

A LOGICAL PHYSICAL THEORY

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Abstract: Logical development of physical theories is hindered by a lack of rational mechanisms of interactions between material bodies. This has led to many illogical assumptions. The concept currently used to facilitate interactions between material bodies—the 'action at a distance through empty space'—has no mechanism of action. Vague forms of fields and aether, which are also in use, suffer lack of logical structure or mechanisms of action. Until these are replaced by a concept of a rational as well as a real entity to facilitate as a medium between the material bodies, the development of physical theories will continue to become more and more irrational. Matter is the only real entity in the universe. Hence, it is logical to expect the matter to provide structured material bodies as well as a universal medium that interlinks all material bodies in nature. Matter itself has to be in the form of an infinite number of basic matter particles. A logical theory based on only one type of postulated matter particle will lead to the development of an ideal universal medium. This universal medium should be able to account for all physical phenomena in nature, under the same rules and under all conditions.

'Ultimate possibility in physics' is a theory that can logically explain all physical phenomena by using the same fundamental laws under all conditions. However, the current situation delays the advent of such a possibility. The blame for the delay rests upon both conventional and non-conventional physicists.

Conventional physicists refuse to give up many illogical assumptions and numerous imaginary particles currently used in orthodox physics. Every new line of thought, not based on current assumptions, is discouraged. New concepts are developed in such a way as not to injure old beliefs but at a cost of becoming illogical and thereby increasing the confusion. In this process, modern mathematics provides great help.

In formal or abstract logic that is used in mathematics, we have the advantage of being able to decide whether a reasoning is valid without being psychologically influenced by statements. Notations given in the mathematics have no specific meanings. They may be given many different meanings. When the arguments are exhibited in their skeleton form in the notations in equations, it becomes much easier to tell good reasoning from bad one. In this form, they are just 'propositional functions'. However, conclusions reached in mathematical treatments cannot be considered assertions until meanings are assigned to the notations used in them. Only then do they become proper 'propositions'. The resulting statements may be true, false, or nonsense.

Consequently, similar conclusions reached mathematically (using propositional functions) in two sets of arguments do not guarantee similar conclusions when propositions are used. Those who insist on mathematical conformity as the sole criteria for a good theory often overlook this fact.

On the other hand, non-conventional scientists (who work outside the establishment) focus their theories only on one or a few aspects. Even when their theories seem to satisfy certain aspects of one phenomenon, they may not do so about other physical phenomena. As most of these scientists have thorough prior training in conventional wisdom, they fail to give up many of the misconceptions currently used in physics.

Both groups of scientists conveniently forget to address the basic problem and engage their time on major aspects of physical theories. It is doubtful if there are many who understand the very basic nature of fundamental aspects like matter, energy, force, inertia, etc. Any theory, developed without considering these fundamental aspects, can be at the very least provisional and related to certain phenomena only. Such theories, developed in the past, were based on the knowledge and circumstances prevailing at the time of their development. When judging them with respect to current knowledge, inconsistencies are bound to appear.

A person developing a logical theory should be prepared to make concessions on his beliefs on fundamental truths, held sacred by conventional physics. Logical development of a chain of reasoning should be the only guide. Strict adherence to cause-and-effect relations is essential to making a theory logical.

An ultimate theory that logically explains all physical phenomena related to matter needs not remain a dream. Once the fundamental aspects of physical theory are defined, its logical development is sure to lead us to a theory that covers all physical phenomena. The aim of such a theory is to supply logical and comprehensive explanations suitable for all occasions for different behaviours and properties of all physical entities. It has to have certain initial postulations. A physical theory should be based on a concept that is simple enough to be conveyed in plain language. Use of complicated mathematics will be required only in comprehensive study of any particular phenomenon. 'Cause and effect relation' should be strictly maintained in all explanations.

Science explains most of the observed physical phenomena in the universe. Some of the explanations vary in different contexts. There are some phenomena that do not have satisfactory explanations. Many of the observed phenomena are explained on assumed fundamentals, and the basic reasons for such explanations are not made clear. A logical physical theory should explain all physical entities and their actions in all forms, including their very basic nature. It should give simple and satisfactory explanations for every physical phenomenon observed in nature.

