Rotations within Rotations

A Foundation for a New Modern Physics

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To all the family, friends, marines, musicians, coworkers, girlfriends, and just random nice people that I've been fortunate for having in my life over the decades of me 'working on physics'. Especially, I have to thank my parents, my sister, Lesley, and Kathi. I'm very lucky to have far too many good friends to name them all here. I don't feel like I would be alive if not for some of you.

Table of Contents

1. Abstract

I've learned from studying philosophy that when you have rock solid inferences, and a crazy conclusion, then there must be something wrong in one of the premises. Bell's Theorem is rock solid, and having to choose between realism and special relativity is crazy, and so something in the foundation of physics must need adjusting. I will define a simple geometry that is slightly more complicated than three dimensional Euclidean geometry, but is slightly less complicated than four dimensional spacetime. It is comprised of only spatial dimensions and using the space displacements between two events in those dimensions, I will define time displacements, the spacetime interval, the speed of light, matter, and the rate of change will define the fundamental force. I will mathematically and conceptually derive rest mass, momentum, total energy, angular momentum, time dilation, Bohr's Quantum Condition, and the DeBroglie Relations. This is not a hidden variable interpretation of quantum mechanics. I take the existing principles and concepts of modern physics and I apply it to a slightly different simpler foundation. A foundation for a new modern physics.

2. Introduction

In Physics, a child does not become an adult until they accept that we live in a non-realist universe. That matter physically exists as a probability, there are many universes that differ by coin flips, or any number of other non-realist interpretations of quantum mechanics. Einstein, Schrödinger, and countless others, including myself, have never accepted that. Bell's Theorem is rock solid however, and so that means that we must have either an incomplete understanding of the speed of light as a maximum or an incomplete understanding of causation. Note that I am not saying an 'incorrect' understanding, but instead an 'incomplete' understanding. By the end of this paper, the reader will see how they are actually both, in the same way, incomplete.

This entire paper is built on one single simple idea. It is not a hidden variable, but instead a simple foundational change. A way to look at all the same physics in a slightly different but unified way. To see the forest from the trees. Once the reader sees the forest, no tree will look quite the same. I apply all the main principles of Relativity, Momentum-Energy, Quantum Mechanics, force, etc., to the new foundation to show a more simplified picture of the universe. This is a realist interpretation of Quantum Mechanics. It also does not violate the principles around the speed of light and Special Relativity. I do not question any core aspects of modern physics. All I did was put them on a different foundation to pull the rug from underneath of Bell's Theorem. The standard murky definitions of local and non-local will be abandoned. The new foundation defines both under the same single simple but more concrete definition. Again, I do not doubt any of the existing math and experimentation in modern physics, I just doubt the ways we understand those things.

The basic idea in this paper is that we currently define spatial dimensions incorrectly with what exists in the natural universe. The normal way spatial dimensions are viewed is like in Euclidean geometry where you have an x, y, and z axis and each are a straight line and represent a spatial dimension. Einstein did so much that I never could have done, and brilliantly figured out that time was not a constant and that matter, space, and time impacted each other, but I believe that by treating spatial dimensions like straight lines is where physics made a wrong turn, so to speak. Due to Einstein, we all know that there are no truly straight paths of travel because there is matter in the universe and general relativity exists. Nothing in the definition of matter seems to support straight lines either. Instead of straight lines, this paper will be defined by rotations. Everything that can be regarded as matter is a part of several rotations. I will define spatial dimensions themselves as being along these rotations. These rotations are not completely independent from each other and, basically, this paper is built on a universe of rotations within rotations and Dimensions within Dimensions. The Dimensions are spatial dimensions and the rotations within those Dimensions have a space displacement. Therefore, the universe can also be thought of as space displacements within space displacements. With these space displacements within space displacements along rotations within rotations, I will define time displacements, the spacetime interval, the speed of light, matter, and the rate of change will define the fundamental force. I will mathematically derive rest mass, momentum, total energy, angular momentum, time dilation, Bohr's Quantum Condition, and the deBroglie Relations. That the universe is rotations within rotations is why there is a maximum known as the speed of light and also why the minimum amount of action, or quanta, exists. This basic idea of rotations within rotations will solve the Schrödinger Cat Paradox of

Quantum Mechanics, the Twin Paradox of Special Relativity, and the Triplet Paradox of Special Relativity that I will propose in this paper. Since time can be defined by space displacements within space displacements, then the math can be much simpler than current modern physics. I will also mention some new possibilities with experimental physics. Things that were previously impossible, like determining both position and momentum, will now just be really really hard. Some things that were previously really really hard, will now be a little bit easier.

I am no Heisenberg or Schrödinger when it comes to math. The math in this paper is no more challenging that Special Relativity. The strength of this paper will not be the language, but instead just what the language is trying to describe. The most important thing in this paper, by far, is simply the most basic idea and visual image. This is challenging material that is difficult to explain in a sequential fashion. I highly suggest to the reader to read the paper once through without thinking too much, to get the big picture, and then read through again to think about the ramifications.

This paper can be considered a Theory of Quantum Gravity and a Theory of Everything. The word 'Everything' is tremendously misleading though. This paper is a start to a new foundation, but much has to still be built on top. Prior to the release of this paper, this paper has been the sole effort of myself. With its release, anyone will be able to build on it. Physics ultimately is a team sport. I am enthusiastic for anyone that reads this paper. This paper is ambitious to the point where the majority of it could be deemed incorrect and it could still have a major impact on the math and experimentation of modern physics. Enjoy the read!

3. Odds and Ends

3.1. Reference Frames

As everyone knows, Newton proposed a universal reference frame that all matter moved relative to. This aether was obviously disproven with the Michelson-Morley experiment. In both Special and General Relativity, my favorite physicist Einstein's focus was on 'local' inertial reference frames in conjunction with a latticework of clocks. As is commonly known, if you go outside of 'local' reference frames then there are many difficulties, and there is no arguing with the effectiveness of Einstein's approach. However, I believe that limiting oneself to only local reference frames limits one's ability to see the forest from the trees, so to speak. While I will not use a universal reference frame like Newton did, I will use both inertial and non-inertial reference frames that are not local. I will do this because in doing so, it leads to seeing some behaviors in the universe that one would not otherwise see. I will write more of the limitations and fallibilities of the traditional latticework of clocks and the notion of truly inertial reference frames throughout this paper.

3.2 Units of Measurement

Within this paper I will use the velocity of light, c, to convert time into meters, momentum into mass, and energy into mass. Momentum-Energy, or momenergy, is also then mass. In other words, I will use the Natural Units for time, which is meters.

3.3 Abbreviations

E is total energy, K is kinetic energy, P is potential energy, m is mass, p is momentum, L is total angular momentum, h is Planck's Constant, f is frequency, and w is wave number.

I will refer to the conservation of momentum, conservation of energy, and conservation of angular momentum as the conservation laws.

I will call the "spacetime interval" simply the "interval" (which, like time, is in meters)

3.4 Vectors vs. Scalers

There are many times in this paper that I will ignore that relative direction is changing, and will write of vectors like scalers. This is done in cases where the relative spatial direction is changing relative to an observer, but is still in an inertial, or free float, reference frame.

3.5 Objects

Within this paper, I will frequently use the term "object". By "object", I simply mean a single chunk of matter. Mass means much more than matter, and historically "systems of matter" can be arbitrarily defined. The definition of matter will be more concretely defined throughout this paper.

3.6 Circles vs. Ellipses

Within this paper my math and diagrams will cover the most basic cases. In other words, all matter is being treated as being uniform, there are only circles and no ellipses, and there is generally equilibrium. By no means should the reader take that to mean I am suggesting, for example, that everything travels in a perfect circle. I will largely leave out many important, but for the purposes of explanation of the concepts of this paper unnecessary, complexities.

3.7 References and Acknowledgments

Since this paper is at the very foundation of Physics, then most Physics information is very common knowledge, introductory Physics. I will use three main introductory college textbook references. They are of undergraduate level as is my mathematics. The two for Quantum mechanics are “Quantum Theory at the Crossroads” and "What is Quantum Mechanics - A Physics Adventure". The main textbook referenced for Special Relativity and Momentum-Energy is "Spacetime Physics". Given how basic this paper is, I will avoid giving references for anything found on wikipedia, and will instead assume that is common Physics knowledge.

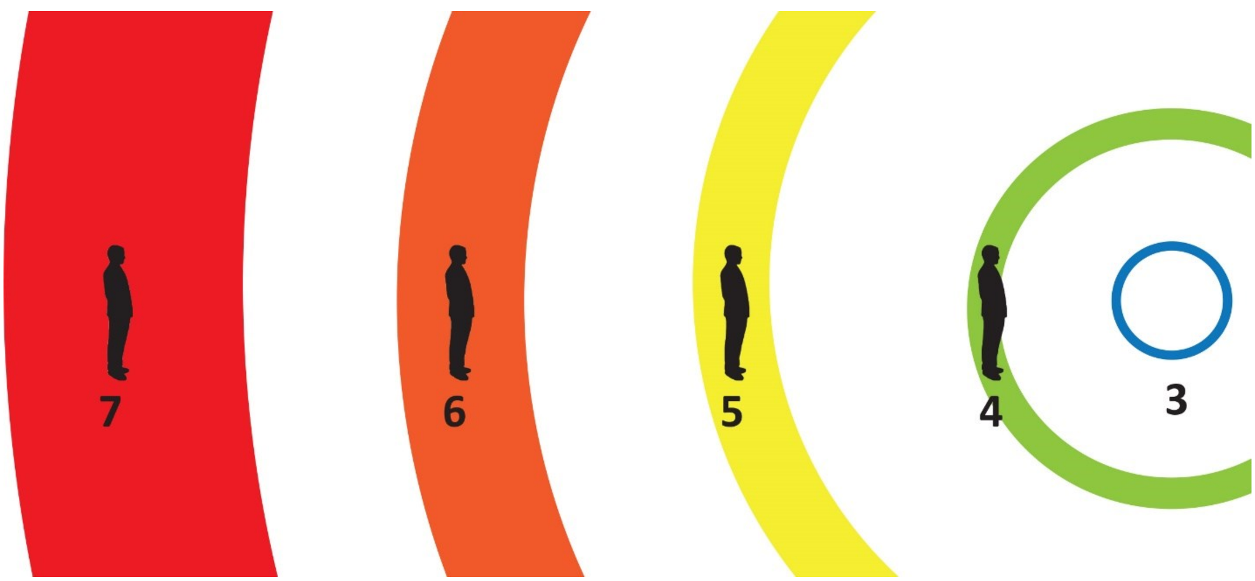
I would also like to thank my friend Jeremy Avery for taking my horribly drawn diagrams and making much better versions of them. I’m thankful the reader doesn’t have to endure the ones I drew.

4. Rotations within Rotations and Dimensions within Dimensions

The Universe, and all matter, are rotations within rotations within rotations, and so on, with the rotations, or angular momentum, being by orbit or spin. All matter, particle or system, is defined by the rotations of the various systems of matter that it is a part of. i.e. a spinning top on the Earth is defined by all the rotations the top contains, like electrons, etc., as well as, the rotations of the Earth, the Solar System, the Milky Way galaxy, etc. This should not be too controversial, as everything from sub atomic particles to galaxies have rotations, and angular momentum.

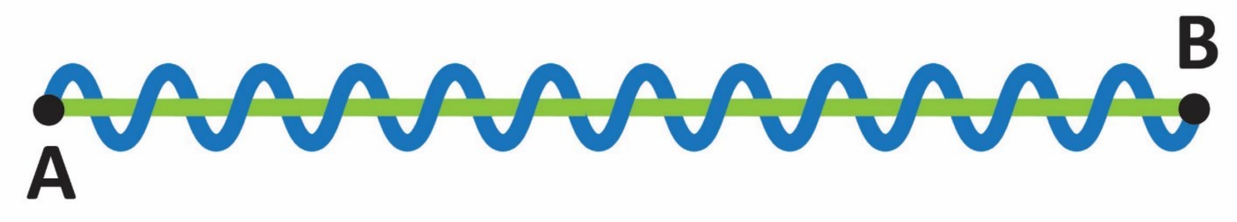
To paint the picture a bit more, let's say that we have an observer 4 in a reference frame on the Earth and they are staring at a point marked on the outer edge of a spinning top. Let's then also say we have an observer 5 in a reference frame within the solar system and around the sun but outside the orbit of the Earth. Then also an observer 6 in a reference frame within the Milky Way galaxy but outside the Solar System, and an observer 7 that is outside the Milky Way galaxy but within the known universe. Such as:

Diagram 4.1 – Observers in Different Rotations



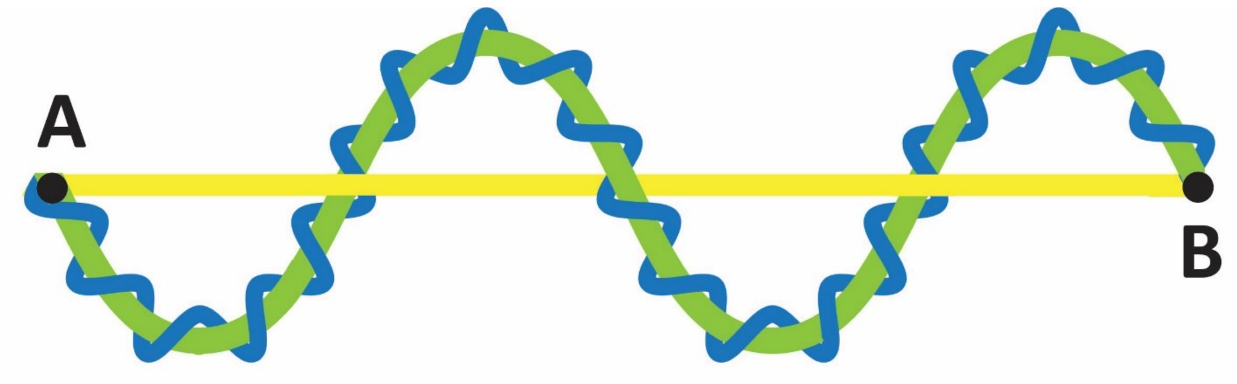
If the observer 4 is stationary relative to the center of mass of the Earth, and observing the point on the spinning top that is also rotating around the center mass of the Earth, then they will observe the point on the surface of the spinning top as not traveling in a straight line, but instead will observe a space displacement that follows the rotation of the top along the much larger, and therefore relatively flat, spin rotation around the center of mass of the Earth. In other words, for spacetime events A and B:

Diagram 4.2 – Observing a Rotation within a Rotation



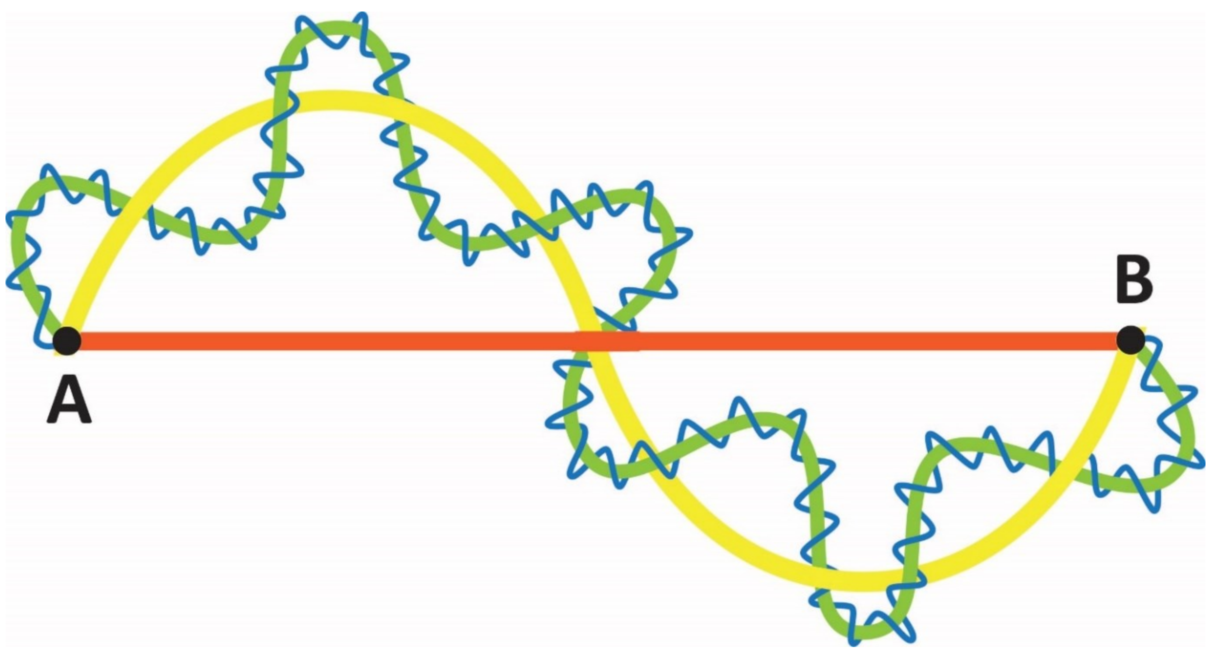
If then let's say we have an observer 5 that is beyond the edge of the Earth's Solar System, which also has spin rotation, and is stationary relative to the center of mass of the Sun, then observer 5 will view the following:

Diagram 4.3 – Observing a Rotation within a Rotation within a Rotation



If then let's say we have an observer 6 that is beyond the edge of the Milky Way Galaxy, which also has spin rotation, and stationary relative to the center of mass of the Milky Way, then you would get something like the following:

Diagram 4.4 – Observing a Rotation within a Rotation within a Rotation within a Rotation



Obviously, my diagrams are for the most basic examples, but hopefully they illustrate the point:

Main Point 4.1 – All observers outside a particular rotation, or angular momentum, will observe a curved\wave path of travel when observing matter within that particular rotation, or angular momentum.

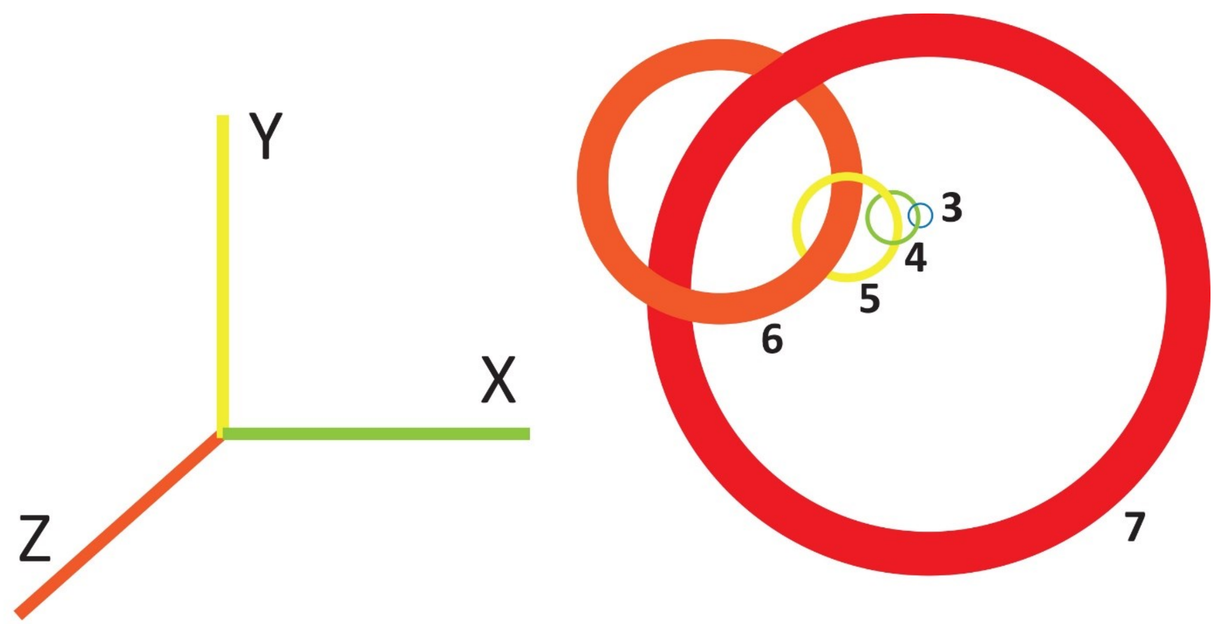
There is no such thing as completely empty space or a completely straight path of travel. All matter travels in a curved or wave path, or frequency, in some reference frame, and even within the same angular momentum straight paths of travel do not actually exist. All matter is rotations within rotations within rotations, and so on, which means it is angular momentum within angular momentum within angular momentum, and so on, too. One of the critiques of Bohr's Quantum Condition was Sommerfeld's critique that it could only be applied to when things moved in a circle or ellipse (QM p.134). I am suggesting Bohr's Quantum Condition can be considered a general physical law, because all matter does have rotations and angular momentum in some reference frame and nothing can travel in a completely straight line.

So while all that read this are trained not to think of the electron moving around the nucleus, that is exactly what I want the reader to do early in this paper. Basically, the reader can initially think in terms of Bohr's early atomic model where there are stepped orbits and electrons do not emit light as they rotate and instead change radius as photons are absorbed\emitted (QM 115). Visualize the atom in terms of it's angular momentum, whether by spin or orbit. It is very close to visualizing like Schrödinger's Wave Mechanics. Angular momentum, or a rotation, like a wave, is just an oscillation. The electron has spin as well as orbital rotation around the atom nucleus, but the atom nucleus has orbital rotation around the Earth, and the Earth has orbital rotation around the Sun, the solar system has orbital rotation within the galaxy, etc. In particular, it is the angular motion around an axis (or point) that is at the heart of it all. It creates the radius\frequency, which differs in magnitude greatly from galaxy to solar system to planet to atom, and so on.

5. Rotations and Dimensions

Normally, dimensions are thought of like the x, y, and z axis. Each axis is thought of as a degree of freedom in one direction and they all intersect. A space displacement along any axis is a straight line. Within this paper a Dimension (notice the capital 'D') is actually not defined by a straight line axis, but instead is defined by a point, or reference frame, at a center of mass with which there is a rotation around that point. The rotation can be orbital or spin. Typically, one thinks of a rotation as Angular Momentum. One can also think of a rotation in terms of angular velocity. The reader can visualize and represent the math with angular momentum or angular velocity, but for the majority of this paper, the visual picture and math I will use is the curved line space displacement along a rotation between two events, or the length of s_a. At any instant, this is the tangent to the curve velocity. In this paper, Dimensions 5, 6, and 7, for example, each have a curved line space displacement along a rotation. I initially introduced the term "Dimension" simply for the readability of this paper, but now I see how close that it really is to dimensions, and how much the terminology helps in conceptualizing this paper. Dimension will not be in any equation, but instead the equations will mostly contain the space displacements of matter between two events along the rotations around centers of mass of other chunks of matter. A normal dimension is a degree of freedom, while a Dimension is more like a degree of restriction. For example, the Earth has motion around the Dimension of the Sun. Matter on the Earth is free to move as it wants on the Earth, but is restricted in that it's motion must also move around the Sun. Dimensions in this paper do not intersect like straight line dimensions. Instead, for example, the point at the center of mass that defines Dimension x is a point along the space displacement of Dimension y, with the point at the center of mass that defines Dimension y also being a point along the space displacement of Dimension z.

Diagram 5.1 – Euclidean x, y, z vs. Five Rings with Center at each of 3, 4, 5, 6, and 7



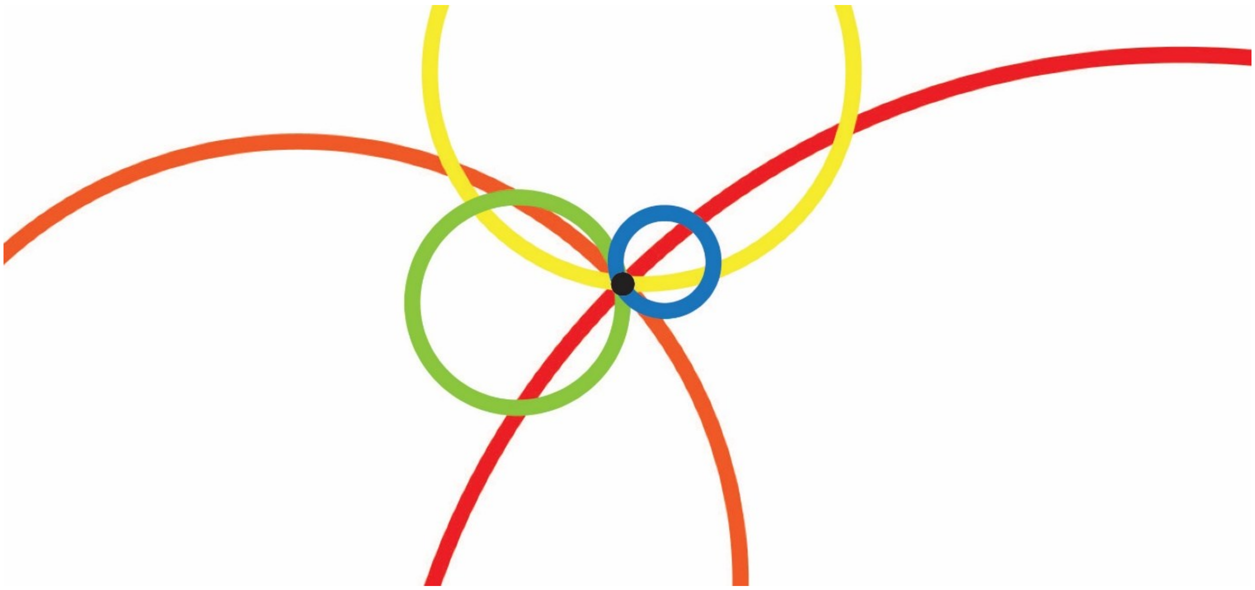
Good to note that I will use the term rotation, but in many cases any oscillation would do. Oscillations like simple harmonic oscillation can still apply, but the visual picture I would like to paint is easier to think about in terms of rotations, because for the majority of this paper, matter is in inertial reference frames. Non-inertial, or accelerated, reference frames will be covered when I write of force and collisions.

So, let's say we have the mass known as the Earth, then the Earth is a Dimension and the Earth's orbital angular momentum around the Sun is a rotation. The Sun has a particular center of mass with motion around it and so is also a Dimension. The Milky Way Galaxy is also a Dimension and the Sun has a rotation in that Dimension. The Earth also travels around the center of mass of the Milky Way and so the Earth also has a rotation in the Dimension of the Milky Way. Every atom that makes up the Dimension known as the Earth, is also itself a Dimension that has a rotation around the center of the Earth. Two different atoms that each make up part of the Dimension of the Earth will each have different rotations around the center of the Earth. Every electron on the Earth is also a Dimension that has rotations of the Earth, rotations of the Sun, etc. I say an electron is a Dimension because I propose that an electron is made up of smaller matter that travels around it's center of mass. As stated previously, I fully understand that one is not supposed to view an electron as traveling around an atomic nucleus, or that the electron is made of smaller matter traveling around it's center. That is for good reason. However, I will be changing the foundation of physics in a way that will make it possible to think of it like that, for now at least.

One can also think of it as each rotation of any Dimension can be thought of as a simple wave. All the rotations, or simple waves, can be combined, or superimposed, to make a Dimension, or complex wave. Like modern day quantum mechanics however, there are differences, and the universe is more than just a standard complex wave. The reader can also think in terms of General Relativity, and that each rotation causes a particular warping of spacetime. If you add up all the rotations of a Dimension, then you get the total warping of spacetime of that Dimension. Again, while any oscillations will work in some cases, for most of this paper, the reader should think as rotations and inertial reference frames. This will all be stated more precisely throughout this paper.

Most all Diagrams in this paper will show various rotations of a particular chunk of matter, or Dimension. For example, if the diagram is of the Dimension known as an electron, and is in an atom on the Earth, then it will show all the rotations that the electron has within an atom, the Earth, the Solar System, the Milky Way galaxy, etc. For example:

Diagram 5.2 – overlapping angular momentums



Each of those colored curved lines is a rotation of a particular electron Dimension. At the center, is the chunk of matter, or electron. All of these rotations intersect at the electron Dimension.

As previously stated, the reader can also initially think of all this in terms of angular momentum or angular velocity. At the heart of a Dimension is matter traveling around an axis or point and the conservation of total angular momentum. Matter, time, space, and motion can vary within a particular Dimension, or degree of freedom, but all are constrained by the conservation of total angular momentum of that Dimension. The conservation of total angular momentum within a Dimension tries to keep the Dimension's total angular momentum constant, and when it cannot, then a force, or torque, is observed, and a transfer of angular momentum between Dimensions occurs. Normally in this paper though, instead of viewing as the angular momentum and area under the curve between two events, or viewing as angular velocity, I will present as space displacements along the rotation of an object around a center of mass.

