PHYSICAL INFORMATICS

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ABSTRACT (by GROK 4.5)
Physical Informatics proposes that the fundamental missing element in both quantum mechanics and continuum physics is quantization information—the ordered sequence of quantizing events inherent to material systems. Standard theories rely on virtual mathematical constructs (dark energy, entropy, spacetime continua) that detach models from physical reality, necessitating endless empirical corrections. More than 90 % of the known universe consists of quantizing hydrogen and helium systems whose collisions and orbits cannot be consistently captured by equipartition or continuous frameworks.
The presented model starts from the kinetic energy of elementary quantizing parts rather than space and time dimensions or spacetime. Kinetic energy is treated as the conserved long-term quantity, while potential energy arising in elastic collisions remains transient. Quantization information—frequency of collisions, changes therein, and relative durations—becomes an integral, energy-valued component of the energy balance. This information acts as a creative spacetime operator that links quantum events to complex macro and cosmic scales without mystical conjectures such as entanglement or superposition. Information spreads irreversibly through quantizing processes, combining mass, energy and order into successive environmental effects. The approach eliminates fictitious operators and offers a consistent bridge between quantum and continuum domains.

1. INTRODUCTION

Practitioners of quantum mechanics, wanting to expand toward complex systems that also appear larger in size, deploy — for lack of anything better — conjectures called mystical: entanglement, quantum friction, superposition, quantum teleportation, in order to fill the macro gap up. These wilder-and-wilder ideas prove that some decisive element is still missing from the theories that are also meant to encompass real events. At least their sense of humor hasn't been lost!

Macro, or continuum-based physicists is in trouble with quanta because it cannot fit quantizing events and elements into its energy balances. What cannot be examined in reference or inertial frames is no longer even presentable in polite company for relativistic models and for space and spacetime theories. Yet more than 90 percent of the known universe consists of quantizing hydrogen and helium molecules, atoms, ions and plasma. It is rather hard to squeeze this constantly changing ensemble consistently into energy balances.

If we introduce into an energy balance a virtual — that is, physically non-existent — mathematical factor, constant or procedure, the derived quantities and equations become virtual as well. The virtual quantities created in this way become detached from physical reality, and only an endless series of fictitious corrections can bring the theories close to describing real events. Under these circumstances, mathematics comes to an independent, creative life of its own in a world bent into the virtual.

If need be, hidden or so-called dark energy, entropy, and cosmological and other constants are inserted into the equations of matter and energy, but it is well known that this is far from a consistent solution. Such models are suitable only as some kind of guidance. Entropy is thermodynamics'

favorite quantity, but it cannot consistently cover the gaping void in the energy balances.

Must we resign ourselves to the idea that if theoretical physics has worked this way for a hundred years, it will remain so? On closer thought, is it possible that the same deficiency disease causes the model-building problems of both quantum mechanics and continuum mechanics?

In our view, in both cases quantization/physical information is the fundamental quantity missing from the theories. To demonstrate this, we have clarified the relationship of quantization information to the following concepts and areas: space, time, spacetime, combination of information, quantization, kinetic energy, repeated elastic collisions, many-element/composite systems, thermodynamics, relationships between systems and persons, receding, approaching, entanglement…

2. AXIOMS ON DIFFERENT TRACKS

We do not attach detailed literature references to this paper, firstly, because we formulate our own ideas starting from well-known concepts, theories and axioms, arguing according to the rules of formal logic. Secondly, we do not attach references for our statements about physical information because, in studying many thousands of articles, we found no relevant, positive writing. The information mentioned in them is far from what we call physical information.

Continuum physicists has so thoroughly enclosed the world under study within the principles of conservation of matter and energy that quantization — that is, the mechanics and energetics of repeated action and collision — does not fit into it. There was nothing to be done: the energy that contained the totality of the parts' kinetic thermal motion was given the label of hidden energy (entropy), but as if every part quantized at the same time, which is impossible to begin with. Repeated collisions, deflections and orbits cannot be divided up in time and space the way the equipartition theories of continuum mechanics do.

It is hard to move forward because thermodynamics, still popular today, was also built on a continuum-mechanical foundation, even though it is now common knowledge that the known universe consists of the totality of quantizing, pulsating, vibrating, orbiting parts, whose constituent elements do not behave identically. Equipartition exists only in theory. The quantizing collisions and vibrations called thermal motion do not happen at the same time either. They exert occasionally differing effects on one another and on the environment. One cannot wait for the last collision and then press the observer's stopwatch, because then we could wait until doomsday.

