

Basic Principles of Generic Motions as Holistic Entities in Physics

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Abstract: We propose some basic principles for a new kind of dynamics. We start with modification of the most elementary notion in physics by assuming that the absolutely arbitrary Motion is a paradigm of uninfluenced physical state instead of the rest state. Such Motion can turn into a usual motion only by the influence of a multitude of various Constraints. Interactions among Motions through various Motion Contacts and Motion Connections establish the foundation of the emerging Space-Time and matter particles. Constraints are utterly responsible for appearance of deterministic physical effects.

- 1. Motions.** Rest state cannot be a paradigm of elementary (uninfluenced) physical state, because it is a relative notion dependent on the point of view, as well is the case with a uniform motion, or generally with any continuous motion. Therefore, the paradigm of the uninfluenced physical state must be an *elementary motion*, which can be only a *discontinuous and absolutely arbitrary motion* – a totally unhindered random motion with indefinite degrees of freedom, where arbitrariness appears primarily as a kind of *omnipresence*.

Our *generic Motion* is every individual motion *defined by entirety of the persistent overall characteristics* of the Motion; we disregard all the transient and volatile characteristics, such as positions or trajectories. Generic Motion is a *holistic physical entity* and source of every possible physical change or process. We assume that all the physical properties and all the physical phenomena are established only by holistic "dynamic part" of Motions and various interactions among them. Rudimentary consequence of this assumption is that presupposed elementary object in Motion, participating in elementary Motion, ought to be a *propertyless* (even dimensionless) *particle-like object*.

- 2. Constraints.** Every influence on a Motion, which somehow reduces arbitrariness of that Motion, is a *Constrain*. Generally, *every individual Motion is Constrained* through some interactions with all the other Motions. Therefore, a Constraint either exists, as an *omnipresent* occurrence or it doesn't exist at all. We presume existence of an axiomatic system of *elementary Motions*, which is a *Primordial Motion System*. There is present only one most elementary *Primordial Constraint*, which merely provides persistent distinction among all the identical Primordial Motions, by preserving *individuation of each Motion*.

Primordial Motion, as *absolutely arbitrary individual motion*, can be "tamed" only by some Constraints needed to considerably *reduce degrees of freedom*. To eventually achieve a well-known continuous motion it is necessary a multitude of firm Constraints. However, even the vast (but finite) number of Constraints *cannot eradicate intrinsic arbitrariness*; a kind of *omnipresence is an unavoidable persistent share* of every Motion. Only hypothetically infinite number of Constraints could "kill" intrinsic arbitrariness, but then there would be no motion at all and our universe would be completely "frozen".

- 3. Substantial Motions.** Every individual Motion, which has a *substantial property* of *susceptibility for interaction* with other such Motions, is a *Substantial Motion*. Emergence of interactions among Substantial Motions, primarily through the *omnipresent Synkinesis* (concurrency), results in the presence of *Substantial Constraint*. Thus we are getting a subsystem of Substantial Motions, with established *collective synergy* that achieves mutual attraction; at the system level it appears as a kind of universal convergence, and accordingly the Substantial Constraint besides Constraining individual Motions keeps them gathered. Such subsystem of Substantial Motions is a precursor of the existence of physical matter.

Here we have to emphasize the key difference between two species of Constrains exerting influence on Substantial Motions. Substantial Constraint belongs to *Universal Constraints*, because it affects equally all the Substantial Motions, no matter what specific properties pertain to those Motions. Every other Constraint is influent upon all the Substantial Motions, but its effects depend on specific properties and values pertaining to each Substantial Motion, therefore such a Constraint belongs to *Specific Constraints*.

- 4. Motion Contacts.** Due to Substantial Constraint the Substantial Motions can be entangled in particular interactions called *Motion Contacts*, where Motions experience strong Synkinesis, which is a reason for essential *Separation Constraint* (actually ensemble of two Constraints): Substantial Motions involved in one actual Contact cannot take part in any other Contact, as far as they are involved in actual Contact (*Separation of Motions*); consequently, all the Contacts are as well mutually separated (*Separation of Contacts*).

Separation Constraint establishes *dynamical localizations* of Motion Contacts, thus enabling establishment of *physically measurable* Space-Time and the origination of physical matter. Separation of Motions dynamically creates *localized counterbalances* to ubiquitous mutual attraction; at the system level it appears as a kind of uneven adaptable compressibility. Separation of Contacts establishes some *intervals among Contacts* in space and time; since these intervals are *jointly originated* by Motions, the more correct notion is obviously a '*Space-Time*' interval. In environment with established Space-Time, Synkinesis predictably appears as a kind of Synchronization, and under some conditions it appears as Resonance.

Motion Contacts have another very important outcome: during volatile Contacts it can happen exchange of properties and/or values pertained to entangled Motions, as well happen creations of some new volatile Substantial 'properties' and 'values', occurred by pure chance. Unstable volatile Contacts are the source of elemental random noises and fluctuations, which cannot be controlled; for instance, to suppress them or somehow to use them. Those Substantial 'properties' and 'values' whose occurrences are highly repetitive and uniformly present throughout the subsystem of Substantial Motions can establish proper Specific Constraints, acting as conservant factors to those volatile 'properties' and 'values'. In that way they become persistent properties and values, stably integrated into appropriate Substantial Motions. Therefore, environment with high repetitiveness and uniform presence of appropriate Substantial Motions is a necessity for conservations of physical properties and values, as well is a prerequisite for any kind of physical symmetry.

