

Axiomatic of mechanics

What's the use of axiomatic?

The axiomatic presentation of mechanics is based on undefinable, fundamental notions from which the other notions can be defined.

What is meant by undefined basic concepts? We cannot define all concepts in a logical manner (by words) because this would go to infinity. We don't define some concepts by using other concepts but we introduce these primitive concepts by reference:

This one! is movement, *this one!* is force...

Axioms are indemonstrable propositions.

From axioms theorems can be demonstrated.

In order to understand rational mechanics, an axiomatic presentation is necessary. Gödel's theorem states limits to formalization, namely that a consistent system sufficiently rich to contain elementary arithmetic cannot prove its own consistency.

Because formalization is not our intention, *understanding* by an axiomatic presentation is not concerned by Gödel's formal objection.

Category mistakes in mechanics

The danger of hypostatizing concepts:

To hypostatize: to conceive a relation as an existing being.

Hypostasis of a concept means a concretization, the erroneous assignment of qualities of things to relations.

Example: time is not a physical process with a flux-velocity but only a relation.

To say that time has a flux with variable velocity is a category mistake.

Only clockworks can change their periodicity. The rotational speed of our globe decreases but this is not time dilatation!

Energy is by definition not a thing with a flux but a relation, a measure.

Therefore Planck's energy lumps are a category mistake.

Mass is an amount of substance, it cannot be converted into energy which is a relation. The alleged conversion of a thing into a relation (which is no thing) is a classical category mistake.

The same holds for the conversion of energy into mass. Because the mass/energy conversion is impossible, the so-called massergy conservation law is a failure.

But you must discriminate between binding energy, for example the binding energy of the constituent sub-particles of a proton and the alleged intrinsic energy of the entire mass of the proton. The latter is science fiction.

Still mass conservation holds. And of course energy conservation holds...

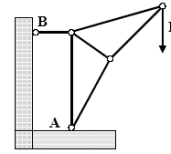
Space is a relation and not a thing that can undergo deformation or expansion. Velocity is a relation and not a state of a body.

Also momentum $p \equiv mv$ is not a physical state of a persisting body.

Relativistic mechanics is *science fiction* because time and space are treated as things that have velocity or are deformable, respectively.

Force in Engineering Mechanics: Statics

Undefined basic concept of force introduced without any relation to dynamics. If $\mathbf{F} = m\mathbf{a}$ would be the definition of force, statics would be not possible. To determine the forces in rods is one goal of statics. See the example. Picture: veit.co.at



Relativistic force formula physically impossible

Relativistic mechanics treats the famous lex II of Newton's mechanics:

$\mathbf{F} = m\mathbf{a}$ not as axiom but as the definition of force $\mathbf{F} \equiv d(m(v))/dt$, i. e.

Force $\mathbf{F} \stackrel{\text{def}}{=} \frac{d}{dt}$ the time derivative of momentum.

If one supposes a velocity dependent increase of inert mass:

$$m = m_0 \gamma, \quad \gamma = 1/\sqrt{1 - (v/c)^2} = c/\sqrt{c^2 - v^2},$$

then the formal relativistic derivation according to the vector calculus yields a physical impossible force:

$$\mathbf{F} \equiv d(m\mathbf{v})/dt \rightarrow \dots \rightarrow m\gamma \mathbf{a} + m\gamma^3 (\mathbf{v} \cdot \mathbf{a}/c^2) \mathbf{v}$$

In classical mechanics acceleration and force vector have identical direction!

There is no empirical indication for this force.

0 - The frame of reference for mechanics is the universe

The universe is unmovable.

The frame of reference for all movements in the universe is the universe itself.

The universe is at rest because a movable universe would require a reference body that is not a member of the universe, but all bodies are parts of the universe.

Our solar system has a velocity of about 390 km/s with respect to the unmovable universe.

Smoot et al. [smo] detected a blue shifted radiation coming from the direction of constellation Leo. The corresponding radiation coming from the opposite direction, namely from Aquarius, is red shifted. Obviously these observations are an indication for a Doppler shift.

The blue- and red shift is due to a velocity of our solar system of 390 km/s in the direction of Leo. The connecting line: Leo-Earth-Aquarius is nearly lying in the Earth's orbital plane.

Furthermore, light propagation is anisotropic in our solar system.

