

Evolution of the Donut Chain Theory of Space and Matter

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Abstract

The Donut Chain Theory of Space and Matter started during the late 1970's as one person's attempt to understand the journey taken by nature to create space and matter in the universe. The development focused on gaining a personal conceptual understanding of how such a journey might occur. Originally, the process was never intended to be definitive; nor, was it intended to produce numerical results of any significance. It was simply meant to provide a personally plausible understanding of space and matter.

The Donut Chain Theory provides a dynamic ontology for the metaphysical structure of the fabric of space. This theory has never been published or submitted to a peer-reviewed journal due in part to the challenge of communicating metaphysical relationships using a language based on physical relationships.

Many of the thoughts expressed in this note developed from conversations with Suvankar Majumder of Kolkata, India.

Significance

In 2016 the Donut Chain Theory yielded a logical calculation of the ratio of the gravitational to electromagnetic force between two electrons^[1]. The *ggee* ratio calculation requires external input of the fine structure constant to determine the *ggee* ratio to within 0.004 of a percent (0.00004) of the 2018 Codata calculated value (0.008 of a percent (0.00008) based on 2014 Codata data).

This note chronicles the evolution of the Donut Chain Theory (DCT) from vague beginnings into a tool useful for calculations that provides a causal mechanism to explain gravity and more. This theory needs the knowledge, understanding and communication efforts of someone skilled in QFT in order to advance the theory and better communicate the details. Ideally, the person would identify parallel relationships between DCT and QFT. In the absence of such a person this fundamental understanding likely will fade into obscurity.

1. Physical Understandings

The metaphysical realm (in a foundational sense, not a spiritual sense) consists of elements and behaviors that differ from those that we encounter in our physical realm and quantum realm. This creates an understanding gap and a language gap. Our languages, understandings, and physical laws reflect the physical environment that we experience. Yet, we must somehow use those physically based communication tools to explain the metaphysically based underlying foundation.

The Donut Chain Theory started with the naive assumption that the metaphysical realm could be understood. Paradoxically, the journey to understand the metaphysical realm presents challenges that could be overwhelming were it not for the naive assumption that such an understanding is possible. It would take twenty years of intense thinking before finding the logic employed had validity.

2. Drilling Down

Before we can understand nature's building process, we first need to determine the most simple starting point. Granularity helps us determine the form of that which seems most simple. Something that has granularity cannot be the most simple starting element. Next, consider physical characteristics that distinguish one elementary "particle" from another. It seems unlikely that there are variations of the most simple starting element. We consider there to be only one most simple starting element. We call the fundamental starting element *something*. We consider multiple *somethings* to be separated by *nothing*.

The *something* element of the fabric of space lacks all physical characteristics, including size. The *nothing* that separates the *somethings* is a complete void, absent even the fabric of space. *Nothing* differs from a pure vacuum. A pure vacuum contains the fabric of space.

Extension (the ability to measure distances) has no meaning at this metaphysical level. The question as to the existence or nonexistence of extension has meaning in our physical reality, but not in the underlying metaphysical reality. Regardless, we will introduce artificial concepts of *extension*, *time*, and *motion* when considering metaphysical reality because those concepts are useful to us in visualizing structures, processes, and events.

3. Starting at the Bottom – Rules & Chaos

In our physical reality there are numerous ways to build things. How do we build in an underlying metaphysical reality? The Donut Chain Theory didn't start with donut chains. Building in the metaphysical realm started with *some things* that lacked physical characteristics separated by *nothing*, a complete void absent even the fabric of space. Our selection of building tools chosen from our physical reality will greatly affect the outcome. We make our best guess and spend decades trying to figure out the building process. This may sound like a tenuous approach, because it is. Finding nature's fundamental structure requires much effort and a great deal of lucky guesswork. It is only by remarkable precision of the results that we gain confidence that the approach worked.

Starting metaphysical rules for the Donut Chain Theory are described in the following list:

No Magic – Magic in any form is disallowed. The Donut Chain Theory is a causal mechanistic theory in all respects. The existence of any field underlying the fundamental structure is disallowed. Fields must develop causally from the behavior of the structure itself. This requirement applies to force carriers and particles as well.