Quantum physicists use duration as a physical quantity mostly to measure the length of their lunch break. (In quantum mechanics, duration is not an operator, only a lifetime characteristic.) The interpretation of duration only deepens the chasm between continuum-based physics and quantum mechanics. If our time measurement is this fragmented, it is no wonder that its value has to be corrected and transformed in every case in order to derive the other physical quantities.

When we calculate velocity, frequency, acceleration, mass, kinetic and potential energy, and spacetime from continuous space and time dimensions, we ignore the effects arising from the quantization of the constituent elements, which the principle of continuity conceals. For this reason our calculations do not reflect reality. We correct the deviations with empirical factors, constants and complicated procedures, but in practice this means only a numerical, not a conceptual, correction. The popular theories of relativity also require such corrections, where an ever more complicated tangle of transformations and dilations is needed for an approximate description of real processes.

It follows from the above that any physical model that contains duration or the passage of time, or uses it as an operator, cannot be regarded as consistent or free of internal contradiction. This finding does not come as a surprise to most physicists; they just don't like to hear it.

The energy balances of quantum mechanics can be set up well. The theory does not always keep pace with the results of numerical and empirical work, but individual events pose no problem. Quantum mechanics is the success story of present-day science.

The problems begin when the interaction of several quantizing, repeating events has to be uncovered. That is when the so-called mysterious quantum entanglement, mystical quantum friction, superposition, quantum interference and quantum teleportation come out... These in turn are physical characteristics that macro physics cannot interpret. The Schrödinger paradox also tries to extend quantum phenomena into the macro world, with rather debatable results.

For decades, many have tried to fit information into physical systems, but this has always got stuck on the earlier energy balances. Neither the qubit, nor knowledge of the state, nor the information bit has brought a breakthrough. All of them have been pushed out of the energy balances, and only misterious allusions connect them to matter and energy.

According to the conservative view, physical quantities without a measure number and unit of measurement cannot be members of matter and energy balances.

It doesn't bother the mystical physicists either that if a hidden relationship can determine or explain anything for the future, it should also have material and energetic consequences. (By material consequences we do not mean the monetary reward that comes with X prizes.)

To the question of "*how information is interpreted in physics*", the AI agent called GROK 4.5 replied as follows: "*According to John Archibald Wheeler's famous saying, information lies at the deepest level of physical reality ("it from bit"). In modern theories (the holographic principle, quantum gravity), spacetime itself appears as a structure "woven" from information.*

In summary: In physics, information is treated as a physical quantity that:

- *can be measured by entropy,*
- *is tied to energy (Landauer),*
- *follows quantum-mechanical rules,*
- *and is preserved in the case of black holes as well."*

According to ChatGPT-6: *"Perhaps what we call matter and spacetime is the manifestation of a deeper informational structure?"*

The above should be regarded as mere poetic musing, in the absence of a consistent derivation.

In our view, all the above definitions of information go wrong in that they think in terms of structures, continua and bounded equipartition ensembles, and do not treat the totality of quantizing elements properly. A quantizing element may be an atomic/subatomic particle, a macroscopic oscillating element, or a cosmic orbit — a repeated withdrawal from and approach to other units.

We must also emphasize here that quantization is not a size-dependent phenomenon. Quantizations typically do not occur at the same time or in the same place, so the result can be determined only if we know when what happened and is happening.

The order of events is itself the quantization information, which is a constituent of the material system. We do not impose this order from outside; it results from the very process of the material system. We can only recognize it, combine it and calculate with it. This holds regardless of size, for subatomic and cosmic scales alike, and for everything in between. The individual quantizing systems may also be embeded within one another.

3. GENERAL MODEL

We present a physical model that, instead of the dimensions of space and time and the mathematical product made from them known as the spacetime continuum, starts from the **kinetic energy** of quantizing elementary parts and contains real quantities. It can be applied in both quantum and composite systems. (Not to be confused with the theories known as *"multiscale modelling"*!)

With its use, real energy balances free of internal contradictions can be constructed. Most known physical quantities tied to relative motion can be consistently derived from it.