The same anisotropy holds for the 4° K cosmic microwave background radiation CMB, which is not the rest heat of the big bang but the radiation of a dielectric cosmic medium, the aether, that makes the propagation of all electromagnetic waves possible.

The experiment was flown aboard the NASA Ames U2 jet aircraft.

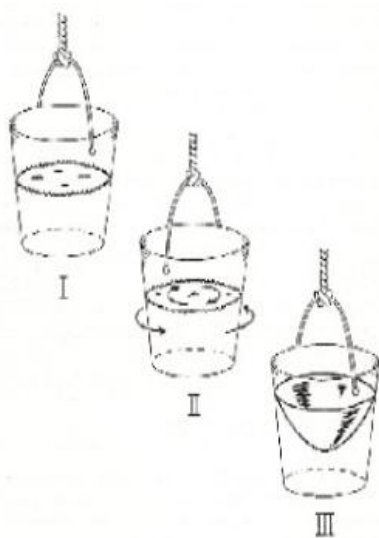
See the conclusion [smo2]:

The CMB is then the standard frame of reference for cosmology work.

The U2 experiment had still another result:

... This is good evidence that Galileo is right - the Earth does go around the Sun.

The universe cannot be a rotating one: The opinion that a rotating universe with one revolution per day is possible because all inertial effects can be explained by a rotating universe or by a rotating earth within an universe at rest is wrong.



Peter Marquardt [pm] made it plain: *Newton's rotating bucket does not yield the same result when the bucket is assumed at rest in a universe rotating around it (apart from the inconsistency that the one-and-only inertial system does not rotate). Uniqueness tells why. Just make two buckets rotate clockwise and counter-clockwise, respectively, or in different directions (this can be realized most easily!)*

Conclusion:

The universe cannot rotate clockwise and counterclockwise at the same time in order to explain the phenomena of the two buckets that rotate clockwise and counter-clockwise. Therefore our earth is a rotating one.

(Graph from www.timephysics.com)

Short remarks to an all-pervading dielectric aether

Any erroneously so-called inertial force is a proof for the existence of the aether. We would not see moonlight without a carrier of electromagnetic waves. It is unbelievable but some physicists claim that em. waves don't need a carrier because space itself vibrates...Space is a relation that don't possess the quality of waving...

Capacitors cannot function in vacuo. Note that electrical permittivity ϵ_0 of the aether has a certain value. Claims that this is a constant of the vacuum (= nothing) is wrong...

I - Undefined fundamental notions of mechanics:

- *Space and movement*
- *Force*
- *Quantitas materiae* (as Newton denoted it)

Quantitas materiae

In Engineering mechanics we are free to determine a mass unit. For example we could opt for 1 liter water as the unit of mass.

Since the time of Newton we know that matter consists of atoms. According to Dalton, Prout, Proust et al., i.e. according to stoichiometry all atoms comprise hydrogen atoms. – Prout's thesis in 1815 states *that an element with mass number A is a specific configuration of A hydrogen atoms*. Therefore the number of H-atoms (H-quanta) is identical with the so-called **mass number A**.

When we explain a reaction equation for atoms, we quantize the masses easily.

For example: $^{232}\text{Th} \Rightarrow ^{228}\text{Ra} + ^4\text{He}$: Mass of Th is 232 (H's), this mass value is conserved, therefore masses of Ra and He are together $228 + 4 = 232$ H's.

Regarding the above fission: Decaying Th atoms cause aether vibrations. But no mass disappears. Aether vibration is due to diminution of Th bonding energy and not due to mass-energy conversion.

Mass values are known according to stoichiometry. Mass values due to mass spectrometer measurements and related calculations are false, see below for explanation: *What does a mass spectrometer measure?*

Hydrogen atoms consists of of smaller components that possess positive and negative **charge**. Therefore instead of the undefined fundamental concept of mass we can set charge as undefined fundamental concept of mechanics.
So mass is quantized, but the nature of charge is unknown in detail.

The assumption that there are two masses, an inertial m_i one and a gravitational m_g one is irrefutable. The property of an atom with mass number A says that it consists of A hydrogen atoms. These hydrogen atoms don't possess inertial or gravitational qualities.

The erroneously so called inertial force is in fact the resistance \mathbf{R} of the all pervading dielectric aether on moving bodies.

For macrophysics $\mathbf{R} = m\mathbf{a}$ holds, where \mathbf{a} is acceleration.