No Pulling

Forces – Pulling forces are disallowed. This emphasizes a particular aspect of *No Magic*. It is quite difficult to imagine how the dynamics of a structure could work with this rule.

No Centrifugal

Forces – Centrifugal forces are disallowed for *something* as it moves through *nothing*. Again, this emphasizes a particular aspect of *No Magic*. Motion of *some things* is not defined at the metaphysical level, so even this statement is somewhat misleading.

*Matter Arises
from Flaws in the*

Fabric of Space – It seems unreasonably complicating to assume otherwise. This means that solving the riddle for the fabric of space should provide clues for solving the riddle for matter.

When completely surrounded by *nothing*, and with no fields allowed; *something* lacks a reference to know what it means to be in motion. Initially the many *some things* are in completely chaotic motion relative to each other because they lack a frame of reference to do otherwise.

4. Random Contact – Order from Chaos

It took five years of thinking about a seemingly impossible start to forming a structure. This is the only time that I thought about giving up on the quest to follow nature's path. The thought only lasted 15 minutes before casting it aside and doubling down on the search. The question remained of how nature could build structure from *some things* in completely chaotic motion surrounded by *nothing*. The answer was a simple answer that should have become obvious much earlier.

The chaotic *some things* lacked knowledge of each other until two *some things* made a random contact. Upon chancing to contact each other they simply canceled opposing motions. This is the totality of what happened. We will find that it allows nature to build the universe.

5. Donuts – Mathematics of Order

For two years I pursued evaluating the mathematics of two *some things* canceling opposing motions. The mathematics eluded me. Instead, I guessed at the answer of a spiral path around the surface of an imaginary donut. This may have been a lucky guess, but it was not a free guess. It took another thirteen years of intense thinking and working with donuts to understand them well enough to solve for the chain segment length of space and the chain segment length of the electron.

The spiral path around a donut surface allows us to visualize a structure that inherently lacks *extension* and *motion*. This visualization provides a powerful tool for setting up calculations. The path facilitates *pulling* by *pushing from behind*.

Nodes provide the single most important feature of the donut. A donut with 3 poloidal (minor outer circle) revolutions for each toroidal (major circle) revolution would have 3 nodes. A donut with 3 poloidal revolutions for every 2 toroidal revolutions would also have 3 nodes. A donut with 6 poloidal revolutions for every 2 toroidal revolutions would have 3 nodes because the second toroidal revolution would follow the same path as the first. Common factors in the poloidal and toroidal revolution counts will cancel because they repeat of the same path.

The connectivity of donuts requires that all connected donuts in the universe have the same handedness. The Donut Chain Theory ignores handedness and simply assumes that all donuts have the same handedness.

Connected donuts preserve the equivalent of angular momentum when events occur between adjacent donuts. This is done by the choice of major and minor radii.

6. Chain Segments – Node Synchronization

Chain segments form the connected fabric of space. These chain segments differentiate Donut Chain Theory from other donut based theories. Understanding chain segment behavior provides both the solution power and explanation power of the Donut Chain Theory.

Chain segments are formed from the donuts described in Section 5. A donut may be viewed as a link in a chain. When a sequence of these links are connected they form a chain segment. A chain segment facilitates *pulling* in a causal mechanistic way.

Donut events between donuts occur when the *somethings* in adjacent donuts make contact at the same place and the same instant. The contact point is assumed to be positioned on the inside of the outer circle and on the main circle a direct line between the centers of each donut. Until the *somethings* from two adjacent donuts make contact no events happen. The no-event part of a cycle could be viewed as imaginary since nothing happens. This is also why events happen in quantum packages rather than in a continuous process.

The donuts may be considered as metaphysically real. This helps to visualize the elements of metaphysical reality; and to perform calculations. It is good to recognize that they are simply elements of metaphysical reality. They provide a convenient way to handle phasing, angular “momentum”, nodes, handedness, and connection requirements. Originally, I viewed the donut chain segment as rigidly fixed on each end in spite of the fact that the segment needs to twist in situations involving motion. Now, I view the chain segment ends as being in phase (or π radians out of phase) unless a change of motion is involved. Note that chain segments need not be “straight”. Regardless, we perform the calculations as if they are straight.