6. Terminology

The following terminology could be applied to Dimensions, rotations, angular momentum, or space displacements, since Dimensions are defined by points at a center of mass with rotations, that are angular momentum, around it that have space displacements. Space displacements will generally be in equations while Dimensions and rotations will generally not. I will explain below with the word ‘Dimension’. For terminology sake, I will use 'above' to mean that if Dimension 7 is 'above' Dimension 6, then Dimension 6 is in a rotation around Dimension 7. I will use 'below' to mean that if Dimension 6 is 'below' Dimension 7, then Dimension 6 is in a rotation around Dimension 7. The Dimension of the Earth is 'lower' than the Dimension of it's Solar System, and it's Solar System is 'higher' than it. When I say matter is 'at' a Dimension, I mean the lowest Dimension that the matter has a rotation around. Matter with a velocity on earth (ie reference frame) is 'at' the Dimension of the Earth. The Earth is also 'at' the Dimension of the Earth. If a top is spinning on the earth, then both the top and all the atoms within it are 'at' the Dimension of the top. This is just terminology because it's too long of sentences to always write: 'top at the Dimension of the Earth, which is part of the Dimension of the Solar System, which is part of the Dimension of the Milky Way Galaxy, etc...'. I believe there are more Dimensions 'above' the galaxy Dimensions, and I believe there are many Dimensions 'below' that of the electron. Again, the previous terminology could be applied to Dimensions, rotations, angular momentum, or space displacements.

When I mention ‘neighboring’ Dimensions, I mean Dimensions that intersect and share a degree of freedom. For example, the Earth’s Dimension ‘neighbors’ the Dimension of our Solar System, the Dimension of the Milky Way Galaxy, as well as the Dimension of particular atoms on the Earth. When Dimensions are ‘neighboring’ then they can directly impact each other’s angular momentum. The Earth does not neighbor Mars, for example. The Dimension, or total angular momentum, of the Earth and the Dimension of Mars do not intersect. So for example, in order for the Dimension of the Earth to impact the Dimension of Mars, it would have to indirectly impact Mars via impacting the angular momentum of the Dimension of the Solar System, or above. (or obviously by the Earth sending matter to Mars, but collisions will be covered later in this paper) (‘neighboring’ might have to go away because all Dimensions try to pull all other Dimensions around them)

Obviously, this terminology can get a little strange because not only does the Dimension of the Earth rotate around the Dimension of the Sun, but, for example, the Dimension of the Earth rotates around Dimensions of any electrons within the Sun. In other words, for terminology, whether a Dimension above or below another Dimension is purely based on motion and not magnitude.

7. The Dependence of Dimensions within Dimensions

7.1 - Principle of the Dependence of Dimensions, Oscillations, and Angular Momentum

In this paper, I am proposing a universe of Dimensions within Dimensions, and rotations within rotations. Typically, in current physics, Dimensions and rotations are thought of in very independent terms. In other words, when you want to know the total angular momentum, you just add a bunch of independent angular momentums, or rotations, together. Each has their own axis, and you just add all those independent angular momentums around each axis together. The issue with thinking like that however, is that in most cases when a chunk of matter has angular momentum around two or more separate axis, like an electron on the rotating Earth around the Sun, etc., the axis themselves have motion around each other. For example, the electron has a rotation around the Earth's axis as well as the Sun's axis, but it is also true that the Earth's axis has a rotation around the Sun's axis. If one chunk of matter is involved in two or more rotations, and any of those rotations is in rotation around one of the other rotations, then a dependence between rotations, or Dimensions, is formed. It is also typically thought that if a chunk of matter is traveling along, for example, three spatial dimensions, then it has independent motion in each of those spatial dimensions. This paper is different in that Dimensions can be within Dimensions, and the space displacements along the rotations in each of those Dimensions is not independent.

More simply put, the spacetime of a Dimension is not independent from the Dimensions above it. If the Milky Way Galaxy defines a spacetime, then our Solar System's spacetime rides on top of the Milky Way Galaxy spacetime. The Milky Way Galaxy spacetime is the foundation of the Solar System spacetime. Furthermore, the Earth's spacetime rides on the Solar System's spacetime, and so on. The Solar System's spacetime is the foundation of the Earth's spacetime. If think in terms of simple waves and complex waves, the way these overlapping Dimensions, or rotations, are different from a standard superposition of simple waves, or a standard superposition of warpings of spacetime, is that they are not each completely independent from each other. Each Dimension defines a degree of freedom, but since these Dimensions contain and are contained by other Dimensions, the Dimensions constrain each other. This will all be defined more precisely throughout this paper.

The Principle of the Dependence of Dimensions, Oscillations, Angular Momentum, and Spacetime - If an object is in relative motion around two or more axis, and those axis are in relative motion around each other, then the Dimensions, Oscillations, angular momentum, and spacetime of the matter around each axis will partially depend on the matter's motion around all axis.

7.2 – DeBroglie

One very well known dependence of Dimensions, Oscillations, and Angular Momentum that is from DeBroglie is that n_a, or the number of cycles, is always an integer in order to keep the universe stable and keep waves as standing waves. In this paper the cycles of each overlapping rotation must line up. When I say that, for example, I mean that any given electron's rotation within the Earth's Dimension must line up with the electron's rotation within the solar system and the electron's rotation within the

Milky Way Galaxy, etc. In other words, the lining up of cycles for a given Dimension, like an electron, is local to that electron. If the cycles do not line up perfectly then there will be a force as a result that works to line the cycles up. A force will exist to work towards quantum equilibrium. More on force later in this paper.

More specifically, the spacetime interval and the time displacements must line up and the wavelength of each cycle along them remains constant (i.e. is quantized). The space displacement also lines up, but the wavelength of each oscillation along the space displacement does not have to remain constant. Much more detail in the section on The Principle of Stable Spacetime.

8. The Large Time Catchup at the Turnaround

Einstein's amazing and brilliant Special Relativity and General Relativity obviously showed that we do not have a very good understanding of time. Even after Einstein's very insightful work, much murkiness remained. The main area of concern is, of course, the Twin Paradox and our understanding of some of the principles of Special Relativity. While I disagree with the explanation for the Twin Paradox, I do not doubt the vast majority of both Special and General Relativity, including time dilation, invariance of the spacetime interval, momentum-energy, or that matter warps spacetime.

8.1 – A Triplet Paradox

In regards to the Twin Paradox, Einstein proposed that if one twin is separated from another and put on a rocket to a distant planet, then according to modern Relativity then both twins would observe each other's time as being slower. At the sharp turnaround, however, there is an acceleration and the twin in the rocket will observe a large catchup in time for the twin on the Earth. The large time catchup happens at the sharp turnaround for the traveling twin because the traveling twin goes through an acceleration which is due to a force. The twin on earth does not go through that acceleration and instead keeps their inertial reference frame.

One of the issues with this explanation is that let's say the twin goes on a trip in a rocket that is twice as far? In other words, outside the distance between the start and the turnaround, the trip is identical in every way including the Force used to determine exactly how sharp of a sharp turnaround. One would think that if the sharp turnaround was identical then the time catchup would be identical, but instead if the distance to the turnaround is doubled then the time catchup at the turnaround is greatly increased.

For example, let's say we have triplets. One stays on the Earth, one goes 99 lightyears in a rocket, and the other goes 198 lightyears in a rocket. Let's say that each twin in a rocket goes through an identically sharp turnaround, in other words identical acceleration. One would expect that if the sharp turnaround is identical then the amount of time catchup will also be identical. According to modern Relativity that is not the case. In modern Relativity, the twin that goes the longer distance will have a greater time catchup at the turnaround. This is a paradox. An identical acceleration should have an identical impact on time. My paper solves this paradox with the twins and triplets all agreeing on the time dilations that are occurring.

So I agree completely with the vast majority of Special Relativity and time dilation. I agree that force and acceleration change the amount of time dilation and I agree completely with the equivalence principle in regards to General Relativity. What I can't agree with however is that the amount of time catchup at the sharp turnaround depends partially on the distance of travel and not solely on how sharp of a turnaround the observer takes. It is the many miles of travel that determines time before the turnaround, and the acceleration at the turnaround does alter that time, but that altering of time is determined by the force causing the turnaround and the time catchup is not determined by the many miles of travel that happened before that force. More on force and accelerated reference frames later in this paper.

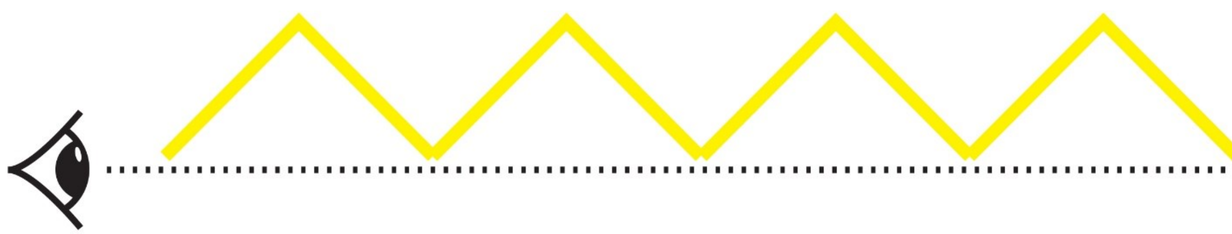
8.2 – Observers agree to disagree

To explain better, I will go through an observation from when I was 18-19 years old. One of the things that bothered me most about Special Relativity when I was young, was that once a rocket moved past a station then the light bouncing between the two mirrors of the rocket clock would no longer demonstrate a longer path of travel. In other words, if a clock with two mirrors and light bouncing between moves past you (i.e. perpendicular to observation) then you will observe the light traveling a further distance. As the clock goes from moving past you to moving away from you, then the observed distance the light travels will approach that of what the twin on the rocket observes (obviously distance of observation when perpendicular matters…or radius).

In other words, if an observer is observing a small object moving directly away from them, then the observer doesn't really observe that motion. It's like closing one eye and trying to tell the difference between a very small object two feet away, three feet away, or even a hundred feet away on the same line. The observer cannot observe that dimension. Human beings fool ourselves into thinking we can because we have two eyes, but in reality anything very very small moving directly towards us or away from us will not have that motion observed.

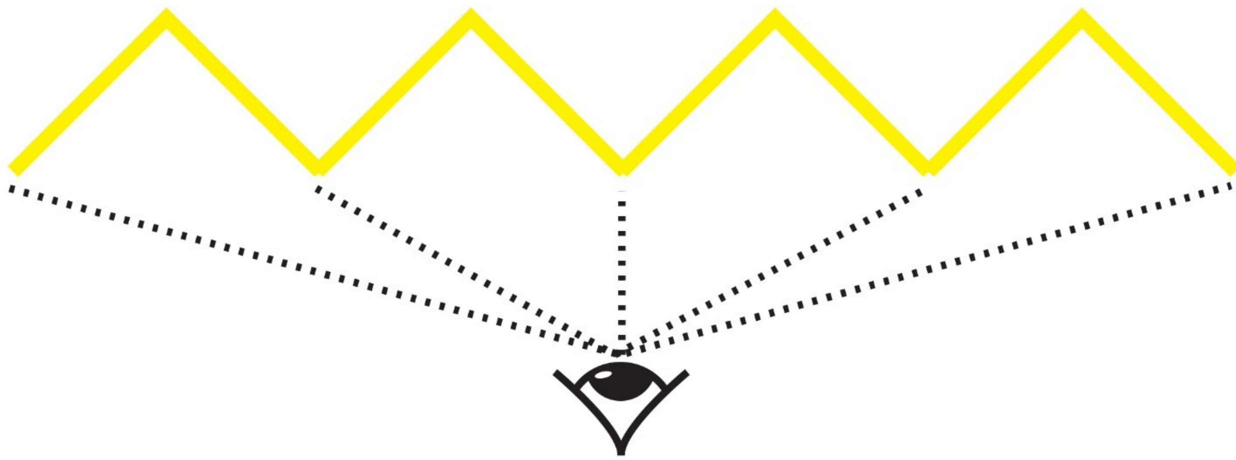
That means that if the observer is observing a rocket with a light and mirror based clock on it moving away from them, then they will observe the same distance of light traveled in that clock that a rocket observer would observe. The time that distance happens in however, will be different.

Diagram 8.2.1 – observed distance of light of clock while moving away



In other words, if an object goes past an observer in what the object thinks is a straight line and at a constant speed, then when the observer observes the object, it will not observe it at a constant speed because the distance between the object and the observer does not decrease and increase in at a constant rate. That means that instead of a constant ratio of space displacement to time displacement, or constant velocity, that the observed velocity of coming towards, going past, and moving away, will look more like a hyperbola.

Diagram 8.2.2 – observed distance of light of clock while moving past



That is the reason why the mathematics of Relativity is hyperbolic. Relativity uses a lattice work of clocks and so the 'rocket' is always going from moving towards, moving past, and moving away from what we are measuring time with. The paradoxes of Relativity mainly stem from that. If instead judge relative to the observer themselves, instead of a latticework, then no paradoxes or large time catchups will arise. Furthermore, any one clock in any latticework that was set up would also not see any paradoxes.

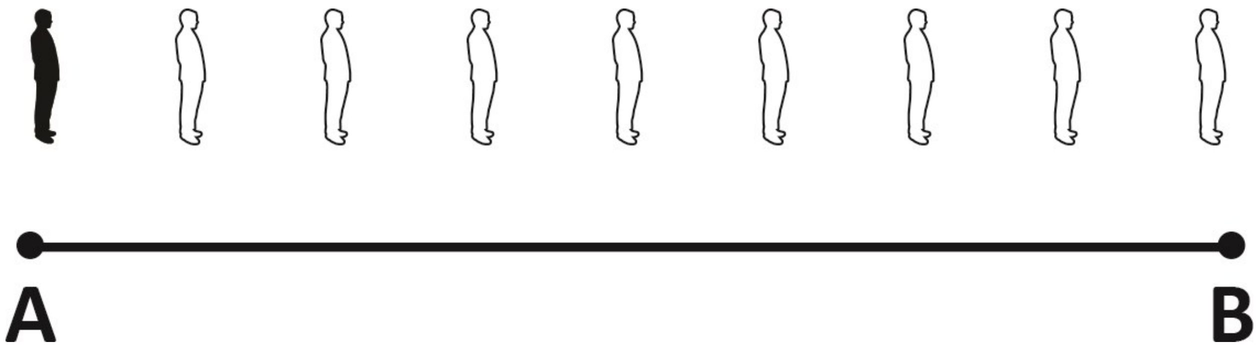
Principle – Distance between observer and observed - Distance between observer and observed matters when judging velocity, not distance according to latticework clocks that are not the observer or the observed.

Observers disagree when passing each other, agree while moving towards and away from each other, and agree to disagree when one is orbiting the other in a circle. In other words, observers passing each other in a straight line will both disagree on how much time has elapsed and which one of them is observing which time. Observers moving towards and away will agree on the time elapsed. Observers with one orbiting the other will disagree on how much time has elapsed but they will agree on which one of them is observing which time. Travel around a circle results in a constant distance of light observed.

You can try to make correct calculations by creating a latticework of clocks and essentially trying to have the rocket always, roughly, be moving past some clock, but that is just theoretical trickery, brilliant as it may be, to get the calculations to work. It is that theoretical trickery that leads to the contradictions in the twin paradox and the need for a large time catchup at the turnaround. In other words, two identical clocks separated by a space displacement are not identical clocks. I do not doubt that measuring as moving past is valid and provides wonderful insights, I just don't see it as the complete picture. To fill out the picture fuller, I would like to investigate what the station observes as a rocket travels toward and away. In Special Relativity, time and space dilation only happen in the direction of motion, so looking at motion towards and away, instead of just when perpendicular, makes sense.

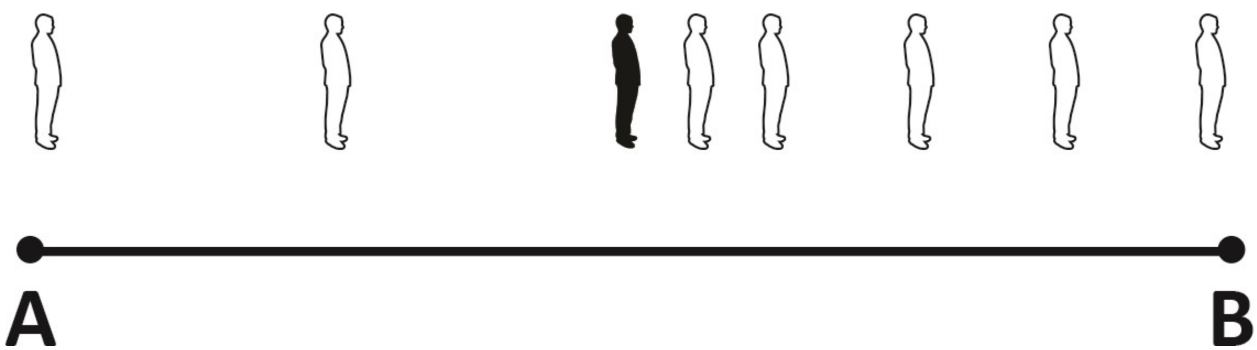
First let's look at what a rate of time might look like between a Station A and a Station B that are 8 light years of distance away from each other, that are at rest relative to each other. The reader should see the diagrams as the solid black figure represents the actual location of the astronaut traveling on the rocket through space. The silhouette figures should be thought of as representing the location of the light if light from the real figure were released every year, with the year measured using the clock of Station A. In other words, for the following diagrams, each silhouette is a light year of space displacement apart from each other.

Diagram 8.2.3 – All Observers Agree Astronaut Standing at Station A



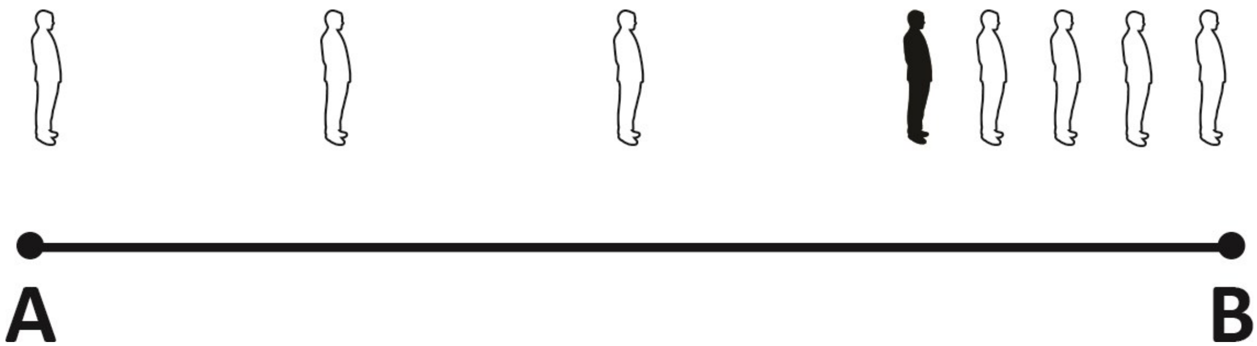
Next let's look at what it looks like with a rocket at the half way point traveling near the speed of light between Station A and Station B.

Diagram 8.2.4 – Astronaut Observes They Are Halfway to Station B



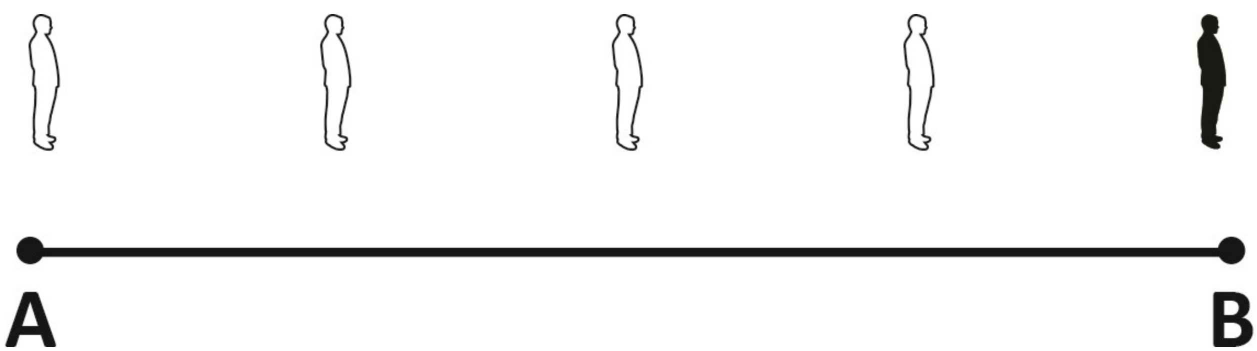
As the reader can see, time is faster in front of the traveling rocket and is slower behind the traveling rocket. In the diagram above, station B does not yet observe that the rocket has left Station A. Station B observes the rocket leaving Station A when that light of the rocket leaving Station A reaches Station B. That looks like:

Diagram 8.2.5 – Station B Observes the Astronaut Has Left Station A



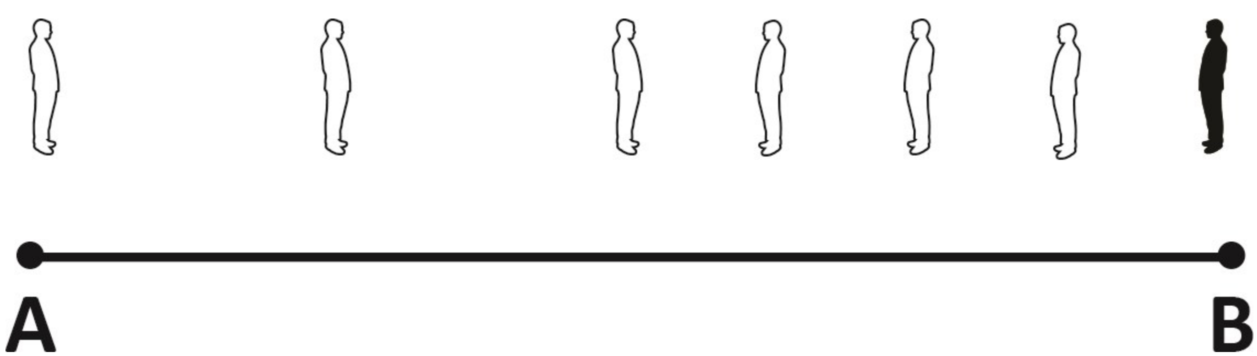
So as Station B is observing the rocket from a distance, Station B will observe the rocket leave Station A, and because the rocket is going so close to the speed of light, then station B will observe the trip of the rocket to be extremely fast (i.e. the observed time of the rocket will be very fast). In other words, light that shows the rocket leaving Station A is moving just a little faster than the rocket itself, so not long after Station B sees the rocket leave Station A it will observe the rocket arrive at station B, like in:

Diagram 8.2.6 – Astronaut and Station B Observe that Astronaut Arrives at Station B



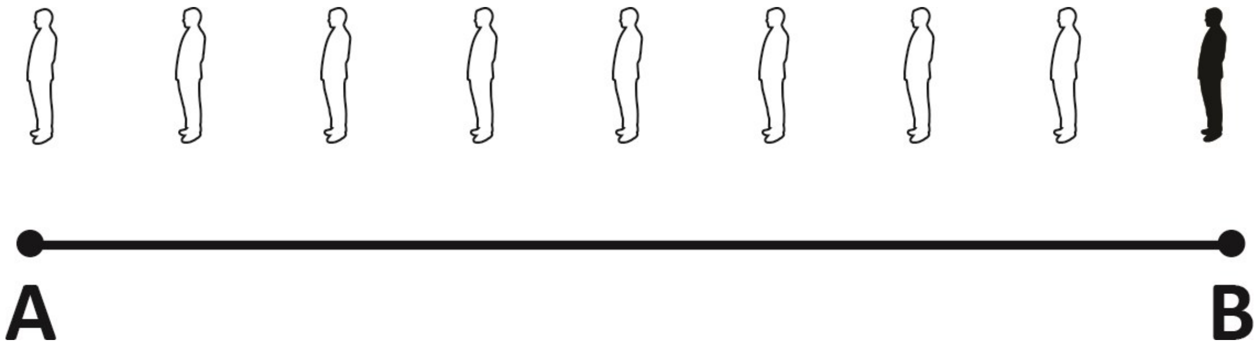
This is an example of moving towards. If the rocket stops at Station B then the light emitted at every year of Station B's time will be more frequent than it was when it was motion away from Station A, like the following:

Diagram 8.2.7 – Light From Arrival At Station B Arrives Halfway To Station A



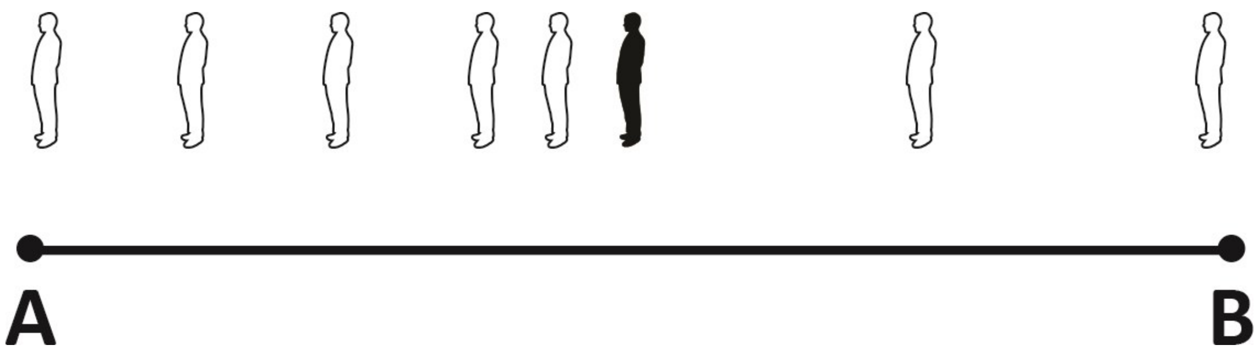
Eventually Station A will see the rocket arrive at Station B, like in:

Diagram 8.2.8 – Station A Observes That Astronaut Arrived at Station B



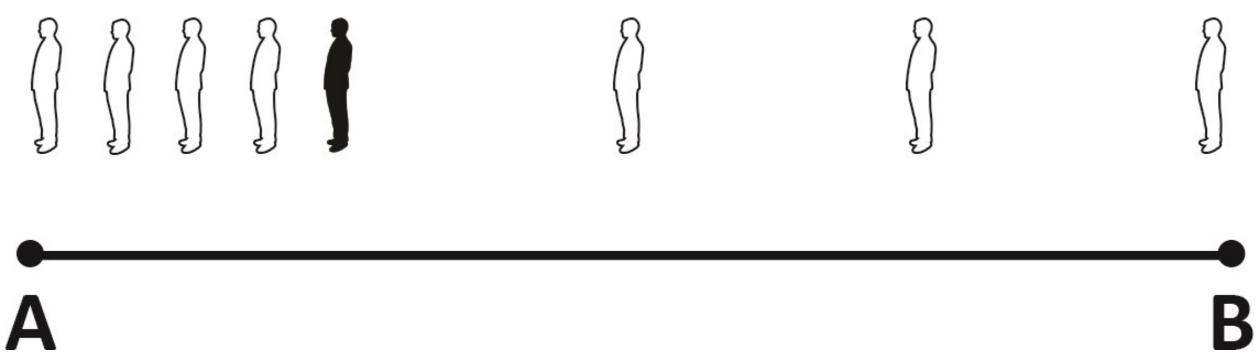
In regards to moving away, as soon as the rocket leaves Station A then it is at an ever increasing distance away and the light from the rocket takes that much longer to reach Station A. Station A will observe the time from the rocket to be very slow. From Station A's reference frame, the rocket will take a very long time to get to Station B. If the rocket started the return trip, then when it traveled halfway it would look like:

Diagram 8.2.9 – Astronaut Observes They Are Halfway Back to Station A



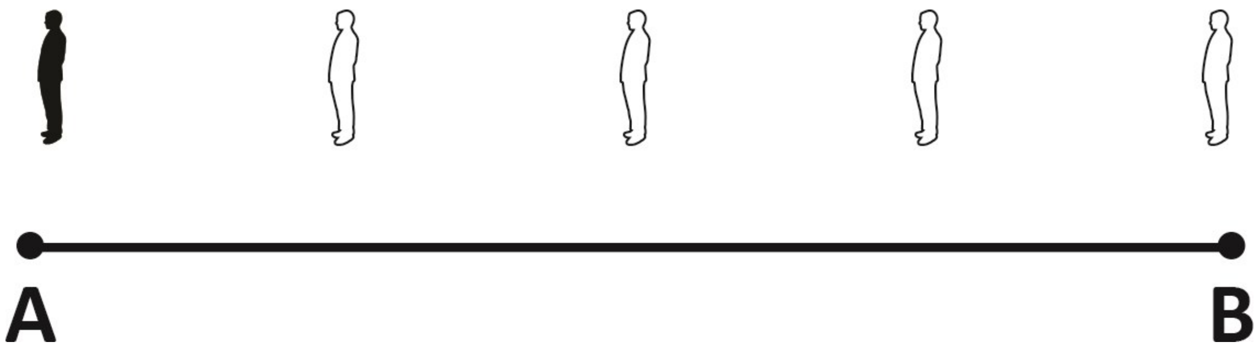
Station A will finally see the rocket leave Station B, like in:

Diagram 8.2.10 - Station A Observes the Astronaut Has Left Station B



Eventually, the rocket will arrive back at it's destination, although Station B has not observed that yet, like as is in:

Diagram 8.2.11 - Astronaut and Station A Observe that Astronaut Arrives Back at Station A



So what I am saying is, with a rocket moving from Station A to Station B, then the rocket will be very quickly moving towards station B and very slowly moving away from Station A. All observers, whether at a reference frame of Station A, Station B, or the Rocket, will observe those same things. Travel towards happens quickly, travel away happens slowly. Observed time at the point in space of the observers reflects that.

