

From Galileo Galilei, Newton, Rutherford and Bohr to Einstein

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Abstract. *In the present paper are two corrected Newton's laws of motion First law and Third law. Space ships, Earth satellites and orbital laboratories move quasi-uniformly in almost a circle around the Earth. The electrons and the nucleus circulate around the center of gravity of atom in approximate circles.*

Keywords: *inertia, action, reaction, transmission medium, waves, particles, the generalized law of inertia*

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Introduction

Inertia (Galileo):

The tendency of objects to resist changes in motion.

Galileo Galilei, however, realised that a force is necessary to change the velocity of a body, i.e., acceleration, but no force is needed to maintain its velocity. In other words, Galileo stated that, in the absence of a force, a moving object will continue moving. The tendency of objects to resist changes in motion was what Galileo called inertia. This insight was refined by Newton, who made it into his first law, also known as the "law of inertia"—no force means no acceleration, and hence the body will maintain its velocity. As Newton's first law is a restatement of the law of inertia which Galileo had already described, Newton appropriately gave credit to Galileo.

Rutherford and Bohr:

Bohr proposed, in 1913, what is now called the *Bohr model of the atom*. He suggested that electrons could only have certain *classical* motions:

Electrons in atoms orbit the nucleus.

The electrons can only orbit stably, without radiating, in certain orbits (called by Bohr the "stationary orbits") at a certain discrete set of distances from the nucleus. These orbits are associated with definite energies and are also called energy shells or energy levels. In these orbits, the electron's acceleration does not result in radiation and energy loss as required by classical electromagnetics.

Bohr's atomic model is based on the following principles:

Electrons move along the trajectories circles (spheres), which do not emit any electromagnetic radiation. Speed is constant.

In 1911 he published under the name of Ernest Rutherford. Rutherford model, whose basic idea is that the atom consists of a core material and light electrons in orbits. Rutherford model, although very well explain the results of experiments conducted in the shelling of very thin films, however, say nothing about the spectroscopic properties of the atom. Soon, it was also shown that the atoms, depending on the model of Rutherford were very unstable, which contrasts sharply with our experience. Thus, in 1913 Bohr year, trying to find a model of a hydrogen atom, which is stable and said range is hydrogen.

In the transition from one level to another electron emits (absorbs) only one photon (1 flash).

Inertial,inertial, inertial, What is it ?????

Inertia is not straightforward (straight- line) but quasicircle !!

Galilei: imaginary experiment. He proposed to introduce a closed-ship cabin with no windows on the ship, which in moderate winds evenly glides over calm water in a quasi circle ($R_{\text{Earth}} = 6378 \text{ km}$) .

In his work "Dialogue on the two main systems of the world" describes the situation as follows:

"Enter with one friend in the large room, located below the deck of a ship and stock up on flies,

butterflies and similar insects. Please also large pan of water to which you put the fish. Furthermore, hang above a small bucket, from which it will drip water into second vessel with narrow necks built at the bottom. When the boat is not moving, the insects fly at the same speed in all directions, the fish will swim well in all directions and all the drops fall into the vessel underneath ... If you jump with both feet at the same time, you make the same jumps all side ... bring the ship into motion. If the motion is not uniform, and if leaning to one side or the other, you determine the slightest change in all these phenomena. Neither one of them can not determine whether the ship was moving or not.

Galileo Galilei first described this principle in 1632.

Newton's First Law says that objects at rest remain at rest and objects in motion remain in motion at a constant velocity in a straight line, unless acted upon by an unbalanced force.

So, for example, if you go into space and move a long way away and then you throw a baseball it will keep going, basically forever.

The flywheel, which is used to stabilize the position and direction, in English usually referred to as a gyroscope. Gyroscopic effect is used to stabilize the spatial position of the larger machines and technical equipment, such as flight control space stations, its constant stabilization of the main gun, flight, spacecraft, track artificial satellites and interplanetary probes.