No abstract logical system can work on many basic assumptions. If a system has more than a few basic assumptions, its chain of reasoning will no longer be logical. The fewer the initial assumptions, the more logical the system will be. For this reason, the number of entities postulated in a comprehensive theory should be kept to a minimum, preferably to only one. This entity should have a definite nature, structure, and properties to account for all diverse phenomena observed in nature. By postulating an ideal fundamental entity, it will be possible to develop a concept to explain all physical phenomena. Characteristic properties of the postulated basic entity should be carefully chosen so that it can fulfil its role in the development of a comprehensive theory. If such a concept can provide reasonable and logical explanations, it should be given a chance to be judged by learnt physicists.

All diverse substances in the universe are essentially made from the same basic material and

in a similar manner. They should all be (basically) identical and obey the same basic laws under all conditions. It is illogical to assume the occurrences of singularities and different applications of the same laws, depending on the parameters of an entity (different at microscopic and macroscopic scales). Nature is simple and logical. Therefore, all physical laws operating in the process of creation and apparent interactions of physical entities should also be simple and logical. Complicated or illogical physical laws are unnatural. Irrational assumptions and mysterious forces or their (apparent) actions are unreasonable. Fundamental laws of physics should hold true under all conditions. Most of the present-day theories in physics are developed from observation of material objects and their apparent interactions in nature. These theories attempt to construe and explain observed phenomena, separately or in separate groups.

Physics is the science of material objects and their interactions, as observed by us, the rational beings. Rational beings consider only those entities that have substance in three-dimensional space as real. Rational beings' sensory organs perceive real entities. Those entities without material existence but whose actions may be visualised by the rational beings are the functional entities. Actions of functional entities are not tangible in space. Functional entities fulfil the functions assigned to them by rational beings.

We, the rational beings, live and operate in a three-dimensional world (space). For our convenience, we divided the space around us by three mutually perpendicular planes to create our three-dimensional space system. Space, a functional entity, is presupposed by rational beings whenever they envisage real entities. Space provides a place for real entities to exist. It comes into being only because rational beings consider a real entity needs to exist within another entity, outside itself. The presence of space is conditional on the existence of real entities. Space has no other function. Space has no form, structure, or any real existence. It is not right to consider that space can deform, curve, shrink, or expand.

All real entities have substance and existence in space. To exist in space, an entity has to be made up of real matter. Matter, as we know it today, is a fact of our observation. It is the real substance we actually come across in everyday life. Rational beings' sensory organs can physically perceive matter. There is nothing virtual or imaginary about the matter. It has to be identical under various situations and various places in nature. It cannot exhibit different fundamental properties under different conditions.

Matter is defined as the *"material substance that constitutes the observable universe and, together with energy, forms the basis of all objective phenomena"* (Encyclopaedia Britannica). Matter is a specialised entity associated with energy and has attributes of mass and real existence in space and time. By definition, matter provides substance to an entity to make it real. Matter has real existence in space, and it provides substance to all real entities. The matter content of real entities gives them material presence in space. It gives an entity its sense of objective reality. Matter has its positive existence in space, even if it is closeted in a cupboard beyond the perception of rational beings. Since matter alone can provide substance, matter is the only real entity. Matter being the only real entity, it should be able to provide everything else in the universe. A three-dimensional real entity, by its definition, contains matter. Therefore, it is not right to assume virtual or massless (meaning matter-less) three-dimensional entities and their part in any interactions. All real entities are made up of matter.

In physics, energy is defined as *"the capacity for doing work"* (Encyclopaedia Britannica). The capacity of an entity is one of its qualifications or attributes. Energy is the quality of a certain entity that helps it to do work or to act. Since energy is a quality, it has no material existence in space. Energy has no substance, and it cannot occupy space. Hence, it cannot be a real entity. A

qualification cannot do work. Energy neither can act nor be acted upon. In the course of our observations, we may visualise it. A qualification can only be a functional entity. Hence, by definition, energy is a functional entity. Being a functional entity, energy can neither perform work nor can it be transferred from one body (one part of a body) to another body (to another part of the same body). A functional entity fulfils the meanings assigned to it by rational beings, but it cannot perform physical actions. It is not right to classify energy into many different types, according to the phenomenon with which it is associated. Energy has but one property. It will be the same in all phenomena.