The reader, at this point, must be asking: If the Rocket observes time slowly behind them and quickly ahead of them, then what is the observed time of the Rocket itself? In other words, what are the calculations? The answer is that it is exactly as Einstein predicted. It is the spacetime interval. To think about it another way, in front of the rocket is time-like travel and behind it is space-like travel. The invariance of the spacetime interval can be solved for both situations and both arrive at the same value for the spacetime interval.

Let's plug some numbers into the example. Let's start with what Einstein would have calculated (SP p124-130). In this example station A and station B are 99 light years apart and the rocket is moving at 99/101 or 0.9802 light speed. Einstein would have predicted that the station reference frame (same frame for both station A and station B because at rest relative to each other) would observe that the trip to station B would take 101 years and the trip back would take 202 years. Einstein would predict that the time measured by the rocket would be 20 years to Station B and 40 years to get there and back. He would also say that the station frame would observe the rocket frame from station A to station B to be 3.96 years, and the return rocket frame from station B to station A to take 3.96 years. At the turnaround, when jumping from the outgoing rocket frame to the return rocket frame, Einstein predicted a large time catchup of 194.08 years. I agree that the rocket frame will observe it's own time as being 20 years to station B and 20 years back. I also agree that station A and station B will both observe a total round trip time of 202 years, and if you were to use a latticework of clocks I agree that the stations would observe 101 years there and 101 years back. However, if station A and station B were to observe each other directly to see when the rocket leaves and arrives, then they would not observe 101 years each way. Instead, when the rocket goes from station A to station B, station A would observe itself and station B's time as ticking ahead by 198.04 years and station B would observe itself and station A's time as ticking ahead 3.96 years (which totals 202 years). Furthermore, on the return trip, station B would observe itself and station's A's time as 198.04 years and station A would observe itself and station B's time as ticking ahead 3.96 years (which also totals 202 years). Furthermore, if we ask what the rocket observes when traveling from station A to station B, then it will observe 3.96 years passing on station A and 198.04 years passing on station B. After the turnaround, the rocket will observe 198.04 years passing on station A and 3.96 years passing on station B…for a total of 202 years.

So the incredibly brilliant Einstein, my favorite physicist, was indeed correct in both the round trip time observed from Station A and was correct about the amount of time observed by the rocket. He came to those conclusions by analysis of motion going past (i.e. perpendicular), and had to devise a latticework of clocks to calculate correctly. The big thing he was incorrect about in this scenario was the large time catchup at the turnaround. The acceleration however does cause the rocket to observe Station A going from slower time to faster time, because changes from motion away to motion towards.

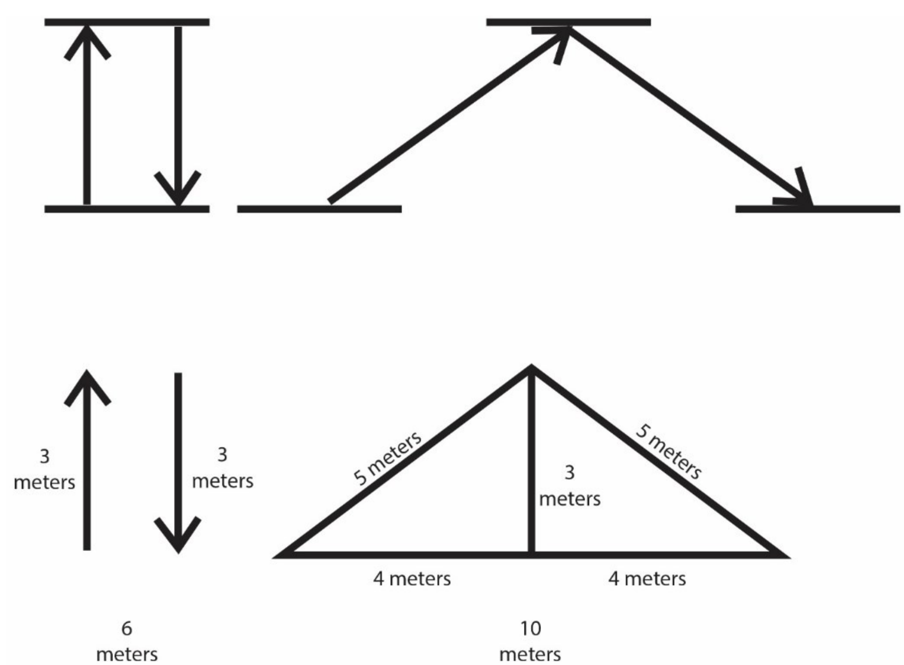
8.3 – Applying Special Relativity to Rotations within Rotations

Two of the most fundamental aspects of Special Relativity are:

1. The velocity of light is constant in a vacuum.
2. If an observer A in an inertial reference frame observes a larger space displacement between two events than an observer B in another inertial reference frame, then observer A will also observe a larger time displacement than observer B. i.e. The invariance of the spacetime interval ($interval^2 = space^2 - time^2$ and $interval^2 = time^2 - space^2$)

For example (SP p69), let's say we have an observer A at a station and an observer B on a rocket. On the rocket, there are two mirrors, mirror A and mirror B, separated by 3 meters and light is bouncing between them (i.e. acting as a clock with the light reaching each mirror being an event).

Diagram 8.3.1 – Special Relativity

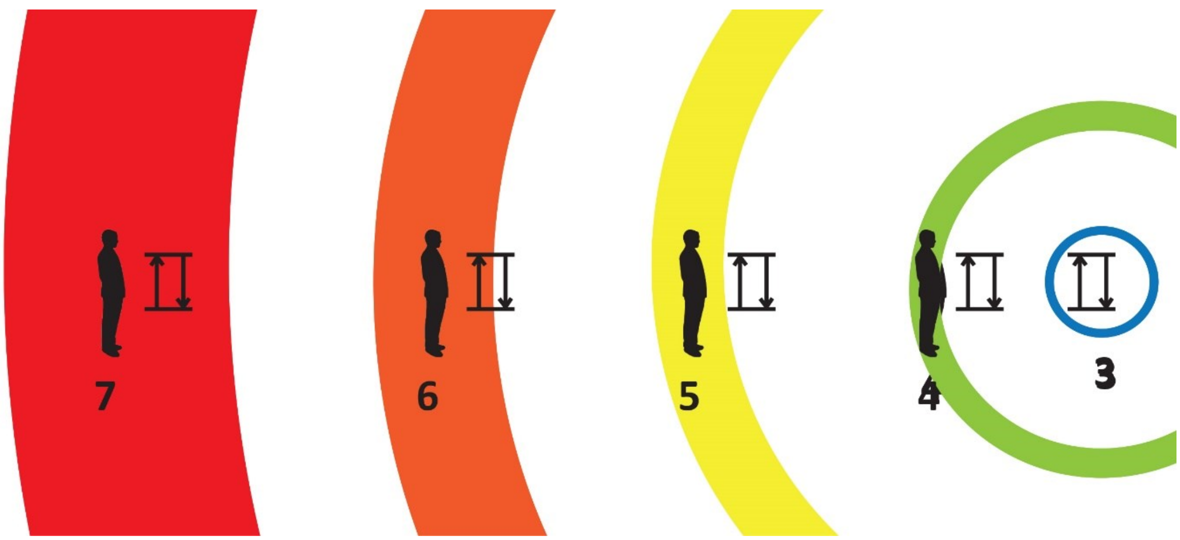


Observer B, on the rocket, observes the light to travel from mirror A to mirror B in 3 meters and back to mirror A in another 3 meters, for a total space displacement of 6 meters. However, observer A, at the station, observes the light traveling 5 meters from mirror A to mirror B and 5 meters from mirror B to mirror A, for a total space displacement of 10 meters. The speed of light is a constant, so observer A must observe more time elapsed.

Main Point 8.3.1 - If an observer observes light to travel a further distance then they must also observe a greater time elapsed. This is one of the most basic aspects of Special Relativity and is very important in this paper.

To apply this concept to my model of matter, time, and space, let's go back to Diagram 4:

Diagram 8.3.2 – Time Dilation



So let's say that each of the observers, 4, 5, 6, and 7, has two mirrors with light bouncing between them (i.e. a clock where each 'there and back' of the light is a 'tick'), and that they are all in inertial reference frames. If the clock of observer 4 is observed by observer 5, then observer 5 will observe a greater path of travel of that light, and therefore more time, between the clock ticks than observer 4 will. Observer 6 will view a greater path of travel, and therefore more time, between the clock ticks than both observer 5 and observer 4. Observer 7 will view a greater path of travel, and therefore more time, between the clock ticks than any of observer 6, 5, or 4. If two events happen at a particular Dimension, then Dimensions above it will observe a greater space displacement of the light bouncing between mirrors, and therefore greater time displacement, than any relatively stationary observers at the particular Dimension. This of course, is because the speed of light is a constant and so if an observer observes a longer path of travel for that light then it must be because they observe more time.

So if observer 5 is observing the clock of observer 4 and observes an entire cycle of Dimension 6, then the amount of observer 5 clock ticks will be based on the difference in length of the path of travel of the light of each clock through each Dimension. In other words, if the space displacement of light bouncing between observer 4's clock is l_4, and the space displacement of light bouncing between observer 5's clock is l_5, then the time displacements will be indirectly proportional like as follows:

$$\frac{t_5}{t_4} = \frac{l_4}{l_5}$$

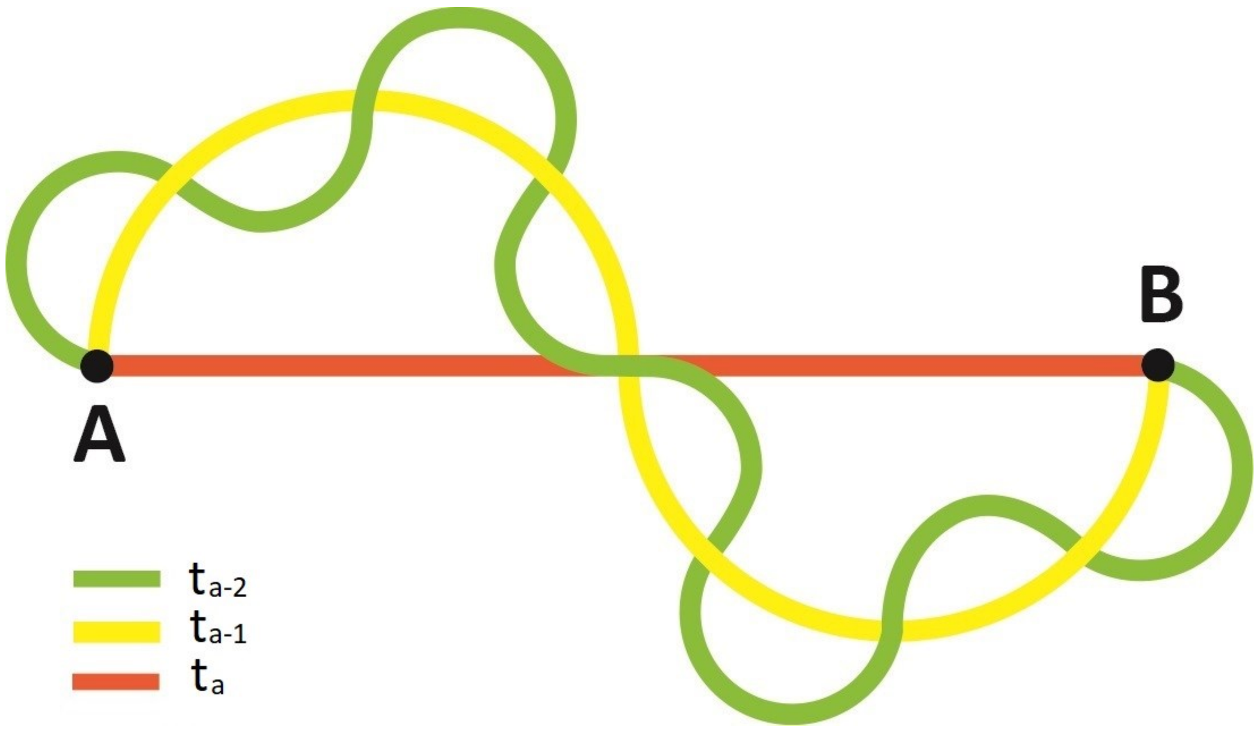
Typically, in Special Relativity, the train moves past the station just like the station moves past the train. As is known in the Twin Paradox, each twin observes the other twin as having the slower time and there is a large time catchup due to acceleration at the turnaround. This paper is different in that all free float observers agree on how much time elapses for each observed clock as observed, not from a latticework of clocks, but instead simply the single clock of the observer. In other words, this paper is different from special relativity in that each observer observes the same time dilation for each other observer. Observer 7 will observe more motion of light in observer 4's clock that observer 4 will. If observer 4 observes the clock of observer 7, I propose that observer 4 will observe less motion in observer 7's clock that observer 7 will. Observer 7 and observer 4 will agree about how much each clock disagrees. There is no need for a large catchup of time at a turn around like there is in Special Relativity. The train going past the station is different than the station going past the train because the motion of each when viewed from Dimensions above is different.

To calculate time dilation then just need to follow Einstein's example and have it be based on what the observer observes. For example, if observer 7 and observer 4 are observing each other, then they will both agree that observer 4 has extra space displacement that observer 7 does not have. Each will also view the other's time displacement the same as the other does. Going back to our previously used example, that means that observer 4 could have an extra space displacement of 99 meters and time displacement of 101 meters. If observer 4 is observing observer 7, then the observed space displacement will be zero extra meters and the time displacement would be proper time, or the spacetime interval, or 20. Both observers agree on each other's time and space displacements. The reason they do is because they are observing the time and space displacements relative to the Dimensions above those time and space displacements. There is no large time catchup at the sharp turnaround because both observers agree on the time and space dilations. Force and accelerated reference frames will be covered later in this paper, but for now I will just write that, as expected, force does alter time. To begin to explain this all more concretely, and mathematically, let's look at our most basic and simple diagram that will be used throughout this paper.

9. A Simple Diagram

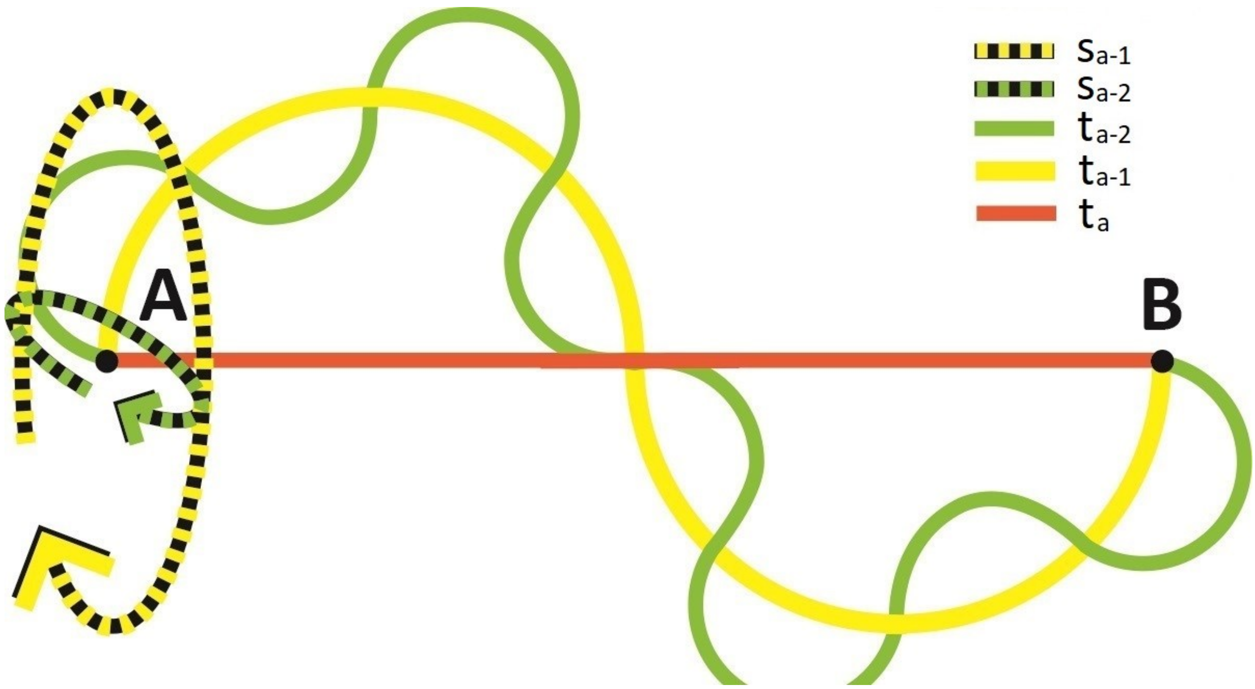
To proceed further, I must explain the following diagram and equations, as they will be used frequently in this paper:

Diagram 9.1 – Three Overlapping Rotations of Matter



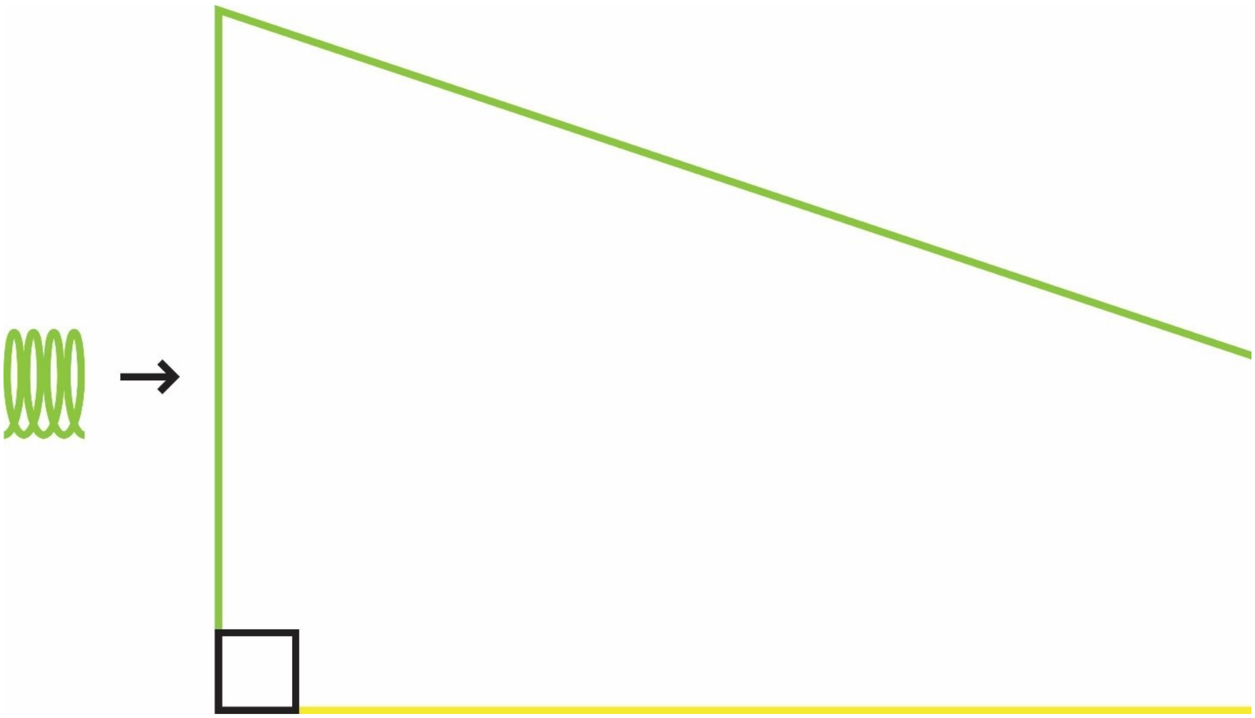
Good to remind the reader, in regards to Diagram 9.1, that the lines drawn only appear to be sine waves because looking at from a tangent, and instead the reader should view as circularly polarized waves. If the reader looks closely at the diagram the reader will see what I mean. With a picture being worth a thousand words, I mean:

Diagram 9.2 - Another Way to View Diagram 9.1



Within Diagram 9.1, some matter is traveling between points A and B. This matter has rotations within three overlapping Dimensions. The distance traveled by that matter along each rotation in each overlapping Dimension are represented as: s_a, s_{a-1}, and s_{a-2}. Due to the Dependence of Rotations within Rotations, there are not just independent space displacements, but also there is a total combined space displacement for every Dimension that is a part of, which I will name like: t_a, t_{a-1}, and t_{a-2}. Each of t_a, t_{a-1}, and t_{a-2} corresponds to the length of each line drawn between points A and B in Diagram 9.1. The displacements s_a, s_{a-1}, and s_{a-2} are represented by coiled, rotated motion. Each orthogonal rotation can be unwound and flattened, which results in being able to treat like a triangle:

Diagram 9.3 - A Rotation as a Triangle



The number of cycles between events A and B, for Dimensions a, $a-1$, and $a-2$ are n_a, n_{a-1}, and n_{a-2}. I will cover frequency, or f_a, and wave number, or w_a, later in this paper. For diagram 9.1 though, between events A and B, s_{a-1} has one cycle, and s_{a-2} has four cycles. So, in Diagram 9.1: n_{a-1}= 1, and n_{a-2}=4.

Since using circles and not ellipses for simplicity sake in this paper, the total distance traveled at a tangent to d_a and within one cycle of n_{a-1} is:

Equation 9.1 – $\mathrm{s}_{\mathrm{a}-1}$

$$s_{a-1} = 2\pi r_{a-1} n_{a-1}$$

For any t_{a-1}, you can think of it as a combination (vector addition) of $t_a$and s_{a-1}. For example:

$$t_{a-1}^2 = (2\pi r_{a-1} n_{a-1})^2 + t_a^2 = {s_{a-1}}^2 + t_a^2$$

Which also means:

$$t_{a-2}^2 = (2\pi r_{a-2} n_{a-2})^2 + t_{a-1}^2 = (2\pi r_{a-2} n_{a-2})^2 + (2\pi r_{a-1} n_{a-1})^2 + d_a^2 = s_{a-2}^2 + s_{a-1}^2 + t_a^2$$

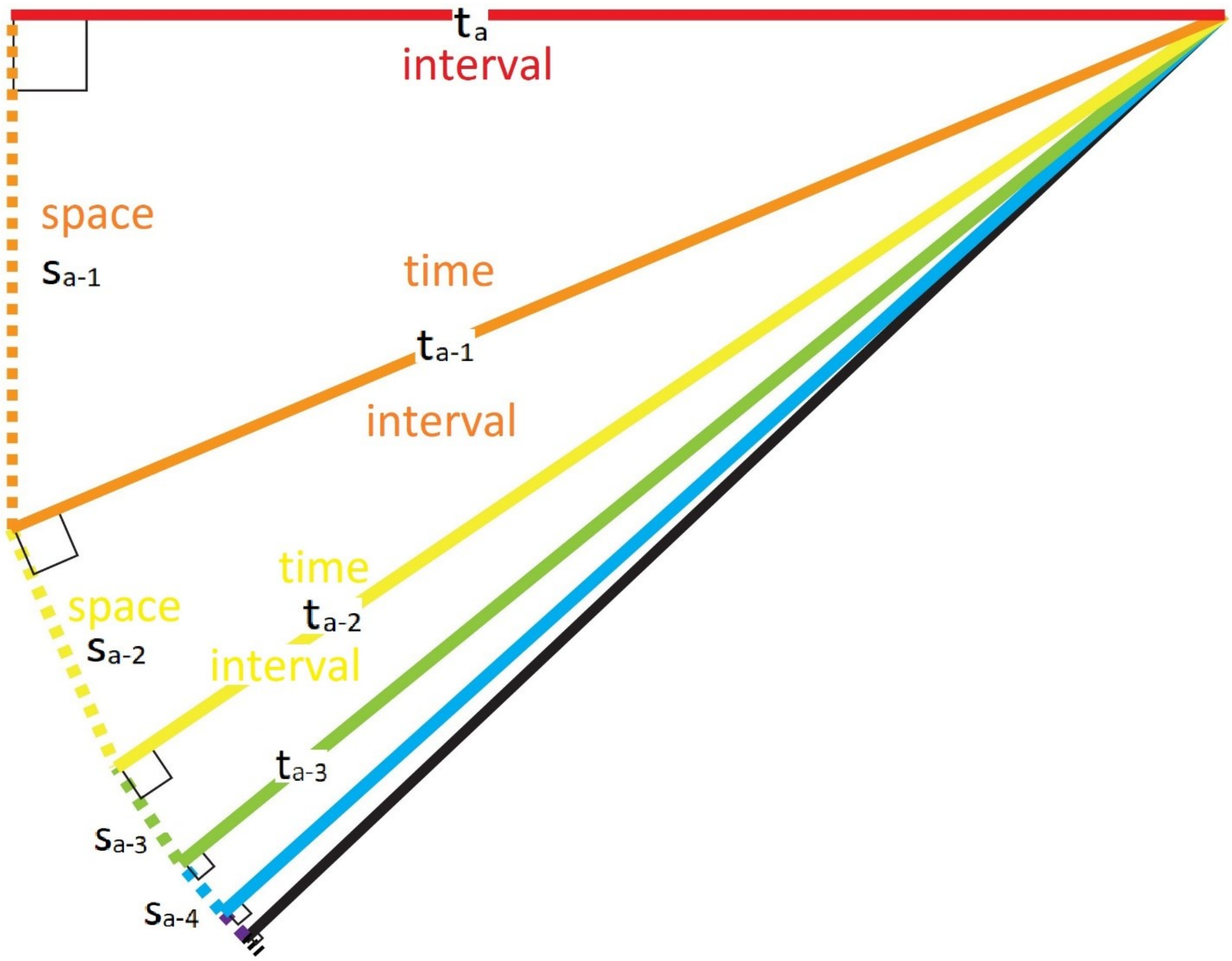
Which leads to:

Equation 9.2 – $\mathrm{t}_{\mathrm{a}-\mathrm{n}}^2$

$$t_{a-n}^2 = s_{a-n}^2 + \cdots + s_{a-2}^2 + s_{a-1}^2 + t_a^2$$

In other words, the matter is traveling along multiple rotations, or Dimensions, that are orthogonal to each other, and so Diagram 9.1 can visually and mathematically be represented with triangles:

Diagram 9.4 – Diagram 9.1 as Triangles

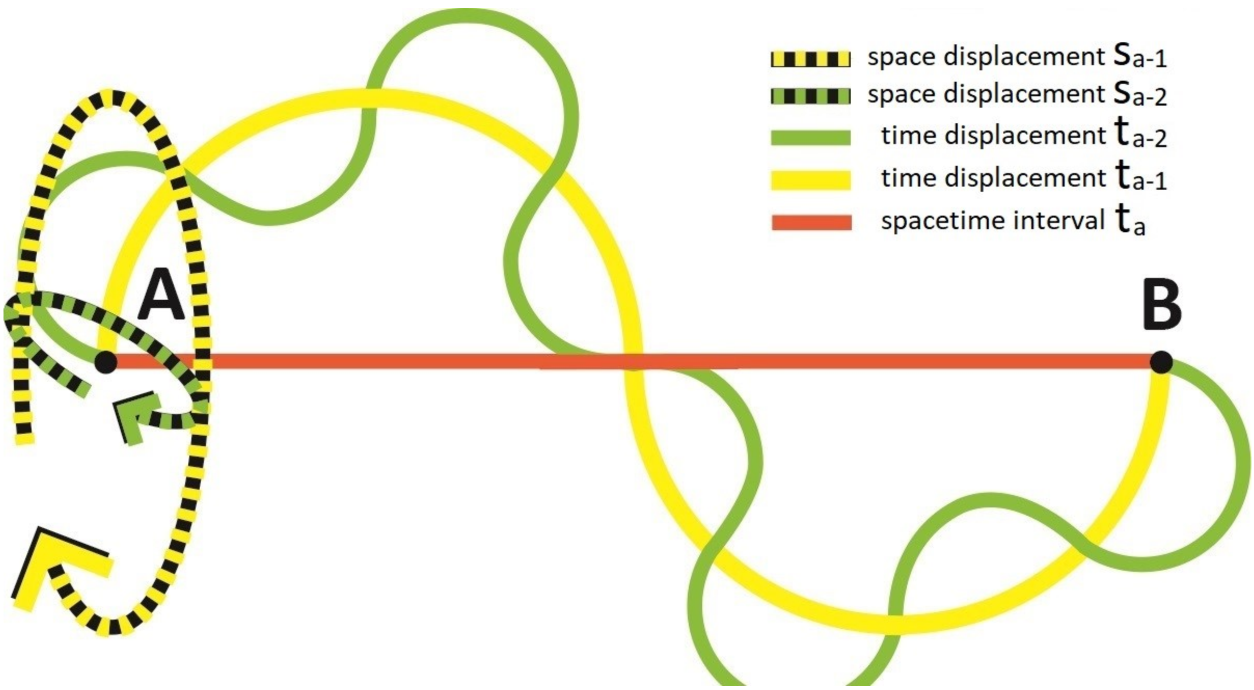


10. Spacetime Interval and Momenergy

10.1 – The Spacetime Interval

Going back to Diagram 9.2, and as shown in Diagram 9.4, the basic way the reader can think of spacetime, is if the observer is at Dimension t_a, then the spacetime interval is t_a, space displacement is s_{a-1}, and time displacement is t_{a-1}. If the observer is at t_{a-1}, then the spacetime interval is t_{a-1}, space displacement is s_{a-2}, and time displacement is t_{a-2}.

