RS2 Theory

The Re-evaluation of Dewey B. Larson's Reciprocal System of physical theory

by

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2010

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This book contains detailed information on the 15-year research effort into extending and improving Dewey B. Larson's Reciprocal System of physical theory. It is recommended that the student review the *Fundamentals* section prior to reading specific topics, as this extension adds some new concepts to Larson's work, as well as updating some of the existing ones. The basic premise of the theory remains unchanged, being that the Universe is a Universe of Motion, not of "matter," where all things are defined by explicit relations between space and time.

All that is required to understand this reevaluation is basic, High School algebra and trigonometry. A background in the Eastern philosophical concepts of yin-yang and the Tao are a benefit, as a mathematical interpretation of yin-yang forms much of the basis of the RS2 theory.

Hope this research adds to your understanding of the Universe and the world around you.

Dewey B. Larson's *Reciprocal System of physical theory*, a Theory of Everything that is based on the concept of *motion*, rather than *matter*. With only two, fundamental postulates, Larson was able to construct a theoretical universe based on just the inverse relation between *space* and *time*, that he called "motion." (It has nothing to do with something moving--"motion" is just a ratio between space and time that causes change.)

Larson's universe, referred to as the *Universe of Motion*, has some different premises than conventional theory:

- Because mathematical relations are based on the multiplicative inverse (not the additive inverse), the condition of rest is *unity*--not zero. Larson calls this motion the *natural datum*, and is the speed of light. In Larson's universe, change is measured as a displacement from unity (the speed of light). A simple analogy to understand this concept is the see-saw, where the fulcrum is unity and distances are measured outward from the center, towards the far edges. Conventional science starts at the edges, measuring towards the center.
- Because of this inverse, see-saw relationship of space and time, Larson's universe also contains two "halves" that he calls *sectors*. The first is the *material sector*, the one of our everyday experience, consisting of 3-dimensional space and *clock time*. Because of the reciprocal relation flipping across unity, he discovered the *cosmic sector*, the realm of *3-dimensional time* and *clock space*. These two halves of the universe sit in opposition to each other, and are connected through his concept of *motion*.

As a result of this structure, the Universe of Motion tends to look inside-out to those with a conventional, scientific background--whom are usually the first to ask, "How can you have motion, without something moving?" Larson describes this as the "actors on the stage" approach, where you have things in a setting, and the two are entirely different from each other. Conventional science has "atoms" playing parts on the space/time stage of the Universe. In the Reciprocal System, however, the actors and stage are the same stuff--motion--acting in relative relation to each other. As such, the only fixed reference in a universe of motion is a speed--the speed of light, which Larson refers to as the "progression of the natural reference system."

Table of Contents

- Preface
- Introduction
- Conceptual Basis
    - Numbers and Number Systems
    - Reference Systems
    - Datums: Origins of Measurement
    - Opposites
    - Infinitesimals: Calculus and Geometry
    - Architectural Pattern
    - Yin-Yang
    - Complex Motion
    - Material & Cosmic Sectors
    - Uniform Motion
    - Dependent Motion
    - Simple Harmonic Motion
- Fundamental Postulates
- Scalar Motion
    - 1. Definition of a Scalar
    - 2. Scalar Ratio, Orientation and Cross-Ratio
    - 3. Scalar Motion
- Projective Geometry
- Physics
    - Photons
        - Frequency
        - Electromagnetic Spectrum
        - Density Bands
    - Leptons
        - Muons and Tauons
        - Neutrino Oscillation: Charged Neutrinos
        - Positrons and Electrons
    - Atoms
        - Isotopes
- Electronics
    - Electrostatics
- Astronomy
    - Cosmic Galaxies
- Metaphysics
    - A Note on Metaphysics
    - Electrical Effects and the Paranormal
    - Orbitally Rearranged Monoatomic Elements
    - Zero Point
- Reference
    - Space Time Units

- The Bi-Radial Matrix (page 99)

Preface

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 *People go through four stages before any revolutionary development:*

1. It's nonsense! Don't waste my time.

2. Oh, it's interesting, but not important.

3. I always said it was a good idea.

4. I thought of it first.

—Arthur C. Clarke

Dewey B. Larson's *Reciprocal System of physical theory* (RS) was published in the 1959 book, *The Structure of the Physical Universe*. Larson's theory differed from conventional theory by positing a universe based on the concept of *motion*, rather than *matter*, defining all quantities as a reciprocal relationship between space and time. Larson used the term "motion" over "matter" because all physical quantities (space) were inversely associated with the passage of time, as a ratio of space to time, s/t, which is the definition of *speed* and the generic form of speed is *motion*.

As a first draft of a *Theory of Everything*, Larson's work was exceptional in its ability to describe the behavior of everything from the smallest photon to the largest galaxy, using the same theoretical postulates—with no exceptions or fudge factors. Larson even predicted the existence of quasars in his 1959 work, three years before they were discovered in 1962—but Larson also described what they are, how they work, how they formed and how they behave, a feat yet to be paralleled by conventional astronomers.

As science advanced from the more simplistic view of the 1950s that Larson used to test his theory, a number of factors arose that the RS could not adequately describe, starting with characteristics of the photon: polarization, the Zeeman effect and other attributes of black body radiation. In 2001, Professor K.V.K. Nehru of India and Dr.

Bruce Peret of America began a collaboration to see if these problem areas could be resolved with a simple modification to Larson's postulates—Nehru's concept of *birotation*—which did solve most of the problems with Larson's photon model in a consistent, repeatable fashion that retained the idea of a *Universe of Motion*, rather than a "stage" of matter[1].

It was found that electrons, when represented as a birotation model, also provided a simple and consistent solution to superconductivity and Cooper pairing. This led to a generalization of the birotation concept and into the realm of complex quantities, where both the spatial (real) and temporal (imaginary) quantities could be expressed in a single, complex number. It was not long before it was discovered that in the Cosmic sector, Larson's realm of 3-dimensional time, the inverse was true—time had to be represented as the "real" part and space as the "imaginary" part. This led to the conclusion that the point of observation was just as important as what was being observed and brought the research into the realm of *projective geometry* to include those variables.

Projective geometry led to the writings of Nick Thomas on *Counterspace*, based on an interpretation of Rudolf Steiner's work of the past century. Thomas introduced the idea of negative and polar spaces, and the concepts of shear and stress that occurs between varying geometries. Steiner's work led to the papers of his students, such as George Adams, and their work into geometric duals between point and plane and the concept of infinity.

By updating Larson's postulates from Euclidean geometry to projective geometry, it opened the door to the one, reciprocal relationship that Larson never considered: that of *reciprocal geometry;* the inverse of linear geometry being polar geometry, which matched up perfectly with Nehru's original birotation research with one, important difference—the birotations were not the commonplace rotation of trigonometric transforms, but a function of *polar* geometry, itself. The inclusion of linear and polar realms[2] was sufficiently different from Larson's original work that it was decided to keep this work distinct from the RS and was given the name, "RS2, the *Reevaluation of the Reciprocal System of theory*."

The latest research that has been incorporated into RS2 is that of Miles Mathis[3] and his new form of the derivative, a type of unity-datum Calculus where deltas are only taking to a unit value, rather than to the limit of zero. It seems rather unusual at first glance, but is a remarkable insight into the same concept of Larson's scalar motion, arrived at from an entirely different premise. Though Mathis is not familiar with Larson's work, we were able to take his concepts and apply them to the RS2 theory, which enabled us to greatly clarify concepts such as *clock time* and *time dilation*.

RS2 is basically a second draft of Larson's original "reciprocal system" theory. It still retains the basic concepts of the reciprocal relation between space and time, though with updated expressions. As with any theory, the interests of the authors become part of the theory—which can be seen with Dr. KVK Nehru's Theosophical terms and my own experiences with computer simulations and virtual reality. But they do provide the terminology and concepts that are not present in conventional theory.

This book contains a summary and comparison of RS2 to Larson's original work, pointing out the Larson's problem areas and what the reevaluation did to overcome those areas, while keeping the original context of the reciprocal system—the inverse relationship between space and time as motion. In many cases, we've found that the "correction" actually clarified and simplified Larson's concepts, and once you get over the fundamental concept hurdles[4], RS2 is actually a *simpler* system than Larson's RS and falls in line with many of the ancient, philosophical concepts describing the nature of things.

The first part deals with the fundamental concepts of space, time and motion. It also documents where students have had problems with Larson's ideas and the route we followed to clarify the situation.

The second part is an analysis of Larson's *Fundamental Postulates* and how they are interpreted.

The third part concerns the concept of *projective geometry*, describing what could be called the "geometry of shadows," namely how what we observe and measure is the spatial shadow, not the actual scalar motion casting that shadow.

The fourth part defines how the fundamental concepts come together to produce the elementary particles and atoms we are familiar with, and how they work and interact.

Additional works will cover specific disciplines, such as physics, electronics, astronomy, cosmology and biology—where a detailed model of the *life unit* will be proposed, which includes a new, organic chemistry to explain the transmutation of elements, along with details on bioelectric and biomagnetic fields (what used to be called auras, qi, ch'i or prana).

And still, ALL are natural consequences of the reciprocal relation between space and time.

—Bruce Peret, December, 2010

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1 "All the world's a stage..." was how Larson viewed conventional physics; the Universe was the stage upon which things happened. In his universe of motion, he did not view things as acting upon a stage, but what could be considered an *interaction* between stage, cast and audience—all being aspects of the same thing—space and time.

2 The polar and linear geometry of RS2 parallel the yin-yang of Chinese philosophy quite closely, when observed from the conventional reference frame of the material sector (3-dimensional space, clock time). In that frame, yang is spatial and linear, whereas yin is temporal and polar. Motion, expressed as a complex quantity, parallels the *taijitu*, the symbolic representation of yin-yang linked together in reciprocal relation.

3 *See*: http://milesmathis.com

4 “Hurdles” such as projective geometry, the yin-yang (which is difficult for Western cultures, where the language is not “gendered”) and trying to think in terms of *motion*, rather than *matter*. And they are challenging to comprehend, but when one does, the Universe becomes a much simpler place.

Introduction

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As a reevaluation of Dewey B. Larson's *Reciprocal System of physical theory*, something must be known about the theory that is being reevaluated—Larson's original work. If you are not familiar with Larson's concept of a “universe of motion,” there are some basic principles that need to be understood prior to reading the reevaluation.

The universe of motion is comprised of... *motion*! Matter, energy and antimatter are all *derived* from the concept of motion, which is nothing more than a *ratio* of space to time that we commonly understand as *speed*. Larson preferred the use of *motion* over *ratio* because motion has the sense of “change” built in to the concept; change of location over change of time. In his later years, he described his theory as “nothing more than *abstract change* in three dimensions.”

Motion, in the context of the Reciprocal System, is not about “something moving,” but about a ratio of space to time that can be expressed as speed or energy—both of which cause *change*.[1] Space and time are not separate concepts in the RS; they are always linked together as aspects of motion. You cannot have one without the other.

This reevaluation assumes the reader has some knowledge of Larson's *Reciprocal System of physical theory*, or at least its basic concepts:

- The natural datum from which things are measured is *unity*, the speed of light.
- Measurements are made in *natural units*, which are just the aspects of motion: space and time. Every measure can be expressed as a relationship between space and time; no other units are needed, though Larson's natural units can be converted to conventional units. Note that these are not the same natural units as conventional physics.
- The Reciprocal System is based on the reciprocal relation: the multiplicative inverse, with a minimum quantity of one. Speed is measured relative to this unity as displacements, either an increase (n/1) or decrease (1/n) from unity.
- Because of the inverse relation, scalar motion has no zero or negative values. These ratios are always counting or natural numbers.
- Larson refers to the reference frame of our conventional experience as “extension space,” containing three coordinate dimensions of space and clock time.
- Because of the reciprocal relation between space and time, the Reciprocal System also includes another view that contains three coordinate

dimensions of time and *clock space*, the Cosmic sector. This is analogous to the concept of “antimatter,” though it would technically be “inverse matter.”

It is recommended that the reader at least read Larson's “Outline of the Deductive Development of the theory of a Universe of Motion,” which is a concise summary of the Reciprocal System of physical theory to get a general idea of what the RS is, what it isn't, and how it differs from conventional physics.

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1 If you find yourself having difficulty with the concept of motion without anything moving, just substitute “ratio” for “motion” to break that connection. You *can* have “ratio” without “rationing.”

Conceptual Basis

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One of the difficulties Larson had with presenting his *Reciprocal System of physical theory* (RS) was that he made a number of assumptions about the background of his readers--namely that they were open-minded scientists, only to find that it was a losing battle. Conventional scientists just had too much of a vested interest in the status quo to really consider a new system of theory.

RS2 is targeting another audience. With the advent of the Internet and globally available information, this book is being written for the average, armchair theorist who is more interested in reading about new ways to represent old truths, As such, a number of fundamental concepts need to be reviewed and developed so the later developments of this system of theory can be better comprehended. This first section concerns those fundamental concepts.

Numbers and Number Systems

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Like it or not, theories will eventually come down to how you “add up” the Universe, so understanding some basic concepts about numbers and numerical systems is an essential building block. The descriptions following are “common sense” interpretations, based on historical and mythological use of numbers, not the mathematician's entries in encyclopedias.

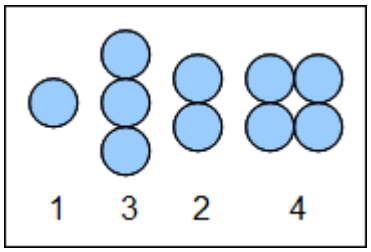
There are three types of numbers, which are not apparent from their value but only from the context they are used in:

- **Cardinal**, a number that represents a *quantity* or *magnitude*. “I have 5 friends.”

- **Ordinal**, a number that represents a *rank* or *position* within a set (ordering). "Your seat is in row 5."
- **Nominal**, a number that is just a *name* or *identity* for something, like a phone number.

In the context of the Reciprocal System, motion (a ratio) is composed solely of cardinal numbers, which is why Larson refers to that ratio as a *scalar* motion. "Scalar" means, "magnitude only." Scalar motion does not contain ordinal nor nominal numbers.

Larson's coordinate space (or time) is composed of ordinal number he calls *absolute locations*, since their value is determined by an ordered set starting at zero.



One of the problems identified with both Larson's Reciprocal System and conventional theories is that they lack the proper context for numbers, particularly in mathematical equations. This has led to a great deal of confusion and misinterpretation in both systems. By pointing this out now, it is hoped that confusion can be minimized.

Natural Numbers (Cardinal numbers)

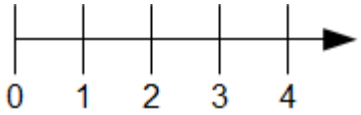
It all starts with simple *counting*. I have one, he has two, she has three. Larson's Reciprocal System and this reevaluation both start with the ancient Greek concept of *Natural Numbers* that begin with *one* and increase by single, whole amounts to a finite[1] maximum. Zero[2] and infinity[3] are not included. Counting is the cardinal, *scalar* concept of *magnitude only*, not inferring any direction, geometry or coordinates.

Because the minimum quantity of the natural number system is unity, "one" becomes the reference point for natural ratios, the multiplicative inverse.

Whole Numbers (Ordinal numbers)

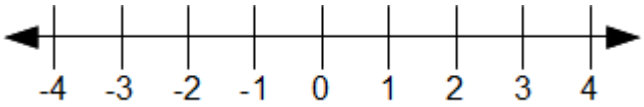
Once you can count, you can also "order"—what comes first, second, third… to define a *sequence*. Sequences imply *direction*, fewer to greater or vice versa. Once a sequence is established, it can point in two directions… you can always have more, but what about not having any? The ancient Greek argument of "how can nothing be something?" comes into play here, *nothing* is undefined—either you've got it, or you don't. It isn't until we impose order, a sequence, that the concept of "not having" comes into play and *zero* is born. The addition of zero to the set of natural numbers gives the concept of *whole* numbers, making a more complete system of representation, beginning with "I don't have any" through "I have this quantity." But this is misleading!

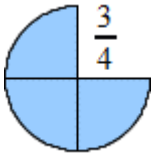
Whole numbers are *not* cardinal quantities; they are ordinal distances from an origin of zero. Using whole numbers, you do not actually have "one" of something, but "one more than nothing." It may sound like a trivial difference, but it is an important one[4].



Integer Numbers

Now it's pay-back time! With the rise of trade and mercantilism, simple *counting* gave way to *accounting*, the tallying of quantities and the concept of *debt* (or owing). “You owe me two apples,” and when those apples were returned, the count of 2 went against the debt of 2, resulting in no debt or “nothing”—back to zero. This gave rise to negative quantities, those “owed,” and the *integer* number system, which included none (zero), the natural, counting numbers, and their opposite—the negative counting numbers, which are again, ordinal in structure.





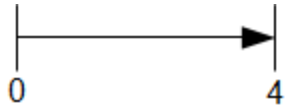
Rational Numbers (Cardinal ratios)

Trade also gave rise to the concept of fractional parts, as individual items could be subdivided, such as one apple pie into 8 pieces. This resulted in the *proportions* expressed as the ratio—how many times one thing is contained in another—and the *rational* number system to represent it. Rational numbers are a ratio of natural numbers, meaning that the minimum quantity of both aspects[5] is unity and the minimum ratio is 1/1.

Larson's concept of *scalar motion* is defined by a rational number. By assigning a unit of space to the numerator and of time to the denominator, he creates the concept of *scalar speed*[6].

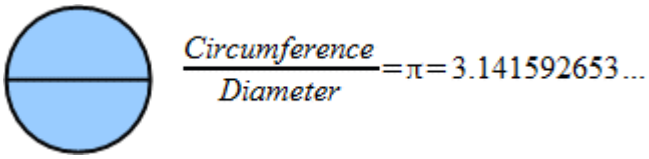
Real Numbers (Ordinal measure)

The use of counting numbers and ratios lead to the general system of *measure*, where numbers no longer represented quantities but *relative amounts*. If something is “4 miles distant,” that does not mean you have “4 miles” in a box marked “distant.” Relative measure required a starting point, or a “datum” as used in the Reciprocal System, from which measurement of quantity is made. Note the distinction here: *quantity is absolute (cardinal); measurement is relative (ordinal)*. Given that quantity can have proportion (ratio of one quantity to another), measurement can also have proportion… these proportional measurements became the set of *real* numbers, which can express any measurement, when given a place to start.



Irrational Numbers (Ordinal ratio)

To this point, the number systems have been primarily linear in use. The ordering systems can be placed in a straight line, the ratios of rational numbers are analogous to slopes of a line—but still a straight line. But that is only one aspect… the other is the curve, when ordering becomes dependent upon two dimensions and is no longer commutative. When a curve interacts with a straight line, such as the ratio of a circumference to its diameter, another type of real number comes into existence, that of the *irrational* number—a number that cannot be expressed as a ratio of two integers, as it is not a ratio of *quantities*, but a ratio of *measurements*. Common examples of irrational numbers are π and the natural log, *e*. These numbers represent a different type of ordering system based on angles, with different forms of representation—polar sequencing.



Complex Numbers

The basic problem with mixing linear and polar numbering systems together was that they did not play by the same rules. Trigonometry was the first to correlate the two; later on, the concept of the *imaginary number* came into play and when joined with the linear became the *complex* number system, allowing both the linear and polar values to be represented on a linear graph known as the *complex plane* or *Argand diagram*. This simple concept allowed both linear and polar coordinates to be represented with a single "number,[7]" creating a global system of all the number systems preceding it.

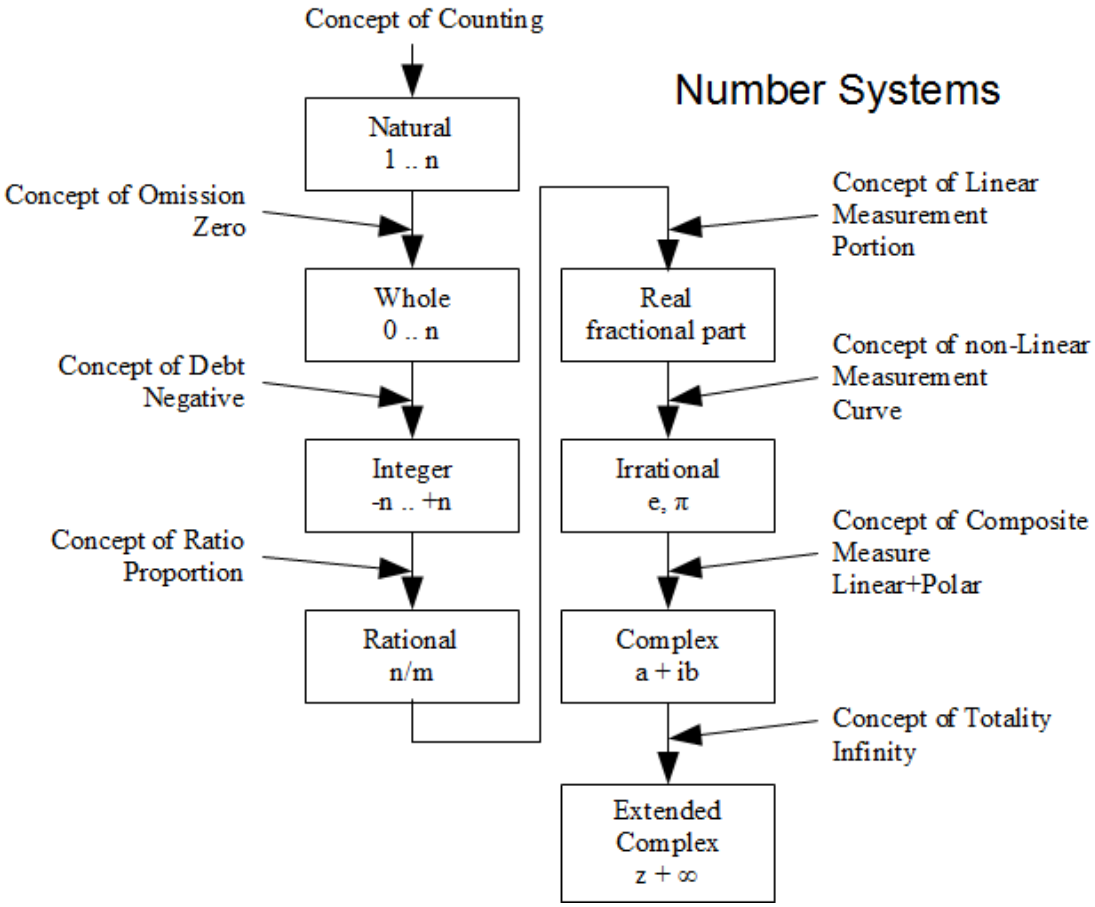
Extended Complex Numbers

The final step is to close the system of complex numbers to include the counterpoint to nothing—that of totality (everything), or *infinity*[8]. Zero and infinity represent the numeric extremes of *nothing* to *everything* and are treated as boundaries—not limitations—in the system of extended complex numbers.

Summary

As explained, number systems have developed from simple, cardinal counting, through ordinal sequencing, measurement, proportions and mixing lines with curves.

Though there are many other number systems for specialized branches of science and mathematics, RS2 only requires comprehension up to the *extended complex* number system to represent its universe of motion.



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1 Finite in the sense of never reaching infinity. The maximum value can be very large, but it will *always* be a countable quantity.

2 Records show that the Ancient Greeks seemed unsure about the status of *zero* as a number: they asked themselves "how can 'nothing' be something?" leading to interesting philosophical and, by the Medieval period, religious arguments about the nature and existence of zero and the vacuum. (Wikipedia on *Numbers*).

3 By the same context, “how can 'everything' be something?”

4 In this research, cardinal numbers are used in the natural reference system and ordinal numbers in the coordinate system. If the two are confused, the process of transforming the cardinal, scalar motions to coordinate locations may not be understood.

5 The conventional definition of a rational number only restricts the denominator to non-zero values.

6 Larson defines the concept of speed as a rate of change only, without any directional component. He uses the term “velocity” when referring to a vector: speed + direction.

7 The complex number is defined as “z”, represented numerically as Real + (axis-designator) Imaginary. The “axis designator” is typically i, j or k. Even though it consists of three parts, it is considered a single “number.”

8 *Infinity*, in this context, does not represent a very large number. It is considered an entity and just as “tangible” as *zero*—it is explicitly defined. The relations between zero and infinity are described in detail later on.

Reference Systems

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As can be seen from the number systems, once assumptions are made against the natural, counting numbers there is a change in context as to what a number means, moving from the natural, cardinal count to a constructed, ordinal measure from a specific reference.

Two reference systems are being defined here, the first being the “natural” or cardinal reference that will define scalar motion as a rational number. The second is the projection of the natural reference system onto a screen we call “reality,” which is a normalized snapshot of the natural reference system that our physical senses can make use of to make observations and measurements. This second reference system will be referred to as the “diagrammatic” reference, a term coined by Miles Mathis in his papers[1] concerning, “The Greatest Standing Errors in Physics and Mathematics.”

The Natural Reference System

The natural reference system is characterized by rational numbers, where both aspects have a minimum quantity of *unity* with a *finite*[2] upper bound. No zero or infinity here, as those are ordinal concepts. The minimum *dimension* in this realm is also unity, since there is no zero:

$([1..a] : [1..b])^{[1..n]}$

In other words, the smallest quantity that can exist in the natural realm is $(1 : 1)^1$, which students of the Reciprocal System will recognize as Larson's “unit speed.”[3]

In order to distinguish natural ratios from diagrammatic ones, natural ratios will use the colon separator: *a:b*, rather than the slash.

The Diagrammatic Reference System

The diagrammatic reference system consists of relative measurements defined by the ordinal numbers. Since it is a reference system based on measure, the system defines a

minimum measure of zero (nothing, the origin) and a maximum measure of infinity (everything). Zero and infinity are required in a diagrammatic reference system because there are certain, geometric conditions that cannot be expressed and the results extend to the limits of expression.

In the Reciprocal System, the diagrammatic reference system is what Larson refers to as “Euclidean geometry” in his Fundamental Postulates, referring to both the conventional reference of 3D space with clock time, and 3D time with clock space. Clock time, clock space, time dilation and space dilation only occur as a result of the normalization of the natural reference system into a diagrammatic reference system. These concepts, as conventionally understood, do not exist outside of the Euclidean stratum of geometric projection.

The Conventional Reference System

The conventional reference system is the one we use in our everyday perception of the world around us. It is the one we observe and measure, a subset of the diagrammatic reference system with the properties of three dimensions of space, clock time, uniform scaling in all dimensions, and Euclidean geometry.

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1 *See*: http://www.milesmathis.com for papers on Mathis' work. Mathis' concept of separating out the diagrammatic from the natural is remarkably similar to Larson's separation of coordinate/extension space from the scalar dimensions. I have used his papers as a template to form a more detailed description of Reciprocal System concepts, since Mathis is unfamiliar with Larson's work and has a preference towards *Relativity*.

2 Because the natural realm does not contain a zero (nothing), it's reciprocal, infinity (everything), also does not exist, making the realm finite.

3 This also means that the common concepts we use in everyday experience, such as that of a spatial length or clock time, not being ratios, *do not exist* in the natural reference system!

Datums: Origins of Measurement

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One of the prerequisites for observation and measurement is to know where you are measuring *from*. Larson's original work contains zero (physical location reference) and unity (scalar motion reference). RS2 defines several datums[1] of measurement based on basic, arithmetic concepts:

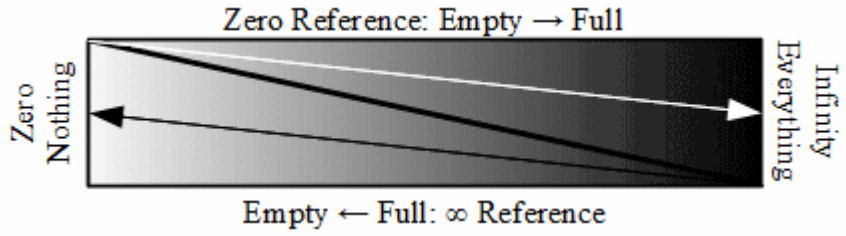
- Additive inverse: *Zero*, the one we are all familiar with, $0 \pm n$.
- Subtractive inverse: *Infinity*, the other end of the number line, $\infty \pm n$.

- Multiplicative inverse: *Unity*, the natural datum of the Reciprocal System, $n/1$, $1/n$.
- Evolutive inverse: *Dimensional*, from where powers (evolution) and roots (involution) are measured, $n^{m/1}$, $n^{1/m}$.

Zero and *unity* are fairly well understood, as we use them in everyday life. The dimensional datum—why the Universe has 3 dimensions—is there, but goes unnoticed. However, *infinity* is probably one of the least understood concepts that mankind has ever conceived of. It is commonly defined as "unbounded or without end."[2] For the purposes of the Reciprocal System, this is inadequate without some clarification.

Zero and Infinity

For the purpose of this reevaluation, zero and infinity are nothing more than pseudo-locations in the diagrammatic reference system **from** which we count or measure a *finite* quantity. I realize that sounds a little strange, but consider them as the conditions of "nothing" (zero) and "everything" (infinity) in the number system. From this perspective, the references can be described as:



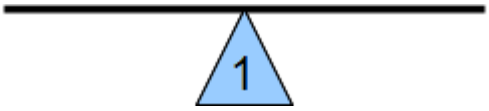
Zero: the location or point measure, used when starting with *nothing* and building up to *something*.

Infinity: a directional or plane measure, used when starting with *everything* and excavating down to *something*, as in a sculptor creating a piece of art from a block of rock.

To clarify, measuring from these reference locations do not measure the *same* values. When measuring from zero, you are adding "things" to nothing, like counting the number of balls in a bucket. When measuring from infinity, you are subtracting "holes" from everything, analogous to counting bubbles in a bucket of water.

The situation arises in mathematics when using these datums, where an attempt is made to count "holes" by counting "things." This, of course, does not make much sense. One cannot determine the number of apples in a bucket by counting the gaps between the apples[3]. But mathematics has devised a way to count "remainders," a process of starting at a quantity and estimating how much more could be added before "everything" is reached. This technique uses *difference equations*, discussed later on in this section.

The Natural Datum: Unity



By postulating *motion*, a rational number, as both the contents and the container of a universe of motion, the natural datum is *unity*: the minimum quantity for the multiplicative inverse. The maximum quantity is *finite*—zero and infinity are never actually reached in any situation regarding motion, so the problems associated with 1/0 and 1/∞ are not an issue.[4]

We are accustomed to considering zero as the center of measurement. With a natural datum of unity, *one* becomes the center—not zero. When taking measurements, we can either measure either *from* unity or *towards* unity. Larson calls this a *scalar direction* and refers to "from unity" as *outward* and "towards unity" as an *inward*, scalar direction. These concepts indicate a shift from the projective to affine stratum of geometry used to express the system, discussed in the section on *Architectural Patterns*.

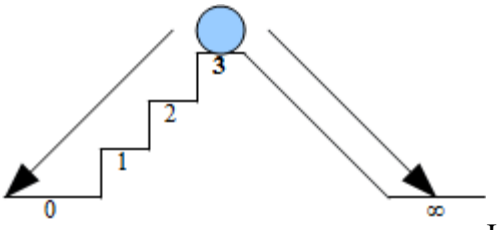
The Dimensional Datum

The dimensional datum concerns the counting of powers, n^1, n^2, n^3,... which gives us the concept of *dimension*. In order to determine a dimensional datum, one must count the *quantity of operators* involved, not the specific *magnitudes* of the operators.

In a closed group of operators, like [*i j k*], the result of the combination of any number of the basal elements is also a member of the same group. The result of any such combination can be known only if all the possible binary combinations of the elements are first defined in terms of the basal elements *i*, *j* and *k* themselves. Let there be *n* basal elements in a group. Then the number of unique binary combinations of these elements, in which no element occurs twice, is $n(n\text{-}1)/2$. We can readily see that a group becomes self-sufficient and finite only if the number of binary combinations of the basal elements is *equal* to the number of those basal elements themselves, that is:

$$\frac{n(n-1)}{2} = n$$

In the *natural* reference system, the only solution for *n* is 3. Therefore, there are three, and only three, scalar dimensions of motion. The natural, dimensional datum is $(1{:}1)^3$, which Larson refers to as the "progression of the natural reference system," a unit *speed* (not velocity) in 3 dimensions.



In the *diagrammatic* reference system, the solutions are 0, 3 and ∞. When the number of dimensions is less than 3, the system will cascade down to zero. When greater than three, it will cascade up to infinity.

If we regard any coordinate system as a group of orthogonal rotations about a datum, its dimensionality has to be *three* in order to make it self-sufficient, dimensionally. *Three* is the point of dimensional stability, the diagrammatic, dimensional datum, and can be considered *independent* dimensions. There is no restriction to the number of dimensions involved, however anything beyond the stable three dimensions would become dependent upon that structure and hence, *dependent* dimensions.

The dimensional datum also has a reciprocal structure to it, just as the unit datum does, which is expressed mathematically as *powers* and *roots*.

---

1 "Datum" is used in the context of engineering, meaning a point, line or surface from which a measurement is taken.

2 Wikipedia entry on "Infinity."

3 It could be *estimated*, but will not be accurate.

4 When using a number system that starts with "1," there is no concept of "nothing," so there is no zero, though there is a concept of "less than one" through the inverse relationship. Unlike the condition of 1/0, a unity reference has its reciprocal at 1/1 = 1/1, so you do not have these opposed reference locations of zero and infinity, only the single reference of unity.

Opposites

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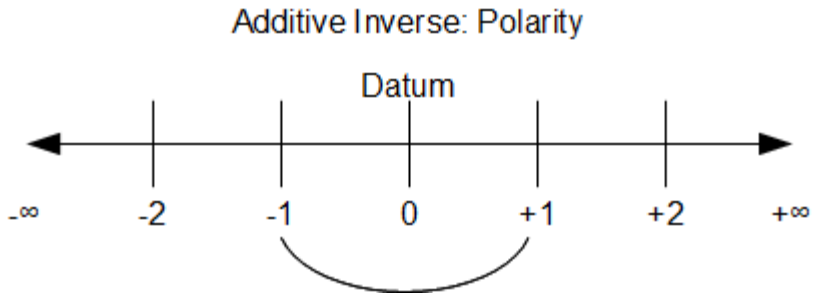
Opposites come in different forms. Basic mathematics represents them as inverses: the additive inverse and the multiplicative inverse. The use of complex numbers add another "opposite," that of the *complex conjugate* and the dimensional datum adds an evolutive opposite[1], roots and powers. Opposites require a reference point from which to measure the "opposite" character. This reference is called a datum[2]. A datum can have any value, but zero and unity are the common ones.

