

# Spacetime Energy Continuum

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Date of Submission: 09-10-2021

Date of Acceptance: 23-10-2021

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The spacetime energy continuum hypothesis says that energy is a dimension of spacetime, such that energy and spacetime form a continuum. This hypothesis entails that energy exists whenever space and time are interwoven together. Einstein's brilliant idea that space and time form a continuum, which is called spacetime, is just part of the scientific story of our universe because energy and spacetime are interwoven together and form a continuum as well.

## Avoiding Circular Analysis of Energy

Energy is usually defined in physics as the capacity to do work. But this definition is circular because work is the manifestation of energy. From the same perspective, if we define energy in terms of quantitative properties capable of being transferred from physical systems or bodies to other physical systems or bodies, then our definition is also circular because physical systems or bodies, in addition to transference of any property, are just manifestations of energy. Hence, analyzing energy in terms of physical systems and transference of properties is nothing but analyzing energy in terms of energy, which is circular, and thus, unacceptable.

All of this indicates that the best way to define energy without falling into circularity is to define energy as a dimension of spacetime, which means that energy is just a mathematical construct, exactly as spacetime is. This definition is not circular because mathematical constructs are abstract, and hence, they aren't the manifestation of energy. This shows that defining energy as a dimension of spacetime, i.e., as a mathematical construct (exactly as the spacetime energy continuum hypothesis says), is the most plausible analysis of energy, given that it avoids falling into circularity. In other words, the noncircular definition of energy is the following: energy is the prerequisite of spacetime continuum. This entails that energy is a dimension of spacetime. Nothing could be done without energy. Therefore, whenever space and time are interwoven together, i.e., whenever space and time form a continuum, energy exists because space and time couldn't be interwoven together without energy. This leads to the conclusion that energy is the prerequisite of spacetime continuum.

## Empty Space and Energy

According to quantum mechanics, it is possible to borrow energy from empty space. This means that energy exists in empty space [1]. The best explanation of the fact that energy exists in empty space is that energy is a dimension of spacetime, such that spacetime and energy are interwoven into a single continuum. This spacetime energy continuum hypothesis entails that the different forces of nature are different constructions of spacetime, such as gravity being the curvature of spacetime, because if energy is a dimension of spacetime, then the distinct instantiations of energy, namely the diverse forces, are just different constructs of spacetime. The diverse forces of nature are nothing but distinct spacetime constructs, such that each force amounts to a specific spacetime construct different from the spacetime constructs of the other forces. From this perspective, the strong force might be the circularity of spacetime, such that the strong force amounts to spacetime shaped in a circle, leading the strong force to stick protons and neutrons together in the nucleus of an atom, due to its circular shape in a very small region.

## Explaining Dark Energy and Black Holes

Around 68% of the universe is dark energy. Dark energy had been proposed as an acceptable hypothesis in order to account for the fact that the expansion of the universe is accelerating. If dark energy doesn't exist, then the expansion of the universe is expected to slow down due to the attractive force of gravity. But the expansion of the universe is not slowing down rather it is accelerating, leading to the inevitable conclusion that there is an extra repulsive energy, which the physicists call dark energy, causing the expansion of the universe to accelerate [2]. The spacetime energy continuum successfully explains the dark energy of our universe and its origin. Since energy is a dimension of spacetime, such that energy and spacetime form a continuum in the sense that energy exists whenever space and time are interwoven together, and given that our

universe is full of spacetimes, it follows that our universe should contain a huge amount of energy due to its enormous number of spacetimes, leading to what we call dark energy.

On the other hand, a black hole is a huge amount of matter existing in a very small region, causing its gravity to be very strong, such that nothing can escape from it [3]. If spacetime energy continuum is true, such that energy exists when space and time are interwoven together, then when huge numbers of spaces and times are interwoven together in a very small region, huge amount of energy is formed, leading to the existence of black holes. From this perspective, black holes are spacetimes interwoven together and folded into a single and very tiny region, causing the emergence of tremendous amount of energy.

### **Conservation of Energy**

According to the first law of thermodynamics, energy is conserved in an isolated system, such that it could neither be created nor destroyed [4]. This law, which is known as the law of conservation of energy, proves that energy is abstract, such as being a dimension of abstract spacetimes. Since energy could neither be created nor destroyed, and given that abstract entities could neither be created nor destroyed (due to the fact that they are abstract), it follows that energy is abstract, such as being a dimension of abstract spacetimes. If energy weren't abstract, then it could be created or destroyed as concrete objects could. But it couldn't. Therefore, it is abstract.

Abstract entities could neither be created nor destroyed, given that they are abstract. For example, humanity is abstract, and hence, it could neither be created nor destroyed. But only humans as concrete beings, such as the philosopher Socrates, could be created or destroyed. Similarly, energy could neither be created nor destroyed because it is abstract, given that it is a dimension of abstract spacetimes, while a material instantiation of energy could be created or destroyed enabling work to be done or terminated, such as providing energy to an engine enabling it to work.

### **Different Forms of Energy**

Energy takes many different forms, such as kinetic energy, potential energy, nuclear energy, and gravitational energy [5]. This shows that energy is abstract, such as being a dimension of spacetime. If energy weren't abstract, it wouldn't have taken different forms, but rather it would have taken one unique and definite form as concrete objects do. For example, Socrates doesn't take different forms, such as being Socrates, Plato, and Aristotle, because he is a concrete individual taking the form of Socrates himself. Yet humanity, which is shared among all humans, is abstract because it is instantiated in distinct humans, such as Socrates, Plato, and Aristotle. From the same perspective, energy is abstract because it could be instantiated in different forms, while a particular instantiation of energy is concrete, such as the energy used to move a table or drive a car.

### **A Scientific Hypothesis**

The spacetime energy continuum is a scientific hypothesis because it could be tested. If there are spacetimes without energy, then this hypothesis is false. Therefore, the spacetime energy continuum could be tested, leading to the conclusion that it is a scientific hypothesis.

### **References**

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Hassan Ajami. "Spacetime Energy Continuum." *IOSR Journal of Applied Physics (IOSR-JAP)*, 13(5), 2021, pp. 01-02.