The Photon, Graviton, Electron, and Quark

1. Introduction

This paper provides a thumbnail sketch of how the properties of selected fundamental particles are interpreted under the Impressionist Theory of Everything (IToE). The particles studied are the photon, graviton, electron, and quark. The format of this Theory of Everything is inherently descriptive and narrative, taking its format from the Impressionist perspective. Impressions are, by definition, comparative representations of relationships. This can be contrasted with the academic approach of analysis that focuses on singular perspectives intended to be definitive and predictive. A clarification of the relationship between Impressionism and academism is important to the frame of reference and central topic of this web site. The Impressionist approach provides the important final element necessary to derive meaning (understanding) for what we observe in nature and discover in theory. It is not simply an adjunct to academism, but an equal partner for any theory presented in the academic format.

Impressionism combines elements that go beyond the proper limits defined in any single academic subject area. The Impressionist approach, in the most general sense, is comparative across more than one such topic. We can state that the Impressionist and academic stances for understanding the world (or more generally, the universe) are absolutely complementary. As absolute perspectives, they do not have common properties even though they describe a common space.

Academic and Impressionist representations each rely on the use of symbolic mediums or formalisms for their representations. The term *medium* applies in Art and the term *formalism* applies in scholarship. Works in the separate modes of Impressionism and academism are equally attempts to mirror relationships found in the universe. The distinction between these modes fits the model of IToE. Impressionism is the comparative representation of dualisms found in nature,

and academism is the rigorous description of singular principle (for scholarship) and singular view (for Art).

1.1 Nontransformable perspectives in a common space

The two bases of understanding found in the Impressionist and academic approaches are complementary and nontransformable perspectives. In other words, there is no basis on which to show the existence of a rational relationship between these formats. The only thing that they have in common is that they have nothing in common, because each is paradoxical in its format to the other. The academic approach addresses the question how and the Impressionist approach addresses the question why. Each question requires a different approach to the process of understanding. When physicists attempt philosophy, they come up against the same barrier presented in the relationship between quantum and classical mechanics. No rational structure (no rational transformation) exists.

In modern science we are approaching the absolute limits of understanding the how of the universe. It is time to address the why in a proper format that does not confuse these terms as having common properties. Any attempt to address the issue of *why* from a purely academic stance will fail.

This paper describes how the existence and nature of fundamental particles fits into IToE. None of the detailed how of the academic description applies in this discussion; yet the subject discussed is the same, namely the nature of fundamental particles.

2. The photon and the graviton as the dichotomy of singularism/dualism in *R*

The photon and the graviton form a natural set because they are the fundamental messenger particles of the classical universe. Under IToE, their relationship represents the dichotomy of singularism and dualism found for the description of the Russell set object, *R*.

2.1. The observational hiding of structure by the mechanism of superposition

Within the concept of IToE, any observational perspective (and as it follows, any object) consists of a dualism that is not singularly accounted for. The mechanism of this incompleteness is the natural presence of paradox.

A second concept of IToE is that in dynamic unrestrained spaces this incompleteness (paradox) is responsible for a pressure and subsequent cycle that cause the superposition of fundamental structure. The process is generic and has been discussed in other papers on his web site (notably Chapters 1.5 and 1.6). The initial object of cycle is called the *primordial cycle*, and the photon and the graviton are the fundamental forms of this primordial cycle in the physical universe. The photon is its singularism and the graviton is its dualism.

3. The photon as the singularism

The photon is the messenger particle of the universe constructed as a singular space. On one hand, the photon obeys the condition that its cycle is one-half inflationary to the observer, however the real and inflationary portions refer to the singular universe. The rotational (cyclical) relationship between the real and inflationary portions of the photon has linear interpretation as velocity. Velocity is the natural consequence of the subsumation (accumulation and change) of the separate locations of real and imaginary parts of a dualism into a common domain. This is a process of collapse that, in this instance, appears as linear extension. This process of extension is continuous because observational incompleteness to primordial cycle is never resolved in any single location. The cycle between the real and imaginary portions is continuously incomplete to the classical observer.

4. The graviton

The graviton is also a messenger particle, however, it is the dualism of the primordial cycle described in the Impressionist Theory of Everything (IToE). In the same sense that the photon describes the singular universe, the graviton describes a version of the universe that is larger than

can be singularly observed. Again, this has important inferences to how the singular universe must respond to the observer for the completion of the hidden portion of the graviton's cycle. One half of the graviton, and the universe it describes, is irretrievably hidden to the singular observational perspective of the observer, and both halves are mutually hidden to each other. There is no rational transformation across these parts other than collapse over the process of cycle. As the cycle across these parts is completed, collapse occurs, and the portion of this dualism that is larger than the component of the universe that is singularly observable is subsumed. This process of collapse has separate identifiable consequences.