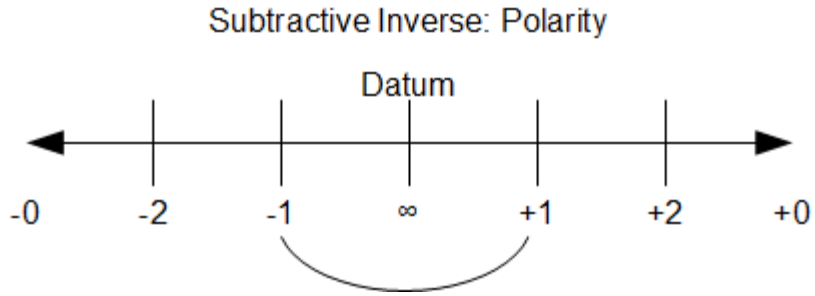
Additive Inverse: Polarity from Zero

The most familiar algebraic inverse is the *additive inverse,* which has a datum of *zero* and a *polarity* of *positive* or *negative* from zero. Larson uses the additive inverse for displacements[3] and the 3D coordinate systems: material *extension space* or cosmic *extension time*. Note that the number line includes zero and both positive and negative directions towards infinity.



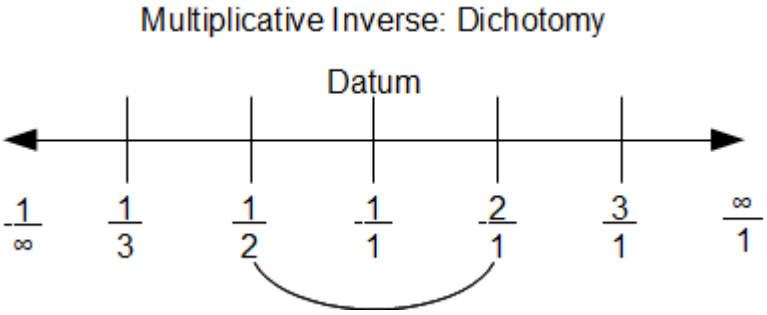
Subtractive Inverse: Polarity from Infinity

A completely unfamiliar inverse is the *subtractive inverse,* which has a datum of *infinity* and a *polarity* of *positive* or *negative* from infinity. Note that the number line includes infinity and both positive and negative directions towards *zero*. This is possible because infinity is just a reference datum—not a quantity.



Multiplicative Inverse: Dichotomy

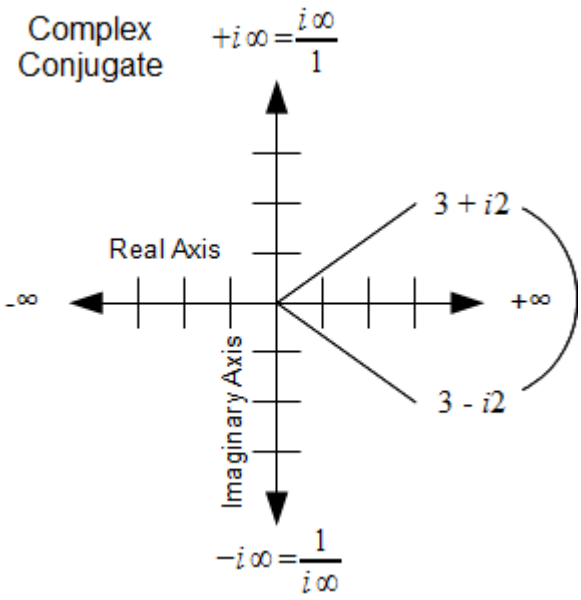
The *multiplicative inverse* has a datum of *unity*, with a *dichotomy*[4] of greater or less than unity. Larson uses the multiplicative inverse for *scalar motion* (speed and energy). Note that the number line does not include a negative direction towards infinity, as does polarity, but an inverse direction—expanding towards infinity or shrinking to it. 0, 1, ∞.[5]



Complex Opposite: Conjugate

Complex numbers add another form of opposite that can be represented on an *Argand diagram* (a linear, real axis and an polar, imaginary axis). Both have a datum of zero and the relationship is called the *conjugate*.[6] The complex plane contains a single datum at 0+*i*0, which is the center of the diagram. As a 2-dimensional representation,

the complex plane contains *four* directions, a composite of both polarity and dichotomy.



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1 The evolutive opposite will be discussed later in the sections dealing with dimensionality.

2 A “datum” is a reference point from which things are measured; the end of a tape measure, the center of a room, etc.

3 A “displacement” is used as a notation to represent atoms and particles, being the displacement (or offset) from unity. Hence a speed of ¼ has a temporal displacement of 3 (1/4-1/1=0/3; numerators (1-1=0) and denominators (4-1=3) are treated independently, not as normal fractions). Spatial displacements are put in parenthesis, so that a speed of 4/1 has a spatial displacement of (3).

4 A “dichotomy” is a division into halves or pairs, more indicative of a reciprocal relationship than a polarized one.

5 See KVK Nehru's slide presentation entitled, “Zero, One, Infinity” for further information.

6 Unlike the arithmetic and multiplicative inverses, the complex plane is *not* commutative, as it is two-dimensional. Commutative operations only apply to one-dimensional functions. Larson included “commutative” in his postulates because he uses a linear, 1-dimensional system. The RS2 polar geometry used to represent the yin aspect of motion *is* commutative as an *imaginary* quantity, but the complex form of motion, being 2-dimensional, is not.

Infinitesimals: Calculus and Geometry

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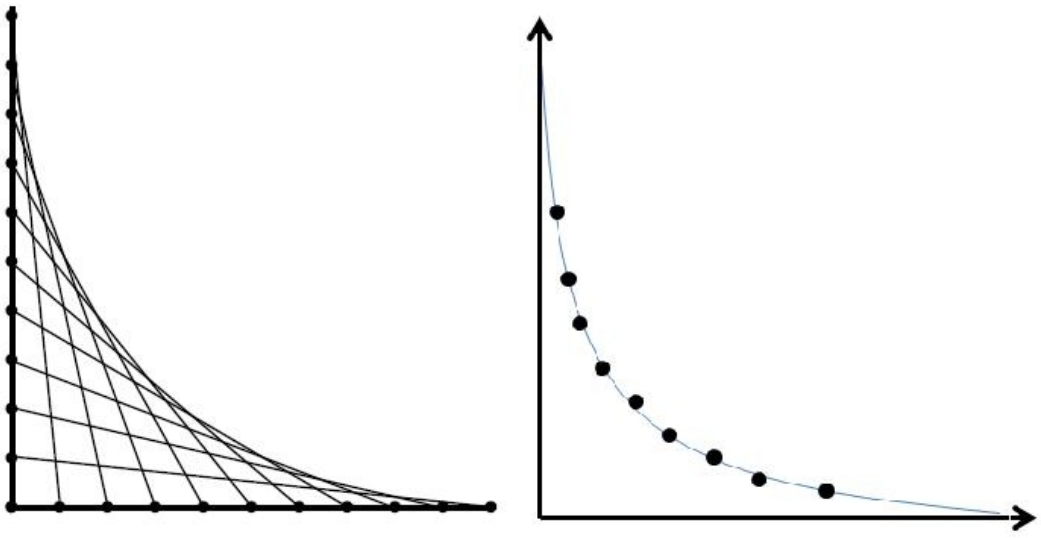
Some of the characteristic features of the ideas in calculus has to do with the concept of infinitesimals, and the corresponding infinitesimal elements, such as *dx*, *dy* and *dt*. In order to first understand the different applications of calculus, we need to clarify what a *differential* means, and what it means to *integrate* them. A geometrical derivation of those concepts are outlined here.

First, consider a 2-dimensional plane as an example. There are two ways of characterizing elements on that surface, which are essentially *duals*[1] of each other. Duality is a geometric reciprocal where one aspect is a single point at the intersection of two lines and the other is a line drawn through two points. This means that every given curve can be defined in two ways: one which gives points (where we can fill in the lines by "connecting the dots"), and the second as an envelope of lines, where the lines are given, and we "fill in" the dots.



The concept of defining a curve by its envelope is well known, but seldom applied in conventional science, as the point-based system has been developed for plotting. But essentially what we are doing when we move from the envelope determined curve, to the point-wise determined curve, is to shift our reference from the *line at infinity*[2] to the *point at zero*. A similar thing can be envisioned in three dimensions, where a spherical surface, for example, is either constructed out of points on it, or out of a series of circles, while at the same time being an envelope of either a planes coming from all sides, or lines coming from all sides.

So this means we can either "build up" a surface, or even "build down" a surface. Hence there are two ways of accomplishing the same thing, depending upon the reference point selected.

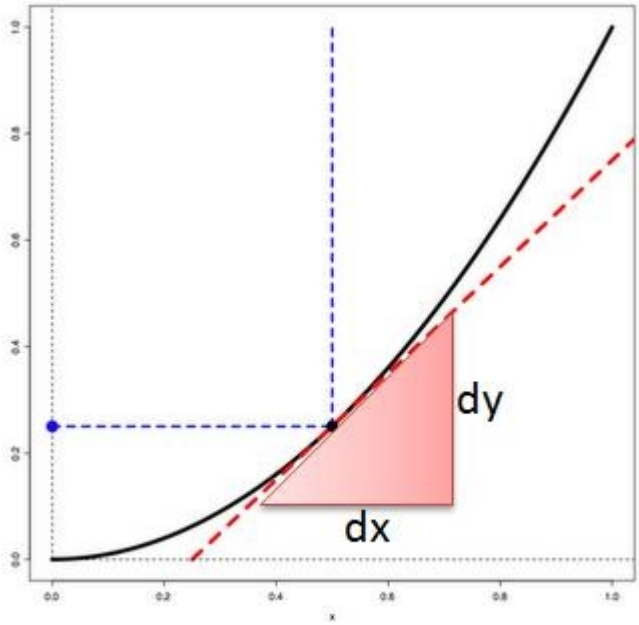
Now let us consider a curve such as the one shown in the figure above and identify what the process of *differentiation* does to it. There is a point selected on the curve

and the differential at the point gives us the tangent to the curve, at that point. In other words, we are getting the slope of the curve at that point.

Hence, if

$$y = x^2; \frac{dy}{dx} = 2x$$

where 2x is now its slope.



What differentiation has done is to converted to an *angular measure*; the ratio dy/dx is actually the tangent of the angle of the slope. The geometrical transformation is from a point to a line, where we go from (x, y) to dy/dx, and from two lines (parallel to the axes) defining a point, to two "points" (dy and dx) defining a line. An inversion of geometric duality is accomplished.

The inverse process, *integration*, is that of building up. It is generally the transition from a line to the area under the curve, or from the area to the volume in three dimensions. The logic is the same in that from the reference line at infinity, we are shifting back to the reference zero point, therefore needing to the increase the dimensionality by one in the process.

Since differentiation is a "building down" approach, it is *insensitive to changes* in the origin of the coordinate system. Since it is reckoned with respect to the line at infinity, every line is "equidistant" from the line at infinity, and shifting around a given graph anywhere in the coordinate system will not change its differential. In other words, if the function *y* is replaced with *y+c*, there would be no change in the differential. This is a direct consequence of the fact that the point at zero is *not* fixed, unlike the unique line at infinity.

This provides the reason for *asymmetry* in the behavior of the differential and the integral. Integration always results in the addition of an arbitrary constant, while differentiation always removes the effect of the arbitrary constant.

$$\int ydx = \int x^2 dx = \frac{x^3}{3} + c$$

This also provides a means of determining whether or not the application of differential equations is valid or not in any particular system. From just geometry, we can say that in systems where the point at zero is uniquely defined, we *cannot* use differential equations. Nor can we use them where the two quantities are not related with the same line at infinity[3]. We cannot use it for motion in Larson's time (or space) region, where one component progresses while the other is fixed at unity, *except* for the only function that is unchanged under the differential, the *exponential function*. It is seen that the application of quantum mechanical differential equations leads to the solutions which are combinations of exponentials, both real and imaginary.

$$y = e^x; \frac{dy}{dx} = e^x$$

Also note that this means a reversal of the previously accepted pattern of analyzing the problem. Instead of setting up a differential equation and then trying to solve it for physical answers, we instead set up the geometry from the physics considerations and then *create* the differential equation from it. This had largely been the case before calculus started being applied to mechanics during the time of Newton, when it was purely based on the kinematic aspects of velocity and acceleration. Thereafter, after Leibniz and Newton attributed a reality to differentials, it has been followed by a tendency to “find the solutions to a given differential equation.” It is the exact analogue of finding the behavior of the world under a given set of forces, instead of observing that force is a *property* of motion.

From the logic developed, it can also be predicted that the appropriate equations that should be utilized in the case of time region phenomena will have the form of difference equations, dealing with *finite* differences instead of differential equations. Liquids must be treated with rotational differentials, taken with respect to the center of the earth as the absolute frame of reference[4].

This provides the reason for the difficulty faced for the last 150 years of aligning two major branches of physics into the differential equation mold... it is a question of the *right geometry for the right motion*, and thereby the right equation, and not the reverse.

---

1 The concept of geometric duality is explained in the sections on projective geometry. In a 2-dimensional system, points and lines are geometric reciprocals of each other; in a 3-dimensional system, points and planes are reciprocals.

2 On a 2D sheet of paper, the dual of a point is a line; in 3D, the dual of a point is a plane.

3 This means that in case of fluid mechanics, we are not justified in using differential equations because the geometry of the liquid aligns itself constantly with gravity, or in other words the center of the earth, and hence there is always a preferred zero point, unlike the case of solids.

4 This situation regarding liquids and the center of gravity has not yet been fully explored.

Architectural Pattern

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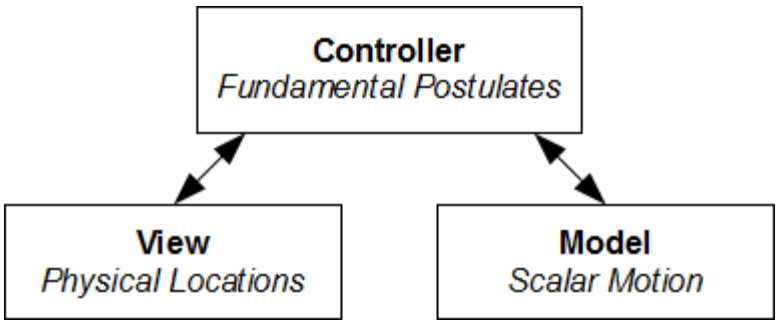
Larson's technique for modeling the universe is very similar to today's technique of presenting information on the World-Wide Web, specifically separating out the concepts of a data model (scalar motion), how the data is viewed (coordinate locations) and how the two correlate (Fundamental Postulates). This is analogous to modern software architecture known as MVC, the *model*, *view* and *controller* method of programming computers.

"This theory introduces two new concepts into physical science: the concept of *physical location*, and the concept of *scalar motion*."[1]

Larson refers to his *model* as "scalar motion," rational numbers (a ratio of natural numbers) that comprise the data model to define any object in the universe. This would be analogous to your checkbook data that is stored in a banking computer. The numbers are stored there as thousands of binary digits, and though useful to a computer, is rather useless to find your account balance. Larson's scalars are the same concept; just numbers, without any "formatted output."

Next, he defines the concept of "physical location," the coordinate *view* of a grid of points, spaced one natural unit apart, forming a framework in which his scalar motion can be observed and measured, his diagrammatic reference system. This would be analogous to a blank check register, either hard copy or on a monitor. The view just defines how the model *will be* presented—the actual numbers are not yet filled in. Larson refers to these views as *extension* space or time; the concept being that the scalar motion was extended out into a system of representation.

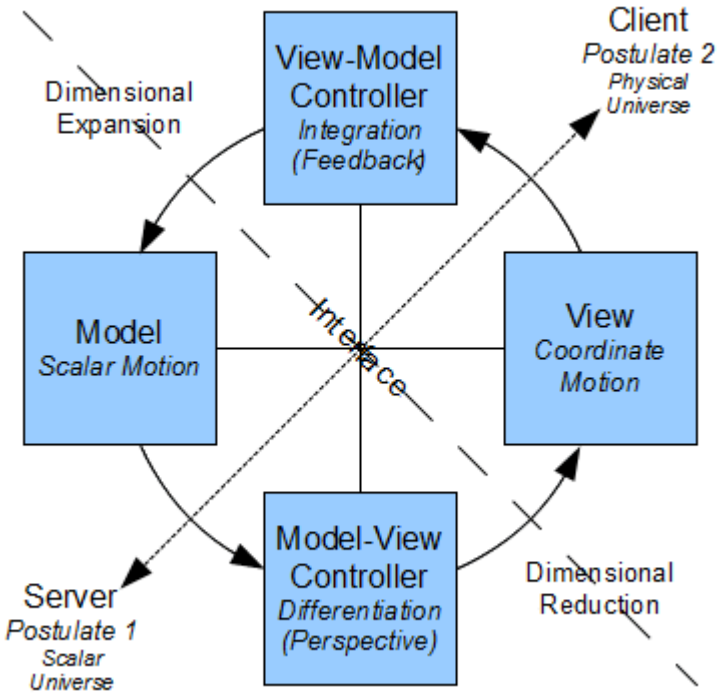
Lastly, Larson introduces his *Fundamental Postulates*—the *controller*[2] of the system that outlines the interaction between the model and view. This is analogous to formatting the binary data in the computer into readable numbers and placing those numbers on the check register, including the running balance and totals. It connects the unrepresentable data to an observable and measurable system of reference. As a theatrical analogy, the script of a play is the controller, the actors are the model and the stage is the view. This is the classical, scientific view of the Universe.



Having developed the Reciprocal System in the 1950s, Larson had this same, conventional view which is expressed in his postulates. Scalar motion is projected into a coordinate system, where it is observed and measured. However, like modern science, one important consideration is lacking: that of *feedback from* the coordinate system affecting scalar motion. Using the computer analogy, the concept of "user input," where something is typed on the keyboard or the mouse is used to select something on the viewing screen. In the context of the Reciprocal System, how kinetic interaction of locations can alter scalar motion[3].

The reevaluation separates the controller into two, different sections, analogous to the way Larson split the Universe into material and cosmic sectors. To incorporate this additional controller, the MVC model has been updated to an "MCVC" model:

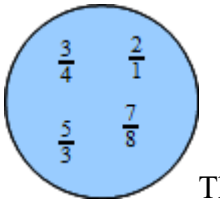
- Model (database): Scalar Motion.
- Model-View Controller (server programming): The process that projects scalar motion into a coordinate system.
- View (browser on monitor): The 3D coordinate system and clock we experience.
- View-Model Controller (keyboard and mouse): The process that integrates coordinate locations back to scalar motion.



By separating the controllers into two, distinct processes, the architectural pattern now shows the same, inverse relationships that exist throughout the Reciprocal System of theory between Model and View, and the Model-View and View-Model controllers.

With the updated MCVC model, the Model and View components are now reciprocally related, what would be called in philosophy the "objective" and "subjective" perspectives.

The Model Component



The scalar motion that comprises the Model component is *objective* in the sense that it is *independent of any observer*. Scalar motion is literally "pure data," and is nothing more than a ratio of magnitudes, without any interpretation as to orientation, direction nor location.

With respect to the Reciprocal System, it should be noted that scalar motion, being nothing more than magnitude, is considered to be part of the *projective* stratum of geometry, **not** the Euclidean, as concepts such as length, direction and location do not exist in the pure data model. Larson recognized this, and it is the reason he has two, separate postulates[4]. It is important for further development not to confuse the Model (scalar) with the View (coordinate).

The View Component

The View component is *subjective* in the sense that it is *dependent on all observers*, being by a series of assumptions defined by our physical senses and consciousness. Unlike the fixed ratios of scalar motion, what we observe and measure as "reality" is totally defined by our body, mind and spirit and the rules that we have imposed upon ourselves. The "View" is created by the rules of the observer[5], not by the organization of the data in the Model. In this architectural pattern, the view deals strictly with the presentation of scalar data in a 3-dimensional, diagrammatic, coordinate reference frame, of which there are two defined in the Reciprocal System:

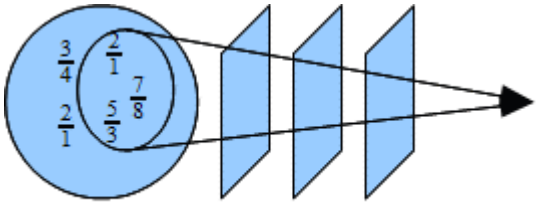
- The Material Sector: 3-dimensional, coordinate space and 1-dimensional clock time.
- The Cosmic Sector: 3-dimensional, coordinate time and 1-dimensional clock space.

Again, I will emphasize that the View is **not** the data, it is a projection screen on which scalar motion is observed and measured *after* it has been transformed by the Model-View controller. The transformation process, described below, will lose information resulting in some apparent contradictions, such as wave-particle dichotomies, but it is only the misinterpretation of this "shadow on the screen" that is causing the contradiction, not the data in the Model, itself.

The Model-View Controller Component: Projective Geometry

The Model-View controller is the formal definition of the functions that we use to interpret scalar motion and bring it in to our consciousness, to make us aware of the surrounding environment. Its character is defined by Larson's First Postulate, which defines one component, motion, existing in three dimensions, in discrete units and with two reciprocal aspects[6].

"Motion" and "two reciprocal aspects" define the type of information being obtained from the Model, the ratio of scalar magnitudes that Larson labels, "motion." "Existing in three dimensions" indicates how many of these parameters are being passed to the controller for projection into a coordinate view[7].



Projective geometry is the study of relationships between geometric entities, divided into a series of strata that have distinct, and well-defined, assumptions. To project a model (such as scalar motion) through these strata is much like projecting a beam of light through a series of glass

plates, where each plate has a different property (assumption) associated with it. The final result contains an image that has been filtered and rearranged, based on the properties of the plates the light has traveled through, although some information is lost in the process. This is indeed the case with the Reciprocal System's scalar motion: only a *single*, scalar dimension can be fully represented in a coordinate view. The other two dimensions just modify that representation. So what is seen as atomic structure is a "dimensional reduction" from the 3 dimensions of scalar motion to the 3D coordinate structure.

Geometric Strata

Geometry is divided into four "strata" or "layers". Each strata adds a set of assumptions that create certain *invariants* for that layer. An "invariant" is a property of a configuration of geometric entities that is not altered by any transformation[8] belonging to the specific strata.

There are normally four strata defined, with the Euclidean stratum being "what you see is what you get," the realm of our conventional experience.

	Stratum	*Invariants*		Degrees of Freedom	
		Invariant Property	Projective Invariant		
GEOMETRY	Projective	1. cross-ratio	1. incidence 2. collinearity 3. tangency	15	15 scale
	Affine	2. relative distance along direction 3. parallelism 4. plane at infinity	Lines or planes that intersect at infinity are called "parallel." Ratio of lengths along a certain direction is a cross-ratio with one point at infinity.	12	9 scale 3 translation
	Metric	5. relative angles 6. relative lengths 7. absolute conic (circle at infinity defining rotation)	Scale applies equally to all dimensions.	7	1 scale 3 orientation 3 translation
	Euclidean	8. absolute distance	Everything is scaled to unity, removing that degree of freedom.	6	3 translation 3 rotation

Summary of Geometric Strata

Projective Stratum	This is the least structured stratum of geometry, dealing with the concept of a “ratio of ratios” — the cross-ratio.
Affine Stratum	Creates the assumption of a plane at infinity. This creates parallel and orthogonal relationships between geometric entities by placing one of the 4 points of the cross-ratio in the plane at infinity. This “squares up” geometric entities by making lines and planes parallel.
Metric Stratum	Adds the concept of scaling to the affine stratum.
Euclidean Stratum	Fixes the scale at unity.

-

Application in the Reciprocal System of physical theory

It can be readily seen that the Reciprocal System concept of *scalar motion* is in actuality that of the projective invariant, the *cross-ratio*. The only difference is that the cross-ratio is a more generic term than scalar motion, with the latter having named aspects of “space” and “time” whereas the former does not label the aspects[9].

Projective Stratum *cross-ratio*	Reciprocal System *scalar motion*
Four scalars reciprocally related as a ratio of ratios, with no zero or infinity.	Two scalars reciprocally related. Whereas Larson assumed zero and infinity, his motion is actually a cross-ratio with one value at zero, two forming a ratio, and the final at infinity.
Unnamed aspects.	Named aspects of space and time (defining speed).
Has magnitude only.	Has magnitude only.
Non-zero.	Non-zero.
Finite.	(Unaddressed, but all motion applied as finite values.)
Cannot be translated.	Cannot be translated.
Cannot be rotated.	Cannot be rotated.
Can be scaled.	*Can* be scaled.

-

Geometric Concept	Application	Results in Reciprocal System:

Projective Stratum *cross-ratio*	Name aspects *space* and *time*.	Scalar motion.
Affine Stratum plane at *infinity*	Makes motion relative to other motion resulting in towards/away (in/out) *direction of motion*.	Scalar direction; linear vibration.
Metric Stratum *absolute conic*	Defines angular relationship between motions.	Rotational base.
Euclidean Stratum *fixed scale*	Defines common perspective by fixing scale at unity.	Vectorial motion in absolute Euclidean coordinate system.

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The View-Model Controller Component: The Observer Effect

Larson, in his publish works, does not address the *Observer Effect*[10]. In his system, designed by a chemical engineer considering the inanimate realm of atoms and chemistry, there is no feedback into the system. Chemical reactions behave the same way, whether you are looking at them or not. However, with the inclusion of projective geometry as a system to transform scalar motion into coordinate motion, it became apparent that the observer—who defines the way in which things are viewed—could not be overlooked, nor omitted as a source of potential change to the data model.

The View-Model controller component is often not considered as a separate function. In the computer industry where the concept gets its origin, the mouse and keyboard are attached to the computer, right along with the monitor. They are essential to the interaction of the system, as you could not browse to a web site if you could not type in its URL, or be able to point the mouse at a link and click the button. But the architectural pattern being adopted by this reevaluation is more generic than a simple, user interface to a computer, so separating the component and identifying the functions it performs is a required part of the pattern, in order to come "full circle."

During consideration of this architectural pattern, the question arose as to how (or what) actually provided "feedback" in a physical sense. As Larson describes in

Nothing But Motion, all chemical interactions are done at a scalar level (the Model), not in the coordinate system (the View). This, along with information in Larson's final book, *Beyond Space and Time*, indicates that feedback is of two, distinct types: a *natural consequence* of the projection in the view, and what could be termed an *unnatural consequence* initiated by a biological organism.

Feedback from a natural consequence would be anticipated as part of the projection of the Model, such as a burning piece of wood igniting an adjacent piece of wood. The thermal conditions of the atoms define whether or not it is burning, and the projection into a coordinate system determines if the adjacency is sufficiently close to induce thermal motion in the atoms of the non-burning piece, therefore sending feedback to the model that, in turn, increases the thermal motion at the scalar data level. The entire system is 100% predictable, or *predestined*.

Now enter a young child with a box of matches, and he ignites a piece of wood that would not normally catch fire in the given environment. This is an unnatural consequence from the perspective of the inanimate realm (though it may be predictable from the biological—or parental—realm). As such, the act of the child to alter the thermal state of the scalar motion comprising the atoms in the Model is *feedback*—an observer effect from the view, changing the model. The system is unpredictable, or an act of *free will*[11].

Knowing this, the View-Model controller component is basically the reciprocal of the Model-View component, taking coordinate information and altering the model from it. Projective Geometry is the tool we are using for the Model-View *differentiation*, and can also be used—in reverse—to perform a View-Model *integration*, where information from the view (primarily structural location) is dimensionally expanded through the use of a type of *constant of integration*, to affect the scalar motion of the Model[12].

In summary, it can be seen that the four components of this architectural pattern work together to make a full circle of interaction, where each can affect the other through a series of well-defined relationships.

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1 "Outline of the Deductive Development of the theory of a Universe of Motion," section 1.

2 The "controller" is inferred to mean the connecting link between the pure data model and the perspective views. There are presently many variations of this architecture, such as MVP (model view presentation) and MV (model view, where the control functions are incorporated into the view). In order to keep things simple, the MVC architecture will be used, as described.

3 This concept of feedback is analogous to the philosophical difference between *predestination* (scalar motion determining what goes on in the coordinate system) and *free will* (user input altering the model).

4 See *Part II: Fundamental Postulates* for details.

5 A study of people blind from birth reveals that they internally represent objects and relationships in a totally different manner than sighted persons, since they have no concept of structural image. (Their internal model is closer to the echo-sounding systems used by submarines.) For sighted life forms, the structure of the eye plays a large role in how the environment is perceived, for a binocular mammal sees quite differently than an insect or fish.

6 Larson labels these aspects as “space” and “time,” though they are historically and esoterically known as “yang” and “yin,” respectively.

7 See section on “Dimensional Datum” for why there are THREE dimensions.

8 A “transformation” is simply an geometric operation applied to that geometric entity; the most common being translation, scaling and rotation.

9 The four components of the cross-ratio are usually designated as a, b, c and d, and do not have accepted labels such as space, time, yang, yin, etc.

10 “In physics, the term *observer effect* refers to changes that the act of observation will make on the phenomenon being observed. This is often the result of instruments that, by necessity, alter the state of what they measure in some manner.” --Wikipedia

11 The concepts of *predestination* and *free will* will be discussed in the future, as it is beyond the scope of this work. To use Larson's terms in *Beyond Space and Time*, *free will* occurs when action from one Level of existence impedes upon another Level, such as the biologic affecting the inanimate, or the Ethical affecting the biologic.

12 It is actually a common practice, as Projective Geometry was developed from military applications that took 2-dimensional photographs from spy planes, and used those images to reconstruct 3-dimensional models of boats and aircraft.

Yin-Yang

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Yin-Yang: the Gender of Motion

In the Reciprocal System, *motion* is composed of two aspects: *space* and *time*, which are inseparable—you cannot have space without time, nor time without space. Larson calls the ratio of the two, "motion."[1]

The inseparable pairing of opposites is not an unfamiliar concept. Eastern philosophies have long accepted the idea of the yin-yang, a pairing of the feminine and masculine principles. That which is *yin* is feminine, curved, rotational, smooth or cold. That which is *yang* is masculine, straight, linear, rough or hot. These philosophies accept that *opposites can only exist in relation to each other*. The uniform motions discussed next have similar characteristics, so one can draw a correspondence between yin-yang and uniform motion: *linear motion* is yang; *rotational motion* is yin.

However, the yin-yang concept differs in one, important aspect from Larson's space-time: the aspects have *gender*… yin and yang are "opposites" in the truest sense, embodying the concepts of additive inverses, multiplicative inverses and conjugates. Larson's Reciprocal System was limited to linear motion (the *yang* aspect). It was Prof. K.V.K. Nehru's work on *birotation*[2] that represented the *yin* aspect of the Reciprocal System.[3]

Larson's and Nehru's research merge into RS2, as the best of both worlds. This includes the gender distinction by defining a reciprocal relation that Larson never considered: the geometric reciprocal of the *linear*, Euclidean geometry being *polar*, Euclidean geometry. Motion, in RS2, has aspects of yin and yang that can manifest as *either* space or time, depending on the observer perspective. What is meant by this, is that the observer often determines what is yin and what is yang in the field of observation, just as one would determine what is "right" and what is "left" depending on where you are standing.[4]

In the case of our everyday existence, we see the coordinate system of space as *yang*, extending linearly outwards from us towards infinity. Time, as used in the context of the Reciprocal System (*not* clock time) is *yin*, but typically only observable at the atomic level, once we cross the unit boundary out of space and into the time region of atomic *rotation*. From our conventional reference, space is yang and time is yin.

However, if you were born in the *Cosmic sector*, the sector of the Universe where time is 3-dimensional with "clock space," you would argue that point, saying that *time* is *yang* and *space* is *yin*, based on the way they behave. Time would have the linear, coordinate system extending around the Cosmic observer, while atoms would have a "space region" of rotational, atomic systems.

To avoid this confusion with the terms "space" and "time," RS2 uses the term "yang" to represent the linear, translational aspects of motion and "yin" to represent the polar, rotational aspects of motion, because that correlation is consistent in all frames of observation.

1 Larson originally called it “space-time,” rather than “motion,” but that became ambiguous when he started referring to space-time, time-space, space region, time region and other permutations of space and time. He selected the generic term “motion” to represent this reciprocal pairing of space and time that should not be confused with “something moving”—it's just the label he used to represent a ratio of space to time.

2 *See*:
K.V.K. Nehru, “On the Nature of Rotation and Birotation,” *Reciprocity* XX, № 1 (Spring, 1991);
K.V.K. Nehru, “Birotation and the Doubts of Thomas,” *Reciprocity* XXI, № 1 (Spring, 1992);
K.V.K. Nehru, “The Photon as Birotation,” *Reciprocity* XXV, № 3 (Winter, 1996).

3 Nehru's “birotation” concept was never formally accepted by Larson, as it represented the yin/angular aspect of motion, which has no place in Larson's totally linear system. Yin was just as foreign to Larson as the concept of a Universe of Motion was to conventional scientists. Yet Nehru's birotation model was able to correct all the problems with Larson's photon model, still staying within the confines of a universe defined by motion.

4 During the ISUS Conference of 1996, Larry Denslow gave a presentation that included how motion is “observed” in multiple frames of reference… in a room full of people looking at a spinning object, no two may agree on the exact direction the object is spinning, but ALL will agree as to how fast it turns.