Later it is shown that in microphysics the force R depends at least on m , \mathbf{a} , v^2 and the structural configuration of the hydrogen atoms of a specific atom.

Mass (= quantity of matter) cannot depend on velocity

$$m \neq m_0 \gamma, \quad \gamma = 1/\sqrt{1 - (v/c)^2} = c/\sqrt{c^2 - v^2}$$

The higher velocity the bigger a drag force. The interpretation that mass increases with velocity is impossible. Redoubling a drag force is not due to redoubling of atoms of the body. Not mass is dependent on velocity but drag force: $R = R(m, a, v)$

II - Defined notions

For modern science time is an undefined basic concept. But for

Aristotle time is defined: time is the duration of movement in space.

Therefore movement and space are undefined basic concepts. But spatial movement is also a temporal movement. So it is not justified to separate space and time. These concepts are combined ones. Basic concepts are space and movement.

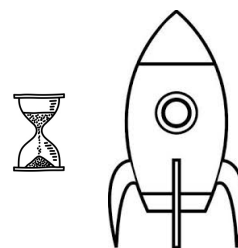
See the appendix on Piaget's Genetic Epistemology where he shows that space and movement are conceptually prior to time.

Aristotle declares that movements can be faster or slower, which time cannot. Time as the duration of movement, i.e. a measure, cannot itself be a flux with a velocity. Time is a relation and not a physical process.

Thinking about *time dilatation* is a *category mistake*. A measure cannot have a dilatation. Only a clockwork mechanism can change its periodicity due to physical circumstances.

Example sandglass in an accelerated rocket:

Sand runs in the rocket faster than in a sandglass at the earth's surface but time is not running faster. And biological processes of the astronaut don't run synchronously with the physical process inside the sandglass.



Energy is defined: $E = \int_1^2 \mathbf{F} \cdot d\mathbf{s}$

Energy is not a physical entity or a thing; it is a measure, a bookkeeping device when we require that energies of a process must be conserved. Thinking at energy lumps of magnitude hf is a category mistake: energy is not a thing that can be divided and energy is continuous.

(h = Planck's constant, f = frequency)

III – Axioms

Natural laws or law-sketches:

$\mathbf{F} \propto m\mathbf{a}$ is not the definition of force but a law-sketch that expresses that the force \mathbf{F} must overcome an aether resistance $\mathbf{R} = m\mathbf{a}$ in order to accelerate (\mathbf{a}) a body.

A natural science like mechanics cannot be based on a definition but on natural laws only!

The m in the law-sketch $\mathbf{F} \propto m\mathbf{a}$ is treated as an undefined basic concept. But to conceive the erroneously so called *inert mass* m as intrinsic quality of any body, namely to be lazy or capable of resisting a force, is untenable.

Recall that it is assumed that *the stage* for the body–force–interaction is vacuity! Bodies in vacuity cannot produce intrinsic inertial forces $m\mathbf{a}$.

The occurring inertial force $m\mathbf{a}$ (a misnomer) is an *experimentum crucis* for the existence of an aether or *vice versa* for the impossibility of a vacuum. This was Aristotle's argument against the possibility of a vacuum.

IV Dimensionality analysis

Force as undefined concept has the dimension $[F]$.

In classical mechanics mass has the dimension $[M]$ because mass was set as an undefined prime concept.

Force was erroneously assumed to be a defined (derived) concept according to $F \equiv ma$.

Therefore the dimension of force in classical mechanics is $F: [ML/T^2]$.

Force is a fundamental undefined concept, its dimension referred to as $[F]$. Concerning macrophysics, mass is the amount of matter (unit kg or tons).

But for microphysics we have the atom as unit.

Regarding axiomatic of mechanics, **mass m denotes quantity of matter (*quantitas materiae*)**

Building blocks of atoms are hydrogen atoms (Prout, Dalton), so we have absolute and relative masses of all elements: $H = 1$, $D = 2$ etc. Explanation below. Since we know that atoms consist of hydrogen and hydrogen consists of charges, we can treat charge q as fundamental undefined concept.

**V The meaning of mass: it is the quantity of matter.
Matter consists of atoms, atoms consist of charges.
Charge is the undefined basic concept of microphysics.**

In many articles the present author demonstrates that Prout was right in 1819, claiming that all atoms are made up of hydrogen. So, the unit of *quantitas materiae* may be hydrogen.

