Quanta transfer in space is conserved

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Physical phenomena emerge from the quantum fields everywhere in space. However, not only the phenomena emerge from the quantum fields, the law of the conservation of energy must have its origin from the same spatial structure. This paper describes the relations between the main law of physics and the mathematical structure of the “aggregated” quantum fields.

Introduction

The law of the conservation of energy is the main law in physics. Its existence originates upon the phenomenological view of reality: the local addition and subtracting of energy in relation to the alterations of observable phenomena. This point of view presupposes a fundamental difference between the phenomena and the surroundings of the phenomena in the universe.

Modern physics has abandoned this concept of reality. Quantum field theory has replaced the phenomenological point of view and all the phenomena are thought to emerge from the distinct basic quantum fields.[1] Distinct fields that are existent everywhere in the universe. Albeit not all the known phenomena have a consistent theoretical description in quantum field theory. For example gravity.[2]

Quantum reality is far more complicated than reality by the phenomenological point of view, because the latter is a simplification of quantum reality. Therefore, it is natural that we use the phenomenological point of view to calculate macroscopic phenomena.

It is not possible to calculate all the alterations between the distinct quantum fields within a macroscopic volume of space. Even the calculations of all the alterations during a very short time within a volume that encloses a hydrogen atom is impossible without implementing empiric data.

Notwithstanding the fact that the law of the conservation of energy originates from the phenomenological point of view, the conservation of energy must be consistent in quantum field theory too.

However, the concept of quantum field theory is not restricted to the observable phenomena within the quantum fields. Because these phenomena represent only partly all the existing quanta in the universe because everywhere in space there is a transfer of quanta. Phenomena like particles are just concentrations of quanta that have only partly independent properties during a limited period of time.

We cannot postulate the conservation of energy between volumes of space – in fact volumes of enclosed quantum fields – with the same size and shape. It is clear that there is an energy difference between 1m^3 of the volume inside our sun and 1 m^3 somewhere in a void between the galaxies.

So the question is: “*What about the mechanism behind the conservation of energy, caused by the structure of the quantum fields*?”

The Planck-Einstein relation

The only phenomenon that’s observable every-where in the universe is the electromagnetic wave. Thus if we want to discover a “gleam” of the basic structure of the quantum fields within the frame of reference of modern physics we have to examine electromagnetic waves, travelling in space.

The properties of electromagnetic waves – as a stream of single quanta – are described by the Planck-Einstein relation:

$$E = h\,v = \frac{h\,c}{\lambda}$$

[h = Planck's constant; v = frequency; λ = wave length; c = speed of light]

The equation is really remarkable because nearly every quantity is a constant. The only exception is the wave length. Unfortunately, an equation with all constants and only 1 exception – a property that is a variable – is logically inconceivable. Why should the universe make a difference between the nature of properties that are 100% related to each other? All are constants and one is a variable?

They all emerge from the interactions between the underlying structure of the basic quantum fields, so why are some properties constants and other variables?

Why isn't the wave length a constant? Probably because it was not customary to imagine that the curvature of space – Einstein's theory of general relativity – can have a constant that determines length. However, the wavelength of electro-magnetic waves is enormous in relation to the smallest elementary particles so there is no “empiric” argument to reject an invariant basic wave length.[3]

Of course, the mutual interactions between local macroscopic phenomena show all the characteristics of curved space-time as described by Einstein's theory of general relativity. That's why in the past the physics text books have taught us that Einstein's space-time is the underlying fabric of the universe, perfect in line with the observations.

This in contrast to the axioms of Isaac Newton about absolute space and absolute time. But that's just a believe. There is any proof to support this opinion. Because without phenomena there is still the structure of the creating quantum fields. And what's beyond.[4]

The Planck-Einstein relation shows the determination of the energy by the wave length. Therefore, I can express the size of the wave length with the help of a new constant:

$\lambda = n\,\underline{\lambda}$ [n = integer (variable); $\underline{\lambda}$ = standard length]

So $\underline{\lambda}$ is a constant and named “standard length” in this paper (the underline is used to show the difference).