Einstein:

Instead of universal time, each inertial frame has its own time.

The Galilean transformations are replaced by Lorentz transformations.

According to Einstein's thought experiment, a man in such a cabin experiences (to a good approximation) no gravity and therefore the cabin is an approximate inertial frame.

Gyroscope Earth

Many of our favorite toys were and are really gyroscopes. A two-wheel bicycle has two gyroscopes (the wheels) which keep it stable as long as it is moving at a good speed. A football pass or punt thrown or kicked as a spiral is a gyroscope. Our yo-yos, Frisbees, and tops are all toys that work on the principle of the gyroscope. The gyroscope is much more than a toy. Gyroscopes are used in planes, rockets, submarines, and spacecrafts to maintain directions and provide stability.

How does Earth itself compare to the standard aircraft gyroscope? Planet Earth spins at one revolution per day.

The Milky Way is the galaxy that contains our Solar System.

Sun's Galactic rotation period 240 Myr

While estimates among different experts vary, an acceptable range is between 100 billion and 200 billion galaxies, Mario Livio, an astrophysicist at the Space Telescope Science Institute in Baltimore, ..

Covariant Lorentz transformations groups ... coordinate systems,

which not contain gravitational field.

Without the gravitational field can not be mass.

Without mass can not be a real 3D world, real force, real physics.

Covariant Lorentz transformations are therefore bad notions!

Mathematical physics formulated in Minkowski space, space-time is incorrect.

The three laws of motion were first compiled by Isaac Newton in his *Philosophiae Naturalis Principia Mathematica* (*Mathematical Principles of Natural Philosophy*), first published in 1687. Behind 327 years we have a lot of new knowledge. Therefore, they should be corrected.

First law: When viewed in an inertial reference frame, an object either remains at rest or continues to move at a constant velocity, unless acted upon by an external force.

Third law: When one body exerts a force on a second body, the second body simultaneously exerts a force equal in magnitude and opposite in direction on the first body.

Theory

Let's have a real coordinates system firmly connected with a real laboratory on Earth, where all experiments testing the physical theories are performed. We know that this coordinates system moves around the Earth axis during an astronomical day i. e. it performs a quasi-circular motion. During the year it rotates around the Sun approximately in a quasi-circle together with the Earth. During 2.10^8 years it circulates in the quasi-circle around the center of the Galaxy. It performs a quasi-uniform motion in a quasi-circle together with the Sun. The Galaxy performs a quasi-uniform and quasi-circle motion around the center within the framework of metagalaxies of star clusters and our laboratory coordinates system on Earth together with it, etc. From the experimental testing of the law of inertia it is known that the body moves along the "plane" stated by a waterlevel, i. e. in fact it is not a straight-line uniform motion, but it is the motion in the circle of the Earth radius of $R=6378$ km. The space aeronautics show that space ships, Earth satellites and orbital laboratories move quasi-uniformly in almost a circle around the Earth.

The atomic theory shows that the electrons and the nucleus circulate around the center of gravity of atom in approximate circles. The body rotating around its own axis (a flywheel) persists in this status. Similarly, the planets, stars, galaxies, molecules, nuclei and elementary particles rotate around their own axes. Since the uniform straight-line inertial motion cannot be achieved in a microworld, its

place here is exclusively in

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the inertial quasi-circle motion. It is analogous in the macroworld. Each real "straight-line" motion can be replaced by a circle of a huge radius. This discussion results in the following:

"Every mass (atom, molecule, particle, body, vacuum, *transmission medium*) persists in the status of the quasi-rest or quasi-uniform motion in a quasi-circle, or quasi-ellipse (eccentricity $e \rightarrow 0$) as far as it the external forces do not force it to change its status. (This notion is called the ***generalized law of inertia***)."

The inertial rotation of body consists of a quasi-uniform motion (in the quasi-circles or quasi-ellipse with eccentricity $e \rightarrow 0$) of body's atoms, particles. The inertial rotation of particle consists of a quasi-uniform motion (in the quasi-circles or quasi-ellipse with eccentricity $e \rightarrow 0$) of subparticles.