Carbon-12 has 12 hydrogen constituents. Mass number $A = 12$ is the quantity of matter for C-12 in microphysics. During motion through the all-pervasive cosmic medium a counter-force is exerted on atoms or macroscopic bodies.

In macrophysics we use the law sketch $\mathbf{F} \approx m \mathbf{a}$ where \mathbf{F} is a force that accelerates a body with mass m . Of course when \mathbf{F} is a force, in a force law the expression $m\mathbf{a}$ on the other side must also be a real force.

Actio = reactio means then that $\mathbf{F} = \mathbf{R}$ where $\mathbf{R} = m\mathbf{a}$ is a real resisting force due to a medium and not a *fictitious force*. (Scheinkraft in German.)

Aristotle argued that in an absolute vacuum (no fields in modern terms) a little force could accelerate a heavy body infinitely. So he concluded that an absolute vacuum does not exist.

And the reacting force $\mathbf{R} = m \mathbf{a}$ is the proof for the existence of a resistive medium, the aether.

The primordial ontological error of classical mechanics is the thesis that bodies move in a vacuum. Therefore no resisting force reacts against the accelerating force. Therefore classical mechanics claims that the body possesses an intrinsic capability of resisting any alteration of its state of constant velocity or rest.

The claim is therefore that $\mathbf{R} = m \mathbf{a}$ is not a real force, it is allegedly an “*apparent force*.” This force is selective: Velocity does not matter: For any velocity, the apparent force depends only on acceleration!

Example: acceleration from 0 to 100 m/s or from 10.000 to 10.100 m/s causes the same reactive force

$\mathbf{R} = m \mathbf{a}$. This seems to be plausible for low velocities.

So we define $\mathbf{F} \approx m \mathbf{a}$ as a law sketch in *macrophysics*.

According to this law, velocity remains constant whereas maintenance of uniform motion in a resisting medium is impossible.

In *microphysics* things change entirely:

Moving atoms or molecules cause resisting aether forces that depend not only on mass and acceleration but also on velocity and on the spatial structure of the atom.

This force function is unknown in detail but from the phenomena we can infer from what the force must depend...

Let me explain which kind of phenomena convinced me that the current doctrine of physics is essentially erroneous.

Take for example the mass of the molecule with the chemical formula CH_2N .

Its mass number is $A = 28$, that is the sum of *its* individual mass numbers.

CH_2N exists in two varieties or *isomers*, namely

Methyleneamino



or

Methyldyneammonium

A = 28	Isomere	MS (amu) C = 12.00
CH_2N	Methyleneamino	28.018724
CH_2N	Methyldyneammonium	28.018175

Evidently, varieties show a different layout, but the quantity of matter is the same, namely $A = 28$.

But currently accepted physics claims that the two isomers possess different “inertial masses”: 28,018724 vs. 28,018175. Why?

Chemical stoichiometry teaches that the quantity of matter (Newton’s *quantitas materiae*) is $A = 28$.

No experiment is necessary in order to determine the mass.

The masses of all elements are known: H = 1, D = 2, T = 3, He = 4 etc.

But experimental physicists present mass spectrometers that allegedly deliver other exact mass values.

I argue that the claim for different masses of isomers is an indication of a principal misunderstanding of the meaning of mass and of the damnation of the aether...

What does a mass spectrometer measure?

Take the *Time of Flight Mass Spectrometer (TFMS)*.

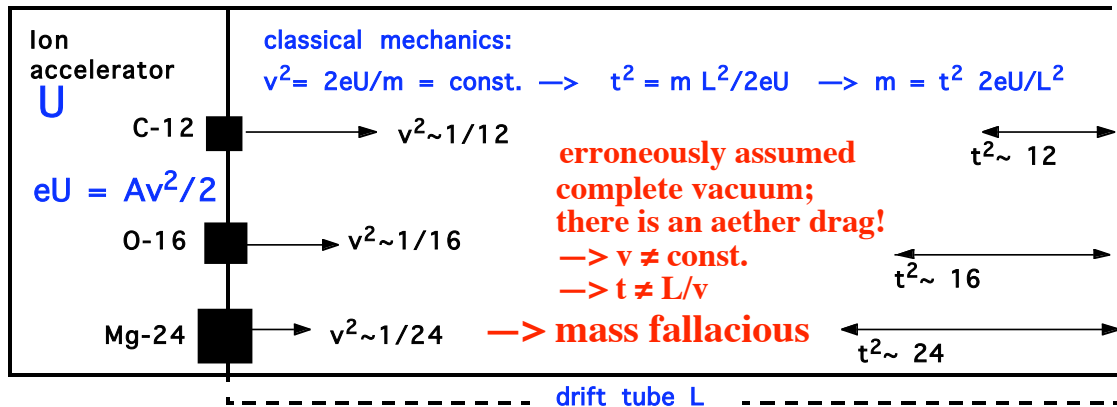
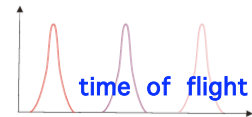
In order to measure the masses of the two isomers of CH_2N , the molecules must be ionized. Then ions get accelerated.