Complex Motion

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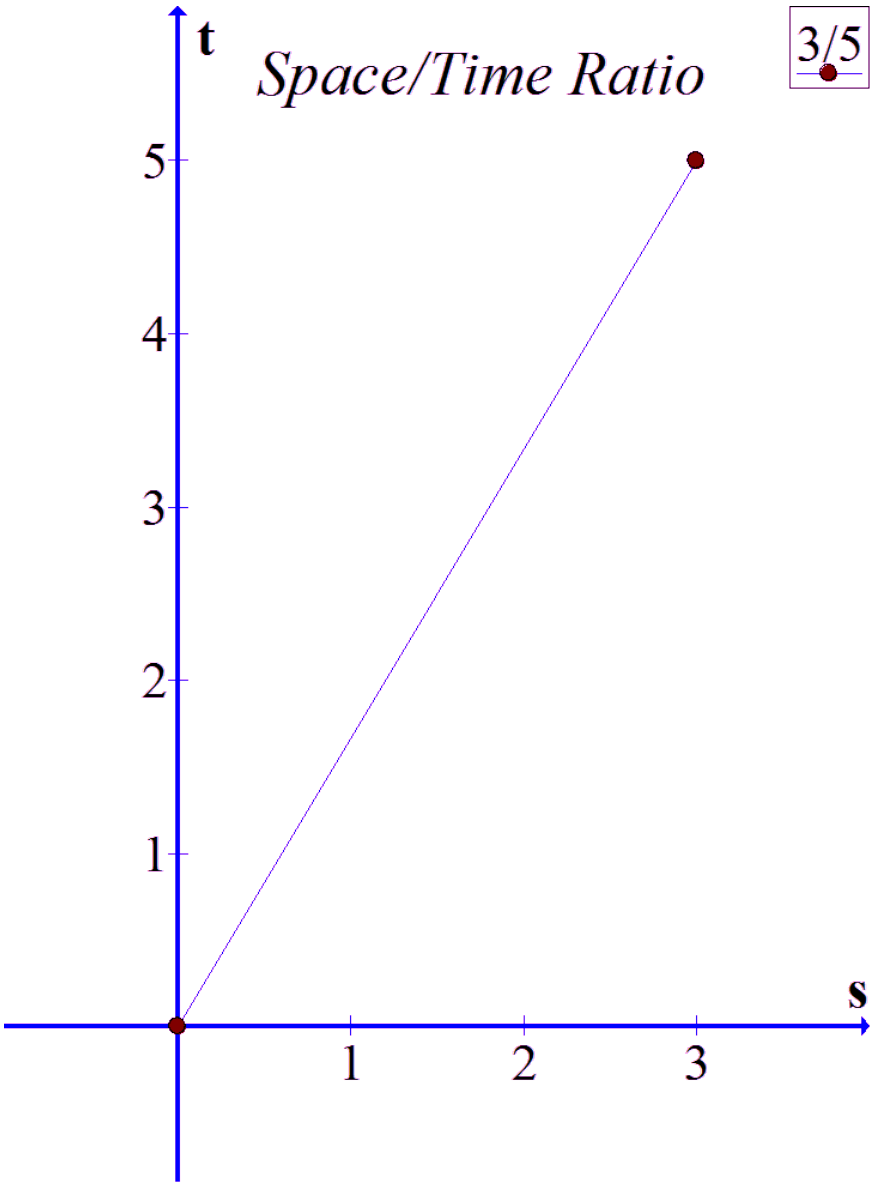
Motion as a *Complex* Quantity

For scalar quantities, where one is dealing solely with magnitudes only, the simple ratio of **a/b** or **a:b** is fine, as neither aspect has any properties other than magnitude. But to properly represent the yin-yang of motion, both its yin (polar) and yang (linear) properties need to be represented clearly in a single “formula.” Thanks to 16th century mathematician Gerolamo Cardano, such a formulation exists: the *complex number*:[1]

$$\frac{s}{t} \rightarrow (yang) + i\,(yin) \rightarrow s + it$$

The question may arise, “Is a ratio (motion) and a complex number the same, basic concept?” Consider that motion is a ratio of space to time and that ratio is simply the slope of a line. Take, for example, a motion of 3/5. That is 3 “space” and 5 “time” in

Larson's system and plot it on a graph where “time” is on the vertical axis and “space” is on the horizontal, then compare it to a plot of $3+i5$ on the complex plane[2]:


t
Space/Time Ratio
3/5
5
4
3
2
1
s
1
2
3

The only visible difference between the two graphs are the labels. But the mathematical difference is what is crucial: the real axis represents the linear, yang aspect of motion, while the imaginary axis represents the polar, yin aspect of motion.

These are not *new* Reciprocal System concepts, just a different way of expressing the ratio of motion that introduces a new, intermediate step between Larson's scalar motion and coordinate motion: *sector motion*. Sector motion adds the yin-yang property to the magnitude-only scalar motion, creating the concepts of linear (yang) and angular (yin) motion. Sector motion is *not* scalar motion because it possess this yin-yang property; nor is it coordinate motion, as there are no coordinate components —it sits somewhere inbetween, sort of a “missing link” between the scalar and the coordinate systems defining two different systems of measurement.

---

1 *Complex numbers* were first conceived and defined by the Italian mathematician Gerolamo Cardano (1501-1576), who called them "fictitious," during his attempts to find solutions to cubic equations. The solution of a general cubic equation in radicals (without trigonometric functions) may require intermediate calculations containing the square roots of negative numbers, even when the final solutions are real numbers, a situation known as *casus irreducibilis*. This ultimately led to the fundamental theorem of algebra, which shows that with complex numbers, a solution exists to every polynomial equation of degree one or higher. Complex numbers thus form an algebraically closed field, where any polynomial equation has a root. (Wikipedia)

2 Also known as an *Argand* plane, after Jean-Robert Argand (1768-1822). Normally, a slope is rise/run, not the run/rise as is shown. I swapped the axes to better show the correspondence between space=*Real* and time=*Imaginary* aspects in the comparison, which is extensively in this paper. The complex plane is always represented with the real axis on the horizontal.

Material & Cosmic Sectors

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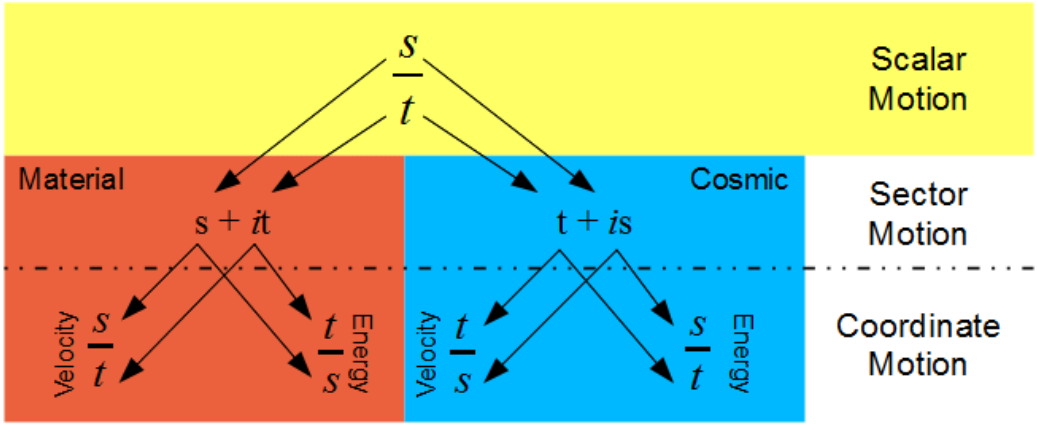
The two aspects of a ratio can be expressed as **a:b** or **b:a** (now many times **a** contains **b**, or how many times **b** contains **a**). The magnitudes of **a** and **b** do not change, but the choice is determined by how the *observer* wants to express the ratio.

Larson uses the terms *space* (s) and *time* (t) to represent the two aspects of motion, so there are two possible forms of *sector* motion: one where space is yang and time is yin (which Larson calls the *Material Sector*), and the other where time is yang and space is yin (Larson's *Cosmic Sector*):



Material Sector Properties

In the conventional frame of reference, space is yang, linear and is measured by the *real* aspect of sector motion. It is therefore *observable* and *measurable* by conventional techniques.[1] Time is yin, polar and measured by the *imaginary* aspect of sector motion and is *unobservable* and *unmeasurable* by conventional techniques. However, the effect that *time has on space* **can** be observed and measured as *force fields*.[2] The clock[3] is considered *temporal*: clock time.

Cosmic Sector Properties

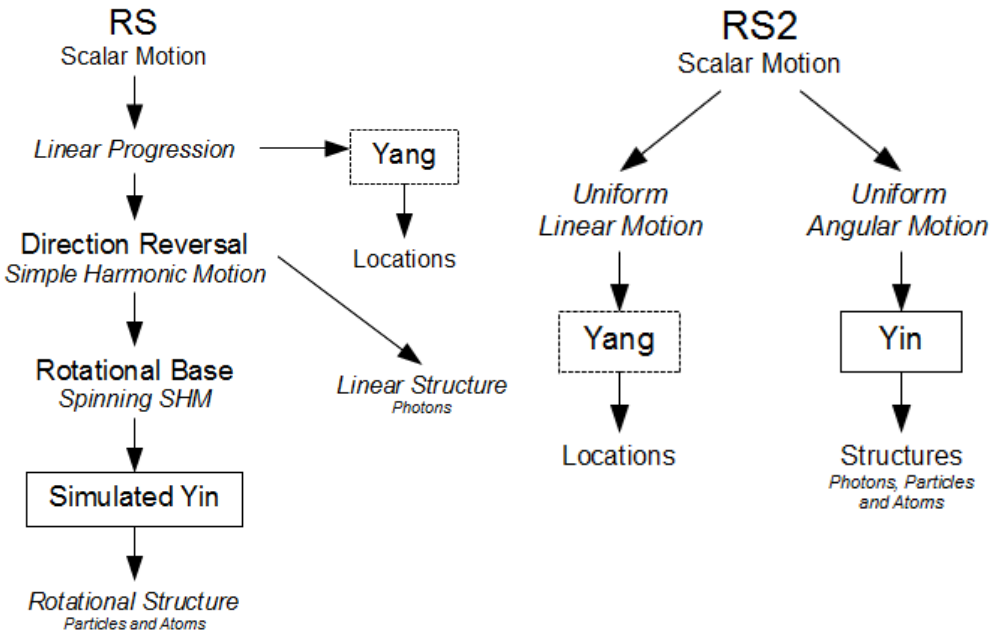
The cosmic sector is *not observable* from the conventional frame of reference. However, time is yang, linear and measured by the *real* sector motion axis and *observable* and *measurable* to a Cosmic observer, as coordinate time would be their "conventional" frame of reference. Space is yin, polar and measured by the *imaginary* aspect of sector motion. The clock is considered *spatial*: clock space, analogous to the conventional concept of *length*.

Simulating Yin: Larson's "Rotational Base"

Because Larson's Reciprocal System did not include the yin aspect of motion, he *could* have "motion without something to move"—providing it was *linear* motion—but *could not* have "rotation without something to rotate." Since the Universe *requires*[4] both yang and *yin* to function, Larson had to come up with a way to *simulate* the yin aspect of motion, which was lacking in the RS.

To circumvent this lack, he used the linear vibration generated by the "direction reversal" to create a structure that *could* be rotated, which he termed the *rotational base*—his version of yin. Even Larson admits the rotational base has no observed physical properties,[5] which is what you get if you had started with polar geometry to begin with.

Table 1: Comparison of the Derivation of Yin-Yang in RS and RS2



In RS2, neither the direction reversal nor the rotational base are necessary structures, as both concepts are embodied in the fundamental concept of the uniform and dependent motion. All motions identified as photons, particles or and atoms have the same, foundational structure (Larson's photon is not built upon a rotational base) and there is a clear distinction between location and structure. *Lex parsimoniae*[6].

---

1 Human senses and conventional, scientific equipment can only measure *space* (distance) and *change of space* (velocity, acceleration and other measures of spatial distance to clock time).

2 Larson did not like the concept of "force," preferring to use the word "push," as temporal motion was *pushing* upon a spatial *location*, causing a change of that location that could be measure by conventional, scientific techniques.

3 The concept of the "clock" will be discussed in the section on *Projective Geometry*. In RS2, the concept of a clock is different from what is conventionally accepted, being a *scale factor of space*, due to the presence of temporal motion.

4 *Requires* in the sense that "*opposites can only exist in relation to each other."*

5 Larson, Dewey B., "Outline of the Deductive Development of the Universe of Motion,", Item 68: "Where a one-unit positive rotational displacement is applied to a one-unit negative vibration, the net total speed displacement (a scalar quantity) is zero. This combination of motions has no effective deviation from unit speed (the physical datum), and therefore *has no observed physical properties*. We will call it the rotational base of the material system. A similar combination with positive vibration and negative rotation is the rotational base of the cosmic system."

6 Occam's Razor; a principle that generally recommends that, from among competing hypotheses, selecting the one that makes the fewest new assumptions usually provides the correct one, and that the simplest explanation will be the most plausible until evidence is presented to prove it false.

Uniform Motion

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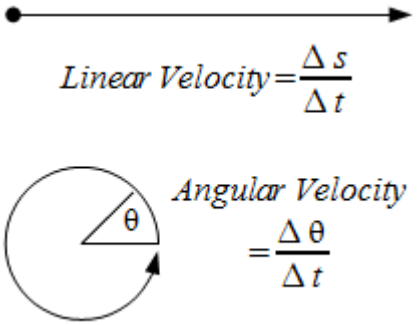
Uniform Motion

Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.[4]
—Isaac Newton

Though *motion* is fundamental to the Reciprocal System of theory, the concept of *uniform motion* is often overlooked. Uniform motion simply means a constant velocity; the motion does not accelerate or decelerate, which applies to both scalar and coordinate motion. The most obvious example of uniform motion in the RS is the progression of the natural reference system at the speed of light—a scalar motion of 299,792,458 m/s, or 1.0 s/t (in Larson's *natural units*).



The forceless nature of uniform motion gives things permanence. The progression will never slow down and stop (as in astronomical “Big Crunch” theories) or speed up. The only motions that are permanent are the uniform motions.

Professor KVK Nehru in his paper, “The Law of Conservation of Direction,”[5] points out that there are actually two forms of uniform motion: *linear*, the commonly recognized, straight-line motion that is used exclusively by Larson and *angular*, which is more commonly known as *angular velocity*. Any object exhibiting a uniform, angular motion will be observed as spinning, from the spin of electrons to

the orbits of planets about the sun. This motion is also permanent when no “forces” are acting upon it.

The linear and angular aspects of uniform motion are *independent motions*, as they do not require any external forces or other motions to maintain their integrity, so they remain in their state of motion permanently.

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4 *University of Tennessee* definition. Newton's first law is: “*Corpus omne perseverare in statu suo quiescendi vel movendi uniformiter in directum, nisi quatenus a viribus impressis cogitur statum illum mutare.*” (Every body persists in its state of being at rest or of moving uniformly straight forward, except insofar as it is compelled to change its state by force impressed.) Modern interpretation excludes the “straight forward” or “in a straight line” clause to account for *gyroscopic motion*, which would otherwise defy Newton's first law (uniform, angular velocity).

5 K.V.K. Nehru, “The Law of Conservation of Direction”, *Reciprocity* XVIII, № 3 (Autumn, 1989).

Dependent Motion

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Non-Uniform Motion (Dependent Motion)

When a force[6] acts upon uniform motion, that motion begins to vary in time ($\Delta v/\Delta t$), resulting in speeding up (acceleration) or slowing down (deceleration). The common term is *accelerated motion* for both cases—a consistent change in velocity over a period of time. **All** waves are accelerated motions, including simple, harmonic motion:

A form of periodic motion of a particle, etc, in which the **acceleration** is always directed towards some equilibrium point and is proportional to the displacement from this point.[7]

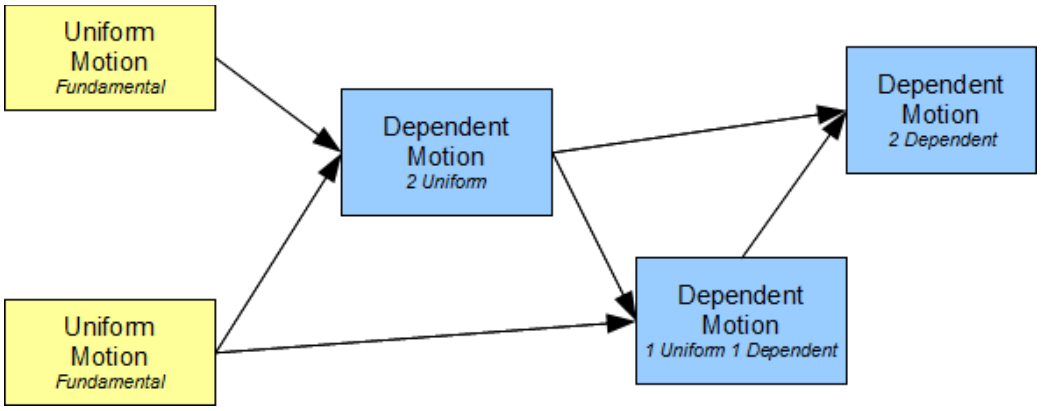
Accelerated motions require at least TWO other motions to maintain their behavior, whether periodic or not. For example, if you have a car moving at a constant velocity down the highway (uniform motion), all the other related motions (seats, occupants, etc) are dependent upon the car, but cannot change from that constant velocity unless another motion is introduced, such as stepping on the gas or turning a corner. Therefore:

1. Any motion derived from a single, uniform motion will act in unison with the uniform motion. There can be no change in linear or angular velocity.[8]

2. Any motion derived from a combination of two or more motions *can* change its velocity, accelerate or vibrate.

These non-uniform motions will be referred to as *dependent motions*, as they are dependent upon either a uniform motion or another dependent motion to maintain integrity.

The relationship between uniform and dependent motions can be expressed graphically:



The fundamental motions are the uniform motions, which are called the "scalar motions" in Larson's *Reciprocal System* of theory. However, Larson only considers the linear form of uniform motion in his analysis. RS2, the reevaluation of the Reciprocal System, considers *both* linear and angular aspects of uniform motion in its structure.

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6 The generation of acceleration and force from uniform motion is discussed in the *Compound Motion* section.

7 *World English Dictionary* entry, "simple harmonic motion."

8 Do not confuse *angular velocity* with the resolving of rotational motion into its vectorial components.

Simple Harmonic Motion

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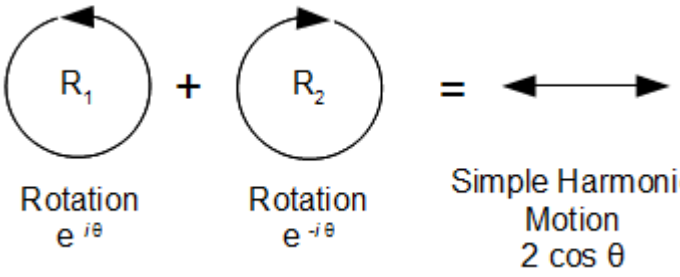
Simple Harmonic Motion (Direction Reversals)

In order to create simple harmonic motion in Larson's Reciprocal System, the outward, scalar expansion of the Universe must reverse itself at *regular intervals* at

specific locations, but not necessarily all locations. Larson gives no reason for this "direction reversal"[23] where, at the end of each "unit" of motion, the progression can just decide to reverse itself and go inward rather than outward—and does it with clock-like regularity. Students have had a problem with this description for decades, citing that a direction reversal would generate a square or triangle wave, not a sine wave, and a truly random function would not be the perfect wave that the photon exhibits. Larson provided no mechanism for this reversal to occur but requires it to build his system of theory.



With the understanding of uniform and dependent motion provided by RS2, we know that simple harmonic motion is an *accelerated motion* and must therefore be a *dependent* motion, derived from **two** or more uniform motions. The RS2 model is based on Nehru's paper, "The Photon as Birotation" that uses *two* dimensions of uniform, angular motion (rotation) to represent the photon. These uniform dimensions of motion, acting in opposition[24], create the simple harmonic motion commonly associated with the sine wave of the photon. Euler's formula[25], using complex quantities, can be used to represent this relationship:

$$
\begin{aligned}
R_1 &= e^{i\theta} \\
R_2 &= e^{-i\theta} \\
\lambda &= R_1 + R_2 \\
&= e^{i\theta} + e^{-i\theta} \\
&= (\cos\theta + i\sin\theta) + (\cos\theta - i\sin\theta) \\
\lambda &= 2\cos\theta
\end{aligned}
$$

Where R_1 and R_2 are the *two, uniform angular velocities* (rotations) and λ is the resulting *dependent* motion: simple harmonic motion. Note that the two-dimensional system of rotation is reduced to a single dimension of linear vibration.[26] No "direction reversals" required, no question as to the wave shape or randomness of direction and a direct, predictable, and consistent coupling between the scalar dimensions and the resulting wavelike motion.

Simulating Yin: Larson's "Rotational Base"

Because Larson's Reciprocal System did not include the yin aspect of motion, he *could* have "motion without something to move"—providing it was *linear* motion—but *could not* have "rotation without something to rotate." Since the Universe *requires* both yang and *yin* to function, Larson had to come up with a way to *simulate* the yin aspect of motion, which was lacking in the RS.

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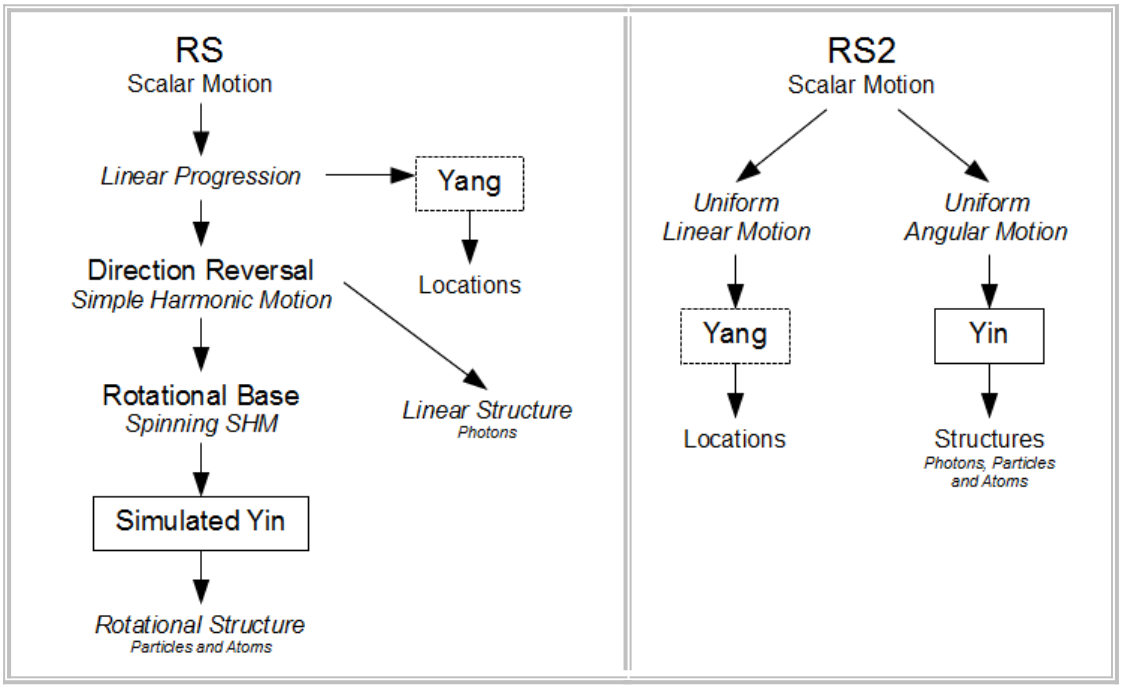

In RS2, neither the direction reversal nor the rotational base are necessary structures, as both concepts are embodied in the fundamental concept of the uniform and dependent motion. *Lex parsimoniae*.

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23 Larson, Dewey B., *The Structure of the Physical Universe*, 1959: "From the foregoing it is apparent that where *n* units of one component replace a single unit in association with one unit of the other kind in a linear progression, the direction of the multiple component must reverse at each end of the single unit of the opposite variety. Since space-time is scalar the reversal of direction is meaningless from the space-time standpoint and the uniform progression, one unit of space per unit of time, continues just as if there were no reversals. From the standpoint of space and time individually the progression has involved *n* units of one kind but only one of the other, the latter being traversed repeatedly in opposite directions. It is not necessary to assume any special mechanism for the reversal of direction. In order to meet the requirements of the First Postulate the multiple units must exist and they can only exist by means of the directional reversals. It follows that these reversals are required by the Postulate itself."
"When viewed from the standpoint of a reference system which remains stationary and does not participate in the space-time progression the resultant path of the oscillating progression takes the form of a **sine curve**."
Note that a "sine curve" is an *accelerated* (dependent) motion, not a *uniform* motion. His conclusion is logically inconsistent in that a single, uniform motion (scalar space-time) can produce an non-uniform (accelerated) motion without a second, uniform motion to alter its behavior.

24 The two rotations are actually *complex conjugates* of each other, one of three forms of "opposites" used in RS2.

25 Euler's formula: $z = x + iy = |z| (\cos \theta + i \sin \theta) = re^{i}$.

26 This reduction in the number of dimensions where counter-rotations interact to produce a wave structure is called "dimensional reduction" and plays a key part in physical interactions, such as superconductivity.

27 Larson, Dewey B., "Outline of the Deductive Development of the Universe of Motion,", Item 68: "Where a one-unit positive rotational displacement is applied to a one-unit negative vibration, the net total speed displacement (a scalar quantity) is zero. This combination of motions has no effective deviation from unit speed (the physical datum), and therefore *has no observed physical properties*. We will call it the rotational base of the material system. A similar combination with positive vibration and negative rotation is the rotational base of the cosmic system."

Fundamental Postulates

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Fundamental Postulates

One of more interesting facets of Dewey Larson's *Reciprocal System* is that an entire Universe can be derived from two, fundamental postulates. Larson based these postulates on *everyday life*—not mathematical theory:

"They [The fundamental postulates] have not resulted from a search for the absolute truth, whatever that may be, but from an effort to establish a working basis by which the **ordinary phenomena of everyday life could be explained** qualitatively and quantitatively."[1] [emphasis mine]

Larson intended that his "physical universe" be the ordinary Universe in which we live—one of three, spatial dimensions and clock time. Over the course of the development of the RS, Larson has updated the postulates a number of times. Prior to the 1959 publication, *The Structure of the Physical Universe*, the postulates were:

Pre-1959 Postulates

I. The physical universe is composed entirely of a single entity: space-time, existing in three dimensions, in discrete units, and in two reciprocal forms: space and time.
II. Space-time conforms to the relations of ordinary mathematics, its magnitudes are absolute and its geometry is Euclidean.
III. (Exact wording has been lost, but concerned the scalar, magnitude-only, non-geometric nature of space-time).

Larson also included some "Laws" to clarify the Postulates:

1. Every physical event is accompanied by a reciprocal event equal in magnitude and opposite in space-time direction (*General Law of Reaction*).
2. The total amount of space-time displacement cannot be altered by any process within the physical universe (*General Law of Conservation*).
3. Where a physical event may have more than one possible result, the proportionate number of each alternative resulting from a number of events of this kind is equal to the mathematical probability (*General Probability Law*).

After consideration, Larson dropped the third postulate as unnecessary:

“In the early stages of this investigation the **scalar nature of space-time** was embodied in an additional postulate. Further study indicated that it was a necessary consequence of the previous assumptions, as indicated in the preceding paragraph, and it was therefore eliminated from the list of postulates.”[2] [emphasis mine]

He also dropped the General Laws as being a natural consequence of the Fundamental Postulates. This may not have been a good idea, as students of the Reciprocal System often confuse fundamental, scalar motion with the Euclidean motion of the physical universe. In Larson's view, it was obvious that "scalar space-time" was of *magnitude only* and as such, could **not** include any concepts such as a point, line, circle or plane —scalar motion has no geometry!

The first official publication of the Fundamental Postulates was in the 1959 publication, *The Structure of the Physical Universe*:

1959 Fundamental Postulates (from Structure of the Physical Universe)

I. The physical universe is composed entirely of one component, space-time, existing in three dimensions, in discrete units, and in two reciprocal forms, space and time.
II. The physical universe conforms to the relations of ordinary mathematics, its magnitudes are absolute and its geometry is Euclidean.

Most notably is the absence of the concept of *motion*—Larson started with the concept of space-time, which was nothing more than a ratio of two scalars: a magnitude of space inversely related to a magnitude of time. In later works, he changed space-time to *motion*, which was the same concept—a ratio of absolute, scalar magnitudes (again, NO GEOMETRY involved).

In the 1965 publication, *New Light on Space and Time*, Larson altered the 2nd postulate to include the "commutative" adjective to mathematics:

1965 Fundamental Postulates (from New Light on Space and Time)

I. The physical universe is composed entirely of one component, space-time, existing in three dimensions, in discrete units, and in two reciprocal forms, space and time.
II. The physical universe conforms to the relations of ordinary **commutative** mathematics, its magnitudes are absolute and its geometry is Euclidean. [emphasis mine]

"Commutative" was added to counter the non-commutative mathematics becoming popular with the *Relativity* theory of the time. Larson was aware that conventional scientists did not comprehend the temporal nature of the atom, and he was able to approximate atomic properties quite closely with his "commutative" slide rule, so he converted it to a general statement.

It should be noted that the "commutative" adjective applies to the *physical universe*—NOT "space-time," which has no concept of the number line on which the commutative property is based, being magnitude-only. Another facet missed by most RS students is that scalar motion can be *increased* or *decreased* through the mathematical concepts of *evolution* and *involution*—**not** added or subtracted, which are Euclidean, number-line based concepts.

By the time 1979 rolled around, Larson revised the Fundamental Postulates yet again, moving away from the idea of "space-time" and substituting the concept of "motion," primarily because space-time had too many hard-core connotations with conventional scientists:

1979 Fundamental Postulates (from Nothing But Motion)

I. The physical universe is composed of one component, motion, existing in three dimensions, in discrete units, and with two reciprocal aspects, space and time.
II. The physical universe conforms to the relations of ordinary commutative mathematics, its primary magnitudes are absolute, and its geometry is Euclidean.

When Larson wrote *Beyond Space and Time*, he discovered that his Fundamental Postulates did not apply to the non-physical Universe[3], which was obvious by the opening remarks concerning the fact that he created the Postulates to reflect ordinary life—and metaphysics was hardly "ordinary." To correct this, he added the set of *Metaphysical Postulates*:

1995 Metaphysical Postulates (from Beyond Space and Time)

I. There are existences in the metaphysical region of a more general and less restricted type than the units of motion that are the basic constituents of the physical universe.
II. The metaphysical existences are logical, orderly, and rational.
III. Metaphysical existence conforms to a specific set of laws and principles different in some respects from those of the physical universe.
IV. The metaphysical existences of which we have evidence are intelligent.

As demonstrated by the need for Metaphysical Postulates, the Fundamental Postulates are not complete and all-encompassing of the Universe, in general, but only applicable to what Larson describes as "Level I—Inanimate" in *Beyond Space and Time*. Larson identified three levels of existence, which means that his Fundamental Postulates only describe approximately ⅓ of the known "ultimate truth" of the Universe, which is where **RS2**, the reevaluation of the Reciprocal System, steps in:

"… At best, therefore, what we term knowledge is merely an approximation and the advancement of knowledge is essentially a process of arriving at even closer approximations to the ultimate truth.

"Fundamental 'laws' and principles are no exception. Even though they may have served us well and faithfully in those fields wherein we have utilized them thus far, **time comes that greater accuracy is needed we must replace them with closer approximations in order that progress may continue unimpeded**. The carpenter's rule serves its own limited purpose very satisfactorily but the marvels of modern machinery would be impossible without micrometer calipers or their equivalent. **From time to time, therefore, it is well that we should undertake a critical reexamination of our fundamental theory** in order to determine whether it is still adequate to carry the additional burdens that our more advanced facilities for observation and measurement have placed upon it. Perhaps the branches of the tree may have become too numerous and heavy for the trunk to support."[4] [emphasis mine]

RS2 **is** the "critical reexamination of fundamental theory," using modern tools developed by the computer industry, such as matrices, quaternions, projective

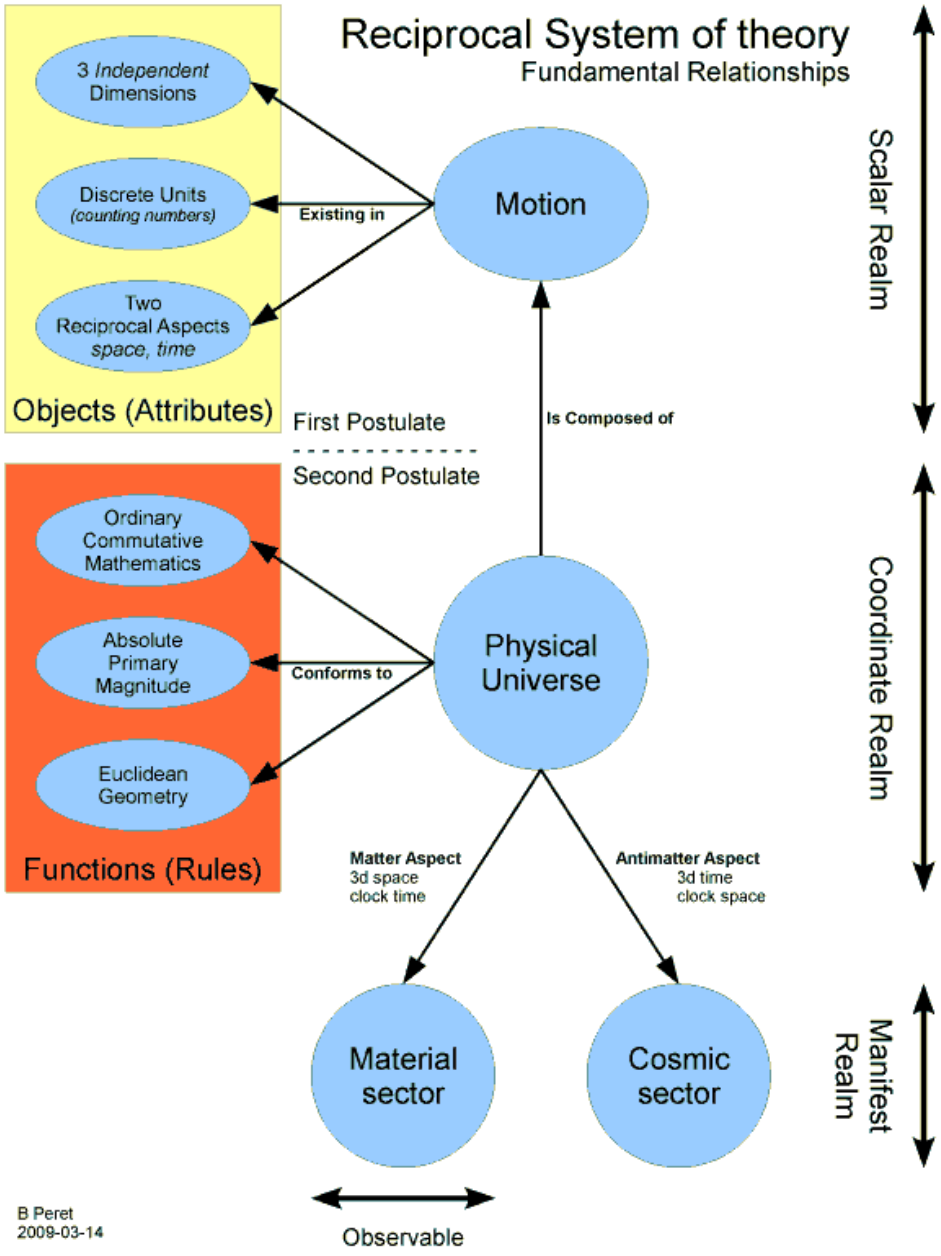
geometry and the resulting virtual reality—commonplace tools we use and experience daily that were inconceivable when Larson published his first book in 1959.