Matter provides a real entity with its substance. It has physical presence in space. According to external conditions, it may change its form, shape, or other parameters. Effort or the capacity to do work is the energy. Energy has no physical presence. It does not occupy space. It has no form, shape, or other parameters. Hence, matter and energy have to be distinctly separate entities. Matter being a real entity and energy being a functional entity, neither of them could be converted or reverted to the other.

Macro-matter bodies can be divided into many smaller parts. Even atoms of elements are made up of different but smaller fundamental particles. There are many types of fundamental particles, which exhibit diverse characteristic properties. They are all made of material bodies and hence are made up of matter particles. Basically, all matter particles should be identical and fundamental to nature. It is essential that these basic matter particles constitute all other material bodies in nature. Assumption of different types of matter particles will defeat the aim of the concept. Since there can be only one type of matter particle in nature, it should be their relative arrangements within different fundamental particles (and other bodies), which cause diverse properties in them. The same type of basic matter particles, structured differently, should make fundamental particles or superior matter bodies with different properties.

All basic matter particles should have identical and definite structure and properties, required to form all other superior matter bodies. Superior matter bodies, which we come across in nature, have to be developed through various steps of conversions of the 'basic matter particles' (without any changes to their fundamental nature) and their associations into more and more complicated and self-sustaining objects. These self-sustaining objects should be made from the same type of basic matter particles and in a similar manner. Depending on the structure of their formation, they could exhibit diverse properties and apparently interact with each other in different ways, as observed by us.

To form superior bodies, the basic matter particles (or fundamental particles) have to form unions or groups. This will require interactions between them. An action by or on a matter particle should affect another independent matter particle. Physical actions cannot be transferred, or physical interactions cannot take place through empty space between the participating matter particles (bodies). Other than to provide substance to a body, matter cannot have the ability to interact through empty space. In order to interact, material bodies have to have certain mechanical connections between them. (Apparent) interaction between two material bodies requires a link between them. This can be provided only by a medium in which both the material bodies exist. Hence, it is only logical to conclude that there has to be another entity (a medium) that provides physical continuity from one material body to another.

Everyone agrees to the fact that natural forces between two material bodies (apparently) act on them. How or why this action takes place is not well recognized. The mysterious property of 'action at a distance' is envisaged (attributed to the functional entity of force) so that each of the material bodies can act on the other through empty space between them. By doing so, not only

the mathematical relation, called force, is given all the status of a real entity, but also a mysterious ability to act through empty space (without any logical mechanism) is attributed to the force. The whole of our physical science presently rests on this illogical assumption. The only logical thing is to accept that there is a medium between and around two (apparently) interacting material bodies, and one body's action affects the other through this medium. A change in the structure of the medium could cause the material bodies to move away from each other (repel) or move towards each other (attract). Such a medium can replace the ambiguous aether proposed in other aether theories and vague forms of fields in field theories.

In order to transfer an action from one material body to another, the medium has to provide physical continuity between them. To provide a physical link, the medium also has to be a real entity. That is, it should occupy space and has to have substance. Since there is no real entity other than matter, this medium also has to be made up of matter. As material bodies could exist in any part of space, in order to facilitate direct interaction between material bodies, the medium has to fill the entire space. Developing a universal medium to facilitate (apparent) interactions between material bodies will avoid the assumption of 'action at a distance through empty space', used in current physical theories.