As we cited earlier, more than 90 percent of our known universe is made up of hydrogen and helium atoms, molecules, ions and plasma, which move relative to one another and rebound as they collide. On collision, the moving particles transfer kinetic energy, also called energy of motion, to the neighboring particles they hit, and then, rebounding, take over kinetic energy in turn.

Generally, when a collision has ended, the total amount of kinetic energy equals that before the collision, and no free potential energy remains at the site of the collision. Collisions must be perfectly elastic, because otherwise the motion of the particles would have stopped long ago, and we could not exist in our present form either.

The formation of subatomic particles and their interactions are also quantizing processes, so we do not single them out here. Interactions and transformations between atoms that go beyond quantization do change the transfer of kinetic energy, but the quantizing motion, or repeated change, also called thermal motion, remains a characteristic of the known material systems. Subatomic particles inherit kinetic energy in accordance with the mass–energy equivalence.

By mass we primarily mean an invariant quantity of matter that can be interpreted identically both at rest and in motion relative to its surroundings.

In continuum mechanics we are used to regarding potential energy as fundamental and treating kinetic energy only as a temporary player, which turns into potential energy after a while anyway. (See the laws of thermodynamics!)

In contrast to the above, we regard the kinetic energy of the motion of molecules, atoms and other elementary particles as conserved in the long term, while the potential energy stored by the elastic deformation created during collisions we regard as temporary or transient.

Thus the hidden and so-called mystical elements and factors disappear from our energy balances, and in their place comes quantization information, which, being worth energy, is a real physical quantity.

The motion and collision of gas molecules and atoms, wave motion, the orbiting of celestial bodies, the repeated motion of elementary particles, and the repeated assumption of discrete maximum–minimum values are also all called quantization. The best-known, tangible examples of quantization

are the bouncing of a ping-pong ball, the motion of a pendulum, the emission of light, the orbiting of planets, or the production of sound.

The information belonging to quantization opens the gate to the complex world, where we can already treat repeated events as a real process. The complex world may be of subatomic size, but it may also be of galactic size, if several quantizations occur in it.

4. IRRESISTIBLE INFORMATION

In the word *in**formation,*** the ***formation*** part indicates that in the background there is a carrier whose shaping is not random but bears and transmits some order, ordering principle or effect for those that come after.

We start from the well-known fact that our known material world, built from colliding, orbiting, accelerating and decelerating elementary particles, atoms, molecules, bodies and celestial bodies, moves, changes and is (in)**formed.**

A ping-pong ball dropped on a table also quantizes while it bounces, and so does a planet when it periodically orbits its star. The individual quantizations typically occur independently of one another, but the effects of individual quantizations on the environment combine. Quantizations do not add up like apples in a basket, because they do not arise at a single point in time or at the same place, yet they can influence one another through the transfer of information and the transfer of kinetic energy.

By contrast, the popular physical system known as continuum mechanics cannot handle the mutual influence arising from the quantizing motion of the constituent elements. It takes the constituents into inventory, as we do with a basket of apples. In the course of possible transformations, it regards the parts as a randomly arranged set, or medium, of equivalent parts, as if the same thing were happening to every element in the same place at the same time.

In reality, the constituent elements — that is, atoms and molecules — cannot be frozen into a snapshot, because they travel with kinetic energy relative to their surroundings and collide with one another at different places and times, and these interactions can only be represented as a process of change. Since collisions do not occur at a single point in time, the frequency of collisions, and the change in that frequency, are also determinants of the net effect measurable on the environment.

In the basic case of quantization, a molecule moving with kinetic energy collides elastically with its surroundings. (see *Figure 1*) This process creates a kinetic effect that can be described and calculated consistently with the tools of point mechanics (for example, Newton's laws) in the given situation, which we call the **creative level**. At the creative level we cannot yet know what the effect at the macro level

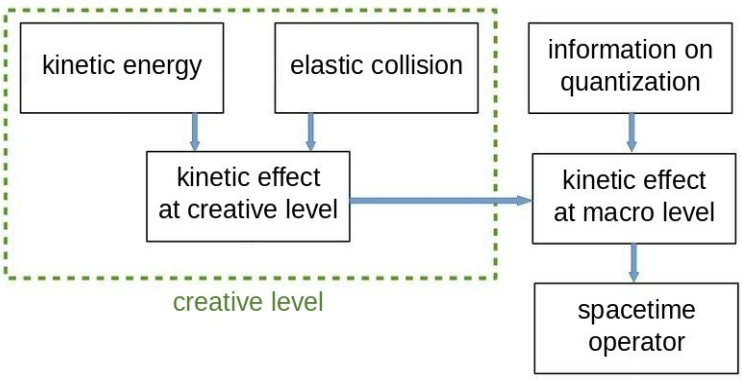


Figure 1: Collision process

will be like. (By macro or composite/complex level we mean a scale encompassing a multitude of molecules.) The relationship and circumstances of the preceding and the current collisions are carried by the information about quantization. The macro-level kinetic effect that reaches the environment can only be interpreted by taking the **quantization information** into account.