4.1. Deflation in the universe: The role of the graviton

Unlike the cycle of the photon, the cycle of the graviton is larger than contained in the universe of the observer. Consequently, as each cycle is completed one part of the structure of the graviton (the portion that is imaginary and inflationary) is subsumed into a smaller description observable to the observer. One portion becomes hidden or expressed within the other. There are two ways such subsumation can occur that reflect the observational perspective of the observer to this dualism.

For the relationship between objects of the observer's universe, the property of the graviton observed over cycle is deflation. As cycle of the dualism of the graviton is complete, one portion of this cycle is hidden and lost to the observer. In the process, a contraction has occurred. One expression of this property is the change in distance that occurs between objects of mass. Distance deflates between these objects. This process of deflationary accumulation proceeds by the formula

$$d \propto t^2 \tag{4.1}$$

where t represents units of cycle and d represents the units of distance accumulated. An extremely simple experiment confirms this process Place a ball at the top of a sloping gutter. Release the ball and mark of its location after one unit of time. Now mark off the entire gutter in lengths equal to this first unit. Release the ball again and record where it is after each unit of time. After n units of

time the decending ball is exactly at the mark numbered n^2 regardless of the angle of the gutter. By the end of 4 seconds (4 cycles), the number of units of distance that have accumulated to the observational perspective of an observer is 16, and for cycle 5, it is 25. The units of distance to the units of time obey Euler's series. The effect of the cycle of the graviton is that the distance between the ball and the earth in this gravitational field has decreased, and the decrease accelerates.

The process is one of superposition of units of cycle and their subsequent display (collapse) to a linear format. There are two ways in which such cycle can be superposed, and in this case it is accumulation by containment of superposition. Please see Chapter 1.7, The Hexorthogonal Geometry of Subclassical Space for a more complete discussion of the process of containment and noncontainment.

The force of acceleration continues by cycle until it becomes constrained by some other factor. At the largest scale, time itself becomes the basis of constraint. This is because time and space accumulate toward the same infinity but under different formulae of accumulation (formats of superposition). As explained in Chapter 1.7 on this web site, the two formats are containment and noncontainment. This results in the accumulation for space reaching an infinity before the accumulation for time reaches its complementary format of infinity. Thus, a relationship between objects exists for which further accumulation cannot occur for space, but can occur for time. Space is then imaginary as time continues to be expressed. This relationship between space and time at their separate infinities results in the phenomenon of the singularity, or Black Hole. Deflation of distance continues in time but has no expression in space.

4.2. Inflation in the universe: The role of the graviton

As stated above, the graviton defines the universe as two structures, one of which is not included in the observer's perspective. The deflationary process for n, the cycle of the graviton, refers to the relationship found between two objects within the singular universe of the observer.

In complementary format, the inflationary process refers to the relationship of the observer (within the observable universe taken as a singular object) to the second and imaginary partner that forms the dualism of universes.

Over the cycle of the graviton for the description of this larger space, one part is again subsumed into the description of the other. However in this case, the process of subsumation does not result in the loss of space as distance but rather its accumulation. The distance contained by the universe inflates or expands.

A cycle has occurred that refers to the relationship between two objects, the singular universe of the observer and an imaginary partner universe. This relationship must change to the observer because both parts of the cycle are not singularly observable by the observer — one part is lost. The result is that the discrete relationship between the real and imaginary universes collapses. Distance, the property of the imaginary portion, becomes real to the observer on each cycle of accumulation. In similar format for superposition (by containment), this accumulation accelerates as the initial state of the separation of the two universes collapses, and the real universe grows. This growth is the expansion of the universe predicted by relativity theory and first observed by Edwin Hubble. The distance that grows does so at every location in the universe. In its initial state the growth is relatively very small, and thus the effect is only recordable on the largest scale.

4.3 The photon: One half of the graviton

The graviton is dimensionally larger than the photon because it is the object of reference for the universe constructed as a dualism. The result is that the spin of the graviton is absolutely one-half imaginary to the classical observer and is contained by the second universe in this generalized model. The portion of the property of the graviton that can be assessed classically will not appear gravitonic and is, in fact, the complementary singularism defined as the photon. The only properties of the graviton that can be studied are those of one half of its structure, namely the

properties of the photon. These are the photon's orthogonal structure (in the half-silvered mirror experiment) and its polarization. The observable properties of the photon are studied in two experiments in Section 2 of this web site.