5. Motion Connections. Strong Synkinesis during Motion Contacts enables localized recurrences, with regular cyclic iterations. Extended Motion Contacts, with *persistent cyclic iterations*, are *Motion Connections*. They are the "building blocks" of elementary matter particles, which cannot be definitely localized because of the unavoidable omnipresent shares of all the involved Motions. Additionally, the structure of these cyclic iterations defines the correspondent physical properties and their capacity to accumulate certain amount of Motion Quantity, whose one part is completely persistent and the other part is available to be exchanged with other Motion Connections over mutually Synchronized cyclic iterations. Motion Connections can be further commonly Connected; in the case of *persistent Connections* they can form complex Motion Compounds, which can be combined into composite physical objects and systems with extreme complexity.

6. Restrictions. Specific Constraints applicable to localized Motion Connections and Motion Compounds are *Restrictions*. These kinds of Specific Constraints are *exclusively effective* on *localized* Motion Connections and their composites, without any influence on nonlocalized shares of the Motion Connections. Restrictions originate all the physical invariances in relation with all the physical interactions; it is especially true for all the conservation laws, selection rules, and classifications, which are related to correspondent physical symmetries. Nothing else but *totality of Constraints*, with exceptional contribution of the *Restrictions*, makes possible the "grand entrance" of *determinism in physics*.

Multitudes of appearance of identical Motion Connections are responsible for the emergence of ample repetitiveness, forming various uniform structures, which appear as correspondent physical symmetries. Our firm attitude is that symmetries in mathematical physics cannot emerge without the presence of coherent physical symmetries; if there is any kind of incoherent mathematical model, it must be irrelevant to physics.

7. History. Motion paradigm as a foundation of ever-changing world is a very old idea. The classical aphorism "Panta Rhei", a metaphor for "All things change", is a succinct phrase from the full statement of ancient Greek philosopher Heraclitus (about 535 – 475 BC) translated as "*All things are at motion and nothing remains still*". Then, after many centuries, extensive efforts in establishing physics based on kinetic origin and on the Gauss' principle of least constraint, was done by Heinrich Rudolf Hertz in "The Principles of Mechanics – Presented in a New Form" (published firstly 1894).

Idea of conservation of physical properties and some quantities is also very old. The idea in ancient Greek philosophy was that "Nothing comes from nothing". An explicit statement of this, along with the further principle that nothing can pass away into nothing, is found in Empedocles (approx. 490–430 BC): "nothing comes to be or perishes". Yet again, after many centuries, experimental discoveries were made by several scientists: conservation of mass primarily by Antoine Lavoisier (18th century) and conservation of energy primarily by James Prescott Joule (19th century). The first theoretical contribution to basic understanding of the conservation of energy was done by Gottfried Wilhelm Leibniz (17th/18th century). Finding of the correspondent symmetries came much later, firstly as a surprise and only afterward with recognition of their significance in understanding of some very important invariances.

- a. **Instead of Conclusion.** In the entirety of experimental and theoretical Physics, it is a well-known fact that in many cases (especially in Quantum Physics) the initial conditions, or generally the boundary conditions, can exert greater influence on the final physical results than the encompassed physical processes. The 'boundary conditions' are obviously proper representatives of particular Restrictions.

Anyway, there is perhaps a lack of awareness that we have everyday experience with some rough examples of generic Motions and Constraints. A very simple raw example: If we have to drive a car from point A to point B, the crucial property of this generic Motion is the arrival at point B, regardless the specific details of possible trajectories, determined by expected and unexpected particular specific constraints (available roads and streets; possible obstacles; jammed traffic etc.).

As a rule, empirical revelation of many physical effects, properties, and phenomena, almost always comes before the creation of proper mathematical models that include such notions. It seems that the current mathematical methods, as far as we know, are not suitable to establish a non-trivial effective formalism based on here presented approach to physical properties and phenomena. For the time being, we are anyhow confined to available mathematical methods in physics as our valuable tools, especially those with proven applicability. However, we need to be aware that these methods are only more or less approximate partial models, incongruous to improve the comprehension of incredible complexity of Nature. We timely got a proper warning by Kurt Gödel (the Incompleteness Theorem), and also by Stephen Hawking ("Gödel and the end of physics").

Our intention in writing this article was not to develop a new TOE or to find a simpler or better explanation for some open issues in physics. The intention was to find the most consistent basic principles required for the more profound understanding of physics and through their implementation in accomplishing a broader coherent picture of Nature. Presented approach is rather essential and contrastive to the present scientific paradigms; evidently, it is not in accordance with famous principle of "Ockham's razor", whose simplicity and easiness of application were always intriguing. In presentation of such an abstract theme the utilization of deduction logics has been unavoidable. The usage of unusual terminology and unusual usage of customary terminology were inevitable. Presented concept is given in a very short and oversimplified manner, with only one aim: to suggest an innovative concept for a *more comprehensive and really fresh World View*.