Photons, Gluons and Gravitons Have Infinitesimal Mass

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Abstract

In this article it is shown that point particles have infinitesimal mass (not zero mass). Though this may seem like a trivial distinction, it is an important one since, it is argued, the only object that has exactly zero mass is nothingness. Therefore, establishing that point particles have infinitesimal mass is equivalent to establishing that the particles exist. The cardinalities of differently-sized infinite sets are discussed and the infinitesimals are defined as the reciprocals of the value of such infinities. An infinitesimal of a particular magnitude is chosen as being the value of point particle masses.

Introduction

In a prior article (1), it was discovered that the mass ratio of two subatomic particles could be accounted for solely by the consideration of the particle's cross sections and the introduction of a version of relativistic quantum spacetime that has the property of nonreflexive distance. Refer to the article for a derivation, but the theory of the proton-electron mass ratio is encapsulated by the relations

$$\frac{R_{p,e}}{R_{e,p}} = \sqrt[4]{\frac{P_{t,p}}{P_{r,p}} \cdot \frac{P_{r,e}}{P_{t,e}}} = \sqrt[4]{B} = \frac{m_p}{m_e} = \beta \tag{1}$$

where $R_{p,e}$ is the distance from the proton to the electron, $R_{e,p}$ is the distance from the electron to the proton, $P_{t,p}$ is the power (of the shower of virtual particles) transmitted by the proton, $P_{r,p}$ is the power transmitted to the electron and then received back (echo) by the proton, and so forth, B is Bonnar's constant which is an integer having value $11,366,719,876,399$, and β is the proton-electron mass ratio.

Eqn. 1 essentially amounts to relativistic quantization of spacetime and it is proposed that the virtual particles are actually *creating* spacetime and, in conjunction with particle's cross section, relative mass.

Now since it can be assumed that $P_{t,p}/P_{t,e} = 1$, we'll say that

$$B = \frac{P_{t,p}}{P_{r,p}} \cdot \frac{P_{r,e}}{P_{t,e}} = \frac{\sigma_p}{\sigma_e}. \tag{2}$$

so the radius of the electron can be solved for quite simply and it is found that the result agrees with the experimental value.

Much can be inferred from Eqns. 1 and 2 taken together. Most importantly, mass is not an intrinsic property of subatomic particles. This fact was proven a second way by the author in (2). Rather, particle mass is a function of the particle's cross section and the nonreflexive nature of relativistic quantum space-time. The only intrinsic property of the particle that contributes to mass is the cross section. Particles such as electrons and protons that are considered to have mass have a noninfinitesimal cross section. But all particles that exist have a cross section and therefore all particles have mass. Particles such as photons, gluons and gravitons, that are conventionally considered to have zero mass, are point-like and therefore have infinitestimal cross sections, thus have infinitesimal mass (otherwise they wouldn't exist). The only type of "object" that actually has zero mass is any portion of the classical vacuum.

Infinities and the Infinitesimals

Until the end of the 1800s no mathematician had managed to describe the infinite, except for the intuitive idea that it is an absolutely unattainable value. Georg Cantor was the first to address it, and he did it by developing set theory, which led him to the mind-blowing conclusion that there are infinities of different sizes. Faced with the rejection of his ideas, Cantor went mad and ended up dying in an insane asylum. But today, mathematics cannot be understood without his revolutionary insights.

For Cantor, sets are collections of objects that can have finite or infinite elements (3). He established the concept of cardinal as the number of elements that a set has. The cardinal of the set of fingers of one hand is 5, while the cardinal of the set of natural numbers $\mathbb{N} = \{1, 2, 3, \ldots\}$ has infinite elements and we denote the cardinality of that infinity $\aleph_0$, which happens to be the smallest infinity. Notice that we are able to count (i.e., write down) the consecutive elements of that set if it is ordered. The next biggest set is the set of real numbers $\mathbb{R}$. In that case, we cannot write down the consecutive elements of the ordered set. $\mathbb{R}$ is an uncountable set, we denote its cardinality by $\aleph_1$, which is a larger infinity than $\aleph_0$. Cantor proved that it was impossible to establish a bijective function between the set of natural numbers and the reals. He thus came to the conclusion that the cardinal of the set of real numbers was greater than that of natural numbers: they were infinities of different sizes. Cantor proposed that there are an infinite number of infinities of increasing cardinality.

Cantor proposed the continuum hypothesis which is a hypothesis about the possible sizes of infinite sets. It states that "there is no set whose cardinality is strictly between that of the integers and the real numbers" or equivalently, that "any subset of the real numbers is finite, is countably infinite, or has the same cardinality as the real numbers."

By an *infinitesimal* it is meant a number that is infinitely small in magnitude. Just as there are infinities of different sizes, there are infinitesimals of different degrees of smallness. We shall define our infinitesimal quantities ϵ as the reciprocals of infinities.

In particular we have,

$$\epsilon_0 = \frac{1}{\aleph_0} \text{ and } \epsilon_1 = \frac{1}{\aleph_1} \tag{3}$$

ϵ_0 and ϵ_1 are both infinitesimal but $\epsilon_1 < \epsilon_0$.

Point Particles Such as Photons, Gluons and Gravitons Have Nonzero Infinitesimal Cross Sections

It was argued that point particles have nonzero cross sections otherwise they simply wouldn't exist. It was further argued that, through interaction with a quantum field that creates nonreflexive relativistic quantum spacetime, mass is conferred on any particle having a cross section. But since particles (which are conventionally considered to have no mass) are points, their cross sections are infinitesimal and they therefore behave as if they have infinitesimal mass.

It remains to determine the actual magnitude of the infinitesimal cross sections and masses. Quantum space time is a tricky concept that befuddles the human mind. We can imagine the spacetime coming in discrete chunks of a certain size, but for one there are no "spaces between the spaces", which is why Stephen Hawking said he saw no reason to abandon the conventional continuum conception of spacetime. Furthermore, the discrete chunks of spacetime are themselves infinitesimal (we might try to imagine that the shower of virtual particles that generates relativistic quantum spacetime being described by infinitely dense and complex Feynman diagrams, even though only a finite number of virtual particles can exist at any one instant).

Since the current of virtual particles that generates relativistic quantum spacetime is infinitely dense and complex, therefore uncountable, I propose that the correct infinitesimal to assign these particle cross sections and masses is ϵ_1. So it can be stated

$$m_\gamma = m_g = m_G = \epsilon_1 \tag{4}$$

and

$$\sigma_\gamma = \sigma_g = \sigma_G = \pi\epsilon_1^2 \tag{5}$$

Afterthoughts

The main consequence of having an infinitesimal cross section, thus having an existence, is that the particle will have an infinitesimal mass due to the effects of the nonreflexive character of relativistic quantum spacetime. All particles with infinitesimal mass travel at the speed of light c. All particles with infinitesimal mass are affected an infinitesimal amount by a gravitational field. Particles cannot exist without possessing a cross section that is at least infinitesimal. The existence of γ, g and G is thereby proved.

References

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3. Jourdain, P. (1955). "Contributions to the Founding of the Theory of Transfinite Numbers". New York: Dover Publications