Dimensional Mechanics - 101

(Di-Mech-101, Theoretical, v.2026-05-09)
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This Course Sets The Model For Our Universe

Pre-requisites: none

This paper can be a Course of study in Cosmology and Physics; What Reality is in our Universe. It ranges down past particles to the continuous natural dimension base tridium. As a continuous base, nothing can be smaller, the flag is planted. This is Theoretical now; in time it should be proven. The main points are:

1. Space or spacetime is a real thing tridium, defining the extended 3-D universe with time progression.
2. The Dium TOE Electromagnetic Wave, and Particle-Antiparticle Creation (NEW!).
3. A Proof that Block Time is not real, but there is time progression (Type 2 Changer Object).
4. Tridium subsumes all 17-24 fields (QFT of QM), but keep GR and QM as Predictor Class models.
5. Proof that Magnetic Monopoles don't exist.
6. Applied Di-Mech : Design of the Gravity Drive Attraction Engine by Annihilation of Matter and Antimatter.
7. Three proofs of a Rest Velocity Against Space (tridium is a thing to measure against).

The Dium TOE Model of the Real Universe

It will be shown that our Universe of 3-D space with time progression to the future is a real object in Nature. The so-called "empty void" or "vacuum" of space is in fact a substantial object: continuous natural dimension of type Dimension, even given the name tridium for 3-space because things that exist in nature need a name to distinguish them from other types of things. The adjective "natural" distinguishes it from the all too common "abstract" dimensions such as Cartesian Plots in X-Y dimensions which spring into conception or imagination at mere thought. A proof will be provided that the presumed fourth dimension of Time is not a fully allocated "Block-Time" with storage set aside for the future and the past, in the Dium TOE [1] and included, known as Type 1 Time, but has to be Type 2 time Changer Object within the 3-space tridium. Two new Communications that may be of interest are the Dium TOE Electromagnetic Wave[2] and the Dium TOE Particle-Antiparticle Creation[3], both included and released together.

While the Dium TOE (included, 2 pages) is a Formal Axiomatic Model, this document is less formal and should be easier to follow. The dium axioms should be consistent, independent and complete. It is intended to be Reality, not a mere abstract model. The definition of a Theory Of Everything (TOE) in Physics is supposed to be a Mathematical Framework which aims to explain all fundamental forces (gravity, electromagnetism, strong and weak nuclear force) and all matter in the universe within one structure. The Dium TOE does that, reducing all the 17 to 24 fields in QFT to one thing and even addresses directly what is Nothing. It answers the most intractable challenging question ever conceived: "What is natural dimension made of?". The Dium TOE uses simple shape concepts similar to geometry to explain how the four forces and particles are properties of 1 thing, a seemingly new thing yet which is right under our noses that we are even "swimming" in it: continuous natural dimension, an extended object of type Dimension which is our universe.

The "N" of N-dimensional or N-D or (N+1)-D, etc is called the Rank or Cardinal or Cardinality , used interchangeably. The word "dium" itself explicitly has no specific rank but could be N >= 0. There is no negative rank, no -N. The dash "-" in N-D is syntactic, a separator of two concepts, but conjoined as if "N D" with apostrophes, but N-D is 3 characters and "N D" is 5 characters. The (N+1)-D syntax uses the parenthesis to enclose the mathematical increment plus "+" or minus "-" (N-1)-D to decrement the number N. The -D merely joins with the resulting numerical value in the parenthesis. Parenthesis are necessary or else "N+1-D" and "N-1-D" becomes unwieldy and should not be used.

Definition 1: The word "dium" is the contraction of dimensionium. The idea is to reuse a pattern from the Elements where 78 Atomic Elements end with "ium", 19 of those ending with "nium" and 10 of the 78 ending with "dium", like Sodium and Vanadium. But the intent is not that dimensionium is an Atomic Element, just reusing the principle or concept that things exist in Reality which end with "ium", "nium" and "dium". Once dimensionium is established, it unfortunately has 5 syllables and 12 characters making it verbose to spell and pronounce. A common pattern in language is to shorten words or even phrase into fewer syllables and/or acronyms. Here the long word dimensionium is contracted to dium. There is an old word Dion, two letters are different, no collision. Some say there is an old word Dium but if so it has gone out of use. The "dium" is thus established as short for "dimensionium", an object which exists in Reality of type Dimension and without reference explicit nor implied to any deity. Alone, "dium" is without rank or cardinality or measure as is "dimension", the N is missing such as in specific 3-D. A number can be added with a dash after it, or the alphabetic prefixes may be used without dashes: zedium, unidium, bidium, tridium, or 4-D quadium.