Quantization information includes the frequency of collisions, the change in that frequency, and the duration of the collision process relative to free motion. We call the effect that appears toward the environment a **spacetime operator**. It inseparably contains both the creative-level kinetic effect and the quantization information.

If the average kinetic energy of molecules moving and colliding (quantizing) in a given volume of air is not changed, but the average free collision distance between the molecules decreases, this is a change in quantization information, which carries no direct change in kinetic energy, yet at the macro level still causes a change in pressure. This is nothing other than a change in the potential energy appearing toward the environment.

The extra energy that appears toward the environment did not come from nothing, but is a consequence of the change in quantization, carried by the change in quantization information.

A molecule bouncing with the same mass and kinetic energy exerts greater pressure on the surface of a pressure gauge the more frequently collisions occur.

The quantization information is an integral part of the environmental, macro-level energy balance. In systems containing quantizing elements we cannot speak of independent matter, energy and information. The quantization information is contained and passed on by matter itself in the course of a process, from one quantizing event to the next.

Everything that bounces, collides, orbits, radiates, attracts and repels — that is, the entire known universe — contains, combines and transmits quantization information. The existence of Planck's electromagnetic radiation is also proof of universally present quantization, which includes both the periodic change of the electromagnetic field and the repeated motion of constituent parts having mass. We also know of no subatomic, elementary particle that does not quantize or collide.

Quantization information links the phenomena and elements of quantum mechanics organically and consistently to the macro/complex world, for which neither mathematical transformations, nor conjectures, nor mystical tricks are needed. In our view, the consistent presence of quantization information also lies behind the quantum entanglements held to be mysterious. **The present entanglement was already decided in the past; quantization merely made the information available to the environment.**

A quantizing particle "*does not remember*", but quantization information "*does not forget*".

The constituent elements, atoms and molecules collided before, and hopefully will collide later, so they carry information about their environment, and also pass on to their environment information that spreads exponentially.

Quantizing subatomic particles also have their own creative level, where quantization information is present, just as atoms, molecules, celestial bodies and galaxies also have a quantization-information dependence at their own creative levels. Creative levels occur both in parallel and embeded within one another. All quantization information can combine with one another.

The rate (speed) at which the effect and information transmitted by collisions propagate equals the rate (speed) of the transfer (collision) of kinetic energy of the constituent elements and molecules. In the case of electromagnetic waves, the speed of information propagation equals the known speed of light. For information transferred by connection to an external system, there is no physical speed limit.

There are scientists who introduce information into our material system as an existing characteristic, but so far they have not been able to link it organically to the mass–energy system. The information carried by the concepts of disorder and entropy is likewise not connected to the actual formation process of the quantizing elements. Treating entropy, the basis of thermodynamics, as continuous is a mistake from the outset, because of universal quantization.

Somehow, at some time — in the beginning — quantization information entered the material system, and we inherited it. Mass and energy somehow relate to their environment, and the outward effect is not fully (deterministically) determined by the presence of mass and energy. Information cannot be grasped, but its carriers can. **The transfer of information is a process containing quantizing elements, which spreads unstoppably for as long as matter exists.**

The information associated with the presence of matter and/or energy links individual phenomena or events not only to one another but also into a process. **Information acts separately from mass and energy, but the result inseparably passes on mass, energy and information** as the future starting point of a subsequent event, where, through the combination of the carried information and the information received from the environment, a new result arises, which, as part of the process, exerts a new effect on the environment and carries the combined information onward as well.

It is not energy that is inherited as energy, nor information as information; rather, under the influence of the information received/taken up, the mass–energy–information system takes shape.

5. KINETIC ENERGY AS A FUNDAMENTAL QUANTITY

We have chosen a fundamental quantity that can be used in the same way, without transformation, for dynamic effects, high speeds of motion, and real materials and energy packets consisting of quantizing elements as well.