Chain segments with an odd or an even number of donut links behave differently. With an even number of donut links node synchronization can readily occur by swapping tangent and cotangent relationships on every other donut link. With an odd number of donut links synchronization (chain segment end links either in phase or π radians out of phase) requires a twist in the chain segment. Handling this twist requires that all donut links have identical behavior. Being identical places restrictions on the major and minor radii relationships. It is conceivable that the even link chain segments also support nodes in a manner similar to the odd donut link segments. I have not attempted the mathematics of this.

7. Slowing – Gravitational Time Dilation

The precise solution^[1] of the *ggee* ratio provides a strong argument that matter causes time dilation (slowing of the elements of space in the space adjacent to the matter). In turn, this slowing propagates outward to the other elements of space. This is a causal mechanism. Matter causes time dilation and the gradient of time dilation causes gravity.

The causal mechanism for gravity may seem to violate conservation laws. How can matter continuously slow the clocks in the fabric of space without violating conservation of mass and energy? The answer to this question will be surprising. The dynamics of the fabric of space that represent the clocks of the universe continually slow down, but our perceptions slow down at the same rate. Paradoxically, nothing slows down in a relative sense.

For the *ggee* ratio calculation we assume that the mass of the electron is due to its charge, and that the gravitational force is due to time dilation from each electron effectively reducing the mass of the other electron. For the Donut Chain Theory the relationship comes from underlying geometry and node relationships combined with *alpha*, the fine structure constant. *alpha* seems to provide exactly the linkage between the electron and space as is needed both to synchronize the electron with space; and to accurately account for transfer of the slowing effect from the electron to space.

8. Gravitational to Electromagnetic Force – ggee Ratio

Development of the *ggee* ratio from fundamental relationships in the Donut Chain Theory^[1] provides a strong indicator that DCT works. The calculation process does not require and does not allow for latitude in the choice of the exact multiplying factor applied to *alpha* squared. The *alpha* factor accurately encapsulates several component behaviors. The accuracy of *alpha* for this purpose provides an understanding of the components contained in the *alpha* constant.

Following are descriptions of the calculation steps. The First Step and Second Step are calculations for the individual donut. The Second Step relies completely on the results from the First Step. The Final Step combines the First Step and Second Step for the entire electron chain segment.

8.1. Starting Basis

The original calculation assumed that chain segment ends were rigidly oriented with their axes pointing perpendicular to the plane of the fabric. Now, I consider the chain segment ends have their axes aligned (or counter-aligned). Both views lead to the same calculation.

The calculation presumes that the electron segment has one fewer donut links than the space segment. The electron moves by the external chain segment end connection changing from one donut link to an adjacent donut link. This requires that a connected strand of the space fabric (connected chain segments) move in the opposite direction. In order for the strand of space to move in the opposite direction, adjacent chain segments in the strand must momentarily change from lengths of n to lengths of $n - 1$ and $n + 1$. Without assuming this relationship, no meaningful calculation results occur. The factors of $n - 1$ and $n + 1$ are assumed to be nodes in the electron chain segment because when a node factor equals the number of donut links in a chain, a phase shift is allowed from donut to donut with alignment still occurring at the chain segment ends.

Under the view just described, the electron chain segment must have a twist of $\pi/2$ radians. The *collision angle* between the donut links in untwisted chain segments is zero because both donut paths are parallel at the moment of collision. The twist of $\pi/2$ radians spread out over the chain segment length produces an irrational number that cannot be exactly matched from donut link to donut link. This results in a nonzero *collision angle*. A nonzero *collision angle* slows down the donut motion producing time dilation.

8.2. First Step – Segment Length and Collision Angle Calculation

This step of the calculation (modeling) was performed early in 1996. The calculation required over 20 significant digits of precision to produce results. I had to develop special computer programs to handle the precision needed. The results of the modeling produced one clearly preferred answer if chain segment lengths equal to 138 for space chain segments and 137 for the electron chain segment. Note that 137 came from the calculation, it was not forced in any way. In order to achieve synchronization of position on opposite ends of each donut there needed to be 74445 ($3 \cdot 5 \cdot 7 \cdot 709$) poloidal revolutions for every 76172 ($2^2 \cdot 137 \cdot 139$) toroidal revolutions. The resulting *collision angle* equaled $8.808727858986336E - 11$ radians.