Velocity and time of flight:

$$\rightarrow v^2 = 2eU/m \quad \rightarrow t^2 = mL^2/2eU$$

From time of flight the calculated “mass” is $m = t^2 2eU/L^2$

Time of Flight Mass Spectrometer
Mass determination fallacious



Obviously, classical mechanics was applied. According to classical mechanics the molecules or atoms move through an absolute vacuum, so the velocities for equal masses are the same and remain *constant*.

Therefore calculated masses of isomers should be the same.

If the calculated masses differ in value, then times of flight differ necessarily!

If times of flight differ, then the method of classical mechanics was erroneous: velocities diminish!

Then the formula for mass is no longer valid, alleged “masses” are invalid and pointless!

Reverse (*argumentum e contrario*):

Decrease of velocities in the tube indicates a resisting medium that exerts a drag force on the molecules.

Like air drag it depends mainly on the spatial configuration of the two isomers in this case.

Furthermore consider the isobars Si and N₂, (A = 28), they cannot have different masses either!

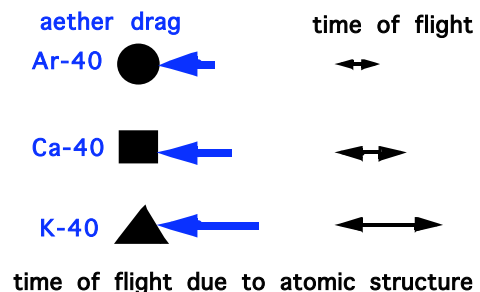
Or consider isobars Ca-40, Ar-40, K-40.

According to the current atomic nuclear model Ca-40 possesses 20 neutrons and 20 protons.

Ar-40 has 22 neutrons and 18 protons.

According to the current theory, neutrons are heavier than protons, Ar-40 should therefore be heavier than Ca-40.

The reverse is the case!



element A = 40	C = 12.00 scale.
Ar-40	39,962384
Ca-40	39.962589
K-40	39.964008

“Masses” of the isobars are pointless because times of flight are wrong.

Times of flight of isobars are different because of different spatial structures. An indication for different structures of Ar-40, Ca-40 and K-40 are different ionization potentials. (6,11; 15,8; 4,4 eV, respectively.)

A curiosity:

Stoichiometry made masses of all elements evident, namely the mass numbers A for H, He, etc. The A = 40 isobars Ar, Ca and K obviously have mass 40. 40 is the mass of neutral Ar, Ca and K atoms with mass number 40, this number is of interest only.

Physics is on the wrong track when for example a Ca-40 ion was sent across the drift tube in order to measure its flight of time and than to determine its fallacious “mass” that is a little smaller than 40.

It is out of all reason that physicists use this fallacious “mass” as the real mass instead of the A = 40, that is known for a long time... Example: In order to calculate the binding energy of neutral Ca-40, for the mass of Ca-40 the invalid number 39.962589 is applied...

In the article *No mass defect Δm*

there are further considerations concerning the meaning of mass:

Different scaled “mass” tables discredit current meaning of mass

Wrong “mass” of proton and electron according to reference mass C = 12.000

VI Theorems

Conservation laws

Classical mechanics states the maintenance of the velocity of a body in the presupposed vacuity. This means that momentum $p = mv$ is conserved. But there is no vacuity but a resisting medium.

Because for higher velocities the aether drag is $\mathbf{R} \propto \mathbf{R} (a, A, v^2)$, therefore there is **no** conservation of momentum. Maintenance of uniform motion in a resisting medium is impossible. Therefore angular momentum cannot be conserved either.