Definition 2: dium is any Type Dimension object universe in reality without explicit N. Such objects of Type Dimension are container universes. Just because a thing has extension and can even contain other things doesn't make it a universe. A basketball in tridium has extension and contains things like air, but the ball isn't a universe, therefore not a dium nor tridium. A Universe has dimensional extension of a non-negative whole number. Examples are tridium or 3-D space which is a volume container universe, bidium or 2-D which is a planar container universe of area, unidium which is a linear container universe of line segments, and even zedium which is a point universe without extension and dimension 0. To be called a dium it must be a universe, not a mere geometric object. Lines drawn on paper are merely lines, not unidium. A sheet of paper is not bidium in 3-space tridium, even paper has thickness, but bidium has no thickness, not even the thickness of 1-atom would qualify as no thickness. A cardboard box is not tridium, but it exists as particle phase volume container within tridium as per the Dium TOE.

Examples: A point-, line-, plane-, volume-, and quadium-universe are each a dium. Any specific container thing within our universe is merely a thing within our universe, but isn't a universe within a universe. Currently there is only our tridium with time progression as our universe, but no other known nor proven tridiums, bidiums, unidiums nor zediums either within our 3-space universe tridium nor external to our tridium. There are the Many Worlds and Multi-Verse Theories which claim there are other universes, but those tridiums seemingly have no way of being proved. These aren't necessarily higher dimensions but seem to be external dimensions in the Bulk non-intersecting with our tridium. Or they could be tridiums within a 4-D quadium, analogously like quadium "pages" in a 4-D book as there are 2-D flat pages stacked in a 3-D book. There are even hypothesis that a nearby tridium or 3-space universe could bump into our universe and that such a bump might be detectable as some kind of anomaly perhaps detectable as a fluctuation in one of the physics fields. But this hasn't been proven.

The Dium TOE is included here. "The Dium TOE: What Natural Dimension is Made Of" [1]. It's not necessary to absorb it in entirety before proceeding, just the 5 Axioms, a few definitions and Theorems will go far. Later, sub-axioms can help for the Electromagnetic Wave doc, Magnetic Monopole doc, etc.

Dium TOE: What Natural Dimension is Made Of

A Communication of the Intractable Studies Institute
Patrick M. Rael, Director, IntractableStudiesInstitute.org

Abstract: The Institutes position on the universe is that dimension itself has to be re-solved before particles and forces. Such a solution is provided here.
-Director

1. Modeling Rules

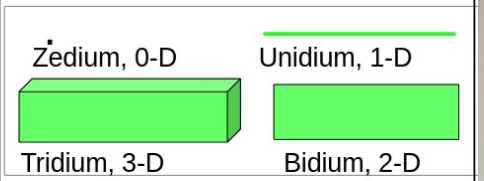
1. Initial state is no thing, no dimension, and zero assumptions.
2. All entities including dimensionality must be declared before used.
3. Assumptions must be declared.
4. Minimize assumptions, but no less than necessary, and no limit.
5. Definitions are word(s) substitutions.
6. Hypothesii can be either proven or dis-proven.
7. Theorems are provable within the model.
8. Conjectures have expectation of proof.
9. Opinions have no rigorous value.

2. The Dium Hypothesis of Natural Dimension

Definition 1: Axiom is an assumption.
Definition 2: Natural dimension is the dimension that is our reality, as opposed to artificial and/or abstract dimensions such as the Cartesian plane for the relation of arbitrary variables in equations.
Definition 3: Continuous – A region which is made entirely of one thing, not a collection of many discrete atomized things. The continuity is infinitely small, therefore not constrained by the principle of atomicity.

Axiom 1: Natural dimension exists as a continuous object.

Definition 4: dium is continuous natural dimension of any cardinality.
Definition 5: zedium is a 0-dimensional continuous point dium.
Definition 6: unidium is a 1-dimensional continuous linear dium.
Definition 7: bidium is a 2-dimensional continuous surface dium.
Definition 8: tridium is a 3-dimensional continuous volumetric dium.
Definition 9: quadium is a 4-dimensional continuous 4-D dium.
Definition 10: chronodium - the solid form of time, aka history.
Definition 11: chronolium - the dynamic form of time, aka future.
Definition 12: dium density - the amount of dium per region.