In keeping with Larson's intent, you cannot have one set of rules for one situation, and another set of another. Larson was able to accurately define the physical universe in terms of space and time—he did not need one set of rules for the atomic configuration space, another for astronomy and another for mechanical interactions. But when he encountered the living realm, his "Level II—Biologic", the postulates fell apart.

Part of the RS2 reexamination effort is to find out why the Fundamental Postulates are not generally applicable to the other levels of existence and to find what can be done to correct that situation so they ARE of general applicability again. Larson changed the Postulates at least 5 times before they settled on their final form, then had to use a new set of postulates to continue from that point. RS2 believes that is unnecessary; that a simple modification of the Postulates, once again, can open the door to a generalized set of Postulates to include the other levels of existence that Larson documented, as well as to clarify some of the inherent problems identified with his “Level I” research.

Clarification of Larson's Fundamental Postulates

First off, some clarification of Larson's Fundamental Postulates are in order. For that, we will use a modern technique called an “ERD”—an Entity-Relationship Diagram—which graphically represents how the various components of the Postulates relate to each other:



The two postulates clearly describe two different realms in the Reciprocal System. The First Postulate delimits the behavior of *motion*, what Larson originally called "space-time" and is purely scalar—magnitude only. The Second Postulate delimits the behavior of the *physical universe*, which is based on the "ordinary phenomena of everyday life," as Larson so aptly described it. A third realm was included, the *Manifest Realm*, to show the "observables" of the physical universe, since ordinary phenomena are what is observable—we cannot SEE a magnetic field, only the effect it has on real "observables."

First Postulate: the Scalar Realm

Larson always used the mathematical definition of the scalar, “a quantity possessing **only** magnitude.” A scalar, as in *motion* or *space-time*, cannot have any associated geometric relationships. It is impossible for “5” to be at a right angle to “3.” But it can have attributes, such as integer or real values, can be contained in sets and can exist in mathematical relationships. Larson defines these explicitly in the First Postulate:

- “Discrete Units” refer to the set of integers, but note that Larson did not say “integers” or “whole numbers.” By using discrete UNITs, Larson is referring to the set of counting numbers, as a “unit” is a countable quantity with a minimum quantity of *one*. And we also know that Larson's “natural datum” is Unity, so there are no integer values less than 1 in the scalar realm.
- From observation, which is Larson's premise, the observable universe has 3 dimensions, so he limits the set of scalars to three dimensions. Note that these are *independent* dimensions, as there is no geometry to create a dependent relationship between them.
- Finally, he defines that there are two magnitudes involved in motion (or space-time), one aspect call *space* and the other, *time*, that exist in an reciprocal (inverse) relationship to each other, what is commonly known as a *ratio*. Note that the ratio of motion is also scalar, and has no geometry associated with it.

Second Postulate: the Coordinate Realm

The Second Postulate clearly defines the behavior of the “physical universe,” the realm of ordinary experience, by listing some of its basic character as a set of rules:

- It conforms to *Euclidean geometry*, which means it HAS GEOMETRY and hence **cannot apply** to the scalar realm of motion. It can be seen from Euclid's Postulates that this is, indeed, a coordinate realm being described:
    1. A straight line segment can be drawn joining any two points.
    2. Any straight line segment can be extended indefinitely in a straight line.
    3. Given any straight line segment, a circle can be drawn having the segment as radius and one endpoint as center.
    4. All right angles are congruent.
    5. If two lines are drawn which intersect a third in such a way that the sum of the inner angles on one side is less than two right angles, then the two lines inevitably must intersect each other on that side if extended far enough. This postulate is equivalent to what is known as the parallel postulate.
- *Primary magnitudes* in the physical universe are “absolute,” which has two meanings:
    1. *Unchanging*, in that the coordinate motion is dependent upon the uniform, scalar magnitude composing it and
    2. The magnitudes are always *positive*[5]. (Having a natural datum of unity, there cannot be “nothing” (zero), so the absolute magnitudes are the set of positive integers.)
- *Commutative*, because the coordinate realm is based on Euclidean, linear relationships—the number line. Again, Euclidean geometry and the

commutative property *only apply* to the coordinate realm defined in the second postulate—not the scalar motion of the first!

The Manifest Realm

The physical universe can be seen as two, independent sectors: the *material* (the ordinary realm of 3D space and clock time) and the *cosmic* (3D time and clock space), which conventional science refers to as "antimatter."[6]

Having material consciousness, we can only directly observe the material sector. In simpler terms, we use "space" to measure "space" and cannot directly measure any temporal event, such as a gravitational, electric or magnetic field, nor any cosmic structure. This limits our observable realm to only half of the manifest, physical universe, but we CAN get some idea of the cosmic side, by how *time affects space*. We cannot see a magnetic field, but we can see how it influences iron filings on a sheet of paper.

To clarify, in the material sector, we have "locations" containing *time* (scalar motion of atoms, 1st Postulate), geometrically oriented in *space* (2nd Postulate).

The New Micrometer: Virtual Reality

The field of computer imaging has produced some very precise and detailed tools for the construction of virtual realities—objects and images that appear so real, one has difficulty separating them from the real, observable objects in the physical universe. This is a big clue that these computers must be doing something right… when reduced to their simplest form, computers are nothing but binary bits, which are grouped into scalars, starting with integers—"magnitude only" that somehow manages to create virtual buildings, people, planets and galaxies. Sound familiar? It should—it's the SAME PROCESS that Larson documented as the Reciprocal System, from scalars to physical universe, but with *millions* of man-hours of effort refining the details of the process.

RS2 applies this new "micrometer caliper" of computer imaging techniques to replace Larson's carpenter's rule of the 1950s and expands upon Larson's request that the system be reexamined regularly to see what these new tools can do to refine and clarify the system.

The primary tool in this virtual toolbox is that of *Projective Geometry*, a technique that explicitly defines the process from converting a scalar magnitude, sitting in the memory of a computer, into a virtual reality that is nearly identical to that which we observe. Projective Geometry has actually been around for a long time.[7] It became popular with the advent of computers and computer imaging and was used by the military to convert photographs into 3-dimensional scale models, so they could figure out what the enemy was building and determine its abilities and limitations.

Larson never provided a mechanism to convert scalar motion into coordinate motion, other than *probability*. Projective geometry provides this solution, in enormous detail.

The second tool in the virtual toolbox is the use of *complex* quantities to represent linear and rotational motion concurrently, as homogeneous coordinates and quaternions. Everyone is familiar with how you can define a point in space to determine a direction. There is also another process—using roll, pitch and yaw, as any flight simulator will demonstrate. The computer imaging process discovered that they are actually geometric reciprocals of each other; polar geometry is the inverse of linear geometry, and what better tool than a “geometric reciprocal” for a Reciprocal System of theory?

One Giant Leap for Larson-Kind

It is obvious that the biological realm, documented in Larson's book *Beyond Space and Time*, is composed of the same stuff everything else is made of. So why did Larson need to define Metaphysical Postulates?

Studies in the biological realm by Nick Thomas[8] show that the geometric relations are not Euclidean in nature, as you find in the inanimate realm, but *Affine*—they appear as a scalar recursion. Some of the geometric assumptions made by Euclid do not hold true in living forms. This is because the *type* of motion is different. Larson's Postulates define the inanimate realm, where you have motion in EITHER space OR time. When it comes to the animate, living realm, a new kind of motion is introduced, a motion that is BETWEEN space AND time, which Larson roughs out as a “life unit.”

By using the tool of Projective Geometry, we can now clearly identify that the "Level I—Inanimate" realm of Larson's Postulates is in the *Euclidean* geometric stratum, the "Level II—Biologic" is in the *Affine* geometric stratum, and Larson's scalar motion (or space-time) sits cleanly in the *Projective* stratum, prior to geometric assumptions. All that is required to make Larson's original Postulates function in the biological realm is to acknowledge the different strata of geometry, each having applicability to a particular “level of existence,” as Larson calls them in *Beyond Space and Time*.

Larson's “Level III—Ethical” realm becomes a consequence of the stratification of geometry, defined by Projective geometry techniques in virtual models. It actually defines seven possible levels, of which *Beyond Space and Time* documents the first three.

By removing these limitations, Larson's postulates work for the biological and ethical realms—no additional postulates are needed. This is what RS2 has done in the reevaluation:

RS2 Fundamental Postulates

I. The universe is composed of one component, motion, existing in three dimensions, in discrete units, and with two reciprocal aspects, space and time.
II. The universe conforms to the relations of ordinary mathematics, its primary magnitudes are absolute, and its geometry is Projective.

What did we change? No more “physical”—the Postulates now function for the non-physical, or “metaphysical” Universe. Euclidean geometry was changed to Projective geometry, to allow for the stratification into the Levels of Existence, and “commutative” was dropped, as it is inapplicable to motion that occurs in more than one dimension, such as the polar geometry of the life or ethical unit.

Now that we are using a micrometer caliper and computer instead of a yardstick and slide rule, a larger and more-encompassing model can be developed from Larson's original work while retaining the best of what Larson has already accomplished.

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1 Larson, Dewey B., *Extended SPU Notes*, p. 70.

2 Larson, Dewey B., *The Structure of the Physical Universe*, p. 8.

3 Larson's use of the term “physical” is synonymous with the term “inanimate.” Therefore, the non-physical, or metaphysical, consists of any compounding of motion beyond the inanimate, which includes biological life.

4 Larson, Dewey B., *Extended SPU Notes*, p. 62.

5 The concept of “absolute value”, where |-x| = +x.

6 Technically “inverse matter.” Conventional science makes the distinction based on charge, whereas Larson makes his distinction on the speed of the rotational base (whether *yin* is in time [matter] or space [cosmic or antimatter]).

7 The first geometrical properties of a projective nature were discovered in the 3rd century by Pappus of Alexandria. Filippo Brunelleschi (1404-1472) started investigating the geometry of perspective in 1425. Johannes Kepler (1571-1630) and Gerard Desargues (1591–1661) independently developed the pivotal concept of the "point at infinity". Desargues developed an alternative way of constructing perspective drawings by generalizing the use of vanishing points to include the case when these are infinitely far away. He made Euclidean geometry, where parallel lines are truly parallel, into a special case of an all-encompassing geometric system. Desargues's study on conic sections drew the attention of 16-year old Blaise Pascal and helped him formulate Pascal's theorem. The works of Gaspard Monge at the end of 18th and beginning of 19th century were important for the subsequent development of projective geometry. Jean-Victor Poncelet had published the foundational treatise on projective geometry in 1822.

8 Nick Thomas (1941-) was educated as an electrical engineer and became an engineering officer in the Royal Air Force for 16 years. He met the work of Rudolf Steiner at the age of 18 and has been inspired by it ever since. In particular he seeks to reconcile Steiner's spiritual research with the findings of science, and has found projective geometry to be a beautiful and appropriate approach. (http://www.nct.anth.org.uk/people.htm)

Scalar Motion

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Larson's *Reciprocal System* is based on the concept of *scalar motion*, a concept that is generally misunderstood. Since RS2 is based on Larson's original work, the "scalar" concept is also important to this reevaluation. Before other concepts are introduced, there must be a clear definition of a "scalar" and how one goes from magnitude to motion.

1. Definition of a Scalar

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Anyone who has explored the realm of the science beyond what is taught in the classroom will undoubtedly run across the term scalar, without any consistency of application. Scalar waves, scalar motion, scalar this, scalar that… it appears the term is popular to describe something that the author does not quite understand himself. So, let us start with a clear definition of what the term "scalar" means:

Scalar
: "a quantity possessing only magnitude."

Quantity
: "an exact or specific amount of measure"

Magnitude
: "greatness of size or extent"

From the definitions, a scalar is simply the "specific amount of greatness." Sounds nebulous, but it is fairly precise and a good definition of "scalar." First, consider the term amount. It comes from the old trading days, where people would barter for one "exact or specific amount of measure" for another. "I'll trade you this sack of sugar for two bags of flour." Amounts were the counting numbers. There are three attributes of the counting numbers that make them unique:

1. There is no zero. Suppose I came up to you, and said, "I'll trade you nothing for your new Lexus." Sound like a good deal? If so, please contact the author
   ASAP. If not, then you understand why zero is not included in the counting numbers. Since they are based in measures, and measures are used in trade, you
   can only trade what you have and if you have zero of it, then it cannot be used
   in trade.
2. There are no fractional parts. "I'll trade you two and a half necklaces for three-quarters of your mule." Possible, but pointless.

3. There are no negative amounts. With counting numbers, there must be something
   to count, and there is no such thing has having "-4" cats in the house.

Now that the idea of quantity is understood to be the whole or counting numbers, consider the term magnitude. How does a magnitude differ from an amount? In simplest terms, and amount is actually an amount of something. You can't have just six. You need six somethings. Amounts qualify other concepts.

But what about magnitude? The magnitude refers to the "greatness of size or extent", which means that it is the quantity specified in the amount of measure, the "six" in "six somethings." The "somethings" is not included in the magnitude, because it doesn't matter what it is, only how many there are.

And there you have the definition of scalar: "A quantity possessing only magnitude", which is one of the non-zero, non-negative, non-fractional, whole counting numbers, without any identification of what they are a quantity of. The minimum scalar magnitude is therefore one and the maximum is unlimited.

Some people may say that zero and negative amounts are valid, but they are not part of the counting number system. If the computer at "Cars-R-Us" says they have "-2" brake pads in stock for you, are you going to walk home with anything? A promise won't stop your car. Until you have them, for all practical purposes, "promises" don't exist, and cannot be counted as an item up for trade.

Since we will be dealing totally with the natural systems of reference in this work, we have to stick to what is "real", not "promises" created by the inventive mind of man. They don't exist in Nature. Can you have "-1" ocean?

2. Scalar Ratio, Orientation and Cross-Ratio

When two scalars are brought into relationship with each other, a *ratio* is the result.

Ratio
: "the relation between two similar magnitudes with respect to the number of times the first contains the second."

As can be seen in the definition of the *ratio*, the ratio adds the concept of *proportion* to the concept of *magnitude*. This gives rise to three possibilities for the proportions of the ratio: one magnitude is either *equal*, *greater* or *less* than the other. This introduces the concept of a **scalar orientation**.

Orientation

"to adjust with relation to, or bring into relation to surroundings, circumstances, facts, etc."

The three possible scalar orientations for a ratio of scalar magnitudes A and B, as A:B, are: A=B, A>B and A<B. These relations shall be referred to as **scalar orientations**, since the definition of "motion" requires a place or location and that concept does not yet exist.

A<B	A=B	A>B
Low Orientation	**Unit** Orientation	**High** Orientation
A/B < 1.0	A/B = 1.0	A/B > 1.0

Recall that the minimum scalar magnitude is unity, so the ratios of A/B or B/A will never become undefined since neither A nor B can be zero.

Note that in the low and high orientations, the possible combinations of scalar ratios are unlimited. But, where A=B, **only one ratio** is possible: **unity**. The scalar orientation structure thus shows a natural separation across a common "scalar boundary" of unity, which can be used as a reference point, a **natural datum**. This gives a "place" or "location" in which we can begin to define scalar motion, but it has a problem: given any ratio, there is no way to determine if you are observing A/B or B/A… another reference point is needed to determine the orientation of the ratio, itself, with respect to an observer or environment. This can be found in the *invariant* property of the **cross-ratio**.

Invariant

"a quantity or expression that is constant throughout a certain range of conditions."

A *cross-ratio* is literally a "ratio of ratios", and is the only projective invariant in all strata of geometry. In a scalar sense, it relates two scalar orientations through a ratio, and that ratio remains constant—giving a secondary orientation to the ratios and producing *scalar motion*. One can also think of it as the ratio of slopes between two lines on a graph.

Note: A "projective invariant" simply means that you can't alter it, regardless of what perspective transformation you apply to it. A perspective transformation is the process of introducing assumptions to coordinates, to produce a reference system (such as a plane at infinity, and the "eye cone"). More on this later.

There are now two things to consider as the basis of scalar motion: the cross-ratio and the ratio orientation.

The cross-ratio introduces the concept of *association*. In a geometric sense, it is like two points joining to form a line, except here you join two ratios to form the cross-ratio. The result is a concept we call "dimension."

Dimension

"a magnitude that, independently or in conjunction with other such magnitudes, serves to define the location of an element within a given set."

There are only two possible ratio orientations, since there are only two scalar magnitudes involved in a specific relationship: A:B or B:A.

3. Scalar Motion

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Scalar motion is another term that is often used with very little understanding of its meaning. *Scalar* has already been defined, so let us examine the term *motion* and its connection with the concept of a *scalar*:

Motion
: "changing place or position."

Motion is a simple enough concept to understand, but when you consider it in the context of "scalar motion", it becomes like "military intelligence"—a contradiction in terms. How is it possible for quantity possessing "magnitude only" to change place or position, when both concepts are totally foreign to the idea of a "magnitude only" scalar? It *can't*, and there lies the problem with the term "scalar motion."

Exactly what is meant by the term, "motion," when associated with the concept of "magnitude?" The answer is found in how we express the concept of *motion* as speed —an inverse relation between some "quantity of spatial distance", *s*, and some "quantity of time," *t*, as *s/t*. In other words, speed is just a **ratio of space to time** and therefore *motion*, and in a more generic sense is simply a **ratio** of quantities.

It is important to understand that the concept of *motion* is a subset of *ratio*, because ratios deal with *magnitudes* and *motion* deals with *quantity* (magnitudes **of** something, namely *space* and *time*). In essence, we have two similar concepts: that of **scalar ratio** (generic) and that of **scalar motion** (specific to space and time).

Scalar Motion is therefore the projectively invariant cross-ratio, with specific aspects of space and time.

Projective Geometry

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Projective geometry is the study of relationships between geometric entities without the assumptions imposed by other strata of geometry.

Geometric Strata

Geometry is divided into four “strata” or “layers”. Each strata adds a set of assumptions that create certain invariants for that layer. An “invariant” is a property of

a configuration of geometric entities that is not altered by any transformation belonging to the specific strata. A “transformation” is simply an operation applied to that geometric entity; the most common being translation and rotation.

	Stratum	Invariant Property	Projective	Degrees of Freedom	
GEOMETRY	Projective	1. cross-ratio	1. incidence 2. collinearity 3. tangency	15	15 scale
	Affine	2. relative distance along a direction 3. parallelism 4. plane at infinity	lines or planes that intersect at infinity are called “parallel” ratio of lengths along a certain direction is a cross-ratio with one point at infinity	12	9 scale 3 translation
	Metric	5. relative angles 6. relative lengths 7. absolute conic (circle at infinity defining rotation)		7	1 scale 3 orientation 3 translation
	Euclidean	8. absolute distances	everything is scaled to unity, removing that degree of freedom	6	3 translation 3 rotation

Summary of Strata

Projective Stratum	This is the least structured stratum of geometry, dealing with the concept of a “ratio of ratios” — the cross-ratio.
Affine Stratum	Creates the assumption of a *plane at infinity*. This creates parallel and orthogonal relationships between geometric entities by placing one of the 4 points of the cross-ratio in the plane at infinity. This “squares up” geometric entities by making lines and planes parallel.
Metric Stratum	Adds the concept of *scaling* to the affine stratum.
Euclidean Stratum	Fixes the scale at unity.

Application in the Reciprocal System of physical theory

It can be readily seen that the RS concept of "scalar motion" is in actuality that of the projective invariant "cross-ratio". The only difference is that the *cross-ratio* is a more generic term than *scalar motion*; the latter having named aspects of "space" and "time" whereas the former does not name the aspects.

Projective Stratum *cross-ratio*	**Reciprocal System *scalar motion***
two scalars reciprocally related	two scalars reciprocally related
unnamed aspects	named aspects of *space* and *time* (defining *speed*)
has magnitude only	has magnitude only
non-zero	non-zero
finite	(unaddressed, but all motion applied as finite values)
cannot be translated	cannot be translated
cannot be rotated	cannot be rotated
can be scaled	can be scaled

Geometric Concept	**Application**	**Results in Reciprocal System:**
Projective Stratum *cross-ratio*	name aspects space and time	scalar motion
Affine Stratum *plane at infinity*	makes motion relative to other motion resulting in towards/away (in/out) *direction of motion*	scalar direction; linear vibration
Metric Stratum *absolute conic*	defines angular relationship between motions	scalar rotation
Euclidean Stratum *fixed scale*	defines common perspective by fixing scale at unity	vectorial motion in absolute Euclidean coordinate system

Physics

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The chapters of this section concern photons, particles and atoms.

Photons

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Frequency

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Given the nature of rotational space (counterspace), the first manifestation with RS2 is therefore the positron, *not* the photon as Larson had predicted. So where does that put the RS2 photon, and how does it differ from Larson's original conception?

When a second rotational motion occurs within the time region, the rotations will interact in conformance with complex Euler relations regarding rotation. The result is not rotation, but a cosine wave—a "simple harmonic motion."

Here we must distinguish between primary and secondary motions. In rotational space, "rotation" is primary, "linear" is secondary and can *only* occur as a result of a combination of primary motions. Therefore, Larson's "simple harmonic motion" photon *never* occurs as a consequence of primary motion in RS—only secondary motion. And it is a consequence of *two* rotations, which Nehru refers to as a "bi-rotation". (See Nehru's articles on bi-rotation for the consequences of this rotational model, including linear and circular polarization, the Zeeman effect and others).

The photon bi-rotation, like interlocked gears, move in opposite directions and are expressed as complex Euler relations, where T_a is the first rotation, and T_b is the second rotation (T = "Turn", the counterspace name for a rotation):

$$T_a = e^{-i\,(kx)} = \cos(kx) - i \sin(kx)$$

$$T_b = e^{-i\,(-kx)} = \cos(kx) + i \sin(kx)$$

The shift (separation) between them then becomes:

$$y(x) = e^{-i\,kx} + e^{i\,kx} = 2\cos(kx)$$

Which shows that the shift between the two turns is expressed as a "cosine" wave—the "linear vibration" of Larson.

Calculation of Frequency

First, the two turns (rotations) represent the speeds of the photon. To determine the wavelength, one must simply compute the shift between the two turns. This is done just like a regular angle; subtract the smaller angle from the larger one, and you get the angle between.

Second, “speed” in the time region is different than the time-space region. We normally recognize “s/t” as speed, but, as Larson describes in *Nothing But Motion*, p. 155, when inside the unit boundary the “space” aspect is *fixed at one unit*. But the equivalent space can be computed by s = 1/t. Therefore, a speed of “s/t” in the time-space region becomes a speed of “$(1/t)/t = 1/t^2$” in the time region. Note that in the time region, speed is is 2-dimensional according to Larson and therefore fits the concept of being polar (rotational) rather than translational.

To compute our shift, all we have to do is take the difference between the two turn “time region speeds”:

$dT = 1/T_a^2 - 1/T_b^2$ (Where T_a and T_b are the speeds of the turns.)

Next, we need to translate that shift out of the time region across the unit boundary, so we can determine the equivalent space in order to observe and measure it. That is simply done by (s = 1/t) and taking the reciprocal, 1/dT.

In legacy science, wavelength is 2 units of space, so the final step is to multiply 1/dT by 2, giving 2/dT. Therefore:

wavelength = 2 / dT (in natural units)

wavelength = $2 / (1/T_a^2 - 1/T_b^2)$ (in natural units)

Then, just multiply by unit space to get conventional units. One may notice the similarity between this wavelength calculation and the formula for computing atomic spectra:

$1/\text{wavelength} = R\,(1/m^2 - 1/n^2)$ (legacy science)

Where “R” is the Rydberg constant, and “m” and “n” are integers.

Let us convert our wavelength equation to match the inverse wavelength of the atomic spectra formula:

$1/\text{wavelength} = 0.5\,(1/T_a^2 - 1/T_b^2)$ (RS2)

Which identifies the Rydberg constant, in natural units, to be 0.5. If you notice in the Euler shift computation above, it is “2 cos (kx)”—not just “cos(kx)”, we can see the origin of the Rydberg constant—the “2” in the formula. (1/2 = 0.5, the Rydberg constant in natural units).

If we set T_a to unit speed, 1, and vary the speed of T_b, we get the equation for the Lyman series of atomic spectra. 2 gives the Balmer series, 3 the Paschen series and 4 the Brackett series.

With this new model of the photon, we can accurately describe, both conceptually and mathematically, wavelength and polarization, along with all the associated effects due to the bi-rotating turns.

Electromagnetic Spectrum

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The electromagnetic frequency spectrum as multiples of the natural unit of space.

The value of 256 is derived from the degrees of freedom of a 1-dimensional, uniform scalar motion in three scalar dimensions. Each scalar dimension has 2^3 (8) possible degrees of freedom, of which only ONE dimension is occupied by the photon motion. Therefore, the total freedom is $2^2 \times 2^3 \times 2^3 = 256$.

The variable "s" is Larson's *natural unit of space*, 45.563 nanometers.

Reciprocal System

	Radio					Reciprocal System
Range	**Wavelength**	**Frequency**	**Band**	**Common**	**Application**	**Unit Space Multiplier**
	8.404955×10[11] m	0.00035668 54 hz	**Maximum wavelength / Minimum frequency boundary**			$s \times 256^8$
	3.283186×10[9] m	0.09131146 hz				$s \times 256^7$
L F r a d i a t i o n			ULF	3.5 hz	Brain Asleep	
				4.0 hz	Theta Brain	
				7.0 hz	Hypnogogic state	
				7.5 hz	Schumann Resonance of Earth	
				8.0 hz	Alpha Brain	
				13.0 hz	Awake Brain	
				14.0 hz	Beta Brain	
	12.825 Mm	23.376 hz				$s \times 256^6$
			ELF	30.0 hz	Agitated Brain	
				30-300 hz		

		VF	300-3000 hz		
50.097 km	5.9842 khz				$s \times 256^{5}$
		VLF	3-30 khz	ITU Band 4	
		LF	30-300 khz	ITU Band 5	
			300-1500 khz	AM 530-1720 khz	
195.69 m	1.5320 Mhz	MF		ITU Band 6	$s \times 256^{4}$
			1500-3000 khz	Short-wave Radio	
		HF	3-30 Mhz	ITU Band 7	
		VHF	30-300 Mhz	ITU Band 8	
0.76443 m	392.18 Mhz				$s \times 256^{3}$
		UHF	0.3-3 Ghz	ITU Band 9	
		SHF	3-30 Ghz	ITU Band 10	
		EHF	30-300 Ghz	ITU Band 11	
2.9860 mm	100.40 Ghz				$s \times 256^{2}$
		Sub-millimeter	300-3000 Ghz	ITU Band 12	
		Far Infrared	3-30 Thz		
11.664 um	25.702 Thz			Larson's Unit Frequency	$s \times 256^{1}$
		Long IR	8-15	Long-	

			um	wavelength Infrared	
5.832 um	51.404 Thz				s × 128
		Mid IR	3-8 um	Mid-wavelength Infrared	
2.916 um	102.808 Thz				s × 64
		Short IR	1.4-3 um	Short wavelength Infrared	
1.458 um	205.615 Thz				s × 32
		Near Infrared	.75-1.4 um	Near Infrared	
729 nm	411.23 Thz		740 nm		s × 16
			Dark Red		
683 nm	438.65 Thz		680 nm		s × 15
			Light Red		
638 nm	469.98 Thz		625 nm		s × 14
			Orange		
592 nm	506.13 Thz		590 nm		s × 13
			570 nm	Yellow	
548 nm	548.31 Thz	**VISIBLE**	565 nm		s × 12
			Green		
501 nm	598.15 Thz		500 nm	Cyan **490**-520	s × 11
			Blue		
456 nm	657.97 Thz		440 nm		s × 10
			Indigo		
410 nm	731.08 Thz		420 nm		s × 9
			Violet		
365 nm	822.46 Thz		380 nm		s × 8
		uV		Near Ultraviolet	
182 nm	1.6449 Phz		200 nm		s × 4

	91 nm	3.3118 Phz		3-30 Phz	Vacuum Ultraviolet	s × 2
	45.563 nm	6.5797 Phz				Unit Space $s \times 256^{0}$
HFradiation			Soft X-Rays	30 Phz 3 Ehz		
	177.98 pm	1.6844 Ehz				$s \times 256^{-1}$
			Hard X-Rays	3-30 Ehz		
			Soft Gamma Rays	30-300 Ehz		
	695.24 fm	431.21 Ehz				$s \times 256^{-2}$
			Hard Gamma Rays	300 Ehz 3 Zhz	(Urantia - atomic)	
	2.7158 fm	110.39 Zhz				$s \times 256^{-3}$
			Cosmic Rays	3-??? Zhz	(Urantia - pre-atomic)	
	10.609 am	28.260 Yhz				$s \times 256^{-4}$
			Ultimatonic		(Urantia - particle formation)	
	41.440 zm	7.234 Xhz				$s \times 256^{-5}$
			InfraUltimaton ic		(Urantia - ultimaton formation)	
	161.972 ym	184.049 Xhz				$s \times 256^{-6}$
	632.313 xm	474.119 Lhz				$s \times 256^{-7}$
	2.470×10^{-27} m	121.375×10^{3} ^{3} hz	**Minimum wavelength / Maximum frequency Boundary**			$s \times 256^{-8}$

Density Bands

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The following table shows the breakdown of natural units of wavelength and frequency--multiples of 256 units of space and time. There appear to be 7 major density groupings of the speeds in both the material and cosmic sectors. Band 8/-8 would therefore be the minimum and maximum bounds for frequency of photons. Also see the EM Frequency Spectrum for details on each band.

Photon Density Bands

Sector	Band	Wavelength (meters) ($s \times 256^{band}$)	Wave duration (seconds) ($t \times 256^{band}$)	Frequency (hz) (1/wave duration)	Density	
M-Limit	**8**	8.404955×10^{11}	2.803591×10^{3}	3.566854×10^{-4}		8
	7	3.283186×10^{9}	1.095153×10^{1}	9.131146×10^{-2}	7	
	6	1.282494×10^{7}	4.277941×10^{-2}	2.337573×10^{1}		6
Material	**5**	5.009744×10^{4}	1.671071×10^{-4}	5.984188×10^{3}	5	
space/time	**4**	1.956931×10^{2}	6.527620×10^{-7}	1.531952×10^{6}		4
LF	**3**	7.644262×10^{-1}	2.549851×10^{-9}	3.921797×10^{8}	3	
	2	2.986040×10^{-3}	9.960357×10^{-12}	1.003980×10^{11}		2
	1	1.166422×10^{-5}	3.890764×10^{-14}	2.570189×10^{13}		
Unit boundary	**0**	4.556335×10^{-8}	1.519830×10^{-16}	6.579684×10^{15}	1	0
	-1	1.779818×10^{-10}	5.936835×10^{-19}	1.684399×10^{18}		2
	-2	6.952416×10^{-13}	2.319076×10^{-21}	4.312062×10^{20}	3	
Cosmic	**-3**	2.715787×10^{-15}	9.058892×10^{-24}	1.103888×10^{23}		4
time/space	**-4**	1.060854×10^{-17}	3.538630×10^{-26}	2.825953×10^{25}	5	
HF	**-5**	4.143963×10^{-20}	1.382277×10^{-28}	7.234439×10^{27}		6
	-6	1.618735×10^{-22}	5.399520×10^{-31}	1.852016×10^{30}	7	
	-7	6.323185×10^{-25}	2.109188×10^{-33}	4.741162×10^{32}		8
C-Limit	**-8**	2.469994×10^{-27}	8.239014×10^{-36}	1.213737×10^{35}		

Color Key	
	Transition point to next octave (Material space/time and Cosmic time/space frequency limit).
	Reciprocal System unit boundary, also called "unit speed" where the transition from Material (space/time) to Cosmic (time/space) occurs.

Densities known and explored by legacy science.

Densities not yet explored by legacy science.

Leptons

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In physics, a lepton is a particle with spin-1/2 that does not experience the strong interaction (that is, the strong nuclear force). The leptons form a family of fermions that are distinct from the other known family of fermions, the quarks. There are three known flavors of lepton: the electron, the muon, and the tau.

Muons and Tauons

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Solid Rotations

In the counterspace of RS2, all motion is polar within the time region. Photons and electrons are polar motions, which we observe as, what Larson calls "single (1-dimensional) rotation." The next logical step is a 2-dimensional polar motion, which we see as a *solid rotation*. Note that this is not a motion IN two dimensions, but a TWO-DIMENSIONAL motion.

Also in RS2, "conservation of motion" must occur. This is the underlying principle of all conservation rules. A 2-dimensional motion cannot be created without a second 2-dimensional motion to counter it. We see this in the bi-rotational structures of the photon and electron/positron systems, and it still applies here. In RS2, a solid bi-rotation will follow all the bi-rotational rules for single rotations with one, important exception, due to the physical limit of three independent dimensions.

In the cases of the photon and electron, there are sufficient dimensions for all motion to occur without combination. However, in the solid bi-rotation case, each "half" of the bi-rotation requires 2 dimensions. 2D + 2D = 4 total dimensions required, and there are only three available. The only way the system can exist in a 3-dimensional reference is to "share" one dimension between the two solid rotations.

If there were 4 dimensions available, the two solid bi-rotations would interact exactly like two photon bi-rotations, going through double dimensional reduction and resulting in a simple harmonic motion (the two rotations being reduced to linear vibration). But since there are only 3 dimensions available, and one axis is shared—that axis cannot be reduced. When the two solid rotations interact, they go through a single dimensional reduction—two solid rotations being reduce to a rotational vibration.

We now have identified bi-rotations and solid bi-rotations as building blocks. So, is a three-dimensional rotation possible, manifesting as a hyper-rotation? Short answer: no. To conserve motion, a 3D rotation would need a second 3D rotation to form the hypersolid bi-rotation, requiring 6 dimensions. There are only three, and we cannot share *all three* axes, because you cannot have the same motion going in two opposite directions, it is geometrically impossible. Therefore, our construction is limited to single and solid bi-rotations.

Particles

Another consideration of solid bi-rotation is that the resulting structure is a single rotation. And we already know that two single rotations can exist as a bi-rotational system, so therefore *two* solid bi-rotations can simultaneously exist within the time region—a "double solid bi-rotation".

This results in the following:

- Single bi-rotation: Positrons and electrons.
- Solid bi-rotation: An motion that *appears* as a positron or electron, but is much heavier: the *Muon*.
- Double solid bi-rotation: An motion that appears as a bi-rotating electron pair, but extremely heavy: the *Tauon*.

These basic systems compose the first half of the leptons. Now to the second half: their neutrinos.

Paired electrons and electron triplets have already been discussed in another topic. Let's take a closer look at their behavior.

Electron/Positron pairs:
: A motion with one, free dimension which carries the pairs with the progression of the natural reference system at the speed of light. Dimensional reduction gives the pairs a geometry of a linear vibration, which has no area or volume, and therefore cannot have any resistance when moving through either material or cosmic solids. As long as there is one free dimension, these pairs will move freely through both material and cosmic atoms.