Finally, it is necessary to stress, that since the idea of inertial straight-line uniform motion has no place in physics, neither the idea of the inertial system (in our theory it is replaced by the notion of equivalent system) nor the notions of Einstein's principle of relativity, local time, co-variant equations, nor Lorentz transformation equations physical definition of simultaneity, nor invariant interval has any place in physics.

No real motion can be straight-line one. Every motion drawing near the straight-line one is just a part of curvilinear circular motion with finite radius. It will never reach the radius $R \rightarrow \infty$.

We have already known that straight-line motion does not really exist, it is only possible a hypothetical approximation for large radii of curvature. On surface of Earth, the circle with radius $R_E = 6378 \text{ km}$ is a "straight line" (in light of the origin of this term at Newton - laboratory desk - a plane defined by the level). These radii of curvature are even larger for galaxies - they have the size

of several light years - and they are more similar to the straight line, which they will never reach.

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In reality we have not uniform motion in a circle, but a non-uniform in ellipse (quasi-uniform motion in a quasi-circle) or rosette respectively. Centripetal acceleration forces in the author's theory are not constant - they change: alternatively it is growing and declining. In a "circle" can be uniform or a non-uniform motion.

The non-uniform motion has a sequel: a little deformed circle on ellipse or rosette respectively and creation of stationary cloud. Centripetal acceleration v^2/r is not the acceleration in direction of the curve of the circle (tangential one), but in direction perpendicular to this curve, it has nothing in common with the acceleration in direction of curve. It determines the size of curvature of circle line only, and in the extreme case, the size of the straight line (for $r \rightarrow \infty$: $v^2/r \rightarrow 0$). However, it is not possible to realize these extreme positions in reality. For any "straight-line" motion it is valid that $v^2/r = 0$. On the surface of the Earth, on an ideal plane determined by the water level, normal acceleration on the "straight line", that lies in this plane, equals $v^2/6378000m$.

The standard Newtonian physics is somewhat corrected by **Generalized Law of Inertia**.

The main differences between Einstein's theory^[1] and the latest knowledge^[2] are:

1. Form of Intensity of the Moving Charge Electric Field is asymmetrical,
2. Form of the interference field is non-linear,
3. Kinetic energy of a charge moving at the velocity of v **has two different values:**

Kinetic energy of electron, (proton)

$T_{kin id} = mc^2 [\ln |1-v/c| + (v/c) / (1-v/c)]$ in direction of motion of electron, (proton)

where v is velocity of electron, (proton).

Kinetic energy of electron, (proton)

$T_{kin ad} = mc^2 [\ln |1+v/c| - (v/c) / (1+v/c)]$ against direction of motion of electron, (proton)

where v is velocity of electron, (proton).

Form of the interference field is non-linear: **2.2.1. Fizeau's Experiment** , **2.2.2. Harres's Experiment**

(from [2] pages 34 – 39).

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Calculation of the kinetic energy T_{kin} of a body moving at the velocity of v

v/c	Vlcek 's theory $T_{kin ad} =$ $mc^2[\ln 1+v/c - (v/c)/(1+v/c)]$	Vlcek 's theory $T_{kin id} =$ $mc^2[\ln 1-v/c + (v/c)/(1-v/c)]$	Vlcek 's theory $(T_{k ad} + T_{k id})/2$	Einstein 's theory T_{kin}
0.1	0.00439 mc^2	0.0057 mc^2	0.0050 $m c^2$	0.0050 $m c^2$
0.2	0.0156 mc^2	0.0268 mc^2	0.0212 $m c^2$	0.0200 $m c^2$
0.3	0.0316 mc^2	0.0719 mc^2	0.0517 $m c^2$	0.0480 $m c^2$
0.4	0.0508 mc^2	0.1558 mc^2	0.1033 $m c^2$	0.0910 $m c^2$
0.5	0.0722 mc^2	0.3068 mc^2	0.1895 $m c^2$	0.1550 $m c^2$
0.6	0.0950 mc^2	0.5837 mc^2	0.3393 $m c^2$	0.2500 $m c^2$
0.7	0.1174 mc^2	1.1293 mc^2	0.6233 $m c^2$	0.4010 $m c^2$
0.8	0.1434 mc^2	2.3905 mc^2	1.2669 $m c^2$	0.6670 $m c^2$
0.9	0.1680 mc^2	6.6974 mc^2	3.4327 $m c^2$	1.2930 $m c^2$
0.99	0.1906 mc^2	94.3948 mc^2	47.294 $m c^2$	6.9200 $m c^2$
1.0	0.1931 mc^2	infinite	infinite	infinite