Now we can rewrite the Planck- Einstein relation:

$$E = h\nu = \frac{hc}{n\underline{\lambda}}$$

The revised equation shows that energy is inversely proportional to the number of standard lengths by which a single quantum is transferred (the outcome is equal to the unmodified equation).

The spatial structure of quantum fields

Suppose we increase the energy of the electromagnetic wave. The result is a decrease of the number of standard lengths between the beginning and the end of 1 electromagnetic waveform. The limit is n = 1 $\underline{\lambda}$, but because of the nature of electromagnetic waves 1 n must be half the size of the electromagnetic wave length.

However, what is represented by the size of one standard length? When we think it over we have to conclude that the standard length is a property of the structure of the creating quantum fields. Moreover, the equation makes no difference in relation to the direction of the transfer of quanta in space.

In other words, the standard length $\underline{\lambda}$ must be the representation of the size of a spatial unity that forms the basic (aggregated) structure of the quantum fields, like the bubbles in a foam. See the schematic figure 01 below with the help of easy to draw cubes.

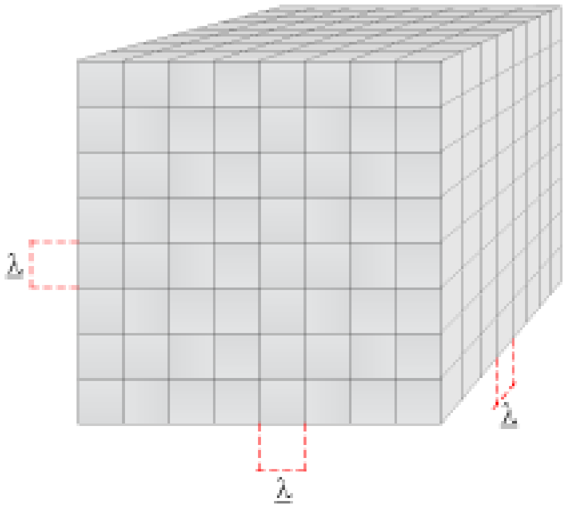

figure 01

This schematic image cannot be a surprise, because quantum fields must have a spatial structure. The only difficulty is the relation between “the foam” of the universe and Einstein’s curved space-time.

However, the cause of the difference is the magnitude of the observed phenomena. General relativity describes the mutual relations between macroscopic phenomena and quantum field theory describes the structure that is responsible for the emerging of the phenomena in space and time. Because electromagnetic waves are everywhere in our universe we have to accept that the “bubbles” *tessellate* space, like the image above.

So every volume in space consist of one or a multiple of the spatial unity that forms the basic structure of the quantum fields. Mathematically spoken, this unity is the element of a mathematical set. Because this mathematical set envelopes everything in the universe, it must be the all-inclusive set that represents the universe.

Now it is only a small step to conclude that all the spatial unities together form the main structure of the basic quantum fields in our universe. In other words: the unities form a mathematical set with topological properties. However, one or more properties of the elements have to be variant, otherwise our universe exists without any alteration. Therefore, every element is a topological object that represents a homeomorphism.

The element of the mathematical set gets the character "*e*". So every volume (*V*) in the universe represents:

V = n e [n = integer (variable); e = element]

Importing the standard length in the Planck-Einstein relation has consequences. The alterations within the vector part of the basic quantum fields – *between the adjacent bubbles of the foam* – are restricted to the exchange of Planck's constant (the scalar part of the structure of the elements is not involved in this rough concept of reality).

Quantum time

The transfer of Planck's constant between adjacent elements of the all-inclusive set – actually the transfer of topological deformation within the mathematical set – has a certain duration: length divided by velocity. Length ($\underline{\lambda}$) and velocity (c) are constants, thus time must be a constant too. So T (duration) becomes a multiple of $\underline{t}$ (underlined to indicate the status as a universal constant):

$T = n\,\underline{t}$

[T = time (period); n = integer (variable); $\underline{t}$ = constant of time]

Actually the transfer of quanta within the basic structure of the quantum fields is impossible without a constant velocity. Because the consequence of a *variable* velocity is a variable exchange of energy, so there couldn't exist a quantum of energy like Planck's constant and there couldn't exist a constant speed of light.