Pushing forces are necessary to initiate motion and conserve momentum and angular momentum!

Aristotle is right! He understood that a flying dart couldn't maintain its constant velocity even in a completely airless space without a pushing force. Medieval and modern physicists invented the false homeomorphisms *impetus* and *inertia* to explain the persistency of motion.

The only remaining conservation laws are:

Quantitas materiae must be conserved.

Energy must be conserved.
 Charge must be conserved.
 Charge and energy can neither be created nor annihilated.

VIX *Kinetic energy is not an innate property ($mv^2/2$) of a particle* moving in the vacuum but the work done to overpower the resistance $\mathbf{R} \propto ma$ of the all-pervasive electromagnetic medium:

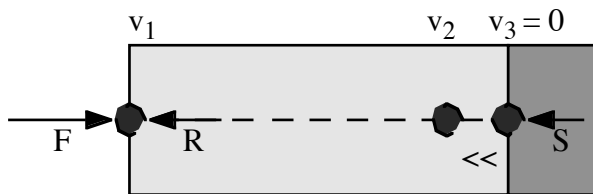
$E \approx m \Delta v^2/2$ if the resistance is $\mathbf{R} \propto ma$.

If the force is $F = ma\gamma^3$ ($\gamma = 1/[1 - (v/c)^2]^{1/2}$), one gets for the kinetic energy:

$$E = \int_0^v ma \gamma^3 ds = \dots = mc^2[\gamma - 1] = mc^2\gamma - mc^2$$

Current physics interprets the work done necessary to overpower the intrinsic inertial force of the body as *kinetic* energy. So, if the force overpowered this inertial resistance the work done is now *kinetic* energy that must have its seat of course inside of the body. This theory has no scruples about the reality of kinetic energy although it declared that inertial forces are not real ones but *apparent forces*...

In reality work must be done to overpower the resistance of a cosmic electromagnetic substratum. Only one part of the energy is stored as potential energy in the accelerated body, the other part appears now as radiation of the cosmic substratum (aether). The partition is a problem of electrodynamics.

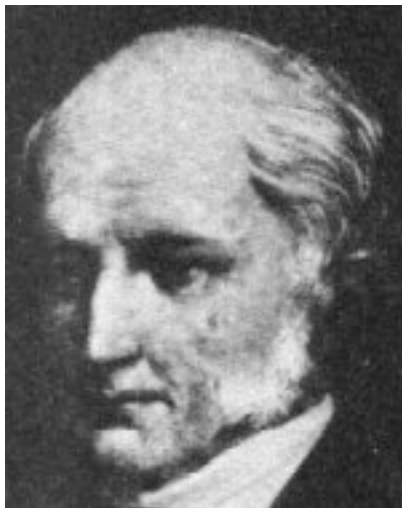


Example: Force F accelerates a body from v_1 to v_2 . The medium exerts a force R upon the body. The work of F done = $m\Delta v^2/2$. Regarding an inelastic impact ($v_3 = 0$), we obtain

$$m v_2 = \int S dt \text{ for force } S \text{ and } m v_2^2/2$$

for the energy of deceleration or impact.

Kinetic energy is a confusing misnomer. *Acceleration energy* or *deceleration energy* would be better. But naming is not necessary



Appendix I

Prout's idea that an element with mass number A is a specific configuration of A hydrogen atoms

C-12 consists of 12 hydrogen atoms.

This configuration of H's is stable. C-11 is a configuration of 11 hydrogen atoms.

This configuration is not a stable one.

It must undergo a trans-formation that is also a trans-position of the hydrogen building blocks.

This transformation occurs not in the void but in a dielectric medium that consists of e^+ and e^- .

The untenable quantum shell model of the atom is the base for the explanation of chemical bonding and the periodic table; therefore quantum physical chemistry is untenable.

Prout's thesis in 1815 that all elements are made up of hydrogen atoms is proved true. The dogmatic exclusion of chemical philosophy and therefore the prevention of a rational metaphysics are the cause for the long sleep of Prout's ingenious idea that the constituents of atoms are hydrogen atoms and that therefore the chemical equivalents in reactions and compounds are expressible by integer numbers.

Stoichiometry

shows that for example carbon, oxygen, and the two isotopes of chlorine consist of 12, 16, 35 and 37 hydrogen atoms, respectively. Constituents of all atoms are hydrogen atoms.