If the universal medium is made up of real matter, it would be observable by us. Since the universal medium is not observable in nature, it has to be made up of real matter in an unobservable state. Only when we can observe it in its three-dimensional state do we consider matter to be real. Nevertheless, the matter particles constituting the universal medium will have to remain hidden from us. This could be possible only if the matter particles have the ability to change between functional and real states of existence. Since we consider only the three-dimensional state of matter as real, a matter particle in its two-dimensional or single-dimensional state could be considered a functional entity. If a natural mechanism (by logical actions) can cause changes in the real or functional states of basic matter particles, it will not cause ambiguity in the reality of matter. Depending on various factors about the matter particle, it could be in any spatial-dimensional state. In their one-dimensional state, basic matter particles would exist along straight lines. In their two-dimensional state, they would exist in a plane. In their three-dimensional state, they would exist in a volumetric space. Unlike other functional entities, in all these cases, they will have a positive existence in space. The thickness of a two-dimensional matter particle and the breadth and thickness of a one-dimensional matter particle will not be zero. They will be too small to be measured by our standards.

Basic matter particles, in their functional states, could constitute the universal medium, in which all real material bodies of higher spatial dimensions exist. A universal medium has to have definite structure, constituents, and properties. It has to be constituted by basic matter particles, which do not attain their status of 'real bodies' in three-dimensional space. Such a medium and its constituent matter particles have to fill the entire space so that it engulfs all three-dimensional material bodies in nature. Since this universal medium fills the entire space, it could replace the formless and structureless space or vague forms of fields in current theories.

Since matter needs energy to act and, at the same time, energy is entirely different from matter, energy associated with a material body has to be stored outside real material bodies. A universal medium around a material body can provide a place to store the energy associated with a material body. Energy stored in the universal medium about a material body could cause all actions attributed to that body. As the energy is not a real entity, it cannot be stored in tangible form, even in the universal medium. If the universal medium has an inherently stable structure of basic matter particles (in their functional state), distorting the medium in a region would produce

a reaction in it. Reaction in the medium tends to restore the universal medium's stability. In order to produce a reaction, a distorted region of the universal medium has to be under stress. This stress could be the energy stored in the medium around and about a material body. Structural distortions in the universal medium about a material body would then represent the work associated with the material body.

All real material bodies should exist within the universal medium. Real matter will be inert without actions on it by the surrounding medium. Displacement of a material body will be the action of the universal medium. Although a material body is moved with respect to the universal medium (on a larger scale), the universal medium will be the agency that moves the material body. Hence, there will be no friction or drag on the material bodies during their motion, in or through the universal medium. During their motion in space, there will be a relative displacement between the material body and the larger extent of the universal medium. A larger extent of the universal medium could act as an absolute reference for all actions.

The universal medium will be a structured entity. Its constituent parts will have a limitation on their magnitude and speed of movements. This limitation sets a limit on the highest speed at which a material body can be moved by the universal medium. If the universal medium tries to move a material body at higher speeds, the medium may breakdown. This highest speed will be constant, depending on the nature of the universal medium. Corpuscles of light, which are made up of real matter, could be moved only at the highest possible linear speed through the universal medium. This will endow light with its critical constant linear speed.

Movements of material bodies are the result of work done in and about them. Varying the amount of work done (e.g., linear velocity) about a material body does not, normally, affect the structure of its constituent matter particles. Therefore, work done about a material body could not exist within its matter particles. Since the work done controls the actions of matter particles, it should exist in close proximity of (but outside) the matter particles of a macrobody. This is possible only if the work is stored in the universal medium in and around the macrobody. In order to do this, the universal medium has to alter its structure. An alteration in an inherently stable system is its structural distortion. Hence, the work stored in the universal medium could only be in the form of structural distortions in it.

In physics, work is defined as '*the measure of energy transfer that occurs when an object is moved over a distance by an external force, at least part of which is applied in the direction of the displacement*' (Encyclopaedia Britannica). Energy being the stress in the universal medium, it could be produced by structural distortions in it. Energy will then be transferred along with the structural distortions in the universal medium. Since a functional entity cannot produce an action, the ability to do work could not originate from the energy. Ability to do work has to have its origin elsewhere.

An action is the development of work in or about a body. Work done about a material body, in the form of mechanical structural distortions of the universal medium, has to be a real entity. The magnitude of work could be the magnitude of structural distortions in the medium. Since the universal medium is structured by real matter particles, its structural distortion constitutes displacements of real entities. Thus, the work done about a body will be a real entity. Work will have material presence about a material body. Work stored about a body will sustain the body's integrity and its constant linear velocity.