The kinetic energy of a mass point can be determined relative to its surroundings, and it also satisfies the requirement of mass–energy equivalence. It is a quantity that has been known and used in point mechanics for centuries. (See the work of G. Galilei, J. Kepler, I. Newton and L. Euler.)

The axiom of energy conservation (the first law of thermodynamics) states that the total energy of an isolated system is constant. The change in the total energy of a non-isolated system equals the sum of the energies supplied to the system from outside. We do nothing else but trace the effect of changes in kinetic energy from molecule to molecule, between bodies, or even from galaxy to galaxy. Neither quantum mechanics nor continuum mechanics has so far been able to do this tracing, although it could have been the missing link between them.

Kinetic/motional energy is transferred without loss in practice in the case of gas molecules too. During molecular collisions (at the creative level), kinetic energy and potential energy convert into each other back and forth.

From the kinetic energy of a mass point, the other variable can be calculated if either the mass or the speed is known. The magnitude of kinetic energy can also be determined, in the case of a collision or deceleration, from the effect exerted on its environment.

If we have several mass points, or multiple collisions occur, we will need to introduce collision frequency as information, because the average effect, pressure or force that a given kinetic energy exerts on its environment at the composite/complex level depends on it.

The same kinetic energy exerts a greater average force — that is, pressure or impulse integral — on its surroundings if the mass point bounces more often in a narrower gap.

Creative spacetime operators have a reserved place in energy balances, which until now has been occupied, for the sake of expediency, by fictitious operators labeled *"dark, internal, mystical and hidden".*

The use of creative spacetime operators offers solutions to questions such as dark matter, dark energy, the condensation of matter aggregates, the expansion of the known universe, the formation and changes of celestial bodies, or the early phenomena of theories of the origin of the world.

The detailed derivation of the calculation can be found in the publications on the *magai.eu* website[1], or on the *academia.edu* portal[2].

The transformations, dilations and contractions formulated in connection with the theories of relativity did not open a new world before us, but in their own way patched up the errors of the continuum-mechanical worldview used earlier. They did not, however, reduce the gap separating it from the quantum world.

Information-driven formation maps out a natural spacetime, which we call **creative spacetime**. A better name could be found, but this makes it easier to contrast it with familiar concepts. We could also call it *"creation"* since it has been the basic element of everything known to exist from the earliest known beginning.

Our creative spacetime model is natural, because it links real, creative-level events possessing spatial elements into a macro process that has an extent appearing in time. Events involving spatial elements and their extent appearing in time cannot be separated. Individual events follow one another displaced in time, **but time has no direct effect on the energy balance**.

The creative spacetime interpretation satisfies A. Einstein's realist expectations just as it does the real results of quantum theory, which is deliberately regarded as non-realist.

Continuum mechanics knows reversible processes, but according to creative spacetime these have no real physical content, and therefore form phantom information. Once information has spread, it cannot be reversed; one can only tinker together something similar, but its antecedent cannot jump about as we please. We know of no process without antecedent.

[1] www.magai.eu

[2] https://www.academia.edu/161296378/REDESIGN_IN_PHYSICS_INFORMATION_IS_THE_KEY

6. SUMMARY

We show that physical information built into composite/complex systems is considered energy itself. We can also put it this way: quantizing mass and energy, held together by their (in)formation, act on their environment. The same quantizing mass and kinetic energy, in a different formation, exerts a different external macro effect.

The built-in information associated with quantum events, or the creative spacetime operator, makes it possible to interpret quantum phenomena and events at composite, macro and cosmic scales, and vice versa. By applying creative spacetime, several earlier conjectures can be demonstrated that were wrongly attributed to mystical quantum entanglements, fluctuations, or other hidden effects.

Quantization information spreads irresistibly. It is not only a defining element of our material environment but also a constituent of every spiritual and mental phenomenon, and every linguistic and cultural activity, connected with our material existence.

Our relationships can bridge considerable spatial distances, because through it not only do neighboring quantizing elements act on one another during collisions/interactions, but information processes of distant origin also combine and act on one another and on distant matter.

The process of the transfer and combination of quantization information is a carrier or part of the relationship with the embodied being. This dependence, however, goes beyond the scope of our present paper. The author's position can be found in the publications at https://www.academia.edu/123563422/AZ_%C3%89LETNEK_BESZ%C3%89DE.

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