Isomers have the same number of hydrogen atoms but different structures.

After the discovery of the isotopes it should have been clear that common chlorine is a mixture of ^{37}Cl and ^{35}Cl (average 35.5) and that Prout was right. But the misunderstanding of 'atomic weights' (measured by mass spectrographs) prevented the insight that stoichiometry calculated the exact chemical ratios long ago.

Appendix II

Since Aristotle, time has been a defined notion

Piaget's genetic epistemology of time

Aristotle's definition of time as the duration of movement concerns the notion of time that we use in science. It is the interval between two events. Of course time has a second meaning: that of temporal order or a succession of events and present time, past, future,

Genetic epistemology shows that the notion of time is based on the undefined notions of movement (that includes speed) and space.

Piaget explains the intellectual construction of the concept of time:

So, in sum, genetic epistemology deals with both the formation and the meaning of knowledge.

... The fundamental hypothesis of genetic epistemology is that there is a parallelism between the progress made in the logical and rational organization of knowledge and the corresponding formative psychological processes... (During the) development of logical structures in children.

...I shall show that the notion of time and the notion of simultaneity are based on the notion of speed, which is a more primitive intuition.

Jean Piaget's *Genetic Epistemology*, Columbia University Press 1970, chapter 1, available under:

Press<http://www.marxists.org/reference/subject/philosophy/works/fr/piaget.htm>

Appendix III

INERTIA: THE ABSURD RESULT OF A GEDANKENEXPERIMENT

In mechanics the principle of inertia is the result of an erroneous thought experiment (*Gedankenexperiment*) The inventor of this thought experiment was Descartes, Euler perfected it and postulated it as one of the fundamental laws of mechanics.

The essence of the *Gedankenexperiment*:

First assumption: *Only one* body is moving *in vacuo*.

Second assumption:

Velocity is a *state* of the body like its shape, its hardness or its colour.

That is to say: velocity is absolute and belongs to the body and is therefore without any relationship to other bodies. In other words: velocity is an intrinsic property of the body.

First conclusion:

The state of velocity \mathbf{v} is persisting: $\mathbf{v} = \text{const.}$ Therefore, the motion continues in the present state of velocity, moving uniformly forward in a straight line. There is no sufficient reason for the body to change its state of velocity or its direction of movement.

Second conclusion:

Only an external force \mathbf{F} can disturb the body persisting in its inert state (or in its laziness) $\mathbf{v} = \text{const.}$, hence change this state. Without an accelerating or decelerating force \mathbf{F} , the velocity and therefore also the momentum $m\mathbf{v}$ of the body are preserved: $m\mathbf{v} = \text{const.}$ (m... mass).

One problem had to be solved by this doctrine:

Even the smallest force would accelerate the biggest mass infinitely because the body does not have any support in the vacuum. In order to get rid of this difficulty, a persisting state of velocity or momentum was invented.

One had to pretend that the body resists the external force owing to this capability of persistence.

But according to Euler the reaction of the disturbed inertial state of the body to the external force can't be a real force because the inanimate matter does not have an internal force reacting „out of“ the body.

The so-called force of inertia is only the consequence of the disturbance of the state of laziness or *inertia* by the external force.

Conclusion: In classical inertial mechanics the so-called force of inertia, namely the product mass times acceleration – $m\mathbf{a}$ – is an *apparent force* (*Scheinkraft*), not a real one.

Recall that Aristotle's argument against the possibility of a vacuum that in the case of vacuity the smallest force would accelerate the biggest body infinitely.

DYNAMICS WITHOUT FORCES?

A strong opposition against force as a primordial concept in physics came from the ideological battle of empiricism against metaphysics and especially against occult qualities. For example Schrödinger believed that positivism had banished the concept of

force, „*the most dangerous remains of animism...*“.

Another method to banish force was to introduce force only as „*auxiliary variable*“ (Kirchhoff, Mach and others) in order to simplify expressions.

IN CLASSICAL MECHANICS FORCE IS A DERIVED CONCEPT

In fact, in physics $\mathbf{F} = m\mathbf{a}$ was treated as the definition of „force“, therefore force is a *derived* or defined concept whereas mass is the *fundamental* concept.

That means that force has not a fundamental dimension [F] but only a derived one.