Diagram 10.1.1 – The Spacetime of Three Overlapping Dimensions of a Particular Matter



Good to note that I also propose that time and the spacetime interval are fundamentally in meters and not seconds. I say this partially because the equations of spacetime all get much simpler if time is in meters instead of seconds. This is an indication that time really always belongs in meters and should exist in nature in meters. Time is a distance that is physically traveled. When in seconds, time can be thought of like the angular velocity of a rotation, although could also use any oscillation. Each cycle of a rotation can be thought of in terms of representing a fraction or number of seconds. This rate of rotation, or angular velocity, can then be thought of as time in seconds (or fractions of a second). This time in seconds though is normally converted to meters by using the speed of light. I am proposing a slight change to that however, and stating that time is fundamentally in meters and is the distance along the time displacement, like in Diagram 10.1.1. The speed of light is the distance traveled along the time displacement between events A and B, or per events A and B. In other words, time travels at the speed of light. Time in meters is historically thought of as the distance that light travels between two spacetime events A and B occurring. In this paper, time in meters can still be thought of as the distance that light travels between two spacetime events A and B occurring, it is just that in this paper, time is a physical distance traveled along between the spacetime events A and B. We don't normally observe the physical distance traveled by time however, on the Earth for example, because most things on the Earth observe roughly the same time (unless going close to speed of light). This all means that I am proposing that all matter is going the speed of light relative to an observer outside the matter of the universe, even if we don't directly observe it. While our velocity is great, our relative velocity is generally very small compared to the speed of light. Much more on this in the section on the Speed of Light and Time.

Notice how t_{a-1} is the spacetime interval in one Dimension and time displacement in another. Notice how as the space displacement approaches zero that the time displacement would equal the spacetime interval, or proper time. Notice how if the spacetime interval approaches zero then the space displacement would equal the time displacement (this last one being relevant only if no Dimensions above). The spacetime interval for a particular Dimension is the totality of motion of all Dimensions above it. The space for a particular Dimension is the amount of motion that Dimension has, and is orthogonal (90 degrees along the imaginary number line) to the spacetime interval. Time, when measured in meters, is the total motion of a rotation. Time, when in meters, is basically the hypotenuse of the space displacement and spacetime interval.

As is commonly known (SP 71):

$$interval^2 = time^2 - space^2$$

Which in this paper gives us:

$$t_a^2 = t_{a-1}^2 - s_{a-1}^2$$

Which, for time-like events, is the same as:

$$time^2 = interval^2 + space^2$$

Which gives us:

Equation 10.1.1 – Invariance of the Spacetime Interval

$$t_{a-1}^2 = t_a^2 + s_{a-1}^2$$

The reader may note that there is not an equation in this paper: $interval^2 = space^2 - time^2$. This is because the spacetime events in this paper can be causally connected, or can have cause and effect, and therefore must then be time-like. In other words, spacetime events happen from the same object and not, for example, different objects on different ends of the known universe.

This is because that equation was a result of a fallibility in the traditional latticework of clocks. The Twin Paradox is also a result of the same fallibility in the traditional latticework of clocks. In short, the traditional latticework does not work in a universe of angular motion within angular motion. If you instead have the rate of rotation of each Dimension be a clock, and apply basic time and space dilation principles, then the Twin Paradox does not happen. There is no large time catchup at the turnaround, even though, time dilation obviously occurs. If each overlapping rotation of angular momentum is it's own clock, then special relativistic time dilation can occur with all observers agreeing upon the time changes, and no large time catch up at the turn around. The reader basically can think of it as time is always greater than or equal to space, just like energy is always greater than or equal to momentum.

10.2 – The Lorentz Transforms and the Time Stretch Factor

The ratio of time in one Dimension to a Dimension immediately below it, or $\frac{t_{a-1}}{t_a}$, represents the amount of time dilation between two observers. One observer is at Dimension $a-1$ and the other is at Dimension a.

If we look at $\frac{t_{a-1}}{t_a}$ closer, and since t_a=$(t_{a-1}^2 - s_{a-1}^2)^{\frac{1}{2}}$, then:

$$\frac{t_{a-1}}{t_a} = \frac{t_{a-1}}{(t_{a-1}^2 - s_{a-1}^2)^{\frac{1}{2}}} = \frac{1}{\left(1 - \frac{s_{a-1}^2}{t_{a-1}^2}\right)^{\frac{1}{2}}}$$

Which, following SP 99, if we see that $v_{a-1} = \frac{s_{a-1}}{t_{a-1}}$, then we get:

Equation 10.2.1 – Time Stretch Factor

$$\frac{t_{a-1}}{t_a} = \frac{1}{(1 - v_{a-1}^2)^{\frac{1}{2}}}$$

This is of course the time stretch factor used in the Lorentz Transforms (SP 99). If we want to put time in seconds instead of meters then:

$$\frac{t_{a-1}}{t_a} = \frac{1}{\left(1 - \frac{v_{a-1}^2}{c_{a-1}^2}\right)^{\frac{1}{2}}}$$

Using $\frac{t_{a-1}}{t_a}$ for the time stretch factor will be pretty standard in this paper. Rarely will you see it in terms of velocity. Now let's say that we have two observers that are not in Dimensions immediately above and below each other, but are instead are separated by a few Dimensions. In that case the time dilation is represented as the ratio between the times of the two observers, or $\frac{t_{a-n}}{t_a}$. If we look at $\frac{t_{a-n}}{t_a}$ closer, and since we know from Equation 9.2 that t_a=$(t_{a-n}^2 - s_{a-n}^2 - \cdots - s_{a-2}^2 - s_{a-1}^2)^{\frac{1}{2}}$, then we get:

Equation 10.2.2 – Time Dilation of Rotations within Rotations

$$\frac{t_{a-n}}{t_a} = \frac{t_{a-n}}{(t_{a-n}^2 - s_{a-n}^2 - \cdots - s_{a-2}^2 - s_{a-1}^2)^{\frac{1}{2}}} = \frac{1}{\left(1 - \frac{s_{a-n}^2}{t_{a-n}^2} - \cdots - \frac{s_{a-2}^2}{t_{a-n}^2} - \frac{s_{a-1}^2}{t_{a-n}^2}\right)^{\frac{1}{2}}}$$

This is the more complete form of the time stretch factor.

10.3 – Momenergy

Given the equations for the spacetime interval, it follows then that, if the observer is at Dimension t_a:

$$p_a = \frac{space}{interval} m_a = \frac{s_{a-1} m_a}{t_a}$$

$$E_a = \frac{time}{interval} m_a = \frac{t_{a-1} m_a}{t_a}$$

…and if the observer is at Dimension t_{a-1}:

$$p_{a-1} = \frac{space}{interval} m_a = \frac{s_{a-2} m_a}{t_{a-1}}$$

$$E_{a-1} = \frac{time}{interval} m_a = \frac{t_{a-2} m_a}{t_{a-1}}$$

Which gives us:

Equation 10.3.1 – Momenergy

$$momenergy^2 = m_a^2 = E^2 - p^2 = \left(\frac{time}{interval} m_a\right)^2 - \left(\frac{space}{interval} m_a\right)^2 = \left(\frac{t_{a-1} m_a}{t_a}\right)^2 - \left(\frac{s_{a-1} m_a}{t_a}\right)^2$$
$$= m_a^2 \frac{t_{a-1}^2 - s_{a-1}^2}{t_a^2} = m_a^2 \frac{t_a^2}{t_a^2} = m_a^2$$

…and you can make all these equations to where time is in seconds by using c:

$$p_a = \frac{space}{interval} m_a c = \frac{s_{a-1} m_a c}{t_a}$$

$$E_a = \frac{time}{interval} m_a c^2 = \frac{t_{a-1} m_a c^2}{t_a}$$

Which gives us:

Equation 10.3.2 – Momenergy with c

$$momenergy^2 = m_a^2 = E^2 - p^2 = \left(\frac{time}{interval} m_a c^2\right)^2 - \left(\frac{space}{interval} m_a c\right)^2$$
$$= \left(\frac{t_{a-1} m_a c^2}{t_a}\right)^2 - \left(\frac{s_{a-1} m_a c}{t_a}\right)^2$$

A good thing for the reader to notice is how p_{a-1} and E_{a-1} have t_{a-1} as the interval, but E_a has t_{a-1} as time. This means that an observer at t_{a-1} observing momentum p_{a-1} will observe t_{a-1} as the interval and when an observer is at t_a observing energy E_a then will observe t_{a-1} as time. In other words, there is not a clear distinction between the momentum and energy of one Dimension and the energy of the Dimension immediately below it. Momentum is space displacement divided by the interval. Which in this paper is the amount of distance traveled along s_{a-1} divided by the amount of distance traveled along t_a. Motion along s_{a-1} is orthogonal to motion along t_a. s_{a-1}'s direction cancels out through a complete cycle relative to t_a.

When an observer is observing the electron s_{a-1} from t_{a+1}, or higher, then the length of the spacetime interval is smaller and the length of the space displacement is larger. This means a larger momentum will be observed from t_{a+1}. A larger total energy will also be observed, and momenergy is invariant as normal.

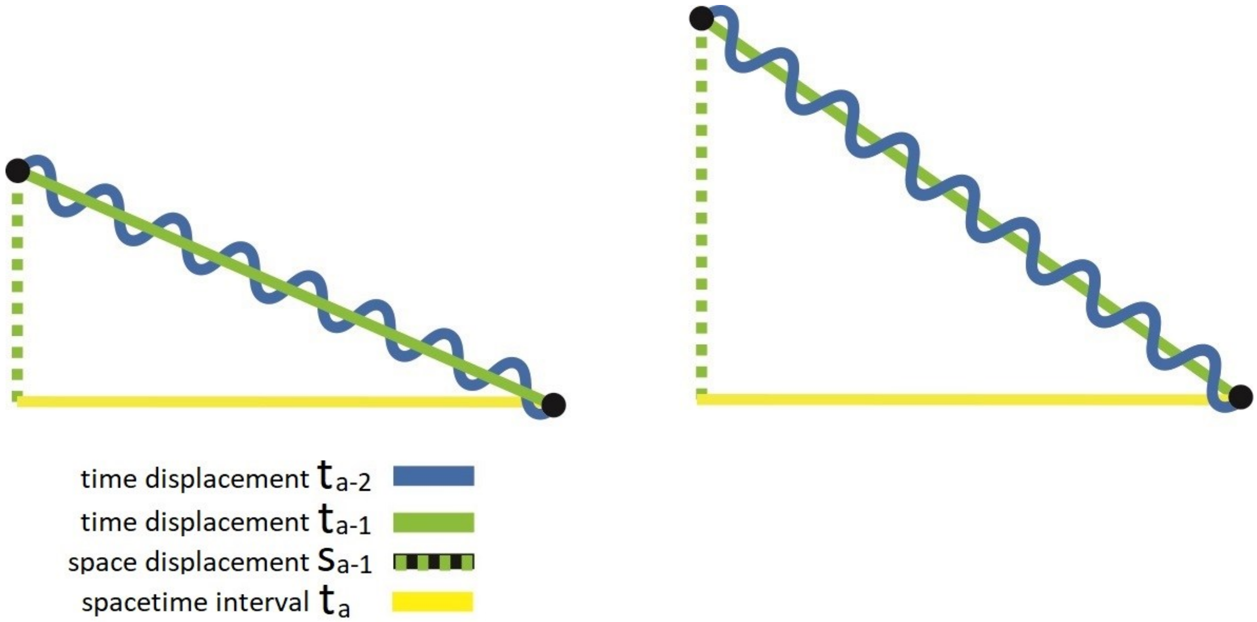
11. The Principle of Stable Spacetime

The Principle of Stable Spacetime: If the spacetime interval between the two events that are at the beginning and end of a single cycle increases due to an external force, then the space and time displacements between those two events will increase by a directly proportional amount to the change in the spacetime interval.

In other words, if there is a force and change in a particular Dimension, then the velocity of the matter in the Dimension below will remain constant, which means no acceleration and stays in free float frame within that Dimension. It then follows that, if the angular momentum, momentum, and energy of a particular Dimension changes due to some external force, then the angular momentum, momentum, and energy of Dimensions below will remain constant. In even other words, if there is change at some Dimension, then Dimensions below will not notice the change.

So, let's go back to Diagram 9.1 and go through an example. Transferring energy, momentum, and angular momentum between Rotations will be discussed later in this paper. For now, let's just say that an external force is applied to Rotation with space displacement s_{a-1} and that change in s_{a-1} causes an increase in t_{a-1}. As stated earlier t_{a-1} is time relative to s_{a-1} but is the spacetime interval relative to s_{a-2}. The Rotation with space displacement s_{a-2} rides on top of the spacetime interval t_{a-1}. What I am proposing with the Principle of Stable Spacetime is that change to s_{a-1}, and therefore t_{a-1}, and therefore E_a and p_a, should not cause a change in E_{a-1} and p_{a-1}. If E_{a-1} and p_{a-1} changes, then the Rotation with space displacement s_{a-2} will itself change and that which may be observed as 'matter' will become destabilized. Good to mention that when I say 'destabilized' or 'unstable' I don't necessarily mean the 'matter' will fly apart. Instead I simply mean the 'matter' goes through change and is not the same after the force is applied a Rotation above it. So, if Diagram 9.1 above is before the force is applied, then before force is applied $t_a = 99.955, s_{a-1} = 3$, $t_{a-1} = 100$, $s_{a-2} = 2$, and $t_{a-2} = 100.02$, as well as, $n_a = 1$ and $n_{a-1} = 4$. If a force is applied to s_{a-1} to where s_{a-1} changes, then because that will result in t_{a-1} changing then s_{a-2} and t_{a-2} must change in a way that keeps E_{a-1} and p_{a-1} constant, even though E_a and p_a are both changing. So, if let's say s_{a-1}goes from being 3 meters to 75.060 meters, then that would result in $t_{a-1} = 125$. This would mean that Energy of Rotation with space displacement s_{a-1}, in units of measurement of mass and without the c^2, would go from $E_a = \frac{t_{a-1}}{t_a}m = \frac{100}{99.955}m = 1.0005m$ to $E_a = \frac{t_{a-1}}{t_a}m = \frac{125}{99.955}m = 1.2506m$. Then in order for the Principle of Stable Spacetime to be followed, then s_{a-2} and t_{a-2} must change in a way that keeps E_{a-1} and p_{a-1} constant. For this example, we will say that the cycles go from $n_{a-2} = 4$ to $n_{a-2} = 5$, which as long as the space displacement of the cycles are of the same length, then increases the space displacement s_{a-2} by a directly proportional amount, as shown in the following diagram (note that Diagram 11.1 shows going from 8 to 9 cycles, so does not quite match the example but that inconsistency should be ignored by the reader):

Diagram 11.1 – Adding One Cycle to a Rotation



If a cycle of the same size is simply added like I am suggesting, then $t_{a-1} = 125$, $s_{a-2} = 2.5$, and $t_{a-2} = 125.025$, which would make the Energy of rotation with space displacement s_{a-2}, in units of measurement of mass and without the c^2, go from $E_{a-1} = \frac{t_{a-2}}{t_{a-1}} m = \frac{100.02}{100} m = 1.0002m$ to $E_{a-1} = \frac{t_{a-2}}{t_{a-1}} m = \frac{125.025}{125} m = 1.0002m$. As the reader can see the Energy of the rotation below stays constant even though the Energy of the rotation above changed. If we look at the Momentum of the rotation below then we will see it also stays constant, even though the Momentum of the rotation above changed: $p_{a-1} = \frac{s_{a-2}}{t_{a-1}} m = \frac{2}{100} m = 0.02m$ to $p_{a-1} = \frac{s_{a-2}}{t_{a-1}} m = \frac{2.5}{125} m = 0.02m$. This is the Principle of Stable Spacetime. This is how you can have change in one Dimension and not have all the Dimensions below notice the change. To Dimensions below, spacetime remains constant, no acceleration is observed, and the matter stays in a free float frame. If the universe did not act like that, then you could not change anything in the universe without destabilizing the matter, or rotations below, of the universe.

The Principle of Stable Spacetime will be referred to throughout this paper.

12. The Speed of Light and Time

The speed of light is used to convert time from seconds to meters. To discuss the speed of light, I will first explain what it means when time is in meters, and then I will mathematically derive what it is when time is in seconds.

12.1. What is the Speed of Light

If the reader went back to Diagram 9.1 and asked the question of what is the time, in meters, between event A and event B, then the time in meters is the distance that light travels between when event A happens and event B happens. In other words, if an observer is at Dimension $a-1$, then the time in meters shown on a clock, or rotation below, that observer is t_{a-1}, then the distance that light travels between A and B is t_{a-1}. If the events of A and B are thought of like two ticks of a clock, then the displacement that light travels within those two ticks is the same as the displacement t_{a-1}. Of course, we know that the time displacement in meters in one Dimension is the spacetime interval of the Dimension below. What is time to one observer is the interval to another observer.

What all that means is that the reason why the speed of light is such a special number is because we are all going the speed of light. It also means that the speed of light is not a constant, but instead varies slightly between overlapping rotations. Note that this is consistent with General Relativity, and the 'bending' but not really bending of light. So, if our clock ticks are A and B, then the distance traveled per clock ticks, or speed of light, for an observer at Dimension $a-1$ is t_{a-1} divided by the seconds of the clock ticks according to an observer at Dimension a, or time of the interval in seconds, or $\frac{t_a}{c_{a+1}}$ (instead of time in seconds can just have time be the two clock ticks A and B…time will cancel in equation below anyway because same observer). If the observer is at Dimension a, then the speed of light between clock ticks is t_a divided by the seconds of the clock ticks according to an observer at Dimension $a+1$, or time of the interval in seconds, or $\frac{t_{a+1}}{c_{a+2}}$. The speed of light between a rotation and the speed of light of the rotation below, when viewed from the same observer, is then based on the ratio of $\frac{t_{a-1}}{t_a}$, or:

Equation 12.1.1 - Difference in c Between Overlapping Dimensions

$$c_{a-1} = \frac{t_{a-1}}{t_a} c_a$$

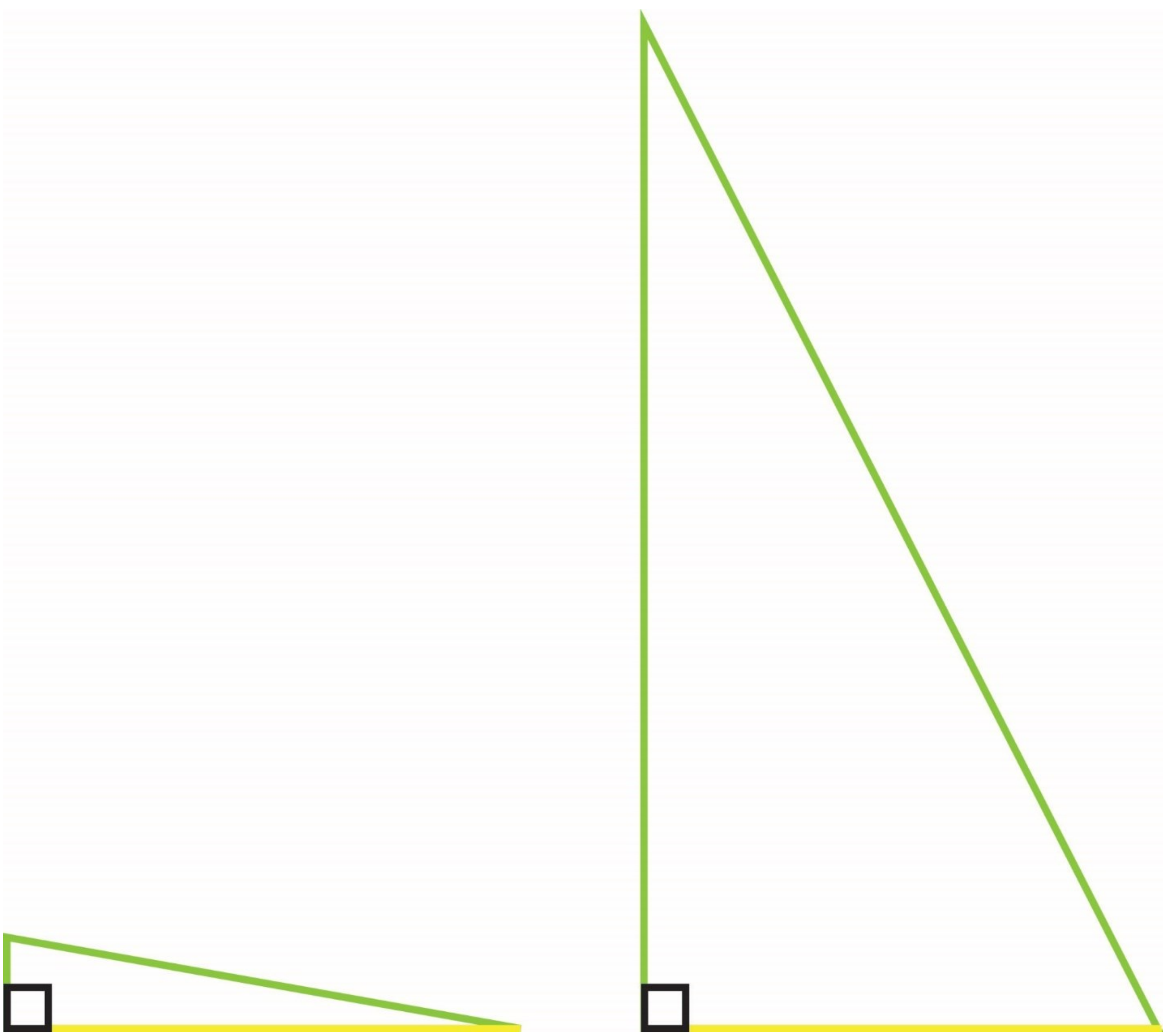
Since we know what the speed of light is on Earth, then we can calculate the length of the spacetime interval of the Milky Way Galaxy, and of the 'known' universe itself. As previously mentioned, I believe there are Dimensions above that of the Milky Way Galaxy, and while it might be difficult to calculate how many and of what sizes that each are, it should be easy to calculate what the spacetime interval is that they result in that our 'known' universe rests upon.

This obviously raises the concern that if this is true, then it should be observable in the universe if can get precise enough instruments. Thankfully, this effort has been already happening. The effect that I am talking about is the same as observed under General Relativity. We already know, in the terminology of modern physics, that spacetime bends around large masses and so the path of travel of light also bends. Light traveling in a straight path and light traveling in a bent path, do not travel at the same speed relative to a distant observer. Just as in General Relativity, as the spacetime of overlapping Dimensions changes from Dimension to Dimension, the speed of light from Dimension to Dimension also changes.

12.2. What Happens When Approach the Speed of Light

Again, the differences in the speed of light between a rotation and the rotation below is usually very small because the spacetime interval is usually so much larger than the space displacement. To come full circle, pun definitely intended, with time and time dilation, let's compare what happens when an object has a small velocity that approaches zero vs. has a large velocity that approaches the speed of light.

Diagram 12.2.1 – Small Space Displacement vs Very Large Space Displacement



So, if have an object traveling along a spacetime interval, where the space displacement is relatively very small compared to the spacetime interval, then if the space displacement of the Dimension doubles then the resulting time displacement will not increase by much. In other words, there will not be much time dilation. If, however, for example, the space displacement increases to where is much larger than the spacetime interval, then the space displacement and time displacement approach being directly proportional. In other words, because the distance along the spacetime interval has not changed, a doubling of the space displacement will roughly double the time displacement, which means much time dilation will occur. Since speed is magnitude of space displacement divided by time displacement, then as space displacement approaches infinity then speed approaches one, or a max speed, which is the speed of light, or the meters of time per clock ticks A and B. This directly explains the Lorentz transforms and the time stretch factor.

12.3. What is Time in Seconds

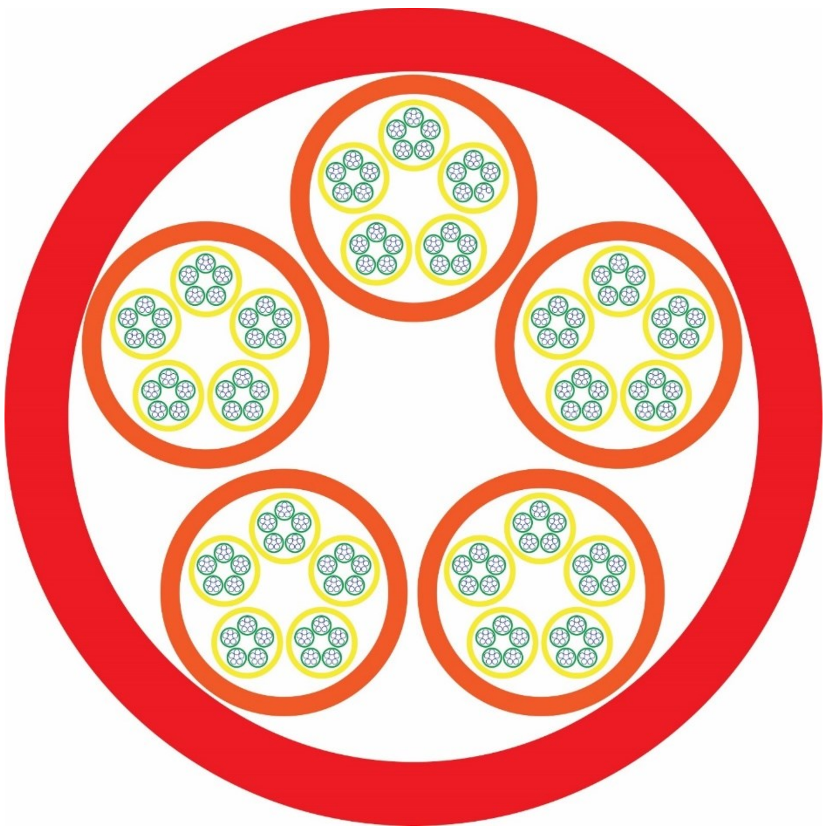
As stated previously in this paper, the best way for the reader to think of a clock is to think of it as a Dimension, rotation, or oscillation. Time in seconds is defined by the number of cycles, or angular velocity, that a clock has. Also, as previously stated, time physically exists as a spatial displacement, most commonly in meters, and so that means that the number of cycles of the clock must be directly proportional to the length the clock travels along the spatial dimension known as time. We already know this to be true due to the Principle of Stable Spacetime. If the number of cycles is directly proportional to the distance traveled along the time displacement, then the cycles per length along that time displacement will be constant. Remember that the time displacement in question is the interval of the rotation riding on it so in order for the internal velocity of the rotation to be constant, and thus energy and momentum constant, and thus staying in an invariant reference frame, then as that interval increases then the number of cycles along that interval must also increase. This is just the Principle of Stable Spacetime and since every oscillation, rotation, angular momentum, or Dimension, must follow it, then as the spacetime interval that those rotations are riding on increases, then the number of cycles must increase on each of them proportionally, meaning each clock staying in sync with each other as the interval changes. The Principle of Stable Spacetime is responsible for humans being able to represent time in seconds instead of meters. It’s a way for us, as humans, to easily measure a spatial distance that is hard for us to directly observe.

13. Matter

13.1 Bowling Balls on Trampolines Made of Smaller Bowling Balls on Trampolines

As was previously explained, both the invariant spacetime interval and the invariant momenergy are the same in this paper as what Einstein described. The only big difference is that they are applied to a universe of rotations within rotations. Matter is best explained by expanding on an analogy. So if you apply Einstein's brilliant concept of momenergy to a universe of rotations within rotations, by rotations within rotations within rotations, I mean a bowling ball on a trampoline where the bowling ball is made of smaller bowling balls on smaller trampolines, and each of those smaller bowling balls is made of even smaller bowling balls on even smaller trampolines. Every bowling ball is matter, but that matter is really smaller matter in motion, with motion being the definition of spacetime, or the trampolines.

Diagram 13.1.1 – Bowling Ball on Trampoline Made of Smaller Bowling Balls on Trampolines



Traditionally, it is thought of as matter warps spacetime, but spacetime determines the motion of matter. In this paper, matter is enclosed warpings of spacetime, and those warpings of spacetime have motion along larger warpings of spacetime. In other words, rotations warp spacetime and create matter. Rotations within rotations, and conservation of angular momentum, momentum, and energy, determines matter's motion. All of these warpings of spacetime essentially are Energy. I've debated with myself many times over the best terminology to paint the picture I am trying to paint. Ultimately, one can think of it as matter is motion within motion, rotations within rotations, space displacements within space displacements, angular displacements within angular displacements, velocity within velocity, angular velocity within angular velocity, warpings of spacetime within warpings of spacetime, simple waves within simple waves…and on and on. They can all be thought of in terms of defining matter, because the important part is that it is enclosed or unobserved motion, rotations, etc. From a distance, there is little to no motion or rotations at all. For terminology sake, I will say in this paper that matter is made of rotations. At the end of the section on matter I will go through options for what is the smallest matter in the universe, but for the majority of this paper it is assumed that relative to the observer that there is a rest mass that represents the total enclosed and unobserved rotations.