Direct measurement of the speed in the experiments Kirchner^{[3], [4]}, Perry, Chaffee^[5]

For $v/c = 0.08-0.27$ can not yet prove the validity of Vlcek's theory^[2] or Einstein's theory^[1].

Through the work of Max Planck, Albert Einstein, Louis de Broglie, Arthur Compton, Niels Bohr, and many others, current scientific theory holds that all particles also have a wave nature (and vice versa).^[6] This phenomenon has been verified not only for elementary particles, but also for compound particles like atoms and even molecules. For macroscopic particles, because of their extremely short wavelengths, wave properties usually cannot be detected.^[7] Wave–particle duality is

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an ongoing conundrum in modern physics. Most physicists accept wave-particle duality as the best

explanation for a broad range of observed phenomena; however, it is not without controversy.

[Albert Einstein](#) , who, in his search for a [Unified Field Theory](#) , did not accept wave-particle duality, wrote: ^[8]

This double nature of radiation (and of material corpuscles)...has been interpreted by quantum-mechanics in an ingenious and amazingly successful fashion. This interpretation...appears to me as only a temporary way out...

The [pilot wave](#) model, originally developed by [Louis de Broglie](#) and further developed by [David Bohm](#) into the [hidden variable theory](#) proposes that there is no duality, but rather a system exhibits both particle properties and wave properties simultaneously, and particles are guided, in a [deterministic](#) fashion, by the pilot wave (or its "[quantum potential](#) ") which will direct them to areas of [constructive interference](#) in preference to areas of [destructive interference](#) . This idea is held by a significant minority within the physics community. When in this idea we will replace the "quantum potential" by "electromagnetic potential" (or by "interference of electromagnetic waves"), the idea will be accepted large majority of physicists.

In 1900 [Max Planck hypothesized that the frequency of light emitted by the black body depended on the frequency of the](#) oscillator that emitted it, and the energy of these oscillators increased linearly with frequency (according to [his constant](#) h , where $E = h\nu$).

Theoretical Planck's oscillator we can replace with circulating electron along ellipse around the nucleus of an atom between two Bohr's energy levels, while electron moving alternately with acceleration and deceleration. This electron really blinks. When an electron moves at the speed of a higher Bohr energy levels (from nucleus) to lower (towards perinucleus) radiates spectral lines of certain thickness. (real blinks) For example, spectral line Halfa 656.281 ± 1.4 nm. From the thickness of the spectral lines we can easily identify the smallest (in nucleus) and largest (in perinucleus) the

speed of the electron around the nucleus of an atom, taking into account the kinetic energy of the electron in the direction of movement and against the movement if we know that according to the Doppler principle is the lowest wavelength (highest frequency) and against the direction of motion of the electron is a wavelength of the highest (lowest frequency).

Physics in the past formulated at least part of the truth about the physical phenomena.