Definition 13: Universe is the union of all natural dimensions.

Axiom 2: Natural dimension can neither be created nor destroyed: it can only be transformed.

Axiom 3: Natural dimension is fundamental energy by existence, not by relation.

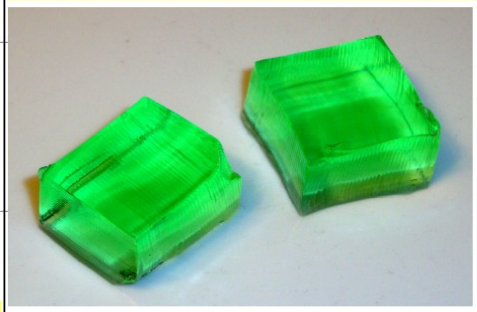
Axiom 4: Natural dimension is capable of phase property, and 3 phases: continuous, particulate and constant.

Definition 14 : Visco-elasticity of dium - A property of any dium where a subset of the dimensions region can deform in an elastic, flowing, and twist without necessarily causing the coordinate system within the dimension to also deform. The resistance to deformation is not caused by particle collisions as in matter fluids, because dium is a continuous object.

Sub Axiom 4.1. Continuous phase dium has three properties:
4.1.1. Elastic property gives rise to gravity.
4.1.2. Flowing loop property gives rise to magnetism.
4.1.3. Twist property gives rise to charge.

Sub Axiom 4.2. Particulate phase is a particle.
Sub Axiom 4.3. Constant phase is static dium, aka history.

Sub Axiom 4.4: Natural dimension in the elastic phase supports rotor and dimple waves.

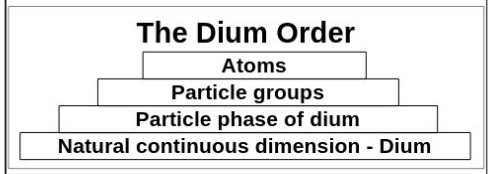


Gelatin cubes are an imperfect analogy to dium.

Definition 15: A rotor wave is a local twisting (torsion) oscillation of dium which then rebounds back in the opposite direction, then back, repeating endlessly without dissipation. A rotor wave can travel in a direction perpendicular to its axis of rotation. It is the dimension itself which is twisting.
Definition 16: An electromagnetic wave is a rotor wave.
Definition 17: A static rotor wave is a rotor wave which stops oscillating at a moment in the oscillation cycle. The region of space is left with a twist. This twist is called charge. The amount of twist is the amount of charge.
Definition 18: A dimple wave is an oscillating rebounding inward/outward compression of dium to higher/lower than surrounding density which then rebounds back, repeating endlessly without dissipation.
Definition 19: A static dimple wave is a dimple wave which stops oscillating at some moment in the oscillation cycle. If the oscillation stops at maximum compression then dium density is higher at the center and at a lesser density surrounding. The delta in density is called a warp in space-time, aka gravity. The higher compressed inner region is called "a particle".

Sub Axiom 4.5: All waves in dium are propagated solely as a property of the continuous dimension, not as particle collisions.

Definition 20: Nothing - no dimension nor time. Empty space is dium, not nothing.
Definition 21: Solidity - A region where particle or solid dium cannot be co-occupied.



Theorem 1: Natural dimension continues to exist when observers stop measuring it. [Certainty principle]

Proof: (Indirect method) If natural dimension ceased to exist, that would violate the conservation of natural dimension axiom.

Opinion 1: The preceding is intended to describe our known universe, as opposed to being only a theoretical model.

Hypothesis: Our 3-dimensional-spatial and temporal universe is composed of dium conforming to the axioms above.

3. The Mechanisms of 3 Fields

Gravitic attraction, **magnetic** attraction and repulsion, and **charge** attraction and repulsion, all have the common property of symmetry-seeking, thus reducing three unknowns to one unknown of symmetry seeking.

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Hypothesis: A particle with a dimple field is defined earlier has having mass. It is the distortion of the dium in its dimple wave that expresses the gravitational strength. Two+ particles have dimple fields that intersect, it is the fields themselves that attract each other, not the particles. The fields seek to achieve fully symmetric overlay centered on the dimple origin. This solves "action at a distance".

Hypothesis: The mechanism of magnetic attraction and repulsion: Magnetism is defined earlier as a loop flow of dium. When there are two magnetic fields near each other the loop flow vector field cannot flow through another loop flow magnetic field. Repulsion will occur when the vectors are opposing. The two magnetic fields attempt to achieve a fully symmetric overlay centered along the central axis of the flow. Opposite magnetic fields attract because this aligns the central axis of the flow. This solves "action at a distance".