The number one thing to mention in regards to an electron acting like a particle is that a particle is just angular momentum with a really small radius relative to the observer. Whether something is observed as a particle or a wave, which is a particle in motion, is simply based on the Dimension of the relative observer. So, for particle behaviors in the Two Slit Experiment, the electron acts like a particle because it has an axis of rotation with a relatively tiny radius and is at a specific position and momentum within Dimensions above. Each electron hits at a specific spot on the detector screen because the rotation of the electron has a small radius, and that electron rotation has a definite position and momentum within the rotation above it. Much more on this throughout this paper.

13.2 Rotations as Matter and Rotations as Motion

In other words, each rotation, or space displacement, has motion that is confined within it. Depending on the location of the observer and what Dimension they are at, they may observe that rotation as motion, but they may also observe that rotation as matter. More specifically, if the observer is observing from a rotation above the rotation we are considering, then that motion, or momentum, will be observed as matter. If the observer is observing at a rotation at or below the rotation in question, then that rotation will be observed as motion. More simply put, matter, or potential energy, or rest mass, is just unobserved rotations (i.e. motion).

So as one goes from a reference frame outside galaxies, to a reference frame outside a solar system within that galaxy, to a reference frame outside a planet within that solar system, to a reference frame outside an atom within that planet, then one will observe less and less matter (and time) and more and more motion (and space). So for a given region of space, let's say one cubic meter on the Earth, how much matter is in that one cubic meter and how much motion is within that cubic meter, depends on the location of the observing reference frame.

The Principle of the Equivalence of Rotational Matter and Motion - How much an observer views rotations as matter or views rotations as motion depends on the reference frame. The higher the Dimension the reference frame resides relative to the rotations observed, the more matter will be observed. The lower the Dimension the reference frame resides relative to the rotations observed, the more motion will be observed.

So, matter is really just rotations within rotations. The rotations cause warpings of spacetime. The total of all the warping of spacetime due to rotations is equal to the total amount of warping due to mass.

This is mass rotation equivalence. A rotation creates mass. Each rotation is both energy and momentum, and so must have mass. That mass can be observed as both motion or matter.

13.3 The Smallest Matter

This all begs the question: What is the smallest matter that exists? The answer is that there is no universal smallest matter. Again we will talk about quanta and change\action later in this paper. How small matter can get depends entirely on the interactions that matter goes through and how much it breaks up over time. In other words, the smallest matter in the universe was larger a year after the big bang than the smallest matter in the universe today.

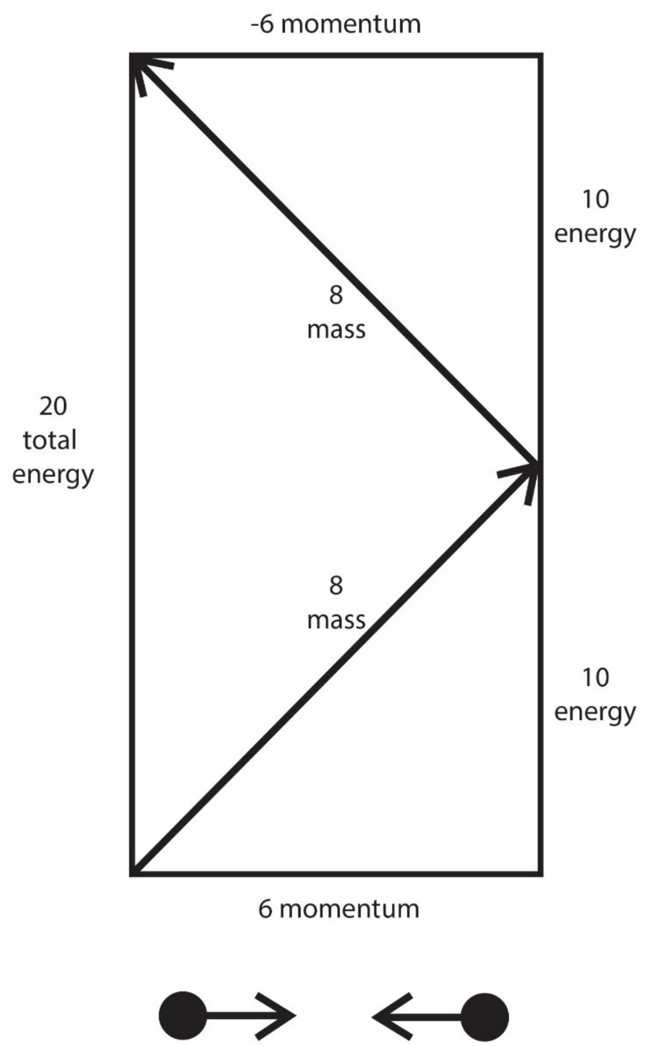
So what does this smallest matter look like? There are two general options and both are consistent with the rest of this paper. The first option is that the smallest matter is a rotation of spacetime. Above that matter, it can be viewed as matter, but within that matter it is simply flat, or possibly rotated, spacetime. The second option is that matter is distinct from spacetime and rotations, and so there basically is a smallest sized bowling ball that can continue breaking up depending on interactions, or changes of angular momentum, energy, and momentum, with other bowling balls. If there is a locally smallest bowling ball, or option two, then it is very, very small…in other words, much smaller than an electron. This second option is basically the same as spelled out in DeBroglie-Bohr. The wave function is defined by the conservation laws which defines how matter moves. Bohr predicted that the internal structure of the electron must be very complex, but DeBroglie-Bohr does work for all quantum mechanics experiments. Which option the reader chooses to use for this paper is fine. What is important is that the wave function, and therefore motion and time, of however we define matter, is controlled by the conservation of angular momentum, energy, and momentum. If there is a smallest matter that isn't just rotated spacetime, then that matter has only one intrinsic quality: Mass. It is the Dimensions of angular momentum above the matter, that are trying to stay conserved, that control the motion and therefore time and total mass of that matter. Of course, other options are possible, including just adopting some string theory or quantum gravity proposals.

14. Rest Mass and Systems of Matter

14.1 Momentum-Energy and Collisions

So far when I have talked of momenergy, I have only been talking of a single mass, or chunk of matter. When momenergy gets really interesting however, is when talking about a system of matter.

Diagram 14.1.1 – Current Day Momenergy



For example (SP 222, 224), if we have inelastic collision between two identical balls of gum. Each ball of gum has a rest mass of 8 before the collision, the magnitude of each of their momentums is 6, and the direction of each momentum is exactly opposite and towards each other. In other words, the balls of gum are traveling towards each other at the same magnitude of momentum. The energy of each ball of gum is 10. Rest mass accounts for 8 of that energy, as stated above, so kinetic energy is responsible for 2 because (SP 201, 223):

$$E = K + m$$

Before the collision, when considering the two balls of gum as a single system of matter, the total momentum is zero because they are in opposite directions, and the total energy of the system of matter is 20. When the collision occurs, and the masses stick together, then because of the conservation of momentum and the conservation of energy, then the momentum is still zero, and because the kinetic energy must be zero then the rest mass of the combined matter is 20. Before the collision, the rest mass of each ball of gum is 8, for a total of 16, but after the collision the combined rest mass is 20. All of this happens again because of the conservation of total energy and conservation of momentum.

More specifically, before the collision the total energy of the system of matter is:

$$E_{system} = 2K + 2m$$

After the collision the rest mass of the system is equal to the energy of the system or:

$$m_{system} = E_{system} = 2K + 2m$$

So the rest mass of the system of matter after the collision is 20, which is greater than the sum of the rest masses before the collision, or 16. This seemingly bizarre result is said to be possible because the balls of gum deform and produce heat thus increasing the rest mass when combined (SP 223).

Within this paper, conservation of momenergy, conservation of momentum, and conservation of energy still hold and are the same as Einstein suggested. The only big difference is that, because of the fallibility of the latticework of clocks, the reference frames chosen to measure momentum and energy should be stationary relative to the center of mass with rotation around it, or Dimension, that the observer is observing from. In other words, if the colliding chunks of matter are at the Dimension of the Earth, then one should use a reference frames at the Dimension of the Earth, at the Dimension of the Solar System, at the Dimension of the Milky Way, etc. This means that a collision does not have to happen in order for the observed rest mass to be different. A difference in observed rest mass does not just happen for a system of matter but also can happen for a single mass. With the fallibility of the traditional latticework of clocks, in standard spacetime and momenergy, it is the relative motion between two masses that determines things like time, space, energy, and momentum. If instead, each Dimension is it’s own clock and all time and space measurements happen relative to the center of mass of each overlapping Dimension, then one does not need two masses to have differences in rest mass, but instead it can be seen with one mass.

As mentioned in the section on matter, rest mass is the same thing and unobserved rotation, and therefore unobserved momentum, which is the same thing as potential energy. Rotation, and therefore momentum and angular momentum, can transfer from one chunk of matter to another, but also can transfer between overlapping Dimensions of each chunk of matter themselves.

Definition 14.1 – A collision is a transfer of rotation, and therefore momentum, angular momentum, and energy, from one Dimension to another. This transfer can happen between overlapping Dimensions of the same chunk of matter, or between Dimensions of separate chunks of matter.

For two inelastic colliding gum balls, during the collision angular momentum, and therefore momentum, are transferred from each gum balls' Dimension of the earth to Dimensions below the Earth's Dimension. In other words, if an observer is on the Earth, then before the collision the observer will observe each gum ball to have momentum that, after the collision, will be unobserved as momentum and observed as rest mass. This happens because the motion is now in a Dimension below the Dimension of the observer. The total momentum of the system of matter of gumballs is observed as zero both before and after just as Einstein has taught us, but the reader can also view each gum ball individually and see the transfer of momentum down Dimensions (and possibly some up Dimensions).

There are other examples of collisions such as an electron changing orbit in an atom and emitting a photon. This is a transfer of angular momentum, and therefore momentum and energy, from the electron's Dimension of the Atom to the newly created photon's Dimension of the Earth.

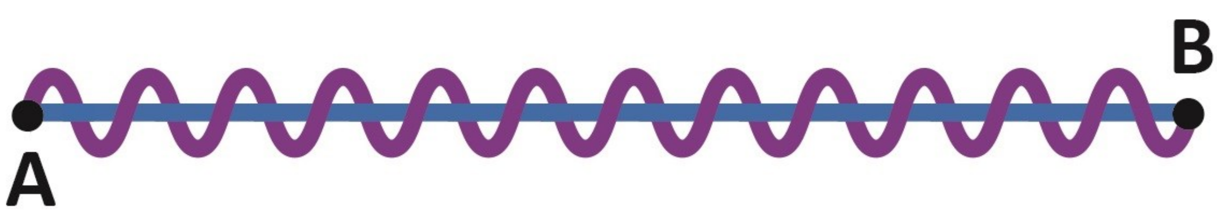
14.2 - Adding a New Rotation to a Chunk of Matter

So let's say we wanted to take a chunk of matter and add motion around a new axis, or point, and calculate how much rest mass increases relative to an observer at the Dimension above. In other words, for example, we take something like a free electron at the Dimension of the Earth and have it go around an atom's nucleus that is at the Dimension of the Earth, with the observer being at the Dimension of the Earth. Stated in even other words, if we add a Dimension of motion to the electron, then how much will the rest mass observed from Dimensions above increase? Well, in this paper I am saying that rest mass is simply the total unobserved motion (multiplied by some constant to get into kilograms if that is the desired unit of measurement), or:

$$m = total\ unobserved\ motion$$

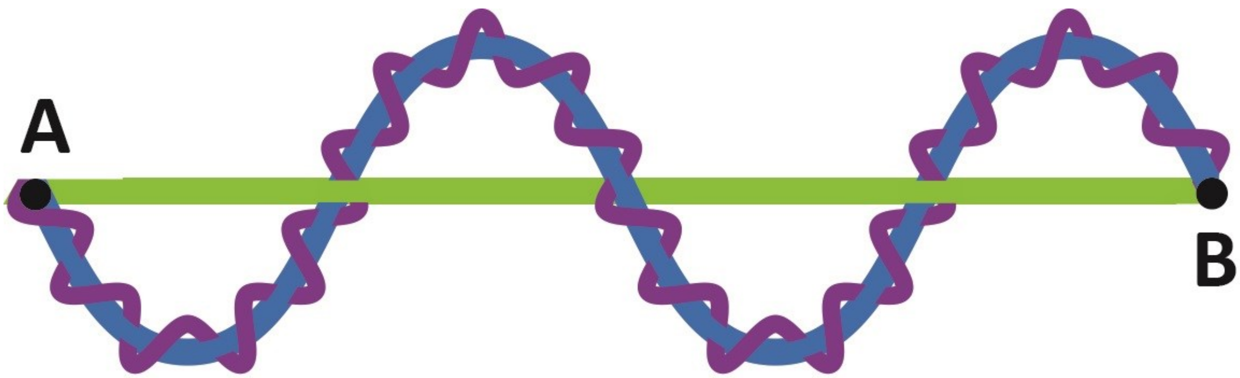
So if we are talking about our free electron traveling at the Dimension of the Earth, then the total unobserved motion would be the total motion of the Dimension of the electron itself plus all the motion of Dimensions below the electron that make up the electron. This total amount of motion, in meters, can be hard to know so we will just call it the old rest mass of the electron (or the rest mass before it started going around the nucleus of the atom). In other words, the electron looks something like this:

Diagram 14.2.1 – Motion of a Free Electron



With the dark purple line being the spin rotation of the electron, that the underlying internal Dimensions of the electron rides on, and the green line being the electron's space displacement along the Dimension of the Earth. When the electron starts going around the atomic nucleus, then it will look something like:

Diagram 14.2.2 – Motion of an Electron in an Atom



With the blue line being the orbital rotation of the electron in the Dimension of the Atom. Due to the Principle of Stable Spacetime, and the internal rotations of the electron remaining unchanged, then the motion of the electron per meter along the spacetime interval of the Earth before going around the atomic nucleus is the same as the motion of the electron per meter along the spacetime interval of the atom Dimension after it starts going around the atomic nucleus. This means that the new rest mass is related to the old rest mass based on the proportion of the lengths of the spacetime intervals of the Dimension of the Atom and the Dimension of the Earth. In other words:

$$m_{new} = \frac{motion_{new}}{motion_{old}} * m_{old} = \frac{d_{a-1}m}{d_a} = \frac{E_a}{c_a^2}$$

After the electron starts going around the atomic nucleus, the rest mass of the electron along the Dimension of the Earth is the same as the Energy of the electron along the Dimension of the Atom. This is consistent with Einstein's momenergy given that the electron's momentum within the atom is not observed.

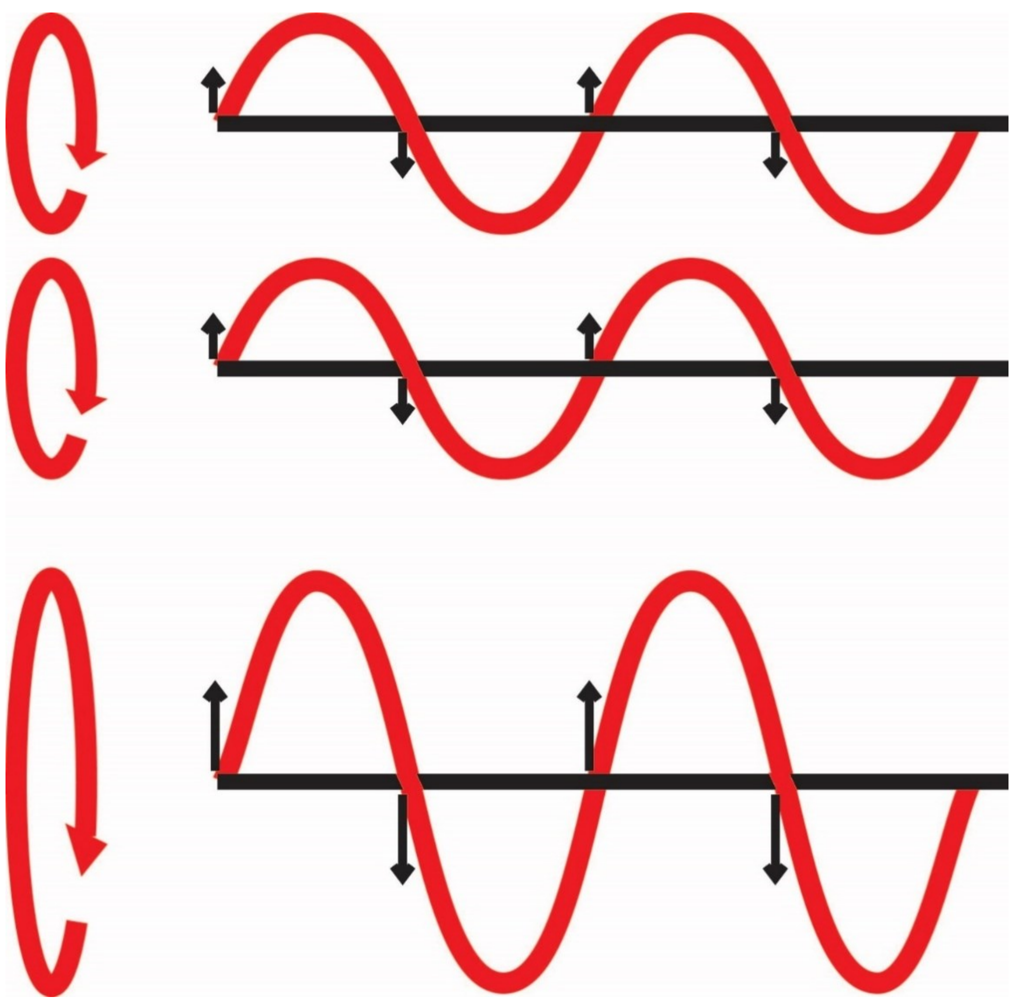
14.3 Interference

So when you have two objects in the same region of space, and they have a certain amount of Dimensions in common, then an observer at some Dimension may observe those two objects are being either two objects in relative motion (or relative are still) or may view those two objects as being one object, or chunk of matter. This is similar to how in Einstein's momenergy one can treat a system of matter as a single mass combined. In this paper, the Dimension the observer is at will determine whether see just matter or matter in motion. If at a given Dimension the observer would observe the two objects as a single object then the rotations of the Dimensions in common of each chunk of matter will combine at the center of mass, and by "combine" I mean vector addition.

To state differently, think of each rotation in a Dimension as a simple wave. Combining two simple waves is the same as combining two rotations in the same Dimension. In other words, there is both constructive and destructive interference. If the rotations are in phase, then there is only constructive interference. Using the radius of the rotation, and again only using circles right now, as the amplitude and the direction of the space displacement (i.e. tangent of the space displacement which is really a velocity because space displacement between two spacetime events really means velocity), then can add those space displacement vectors of the two rotations. If those space displacement vectors stay pointed in the same direction as both travel along a particular spacetime interval, then they will always add, or constructively interfere. If they point in exact opposite directions, then they will destructively interfere and if of the same magnitude cancel each other out. To demonstrate more how wave interference is the same as interference of rotations of Dimensions, let's look at some examples.

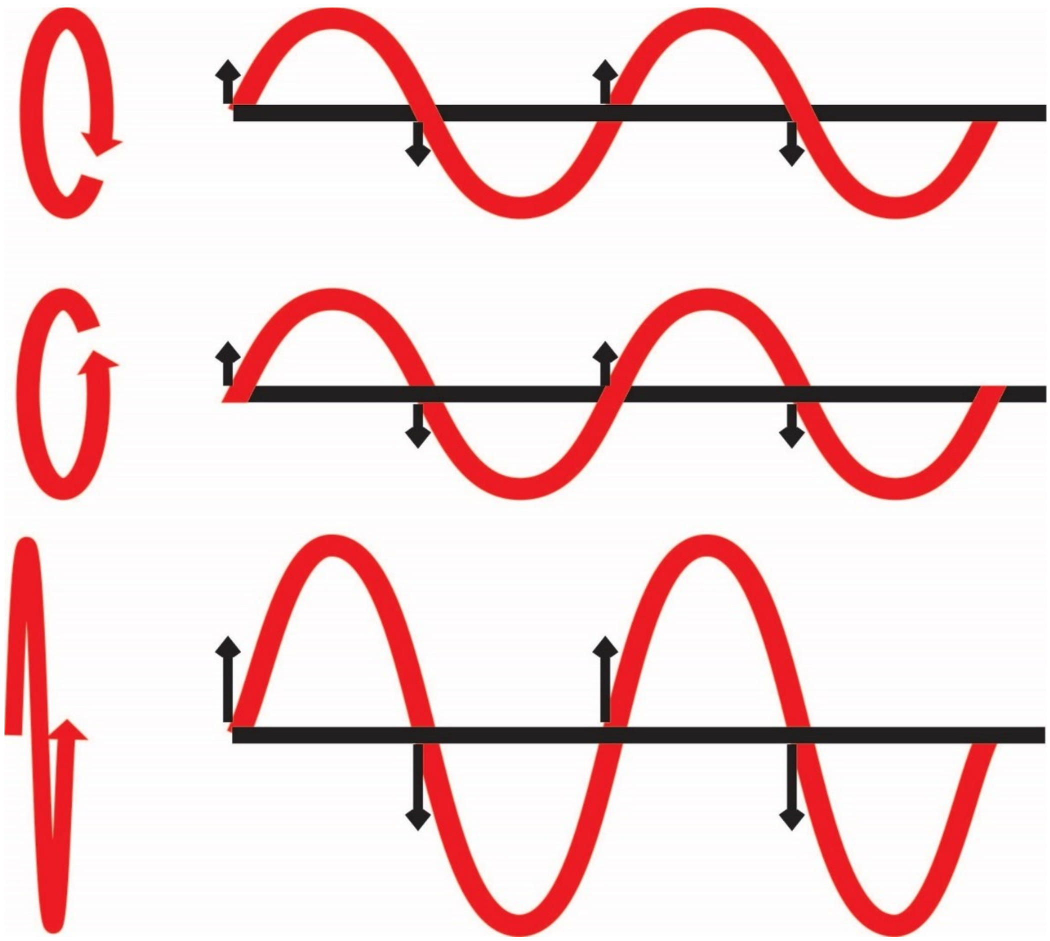
If two identical rotations, or chunks of matter, are in phase with the same spin and combine, then each of their space displacements along each rotation of Dimensions in common will add together. An observer observing as a single chunk of matter will observe the combined space displacements at the center of mass, or:

Diagram 14.3.1 - Two Rotations in phase with same spin combined



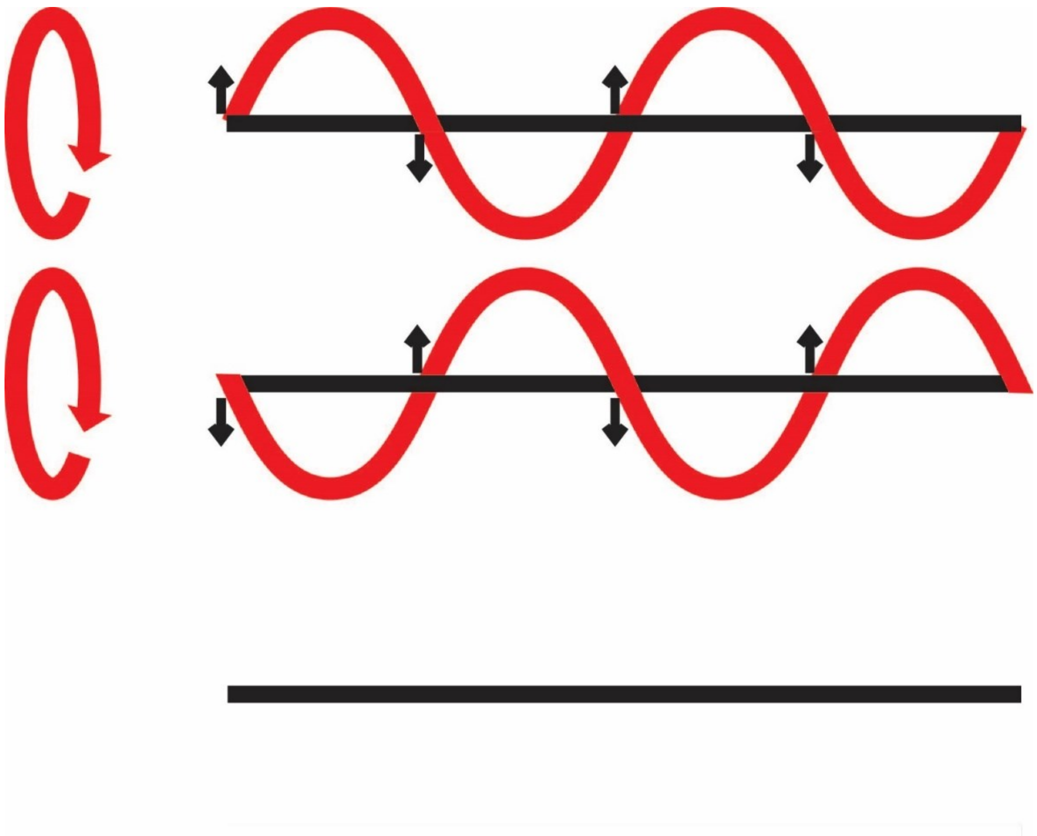
If the rotations that are combined are in phase but with opposite directions of 'spin', or rotation, then they combine into being a sine wave, or plane wave, instead of rotations. This is partially why can use the terminology "oscillations within oscillations" instead of "rotations within rotations". When combine matter then the rotations may not be observed and instead may just observe the combined standard sine wave oscillation. This combined oscillation still has a space displacement within a Dimension, and that space displacement can be plugged into any "circle" equations.

Diagram 14.3.2 - Two Rotations in phase with opposite spin combined



Two rotations can also be completely out of phase by pi and rotations in Dimensions below will be viewed as travelling at the spacetime interval instead of along their space displacements (i.e. combined space displacement is zero). More rest mass and zero space displacement will be observed. More matter, less motion. No rotation at all within that Dimension. This is an example of complete destructive interference. Similar to Einstein's momenergy, the rest mass of the underlying Dimensions below this non rotating combination of two rotations, or a complex wave, of matter is greater than the combined rest masses of the underlying Dimensions below the individual rotations.

Diagram 14.3.3 - Two Rotations out of phase by pi with same spin combined



This all makes the terminology of oscillations instead of rotations more correct. For the majority of this paper though, the reader can view in their head, and as the diagrams do, as rotations within rotations. More on combined oscillations and systems of matter throughout this paper.

15. Gravity

15.1 The Equivalence of Special Relativistic and General Relativistic Time Dilation

In regards to General Relativity, the simple way to put it is, Einstein is correct. This paper is very consistent with General Relativity. The main difference is simply that instead of the universe being bowling balls on trampolines, that it is bowling balls on trampolines where the bowling balls are made of even smaller bowling balls on trampolines, and so on. Within this paper, and Special Relativity, the more motion observed then the more time elapses for the observer. In other words, if observe more motion then the observer will have faster time and that in motion will have slower time. Motion is defined by rotations. In the section on matter, I explained the equivalence of rotational matter and motion. That means that an increase in matter is an increase in unobserved rotations, or motion. Therefore, both Special Relativistic time dilation and General Relativistic time dilation are both due to rotations. The only difference is that Special Relativistic time dilation is due to rotations observed as motion, while General Relativistic time dilation is due to rotations observed as matter. In both cases, the observer is observing more rotations and therefore observing more time. Whether an observer observes as matter or motion depends only on the Dimension of the observer. That matter below the observer can be viewed as matter, and that matter above the observer can be viewed as motion. An even better way to think of is that matter or motion simply comes down to relative magnitudes of radii of rotations of the Dimensions of the observer and observed. In other words, if an observer observes a rotation much smaller than them, then will view as matter. If observer observes a rotation much larger than them, then will view as motion. General Relativistic time dilation, or that time dilation due to matter, is the same as Special Relativistic time dilation, or that time dilation due to motion.

In other words, instead of thinking of it like matter bending spacetime, you can think of it as space displacements along rotations within space displacements along rotations that are riding on a spacetime interval, and the space displacements, or "matter", traveling along that spacetime interval is what is bending time. The motion of the matter along the interval pulls at the space and time of the rotations within the matter. So, let's take the Earth, for example, even if it was not rotating\spinning, it is full of atoms, molecules, and subatomic particles that do have spin. Everything that is called 'matter' within the Earth, either rotates or is made of things that rotate. Then let's say that we wanted to take all the rotations that define the matter that makes up the Earth, and ask what is the combined space displacement of those rotations around the Sun? What about the combined displacement of those rotations, or matter, around the center of the Milky Way galaxy? What about the total combined space displacement if add up the space displacements from going around the Sun, with the space displacements from going around the Milky Way Galaxy, with any other space displacements from Dimensions above it? That answer defines how much matter has bent time. If more matter, or rotations below, like atoms, elections, etc., were added to the Earth, then that new matter will also have space displacements around the Sun, Milky Way Galaxy, etc., and therefore the rest mass would increase by a proportional amount.