Hence, force is not a fundamental concept and not an *essence* of physics, but force is only a derived concept.

As a result of being in the wrong system, force does not have its own *dimension* like time [T], space [L] and mass [M], but force has a dimension according to its

definition $\mathbf{F} = m\mathbf{a} : [\text{ML}/\text{T}^2]$.

The persistence of this error in the axiomatic of physics is irrefutably proven by the commonly accepted *dimension* of force: $[\text{ML}/\text{T}^2]$.

VELOCITY IS A RELATIONSHIP AND NOT AN ABSOLUTE STATE OF A BODY

The physics of modern times turned against occult qualities. The pretended persisting state of velocity, and therefore of the momentum of a body in the vacuum, however, is exemplary of occultism.

Therefore, enlightenment against the darkness of erroneous metaphysics is necessary:

Firstly, thought experiments *in vacuo* (*nothing* by definition) cannot be carried out. Without nature no natural laws can be established.

Secondly, velocity is a relationship:

- relative velocity between bodies;
- relative velocity of the body with respect to the universe, this is the *real* velocity.

The expression *absolute velocity*, meaning the velocity with respect to the universe is misleading because every velocity is *relative*. But as *façon de parler* „absolute velocity“ may be tolerated.

The universe is *absolute*. The universe as a whole is *immobile*. *Internal* motion is an essential quality of the universe. A body as part of the universe does not move uniformly on a straight line.

Natural motion occurs on continuous curves with continuously changing velocity.

Motion is always relative, a two place relation.

There must be a reference body, too.

Thus, velocity cannot be an (absolute) *state* of *one* body.

Therefore, the principle of inertia is based on a category mistake.

Thus, neither velocity nor momentum and kinetic energy are *states* or properties of *one* moving body.

The alleged natural law for the conservation of momentum in the absence of forces, $m\mathbf{v} = \text{const.}$, is *science fiction* based on a *Gedankenexperiment*.

In a *plenum* of anisotropic force fields neither conservation of momentum nor acceleration on a straight line are possible.

Appendix IV

The electrodynamic origin of „inertial“ forces

The present author interprets the so-called inertial forces as drag forces due to movements in a dielectric aether in terms of acceleration, velocity, radius (distance) and charge of a body $\mathbf{F} = \mathbf{m} \mathbf{f}(\mathbf{A}, \mathbf{V}, \mathbf{R}, \mathbf{q})$

For comparison we cite here the opinion of
Charles W. Lucas, Jr.:

The Electrodynamic Origin of the Force of Inertia ($F = m_i a$)

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From Lucas' summary of part 3:

A new classical electrodynamic inertial force law was derived from a local contact type universal electrodynamic force law for finite size particles. In this force law mass is not a fundamental quantity of nature, but merely a common grouping of electromagnetic factors. The first acceleration term of the electrodynamic force, of order β^2 , gives rise to Newton's second law for non-relativistic velocities. The second term, of order β^4 , is a new non-radial $\mathbf{R} \times (\mathbf{R} \times \mathbf{A})$ term that gives rise to a corkscrew type of spiraling inertial motion. The strength of the second term is normally much less than that of the first due to the $A^2 \omega^2 / Rc^4$ factor.

The second term, however, can be quite large for fast spinning large gyroscopes where $A^2 \omega^2 / Rc^4$ gets large and causes unexpected behavior as publicly demonstrated by Eric Laithwaite. (<http://gyroscopes.org/1974lecture.asp>.)

This derived law of inertia appears to be superior to both Newton's Law of Inertia ($\mathbf{F} = m\mathbf{a}$) and Einstein's field equations of General Relativity Theory, because

- (1) it is properly based on local contact forces instead of unphysical action-at-a-distance forces,*
- (2) it is based on forces between finite-size particles instead of imaginary point particles,*
- (3) it is based on relative coordinates instead of fictitious absolute space coordinates,*
- (4) it is derived from a universal force law,*
- (5) it explains the centrifugal force as a piece of the inertial force,*
- (6) it is simpler and does not need mass as a fundamental quantity,*
- (7) it explains the apparent equivalence of gravitational and inertial mass,*
- (8) it contains a second non-radial $\mathbf{R} \times (\mathbf{R} \times \mathbf{A})$ term that describes additional observed phenomena not previously explained, and*
- (9) it contains relativistic type v/c corrections for high velocity.*

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