The solution in this step was based on seemingly reasonable stability factors. The 137/138 solution was over two orders of magnitude more stable than the next best solution. The stability of the 137/138 solution was personally convincing to me; however, I did not consider it sufficient evidence to convince others.

I believed in 1996 that the only step needed to ultimately get the *ggee* ratio was to determine the timing between donut collision events in the same units that were used for the revolution count. The problem was that we needed a rational expression for the square root of the sum of the squares of 74445 and 76172. I thought that looking for a close rational expression for an irrational number would be mostly a guessing game. I have no interest in numerology and did not pursue it. The Donut Chain Theory search was laid to rest for 20 years. My curiosity was satisfied and I was convinced the theory could not be communicated.

8.3. Second Step – Timing Calculation

After release of the LIGO results in the spring of 2016, I decided to have a quick look for the timing factor. I already had the software tool needed from my earlier work. It only took about 3 hours to dust off the software and take a quick look. To my surprise an answer jumped out that was so good it either had to be the correct one; or, I would never find the correct one. This was one of only three times during the entire Donut Chain Theory process that I felt the warm surge of endorphins. The answer was that good. Had I chosen to look 20 years earlier, the *ggee* ratio calculation would have happened in 1996 when the most recent Codata values were from 1986. This would have been much more predictive.

The hypotenuse calculation contribution required using factors from both the numerator and denominator of the rational solution. The solution for the rational factor produced 173952119229567 ($7^2 \cdot 347 \cdot 253153 \cdot 3 \cdot 19 \cdot 709$). The solution was good on its own, but the clincher was the 709 factor. We get to cancel out duplicate factors present in the other legs ($3 \cdot 7 \cdot 709$).

8.4. Final Step – Other Factors and the Electron Coupling Constant

You may be wondering how we allowed ourselves to claim the need for an exact rational solution in the Second Step and then accepted an estimate for an irrational number. I don't think we can simply make that leap. There needs to be an explanation. The best explanation I have been able to muster is that the slowing rate of the clocks of the universe is determined such that it makes this relationship exact. If this guess is correct then the geometry of the electron dictates the slowing rate of the universe which is directly related to the mass density of the universe. How could something so meager as an electron determine the mass density of the universe? If synchronization requires such a particular mass density, then that mass density must develop before the universe becomes stable.

The calculations so far have been for a single donut. We need to multiply them by 274 for the number of donut connections (one for each donut participating in a collision event multiplied by 137 collision events). We also need to allow for interaction on either end of the electron chain segment (multiply by two) and account for the end segment having 3 connecting segments (divide by three).

There is a missing factor from this relationship. Each electron chain segment must connect with a space chain segment and transfer the effect of the collision events. The missing factor appears to be identically equal to *alpha*, the Fine Structure Constant (also known as the Electron Coupling Constant). There are two electrons connecting with space leading to the α^2 as the missing factor. This tells us a great deal about the components that seem to be included in the constant α .

How accurately does the DCT theoretical calculation reproduce the experimental value for the *ggee* ratio? It is 1.000075 times the experimental value calculated from 2014 Codata Value; and 1.000042 times the experimental value calculated from the 2018 Codata Value. This means the experimental value comes closer to the theoretical value. Had we completed this process in 1996 based on 1986 Codata values, the DCT theoretical *ggee* ratio divided by the experimental *ggee* ratio is 1.000300. Note that the entire change in this ratio comes from improvements in the experimental value. The DCT theoretical value within the precision of the current experimental value has not changed since the 1969 precursor values to Codata. The DCT theoretical value is more precise because it is based on the precision of *alpha*.

It is difficult to believe the accuracy achieved by DCT. The exceptional precision could make the results less believable rather than more believable. This makes it particularly important for someone with a skeptical eye to understand the calculations and communicate their assessment to others.

9. Robustness

The behaviors in this section should be considered speculative. They are presented because they demonstrate the robustness of DCT and seem more likely than unlikely to occur.