Principle of Space Displacements Bending Time - The larger the combined internal rotational space displacement, at a center of mass, that defines a given object of matter, then the greater the bending of time of that matter.

15.2 – The Force of Gravity

In Special Relativity, there are only inertial reference frames. So far in this paper, in regards to time, we have only dealt with inertial reference frames. In General Relativity, it is the applying of force that slows time. In other words, if in freefall towards the Earth then in an inertial reference frame, but if standing on the surface of the Earth or standing on a large tower on the surface, then the gravitational force will be applied and time will slow, with it slowing more on the surface of the Earth than in a tower because the force applied is greater.

When a chunk of matter is in free fall, or an inertial reference frame, then that matter has a constant total angular momentum, energy, and momentum within each overlapping Dimension. If you stop that free fall with, let's say, the surface of the Earth, then the angular momentum, energy, and momentum of the matter within a particular Dimension will be impacted. In order for angular momentum, energy, and momentum to be conserved, then a transfer of angular momentum, energy, and momentum across overlapping Dimensions must occur. The rate of change of this transfer of momentum is force, angular momentum is torque, and energy is power. So if someone is standing on the Earth, the force, torque, and power, felt will be the amount needed to keep the total angular momentum, energy, and momentum of overlapping Dimensions conserved. In other words, an equivalent force, etc., to what the special relativistic time dilation would have occurred from the observed increased motion due to the free fall and observed acceleration had the surface of the Earth not stopped the free fall. An increased motion within a Dimension, like free fall, causes a special relativistic time slowing that is equivalent to the General Relativistic time slowing caused by an equivalent transfer of angular momentum to that Dimension due to stopping the free fall. That is very consistent with General Relativity and Special Relativity. In both cases of free fall or stopping the free fall there is an equivalent slowing of time. The only difference is if that slowing is due to Special Relativistic time dilation, which is due to motion within a particular Dimension combined with the Principle of Stable Spacetime, or General Relativistic time dilation, which is due to a transfer of rotations of angular momentum between Dimensions.

This will all make more sense after the section on the Fundamental Force. Until then, I will just say that the force of gravity applied to matter who's freefall is stopped by the matter it is freefalling towards, then there will be a transfer of rotation, or motion, to the rotations that make up the matter with the Force applied to it. This increase in total unobserved rotations, or motion, within the matter is what causes the increase in time. i.e. Observed time is 'below' the Dimension of the observer, and so increasing the rotations increases the observed time.

16. Frequency, Wave Number, Planck's Constant, and Angular Momentum

An alternate title for this chapter: The time I spent a year because Quantum Mechanics sucks.

16.1. DeBroglie's Amazing and Incomplete Work

The special sauce in the Schrodinger equation, and all of Quantum Mechanics, comes from the Planck\Einstein and DeBroglie relations, which if you mix with Einstein's Special Relativity, result in:

Equation 16.1.1 – Energy in Modern Day Quantum Mechanics

$$E_a = \frac{t_{a-1}}{t_a} m_a = h_a f_a$$

Equation 16.1.2 - Momentum in Modern Day Quantum Mechanics

$$p_a = \frac{s_{a-1}}{t_a} m_a = h_a w_a$$

DeBroglie was never fully satisfied with Equation 16.1.1 or 16.1.2. Specifically, the frequency in Equation 16.1.1 is what DeBroglie called the matter wave frequency of the relativistic mass and it is "associated with the relativistic mass increase" (QTC p35). The observer for this frequency is in the 'lab' frame. It's the most popular form of DeBroglie's relation, but the only equation DeBroglie felt the utmost confidence in was the matter wave frequency in the 'rocket' frame, or the "internal periodic phenomenon" (QTC p35) where the time displacement is equal to the spacetime interval, or:

Equation 16.1.3 - Matter Wave Frequency in the Rocket Frame

$$m_a = h_a f_{a2}$$

Debroglie also proposed a second frequency in the lab frame, which he called the "time dilated frequency" (QTC p35), which I will put in the form of this paper, or:

Equation 16.1.4 - Time Dilated Frequency in Lab Frame

$$f_{a3} = \frac{t_a}{t_{a-1}} f_{a2}$$

Debroglie combined the frequencies in Equations 16.1.1, 16.1.3, and 16.1.4 to get:

Equation 16.1.5 – Time Dilated Frequency Compared to Relativistic Mass Frequency

$$f_a = \frac{t_{a-1} m_a}{t_a h_a} = \frac{t_{a-1}}{t_a} f_{a2} = \frac{t_{a-1}}{t_a} * f_{a3} * \frac{t_{a-1}}{t_a} = \frac{t_{a-1}^2}{t_a^2} f_{a3}$$

Debroglie then used Equation 16.1.5 to explain how the magnitude of the phase velocity is greater than the speed of light.

While I agree with DeBroglie about Equation 16.1.3, or the frequency in the rocket frame, I never did like his usage of two frequencies for the lab frame. The reason I don't like two different frequencies in Equation 16.1.1 and Equation 16.1.4 is because they describe the same thing. Relativistic mass increase and time dilation are both due to the same thing, and so should have just one frequency along the time displacement. More specifically, relativistic mass is just total energy. Total energy is simply $\frac{t_{a-1}m_a}{t_a}$. Time dilation is simply $\frac{t_{a-1}}{t_a}$. The only difference between relativistic mass and time dilation is rest mass, which is a constant in this case. In this paper, I will represent DeBroglie's relativistic mass frequency, time dilation frequency, and the rocket frame frequency along the interval as just two frequencies. One along the spacetime interval and one along the time displacement. The magnitude of the phase velocity is still greater than the speed of light, but I will derive that phase velocity with only the frequency along the interval and the frequency along the time displacement. What I mean should become more clear in the following sections.

16.2 – The Math of Current Day Quantum Mechanics

To derive these using the principles in this paper, I will start off with the standard invariance of the interval equation:

Equation 16.2.1 -

$$t_a^2 = t_{a-1}^2 - s_{a-1}^2$$

As we have already covered, to get to Einstein's momentum-energy equation, then just multiply Equation 16.2.1 by rest mass to get:

Equation 16.2.2 -

$$t_a^2 m_a^2 = t_{a-1}^2 m_a^2 - s_{a-1}^2 m_a^2$$

So Equation 16.2.2 doesn't look like Einstein's momentum-energy equation, but if we divide both sides by the spacetime interval squared, or t_a^2, then we get the more familiar form:

$$m_a^2 = \frac{t_{a-1}^2}{t_a^2} m_a^2 - \frac{s_{a-1}^2}{t_a^2} m_a^2$$

Or:

$$m_a^2 = E_a^2 - p_a^2$$

To define the heart of Quantum Mechanics, we simply need to start with the invariance of the interval Equation 16.2.1. Instead of just multiplying both sides by rest mass squared, m_a^2, to get momentum-energy equation, multiple both sides by rest mass squared and number of cycles squared, or n_a^2, to get:

Equation 16.2.3 -

$$t_a^2 m_a^2 n_{a-2}^2 = t_{a-1}^2 m_a^2 n_{a-2}^2 - s_{a-1}^2 m_a^2 n_{a-2}^2$$

So Equation 16.2.3 doesn't look like Quantum Mechanics yet, but like how when we divided both sides by t_a^2 to get the more standard momentum-energy equation, for a more standard quantum mechanics equation we will divide both sides by the spacetime interval and time displacement, or $t_a^2 t_{a-1}^2$:

$$\frac{t_a^2 m_a^2 n_{a-2}^2}{t_a^2 t_{a-1}^2} = \frac{t_{a-1}^2 m_a^2 n_{a-2}^2}{t_a^2 t_{a-1}^2} - \frac{s_{a-1}^2 m_a^2 n_{a-2}^2}{t_a^2 t_{a-1}^2}$$

Which leads to:

Equation 16.2.4 -

$$\frac{m_a^2 n_{a-2}^2}{t_{a-1}^2} = \frac{m_a^2 n_{a-2}^2}{t_a^2} - \frac{s_{a-1}^2 m_a^2 n_{a-2}^2}{t_a^2 t_{a-1}^2}$$

Equation 16.2.4 still represents a triangle, and one that is similar in shape to the triangle in Equation 16.2.1. At first this does not seem like an equation for quantum mechanics, but if we add the following:

Equation 16.2.5 -

$$f_a = \frac{n_{a-2}}{t_a}$$

Equation 16.2.6 -

$$w_a = \frac{s_{a-1} n_{a-2}}{t_a t_{a-1}}$$

And *Equation 16.2.7 -*

$$\frac{1}{h_a} = \frac{n_{a-2}}{t_{a-1} m_a}$$

Or more simply:

$$h_a = \frac{t_{a-1} m_a}{n_{a-2}}$$

If we then square Equation 16.2.5, Equation 16.2.6, and Equation 16.2.7, and plug into Equation 16.2.1, then we get:

$$\frac{m_a^4}{h_a^2} = m_a^2 f_a^2 - m_a^2 w_a^2$$

Which if we divide both sides by rest mass squared, gives us:

Equation 16.2.8 -

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

Another way to look at Equation 16.2.6, or more specifically wave number squared, is like the following:

$$w_a^2 = \frac{s_{a-1}^2 n_{a-2}^2}{t_{a-1}^2 t_a^2} = \frac{t_{a-1}^2 n_{a-2}^2 - t_a^2 n_{a-2}^2}{t_{a-1}^2 t_a^2} = \frac{t_{a-1}^2 n_{a-2}^2}{t_{a-1}^2 t_a^2} - \frac{t_a^2 n_{a-2}^2}{t_{a-1}^2 t_a^2} = \frac{n_{a-2}^2}{t_a^2} - \frac{n_{a-2}^2}{t_{a-1}^2}$$

Given Equation 16.2.5 and Equation 16.2.6, then phase velocity is:

$$\frac{f_a}{w_a} = \frac{n_{a-2}}{t_a} * \frac{t_a t_{a-1}}{s_{a-1} n_{a-2}} = \frac{t_{a-1}}{s_{a-1}}$$

Which is correctly the inverse of velocity. Energy and momentum also calculate correctly to being equal to:

$$E_a = f_a h_a = \frac{n_{a-2} t_{a-1} m_a}{t_a n_{a-2}} = \frac{t_{a-1} m_a}{t_a}$$

$$p_a = w_a h_a = \frac{s_{a-1} n_{a-2} t_{a-1} m_a}{t_a t_{a-1} n_{a-2}} = \frac{s_{a-1} m_a}{t_a}$$

Where things get more interesting is when looking at Angular Momentum and Bohr's Quantum Condition, which gives us:

Equation 16.2.9 -

$$L_a = \frac{n_{a-2} h_a}{n_{a-1}} = \frac{n_{a-2} t_{a-1} m_a}{n_{a-1} n_{a-2}} = \frac{t_{a-1} m_a}{n_{a-1}}$$

16.3 – The Math of Current Day Quantum Mechanics with Angular Momentum

This is not the normal way of looking at angular momentum. This looks nothing like what Debroglie proposed. While I believe Equation 16.2.9 is correct, there is another way to derive angular momentum, and it exposes an interesting pattern. So, let's go back to the previous basic equation for Quantum Mechanics Equation 16.2.3:

$$t_a^2 m_a^2 n_{a-2}^2 = t_{a-1}^2 m_a^2 n_{a-2}^2 - s_{a-1}^2 m_a^2 n_{a-2}^2$$

Instead of dividing it by $t_a^2 t_{a-1}^2$, let's instead divide it by s_{a-1}^4. Or:

$$\frac{t_a^2 m_a^2 n_{a-2}^2}{s_{a-1}^4} = \frac{t_{a-1}^2 m_a^2 n_{a-2}^2}{s_{a-1}^4} - \frac{s_{a-1}^2 m_a^2 n_{a-2}^2}{s_{a-1}^4}$$

Which reduces to:

Equation 16.3.1 -

$$\frac{t_a^2 m_a^2 n_{a-2}^2}{s_{a-1}^4} = \frac{t_{a-1}^2 m_a^2 n_{a-2}^2}{s_{a-1}^4} - \frac{m_a^2 n_{a-2}^2}{s_{a-1}^2}$$

Equation 16.3.1 represents a triangle the same shape as the triangles of both Equation 16.2.3 and Equation 16.2.4. If we define the sides of this triangle in the same way as previous triangles, then we get:

Equation 16.3.2 -

$$f_a = \frac{t_{a-1} n_{a-2}}{s_{a-1}^2}$$

Equation 16.3.3 -

$$w_a = \frac{n_{a-2}}{s_{a-1}}$$

And:

$$\frac{1}{h_a} = \frac{t_a n_{a-2}}{s_{a-1}^2 m_a}$$

Or more simply:

Equation 16.3.4 -

$$h_a = \frac{s_{a-1}^2 m_a}{t_a n_{a-2}}$$

Which again leads to our previous Equation 16.2.8:

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

Given Equation 16.3.2 and Equation 16.3.3, then phase velocity is again correctly:

$$\frac{f_a}{w_a} = \frac{t_{a-1} n_{a-2}}{s_{a-1}^2} * \frac{s_{a-1}}{n_{a-2}} = \frac{t_{a-1}}{s_{a-1}}$$

Energy and momentum also calculate correctly to being:

$$E_a = f_a h_a = \frac{t_{a-1} n_{a-2} s_{a-1}^2 m_a}{s_{a-1}^2 t_a n_{a-2}} = \frac{t_{a-1} m_a}{t_a}$$

$$p_a = w_a h_a = \frac{n_{a-2} s_{a-1}^2 m_a}{s_{a-1} t_a n_{a-2}} = \frac{s_{a-1} m_a}{t_a}$$

Which gives us a little more familiar looking equation for Angular Momentum, or:

Equation 16.3.5 -

$$L_a = \frac{n_{a-2}h_a}{n_{a-1}} = \frac{n_{a-2}s_{a-1}^2 m_a}{t_a n_{a-2} n_{a-1}} = \frac{s_{a-1}^2 m_a}{t_a n_{a-1}} = \frac{s_{a-1} r_{a-1} m_a}{t_a} = \frac{2\pi r_{a-1}^2 n_{a-1} m_a}{t_a} = \frac{Area\ under\ curve}{t_a} m_a$$

So what I am proposing is that Bohr's Quantum condition and Angular Momentum take this form, when Plank's Constant and Frequency are Equations 16.3.4 and 16.3.2.

16.4 – The General Form of the Math of Quantum Mechanics

The two different ways of viewing Quantum Mechanics, one by dividing by $t_a^2 t_{a-1}^2$ and the other by dividing by s_{a-1}^4, show an interesting pattern. Both result in similar shaped triangles, and both result in taking Equation 16.2.3 and dividing it by 'something'. Let's call that 'something': Z_a It can be equal to pretty much anything that keeps the triangle the same shape.

If we follow through with this we see that:

Equation 16.4.1 -

$$\frac{t_a^2 m_a^2 n_{a-2}^2}{Z_a^2} = \frac{t_{a-1}^2 m_a^2 n_{a-2}^2}{Z_a^2} - \frac{s_{a-1}^2 m_a^2 n_{a-2}^2}{Z_a^2}$$

Which leads to *Equation 16.4.2 -*

$$f_a = \frac{t_{a-1} n_{a-2}}{Z_a}$$

Equation 16.4.3 -

$$w_a = \frac{s_{a-1} n_{a-2}}{Z_a}$$

And:

$$\frac{1}{h_a} = \frac{t_a n_{a-2}}{Z_a m_a}$$

Or more simply:

Equation 16.4.4 -

$$h_a = \frac{Z_a m_a}{t_a n_{a-2}}$$

Which again leads to our previous Equation 16.2.8:

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

Given Equation 16.4.2 and Equation 16.4.3, then phase velocity is again correctly:

$$\frac{f_a}{w_a} = \frac{t_{a-1}n_{a-2}}{Z_a} * \frac{Z_a}{s_{a-1_{a-2}}} = \frac{t_{a-1}}{s_{a-1}}$$

Energy and momentum also calculate correctly into being:

$$E_a = f_a h_a = \frac{t_{a-1}n_{a-2}Z_a m_a}{Z_a t_a n_{a-2}} = \frac{t_{a-1}m_a}{t_a}$$

$$p_a = w_a h_a = \frac{s_{a-1}n_{a-2}Z_a m_a}{Z_a t_a n_{a-2}} = \frac{s_{a-1}m_a}{t_a}$$

And then also Angular Momentum:

$$L_a = \frac{n_{a-2}h_a}{n_{a-1}} = \frac{n_{a-2}Z_a m_a}{n_{a-1}t_a n_{a-2}} = \frac{Z_a m_a}{n_{a-1}t_a}$$

So which is the real equation and the real triangle for Quantum Mechanics? I will give several answers to that question. All can be viewed as correct.

16.5 – The Simple Solution

The first answer is to simply say that the most correct way of looking at Quantum Mechanics is Equation 16.4.1. In other words, make $Z_a = 1$ to get:

Equation 16.5.1 -

$$f_a = t_{a-1}n_{a-2}$$

Equation 16.5.2 -

$$w_a = s_{a-1}n_{a-2}$$

And:

$$\frac{1}{h_a} = \frac{t_a n_{a-2}}{m_a}$$

Or more simply:

Equation 16.5.3 -

$$h_a = \frac{m_a}{t_a n_{a-2}}$$

Which again leads to our previous Equation 16.2.8:

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

As the reader can see phase velocity is again correctly:

$$\frac{f_a}{w_a} = \frac{t_{a-1} n_{a-2}}{1} * \frac{1}{s_{a-1} n_{a-2}} = \frac{t_{a-1}}{s_{a-1}}$$

Energy and momentum also calculate correctly:

$$E_a = f_a h_a = \frac{t_{a-1} n_{a-2} m_a}{t_a n_{a-2}} = \frac{t_{a-1} m_a}{t_a}$$

$$p_a = w_a h_a = \frac{s_{a-1} n_{a-2} m_a}{t_a n_{a-2}} = \frac{s_{a-1} m_a}{t_a}$$

And then also Angular Momentum:

$$L_a = \frac{n_{a-2} h_a}{n_{a-1}} = \frac{n_{a-2} m_a}{n_{a-1} t_a n_{a-2}} = \frac{m_a}{n_{a-1} t_a}$$

The reason why Quantum Mechanics is such a pain, and why it operates in such a different way than the macroscopic universe, is because we have been trying to determine things like cycles per space displacement and cycles per time displacement, when the more fundamental quantity is the product of cycles and space displacement and the product of cycles and time displacement. Current wave mechanics, and the idea of matter as a wave, is reliant on frequency and wave number, but it all can be greatly simplified if we represent it just as the number of cycles between two events. Between those two events, all sorts of paths may be taken by different observers, but all observers agree on the number of cycles that occur between those two events. Of course this probably means we should not use the terminology frequency and wavenumber, so I will generally try to use number of cycles within a cycle above. It is also good to note, even though it should be obvious to the reader by now, is that Planck's Constant and the spacetime interval are close to the exact same thing, which is t_a, and only differ by number of cycles, n_a. i.e. the spacetime interval increases and decreases by a quantized amount, which is represented by Planck's Constant.

In other words, the most difficult thing I have had to deal with in Physics has been that quantum mechanics seems to operate the exact inverse of what it is supposed to. This is no more clear than in the Simple Solution to quantum mechanics. In Equation 16.5.2, if divide cycles out of both sides, then the inverse of space displacement is equal to space displacement. In Equation 16.5.1, if divide cycles out of both sides, then the inverse of time displacement is equal to time displacement. Standard relativistic momenergy seems to be the exact inverse of quantum mechanics. If it was not the inverse, and was instead directly proportional, then quantum mechanics would be oh so much easier. I have to remind myself that the two most fundamental equations in current day quantum mechanics, which are amazingly brilliant, were cobbled together without much understanding for how and why they worked the way they did. I believe this to be the most evident in that the two most famous equations, 16.1.1 and 16.1.2, aren't what is observed from either the lab frame or the rocket frame. In other words, the equation that DeBroglie had the most confidence in, equation 16.1.3, is what is observed in the rocket frame. Equation 16.1.4 is the 'time dilated' frequency and so is what is observed in the lab frame. This begs an interesting question of what is the observer for the two most famous quantum mechanics equations? It can't be the rocket frame or the lab frame, because those are different equations, so it must be one of each. In other words, for Equation 16.1.2, the momentum is observed in the lab frame and the wave number, or inverse wavelength, is observed at the rocket frame. For Equation 16.1.1, the energy is observed in the lab frame and the frequency is observed in the rocket frame. This seems to make sense with how experiments are typically performed and the experimental physicist being in the lab frame and what they are measuring is smashing against other things in the rocket frame. I mean, what else could it be? If the reader then thinks about how if one side of the equations are in the rocket frame and the other side of the equations are in the lab frame, and how in this paper labs observing rockets are observing down Dimensions and rockets observing labs are observing up Dimensions, then each side of the equation being the inverse of the other doesn't seem so crazy. I have already mentioned in this paper about how the observers agree on how much time dilation each are going through, and so if the lab frame observer that is observing the rocket observes time displacement divided by the interval, or the standard time stretch factor, then the rocket frame observer observing the lab will observe the interval divided by the time displacement, or the exact inverse of what the lab frame observes of the rocket. More simply stated, observing up Dimensions is the exact inverse of observing down Dimensions. If two observers are observing each other, and one observer is in a Dimension above or below the other observer, in other words to where one observer's motion is contained within the Dimension of the other observer, then they will observe the inverse of each other. Even more simply stated, the most famous equations of quantum mechanics, Equation 16.1.1 and Equation 16.1.2, have the energy and momentum be relative to the lab frame, but the frequency and wave number being relative to the rocket frame. This can make sense in that if an observer is observing electrons smashing into each other, then while the observer is observing from the lab frame, the actual smashing of the electrons happens in the rocket frame.

16.6 – The Inverse Simple Solution

The second answer to the question of "what is the correct triangle for Quantum Mechanics", is that instead of multiplying the momentum-energy equation by the number of cycles squared, one should divide by number of cycles squared. In other words, instead of starting with Equation 16.2.3, you start with:

Equation 16.6.1 -

$$\frac{t_a^2 m_a^2}{n_{a-2}^2} = \frac{t_{a-1}^2 m_a^2}{n_{a-2}^2} - \frac{s_{a-1}^2 m_a^2}{n_{a-2}^2}$$

Which leads to:

Equation 16.6.2 -

$$f_a = \frac{t_{a-1}}{n_{a-2}}$$

Equation 16.6.3 -

$$w_a = \frac{s_{a-1}}{n_{a-2}}$$

And *Equation 16.6.4 -*

$$h_a = \frac{n_{a-2} m_a}{t_a}$$

Which again leads to Equation 16.2.8:

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

Given Equation 16.6.2 and Equation 16.6.3, then phase velocity is again correctly:

$$\frac{f_a}{w_a} = \frac{t_{a-1}}{n_{a-2}} * \frac{n_{a-2}}{s_{a-1}} = \frac{t_{a-1}}{s_{a-1}}$$

Energy and momentum also calculate correctly:

$$E_a = f_a h_a = \frac{t_{a-1} n_{a-2} m_a}{t_a n_{a-2}} = \frac{t_{a-1} m_a}{t_a}$$

$$p_a = w_a h_a = \frac{s_{a-1} n_{a-2} m_a}{t_a n_{a-2}} = \frac{s_{a-1} m_a}{t_a}$$

And then also Angular Momentum:

$$L_a = \frac{n_{a-2} h_a}{n_{a-1}} = \frac{n_{a-2} n_{a-2} m_a}{n_{a-1} t_a} = \frac{n_{a-2}^2 m_a}{n_{a-1} t_a}$$

16.7 – The Lens Solution

One answer to the question of "what is the correct triangle for Quantum Mechanics", is the first triangle mentioned, or Equation 16.2.4. In other words, dividing by both the interval and the time displacement. The way to understand this is to see that to view momentum and energy, we look at the space and time displacements through the 'lens' of the interval. For macroscopic momentum and energy, the space and time displacements are riding on top of the interval. For Quantum Mechanics, the cycles are not riding on top of the interval, but instead are riding on top of the time displacement. This means that an observer observing those cycles are viewing it through not only the 'lens' of the interval, but also the 'lens' of the time displacement. Viewing through both of the lens' and dividing by both the interval and the time displacement is what results in a pseudo space displacement that is longer than the time displacement. This means that if an observer at the interval, or t_a, were to view a cycle riding on top of t_{a-2}, then they would be observing that cycle through three lens': t_a, t_{a-1}, and t_{a-2}. That would result in the following:

Equation 16.7.1 -

$$t_a^2 m_a^2 n_{a-3}^2 = t_{a-2}^2 m_a^2 n_{a-3}^2 - s_{a-2}^2 m_a^2 n_{a-3}^2 - s_{a-1}^2 m_a^2 n_{a-3}^2$$

$$\frac{t_a^2 m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2} = \frac{t_{a-2}^2 m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2} - \frac{s_{a-2}^2 m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2} - \frac{s_{a-1}^2 m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2}$$

And *Equation 16.7.2 -*

$$\frac{m_a^2 n_{a-3}^2}{t_{a-1}^2 t_{a-2}^2} = \frac{m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2} - \frac{s_{a-2}^2 m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2} - \frac{s_{a-1}^2 m_a^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2}$$

So for observing a cycle riding on t_{a-2}, there is something like a frequency, something like Planck's Constant, and two somethings that are like a wave number. Of course the wave numbers can be added together like two side of their own triangle, and all of that would result in:

Equation 16.7.3 -

$$f_{a-1} = \frac{n_{a-3}}{t_a t_{a-1}}$$

Equation 16.7.4 -

$$w_{a-1}^2 = \frac{s_{a-1}^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2} + \frac{s_{a-2}^2 n_{a-3}^2}{t_a^2 t_{a-1}^2 t_{a-2}^2} = \frac{n_{a-3}^2 (s_{a-1}^2 + s_{a-2}^2)}{t_a^2 t_{a-1}^2 t_{a-2}^2}$$

And:

$$\frac{1}{h_{a-1}} = \frac{n_{a-3}}{t_{a-1} t_{a-2} m_a}$$

Or more simply:

Equation 16.7.5 -

$$h_{a-1} = \frac{t_{a-1} t_{a-2} m_a}{n_{a-3}}$$

Which again leads to our previous Equation 16.2.8:

$$\frac{m_a^2}{h_{a-1}^2} = f_{a-1}^2 - w_{a-1}^2$$

Given Equation 16.7.3 and Equation 16.7.4, then phase velocity is:

$$\frac{f_{a-1}}{w_{a-1}} = \frac{n_{a-3}}{t_a t_{a-1}} * \frac{t_a t_{a-1} t_{a-2}}{n_{a-3}\sqrt{(s_{a-1}^2 + s_{a-2}^2)}} = \frac{t_{a-2}}{\sqrt{(s_{a-1}^2 + s_{a-2}^2)}}$$

Energy and momentum calculate to:

$$E_{a-1} = f_{a-1} h_{a-1} = \frac{n_{a-3}}{t_a t_{a-1}} * \frac{t_{a-1} t_{a-2} m_a}{n_{a-3}} = \frac{t_{a-2} m_a}{t_a}$$

$$p_{a-1} = w_{a-1} h_{a-1} = \frac{n_{a-3}\sqrt{(s_{a-1}^2 + s_{a-2}^2)}}{t_a t_{a-1} t_{a-2}} * \frac{t_{a-1} t_{a-2} m_a}{n_{a-3}} = \frac{m_a\sqrt{(s_{a-1}^2 + s_{a-2}^2)}}{t_a}$$

And then Angular Momentum:

$$L_{a-1} = \frac{n_{a-3} h_a}{n_{a-1}} = \frac{n_{a-3} t_{a-1} t_{a-2} m_a}{n_{a-1} n_{a-3}} = \frac{t_{a-1} t_{a-2} m_a}{n_{a-1}}$$

16.8 – Rotation Solution

If we follow through with this we see that:

$$n_{a-1}^2 m_a^2 = n_{a-2}^2 m_a^2 - n_{\neg a}^2 m_a^2$$

$$f_a = n_{a-2}$$

$$w_a = n_{\neg a}$$

And:

$$\frac{1}{h_a} = \frac{n_{a-1}}{m_a}$$

Or more simply:

$$h_a = \frac{m_a}{n_{a-1}}$$

Which again leads to our previous Equation 16.2.8:

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

Phase velocity then is:

$$\frac{f_a}{w_a} = \frac{n_{a-2}}{n_{\neg a}}$$

Energy and momentum then is:

$$E_a = f_a h_a = \frac{n_{a-2} m_a}{n_{a-1}}$$

$$p_a = w_a h_a = \frac{n_{\neg a} m_a}{n_{a-1}}$$

And then also Angular Momentum:

$$L_a = \frac{n_{a-2} h_a}{n_{a-1}} = \frac{n_{a-2} m_a}{n_{a-1} n_{a-1}} = \frac{n_{a-2} m_a}{n_{a-1}^2}$$

16.9 – Rocket Frame Solution

If one wants to calculate what is normally considered Planck's Constant, then one must be able to derive the equation that deBroglie had the most confidence in, and that is the equation for the rocket frame, or Equation 16.1.3, where there is no space displacement, and time displacement is equal to the spacetime interval.