Charged Electron/Positron triplets:
: No free dimensions; so can be captured. Triplets with a net temporal displacement will become trapped in material atoms, adding to the mass. Triplets with a net spatial displacement will move thru material atoms *without* resistance, but attracting each other (since the rotational magnitude exceeds the unit space boundary)—*two* dimensionally, forming "electron surfaces" and staying on the periphery of conductors: aka, "skin effect."

Based on the behavioral characteristics, the electron/positron *pairs* are *electron neutrinos*. The charged state of the electron neutrino is not recognized by legacy science, but does occur in nature.

Muons:

The solid bi-rotation leaves no free dimensions, and it appears geometrically as a single rotational vibration. But it's displacement would allow the capture of an electron (muon) or positron (anti-muon). When the single rotation of the muon interacts with the single rotation of the electron/positron, a bi-rotating system will be formed, going through dimensional reduction down to a linear vibration. In this state the muon will behave like the electron/positron pairs, passing thru matter and having neutral charge. This "charged muon" is the *muon neutrino*.

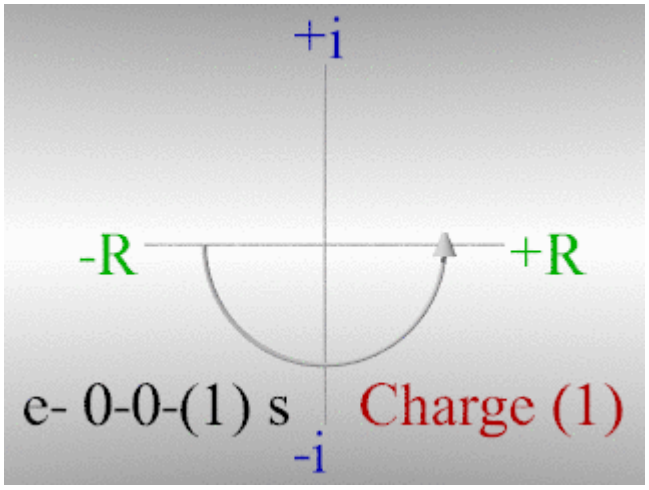
Tauon:

The double solid rotation of the tauon naturally reduces to a linear vibration, as in the muon neutrino. Each can capture an electron or positron pair, causing a further dimensional reduction to 0 dimensions: a point. Therefore, though the structure is viable, there would be no way to detect it. This "charged tauon" is the *tauon neutrino*.

Epilog

A century ago, Nikola Tesla discovered a unique form of electricity he referred to as Electro-Radiant energy. These days we call it "cold electricity." This form of electricity was unusual… it did not require a closed circuit path to flow, it did not heat inductors, and was carried by the "skin effect" across wiring, possessing tremendous voltages.

We now know what Tesla's Electro-Radiant energy is: charged electron neutrinos. Undiscovered and ignored by legacy science, because they believe through their theories that the electron neutrino is *always* neutral, they have never even looked for it. But it IS there, and can be harnessed. In Nature, we call it "ball lightning."



Neutrino Oscillation: Charged Neutrinos

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Larson was puzzled by the charged neutrino, because the charge for a material neutrino was in space, acting as though the magnetic rotating system had the rotational vibration rather than the electric rotation (which, being in space, would have its charge in time).

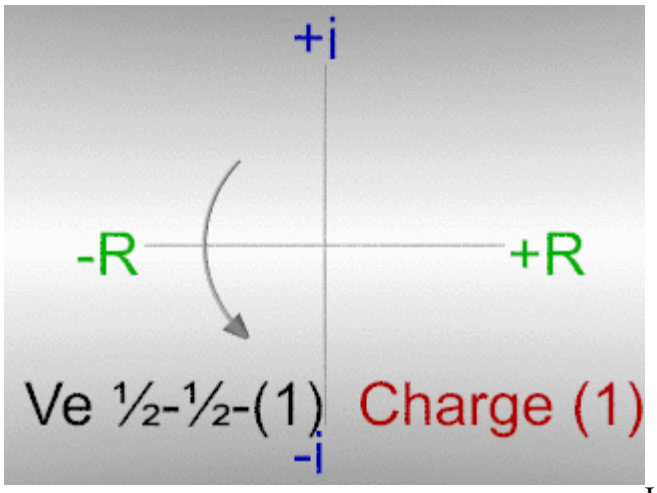
The concept of vibration in RS2 differs from Larson's work in the respect that vibration occurs from the compounding of motion, it just isn't "there" as it is in the RS. In order for a neutrino to become charged, it would have to capture the necessary motions to impart a vibrational component to its motion.

Therefore, the muon neutrino, M ½-½-0 would need to capture a charged electron, 0-0-(1)*, which has its charge in time. The composite motion would have the dimensions of the electron neutrino, M ½-½-(1)*, since the charge was necessary to trap the electron in the time of the muon neutrino rotation ("time" of rotation to "time" of charge does not constitute motion).

As determined with charged electrons, the vibration of the photon upon the rotation of the electron creates a 1-dimensional, rotational vibration. So logically, the rotational vibration of the electron would impart a rotational vibration to the magnetic component of the neutrino. The magnetic rotation, being 2-dimensional, would create a 2-dimensional, or "solid", rotational vibration.

The natural unit of 1-dimensional rotation is π radians. Thus, a 1-dimensional rotational vibration moves from 0 ⇒ π, then π ⇒ 0. When plotted on the Argand diagram, the spatial component oscillates between +1 and -1, completely skipping the imaginary axis--just what you would expect of a simple, harmonic motion.

But the solid, 2D rotation is 4π radians in "circumference", not the customary 2π (it takes 4π rotation to complete a revolution). This means that when a charged electron imparts its rotational vibration upon the neutrino, it will take a periodic, 4-phase appearance running from 1+0i, 0+1i, -1+0i, 0-1i ... which will be viewed as π/2 steps across the real axis: +1, 0, -1, 0, ...



In the uncharged state, there are three neutrinos: electron, muon and tau:

M ½-½-(1) -- uncharged, electron neutrino

M ½-½-0 -- uncharged, muon neutrino

M ½-½-1 -- uncharged, tau neutrino

But the situation changes in the CHARGED state. The basic rotation, the muon neutrino of ½-½-0 captures a charged electron, or an electron neutrino ½-½-(1) becomes charged, it causes the muon to being oscillating between +1, 0 and -1. The resulting motion has three different rotational combinations, that appear in sequence (remembering that conventional science can only observe and measure the REAL axis):

[RV^2 = **-1** + 0i] **M ½-½-(1)** -- charged, electron neutrino

[RV^2 = **0** - 1i] **M ½-½-0** -- charged, muon neutrino

[RV^2 = **+1** + 0i] **M ½-½-1** -- charged, tau neutrino

[RV^2 = **0** + 1i] **M ½-½-0** -- charged, muon neutrino

In the CHARGED state, the neutrino does not appear as ONE particle, but THREE, depending on WHEN you measure it. This is referred to as ***neutrino oscillation***, triggered by the 2-dimensional, rotational vibration that constitutes the magnetic charge.

Conclusion

1. Uncharged neutrinos always look like the particle they are, so there are three different flavors.
2. Charged neutrinos look like ALL three flavors, so depending on how and when you measure them, you could get either an electron, muon or tau neutrino.
3. The charged neutrino is observed as "neutrino oscillation"; the uncharged neutrinos are observed as stable particles.

Positrons and Electrons

The Reciprocal Geometry topic defined the basic geometric relationships between the various regions defined by Larson. From those relations, we have learned that space progresses linearly (translation) from the region of observation, and rotationally for the regions observed across any unit boundary. Since we observe and measure from the time-space region, I will proceed from that assumption.

The progression of the natural reference system therefore moves linearly outward in 3 dimensions from our perspective of the time-space region. Larson calls this the “progression of the natural reference system”, and RS2 supports his conclusions regarding this region.

However, once we cross the unit space boundary into the time region, where atomic motions take place, we view that region as counterspace—a polar region where *rotation is primary*. Therefore, it progresses rotationally—not linearly, and forms "rotational bases" as a natural consequence of that progression. Larson's "direction reversals" are no longer a natural consequence, nor is the linear vibration creating the photon a natural consequence of counterspace.

So what does manifest? All we have to do is change speed from Unity, and see what develops. Working within the time region, we must have the spatial aspect fixed at unity, so only the temporal aspect is variable. Due to the discrete unit postulate, the minimum speed is 1, and must proceed in integer steps. The next logical step is therefore a speed of 1/2—the temporal aspect increasing by 1 natural unit.

The result: a unit of rotating "time", which in Larson's original notation† would be 0-0-1. This makes the first identifiable manifestation as the positron (not the photon).

† Larson uses a different notation in his earlier publications that include the "rotational base" as 0-0-1 for sub-atomic particles. He later dropped this notation, and used 0-0-0, which included the assumption of an underlying "base" displacement. This change, and the resulting fact that 0-0-0 worked better as a notation, indicates that the concept of a "rotational base" may be flawed.

It's cosmic counterpart, a speed of 2/1 (where the temporal aspect is fixed at unity) becomes the c-positron, 0-0-(1), which is identified as the *electron*.

Here, again, the natural consequences of rotational space differ from Larson's original conclusions in two respects:

1. the *positron* is the first manifestation (Larson has the photon), and
2. the *electron* is a *cosmic particle* (Larson has it as a material particle).

The fact that the electron is actually a cosmic particle clears up much of the observed electron behavior, particularly its photon-like wave/particle duality.

Charge on Electrons

Electrons and positrons come in two "flavors", charged and uncharged. Larson attributes this to the addition of a *rotational vibration*, though the origin of this rotational vibration is left unexplained. A second problem with Larson's electron model is that it does not account for the ability of the electron to emit "radio waves"—something that cannot be ignored.

The photon is comprised of ***two*** *rotations*, working as a birotating system, resulting in a cosine wave function—Larson's "linear vibration." (See Nehru's paper, *The Photon as birotation* to see how this can be derived from the RS).

In a 3-dimensional system, this birotation occupies 2 dimensions, leaving one dimension "free" so the photon is carried by the progression of the natural reference system at the speed of light.

The positron and electron, as described above, can be seen as having either one *or two* rotations, with one of the two rotations moving at unit speed. This puts them in the behavioral category of photons—electrons and positrons are just "special case" photons, with the "special case" being that one of the birotating components is at unit speed.

Larson describes the uncharged electron as acting photon-like, being carried by the progression of the natural reference system at the speed of light. When the electron acquires a charge, it no longer moves at the speed of light but becomes a free-roaming "particle", "static electricity."

Analysis of this behavior indicates that the uncharged electron has *at least one* free dimension to be carried by the progression, and it loses that (or those) dimensions when acquiring a charge.

Consider: what if an uncharged electron, a spatial displacement, encountered a photon of spatial displacement? Since the relation of space-to-space does not constitute motion, the photon will become trapped within the electron. The uncharged electron, being comprised of a "half birotation", has *two* "free" dimensions at unit speed. The photon, a "birotation", has *one* free dimension. When a photon gets trapped inside an electron, the photon occupies the two free electron dimensions, and the electron occupies the one free photon dimension, leaving *no* dimensions to be carried by the progression of the natural reference system. This capture results in two observable effects: first, the *electron is no longer being carried by the progression*, and has become a free-roaming particle (behavior of the charged, "static" electron). Secondly, the cosine-wave function of the photon birotation will be added *to* the basic rotation of the electron, producing a 1-dimensional, *rotational vibration* (the "charge" of the charged electron).

The charge on the electron is therefore a captured photon.

Radio "Waves"

Earlier I mentioned "radio waves", which are "electromagnetic energy" or just simply "photons."

The only constraint for an electron to capture a photon is that the photon have a spatial displacement—the number of units ("Frequency") does not matter—they will still be captured by electrons, as it is the spatial displacement that is the mechanism of capture, not the quantity. And which photons are the ones with spatial displacements? Larson calls them "low frequency": near ultraviolet, visible, infrared, radio and television.

We can now see the mechanism of how radios work. Electrons capture and/or emit photons, and are the carriers of photons thru conductors. It is a noticed effect of RF (Radio Frequency) circuitry and antennae—the "skin effect"—where the electrons travel across the surface of the conductor—not thru it. This is the *same* behavior of charged electrons (surface "static" electricity) versus uncharged electrons (thru the conductor).

Electron Pairs—Birotating Electrons

Since an electron can capture a LF photon—space-displaced motion—and an electron is *also* a photon-like, space-displaced motion, the possibility arises that an electron can also capture another electron, resulting in an "Electron Pair as a Birotation" (See: Superconductivity: A Time Region Phenomenon, KVK Nehru, Reciprocity XIX #3, 1990). Nehru, quoting Larson from *Basic Properties of Matter*, p. 113, states:

"[In the] uncharged state the electrons cannot move with reference to extension space, because they are inherently rotating units of space, and the relation of space to space is not motion. … In the context of the stationary spatial reference system the uncharged electron, like the photon, is carried outward… by the progression of the natural reference system."

"But as the temperature is decreased below the critical value T_c, and the electrons in the solid enter the region of the inside of the compound unit of space, the direction of the electron motion changes from outward to inward from the point of view of the stationary reference system. Thus the electrons start moving toward each other, as if mutually attracting.

"Remembering that the electron is a unit of rotational space, when two of them with anti-parallel rotations approach each other to an effective distance of less than one compound unit of space, the two opposite rotations form into a birotation. As explained in detail elsewhere (The Law of Conservation of Direction, Reciprocity XVIII #3) a birotation manifests as a SHM [Simple Harmonic Motion]. We might call this process the "pair condensation," following the conventional nomenclature."††

††See the RS2 article "Photons" for the Euler relations showing how two rotations join to form a simple harmonic motion.

Nehru goes on to state the characteristics of paired electrons as being:

1. The character of the motion changes from rotational (two-dimensional in extension space) to linear (one-dimensional in extension space).
2. The magnitude of the motion changes from steady (constant speed in time) to undulatory (varying speed in time).
3. The dimensional reduction removes all electrical resistance when flowing thru a conductor (superconducts).

For all practical purposes, the paired electrons *act* like a photon, with one important difference—the two electrons are *adjacent in time*, and therefore *do not* have to be adjacent in space.

Electron Triplets—Charged, Birotating Electron Pairs

Paired electrons, through this "dimensional reduction", only occupy two dimensions, and still have one "free" dimension—a dimension that can capture yet a third electron.

This capture adds a rotational motion to the vibratory motion of the prior, birotating electron pair, and will produce a rotational vibrating electron "trinity," adjacent in time, but distributed in space.

The result? Birotating, paired electrons can come in two "flavors": uncharged (behaving as a photon) and charged (behaving as a charged electron).

There are now four possible electron combinations:

Electron Type	Movement	Attraction/Repulsion	Classification
Uncharged Electron	Speed of light	Neutral	"Hot" Electricity
Charged Electron	Static	Repels	
Paired Electrons	Speed of light	Neutral	"Cold" Electricity
Charged, Paired Electrons	Static	Attracts	

The latter two form the basis of an idea known as *Cold Electricity*, which theorists assume is the type of electricity that Nikola Tesla used in many of his machines.

Electron Aggregates

Electrons, actually being cosmic positrons, have a spatial displacement and hence fall in to the *intermediate speed range*. In other words, their rotational speed is faster than the speed of light. This results in two interesting phenomena:

1. All electron motion is quantized when we measure it. This suggests that the quantum distribution of electrons about atoms is a property of the electron —not the atom.
2. All electron motion is 2-dimensional—appears as a surface, not a volume.

A third item was also discovered that is unique to charged electron pairs:

3. The charged electron pairs, being composed of three electrons, has sufficient spatial displacement to have a physical effect outside of the unit boundary (described in the "Inter-Atomic Distance" chapter of Larson's *Basic Properties of Matter*, where the effect outside unit space is computed via the natural logarithm of the net displacement, and $\ln(3) > 1$).

What this means is that the charged, paired electrons, which attract each other *in extension space*, will actually form aggregates—and those aggregates will be in the form of a surface. The simplest such surface is a hollow sphere.

This bears a remarkable resemblance to Kiril Chukanov's devices presented to ISUS members in Utah a couple of years ago, as well as defining all the basic characteristics of ball lightning (ignores gravity, ability to pass thru solid objects, hollow, bubble-like structure), and the "EVs" that Phil was discussing.

Atoms

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In chemistry and physics, an atom (Greek ?τομος or átomos meaning "the smallest indivisible particle of matter, i.e. something that cannot be divided") is the smallest particle still characterizing a chemical element.

The atom in the *Reciprocal System* is different from conventional physics in that it is composed solely of a single, compound motion, not protons and neutrons lumped together into a nucleus and electron cloud.

Atomic properties are not solely due to the compound motion of the atom. The counterspatial fields generated by atomic motion allow the capture of other particles, such as electrons and neutrinos, which account for much of the currently observed behavior of conventional physics (though technically not part of the atom, itself).

The mass of the RS atom is twice its atomic number. Isotopes of that mass occur through the capture of material electron neutrinos, adding 1 AMU per capture.

RS atoms have no electrons as part of their atomic motion. They do have a 1-dimensional rotational component that has "electron" properties. Also, electrons can be captured by the atomic rotations under certain conditions, which result in electron orbitals.

Atomic valences (oxidation states) are just the speeds of the motions making up the atom. These speeds can be 2-dimensional (magnetic) or 1-dimensional (electric).

Isotopes

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In order to account for isotopes, the RS has the concept of a “gravitational charge”. The way it works is this: a magnetically charged, electron neutrino (which are abundant) is captured by an atom. The magnetic charge is transferred to the atom as a rotational vibration, and without the charge, the neutrino flies off into space, leaving the atom with an additional rotational vibration (magnetic), which is identified as a “gravitational charge”, having the equivalent mass of 1 AMU.

In *Basic Properties of Matter*, p. 262, Larson writes: “*When the neutrino and the atom subsequently separate, there is a finite probability that the charge will stay with the atom.*”

Some things to note, regarding the electron neutrino [M ½-½-(1)]:

1. The electron neutrino MUST be charged in order for it to be captured; uncharged neutrinos will pass thru matter, as they have no net displacement in either space nor time.

2. Larson claims the charge on a neutrino is “magnetic”, in other words, the charge applies to the ½-½ temporal displacement, not the (1) spatial displacement (which would be an electric charge). He just sites “probability” as the reason. But, by the same logic, the muon neutrino, M ½-½-0 could also take a magnetic charge.
3. Hydrogen, which is composed of a proton and a charged, electron neutrino [M 1½-1½-(2)], does not follow this pattern. If it did, the charge of the neutrino would be transferred to the proton, and the neutrino would leave the combination, leaving a proton with one “gravitational charge.” (If a sub-atomic neutrino can carry a magnetic charge, then so can the sub-atomic proton. Larson’s assumptions concerning “magnetic charge” do not prohibit this).

This brings into question whether Larson’s analysis is correct, concerning both the nature of the magnetic charge, and its transference to a host atom as a “gravitational charge”:

1. Muon neutrinos have not been observed to carry a magnetic charge, so something is preventing this particular combination of motions from happening.
2. Electron neutrinos, as evidenced by the structure and large quantity of Hydrogen in the Universe, appear to want to stay within the atomic structure, and do not pass their “charge” on to the host atom or particle.
3. There is no clear mechanism of “magnetic charge”, and hence “gravitational charge.” Like Larson’s electric charge, it is a vibratory motion, but how it is achieved remains ambiguous.

The Nature of Magnetic and Gravitational Charge

In RS2, we discovered that the electric charge was due to the capture of a photon by the electron, with the photon’s harmonic motion providing the vibrational component of the electric charge. If we carry this one step further, then the “magnetic charge” proposed by Larson must be the capture of some type of vibratory motion also. So how does the electron neutrino get its magnetic charge, while keeping the muon neutrino immune to it?

The electron neutrino is of the material type, having its magnetic displacement in time [M **½-½**-(1)], and its electric displacement [M ½-½-**(1)**] in space. The muon neutrino has no electric displacement. Therefore, it is logical to conclude that the captured particle must either have a net spatial displacement, or be a cosmic particle. Since we cannot capture a particle with more motion than the existing neutrino motion, that limits the possibilities back to the photon group. In RS2, the photon group includes LF and HF photons, positrons and electrons (c-positrons).

It is observed that the electron neutrino breaks down into the muon neutrino [M ½-½-(0)] plus electron [C 0-0-(1)] (which is why it is called the “electron” neutrino). The carrier of electric charge is the photon, which can be carried only by the electron or positron. In RS2, the electron is actually a *cosmic positron*, not a material particle. That reduces the choice of the magnetic charge carrier to one: the electron.

The sequence of events to create a charged, electron neutrino work like this:

1. The muon neutrino [M ½-½-0] captures an electron [C 0-0-(1)] (space displacement of electron captured in time displacement of neutrino), producing an electron neutrino [M ½-½-(1)]. Note that these two particles cannot combine rotations, because one is material and the other cosmic, so they remain two entities; the electron sharing the *time* of the muon neutrino, and the muon neutrino sharing the *space* of the electron.
2. A *photon* is captured by the captured electron in the electron neutrino, and imparts its vibratory motion as a rotational vibration (as described elsewhere in the forum), adding the vibration to the entire motion—BOTH the electron and muon neutrino in the composite motion vibrate, the electron "electrically" and the neutrino "magnetically". To clarify: the linear vibration of the photon oscillates the rotation of the electron, creation a 1-dimensional *rotational vibration* on the electron—the *electric charge*. The rotational vibration of the electron then oscillates the muon neutrino in a similar fashion, and when the 1-dimensional rotational vibration is imposed upon the 2-dimensional rotation of the muon neutrino, a 2-dimensional rotational vibration is created—the *magnetic charge*.
3. The charged, electron neutrino now has the vibrational mass to add "gravitational mass" to any atom that captures it.

Some other logical consequences of this compound, electron neutrino structure are:

4. Muon neutrinos are *exempt* from magnetic charge, because the charge actually goes on the captured electron in the electron neutrino, and the muon neutrino does not have a captured electron.
5. The magnetic charge from an electron neutrino *cannot* "stay" with the atom if the neutrino is not present. Only the electric charge as a captured photon within can. Therefore, should the neutrino lose its charge and leave the atomic structure, either a charged electron or uncharged electron/photon will be emitted along with the neutrino. In the former case, the charged electron will depart the atomic structure. In the latter, the photon will depart, but the uncharged electron, being a space displacement, will remain trapped within the *time* of the atom.
6. The gravitational charge within the atom is due to the *presence* of a captured, charged electron neutrino, not an independent vibratory motion.
7. Hydrogen, as briefly described above, stays together as a proton/charged electron neutrino pair without problems. The magnetic charge does not get transferred to the proton.

Isotopic Range

With this understanding of how isotopes work thru the "gravitational charge" created by the presence of captured, electron neutrinos, we can also compute a viable isotopic range.

The lower end of the range is the "neutrino-free" environment, which is composed of the atomic motions only, being the atomic number x 2.

The upper end of the range occurs when sufficient neutrinos are captured, that the net temporal rotation of the neutrinos adds up to more than the net atomic rotation. For example, the proton is the “basic” atomic rotation, and it can capture 1 neutrino, creating the aggregate motion we call “Hydrogen.” Should another neutrino be captured, the net temporal displacement of the neutrinos present becomes 2, which equals the proton [M **1-1**-(1)], and neutralizes that motion, causing the atom to become radioactive to emit the excess motion.

Since it takes 2 electron neutrinos to neutralize 1 atomic rotation, the upper zone of atomic viability would therefore be the basic, atomic mass of 2×Z plus 2×Z-1 number of neutrinos: 2Z+(2Z-1) = 4Z-1.

Some conclusions from the isotopic range:

1. Hydrogen is technically an isotope of the proton, but because both elements are sub-atomic, the gravitational vibration influence is not measured but to a very minor degree. It is the electron within the electron neutrino that makes Hydrogen appear as a proton-electron combination.
2. Atomic number 1 must have a mass of 2, and is therefore Deuterium, with one isotope, Tritium.

(When dealing with radioactive decay, as in Tritium, one must include the effects of magnetic ionization, as Larson described. But that is another topic.)

Summary

- The gravitational charge is produced by the presence of charged, electron neutrinos with atoms (not an independent, rotational vibration)
- Electron neutrinos are a composite of a material muon neutrino and a cosmic positron (electron).
- The charge on an electron neutrino is due to the charge of the captured, charged, cosmic positron (electron).
- The muon neutrino cannot be charged, as it has no component that can capture a photon.

Electronics

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Conventional science defines "electronics" as:

Electronics is the study of the flow of charge through various materials and devices such as semiconductors, resistors, inductors, capacitors, nano-structures and vacuum tubes. All applications of electronics involve the transmission of power and possibly information. Although considered to be a theoretical branch of physics, the design and construction of electronic circuits to solve practical problems is an essential technique in the fields of electronic engineering and computer engineering.

--Wikipedia

The Reciprocal System, however, also recognizes the uncharged state of particles, so the RS definition of "electronics" is the study of the interaction of electron motion through various materials and devices.

Electrostatics

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During the course of examining the difference between the measurements of charged and uncharged electrons in a conductor, something unusual turned up: *electrostatic theory*. The equations for electrostatic relationships in space-time units are very different from the conventional “electric current” units described by Larson in “Basic Properties of Matter.”

	Electric Current (flow of *uncharged electrons*)			**Electrostatic (flow of *charged electrons*)**		
	Space-time	**Conventional**	**Mechanical**	**Space-time**	**Conventional**	**Mechanical**
Voltage	t/s^2	volts	force	s/t	statvolts	speed
Current	s/t	amps	speed	t/s	statamperes	energy
Resistance	t^2/s^3	ohms	mass/time	s^2/t^2	statohms	$speed^2$
V = IR	$t/s^2 = (s/t)\ (t^2/s^3)$			$s/t = (t/s)\ (s^2/t^2)$		

Also, examine the electrostatic unit values, as compared to the natural units. Notice any numerical similarity? (The values for the conventional electrostatic units were taken from *Webster’s Unabridged Dictionary*, 1966.)

Space-time	**Static Component**	**Natural Units**		**Conventional Electrostatic Units**		**Difference**
s/t	voltage	2.99792458×10^{8}	m/s	2.9979×10^{2}	statvolts	1×10^{6}
t/s	current	3.33564095×10^{-9}	s/m	3.3356×10^{-10}	statamperes	1×10^{1}
s^2/t^2	resistance	8.98755179×10^{16}	m^2/s^2	8.9876×10^{11}	statohms	1×10^{5}

As the table shows, the significant digits between natural and electrostatic units are *identical*, except for scaling. The measurement for statamps is low by a factor of 10, the measurement for resistance is low by 10^5 and the measurement for statvolts is also too low by 10^6. But the scaling relationship is identical... if you increase the

statampere measure by 10, and increase the statohm measure by 10^5, statvolts (according to V=IR) adjusts by 10^6. We are dealing with the *same relationship* in conventional electrostatics that we are with the Reciprocal System's natural units!

But what does it mean, and how does it relate to electric current? From the equations, it looks like we are dealing with an entirely different phenomenon. What is being measured as electrostatic voltage, appears to actually be current! Let's examine the difference:

Static Component	Space-time	Electrical Property Actually Being Measured	Units Should Be
voltage	**s/t**	current	**t/s^2**
current	**t/s**	energy	**s/t**
resistance	**s^2/t^2**	conductivity	**t^2/s^3**

The question is: what are we actually looking at, when we look at electrostatic units versus conventional ones? First, it appears that a dimension of "space" has been removed from the equation--in other words, the ***electric quantity*** has disappeared. Let's add it back in, by multiplying the equation V=IR on both sides by (s), which will not change the numerical outcome:

$$(s)\ (s/t) = (t/s)\ (s^2/t^2)\ (s)$$

- reduces to -

$$(s^2/t) = (t/s)\ (s^3/t^2)$$

Low and behold, the typical V = IR equation reappears--but it is inverted! It is actually (1/V) = (1/I) (1/R). When viewed in the inverse sense, the unit measurement returns to non-static conventions, voltage is again a force, current a speed, and resistance a mass per unit time.

I believe legacy science adopted this electrostatic convention for two reasons:

1. When the electron acquired a charge and became electrostatic, the spatial rotation (q) became immeasurable, and was removed from the equations (hence the loss of the "s" term required for force and resistance).
2. Normal current is based on electric quantity, s, and is measured as speed, s/t. But electrostatics measures the associated charge, t/s, instead. Therefore, normal current, "space per unit time" (or speed) suddenly turned into electric charge, "time per unit space" (inverse speed, or energy). In order to keep the equations working, it had to be viewed from the inverse perspective--that of energy, versus speed.

Astronomy

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The *Reciprocal System of theory* differs from conventional astronomy in one of its basic premises—that the stellar combustion process is *fission*, based on the atomic age limit, and not *fusion* of hydrogen to helium. Consideration of this single item alone, has some remarkable conclusions that are quite difficult for the modern astronomer to accept… namely, that the entire process of stellar and galactic evolution is *backwards* from the commonly accepted view!

"Ridiculous!", you say. Well, it just might be, but if you take the time to actually consider what Larson postulates, along with the extensions we have made in the re-evaluation of the *Reciprocal System*, you might come to the same conclusions that students of Larson have… it actually makes more sense, backwards!

At the heart of the matter, is the matter at the core of the sun—something very little is actually known about, through direct observation. Through Larsonian physics, one is able to logically deduce the mechanism of stellar combustion based what is termed the "age limit" of matter, which states that *all* atoms, like most living things, don't live forever in an active environment. They reach a point where, due to other particles they have absorbed, and the magnetic and thermal temperatures of the environment, simply explode by a process of fission.

This leads to the conclusion that a sufficient quantity of simply dust and debris, through the process of gravitation and compression, with become "hot". Initially, it will be through thermal interactions of physical impacts, but given time, the oldest atoms will reach their age limit, and explode, setting off nearby atoms. Since the process starts relatively early, we are not talking any type of nova, but simply a reddish glow, usually starting in the infrared band. These young, warm, and very large stars are the red giants of astronomy—the *beginnings* of a new star, not the end of an old one!

For details on this process, the sequence of stellar evolution, and the consequences that this evolutionary process has on galactic systems, please click on the links to the left. A good starting point would be Dewey Larson's *The Mythical Universe of Modern Astronomy*.

Cosmic Galaxies

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In Larson's astronomy, there is a constant exchange of motion between the two sectors of the Universe. The primary manifestations of this exchange are the cosmic background radiation (CBR, inflowing particles from stellar combustion), and gamma ray bursts (GRBs, inverse-matter ejecta from stellar and galactic explosions moving into the 3-x speed range).

In the simple, scalar picture, it is nothing more than changes in speed, from one extreme to the other. There is no sharing, or composite motion between the two realms. Larson refers to this as "Level 1-inanimate" (also known as "first density").

The Cosmic Doctrine, by Dion Fortune has some interesting concepts in it, that roughly parallel concepts in the Reciprocal System. She does describe a universe based solely on motion, and has many features that are in agreement with Larson. But she carries it a step further with the concept of the Logos, which adds an idea of "intelligence" or "life" to structures such as planets, stars, stellar neighborhoods, galaxies, galactic neighborhoods, supergalaxies and cosmic bubbles.

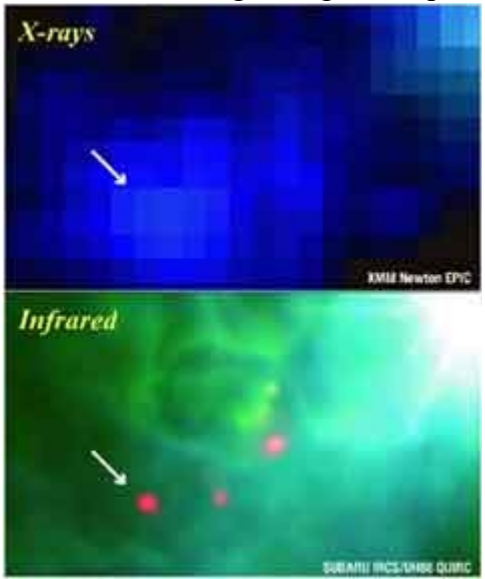
Nehru wrote:

This has some significance that we need to recognize explicitly. Consider the quantity speed [s/t]. The corresponding pertinent quantity in the counterspace of the Time Region (of the Material Sector) is the INVERSE speed [t/s], which manifests to us as energy, as we already know. Now if we consider the quantity pertaining to the Cosmic Sector, namely, the CONJUGATE speed [t/s], it manifests to us not merely as the material energy, but as PRANA—the self-organizing power of LIFE—apparent in all the living systems.

If one considers Nick Thomas' work on "counterspace linkage" (an integral part of RS2), which is the "speed/energy" relationship of the time region, one must also consider a similar "conjugate linkage" between speed and *prana*, as Nehru defines it. This has some interesting characteristics.

From a material point-of-view, a cosmic galaxy would not be visible because it is non-local from that perspective. Even though localized in time, would be randomly distributed throughout space. However, what happens if the stars comprising a cosmic galaxy have "conjugate linkage" to the material sector, due to their intermediate and ultra-high-speed motion? In other words, if what the metaphysicians say is true, and structures like stars and galaxies are "living", then they have such a conjugate linkage, because "prana" IS "life."

How does that change things? The points of linkage will be *localized* in *both* the material and cosmic sectors, and each sector will respond to that sector's gravity, forming similar, structural relationships. Simply put, cosmic stars and galaxies will be "detectable" in the material sector, and will have localized structure.



I quote "detectable", because they will not necessarily be "visible." The only motions that can move freely between the material and

cosmic sectors are the sub-atomic particles, with a net motion of 1 or 2 units of displacement (such that they have no net effect outside of the unit boundary). This limits the possibilities to photons, positrons/electrons, and neutrinos. Positrons and electrons are readily absorbed by matter in the material sector, so they will probably remain undetected. Neutrinos tend to pass through matter, so it would be very difficult to identify their flight paths to get any type of orientation to their source. Photons, however, are detectable and tend to travel very far in space.

But what kind of photons? Remember conjugate relationships. A "visible" cosmic photon would be viewed in the material sector as an X-ray. Radio c-photons would be viewed as Cosmic and Gamma rays. However, photons near the unit speed level, in the infrared according to Larson, would still be detected as infrared—the only difference being that "near" infrared would become "far" infrared, and vice versa, as the unit speed boundary sits between near and far infrared. And this infrared signature, along with X, cosmic and gamma rays, would be localized in the space of the material sector.