5. The photonic properties of the classical and subclassical universe

The photon provides the unique basis for studying the nature of property at its simplest level of construction, and at both the classical and subclassical levels. The photon displays the simplest relationship between a fundamental waveform and a particle for the same space: Property is either noncontained and classical, or contained and subclassical, to the perspective of a classical observer. Please see Chapter 1.1, The Frame of Reference for the Impressionist Theory of Everything, for a detailed discussion of these and various other terms.

6. The electron

The photon and graviton are the messenger particles of space that extends (projects) in the classical universe of the observer. By contrast, the electron closes space that is singularly contained, does not project in the classical universe of the observer. In essence, the electron is the messenger particle for the extent and containment of this format of space that includes atoms and molecules.

7. Spin and charge

Under the Impressionist Theory of Everything (IToE), spin and charge are both properties of fundamental particles that are contained in the observer's universe, and both refer to the ortho-structure of the space they define. There are three such fundamental ortho-bases of space: 90 degrees (the classical basis), 180 degrees (the simpler ortho-basis to the classical plane), and finally 60 degrees. This latter basis is not related to the two classical formats except that it is contained within the same structure. It arises in the eccentric version of the space discussed in Chapter 1.7.

7.1. Spin

Spin is the measure of rotational closure of a fundamental space and can refer to any of the above three ortho-bases of space. If the spin of a particle is one-half (1/2), then the infinity of this particle (to the classical observer) is defined through 180 degrees. This space is subclassical. Particles also exist that have their identities based in the format of the hexorthogonal geometry of IToE. The spin of a particle that is defined by the hexorthogonal structure of the subclassical plane will be some value such as 1/3, 2/3, or a multiple of this ortho-basis that is 1 or greater than 1.

7.2. Charge

The phenomenon of charge is the measure of the ortho terminus for cycle in a subclassical space to the classical observer. Thus, whether charge applies as a factor in the property of a particle is determined by whether the particle is the property of a single site in the space of the observer (displays closure of cycle at a singular location) or extends as a property of the universe itself. If a particle extends in the universe of the observer, then it cannot display its ortho-terminus at a single site to the observer, and it will not display the property of charge. Only spin will apply. Note: the property of charge will not be displayed for a more complex object (contained at a single site) having two ortho-termini that cancel.

7.3. The photon and graviton: Spin

The photon and graviton do not have charge or mass because each extends beyond a single location to the classical observer. For the photon, this extension refers to the universe as a singularism, and for the graviton this extension refers to the universe as a dualism. Since the photon is the superposed singularism of the classical universe, it has spin that is 1. The graviton as a particle is not detectable (observed) at all.

7.4. The electron: Spin and charge

By contrast, the electron is contained to the classical observer because its orbit defines

specific sites in the classical universe. Also, the electron is a 1/2-spin object. This means that the electron contains ortho-terminus and it will not cancel. The electron is a 1/2-spin object because its geometry is displayed over 180 degrees; it has a negative charge because, in the observer's universe, the natural terminus of the electron is on the negative side of the geometry. The positive value for the electron's terminus for spin is entirely missing because this terminus is the inflationary portion to closure of the negative value.

A second half-particle of opposite charge and complementary spin exists that fills the inflationary gap in the electron's properties. This is the positron. The electron and the positron define a structure that is larger than the property of either particle and is not singularly observable.

8. Quark structure

Quark structure is discussed in Chapter 1.4, Two Geometric Spaces, One Roof: The Local and Nonlocal Structures of the Unit Circle. Quark relationship is defined by the subclassical hexorthogonal eccentric geometry in the Impressionist Theory of Everything (IToE) and the strange colour force associated with quarks arises out of this geometry. Specifically, the ortho-structure between quarks contains location that is larger than it should be at the classical level. The result is that the potential for location at the classical level must be conserved when this space is opened. The energy required to conserve this potential must come from the classical domain. So, as the space of the fundamentally hexorthogonal relationship between quarks is opened to the classical observer, the bonds between individual quarks must increase, not decrease. This force is unique in Nature.

9. Conclusion

The Impressionist Theory of Everything (IToE) has been applied to define the relationship of some fundamental particles. The IToE model describes both the internal properties and the relationships of these objects. They are only completely defined when they include a fundamental singularism and dualism. Between these perspectives, a fundamental reversal of property applies.

The Impressionist and academic approaches form the fundamental dichotomy of perspectives necessary for a complete understanding of Nature.

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