Conclusion: *the velocity of the transfer of a single quantum is independent from the velocity – and the direction – of a transferred concentration of quanta from which the single quantum originate.*

The "force" that is responsible for the exchange of quanta between the elements that form the basic structure of the quantum fields is a property of every spatial unity (element). However, this property of alteration must be a constant too. Because we cannot deform topological objects that tessellate space without an identical property of all the elements that is responsible for the alterations between the elements.

Moreover, we have to accept that there is no topological deformation without a fluent transfer of an invariant property of every single element. Thus "quanta" are emerging from the synchronized mutual alterations of the elements of the all-inclusive set.

If the structure of the quantum fields is composed by elements that only can transfer one quantum (h) with the same velocity (c) during the same time ($\underline{t}$) we have to conclude that all the quanta transfer in the universe is conserved.

That means that identical volumes – irrespective of their position in the universe – have the same amount of single quanta transfer during identical periods of time. Thus the transfer of quanta in space is a constant and is correlated too (the transformations are non-local because the elements tessellate space.

Finally, it shows that the conservation of energy is not a law of nature. It is the consequence of the properties of the elements of the all-inclusive set: the basic structure of the quantum fields.

Relative time

"*How can relative time emerge from the constant of time?*"

When we accelerate a clock – or a particle – we change the ratio of the internal changes, because of the conservation of quanta transfer in the universe. Therefore, if a phenomenon moves nearly with the speed of light most of the quanta transfer by the involved elements is "consumed" to enable this high velocity. Only a small part of the involved quanta transfer is available for the internal alterations "inside" the clock/particle. This is the cause behind the twin paradox.

General relativity

It is logically inconceivable that a variable in an equation with only constants is a variable. Therefore, it is also inconceivable that 2 main theories don’t share the same concept about space and time.

General relativity describes the mutual relations of macroscopic phenomena with the help of position (space) and duration (time). However, before Albert Einstein published his paper about Special Relativity in 1905 Max Planck had published the quantisation of energy in 1900.

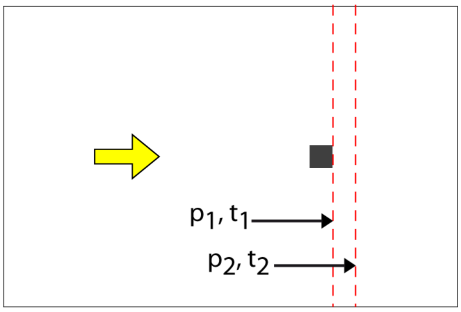

figure 02

The image above (02) shows a quantum of energy (black square). It is the smallest amount of change, Planck’s constant.

At the moment I start to observe the quantum it has the position p_1 at the moment t_1. At the end of the change the position is p_2 at moment p_2. The velocity of the quantum transfer is the constant speed of light (*c*). I don’t know the distance (d) between p_1 and p_2 but the amount of change – energy – is 1 *h*, Planck’s constant.

If the quantum was part of an electromagnetic wave the formula is $E = h\,v$ [v = frequency]. But this is a single quantum. Therefore *h* represents d (position p_1 to position p_2). I have no reference frame but this isn’t necessary because I don’t want to know the length of d in relation to other phenomena. I only want to know if d is determined because *c* and *h* are universal constants.

In other words, if d is determined by the universal constants *c* and *h*, d must be a universal constant too. Because without a change of position there is no observable universe. That means that the minimum amount of change in space – caused by the transfer of a single quantum – proves the existence of a spatial quantity. That’s why I can conclude that – using the basics of space and time – the volume of space is quantised so time must be quantised too. Just like the schematic image in figure 01 shows.

Albert Einstein’s theory of General Relativity describes the mutual relations of macroscopic phenomena. It doesn’t contradict the concept of the existence of a continuum of quantum fields that create observable reality. However, General Relativity is a model that is restricted to the description of observable phenomena. It isn’t a theory that envelopes space and time (the whole universe).

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