Since we are crossing the unit speed boundary, the inter-regional ratio of 154:1 must also apply. Thus, we should observe IR sources that are very massive, in the neighborhood of 150 times larger than your average, supergiant star. Curiously enough, the IRR seems to be a cut-off point for stars, in general:

HubbleSite wrote:

The heaviest-weight stars are blue-white super giants. They may get as large as 150 solar masses.

http://hubblesite.org/newscenter/newsdesk/archive/releases/2005/05/image/b

But we're looking for something very big and red… and that brings us to "infrared protostars". A quick search on the Internet will reveal a large number of papers talking about infrared protostars and their unusual relationship with "intense X-ray emissions"—cosmic "visible light"—something you wouldn't expect for relatively "cool" stellar matter.

Legacy astronomers assume that what they are witnessing is a star in the very early "birth" process. We have now identified the infrared protostar as the "conjugate-prana" localization of a cosmic star. Both situations, however, may be true, because the density gradient of the infrared photons will interact and heat local matter, which may, in time, actually form a material-sector star in the same location.

We also know from "Beyond Space and Time", that this linkage between a material unit and a cosmic unit is what Larson calls a "life unit"—and that when a material star forms at the location of a cosmic star (or vice-versa), it will form a gigantic "life unit" that is known as a "Logos."

On the astronomical scale, these stellar Logoi may be viewed as mere "cells" in a larger organism, a galactic Logos. Therefore, the large-scale structure of the universe should show stars forming into galaxies, galaxies into galactic groups, and groups into superclusters—and all these structures should manifest geometric relationships similar

to what we commonly observe as the galactic shapes, defined by age, according to Larson's galactic evolutionary process.

But what of cosmic galaxies, and their infrared protrusions into our local environment? Same rules apply… Inter-regional ratio and structure. However, we should observe, if we can get a telescope large and sensitive enough, super-infrared-galaxies, many times larger than any galaxies we observe in the visible range.

Metaphysics

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Metaphysics is the branch of philosophy that treats of first principles, includes ontology and cosmology, and is intimately connected with epistemology. It is the search for the underlying theoretical principles of a subject or field of inquiry, brought to light by the publication of the same name by Aristotle in the 4th century BCE. It deals with first principles, the relation of universals to particulars, and the teleological doctrine of causation.

The RS2 inquiry also includes fields of what is known as "alternate science"--stuff that happens, and does not appear to fit current scientific belief. By using the principles of the Reciprocal System and RS2, much of the "alternative science" realm is easily understood, since the basic premises are far more clear.

A Note on Metaphysics

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In *Reciprocity*, Volume 12, No. 3, Summer, 1983, p. 12, Dewey B. Larson writes:

Some of the readers of my latest book, *The Neglected Facts of Science*, are apparently interpreting the conclusions of this work as indicating that the Reciprocal System of theory leads to a strict mechanistic view of the universe, in which there is no room for religious or other non-material elements. This is not correct. On the contrary, the clarification of the nature of space and time in this theoretical development removes the obstacles that have hitherto prevented science from conceding the existence of anything outside the boundaries of the physical realm.

In conventional science, space and time constitute a framework, or setting, within which the entire universe is contained. On the basis of this viewpoint, everything that exists, in a real sense, exists in space and in time. Scientists believe that the whole of this real universe is now within their field of observation, and they see no indication of anything non-physical. It follows that anyone who accepts the findings of conventional science at their face value cannot accept the claims of religion, or any other non-material system of thought. This is the origin of the long-standing antagonism between science and religion, a conflict which most scientists find it necessary to evade by keeping their religious beliefs separate from their scientific beliefs.

In the Reciprocal System, on the other hand, space and time are contents of the universe, rather than a container in which the universe exists. On this basis, the "universe" of space and time, the physical universe, to which conventional science is restricted, is only one portion of existence as a whole, the real "universe" (a word which means the total of all that exists). This leaves the door wide open for the existence of entities and phenomena outside (that is, independent of) the physical universe, as contended by the various religions and many systems of philosophy.

Inasmuch as the Reciprocal System is a theory of the physical universe only, it arrives at no conclusions as to the validity of the contentions of the various non-scientific schools of thought, but it removes all justification for the assertions that are frequently made to the effect that those contentions are scientifically impossible. Those scientists with strong religious convictions who are now looking askance at the Reciprocal System under the mistaken impression that it envisions a purely materialistic universe should, in fact, welcome it, because it removes the basic conflict between science and their religious beliefs.

Electrical Effects and the Paranormal

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Those who are familiar with the study of UFOs are well aware of the fact that “close encounters” with this phenomena often result in the erratic behavior of electrical devices. It is well known that cars stall out and cannot be started—though the engine will often crank—and things like radios, television and kitchen appliances will suddenly turn on and cannot be turned off.

Legacy science has no explanation; and Larson’s RS doesn’t fair too well here, either, but comes a bit closer.

Examine first Larson’s view of electricity, which comes in two varieties:

1. The *uncharged electron*: being a space displacement, becomes trapped in wire (temporal displacement) and gives us the phenomenon of electric current.
2. The *charged electron*: still a spatial displacement, but being neutralized half the time by the charge (as a vibration), thus able to jump gaps across the vacuum of space (when charge is effective), and remain trapped in matter (when charge is ineffective). This gives us the phenomenon of static electricity.

In a conductor, the behavior of “current” and “static” electricity is a bit different; electric current, without a charge, will distribute itself evenly over the cross-section of the wire, making the current proportional to the cross-sectional area, which is a known and measured quantity. Static electricity exhibits the “skin effect”, where the “same charge” on the electrons pushes them apart, so they move to the surface of the conductor. In a basic conductor, we will find *both* forms of electricity, static on the surface, and current in the middle.

In the *Law of One* material, Ra indicates that the majority of UFOs are actually manifestations from the "4th density", our own density being defined as "3rd". (4th density is commonly referred to as "astral" and the 3rd is "physical"). Therefore, when a UFO enters our realm, it has about it a "field" of 4th density "energy" (I quote the terms, because they are not technically correct, but relate the concept). Therefore, it is logical to assume that the weird electric effects are a result of this 4th density "energy field", which we will now evaluate.

One of the characteristics that the RS2 evaluation brought out concerning electrons is that they can "pair up" or form "triplets", the triplet being known as the compound motion of the *charged electron neutrino*, which is *also* a "rotating unit of space" as Larson describes it ("This charged neutrino is thus, in effect, a rotating unit of space, similar in respect to the uncharged electron, and, as matters now stand, indistinguishable from it.", *Basic Properties of Matter*, p. 262). The big difference between the electron and electron neutrino is that the neutrino is a magnetically-rotating (2-dimensional) unit of space, whereas the electron is an electrically-rotating (1-dimensional) unit. But, being a unit of space, it, too, can become trapped in a conductor—and can flow thru matter just like an electron. Larson refers to this as a "magnetic temperature".

It has been theorized that UFOs use some form of magnetic propulsion. An analysis of the data indicates that the type of "magnetism" it uses is not the common rotational vibration, but the non-local field generated by charged, electron neutrinos moving thru conductors—a "4th density" magnetic field. This field will, of course, induce a similar movement of electron neutrinos in the matter in the vicinity, and hence cause the electrical problems exhibited. But why do some things shut down, and others turn on?

As indicated above, Larson identified two forms of electricity, charged/static and uncharged/current. The presence of this 4th density field will try to form charged electron neutrinos by transferring the charges from the static, charged electrons and placing them on existing uncharged neutrinos in the area (since static charges are *not* confined to conductors, and are free to move). Thus, any device that relies on a "static effect", such as the spark plugs in a car or a neon sign, will fail! But, devices that rely solely on electric current will continue to work, which is why one can still crank the starter motor on a car during one of these events, but it will not start because it cannot generate a spark.

But what of the charged, electron neutrinos being generated… increasing Larson's "magnetic temperature"? Since the charged electron neutrino behaves like electric current, everything in the vicinity that requires electric current will suddenly have electric power available, even if it is not plugged in! This effect was noted by Nikola Tesla during his experiments, as well as during UFO close encounters. Radios and TVs turn on, blenders in the kitchen start spinning… usually out of control, digital appliances tend to burn out.

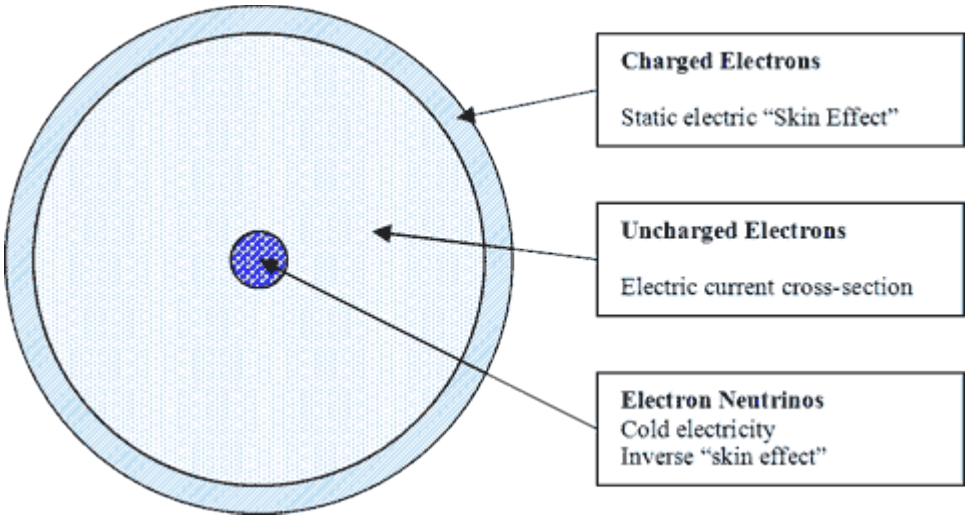
And what other effects does the flow of charged, electron neutrinos have? The charge on a neutrino is *inward*, not outward, as other magnetic charges. Thus, the location of electron neutrinos in a conductor will be the *inverse* of it's static equivalent—they will accumulate at the *core* of the conductor, not on its surface, forming a thin, intense

stream running down the middle of a conductor, which gives us a 3rd form of electricity, and a 3rd type of behavior—cold electricity—a type of electric current with no thermal/heat properties, because it's "thermal" condition is magnetic.

One of the dangers this analysis brings out, however, is summed up by a statement Ra made in Session 63:

"If a third-density entity were, shall we say, electrically aware of fourth-density in full, the third-density electrical fields would fail due to incompatibility."

"To answer your query about death, these entities will die according to third-density necessities."



Every advancement has its dangers; fortunately, there are some warning labels.

Distribution of Electron Types in a Conductor

This diagram shows where regions of static (charged) electrons, current (uncharged electrons) and cold electricity (electron neutrinos) exist within a cross-section of a conductor.

I also noted that cold electricity tends to aggregate at the center of gravity of the cross section, and since electron neutrinos are also responsible for isotopic mass, one would expect to find the higher isotopes of an element near its center of mass. From the little I was able to find on the topic on the Internet, this does indeed seem to be the case—right down to the Earth, itself, where the heaviest isotopes occur closest to the center of the planet.

This might change the view of "magnetic temperature" slightly; Larson had attributed it to a field effect (magnetic ionization level), but it may actually be the rotational vibration of the electron neutrinos, concentrating at the center of mass, that causes the increase in magnetic ionization along with the related effects (increased radioactivity, stellar combustion, co-magnetism, thredules, etc).

It is an interesting cascade situation; the presence of neutrinos causes the magnetic ionization level to increase, causing more elements to become radioactive, releasing more neutrinos, increasing the magnetic temperature further, causing more radiation. Sounds like the basis of nuclear fission—another interesting side-effect of "cold electricity".

Orbitally Rearranged Monoatomic Elements

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See: http://www.subtleenergies.com/ORMUS/

ORME, or monoatomic elements, are metals that exist as a powder rather than a metallic crystal. David Hudson, back in the 1970s, worked with these monoatomic elements discovering some unusual properties, such as their ability to superconduct, aid in healing the body and induce psychic experiences. The monoatomic state of an element, the m-state, is investigated here in light of the RS2 understandings of polar geometry and birotating electron pairs (aka "Cooper Pairing").

Background Information

It is recommended that one read KVK Nehru's article, "Superconductivity: A Time Region Phenomenon?" prior to reading this article, to gain insight into birotating electrons and the mechanism behind superconductivity.

Also recommended is Bruce Peret's article, "Positrons and Electrons" in the RS2 theory website, to understand the dimensional relations involved in creating charged electrons, electron pairs and electron triplets.

Monoatomic Elements

RS Layout	Electric Speed															
Magnetic Speed	**8**			**9**			**10 / (8)**			**11 / (7)**			**12 / (6)**			
3-2 (5)	Iron	BC	Bar	Cobalt	Hex	Bar	Nickel	FC	Bar	Copper	FC	DB	Zinc	Hex	Tb	
3-3 (6)	Ruthenium	Hex	Bar	Rhodium	FC	Bar	Palladium	FC	Bar	Silver	FC	DB	Cadmium	Hex	Tb	
4-3 (7)	Osmium	Hex	Bar	Iridium	FC	Bar	Platinum	FC	Bar	Gold	FC	DB	Mercury	Rho	Tb	
4-4 (8)	Hassium			Meitnerium			Darmstadtium			Roentgenium			UnUnbium			

Monoatomic elements are elements that exist as single atoms only, as compared to diatomic elements which exist in pairs. When evaluated in terms of the magnetic and electric rotations of the *Reciprocal System*, they all fall within a specific range of electric rotations:

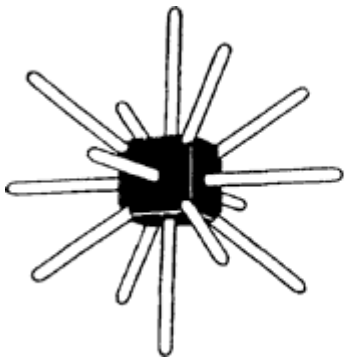
- Items listed in green were not on Hudson's list and were added to fill out the table, based on projection.
- First notation after the element name is the metallic crystal structure: BC = body centered, Hex = hexagonal, FC = face centered, Rho = rhombic.
- Second notation after the name is the Theosophical "Anu" structure: DB = Dumb Bell group, Tb = Tetrahedron group B, Bar = Bar group.
- Whereas the elements in the 4-4 magnetic range do not naturally occur in nature, and were not observed, the crystal structure and Anu structure are unknown.
- Elements below the 3-2 magnetic range have insufficient displacement to have an electric speed greater than 7, which is required for the m-state.

ORME Characteristics

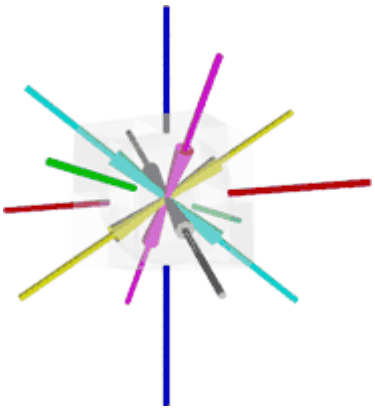
The bulk of the metallic structures are face-centered cubic, followed by hexagonal. Only mercury is rhombic. It is interesting to note that the ONLY "Bar group" element that isn't considered an ORME is iron, which is not on Hudson's list. ALL the remaining Bar group elements are ORME.

There is definitely something about this range of elements that works with biologic structures. The Theosophical Bar group elements are a set of 7 rods piercing a cube, which is virtually the SAME geometric configuration that I cam up with when I plotted the intersection between polar and rectangular geometric of the Cosmic to Material sector linkage, respectively:

Theosophical "Bar Group"



RS2 Diagram of Polar/Rectangular Intersection



Nehru has identified the energy in the Cosmic sector, existing as a conjugate rather than an inverse to the Material sector as *prana*, the life force. This does appear to indicate that some of the unusual shapes that were seen by the clairvoyant viewing of atomic structure by Theosophists has some validity, as it is the resulting geometry of Material-Cosmic linkage.

Nehru identifies "Cooper pairs" as bi-rotating electrons, which might be exactly how the monoatomic elements work--put simply, the outer "valence" electrons transform from individual units into bi-rotating pairs. Due to the dimensional reduction that occurs when electrons pair (described in Nehru's article), the element will lose its electric valence and act a noble gas element. I notice that ALL the noble gas elements

have face centered cubic crystalline structures, the *same* crystal structure as the bulk of the ORME, so there is some superficial evidence to support this conclusion.

Monoatomic elements are noted for their inability to form a crystal lattice or to bond with anything, existing in a fine powder form only. In the link referenced above, even hydrochloric acid and aqua regia have no effect. The behavior as a noble element would explain this inability to form bonds with other atoms.

The presence of bi-rotating electrons in the outer bands will give the element room-temperature "superconductivity", as described by Nehru's article on superconductivity, being a property of the bi-rotating electrons within the material, rather than a characteristic of the material, itself. This is also exhibited in monoatomic elements when exposed to a magnetic field.

Indirect References to ORME

The monoatomic powder has turned up in other references. During Tesla's radiant energy experiments, his copper wiring would often turn to powder, ruining his experiment. This would indicate that certain frequencies cause pair production in metallic elements making them drop out of the metallic bond state and into a monoatomic form, literally turning the metal into dust.

Notable experimenter John Keely demonstrated resonant devices that were able to reduce solid rock and metals to dust, as an alternative to drilling in mines. Again, this is exhibiting similar properties to Tesla's accidental work by using specific sets of frequencies to dissolve the atomic bonds in metals and crystals.

In a second application, Keely was able to fuse metals together in such a way that no weld could be found--almost as though the metals were blended together as a single piece, without any heat. The transition state between crystalline and ORME could explain this, where the atomic structure was beginning to lose it bond, forming a gel rather than solid powder, thus allowing two pieces of metal to be brought together and fused without heat. Upon removal of the effect causing the transition, the material would return to the crystalline state.

Canadian John Hutchinson reproduced this effect repeatedly during his demonstrations of the "Hutchinson Effect", where objects and metals would exhibit superconducting "anti-gravity" effects, along with objects fusing together without any heat, or one object being pushed through another without any distortion of material. Unfortunately, Hutchinson's work was not easily duplicated.

The RS2 Model of the M-State

The RS2 atomic model is closer to the conventional physics model than Larson's atom. It includes both valence and conduction bands, which are nothing more than speed zones created by the magnetic rotations of the atom. Electrons, being cosmic in RS2, are captured in the speed zone that matches their energy, resulting in zero net motion--captured. They are not an inherent part of the atomic rotation, but due to the extreme number of free electrons in the environment, all atoms will capture their

quota in a small amount of time. It should be noted that the number of electrons that can be captured is directly proportional to the net magnetic speed. Therefore, it appears that each atom has the same number of "protons" and "electrons", as conventional science would understand it.

The RS2 explanation proposed to explain monoatomic behavior is that the outer, "valence" electrons are converted into birotating electron pairs (the "Cooper Pairing"). Electrons are cosmic and are therefore adjacent in *time*, not in space, so when viewed by our technology, the electron pairs will be distributed across the environment, not stuck together.

When electrons form a birotating pair, two things happen: first, the rotational torque associated with a "rotating unit of space" is cancelled out, and the electron becomes a boson, with all the characteristics of a photon. Secondly, as Nehru described in his article, it undergoes "dimensional reduction"; the area that comprises resistance to the movement of the electron is reduced to a 1-dimensional structure, with no resistance and would appear as a HF photon in the category of hard ultraviolet or X-rays.

Electrons, in RS2, only occupy a single, rotational dimension. Birotating electrons, like photons, occupy two dimensions and are still carried by the progression of the natural reference system and thus would move easily from atom to atom. When an electron (1-dimensional) captures a photon (2-dimensional), the resulting structure is 3-dimensional, without any free dimensions to be carried by the progression--the "charged" or "static" electron. However, the birotating electron appears as a photon/boson, a 2-dimensional system, which can be captured as a "charge" by another electron.

Microclusters

When the environmental conditions are set up to form birotating, "Cooper" pairs, the probability is that the electron that captures the "charge" will be part of another birotating system, resulting in a type of covalent bond between them--one electron being shared to make each of the birotating systems appear as a stable, captured triplet, remaining fixed in the valence band.

However, due to the non-locality of the electron pairing, it is unlikely that the other member of a pair will exist within the same atom. Thus, a type of covalent bond will form between atoms. It has been noted in Cooper pairing that the spatial separation is limited; so the neutral, noble-gas like behavior of monoatomic elements **will** bond together, but as a loose aggregate. The most stable structure of a loose aggregate is a sphere, observed as the *microcluster*.

Microclusters would have no limit on size, since the bond between atoms is random. However, external influences, such as electric, thermal and magnetic ionization levels, will tend to break up larger clusters since the electron pairs are not as stable as magnetic and electric bonds that one normally finds.

Identification

Identification of monoatomic elements would be difficult, since most test equipment determines the element number based on the number of electrons present (assuming the same number of protons present). Bi-rotating electron pairs appear as PHOTONS, not electrons, and hence would be invisible to that type of testing equipment, resulting in the appearance the the element is of a substantially lower atomic number.

Tests that involve chemical bonding would also be useless, because of the inability of ORME to form chemical bonds.

Spectrophotometers would have a similar difficulty, because the electron triplets forming the aggregate bonds would not be able to absorb and release photons to change energy levels, thus making those spectral lines invisible.

The only way an ORME could be properly identified would be through the rotations of the atom, itself. The magnetic rotations will express themselves through magnetic valence states, but without an ability to directly measure the electric rotation, it is unlikely that the ORME can be identified as their proper elements, unless the element is known prior to conversion.

Reintegration

Hudson, when creating the m-state, said it was like converting an apple to applesauce... once the conversion had been accomplished, it could not be reverted. This may not necessarily be true.

Unlike converting applesauce to an apple, elements do not need to retain their original pattern. Based on Keely's research, sympathetic resonance can be used to create the birotating electrons, so therefore discordant resonance should be able to destroy the pairing, returning the material to a crystalline powder, with all of its original properties.

Zero Point

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The “zero point” is the energy flux that occurs within the vacuum of space. Legacy science refers to it as “zero” because it should be motionless; nothing should be there —but there is. It is often described as a “sea of electrons”, which pop into existence then back out again, making the capture of electrons a bit tricky since you never know when they will appear, disappear, or even where the event will happen.

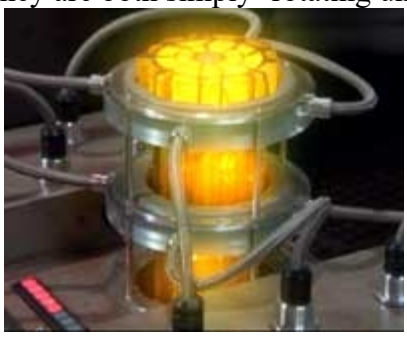
Within the projective geometry model of RS2, the region of the observer appears Euclidean, but the regions beyond any unit boundary appear as the geometric inverse, polar-Euclidean, or commonly called “counterspace”. The space/counterspace interaction creates a set of “duals” between the geometric objects within the region. In space, we see a point, but in counterspace, we observe a plane. A planar construct in space is then viewed as a point in counterspace, BUT a line is a line in both regions.

This linear intersection, therefore, is the geometry underlying the “zero point” domain.

It makes sense if you consider that the zero point flux is referred to as a “sea of energy”. We know from Larson that “energy” is inverse speed, namely t/s. Speed in space is translational; speed in counterspace (time) is rotational. The linear intersection of translation and rotation is the projection of rotation upon a line, or the projection of a line upon a rotation—namely, linear vibration.

This sea of energy is, therefore, a sea of vibration… not a “zero point” but a “unit line”.

In RS2, the first manifestation of motion is the m-positron or c-positron (electron). They are both simply ’rotating units’ in counterspace (or countertime), without



sufficient magnitude of motion to make any effect outside of their unit time (or unit space) boundaries. Also consider that counterspace is the full geometric inverse of space—with a plane at zero and a point at infinity (the center). This means that the first displacement of speed is physically located ON the unit boundary, extending inward. Any displacement, even those that do not have sufficient magnitude to have an outside effect, can still be seen at the unit boundary.

Given that we are not actually looking at “zero space” but at “unit space”, in a vibrational aspect, one would expect to see a totally stationary system, with the material and cosmic sectors perfectly divided at this sub-atomic level. So how does one account for “flux”?

From observation by experimenters, the zero point is a fluxuating sea of electrons and positrons, winking in and out of existence. But DO they? In RS2, NO. Only the projection upon the measuring instruments is winking in and out; the physical motion, itself, *remains constant*. The difficulty occurs because of the intersection between space and counterspace—the resultant linear vibration *has no orientation*. Therefore, at times we view it head-on, and see an electron or positron. Other times, when viewed from the side, it appears as a wave. Other times, when viewed end-on, it disappears entirely. But it is *not the motion* that disappears! It is the projection of that motion into our coordinate space that disappears.

Based on a new understanding of this “unit line” sea of energy, and the fact that it is the projection that is causing the problems with utilizing it for a source of power—not the motion itself—a new approach can be taken to examine the zero point energy devices, determine exactly how they work, and what can be done to eliminate their problems and increase their efficiency.

Reference

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Tables, charts and relations used in the Reciprocal System.

Space Time Units

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The following table defines the aspects and powers of units of space and time commonly associated with mechanical, electrical and other phenomenon.

Mechanical

#Dims		Local (speed)				Non-Local (energy)			
a	b	(s^a/t^b)		(s^b/t^a)		Conjugate (t^a/s^b)		Inverse (t^b/s^a)	
0	0	Unit Speed spatial progression				Unit Speed temporal rotational base			
0	1	1/t	angular velocity (ω)	s	length (d)	1/s		t	duration (s)
0	2	$1/t^2$		s^2	area (A)	$1/s^2$		t^2	
0	3	$1/t^3$		s^3	volume	$1/s^3$		t^3	
1	1	s/t	speed (v)			t/s	torque (L), energy (E), work (W)		
1	2	s/t^2	acceleration (a)	s^2/t		t/s^2	force (F)	t^2/s	
1	3	s/t^3		s^3/t		t/s^3		t^3/s	moment of inertia (I)
1	4	s/t^4		s^4/t		t/s^4	pressure	t^4/s	
2	2	s^2/t^2	c^2			t^2/s^2	momentum		
3	3	s^3/t^3	gravity			t^3/s^3	mass		

Electrical

#Dims		Local (speed)				Non-Local (energy)			
a	b	(s^a/t^b)		(s^b/t^a)		Conjugate (t^a/s^b)		Inverse (t^b/s^a)	
0	1	1/t		s/1	electric quantity (q*) Larson's capacitance (C)	1/s	power (watts)	t/1	dipole moment
1	1	s/t	current (ampere)			t/s	electric charge (Q*)		

			voltage (statvolts)				current (statamps)		
1	2	s/t^2	s^2/t	permittivity (ε)	t/s^2	voltage (volts)	t^2/s	
1	3	s/t^3	s^3/t	Capacitance	t/s^3	electric field intensity (E)	t^3/s	
2	2	s^2/t^2	conductivity resistance (statohms)		t^2/s^2	Resistivity		
2	3	s^2/t^3	s^3/t^2		t^2/s^3	resistance (ohms)	t^3/s^2	

* "q" is considered the same as "Q" (charge) in conventional science

Magnetic

#Dims		Local (speed)			Non-Local (energy)			
a	b	(s^a/t^b)	(s^b/t^a)		Conjugate (t^a/s^b)		Inverse (t^b/s^a)	
1	2	s/t^2	s^2/t		t/s^2		t^2/s	dipole moment
2	2	s^2/t^2			t^2/s^2	magnetic charge (*) pole strength (weber) magnetic flux		
2	3	s^2/t^3	s^3/t^2		t^2/s^3	magnetic vector potential (gilbert) magnetomotive force (MMF)	t^3/s^2	
2	4	s^2/t^4	s^4/t^2		t^2/s^4	magnetic field intensity (oersted)	t^4/s^2	
3	3	s^3/t^3			t^3/s^3	inductance		
3	4	s^3/t^4	s^4/t^3		t^3/s^4	permeability (μ)	t^4/s^3	

** Magnetic charge is not recognized.

Inside the Unit Boundary

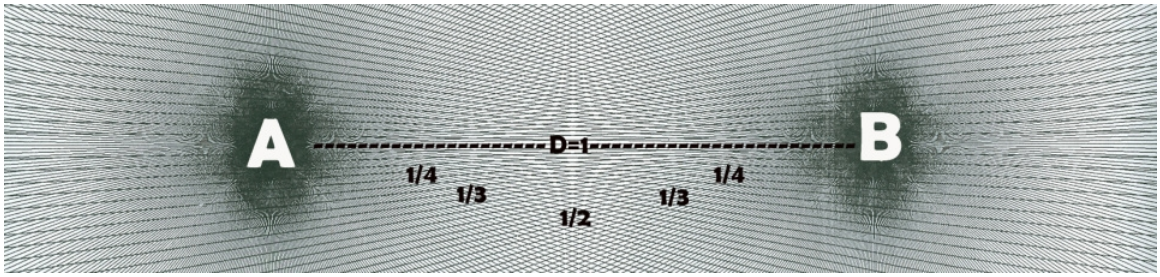
TR=Time Region; SR=Space Region

#Dims		Local (speed)				Non-Local (energy)			
a	b	TR (s^a/t^b)		SR (s^b/t^a)		SR (t^a/s^b)		TR (t^b/s^a)	
0	1	1/t	length	s		1/s	length	t	

0	2	$1/t^2$	speed	s^2	energy	$1/s^2$	speed	t^2	energy
0	3	$1/t^3$	acceleration	s^3	force	$1/s^3$	acceleration	t^3	force
0	4	$1/t^4$		s^4	momentum	$1/s^4$		t^4	momentum
0	5	$1/t^5$		s^5	pressure	$1/s^5$		t^5	pressure
0	6	$1/t^6$	gravity	s^6	mass	$1/s^6$	gravity	t^6	mass

The Bi-Radial Matrix

Developing a Reciprocal Harmonic Geometry



Introduction

A quantized reciprocal geometry is defined revealing numerous properties which are co-extensive with known physical interactions and field structures and their subsequent mathematical description. The reciprocal relationship between space and time has both a numerical and geometric expression. The Bi-Radial matrix shows how the reciprocal relation between the counting numbers and the harmonic series is a direct expression of the reciprocal relation between space and time. The corresponding geometric structure is developed. This is consistent with the finding of RS2 theory.

The properties of invariance are revealed within the underlying structure. "We see all motion in both the cosmic sector, and the time region as having a primary motion of *rotation*". Another way to describe rotation is "angular displacement". Since space and time come in discrete units it is more accurate to say quantized angular displacement.

"Whereas in the material sector, the primary motion is *translation*." Translational motion is linear motion in up to three dimensions. This brings us back to the natural datum of unity. In the material sector, we see outward translational motion in 3 dimensions, which results in the progression of the natural reference system—everything moving away from everything else."

But, when we view the time region that defines atoms, we see an outward *rotational* motion in 3 dimensions, which results in Larson's "rotational base" with *nothing* rotating, because rotation occurs naturally in the region.

A scaling mechanism is identified revealing an underlying structure whose properties are consistent with both microscopic and macroscopic interactions and structures. This includes the near harmonic and toroidal structures of magnetic and gravitational fields. The relation between attraction (toroidal) and repulsion (asymptotic) fields is

clearly revealed and the derivation of these field structures from first principles is advanced giving rise to testable hypothesis and advanced geometric modeling techniques reflecting established and recent scientific advances.

Original derivation of the Bi-Radial Matrix

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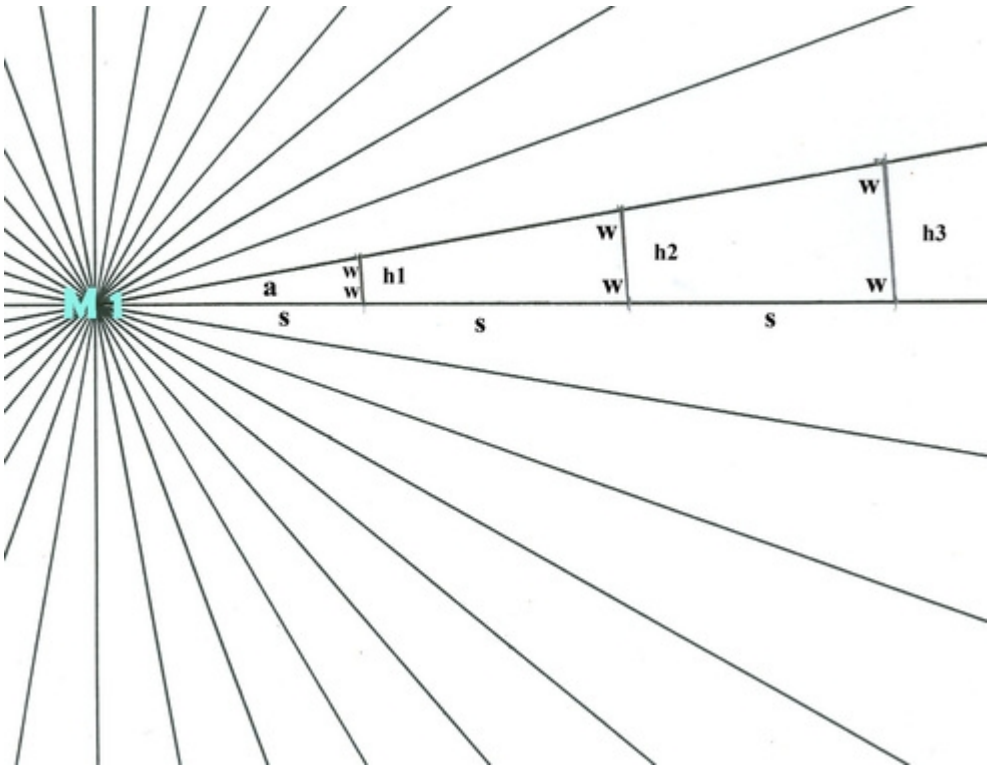

Diagram 1. Previous conception of a gravitational field surrounding a mass M1

Previous investigators have employed equi-spaced radial lines as a model of gravitational fields. Diagram 1 is an example depicting a gravitational field around a spherical mass M1. There can be as many or few lines as desired and they must be equi-spaced. This geometric model is somewhat consistent with observation. As objects fall towards the earth they converge towards a common center of gravity. In diagram 1 the lines converge towards a common center. The strength or density of the the earths gravitational field is stronger towards the center and weaker away from the center of gravity. This corresponds to the equi-spaced lines getting closer to each other towards the center, and further away from each other away from the center.

From any location on the earth at a given altitude the density of the earths gravitational field is the same. This corresponds to the separation of the equi-spaced radial lines being the same from neighboring lines at a given distance from the center no matter which line you start with. The more equi-spaced radial lines the stonger the corresponding field.

This geometric analogy is not complete. The density of a gravitational field is inversely proportional to the square of the distance from the center of mass. In diagram 1 the rate at which the lines converge or diverge from each other is a constant rate or linear function. Hence in diagram 1 if h1 is 1, h2 would be 2, h3 would be 3 etc. Is there a way to refine this geometric model of equi-spaced radial lines such that the inverse square relation with gravity described in Newtons law of gravitation (describing TWO centers of mass) can be described in geometric terms?

