumption is the fact that there is no evidence of space without forces, i.e., gravity of the Universe.

Gravity

Presumption:

Gravity is curvature of space – not a force. This basic postulate of the General Relativity Theory (GRT) is controversial to everyday experience. Everybody feels gravity force.

Alternative:

The force field of gravity is space. Therefore gravity is force and space is curved [8] like force lines of gravity.

Time

Presumption:

In contemporary physics there is no consensus about the nature and definition of Time. According to the Encyclopedia Britannica Time is a measured or measurable period, a continuum that lacks spatial dimensions [9]. So Time is only duration between events. The duration is only part of Time. Therefore the definition is recurrent, i.e., Time is defined by Time.

Isaac Newton believed in absolute Time: “Absolute, true, and mathematical time, of itself, and from its own nature, flows equably without relation to anything external, and by another name is called duration: relative, apparent, and common time, is some sensible and external measure of duration by the means of motion, which is commonly used instead of true time; such as an hour, a day, a month, a year [6].”

Alternative:

Time itself does not exist. There is only motion. The concept of time allows an easy comparison of several motions.

Speed of light

Presumptions:

Speed of light is the maximal possible speed in nature.

Speed of light is a fundamental constant.

Alternative:

It is well known that the speed of light $c = 1/(\varepsilon_0 \mu_0)^{1/2}$. Accordingly fundamental entities are the vacuum electric permittivity ε_0 and magnetic permeability μ_0 . They determine the propagation of electric and magnetic fields in space. The question remains open whether the speed of light in vacuum is constant since permeability and permittivity depend on the density of the environment. It should be noted that vacuum is not empty. At least a gravitational field exists in it. The Universe continues to expand, the average density of the Universe decreases. At the beginning of the Universe the average density of space and gravitation fields was much higher. It has been experimentally demonstrated that in meta-materials values of permittivity and permeability can range from -4 (minus 4) to +4 and more. This means that the speed of light can be within a wide range. It has been also experimentally proven [10, 11].

The objection has been overturned that the electromagnetic field at a speed above *c* cannot transmit information. It has been demonstrated experimentally that transmission of Mozart's symphony can be faster than *c*.

Length contraction

Presumption:

The length of a fast body according to the Lorenz transformation has real contraction:

$$l = l_0 /(1 - v^2/c^2)^{1/2} \qquad (1)$$

where: l – measured value of length,
l_0 – value of length at rest,
v – speed of object,
c – speed of light.

This leads to the following paradox. Spacecraft A and spacecraft B with high speed are moving past each other. The observer on spacecraft A sees that spacecraft B is flat like a pancake in the direction of movement. The observer on spacecraft B sees that spacecraft A is flat.

Alternative:

The measured value of length l is apparent. The length at rest l_0 is the real value of length. There are no paradoxes [12].

Time dilatation

Presumption:

According to the Special Relativity Theory (SRT) the basic equation of time [13] is:

$$t = t_0 /(1 - v^2/c^2)^{1/2} \qquad (2)$$

where: t – measured value of time,
t_0 – value of time at rest,
v – speed of object,
c – speed of light.

SRT presumes that the measured value of time is real, i.e., time dilates at high speeds. It leads to twin and other paradoxes.

Alternative:

The measured value of time t is apparent. The time at rest t_0 is the real value of time. There are no paradoxes [14].

Even the slowdown [15] of atomic clocks is not sufficient proof of time dilatation. There are many experiments which show that processes in atoms are affected by the

gravity field of the Earth and other agent actions. The Shnoll effect [16] shows that small disturbances of a gravity field affect the decay rate of radioactive atoms.

Relativistic mass and energy

Presumption:

The relativistic increase of mass and energy is real.

Alternative:

The relativistic increase of mass and energy is apparent. Rest mass and rest energy is real.

Wave – particle duality

Presumption:

All waves are particles and all particles are waves simultaneously.

Alternative:

The first part of the presumption is based on the fact that all waves have beginning and end, therefore they can be interpreted as particles.

The second part of the presumption is based on the scattering pattern of particles which is similar to the pattern of wave interference. It is not enough to claim that particles are waves.

The particles cannot be in the opposite phase and cannot delete each other like waves. Therefore intrinsic particles (fermions) cannot be waves [17].

Intermediate particles

Presumption:

Each force field has specific intermediate particles which mediate the transfer of momentum, spin, energy and force. Electromagnetic force is carried by virtual photons, nuclear (strong) force is carried by gluons, weak force is carried by Z and W bosons, gravity force is carried by gravitons. The presumption allows to explain action at a distance.

For transfer of force, Z and W bosons must be 80 times heavier than a proton.

Alternative:

The space and force field are synonyms. Therefore each force field is a separate space. The interaction means that particles have common space (force field). There is no action at a distance – the particles are in contact. For example, particles interact in electric space. Simultaneously they are at a large distance in gravity space . It explains the quantum entanglement [18].

Quarks

Presumption:

Nucleons consist of 3 smaller particles called quarks. The presumption is based on the observation of electron scattering on the nucleons which show 3 smaller images.

Alternative:

Nuclear space (force field) is four – dimensional. The quarks are 3 projections of nuclear space on the 3 – dimensional gravity space [19]. This concept confirms the fact

that quarks cannot be separated from nucleons like projections of an object which cannot be separated from the object and therefore they cannot be separate parts.

Conclusions

The article analyses only a small part of all presumptions of physics. Nowadays in physics exist many exotic presumptions, for example, strings, branes, quantum fields, eleven-dimensional super-gravity, a standard model of particle physics, etc.

Alternative concepts resolve basic conundrums of contemporary physics.

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Correspondence and requests for materials should be addressed to I.P. (ilgaitis@gmail.com).