9.1. Chain Segment Twisting Motion

In order for the electron to move a connected sequence of chain segments must move in the opposite direction. In the absence of such motion a charge “field” builds up. The existence of a *collision angle* in the electron chain segment indicates that a twisting motion of the connected sequence of chain segments must occur. This twisting motion requires that the electron move and that a magnetic field exists.

9.2. Photon Spin

For the electron the twisting motion of the connected sequence of chain segments must be $\pi/2$ radians out of phase to match the phasing of the end donut links of the electron. The only candidate structure found for the photon has a similar connected sequence of chain segments, but without the electron included. In this manner, the photon has no phase reversals in its connected sequence of chain segments. The twisting of the connected sequence of chain segments seems to likely to be *spin*. The electron has half spin due to the phase reversal; and the photon has full spin.

9.3. Quantum Packets

Synchronization is a prerequisite to any quantum event. In the absence of synchronization, no event occurs. This leads to quantum events having a *packet* nature because a particular amount is required to achieve synchronization.

9.4. Electromagnetism

The twisting motion of a connected sequence of chain segments provides a candidate for the *magnetic vector potential*. This motion must be accompanied by twisting and untwisting of side donut chain segments connected at the ends of the twisting segments. For an unaccelerated system these side chain segment oscillations likely form standing waves.

9.5. Gravity

Detailed calculations of the ratio of the gravitational force to the electromagnetic force between two electrons provide evidence that parts of the Donut Chain Theory have validity. The calculations establish the source of the gravitational force.

9.6. Modified Gravity

Time dilation of the embedded clocks of space provides the causal mechanism for gravity. There is no offsetting mechanism to speed the clocks. This results in the clocks of space continuously slowing down in a nonconvergent series. The slowing rate is extremely small and affects observers as well as physical behaviors. This makes the slowing almost imperceptible. An exception to this occurs with weak gravitational fields at cosmological distances of a million or so light years or more. This results from the gravity created much earlier acting on space clocks that have slowed significantly.

The need for dark matter (as opposed to invisible matter) to balance the equations of physics is problematic. Mordehai Milgrom's MOND ^[2] gravity relationships in spiral galaxies illustrate the problem well. Modified gravity exhibits in distant regions with extremely low gravitational acceleration. It has been measured, but needs a theoretical basis that explains it. Could the time slowing relationships of DCT provide a suitable basis for modified gravity without dark matter? One would need to model the modified gravity in order to answer the question. I have not been able to model it due to time not being a suitable dimension in this situation.

9.7. Big Bang, Red Shift, CMB, Multiverses, and Neutrinos

These topics all relate to a model of the universe. DCT builds the fabric of space from donut links. I call this a Slow Growth Model rather than a Big Bang. This section should be considered speculative with no strong supporting evidence.

Neutrinos are likely donut links that interact with the Fabric of Space, but do not form a part of the structure itself. Neutrinos become the building blocks when they form a part of the structure. When I hear about neutrinos occurring in large numbers, I think of the Fabric of Space being created or destroyed.

With DCT the Cosmic Microwave Background comes from highly energetic matter forming at the growth boundary. This matter must be accelerated inward away from the boundary. Matter located more centrally in the universe is accelerated outward as part of this process. Eventually, the more centrally located matter has accelerated outward sufficiently to overcome its initial inward motion and begin an accelerated expansion known as the *red shift*. The clue that this happens lies in a decreased red shift near the CMB. I think Adam Riess has detected this, but I cannot find the reference.

Multiverses are a natural consequence of DCT since individual chain segments cannot combine unless they are closely synchronized. This is unlikely to occur except in regions with gravity strong enough to slow the universe sufficiently to match the speed of another universe. This process provides a speculative explanation of GRB's [3].