Developing a quantum reciprocal geometry

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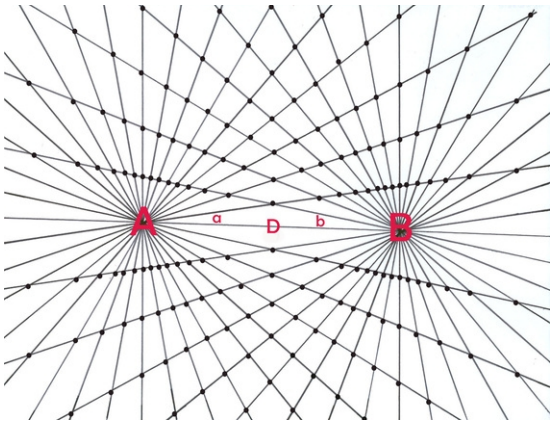

Diagram 2 Two Masses 'A' and 'B' with interacting gravitational fields

According to the analogy diagram 2 represents two gravitational fields surrounding spherical masses "A" and "B" This creates two sets of equi-spaced angles and rays and a resulting set of vertices where the rays intersect. The angles associated with pole "A" will have the variable "a" and the equi-spaced angles associated with pole "B" will have the variable "b". "D" represents the distance between poles "A" and "B". This formation owing to the two sets of equi-spaced radial lines and angles is thus called the Bi-Radial Matrix.

Hence we can summarize the initial variables of the Bi-Radial Matrix thus far:

A = number of rays from pole "A"
B= the number of rays from pole "B"
a= the measure of the angles from pole "A"
b=the measure of the angles from pole "B"
D= the distance between pole "A" and pole "B"

Intrinsic properties of the Bi-Radial Matrix: invariant under transformation

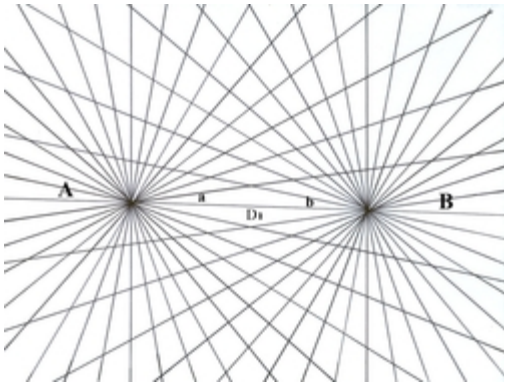

Diagram 3

Notice the formations of the trapezoids in diagrams 2 , 3 and 4. Notice the diamond shape in the central region in both diagrams. Also observe that as the distance "D" between poles "A" and "B" changes the shapes of all the trapezoids and the diamond shape remain the same; i.e. the same internal angles, the same proportion in relation to surrounding trapezoids. This property of the Bi-Radial Matrix is "scale invariant" and will be explored further.

Developing a Bi-Radial coordinate system

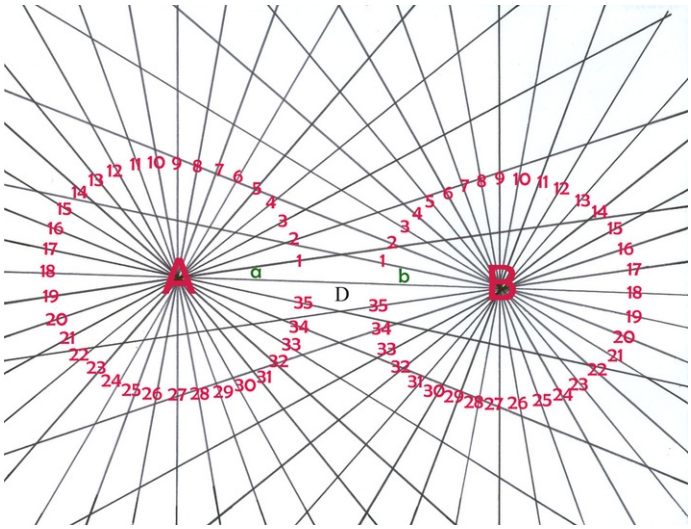

Diagram 3 Both opposing sets of rays are numbered in opposite directions.

As the two centers are opposite each other it is constructive and logical to number the sets of rays from each "pole" in opposite directions starting from the "D" segment..

Notice the included angles "a' and "b". These represent all of the angles about each pole and along with "D" represent some of the initial variables in the Bi-Radial matrix.

Interference pattern from two intersecting sets of equi-spaced rays

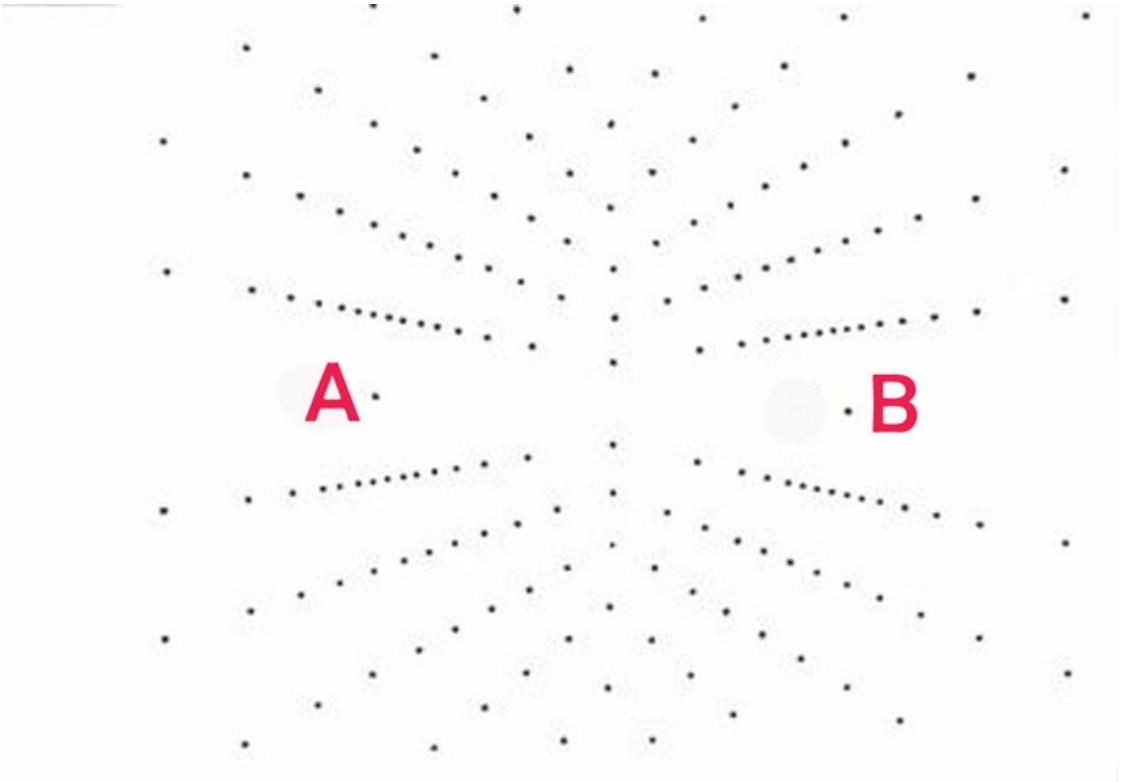

Diagram 4 Nodal interference pattern

Diagram 4 shows the intersection nodes from the two sets of equi-spaced rays. This is an interference pattern. Notice the spacing between the nodes. The vertices in the matrix can now be assigned coordinates based on the ray numbers assigned to the rays which create them.

This is shown in diagram 5. Owing to the dense population of the nodes in certain areas not all of them have assigned number pairings indicated. All nodes in any Bi-Radial matrix have corresponding coordinates.

Assigning the nodes "Bi-Radial coordinates"

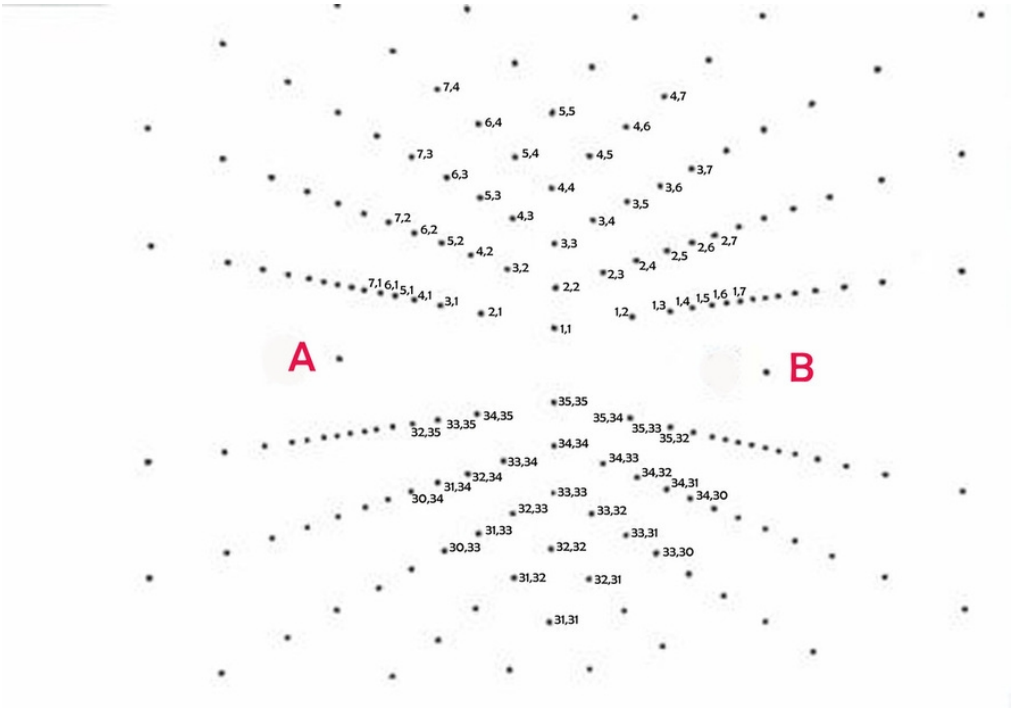

Diagram 5. Each node is assigned a pair of numbers

The nodes are assigned a pair of numbers or "coordinates" based on the bi-radial ray numbers in diagram 3 forming a bi-polar or bi-radial coordinate system.

Superimposing the "attraction lines" with the bi-radial coordinates

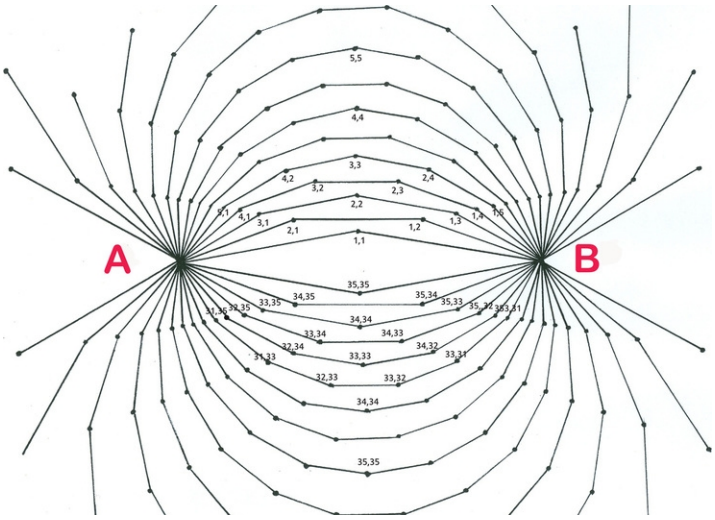

Diagram 6 Bi-Radial coordinates superimposed with attraction lines.

There are two primary ways to interconnect the nodes. Diagram 6 shows the "attraction lines". These correspond to the attraction "lines of force around a magnet and observed
with the use of iron filings on a glass plate in close proximity to a magnet shown in diagram 7.

These lines of force as represented in diagram 6 are a **cross section of a torus or toroidal field.** Diagram 7 shows actual "**attraction lines of force**" around a magnet. It has been proven that these attraction lines fall along the paths of non-concentric circle whose diameters and centers have been calculated from the matrix.

Bi-Radial Structure of Magnetic Field.

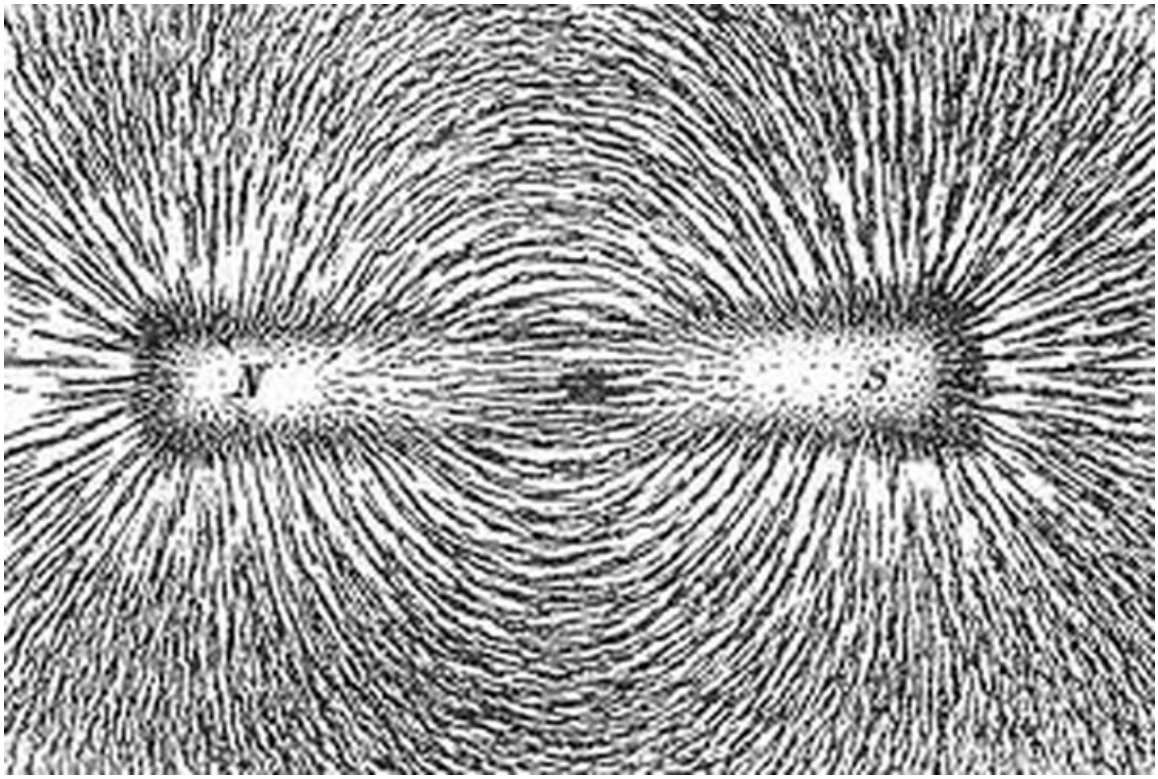

Diagram 7 Magnetic attraction lines of force as revealed with iron filings

The a cross sectional view showing "attraction lines" of a magnetic field. The bi-radial matrix indicate that their is an underlying bi-radial scale invariant structure to this field.

Superimposing repulsion lines with the bi-radial coordinates.

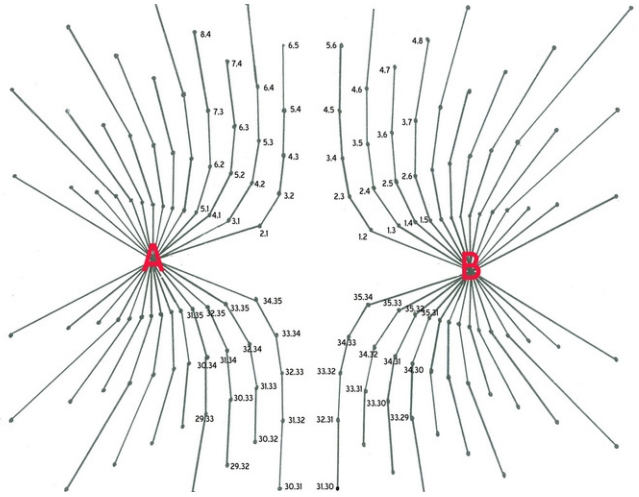

Diagram 8 Magnetic repulsion lines superimposed with Bi-radial coordinates

The second primary connection mode is shown in diagram 8. The resulting "repulsion field" is super imposed with the coordinates of the Bi-Radial Matrix. These correspond to the "repulsion lines of force" between two like poles of opposing magnets as shown in diagram 9. Both these repulsion lies of force and the attractions lines of force in diagram 6 have a simple mathematical expression within the bi-radial matrix which shows in fact that these formations are geometrically opposite forms.

"Repulsion lines of force" between two like poles of opposing magnets.

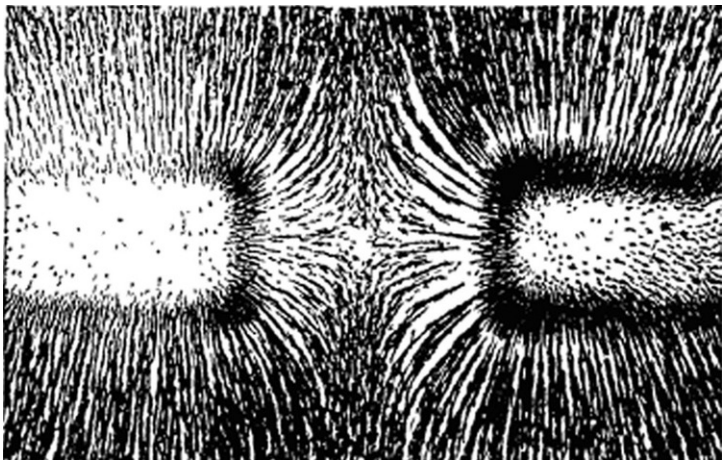

Diagram 9 magnetic repulsion lines between two like poles of a magnet as revealed with iron filings

These repulsion lines of force represent a cross section of another 3-d form which in many respects is the geometric anti-thesis of the torus or toroid. The opposite properties between the torus and the "anti-torous" physically manifest as attraction and repulsion and both of theses forces also like gravity obey an inverse square law.

Developing inverse square equation for all bi-radial matrices

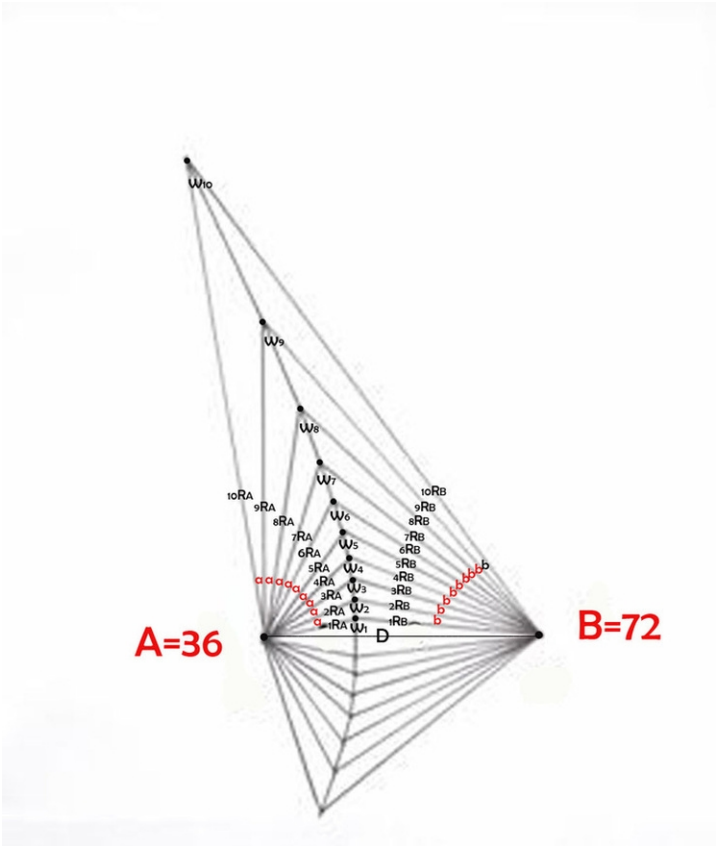

Diagram 15

Here is a partial interior section of a general case bi-radial matrix where A is less than B. Compare this to the special case scenario in diagram 14.

We will develop an inverse square equation which applies to both cases.

A revised list of variables now includes:

A= number of equi-spaced rays from pole "A"
B= number of equi-spaced rays from pole "B"
a= included angle around pole "A"
b=included angle around pole "B"
D= distance between "A" and "B"
WN=central angle(s)
NRA=radial segments from pole "A"
NRB=radial segments from pole "B"

preliminary equation

$$a = \frac{360}{A}$$

Eq. 1

Per initial conditions

preliminary equation

$$b = \frac{360}{B}$$

Eq 2

Per initial conditions

preliminary equation

$${}_N R_A = \frac{D \sin Nb}{\sin W_N}$$

EQ 3

From law of sins

Preliminary equation

$${}_N R_B = \frac{D \sin Na}{\sin W_N}$$

EQ 4

From law of sins

Preliminary equation

$${}_N R_A = \frac{{}_N R_B \sin Na}{\sin Nb}$$

EQ 5

From the law of sins

Preliminary equation

$$ {}_{N}R_{B} = \frac{{}_{N}R_{A} \sin Nb}{\sin Na} $$

EQ 6

From the law of sins

From diagrams 11 and 14 and the law of cosins we have:

$$ D^2 = {}_{N}R_{A}^{\,2} + {}_{N}R_{B}^{\,2} - 2\,{}_{N}R_{A}\,{}_{N}R_{B} \cos W_{N} $$

EQ 7

with partial substitutions from equations 5 and 6 we have:

$$ D^2 = {}_{N}R_{A}\left(\frac{{}_{N}R_{B} \sin Na}{\sin Nb}\right) + {}_{N}R_{B}\left(\frac{{}_{N}R_{A} \sin Nb}{\sin Na}\right) - 2\,{}_{N}R_{A}\,{}_{N}R_{B} \cos W_{N} $$

EQ 8

Isolating NR_A NR_B and dividing both sides by D squared we have:

$$ 1 = \left(\frac{\sin Na}{\sin Nb} + \frac{\sin Nb}{\sin Na} - 2\cos W_{N}\right)\frac{{}_{N}R_{A}\,{}_{N}R_{B}}{D^2} $$

EQ 9

Relating the bi-radial inverse square relation with known inverse square force equations

$$1 = \left(\frac{{}_N R_A}{{}_N R_B} + \frac{{}_N R_B}{{}_N R_A} - 2\cos W_N \right) \frac{{}_N R_A \, {}_N R}{D^2} \quad \text{Bi-Radial inverse square relation}$$

$$F_G = \quad G \quad \frac{M_1 \, M_2}{D^2} \quad \text{Gravitational inverse square relation}$$

$$F_M = \quad A \quad \frac{P_1 \, P_2}{D^2} \quad \text{Magentism inverse square relation}$$

$$F_E = \quad K \quad \frac{Q_1 \, Q_2}{D^2} \quad \text{Electricity inverse square relation}$$

When comparing the bi-radial equation with the known force equations we can casually observe the similarities and differences. On the left side of the force equations is the "F" term where as in the bi-radial equation there is (1) or unity. This sheds light on the fundamental nature of what "force" is. Notice that the equation is derived from a portion of the total matrix and therefore is not a complete mathematical expression of the entire matrix. This suggests that the known force equations are only a partial expression of their related force fields to which they apply.

In the force equations there is a constant, G,A, and K where as in the bi-radial equation there is a variable term comprised of structural components of the toriodal attraction and asymptotic repulsion fields as shown in the previous diagrams. There are a number of possibilities which this opens up. This includes being able to express force as a quantum interference pattern.
It is of vital importance and directly related to this to note that previous investigators noticing that the surface of a sphere and regular polyhedra in general increase or decrease per the square of their respective radius, thus assumed that this was the proper geometric analogy for gravitation. This has lead to the erroneous assumption that gravity, unlike electricity and magnetism is mono-polar. The discovery that the inverse square relation of gravity along with electricty and magnetism are ALL bi-polar or bi-radial is enormously significant.

Geometric properties of the Bi-Radial matrix and deriving a scaling mechanism

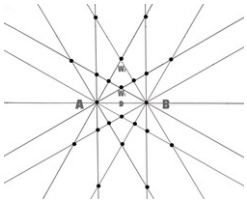

Diagram 15

Many investigators have sought to find a common system which is consistent with known properties from the microscopic to the macroscopic scale. Ruacher, Harramein et al have proposed a universal scaling law. Earlier pioneers Einstein, Weyl et al proposed unified field theories which attempted to find a common expression for quantum physics and general relativity, (micro-scopic vs macroscopic). It is known that the atomic and sub-atomic forces are much stronger and exert over minute distances. It is known that gravity is much weaker and exerts over vast distances. Finding a single system which adheres to both of these conditions has been elusive.

Diagram 15 is a bi-radial matrix with two poles showing 12 rays from poles "A" and "B" corresponding to smaller masses. A general property of the bi-radial matrix which has been proven mathematically is that for a given distance "D" between "A" and "B" the smaller the ray numbers to shorter the "range of the matrix This means for instance that in diagram 16 the set of nodes in the matrix is limited to a short range. The attraction lines are shown in diagram 17 showing a field with limited range.

Interference pattern of bi-radial matrix

Diagram 16

Here is a bi-radial interference pattern where the number of rays is small and the distance factor is small.

Bi-radial scaling function on microscopic scale

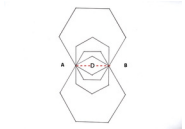

Diagram 17

Interconnecting the nodes in diagram 16 to form the attraction lines yields diagram 17. While the smaller number of radial lines tend to create a more sparsely populated matrix corresponding to a weaker force field if the distance between "A" and "B" is on the atomic scale **the distance factor supersedes the ray number factor and the resulting range of the field is minute and the spacing between the nodes and field**

lines is correspondingly minute creating an extremely strong field exerting over an extremely short distance which corresponds to atomic and subatomic forces. Notice also that with smaller ray numbers the quantized nature of the field is more evident.

Bi-Radial scaling function on a macroscopic scale

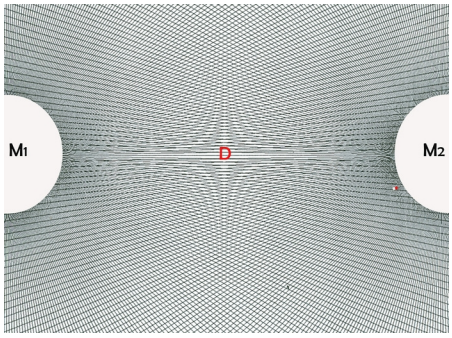

Diagram 18

While a larger ray number count from both poles corresponding to larger masses tends to increase the population density of the matrix corresponding to a stronger field, when the distance between the two poles becomes astronomical in scale the distance factor supersedes the ray number factor and lowers the density of the field while still exerting over a vast distance. This is completely analogous with and corresponds to gravity.

Notice with the higher ray count from poles A and B, M1, M2 there is a finer interference pattern which is not decipherable with lower ray numbers.

Reciprocal harmonic structure

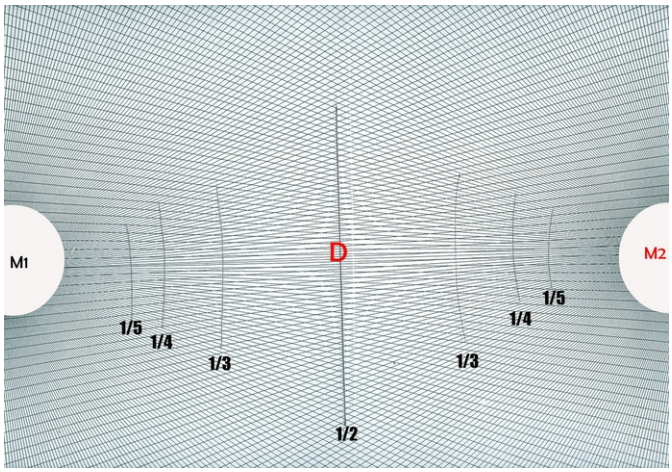

DIagram 19

Upon casual observation of diagram 17 we see there are hyperbolic lines which approach the D segment between the two poles. The equations of these lines are easily derived from the matrix.

The intervals at which the hyperbolic curves approach the D segment correspond to the harmonic series.

Is there a mathematical equation from the Bi-Radial matrix which can confirm this? To do so we need to view a Bi-Radial matrix with a lower sampling rate.

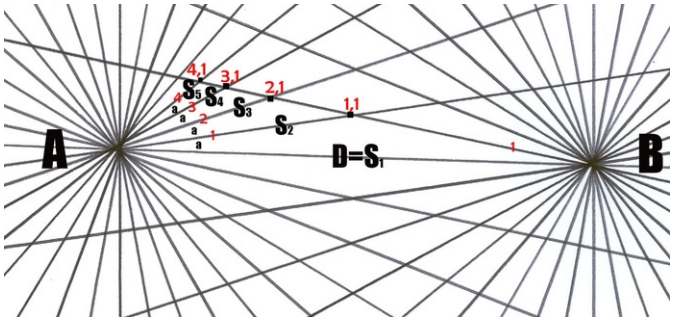

Diagram 20

Notice in diagram 19 the set of "S" segments. This is a different set than the previous set of "R" segments used in the Bi-radial inverse square equation. Here the "S" segments have their origin at "A". There is a similar mirror set of "S" segments whose origin is at "B".

Bi-Radial harmonic equation

$$\lim_{a\to 0} S_N = \lim_{a\to 0} \frac{D \sin a}{\sin Na}$$

$$\text{Where } S_2 = \frac{1}{2,}\ S_3 = \frac{1}{3},\ S_4 = \frac{1}{4,}\ S_5 = \frac{1}{5}\ldots\ldots$$

EQ 10

Equation 10 indicates the near harmonic structure of the bi-radial matrix. . It suggests that as the number of equi-spaced rays from each pole "A" and "B" (when (A=B) approach infinity the exact harmonic series is attained. While no astronomical body has infinite mass the most massive objects known thus far are "black holes" so named because their extreme mass generates an extreme gravitational field which does not even let light escape. It is interesting note that some have suggested that black holes are not pure singularities and that they have two centers approaching but never reaching zero distance.

Bi-Radial matrix where distance between poles approaches zero with high ray counts

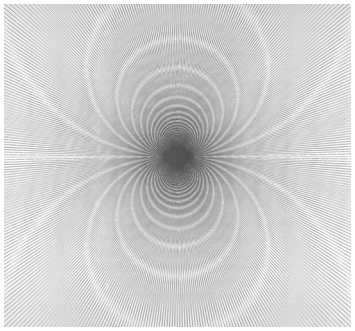

Diagram 21 Bi-radial matrix with high ray number and distance "D" approaching zero

Diagram 21 shows a bi-radial matrix with high number of rays relative to the distance between the poles "A" and "B" which approaches zero. Notice the attraction lines in relationship to the two sets of equi-spaced radial lines. A number of investigators are identifying the harmonic properties of black holes:

"The non-linear generation of harmonics in gravitational perturbations of black holes is explored using numerical relativity based on an in-going light-cone framework."

Philippos Papadopoulos

"The Harmonic Structure of High-Frequency Quasi-periodic Oscillations in Accreting BlackHoles"

Title of article by Jeremy D. Schnittmanand and Edmund Bertschinger

"Simulations of highly distorted black holes provide us with a suitable system to investigate the generation of nonlinear harmonics in black-hole oscillations."

From abstract by Shoemaker, Deirdre; Pfeiffer, Harald; Kidder, Larry; Teukolsky, Saul

Summary

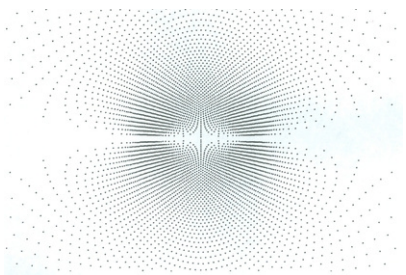

Diagram 22 bi-radilal matrix interference pattern with with interior harmonic structure

A bi-radial harmonic quantum geometry is advanced with a structure which is inherently co-extensive with known physical properties and interactions and

structures on both the microscopic and macroscopic scale. It is consistent with known physical interactions both structurally and mathematically as exhibited by the attraction and repulsion symmetries derived from first principles and the resulting generalized inverse square equation . The repulsion matrix has received very little attention to date and is of equal importance as the toroidal symmetry.

A bi-radial co-ordinate system is constructed on logical grounds giving rise to a simple mathematical description of the matrix. Some of the properties of the matrix were introduced including the property of being invariant under transformation. Numerous other mathematical relationships in the matrix have been explored and the results of these finding are pending. Also the the mathematics relating to the bi-radial matrix is derived directly from the matrix itself versus being arrived at from empirical considerations, or abstract theorizing.

Further the near harmonic structure of the bi-radial matrix suggests relationships between the fundamental forces and harmonics. This is indicated in current research including "black holes". The bi-radial matrix indicates that "force" can be expressed as a quantum interference pattern between to sets of equi-spaced radial lines .. While the bi-radial matrix exists as a pure geometric system independent of observed interactions it is not only co-extensive with these it lends itself to a number of physical interpretations based on recent scientific advances and gives rise to testable hypothesis. The bi-radial matrix is a very useful model to investigate a wide range of physical phenomenon.

Developing a Bi-Radial coordinate system

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Developing a Bi-Radial coordinate system

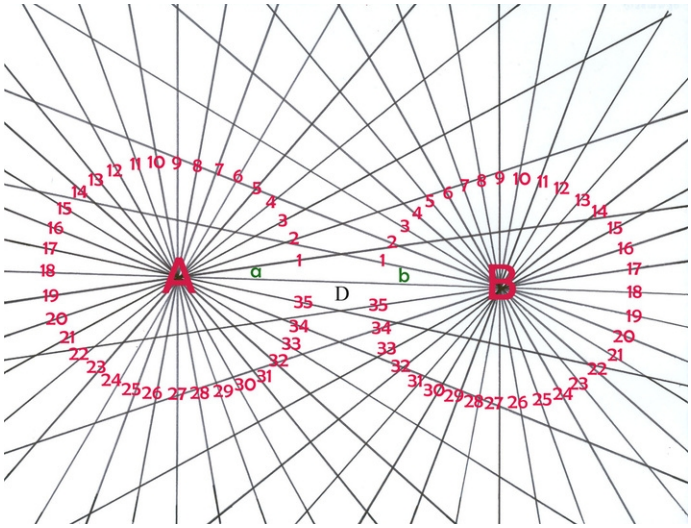

Diagram 3 Both opposing sets of rays are numbered in opposite directions.