If we follow through with this we see that:

$$t_a^2 m_a^2 n_{a-2}^2 = t_{a-1}^2 m_a^2 n_{a-2}^2$$

$$f_a = t_{a-1} n_{a-2} = t_a n_{a-2}$$

And:

$$\frac{1}{h_a} = \frac{t_a n_{a-2}}{m_a} = \frac{t_{a-1} n_{a-2}}{m_a}$$

Or more simply:

Equation 16.9.1 – The Modern Physics Rocket Frame Plancks Constant

$$h_a = \frac{m_a}{t_a n_{a-2}} = \frac{m_a}{t_{a-1} n_{a-2}}$$

Which leads to:

$$\frac{m_a^2}{h_a^2} = f_a^2$$

Energy also calculates correctly to being equal to rest mass:

$$E_a = f_a h_a = \frac{t_{a-1} n_{a-2} m_a}{t_a n_{a-2}} = \frac{t_{a-1} m_a}{t_a} = m_a$$

And then also Angular Momentum:

$$L_a = \frac{n_{a-2} h_a}{n_a} = \frac{n_{a-2} m_a}{n_{a-1} t_a n_{a-2}} = \frac{m_a}{n_{a-1} t_a}$$

16.10 – Radius Squared Solution

So, let's go back to the basic equation for Quantum Mechanics, Equation 16.2.3:

$$t_a^2 m_a^2 n_{a-2}^2 = t_{a-1}^2 m_a^2 n_{a-2}^2 - s_{a-1}^2 m_a^2 n_{a-2}^2$$

Instead of dividing it by $t_a^2 t_{a-1}^2$, let's instead divide it by r_{a-1}^4. Or:

$$\frac{t_a^2 m_a^2 n_{a-2}^2}{r_{a-1}^4} = \frac{t_{a-1}^2 m_a^2 n_{a-2}^2}{r_{a-1}^4} - \frac{s_{a-1}^2 m_a^2 n_{a-2}^2}{r_{a-1}^4}$$

Which reduces to:

Equation 16.10.1 -

$$\frac{t_a^2 m_a^2 n_{a-2}^2}{r_{a-1}^4} = \frac{t_{a-1}^2 m_a^2 n_{a-2}^2}{r_{a-1}^4} - \frac{n_{a-1}^2 m_a^2 n_{a-2}^2}{r_{a-1}^2}$$

Equation 16.10.1 represents a triangle the same shape as the triangles of both Equation 16.2.3 and Equation 16.2.4. If we define the sides of this triangle in the same way as previous triangles, then we get:

Equation 16.10.2 -

$$f_a = \frac{t_{a-1} n_{a-2}}{r_{a-1}^2}$$

Equation 16.10.3 -

$$w_a = \frac{n_{a-1} n_{a-2}}{r_{a-1}}$$

And:

$$\frac{1}{h_a} = \frac{t_a n_{a-2}}{r_{a-1}^2 m_a}$$

Or more simply:

Equation 16.10.4 -

$$h_a = \frac{r_{a-1}^2 m_a}{t_a n_{a-2}}$$

Which again leads to our previous Equation 16.2.8:

$$\frac{m_a^2}{h_a^2} = f_a^2 - w_a^2$$

Phase velocity is again correctly:

$$\frac{f_a}{w_a} = \frac{t_{a-1} n_{a-2}}{r_{a-1}^2} * \frac{r_{a-1}}{n_{a-1} n_{a-2}} = \frac{t_{a-1}}{r_{a-1} n_{a-1}} = \frac{t_{a-1}}{s_{a-1}}$$

Energy and momentum also calculate correctly:

$$E_a = f_a h_a = \frac{t_{a-1} n_{a-2} r_{a-1}^2 m_a}{r_{a-1}^2 t_a n_{a-2}} = \frac{t_{a-1} m_a}{t_a}$$

$$p_a = w_a h_a = \frac{n_{a-1} n_{a-2} r_{a-1}^2 m_a}{r_{a-1} t_a n_{a-2}} = \frac{n_{a-1} r_{a-1} m_a}{t_a} = \frac{s_{a-1} m_a}{t_a}$$

Which gives us an equation for Angular Momentum:

$$L_a = \frac{n_{a-2} h_a}{n_{a-1}} = \frac{n_{a-2} r_{a-1}^2 m_a}{t_a n_{a-2} n_{a-1}} = \frac{r_{a-1}^2 m_a}{t_a n_{a-1}}$$

The reader can view Quantum Mechanics in any of these ways. They are all correct. They are just different. One important similarity is that they all show that there isn't really a difference between the microscopic and macroscopic universes. The Dimension the observer is at, or reference frame of the observer, is the sole reason behind any observed, but not actual, difference.

17. The Fundamental Force

To start the section on The Fundamental Force, it would be good to remind the reader that this paper relies on some sort of quantum equilibrium. In other words, all matter and motion tends towards an equilibrium. If this equilibrium was achieved within the universe, then there would be no force in the universe. In other words, like with Gravity in General Relativity, I propose that all force is fictitious. Force only exists when matter and motion are not at complete equilibrium.

So what is the equilibrium? The reader can think of it like the conservation of momentum, angular momentum, and energy, but also can think of it a little more fundamentally given we know that momentum, angular momentum, and energy can all be expressed in terms of space displacements along rotations, or s_a. In other words:

$$L_{a-1} = \frac{s_{a-1}m}{t_a}$$

$$p_{a-1} = \frac{s_{a-1}m}{t_a}$$

$$E_{a-1} = \frac{t_{a-1}m}{t_a}$$

But we also know that:

$$t_a^2 = s_a^2 + s_{a+1}^2 + s_{a+2}^2 + \cdots$$

And:

$$t_{a-1}^2 = s_{a-1}^2 + s_a^2 + s_{a+1}^2 + \cdots$$

Which mean that both time displacement and the spacetime interval can be expressed in terms of only space displacements along rotations. This means that momentum, angular momentum, and energy can all be expressed in terms of space displacement along rotations. Force is the rate of change of momentum, torque is the rate of change of angular momentum, and power is the rate of change of energy.

All of that means that in order for there to be change, or action, then some space displacement in some Dimension must go through change. The observer of that change may be in a Dimension above or below the Dimension with the change in it, and so the space displacement relative to the observer may not change, but some space displacement in some Dimension must go through change in order for any force to be observed. All forces are different simply because of the difference in the Dimension of the observer relative to the Dimension that has the rate of change of space displacement being observed, both in magnitude of space displacement traveled in those Dimensions as well as whether they are 'up' or 'down' from each other. For all force, space displacement in some Dimension is altered, but the four fundamental forces look different simply because of the relative Dimension of the observer and that transfers of space displacement can happen up or down Dimensions, as well as, the greatly different magnitudes of the radii and space displacements being observed for different forces. Those are the only reasons the four fundamental forces seem different from each other, but at the end of the day, each of them are defined by rates of change of space displacements. The change in space displacement itself is what I will call the Fundamental Force.

Equation 17.1 - The Fundamental Force

$$F_a = \Delta s_{a-1}$$

Of course, now the question is begged of what are those rates of change of space displacements being observed relative to? In other words, are those rates of changes of space displacement with respect to time, with respect to the interval, or perhaps with respect to something else? Due to the Principle of Stable Spacetime, we know that the rates of change of those space displacements are with respect to the spacetime interval. In other words, can view as space displacement per meter of spacetime interval. If the space displacement is transferred to some other Dimension, then the space displacement per meter of spacetime interval must be the same before and after the transfer, in order for the internal Dimensions of the matter of the object in motion to not observe the change, i.e. remain stable. Again, this is just the Principle of Stable Spacetime.

That means that all force is rate of change of space displacement along a rotation, in some Dimension, with respect to the spacetime interval, and since we must not forget the rest mass of the object of matter itself, then we get the definition of the Fundamental Force that all other force can be derived from:

Equation 17.2 – The Fundamental Force in Terms of Momentum

$$F_a = \frac{\Delta s_{a-1}}{t_a} m_a = \frac{d}{d(t_a)} (s_{a-1} m_a)$$

The rate of change of space displacement per meter of spacetime interval times rest mass, in a universe of space displacements along rotations within space displacements along rotations, with observers at different Dimensions, and transfers of space displacement to different Dimensions, is what explains the gravitational, electromagnetic, nuclear weak, and nuclear strong forces. A change in space displacement in a given Dimension, or change in s_a, must be balanced in some other Dimension. In other words, the total energy is conserved, the total momentum is conserved, and the total angular momentum is conserved. It is also true that the total space displacement along some amount of interval is also conserved and is the cause of the conservation of momentum, angular momentum, and energy. This means that if the space displacement, momentum, angular momentum, and energy decrease in a given Dimension then some other Dimension's space displacement, momentum, angular momentum, and energy will increase. The total momentum, angular momentum, and energy must be conserved in any collision. Of course, as we've learned from DeBroglie, all of those rates of change must be according to a certain quantized amount, or lining up of cycles, otherwise equilibrium will not be reached and a force will exist that is working to bring about equilibrium, or a lining up of cycles.

It is good to also note that instead of viewing the Fundamental Force as space displacement along a curve between two events separated by one meter of interval, that could think of in terms of area under the curve between two events separated by one meter of interval. In other words, in terms of angular momentum and torque. So, instead of distance along the curve, area under the curve, and due to the Principle of Stable Spacetime, then is with respect to the interval. Since in this paper space displacement is partially defined by a radius, then adding another to calculate area seems unnecessary. In other words, the difference between circumference and area is roughly the difference between having an r and an r^2. So, in general in this paper I will talk about the Fundamental Force as being the rate of change along a space displacement.

18. The Conservation Laws - Momentum, Energy, and Angular Momentum

In a universe of space displacements of rotations within space displacements of rotations, the conservation of momentum, energy, and angular momentum can all be thought of in the same way. In order for momentum, energy, or angular momentum to change, then some space displacement along a rotation, must change. If there is change, and if total momentum, energy, or angular momentum is to be conserved, then some other space displacement along a rotation must change. For example, let's say that there is a rotation with space displacement s_{a-2} that is within s_{a-1}. If s_{a-2} were to increase while t_{a-1} stayed the same, then p_{a-2}, E_{a-2}, and L_{a-2} would all increase. In order for total momentum, total energy, and total angular momentum of overlapping Dimensions to all stay conserved, then one possible way would be to decrease s_{a-1}. This is called a transfer of momentum, energy, and angular momentum from Dimension to Dimension. More specifically, it is a transfer of space displacement of rotation from s_{a-1} to s_{a-2}.

If an observer, let's say at t_a, is observing a transfer of space displacement, let's call it s, from $s_{a-1}$to s_{a-2}, then the observer will view that space displacement, s, as being the same length before and after transferring Dimensions. The spacetime interval that s rides on will be different before and after. The mass traveling along s will be different before and after. The observed momentum, energy, and angular momentum of the transferred space displacement will be the same both before and after. Observers at different Dimensions may disagree about how much momentum, energy, and angular momentum is transferred between Dimensions, but each will observe a conserved total momentum, total energy, and total angular momentum when the space displacement is transferred from $s_{a-1}$to s_{a-2}.

18.1 – Conservation of Momentum

We can calculate the momentum of the chunk of matter with space displacement s, both before and after, as follows:

Equation 18.1.1 – Momentum Before and After

$$p_s = \frac{s}{t_a} m_a = \frac{s}{t_{a-1}} m_{a-1}$$

If the reader remembers this previous equation from the section on matter:

$$m_{a-1} = \frac{t_{a-1}}{t_a} m_a$$

Then the reader can see how momentum is conserved:

$$p_s = \frac{s}{t_a} m_a = \frac{s}{t_{a-1}} m_{a-1} = \frac{s}{t_{a-1}} \frac{t_{a-1}}{t_a} m_a = \frac{s}{t_a} m_a$$

So as the reader can see, the amount of momentum observed for that chunk of matter along space displacement s that transfers from s_{a-1} to s_{a-2} is conserved. However, before when the space displacement is at s_{a-1} and with spacetime interval t_a, then the observer will observe more momentum from motion, or $\frac{s}{t_a}$, and less momentum from matter, or m_a, than when the observer is observing s at s_{a-2} with spacetime interval t_{a-1}, or $\frac{s}{t_{a-1}}$ and m_{a-1}. By momentum from motion and momentum from matter, I mean something analogous to kinetic energy and potential energy, although not being additive like with energy. In other words, $m_{a-1} > m_a$ and $\frac{s}{t_{a-1}} < \frac{s}{t_a}$.

It is good to note that when velocity is non-relativistic, or approaches zero, then $m_{a-1} = m_a$ and $\frac{s}{t_{a-1}} = \frac{s}{t_a}$. In other words, the spacetime interval and time displacement approach being equal. As approach the speed of light, or $t_a \ll t_{a-1}$, with s being constant, then the momentum due to motion before, or $\frac{s}{t_a}$, will be much larger than the momentum due to motion after, or $\frac{s}{t_{a-1}}$, which approaches zero. As approach the speed of light, the momentum due to matter before, or m_a, is much less than the momentum due to matter after, or m_{a-1}, which approaches infinity.

18.2 – Conservation of Energy

I propose that total energy is also conserved, and similar to momentum, different amounts of kinetic energy and potential energy are observed before and after, by our observer at $d_{\neg a+1}$. For the purposes of this section, I will refer to energy due to motion, which is different than kinetic energy, as t. t is the time displacement caused by the space displacement s before and after. In this section I will also refer to energy due to matter, which is the same as potential energy, as m_a and m_{a-1}, which is the same as momentum due to matter. All three can just be considered rest mass, which is consistent with Special Relativity. Similar to momentum, we have:

Equation 18.2.1 – Energy Before and After

$$E_s = \frac{t}{t_a} m_a = \frac{t}{t_{a-1}} m_{a-1} = \frac{t}{t_{a-1}} \frac{t_{a-1}}{t_a} m_a = \frac{t}{t_a} m_a$$

Calculating the time lost and gained, or caused, by the space displacement s is more complicated. The time lost and gained are equal, as is shown in the following:

$$t = \sqrt{s_{a-1}^2 + t_a^2} - \sqrt{(s_{a-1} - s)^2 + t_a^2} = \sqrt{(s_{a-2} + s)^2 + t_{a-1}^2} - \sqrt{s_{a-2}^2 + t_{a-1}^2}$$

Mathematically proving that time is constant before and after given the above equation is difficult. Well, at least for me. Let's call that an exercise for the reader. What I will do however is ask the easier questions of does time approach being constant as speed approaches zero and does time approach being constant as speed approaches the speed of light. In the case of speed approaching zero, then both the before and after spacetime intervals will approach being equal, or $t_a \approx t_{a-1}$. That means that the amount of time gained or lost by transferring space displacement approaches being equal. The masses before and after also approach being equal, or $m_a \approx m_{a-1}$. If the spacetime interval is roughly equal, the time displacement is roughly equal, and the mass is roughly equal, then the energy is roughly equal and as approach speed of zero then energy approaches being equal. In the case of approaching the speed of light, then just have to remember that if approaching the speed of light then s_{a-1} approaches t_{a-1}, or space displacement approaches being equal to time displacement. If the time displacement is equal to the space displacement, and we know the space displacement is constant before and after, then we know that the time displacement must then also be constant before and after. So I have then showed how, like momentum, total energy resulting from the transferred space displacement is constant before and after the transferring of the space displacement. So if we know then that as approach zero speed that time and total energy are constant before and after, and know that as approach the speed of light that both time and total energy are constant before and after, then I propose that at speeds in between zero and the speed of light that time and total energy are also constant before and after for an observer observing. Again, mathematical proof of that is left for the reader.

18.3 – Conservation of Angular Momentum

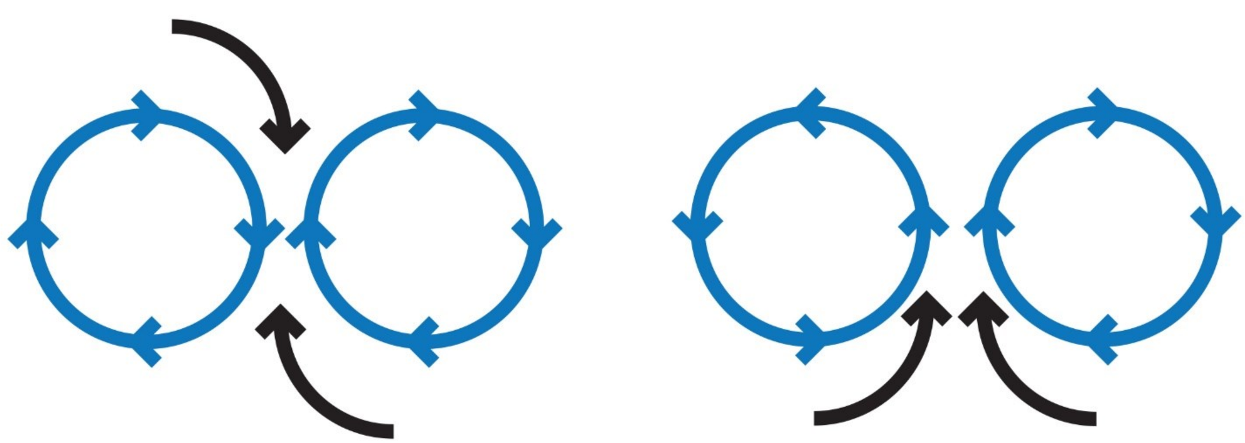
As is normally the case with angular momentum, angular momentum must be conserved. Angular momentum can transfer between different overlapping Dimensions, but the total angular momentum of those overlapping Dimensions must be conserved. The best way to think of the conservation of angular momentum, and a transfer of angular momentum from overlapping rotation to rotation, is to think of as keeping the area under the curve per meter of interval constant. If the Principle of Stable Spacetime holds, and the transferring rotation in question stays at the same magnitude of velocity before and after, and therefore keeps a constant momentum and energy, then as long as the radius doesn't change then Angular Momentum will stay conserved. In other words, when combine the conservation of angular momentum with the Principle of Stable Spacetime, then it ensures that the radius of the rotation that gets transferred must stay the same for all of energy, momentum, and angular momentum to stay conserved. In even other words, it means that the rotation that is transferred stays the same shape per meter of spacetime interval if all conservation laws are followed.

19. Electricity and Magnetism

Both Electricity and Magnetism are enormous topics and only the very basics will be covered. When matter rotates, it has a spin, or electric charge. As we know, matter is made of many molecules, atoms, and subatomic particles. Each with varying spins, whether they vary by radius, orientation of axis, or amount of matter under rotation. When different objects have rotations within the same Dimension, and those rotations are riding along intervals that are comprised of the same Dimensions, and those rotations get close to each other, then the motion of the rotations of the dimension in common can be to varying degrees of conflicting and not conflicting. In other words, the direction of the spin of each makes a difference on resultant motion (think positive and negative charges). Since rotations have a particular direction of rotation relative to their interval, i.e. their charge, then can apply the right hand rule with the thumb pointing in the direction of the interval that the rotation is riding on. This is equivalent to how can view general relativity and the bending of space. When attempting to combine rotations, conflicting space displacements, i.e. space displacement vectors pointing in opposite directions, cancel each other out and agreeing space displacements, or space displacements pointing in the same direction, add together. This results in more or less 'bending' of space than how much space is already bent in that area of space. The more space displacements conflict, then there will be less total space displacement in that area of space, and therefore the less 'bending' of space. The more space displacements agree in direction, then the greater the combined space displacement in that particular area of space, thus resulting in more 'bending' of space. Similar to general relativity, the more bending of space at that particular area of space relative to how much spacetime is already bent in surrounding areas of space, then the greater the force of attraction. If the space displacements conflict and result in less space displacement in that particular area relative to how much spacetime is already bent in surrounding areas of space, then there will be a force of repulsion instead of attraction.

Let's look at what happens if matter collides that has similar directions of rotation and what happens if matter collides that has opposite directions of rotation.

Diagram 19.1 – Collision of Matter where Matter is of Same Spin vs Different Spin



Another way the reader can think about is like the following. When two Dimensions, or chunks of matter with spin, come close to each other, then if they collided fully then the combination of the two Dimensions may increase or decrease space displacement, depending on if have the same direction spin or different direction spin. This increase or decrease in combined space displacement causes momentum, angular momentum, and energy to increase or decrease. Since the conservation of momentum, angular momentum, and energy, or the conservation laws, must hold, then there must be a transfer of momentum, angular momentum, and energy up or down rotations.

If the rotations in Dimensions below are stable and generally at equilibrium, then they will resist the change due to the Principle of Stable Spacetime, and since the change in space displacement, momentum, angular momentum, and energy must go to some rotation, then it goes to a rotation in a Dimension above and so is observed as a repelling or attracting force in that Dimension above. In other words, if they collide, a transfer of space displacement, momentum, angular momentum, and energy across Dimensions would occur from the Dimension of the colliding rotations in question to the rotations in the Dimension above. This is what causes the electric field, each Dimension, that by definition has spin, will transfer space displacement across Dimensions in order to balance the changes in space displacement, momentum, angular momentum, and energy. With two like spins, that force repels because the combined space displacement between the two decreases, and since that space displacement must go somewhere, and cannot go to Dimensions below, then it causes a transfer of space displacement to the Dimension above. This increase in space displacement in the Dimension above that is between the two colliding rotations will cause a force that repels. There is more space between so they get further apart. With two different spins, that force attracts because the combined space displacement between the two increases, and since that space displacement must come from somewhere, and cannot come from Dimensions below, then it causes a transfer of space displacement from the Dimension above to the Dimensions of the colliding rotations. This decrease in space displacement in the Dimension above that is between the two colliding rotations will cause a force that attracts. There is less space between so they get closer.

We all know magnetism happens when an electric charge, or Dimension, is at a velocity. The magnetic field is created with that velocity. All a magnetic field is, is a balancing of angular momentum. So let's say we have an electric charge that is stationary. If there is an electric field then angular momentum must not be at equilibrium. The force of the electric field is an attempt to keep angular momentum constant. If you take an unbalanced angular momentum, or charge, and move it at a velocity, then there has to be a balancing of that added motion. In other words, if you take an unbalanced angular momentum and you apply a velocity, then that makes it even more unbalanced. The magnetic field occurs, at a 90 degree angle, to balance that angular momentum.

Or, magnetism is rotation when observed from interval and electric field is rotation when observed from time displacement (which is that rotation's interval)

20. The Uncertainty Principle and Diffraction

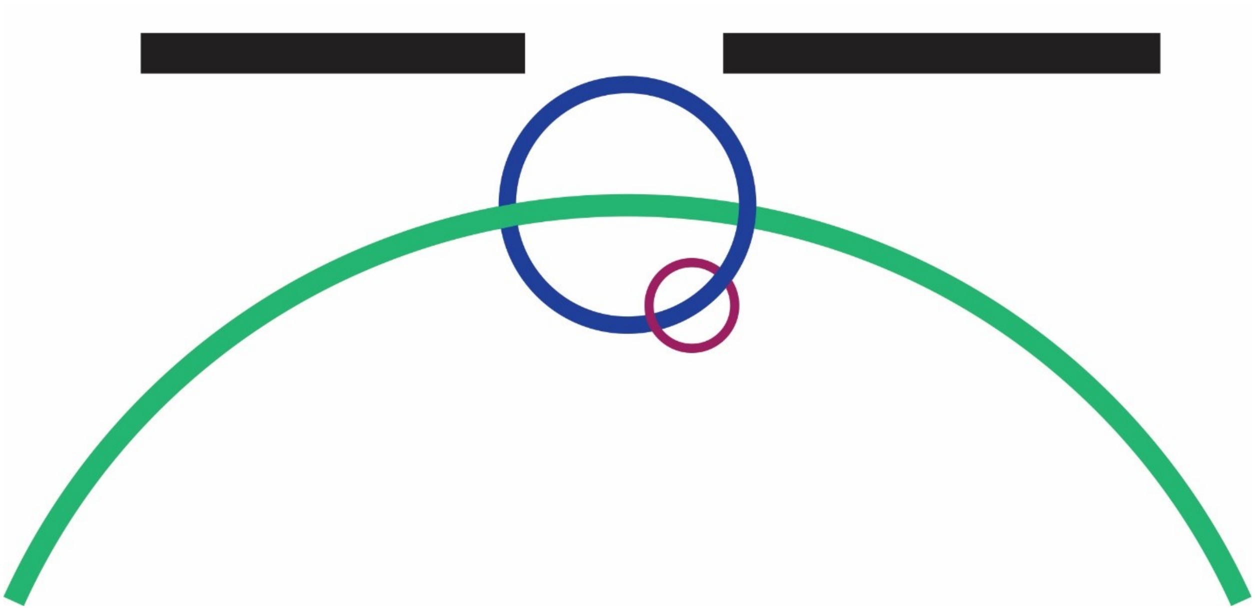
Oh, the Uncertainty Principle. There are multiple ways to derive the Uncertainty Principle, and different ways to think about it. There is no denying that it is correct. However, the Uncertainty Principle is not as limiting as Heisenberg thought. In a universe of rotations of angular momentum within rotations of angular momentum, the Uncertainty Principle actually makes perfect sense. The easiest way for the reader to see how, is to think of position as radius, or more correctly, diameter. In this paper, I will just say radius. All particles that go through a slit have spin. Whether single photon, single electron, or otherwise, and so they are circularly polarized. If circular polarized then what matters on if interferes with the walls of the slit is the radius, with the radius being directly proportional to the wavelength. If the radius, or more correctly diameter, are greater than the width of the slit, then a collision with the slit is much more likely.

Main Point 20.1 – Change in position is directly proportional to change in radius.

The Uncertainty Principle comes into play when there is change. Some text books state that is dispersion of position and dispersion of momentum, and it is generally thought of statistically. In this paper, the Uncertainty Principle can be thought of as change in radius and change of momentum. These are equivalent. If an electron travels through a slit, one can say that it's position is within the width of the slit, and by narrowing it's position to being within the slit then momentum disperses according to the Uncertainty Principle. However, it is commonly known that the wavelength, which is directly proportional to radius (or amplitude), must be larger than the width of the slit in order to experimentally, i.e. statistically, see much dispersion of momentum. This is because the electron must get close enough to the slit wall in order for diffraction, or dispersion of momentum, to occur. If an electron passes through the center of a very large slit that is greater than it's wavelength then no dispersion of momentum will occur. Statistically, over many electrons, some will get close enough to the slit walls for dispersion of momentum to occur, but only the ones that get close enough to the wall. That the wavelength, or the directly proportional radius (i.e. amplitude), of the electron must be larger than the slit width for dispersion of momentum to occur seems to by itself be a paradox of Heisenberg's interpretation of the Uncertainty Principle equation. It is not just a narrowing down of the position, which would be not impacted by wavelength but only position of the electron, but instead a squeezing of position. It's not statistically narrowing down the possibilities, but instead a very cause and effect impeding on position. All of that is a fancy way of saying the electron must collide with a slit wall for dispersion of momentum to occur.

It is also worth mentioning that the position of the electron within the rotations of angular momentum above it, when approaching the slits, will impact the path taken for the dispersion of momentum or position for each simple wave. In other words, as each electron goes through the two slit experiment, the exact position and momentum of the electron relative to the slits determines, in a deterministic way, the exact ending position of the electron on the detector screen. After many electrons goes through, the reason why there is a pattern of crests and troughs on the detector screen is because the relative position and relative momentum of the electron's rotation within the rotations above it has an impact on what the final destination in the detector screen is.