Some ideas, even if they were doubtful and rejectable, are still valid today:

1. Electron radiates electromagnetic waves if and only if moves with acceleration from the higher Bohr's energy levels to a lower. In atom, as a source of electromagnetic waves, then it then, when it moves from afnucleum to perinucleum along the ellipse (eccentricity $e \rightarrow 0$). If the electron moves with decelerated motion, when it absorbs energy, while moving from a lower to a higher energy level, in the direction from perinukleum to afnucleum along the ellipse with of very small eccentricity. Eccentricity of the ellipse is maximal, when electron radiates head of series. Minimal, almost zero, eccentricity corresponds to edge series.

Faulty arguments leveled against classical physics - the electron is moving with acceleration along of a spiral towards the nucleus - we will find in Beiser^[9] 5.7 The failure of classical physics, p.120, Fig.5.12: "Electron in an atom should be according to classical physics, rapidly converge to the nucleus, because as a result of its acceleration radiates energy."

Because the electron flashes **4,57e+14** times per second, i.e. emits energy **4,57e+14** times per second and absorbs energy **4,57e+14** times per second (for spectral line **H α**). Electron creates in the transmission medium, electromagnetic wave **4,57e+14** times per second and absorbs energy **4,57e+14** times per second (for spectral line **H α**) - Beiser's argument is unfounded.

Atom is no oscillator. Atom resembles to the solar system with the same "planets" (electrons) and

different distances from the nucleus. Electron in an atom not to skip, but moves continuously with great speed, which increases from the value **0,002717146 c** (in afnucleum) to **0,0027212042 c** (in perinucleum). Then decreases from the value **0,0027212042 c** (in perinucleum) to **0,002717146 c** (in afnucleum) etc.

Changing the speed of the electron is repeated **9,14e+14** times per sec. (spectral lines **H α**).

2. The quantum harmonic oscillator as the quantum-mechanical analog of the classical Planck's harmonic oscillator we can replace with circulating electron along ellipse around the nucleus of an atom between two Bohr's energy levels, while electron moving alternately with acceleration and deceleration. Linear harmonic oscillator is only the projection of the real motion of the electrons along the ellipse in the plane perpendicular to the plane of the ellipse (excentricity $e \rightarrow 0$).

Linear harmonic oscillator is only the projection of the real motion of the electrons along the ellipse in the plane perpendicular to the plane of the ellipse (excentricity $e \rightarrow 0$).

Or more accurately, is only the projection - of rotating ellipses (Sommerfeld's ellipses around perinucleus) - in a plane perpendicular to the plane of the ellipses (excentricity $e \rightarrow 0$).

In quantum mechanics are used so imprecise and imperfect expressions of motion of electrons around the nucleus.

Results

Corrected Newton's laws of motion

First law:

"Every mass (atom, molecule, particle, body, vacuum, *transmission medium*) persists in the status of the quasi-rest or quasi-uniform motion in a quasi-circle, or quasi-ellipse (excentricity $e \rightarrow 0$) as far as it the external forces do not force it to change its status. (This notion is called the **generalized law of inertia**)."

Third law:

All movements in physics are based on principle of **action - reaction** and on velocity of stable particles (**e⁻, p⁺, n⁰, D, He-3, α**).

Action, as a motion of stable charged particles (**e⁻, p⁺, n⁰, D, He-3, α**), is characterized speeds up in source along ellipse or quasi- ellipse (excentricity $e \rightarrow 0$).

Action creates unstable particles (leptons μ^- , τ^- , baryons, mesons), bosons W⁺, W⁻, Z (= particles = β electrons moving at nearly the speed of light)in direction of motion of stable particles (**e⁻, p⁺, n⁰, D, He-3, alfa**).

Reaction creates in the transmission medium, electromagnetic waves, as unstable "particles" - neutrinos ν_e , ν_μ , ν_τ , mesons π^0 , π^+ , π^- , η , K and gamma rays (=waves of extremely high frequency $>10^{19}$ Hz) - against direction of motion of stable particles (**e⁻, p⁺, n⁰, D, He-3, alfa**).

Accompanying activity of **reaction** on movement of stable particles in the transmission medium are waves, or "unstable particles" respectively , i.e. neutrinos and mesons.

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