As the two centers are opposite each other it is constructive and logical to number the sets of rays from each "pole" in opposite directions starting from the "D" segment..

Notice the included angles "a' and "b". These represent all of the angles about each pole and along with "D" represent some of the initial variables in the Bi-Radial matrix.

Interference pattern from two intersecting sets of equi-spaced rays

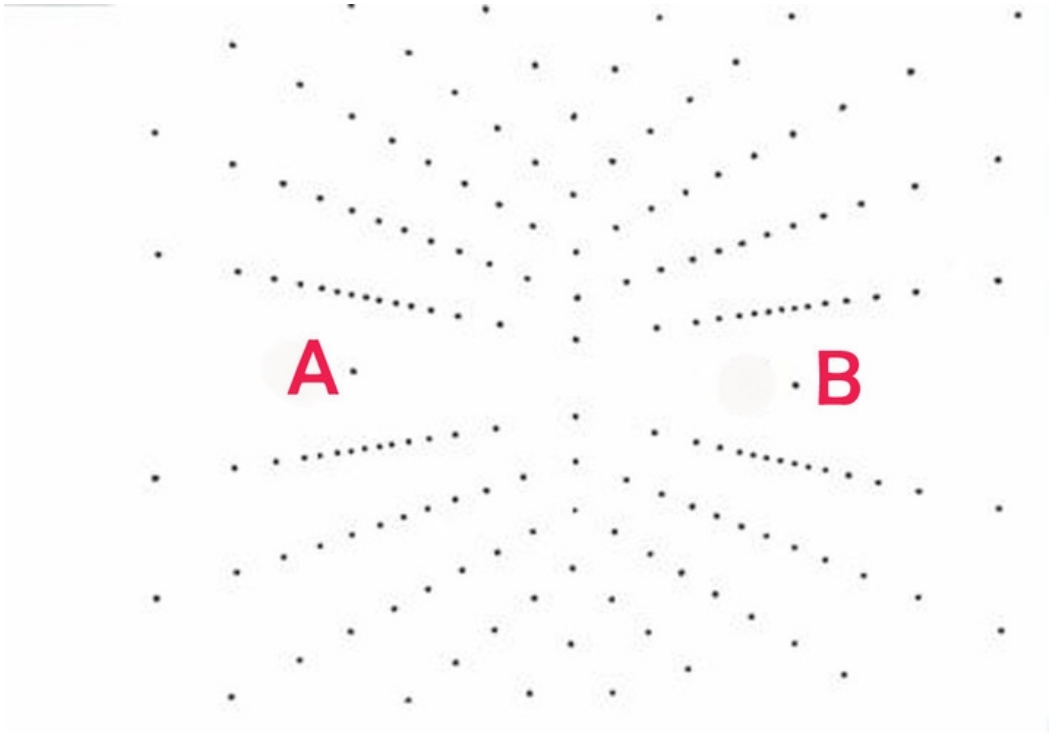

Diagram 4 Nodal interference pattern

Diagram 4 shows the intersection nodes from the two sets of equi-spaced rays. This is an interference pattern. Notice the spacing between the nodes. The vertices in the matrix can now be assigned coordinates based on the ray numbers assigned to the rays which create them.

This is shown in diagram 5. Owing to the dense population of the nodes in certain areas not all of them have assigned number pairings indicated. All nodes in any Bi-Radial matrix have corresponding coordinates.

Assigning the nodes "Bi-Radial coordinates"

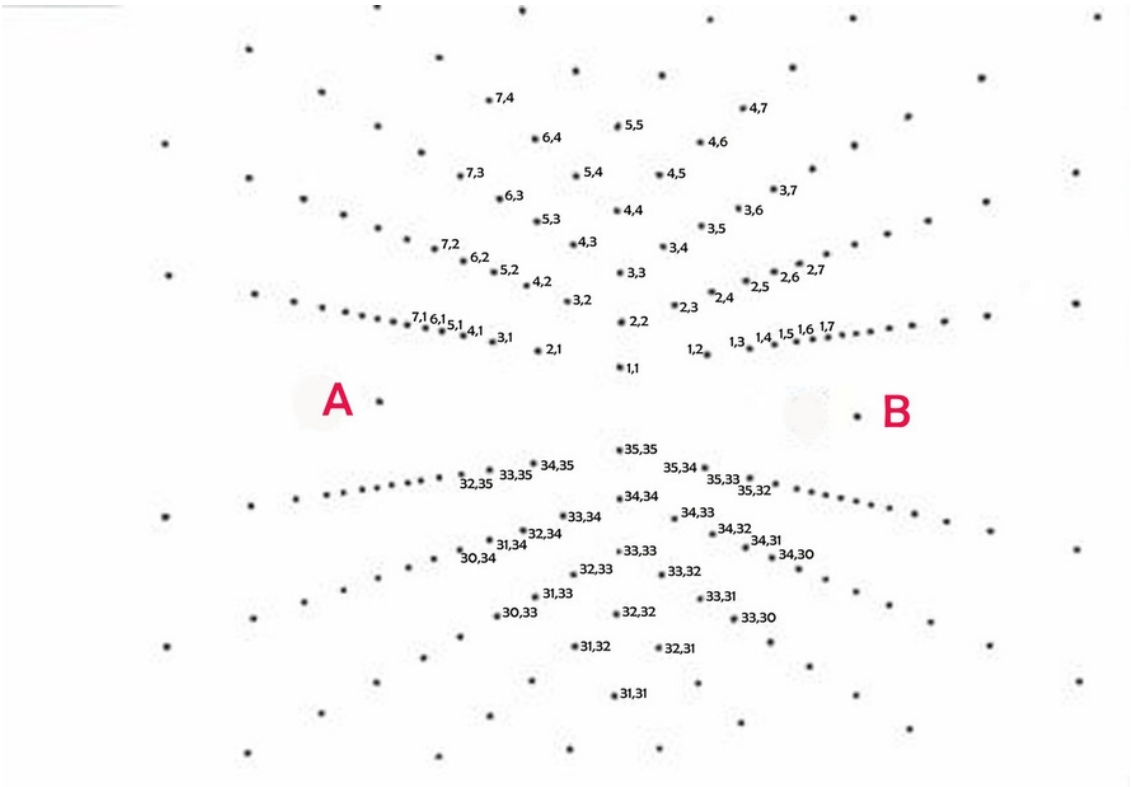

Diagram 5. Each node is assigned a pair of numbers

The nodes are assigned a pair of numbers or "coordinates" based on the bi-radial ray numbers in diagram 3 forming a bi-polar or bi-radial coordinate system.

Superimposing the "attraction lines" with the bi-radial coordinates

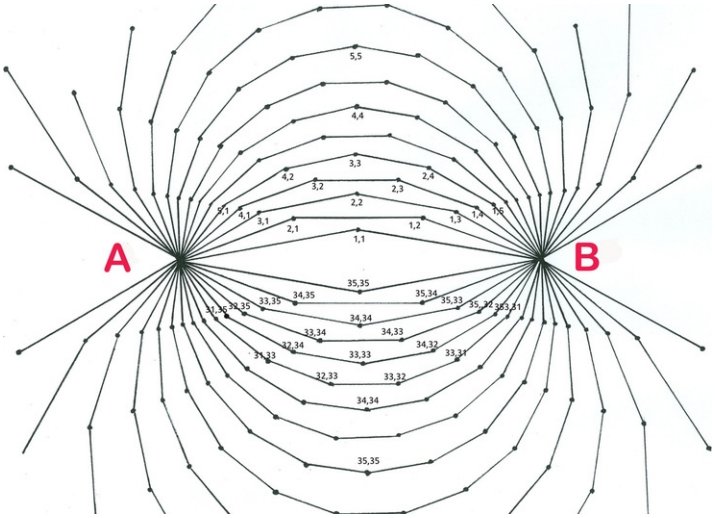

Diagram 6 Bi-Radial coordinates superimposed with attraction lines.

There are two primary ways to interconnect the nodes. Diagram 6 shows the "attraction lines". These correspond to the attraction "lines of force around a magnet and observed
with the use of iron filings on a glass plate in close proximity to a magnet shown in diagram 7.

These lines of force as represented in diagram 6 are a **cross section of a torus or toroidal field.** Diagram 7 shows actual "**attraction lines of force**" around a magnet. It has been proven that these attraction lines fall along the paths of non-concentric circle whose diameters and centers have been calculated from the matrix.

Bi-Radial Structure of Magnetic Field.

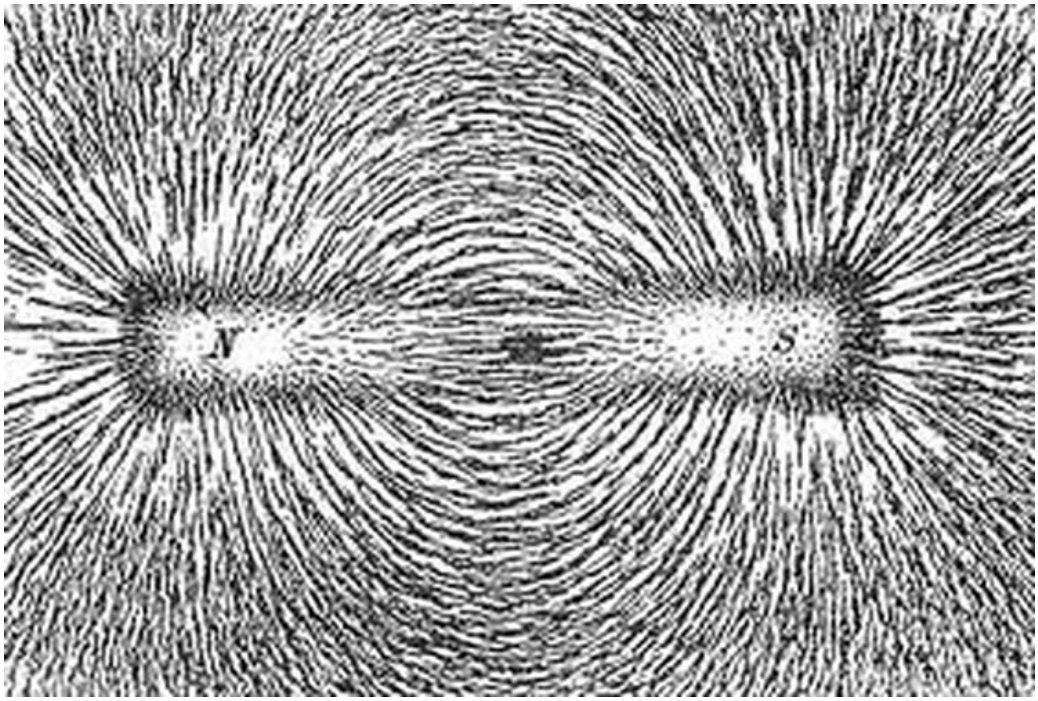

Diagram 7 Magnetic attraction lines of force as revealed with iron filings

The a cross sectional view showing "attraction lines" of a magnetic field. The bi-radial matrix indicate that their is an underlying bi-radial scale invariant structure to this field.

Superimposing repulsion lines with the bi-radial coordinates.

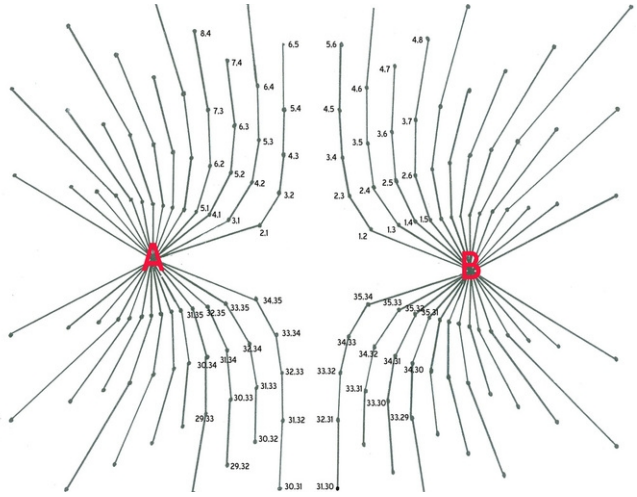

Diagram 8 Magnetic repulsion lines superimposed with Bi-radial coordinates

The second primary connection mode is shown in diagram 8. The resulting "repulsion field" is super imposed with the coordinates of the Bi-Radial Matrix. These correspond to the "repulsion lines of force" between two like poles of opposing magnets as shown in diagram 9. Both these repulsion lies of force and the attractions lines of force in diagram 6 have a simple mathematical expression within the bi-radial

matrix which shows in fact that these formations are geometrically opposite forms.

"Repulsion lines of force" between two like poles of opposing magnets.

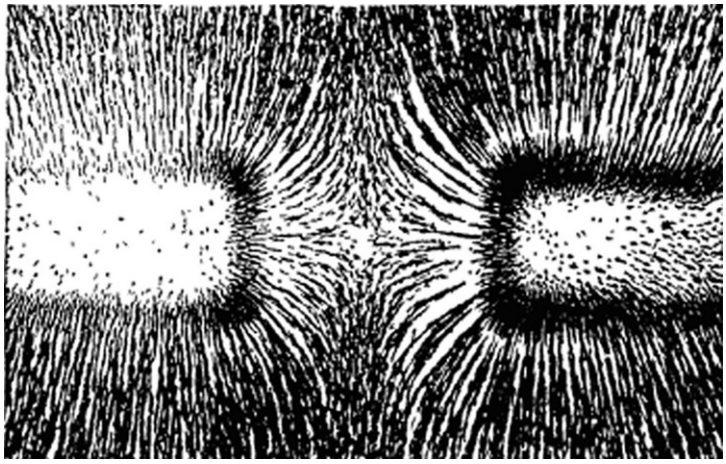

Diagram 9 magnetic repulsion lines between two like poles of a magnet as revealed with iron filings

These repulsion lines of force represent a cross section of another 3-d form which in many respects is the geometric anti-thesis of the torus or toroid. The opposite properties between the torus and the "anti-torous" physically manifest as attraction and repulsion and both of theses forces also like gravity obey an inverse square law.

Deriving preliminary equations

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Preliminary equation for attraction lines

$$X_A + Y_B = k$$

Equation 1

From diagram 6 we can observe that the SUM of any bi-radial coordinates along a given attraction line is equal to a constant. See the fifth layer for example where the set of bi-radial coordinates are: (5,1) (4,2) (3,3) (2,4) and (1,5). The **sums** of all these

pairs being equal to 6. The general equation describing the attraction lines in a bi-radial matrix is shown in equation 1. Also notice that in a bi-radial matrix where A=B Equation 1 describes the set of nodes which runs perpendicular to and passes half way through the "D" segment. The D segment shown in diagram 2.

Equation for repulsion lines

$$X_A - Y_B = k$$

Equation 2

From diagram 8 we can observe that the **DIFFERENCE** of any bi-radial coordinates on a given repulsion line is equal to a constant. Taking the 4th layer from pole "A" as an example we see that the coordinates along this repulsion line are: (5,1) (6,2) (7,3) and (8,4). The DIFFERENCE between these coordinates all being equal to 4.Just as attraction and repulsion are opposite so to the equation for attraction is based on addition, the opposite of subtraction which is the basis of the repulsion equation.

Defining geometric properties of quantum potential

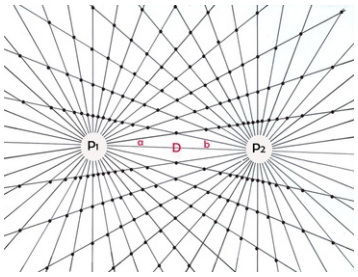

Diagram 10

Bohm et al have introduced the concept of the quantum potential. Here we define any set of equi-spaced radial lines as a quantum "time" potential. Axiom: time without space exists only as a potential. When a second time potential is introduced it creates a space "D" between them. Diagrams 1 and 2.

Time has been expressed as equi-spaced angular increments for thousands of years and is manifested in the face of clocks. These evolved from sun dials which were an indicator of the Earths rotation. Time as we know IS rotation in discrete angular increments.

Thus it is revealing regard the angular increments "a" and "b" as "quantums" of time and the linear segments along the radial axis defined by the nodes as spacial units. Since the attraction and repulsion matrix have lines which form diagonals connecting

the nodes without traversing the rays they are defining units of space-time. The bi-radial matrix thus defines a space-time "dis-continuum".

The bi-Radial matrix then is a useful model of "space time". Since it is quantized with discrete units it is not a "continuum". Thus gravitational and magnetic fields can be described in terms of interference patterns between two "quantum potentials". A more detailed treatment of this is beyond the scope of this introduction. Here the goal is to indicate the possible applications of the bi-radial matrix.

Relation between the Bi-radial matrix and the gravitational neutral zone

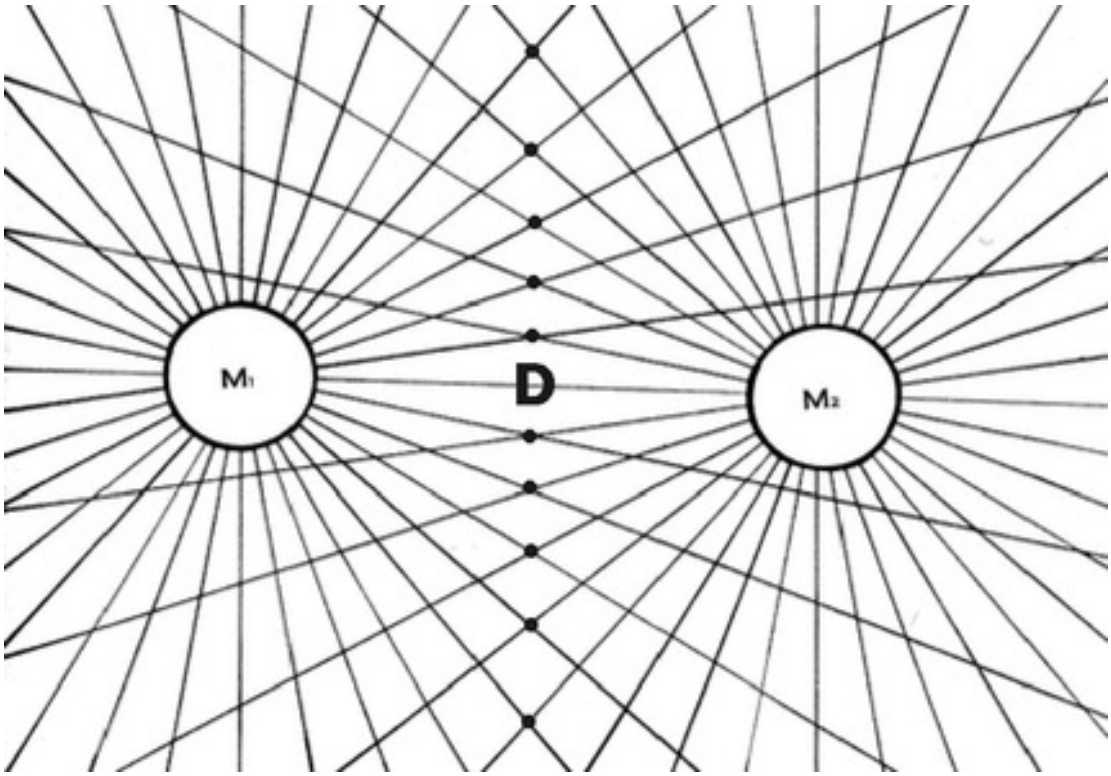

Diagram 11. The gravitational neuitral zone between two masses M1 = M2

The Bi-Radial Matrix to be a viable model needs to be consistent with known physical properties. It is known that between two masses there is a gravitational neutral zone where the gravitational fields cancel each other. When the two masses are equal it would be expected that the neutral zone would be equidistant from the centers of the two masses and perpendicular to the (D) axis between their two centers. Diagrams 6 and 11 show geometrical formations which are consistent with this observation. Equation 3 shows the bi-radial equation for this region and is falls along the line where the value of the bi-radial coordinates are equal. See diagram 6.

The Bi-Radial equation defining the neutral zone would be that line where the

numbers in each coordinate would be equal to the other. In **diagram 6** for example it would be the line including the coordinates (1,1) (2,2) (3,3) (4,4) and so on. This also applies to the general case of the bi-radial matrix where the number of rays from each pole differ. See diagrams 12 and 13.

Bi-radial neutral zone equation

$$N_a = N_b \quad \text{where A=B}$$

EQ 3

The "stronger the gravitational field the more lines are present around each "pole". The stronger gravitational field indicates the presence of a greater mass so the number of radial lines relating to the mass as well. The greater the mass the greater the number of corresponding equi-spaced radial lines and vice- verca. This analogy can be extended further still.

In between two large masses there is a gravitational neutral zone where the gravity of each is canceled out by the other. If the two masses are equal the neutral zone is half way between the two masses and perpendicular to the masses. **This is defined by the bi-radial equation 3 relating to diagram 6**. That is to say the two segments along the D segment on either side of the neutral point are in the same ratio as the two masses. In this case one to one. The italicized nodes in diagram 11 are the interface between the two sets of rays. The segment perpendicular to the D axis passing through these nodes represent the rest of the gravitational neutral zone.

Bi-Radial Matrix and the gravitational neutral zone

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Gravitational neutral zone where A is less than B

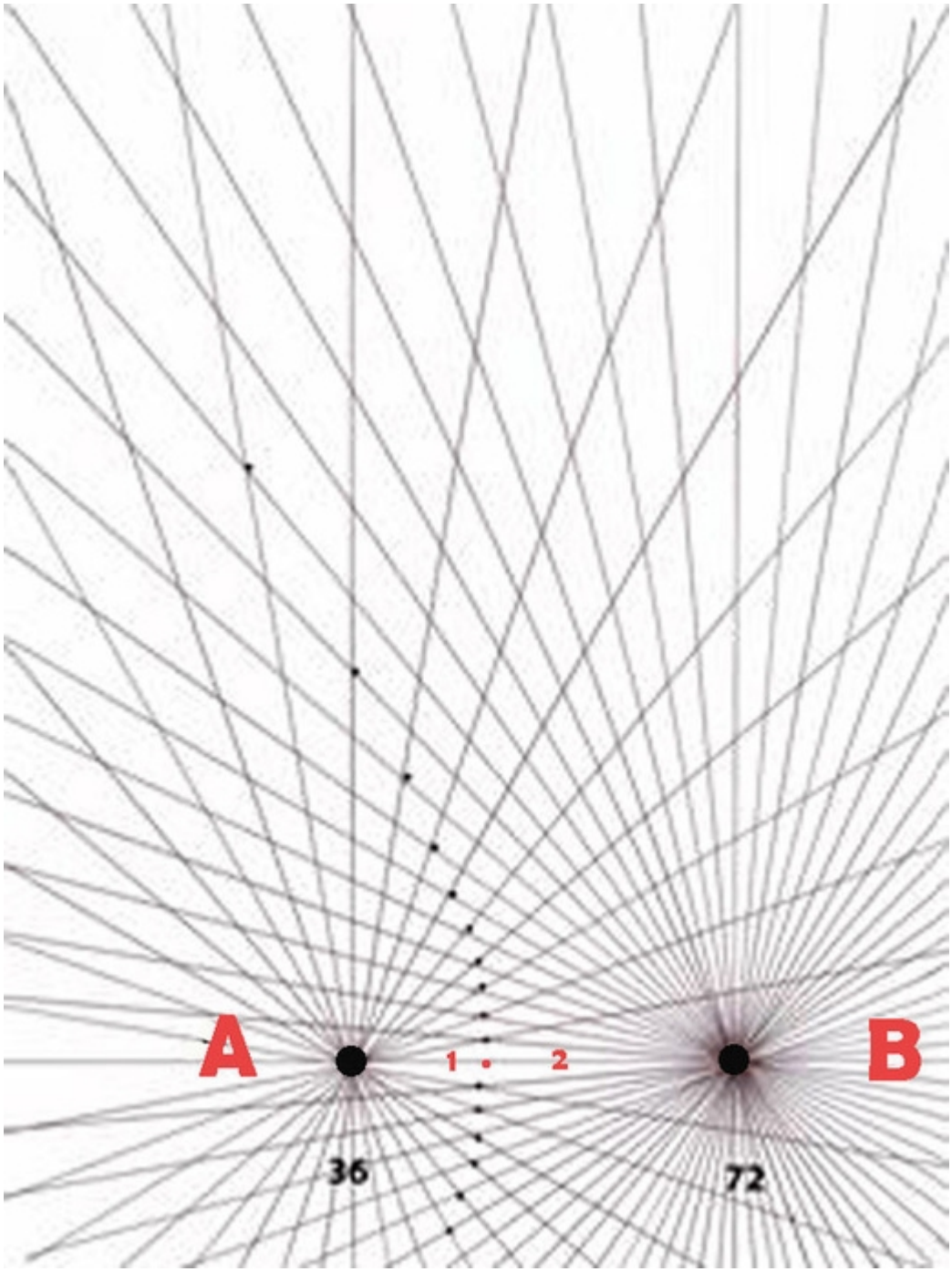

Diagram 12 General case of the Bi-Radial matrix number of rays from each poles differ
Diagrams 12-14 represent the general case of the B-radial matrix where "A" is less than "B". Here it would be expected that the gravitational neutral zone would include a location along the D segment where the segments on either side are in the same proportion to each other as the proportion of the two masses. In this case 2:1. It would be expected that the portion of the gravitational neutral zone of the D segment would be biased toward the smaller mass
owing to the "greater influence" of the larger mass

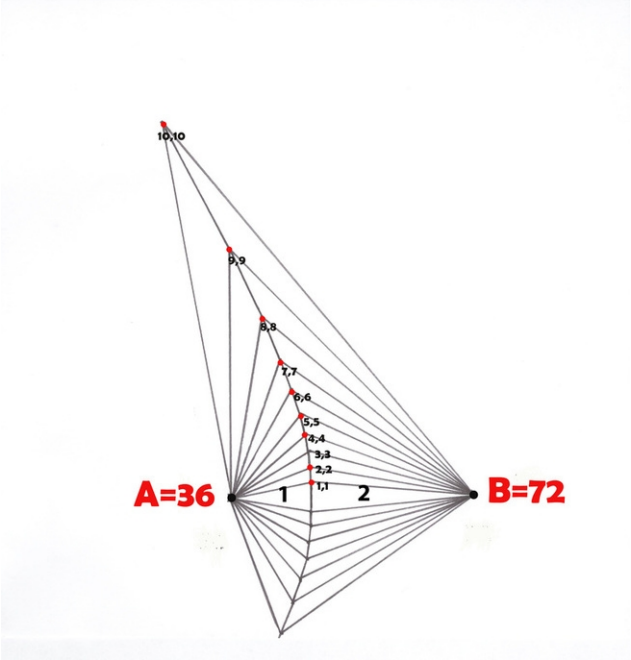

Diagram 13 shows the radial segments from diagram 12 along with the bi-radial coordinates of the neutral zone

general case bi-radial neutral zone equation

$$N_a = N_b \quad \text{where } A \neq B$$

Here the equation for the neutral zone for the general case bi-radial matrix appears the same and the results differ because the initial values of "A" and "B" are not equal. Hence the line defining the gravitational neutral zone is a curve which is biased toward the smaller mass and intersects the D segment at a location where the segments on either die are in the same proportion as the two masses. In this case 2:1. See diagrams 12 and 13. This is a testable hypothesis.

Interior section of Bi-radial matrix showing radial segments where A=B

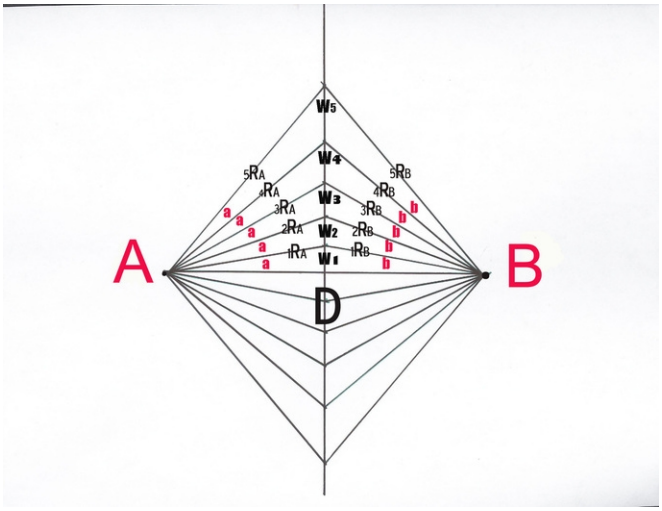

Diagram 14 Interior radial segments from previous diagrams isolated and with interior angles labled

Here some of the mathematical variables of the special case Bi-Radial matrix are shown. This is based on the special case of the bi-radial matrix where A=B

Again this diagram represents a partial interior section of the entire matrix.

Deriving an inverse square equation for ALl Bi-Radial Matrices

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Developing inverse square equation for all bi-radial matrices

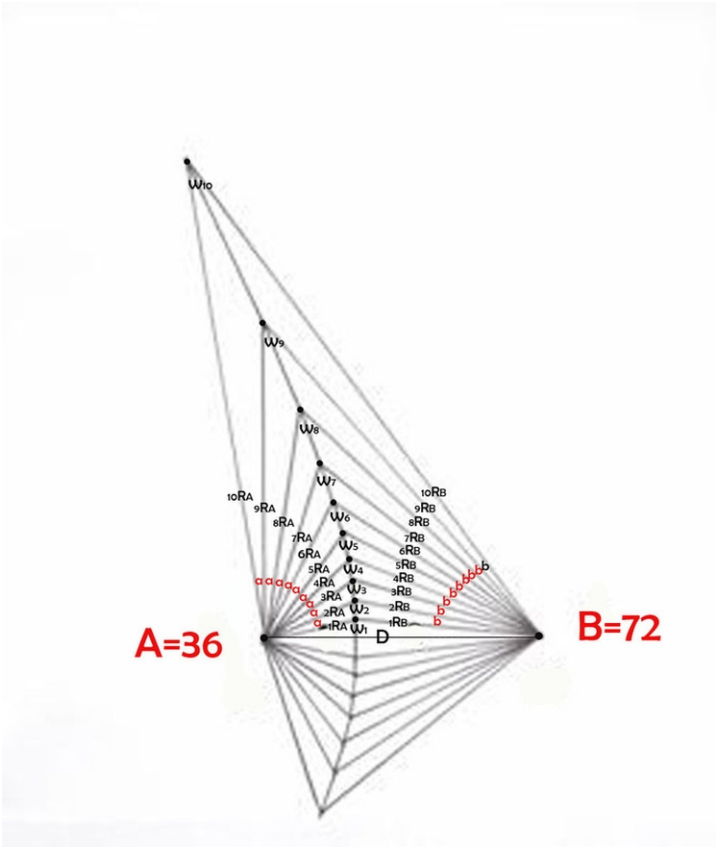

Diagram 15

Here is a partial interior section of a general case bi-radial matrix where A is less than B. Compare this to the special case scenario in diagram 14.

We will develop an inverse square equation which applies to both cases.

A revised list of variables now includes:

A= number of equi-spaced rays from pole "A"
B= number of equi-spaced rays from pole "B"
a= included angle around pole "A"
b=included angle around pole "B"
D= distance between "A" and "B"
WN=central angle(s)
NRA=radial segments from pole "A"
NRB=radial segments from pole "B"

preliminary equation

$$\alpha = \frac{360}{A}$$

Eq. 1

Per initial conditions

preliminary equation

$$b = \frac{360}{B}$$

Eq 2

Per initial conditions

preliminary equation

$${}_{N}R_{A} = \frac{D \sin Nb}{\sin W_{N}}$$

EQ 3

From law of sins

Preliminary equation

$${}_{N}R_{B} = \frac{D \sin Na}{\sin W_{N}}$$

EQ 4

From law of sins

Preliminary equation

$${}_{N}R_{A} = \frac{{}_{N}R_{B} \sin Na}{\sin Nb}$$

EQ 5

From the law of sins

Preliminary equation

$$ {}_N R_B = \frac{{}_N R_A \sin Nb}{\sin Na} $$

EQ 6

From the law of sins

From diagrams 11 and 14 and the law of cosins we have:

$$ D^2 = {}_N R_A{}^2 + {}_N R_B{}^2 - 2\,{}_N R_A\,{}_N R_B \cos W_N $$

EQ 7

---

with partial substitutions from equations 5 and 6 we have:

$$ D^2 = {}_N R_A \left(\frac{{}_N R_B \sin Na}{\sin Nb} \right) + {}_N R_B \left(\frac{{}_N R_A \sin Nb}{\sin Na} \right) - 2\,{}_N R_A\,{}_N R_B \cos W_N $$

EQ 8

Isolating ${}_N R_A\ {}_N R_B$ and dividing both sides by D squared we have:

$$ 1 = \left(\frac{\sin Na}{\sin Nb} + \frac{\sin Nb}{\sin Na} - 2\cos W_N \right) \frac{{}_N R_A\,{}_N R_B}{D^2} $$

EQ 9

Relating the bi-radial inverse square relation with known inverse square force equations

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$$1 = \left(\frac{{}_N R_A}{{}_N R_B} + \frac{{}_N R_B}{{}_N R_A} - 2\cos W_N \right) \frac{{}_N R_A \; {}_N R}{D^2}$$ Bi-Radial inverse square relation

$$F_G = G \frac{M_1 \; M_2}{D^2}$$ Gravitational inverse square relation

$$F_M = A \frac{P_1 \; P_2}{D^2}$$ Magentism inverse square relation

$$F_E = K \frac{Q_1 \; Q_2}{D^2}$$ Electricity inverse square relation

When comparing the bi-radial equation with the known force equations we can casually observe the similarities and differences. On the left side of the force equations is the "F" term where as in the bi-radial equation there is (1) or unity.
This sheds light on the fundamental nature of what "force" is. Notice that the equation is derived from a portion of the total matrix and therefore is not a complete mathematical expression of the entire matrix. This suggests that the known force equations are only a partial expression of their related force fields to which they apply.

In the force equations there is a constant, G,A, and K where as in the bi-radial equation there is a variable term comprised of structural components of the toriodal attraction and asymptotic repulsion fields as shown in the previous diagrams. There are a number of possibilities which this opens up. This includes being able to express force as a quantum interference pattern.
It is of vital importance and directly related to this to note that previous investigators noticing that the surface of a sphere and regular polyhedra in general increase or decrease per the square of their respective radius, thus assumed that this was the proper geometric analogy for gravitation. This has lead to the erroneous assumption that gravity, unlike electricity and magnetism is mono-polar. The discovery that the inverse square relation of gravity along with electricty and magnetism are ALL bi-polar or bi-radial is enormously significant.