Diagram 20.1 – position of electron impacting dispersion



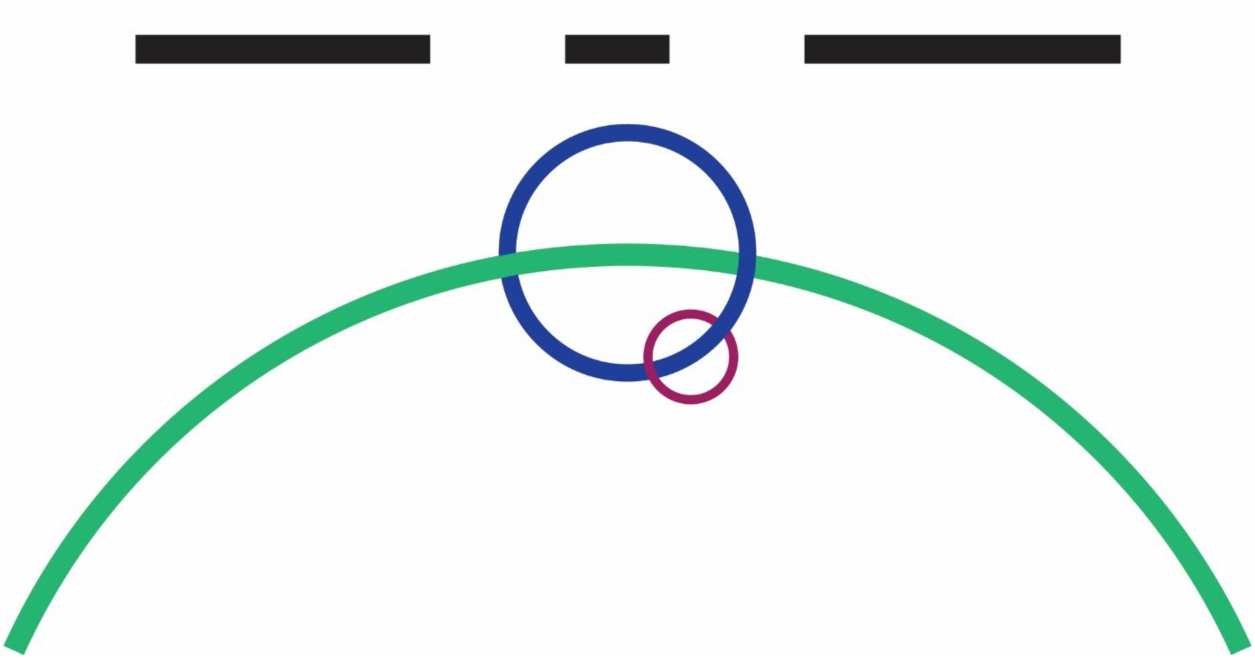
To explain how a restricting of position, or radius, can cause an increase in momentum, and thus increase in dispersion of momentum, one needs to just remember the Principle of Stable Spacetime. So, let's say we have a Dimension we are calling an electron, or s_{a-1}, traveling at a certain radius and number of cycles within the Dimension above it. That electron is made up of Dimensions that are lower than it, for example s_{a-2}, and that travel along the spacetime interval, t_{a-1}, that to the electron is time. If the length of that spacetime interval, t_{a-1}, changes then the Dimensions below, like s_{a-2}, will still travel along the same amount of spacetime interval per undulation. In other words, it's wavelength along the spacetime interval will be constant. So if t_{a-1} decreases, then the number of cycles of s_{a-2} along t_{a-1} must decrease by a directly proportional amount. According to the Principle of Stable Spacetime, this is done so Dimensions below the electron do not become unstable. Dimensions below the electron, like s_{a-2}, are not impacted by changes to the radius of the electron, or r_{a-1}. That means, that if r_{a-1} decreases then s_{a-1} and therefore t_{a-1} and s_{a-2} decreases, while t_a remains the same. That means that Energy E_a, momentum p_a, and angular momentum L_a, all decrease, and Energy E_{a-1}, momentum p_{a-1}, and angular momentum L_{a-1}, all stay constant. Due to the conservation of angular momentum, and therefore momentum and energy, then angular momentum, energy, and momentum must transfer to the Dimension above the electron, or s_a. If $s_a$increases, and assuming rest mass observed is unchanged, then Energy, E_{a+1}, momentum, p_{a+1}, and angular momentum, L_{a+1}, all increase. This is why when you squeeze the radius of an electron, via a collision with a slit wall, that it's momentum in the Dimension above it increases, thus resulting in a greater dispersion. A transfer of angular momentum, momentum, and energy must occur and if the matter in question remains stable and Principle of Stable Spacetime protects the stability and conservation laws of the Dimensions below, then the transfer must happen to a Dimension above. That is not to say that it is not possible to transfer angular momentum, momentum, and energy to a Dimension below without it flying apart, it's just that in order for the matter stay the same and the rest mass to stay the same, then the transfer must happen to a Dimension above, or a Dimension, or rotation, that the observer observes as motion, and not matter. Good to note that some observers in Dimensions above might not even notice the transfer of momentum, energy, and angular momentum. In other words, to them, both the Dimensions the momentum, energy, and angular momentum was transferred between are a part of what that observer considers 'rest mass', and so they do not observe that transfer between Dimensions.

So, what I am suggesting is that the electron, and all matter, has a definite position, or radius, and definite momentum, or velocity. In other words, the spin of the electron is at a particular position and momentum within the Dimension of the atom, the Earth, the Solar System, the Milky Way Galaxy, etc. What causes the dispersion of momentum or position is the conservation laws and the Principle of Stable Spacetime. Observation requires at least slightly changing, or confining, either radius or momentum of some Dimension, and momentum or radius disperses to balance these changes. In modern quantum mechanics this is viewed as the probability wave spreading, but to be clear the electron has a definite position and momentum at all times, it's just that the path of travel, which impacts position or momentum, is determined by the conservation laws and the Principle of Stable Spacetime. This is an equivalent idea to how the curvature of spacetime dictates how matter travels. This is also equivalent to the idea that the wave function dictates how matter travels. The conservation laws, in particular the conservation of angular momentum, applied to a universe of rotations within rotations, causes the curvature of spacetime which defines the wave function that dictates how matter travels.

21. Interference in the Two Slit Experiment

Continuing from Section on Interference, in regards to the two slit experiment, while the Dimension known as the electron only goes through one slit, there are multiple Dimensions above the electron, that the electron is a part of, that do go through both slits. In other words, currently for the double slit experiment the slits and the electron are at the Dimension of the Earth and the electron only goes through one slit. The wavelength, is the wavelength of the cycles of the electron traveling along the Earth. What I am saying is that the electron is a part of multiple rotations in Dimensions above it and it's motion relative to observers in those Dimensions will result in cycles with a much greater wavelength and that are much larger than both slits. For example, the wavelength of the electron relative to the Sun, is greater than the wavelength of the electron relative to the Earth. Stated differently, the electron's motion in Dimensions above are of drastically different and much greater wavelengths. As stated earlier in this paper, different overlapping Dimensions observe different amounts of matter and motion. An observer at the Dimension of the Milky Way Galaxy observes more matter and less motion, and the motion that it does observe is of a drastically greater wavelength (or same wavelength because wavelength proportional to momentum, or mass times motion). Kinda like greater motion along greater wavelength.

Diagram 21.1 – electron traveling through the two slit experiment



So the motion of the electron through the two slit experiment is really the motion of a bunch of overlapping Dimensions of greatly varying wavelengths. It is the sum of those motions that determines the motion of the electron. It is the conservation of angular momentum, as well as energy and momentum, of the Dimensions above that determines the final motion. In other words, the electron will travel a path that makes all superimposed angular momentums stay as constant as possible. If angular momentum, and momentum and energy, cannot be conserved within a particular Dimension, then a force is applied within that Dimension to cause a transfer of angular momentum, momentum, and energy across dimensions, or quanta, to occur. Splitting transfers angular momentum up and combining transfers angular momentum down. For the two slit, many electrons don't make it, only certain do. All overlapping Dimensions must stay conserved or have transfer of angular momentum, momentum, and energy up or down Dimensions. If angular momentum, momentum, and energy cannot stay conserved, then electron bounces off and doesn't go through either slit. In other words, the electron can be headed straight for a slit and not go through because of how Dimensions above collided with the slits.

The reason why the distance between the slits is the only factor in determining width of interference pattern is because the interference pattern is due mainly to Dimensions above because they are the only ones that go through both slits.

22. 'Which Path' Behavior in the Two Slit Experiment and Quantum Entanglement

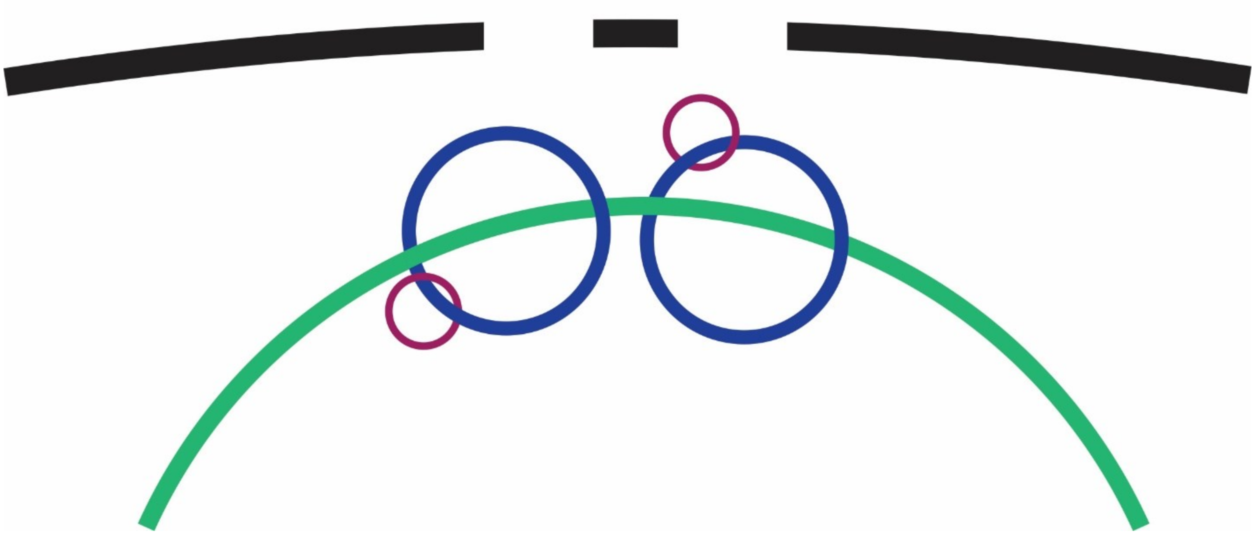
The most confusing of the Two Slit Experiment behaviors is when you set up a detector at one of the two slits, then the particle behavior is seen, which means electrons going through the non-detecting slit knew other slit was detecting…which, ya know, is crazy. With quantum entanglement, entangled particles can be separated by a distance and if measure one particle then that measurement will impact the result of measuring the other particle, and do so at greater than the speed of light, and potentially instantaneously. The best way to explain both of these is simply to remind the reader that a given chunk of matter, like an electron, has many overlapping Dimensions above it that it is a part of. If you treat the electron as only consisting of matter, which is made of rotations, then that electron cannot impact other electrons without some of the matter, or internal energy, of that electron traveling across a space displacement at less than the speed of light. If, however, we treat the electron not only by it's internal rotations, or matter, but also by it's motion in Dimensions above it, then 'action' can be defined per Dimension, or rotation. In other words, if two electrons are in the Dimension of the Earth, the Dimension of the Sun, the Dimension of the Milky Way, etc., then those electrons can impact each other directly by sending matter, or rotations, from one electron to the other at less than the speed of light, but can also impact each other indirectly through the Dimensions, or rotations, that they share in common. In even other words, that means that if you use the fundamental force and impact the motion of one of the electrons within the Dimension of the Earth, Sun, or the Milky Way, etc., then in order for the conservation laws to hold, and the total energy in a given Dimension to remain constant, then something like the other electron must also have the fundamental force applied and be impacted to balance the conservation laws. If you have action or collision that impacts the conservation laws in any Dimension that the electron is a part of, in other words a rate of change of momentum, angular momentum, energy, or space displacement, then either a transfer of rotation will happen between Dimensions, or the impacted Dimensions will have conserved conservation laws because some other matter that is a part of those Dimensions, like the other electron, will have to adjust by having a force applied to it.

In even other words, if two objects are a part of the same Dimension, then one way they can apply force to each other would be to travel along a Dimension above both objects at less than the speed of light towards each other and they will eventually collide. This is action, or force, that happens locally, and matter must travel at less than the speed of light to reach that other matter to apply a force to it. The is generally how Einstein and many others view action and force. In this paper, I also propose that while action and force can happen locally between neighboring Dimensions, action and force can also happen non-locally between two neighboring Dimensions through the Dimensions above them both that they share in common. This is what spooky action at a distance, or quantum entanglement, is. It is a force applied to an object in one Dimension that causes a transfer of rotation that unbalances the angular momentum, momentum, or energy of the Dimension above the Dimension impacted. There must be a balancing in that Dimension above, so that Dimension above will transfer that rotation to some other Dimension within it. In other words, while collisions and action can only happen locally between two neighboring Dimensions, as Einstein stated, once those collisions or actions occur, then to keep the total energy, momentum, and angular momentum constant across all Dimensions, then instantaneous transfers of energy, momentum, and angular momentum can occur up and down Dimensions. Change, or action, up and down Dimensions is instantaneous. Neighboring Dimensions that want to directly impact each other must collide. If those neighboring Dimensions do collide then the type of collision, elastic vs. inelastic, etc., will determine if the 'equal and opposite' reaction to action occurs locally or non-locally via Dimensions above.

The conservation laws in conjunction with the specific position and momentum of the electron within Dimensions above the electron, and all rotations below the electron, determine the path of travel of the electron through the Two Slit Experiment. After many electrons go through, as discussed in the sections on Diffraction and Interference, it looks like a wave like pattern because wave like angular momentum was trying to stay constant. The interference pattern happens for an electron, for example, so total angular momentum, and momentum and energy, of overlapping Dimensions is conserved and the Dimensions below the electron keep a constant spacetime interval so the electron stays stable. If a photon is traveling through one slit, while the electron is traveling through the other slit, then the paths of travel that lead to conserved total angular momentum, momentum, and energy across Dimensions and a stable electron will be different. In other words, the interference pattern goes away.

In other words, so why does detecting at one slit cause the electrons going through the other slit to take a particle like path? It is because the interference pattern is due to the Dimensions above the electron going through both slits. The total angular momentum, momentum, and energy of matter must be conserved as that matter goes through the slits. If detecting with a photon, which has Dimensions of rotations above, at the slit the electron did not go though, then that photon will also have many Dimensions above that go through both slits. The Dimensions above both the electron and photon are the same, even if their motion within those Dimensions is different. In other words, both the electron and photon are a part of the total angular momentums, momentum, and energy of the Earth, Solar System, Milky Way Galaxy, etc. The conservation laws must hold and the observing photon's angular momentum, momentum, and energy in Dimensions above basically cancels out, or has destructive interference, with the electron in the other slit. If there is just the electron, then interference happens because the electron goes through both slits, but if there is a photon in the other slit the interference cancels and becomes particle like behavior. If the photon goes through the same slit as the electron, and collides with it, then the particle like behavior occurs because there was a transfer of angular momentum, momentum, and energy from Dimension to overlapping Dimension.

Diagram 22.1 – Observation at the Other Slit



23. The Brain

Now we must talk about a huge piece of the observation puzzle that has been missing: The brain. Not just the human brain, but all brains. In particular, the frequencies of brain waves. Throughout this paper, I have written of an observer "at" a particular Dimension. The answer to what that truly means has ramifications far beyond Physics. When I write of an observer at a Dimension, I mean specifically that the brain waves of that observer are rotations of angular momentum at a particular frequency, or Dimensions, like every other rotation or Dimension in this paper. The sarcadium rhythm and brain frequency, while on the planet of the Earth, has rotations of angular momentum in the Dimension of the Earth, the Dimension of the Sun, Milky Way, etc..

When I wrote of time, I had a concept of time within time within time and it matching with the angular motion within angular motion (ie complex wave of time is comprised of simple waves of time). It's commonly known that when awake the human brain (consciousness) operates roughly at up to a frequency of 150Hz, or gamma brain waves, and when asleep it operates as low as a frequency of 0.5Hz, or delta brain waves. As I illustrated many times when I was young, using hypnosis you can take the human brain up and down those frequencies. One of my, and the crowds' favorites, was always post hypnotic suggestions. Basically you hypnotize people and lower brain frequency, you plant a little suggestion and tell them they wont remember it when they awake, and then wake them increasing their brain frequency. The suggestion is effectively hidden from the individual (not indefinitely) while their consciousness and brain operate at a different frequency. So I am proposing that the brain can hold information across multiple overlapping dimensions (similar to all matter) and that consciousness, or brain frequency, can access one particular dimension, or frequency, or perhaps small range. So consciousness, or brain wave frequency, is a dimension, like a clock, like the solar system, like an electron, etc. The entire brain itself is dimensions within dimensions of matter and motion. Consciousness traverses those dimensions, as do dimensions of sub consciousness. The hypnotist can build little bridges across dimensions in the brain, like when a hypnotist implants the post hypnotic suggestion to trigger off certain simple words. Now when a human observes the surrounding universe, what happens is something like their eyes can absorb light at a particular frequency range. All the rods and cones do all their stuff and detect light and that information is passed along the nervous system to the brain (subconscious and conscious). At all steps, the light information is being transferred across the nervous system in something with angular momentum.

That matter\energy that transmits through the nervous system to the brain is just like one giant consistent handoff of angular momentum all the way to the brain. If the matter of the universe being observed doesn't fit within a certain range that a particular human can detect and pass along to their own brain, then the brain and human will not be aware of it, consciously or subconsciously. When a human (or other animal) has an observation, the final level\wavelength\radius that goes to is the wavelengths of the human brain. i.e. when we sleep, we have a longer wavelength (lower frequency) and when awake are at a shorter wavelength (higher frequency). Our senses take in stimuli at various frequencies, and then through the nervous system, convert that to a frequency that the brain is at.

The next thing that I will mention about the brain is quite a silly thing. I am not sure if I believe in any sort of sixth sense or way of communicating information across a distance without sound or sight. Whenever I hear of anyone saying that they can read minds I never believe them, but at the same time, I've come across things in life that have made me wonder if it's possible that humans have another sense that allows us to get information at a distance. One that we may or may not be able to control with our conscious or subconscious minds. The reason I bring it up is because this paper explains how it could be possible. All humans on Earth have a brain with brain waves at a particular frequency and wavelength, and those brain waves are just rotations, or oscillations, riding on the rotations of the Earth, Sun, Milky Way Galaxy, etc. All humans on the Earth are connected via the shared Dimensions above us that we are a part of. Just like how those Dimensions in common above us can explain things like spooky action at a distance, it could also, potentially, if it exists, explain how a sixth sense could work.

There are also several potential philosophical implications in regards to the brain, and even a potential theological implication of the religiously inclined person providing a rebuttal to the question of 'if heaven exists then why can't we see it'. Of course, that is well outside science, but a fun thought none the less, like many of the philosophical questions. In terms of science, and this paper, the important takeaway is that humans have brains. Brains have brain waves. Brain waves are just comprised of rotations, and while on the Earth, those brain waves ride on the spacetime that the Earth, Sun, galaxy, etc., provide, and those brainwaves have rotations in each of the Dimensions of the Earth, Sun, galaxy, etc. The most fundamental requirement of being alive, is having some rotation, or oscillation, that keeps going. i.e. If brain waves stop, or our circadian rhythm stops, then we are no longer alive.

24. Experimental Physics

The main experimental limitation of quantum mechanics is that one cannot know both the exact position and exact momentum of any object. Planck's Constant is the barrier that we cannot experimentally get past. While it may not be possible to get the "exact" anything experimentally, I propose that we can get much more accurate about things like position and momentum than what the Uncertainty Principle and Planck's Constant allow. The answer is the same answer as many answers in this paper, and that is the Principle of Stable Spacetime. Since the Principle of Stable Spacetime allows for measuring one Dimension without impacting other Dimensions, whether above or below, then if you want to know the momentum and position of an electron, then just need to get the momentum and position of two separate Dimensions below that electron. In other words, you don't measure the rotation that we are calling the electron, you measure rotations below the electron which make up some of the matter of that electron. If you do that, then you can do it in a way that does not disturb the momentum or position of the electron itself, while giving you enough information on the position and momentum of the electron to get a more accurate measurement than what the uncertainty principle or Planck's Constant currently allows. It won't be easy, but it will be possible.

One of the things that makes it not easy, is that the relative size of different overlapping Dimensions can vary quite a lot. In other words, the size of a galaxy is so very much larger than the size of an atom, and so measuring the impact the galaxy has on the atom is very difficult. For example, I propose in this paper that we should be able to determine both position and momentum of a small Dimension, like an electron, but that to do so requires determining the position of Dimensions within the electron, which are much smaller. One way beyond this difficulty would be to run experiments within overlapping Dimensions that are not relatively as different in regards to size as what we find currently in nature. In other words, put overlapping Dimensions between the Dimension of the Earth and the Dimension of the electron. If the sizes of the overlapping Dimensions in an experiment are not as drastically different as normally found in nature, then it will be easier to experimentally detect the impact the Dimensions have on each other. In other words, it will make it easier to determine both position and momentum experimentally. Again, may never get the exact position and momentum but can get much closer than the Uncertainty Principle allows.

Running experiments in a way that only focuses on what is local and trying to ignore all the Dimensions that impact the experiment will never lead to determining both position and momentum. One must embrace that the universe is Dimensions within Dimensions and rotations within rotations and craft their experiments to embrace the same. The more overlapping rotations and Dimensions are closer in size to what is being measured, then the easier experimental physics becomes. Trying to ignore the true nature of the universe only makes experimental physics more difficult. There are no vacuums, so let's embrace that fact.

25. Miscellaneous

25.1. – Why Gravity is Different -

Gravity is different than the other forces in that it is consistently applied to all matter. The other forces do not operate like that and if go under two different rotations then do not end up at the same place. i.e. Also, AB does not equal BA. These are because the force of gravity is from Dimensions above the observer and the other forces are below the observer. All motion that the observer goes through, and all motion that the Dimensions below the observer go through, all travel along the Dimensions above. They are all relative to the Dimensions above. Matter travels along spacetime. Spacetime, when observed as motion and not matter, is in Dimensions above. The observer is relative to the Dimensions above, and the Dimensions below are relative to the observer. This is why gravity is different than the other forces. It's simply a question of where the observer is located relative to where the space displacement is being transferred that results in the rate of change in space displacement of rotation, or the fundamental force.

Spin-1 photons vs. Spin-2 gravitons – gravitons are larger and Dimension above while photons are smaller and Dimension below. Human brain is in between.

25.2. - Spin vs. Orbital Motion

Also good to mention to the reader, the radius of the matter itself a Dimension above will equal the radius of the orbital motion of the smaller matter when observed from a Dimension below. The spin of the matter when observed a Dimension above, will match the direction and magnitude of the orbital motion when observed a Dimension below. In other words, what is orbital angular momentum when observed from one Dimension, is spin angular momentum when observed from a Dimension above it. Those angular momentums are equal. Both observers observe the same amount of angular momentum. Angular momentum is invariant. It is also good to note that the reason why the orbital angular momentum is quantized to h and spin angular momentum is quantized to $\frac{h}{2}$ is because two is the minimum number of cycles that must have within a given Oscillation. If was one undulation then the Oscillation within an Oscillation would essentially merge or constructively or destructively interfere.

25.3. – Wave Packet -

In the terminology of my paper, a wave packet is simply a rotation with rotations below it. All rotations contained by the rotation with space displacement s_a, that is observed as matter, like s_{a-1}, must have the same phase velocity, or else there wouldn't be a standing wave, which is necessary if to be considered stable matter.

25.4. – Gravity - Increasingly Harder to Keep from Flying Off -

This is all because of the conservation of angular momentum. If decrease radius then to conserve angular momentum then tangent velocity must increase. If that velocity increases then will be traveling a longer path of travel, or space displacement, in that Dimension. This means that observed space displacement is larger from observer in Dimension above, and therefore there is slower observed time than if the tangent velocity was less. In other words, the increased velocity towards the center of mass of the earth is due to increasing velocity at a tangent and the earth Dimension needing to keep from flying off.

25.5. – Another Triplet Paradox - To demonstrate further, I propose another Triplet Paradox. Let's say we have a long tube rotating with twins at each end. Each twin at different radius. Third twin at a distance observing. Twins in tube same time according to their light clocks. 3rd twin observes them both at different times. If all 3 come together then times will be off according to special relativity. No sharp turnaround.

25.6. – No Such Thing as Empty Space - As stated earlier, there is no such thing as empty space, vacuums do not exist, nothing can travel in a completely straight line in every (any) reference frame, and effectively every system of matter has angular momentum of at least some amount in some reference frame. This is the fallibility of the traditional latticework of clocks: the notion that a reference frame ever goes in a truly straight line relative to any other reference frame. Instead, matter travels through overlapping\intersecting dimensions of angular momentum. It is not a Newtonian Ether, it's just the overlapping of angular momentum's that define space, time, and matter (matter only when a quanta is reached).

25.7. - Big Bang – The perceived expanding universe could just be that the larger universe is spinning, or could be that the larger universe is spinning and matter is essentially flying off of it because no fundamental force in the vacuum outside. In other words, the expanding universe is due to a rotation that was not within another rotation, or the expanding of the universe is appearing to occur simply because the rotational motion above the Milky Way Galaxy, and other galaxies, adds extra space displacement, and if you add up all those space displacements and divide by the time of the observer on the Earth, then a larger and larger velocity can be observed…even a velocity of magnitude greater than the speed of light. None of the above possibilities are inconsistent with General Relativity.

25.8. - If know Two Things then know Three Things. Several years ago, after many years of failed attempts of solving the problems of this paper, I had a thought that caused me to tell my closest friends and family that "I've solved all the mysteries of the universe". I was obviously kidding, because no such thing is possible, but I purposely made a very bold unrealistic statement so they would remember that moment. I never have spoken of the problems of this paper with anyone before publishing, and didn't explain my comment then, but now it's kinda fun that I get to reveal what it was that made me say that. At the time it seemed like the last big puzzle piece that I needed in order to write this paper. I could not overstate how wrong I was. That said, here is what I figured out. So if you have three chunks of matter of different masses, let's say A, B, and C, and they are all in a triangle where they are all equal distance from each other (and therefore 60 degrees apart from each other). Let's say those chunks of matter have an attractive force towards each other, let's say gravity since relates to mass, but could be other attractive forces. What I realized was that if you knew the total combined pull of A and B on each other, and also knew the total combined pull of B and C on each other, then you could calculate the individual pull of each of A, B, and C. Even stated more simply, without using force, if you know the combination of A and B, and know the combination of B and C, then you know A, B, and C. If you know 2 things, then you can know three things. Two things can be equivalent to three things. At a fundamental level, that is very powerful. What if one observer observed two things and one observer observed three things. The two observers could be observing the same group matter, and have

disagreement about something as basic as how many chunks of matter are in the group. If one observer observes an electron passing through one slit, then what is to say that another observer might not observe it going through both slits? Does every observer even agree that there are two slits? Do some observers at some Dimensions only view one slit? Or no slits? Do all observers observe the same density of matter? Do some view more matter and others view more space? It was thoughts like this that led me to start to see how all the results of the two slit experiment could be possible while still keeping a realist universe. In the end, it was not even close to the first or last big puzzle piece needed to write this paper.

25.9. – Should Work with String Theory -

This paper could provide the foundation for several string theory and quantum gravity solutions, and actually make them look to be the same thing.

26. Conclusion

In this paper, I defined a Dimension as the point at the center of mass that has rotations around it. The space displacement along the rotation of the Dimension is analogous to the space displacement along a Euclidean x, y, or z dimension. I explained how the universe consists of Dimensions within Dimensions and rotations within rotations, and how every chunk of matter is a comprised of rotations and also travels within multiple rotations. I explained how the rotations are not independent. I demonstrated time dilation and explained a triplet paradox. I explained how observers could agree on how much time dilation occurs, so as to not need a large time catchup at a sharp turnaround. Using the space displacements between two events along those rotations, I defined both time displacement and the spacetime interval. I also mathematically derived momentum and total energy in Einstein's momentum-energy equations. I proposed the Principle of Stable Spacetime, which allows for change in one Dimension, or rotation, without change in other Dimensions. This leads to a constant velocity, or invariant rest frame, and the conservation of momentum, total energy, and angular momentum, for any Dimension that does not observe a change. I explained how matter on the Earth is actually going the speed of light relative to an observer outside the known universe, how time is naturally a spatial distance, normally in meters, and how seconds are a human convention that results from the Principle of Stable Spacetime. I defined matter as bowling balls on trampolines made of smaller bowling balls on trampolines. I defined the equivalence of matter and motion and explained that how much an observer views something as matter or views as spacetime depends on the location of the observing reference frame. I explained how my paper fits in with both special and general relativity, as well as, how special and general relativity are largely equivalent. I explained how in General Relativity, matter bends spacetime. In this paper, matter is overlapping rotations of spacetime within rotations of spacetime. Matter does not bend spacetime, matter is spacetime. The totality of those overlapping rotations of spacetime defines, in the language of General Relativity, the total amount that spacetime bends relative to a given reference frame. Spacetime controls the motion of matter because the momentum, energy, and angular momentum of Dimensions above must be conserved. I explained collisions and systems of matter in my model of matter and applied momentum-energy to them, which more concretely defines rest mass while also explaining why matter has interference like simple waves. I provided two options for what the smallest matter could be comprised of and technically both could work. I mathematically derived Bohr's Quantum Condition for Angular Momentum, as well as, mathematically derived the DeBroglie Relations for frequency and wave number. I also mathematically derived Planck's Constant, which is no longer a constant, in a way that relates it to the spacetime interval, which both change depending on the Dimension of the observer. I defined the Fundamental Force as the rate of change of the space displacement between two events, and mathematically derived the conservation of momentum, total energy, and angular momentum from it. I also explained how if momentum, energy, or angular momentum could not be conserved within a Dimension then a transfer of momentum, energy, and angular momentum would happen up or down Dimensions. I explained electricity and magnetism, the Uncertainty Principle and diffraction, as well as, interference in the Two Slit experiment. I also explained 'which path' behavior in the two slit experiment along with quantum entanglement. I explained the role the brain has in all this, some notes on validating this paper with experimental physics, as well as a few miscellaneous topics. Much more work to be done. Again, Physics is ultimately a team sport. I am excited for others to read this paper and build upon it. Thank you for your time.