9.8. Wave Function

Aspects of DCT seem well suited to a wave function of some sort. The *ggee* calculation assumes that precise node relationships are maintained in the electron chain segment. The tangential (EM) portion of the *collision angle* cannot change the node relationships without upsetting this assumption. The node changing process is further prevented by the need for the tangential portion to propagate in an additive fashion from donut to donut. This only leaves a twisting motion of the chain segment. This is appealing because it allows for oscillations between *collision angle* sizes and chain segment twisting. The problem with this comes from the *ggee* calculation is based on the sum of the squares of the *collision angle*. In order for this to happen, the wave magnitude along the chain segment would need to be such that a root mean square value of the wave magnitude equals the overall average of the *collision angle*.

I have little knowledge of String Theory, but do consider it a candidate for better understanding DCT synchronizations.

9.9. Quantum Entanglement – QE

DCT has a speculative mechanism that provides a basis for Quantum Entanglement. Section 9.1. discusses twisting of the connected chain segment sequence for an electron. If two electrons share a common connected chain segment they would be quantum entangled. In order for this to happen without involving EM wave propagation, the outbound and inbound connected chain segments would need to be tightly bound with each other (think twisted pair). The quantum packet requirement could keep the connection from dissipating over long distances.

9.10. Baryon Triangle

A model for the baryon octet reproduces quantum numbers for the particles involved and shows decay routes. This model does not explain mesons; nor does it provide mass calculations. The model was meant to illustrate the possibility of representing baryons with DCT.

9.11. Fine Structure Constant

The Fine Structure Constant, also known as the Electron Coupling Constant, *alpha* is the only external input used in the *ggee* ratio calculation^[1]. This provides an important clue as to how *alpha* develops. The precursor paper for the *ggee* ratio has an addendum labeled “Chasing Alpha”^[4]. The addendum discusses factors included in *alpha*. The major part of *alpha*, 1/137, likely comes from interacting with only an end donut link . Since events happen many orders of magnitude less frequently in the electron chain segment, interaction with the end donut link of the electron would dominate. The remainder of *alpha* likely comes from propagation of events through the electron chain segment. To accurately model this would require a solution of the Wave Function discussed in Section 9.8.

9.12. Causal Mechanistic View

A *causal mechanistic view* of the fabric of space (or ether) has long been considered impossible or irrelevant. Einstein & Infeld^[5] in 1938 stated: “Science did not succeed in carrying out the mechanical program convincingly, and today no physicist believes in the possibility of its fulfillment.” Griffiths^[6] in 1981 stated: “Maxwell himself came to believe that electric and magnetic fields represented actual stresses and strains in an invisible primordial jelly-like “ether”. Special relativity has forced us to abandon the notion of ether, and with it Maxwell’s mechanical interpretation of electromagnetic fields.”

At the very heart of Donut Chain Theory lies a causal mechanistic view. One might conclude that the DCT view must be reaching. The *ggee* ratio calculation^[1] develops directly from DCT’s underlying causal mechanistic view. It is close to impossible that this ratio could be within 0.004 percent (0.00004) of the Codata derived ratio without there being some basis for the causal mechanistic view.

The causal mechanistic view extends to other aspects of physics ranging from a view of baryon structures to a view that requires modified gravity in circumstances that resemble those required by MOND^[1] gravity. DCT provides physicists a powerful tool for exploring other phenomena.

10. Limitations

10.1. Public Acceptance

The failure to publish papers detailing DCT automatically limits its public acceptance. I lack the experience and affiliations to even consider publishing. Regardless, a full explanation of DCT would require many papers on topics that are both difficult to understand and seemingly in conflict with accepted beliefs. The *ggee* ratio calculation should be conclusive for anyone who takes the time to understand it. This is not a trivial undertaking, but limiting the scope of publishing to the *ggee* ratio calculation itself seems achievable. Even that undertaking likely would best be approached by taking a skeptical perspective.

10.2. Motion

DCT currently only considers a static model with some aspects of motion. Inclusion of the dynamics of DCT would add greatly to the theory.

10.3. Three Spatial Dimensions

DCT relationships are based on two spatial dimensions. It does not lend itself readily to three spatial dimensions. My current best guess is that the third spatial dimension comes from multiple *somethings* traveling the same donut path in a fashion that many holograms are formed. This does not feel satisfying to me.

10.4. Physical Linkage

DCT developed conceptually without concern for physical unit relationships. Note that the *ggee* ratio is a pure number constant. Much work is needed in this area.

References

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