Since the movement of material bodies is accomplished by work stored in the universal medium, all properties of motion currently assigned to material bodies will become the properties

of the universal medium. The phenomenon of inertia being a property of motion will be a property of the universal medium. Work in and about a material body may develop within the region of the body, or it being a real entity, it could be transferred into the region of the body from outside. As long as the work in and about a material body remains steady, the body will continue to move at a constant linear speed. The rate of change of work in and about a body produces the body's acceleration or deceleration. The mathematical relation between the mass of a material body and its acceleration is a functional entity called 'force'.

In general, a force means power, strength, influence, or an agency capable of acting. It may also be understood in many other forms, derived from these meanings. These meanings give the force, the characters of an independent entity, which may perform an act. Effects of a physical act are observable and tangible in space. An entity that can cause tangible effects has to be a real entity. Since a force has no material existence in space, it cannot be a real entity. Force has no material existence, but its actions, though intangible, may be visualised by rational beings. Therefore, force, in any form, is a functional entity.

In mechanics, the 'force' is not very clearly defined. It is understood by the actions related to it. Force is generally understood as *'any action that tends to maintain or alter the position of a body or to distort it'*. Nevertheless, a force being a functional entity, it will not be able to act. A force could be recognized only by the actions associated with it. That is, a force comes into existence only when there is an action. Even an attempt or application of an effort cannot create a force. Force is a relation between the mass of a material body and its acceleration. The mass of a body is also defined from this relation by circular logic. If there is no action, by an effort, the force will not exist. A force being a mathematical relation, different types of forces cannot exist in nature. Whatever phenomenon produces them, all natural forces and their mechanisms of action have to be identical. Hence, there is no meaning in diversifying natural forces according to the phenomena producing them and then trying to unify them mathematically. There are no different types of forces. All forces and mechanisms of their actions are similar in all respects, other than the phenomena associated with them.

In order to sustain the universe in its current state, an infinite number of basic matter particles is required to exist in nature. They should constitute the universal medium that fills the entire space and form all three-dimensional material bodies in the universe. Interlinking matter particles of the universal medium should form a stable system. A real material body existing in the universal medium and made up of converted-real matter particles will create instability in the universal medium. Unstable universal medium could regain its stability only as and when it can get rid of the real material body out of itself. For this, the universal medium should have a mechanism to push away a real material body to move it at the highest possible linear speed from its current location in an attempt to get rid of it. Such a phenomenon will initiate other phenomena like gravitation, constant speed of light, etc.

Universal medium: storing the work associated with material bodies will be able to produce functional entities like energy, natural forces, etc. It could also account for the apparent interactions between material bodies. It will be the originator of all physical phenomena. It will create, sustain, and destroy three-dimensional matter with appropriate mechanisms under suitable conditions. It will develop primary matter particles, fundamental matter particles, and superior material bodies and regulate all their actions and apparent interactions. Having a universal medium, made up of matter particles, could provide us with an entity that stores all other entities in it and initiates and controls all activities in nature. The universal medium will control the development and nature of all physical phenomena, which is much easier and more

logical to explain. Hence, I believe, a logical and acceptable theory on a universal medium will be the ultimate possibility in physics.

If anyone is interested in a humble attempt along the lines described above by the author of this article, he/she may kindly refer to the book 'MATTER (Re-examined)'. It is a revolutionary new concept that explains all physical phenomena related to matter based on just one type of fundamental particle — the quantum of matter. These particles form 2D energy fields. Space is filled with an infinite number of 2D energy fields, extending in all directions. 2D energy fields in all possible planes in the space together form a universal medium. A wide array of physical phenomena, from the origin of 3D matter to gravity and subatomic interactions to cosmological events, are explained on the basis of simple mechanical interactions of quanta of matter. There is no more need to envisage actions at a distance or to invoke irrational assumptions like diversity of forces, mass-energy equivalence, constancy of light's speed, dual nature of electric charge, singularities, big bang, etc. This new concept will radically alter our understanding of the physical universe and, at the same time, explain complex physical phenomena with a simple 'cause and effect relationship'.



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