Hypothesis: The mechanism of electric charge attraction and repulsion: The electric field was defined earlier as a static twist of the dium. The twist distortion of the dium can be visualized as a vector field. The twist is an in-equilibrium. Two equal but opposite charged/twist electric fields can create a symmetry only by canceling the twist by superimposing both twisted dium fields. The fields seek this symmetry state by opposites attracting. Same twist/charge fields repel because that decreases the symmetry. The exact shape of the twist is not provided here.

The three dium field properties above combined with dynamic and static temporal are a rich set of properties of the universe. These properties and/or combinations of these likely account for the Weak and Strong forces.

4. The Geometry of Dium

Theorem 2: The union of two or more diums of max cardinality N results in the same N ie; two lines are not a plane. Proof trivial.

Theorem 3: The intersection of two or more diums of max cardinality N results in the same max cardinality N. ie; ditto

5. The Nature of Time

Two competing models of time are presented with very different characteristics.

Axiom 5: Temporal change implies a delta in time from T0 to T1. If no time is present, there cannot be change.

Theorem 4: A static universe will always remain static.

Proof: Given a static universe which is the union of ALL dium, ANY introduction of delta time requires time to do that, conflicting with the prior assumption of static universe. You cannot find the time to introduce delta because it's all static as per the definition.

Type 1 Time: Container + Dynamic Now
1. Incorporates an extra chronolium and chronodium as a N+1 container dium for N-dium universe.
2. The NOW is the transition boundary and moves from history to future, partially analogous to a growing crystal.
3. The Arrow-of-time direction is well defined: past to future.
4 Time travel is not ruled out, but not guaranteed either.

Type 2 Time: Dynamic Now
1. Requires no higher-cardinality dium to function in a N-dium universe.
2. Is an intersection dium with the universe providing a morphing ability to effect change.
3. No room for a history store, nor a future store, just a dynamic now.
4. Where a spatial dium provides storage ability but no change, a Time dium provides for change ability for a spatial dium.
5. The Arrow-of-time is not well defined, only a transition.
6. Time travel is ruled out because of lack of time storage.

The Dynamic Now object is self-sufficient for time progression. This object seems to be distinct from the static storage of temporal history which any container dimension can provide. This object seems to be a second kind of object distinct from dium. This may require an addition to the Dium Order.

6. Origin of Mass and Inertia

1. A particle with mass is in an equilibrium state when it's at the center of its warp in space.
2. The gravity well of a particle is more than a side-effect of the mass of a particle: the gravity well is the origin of mass and inertial effects of the particle.
3. When a particle is struck by another particle, it moves non-smoothly out of its centered position into a state of dis-equilibrium. It is the dis-equilibrium of the gravity well that resists this non-smooth jolt, not the particle. Therefore, particles with no mass, and thus no gravity well, have no inertial resistance to acceleration. It is the adjusting of the gravity well around a particle which is the origin of inertia. This decouples mass from inertia.
4. When particles with mass collide among themselves repeatedly they cause particle acceleration. This kind of motion exhibits the inertial resistance to acceleration by the particle because **the particle collision is inducing the motion and causing dis-equilibrium with its warp of space**. Thus a space ship launches from the ground with considerable acceleration forces felt by astronauts.
5. When a particle's warp of space encounters another warp, the warped fields themselves, not the particle, induce the motion of the field. When such a field-induced motion occurs, the particle is brought along with **no inertial resistance to the acceleration**. Thus a space ship already orbiting earth is accelerating and has no inertial effects.

7. Predictions

1. A particle and its warp of space **need not always be together**. If a particle is detached from its warp of space, then the particle has no gravitational field, thus no mass, and therefore is not affected by gravity. Such a particle has spatial extents, boundaries, and maybe charge, but no mass.
2. Correspondingly, the separated warp in space now has no particle associated with it, but can continue to exist. Since it is the warp in space that is the effect of gravity, **the warp continues to exert gravity** and is affected by gravitational fields. Such a warp in space without an associated particle is an ideal candidate for the elusive "**Dark Matter**" phenomenon. This is not a black hole. It is gravity without a particle.
3. Concerning "**Dark Energy**" and the seemingly accelerating expansion of the universe, Axiom 3 defines dium as energy. It's trivial to see there is clearly enough energy to expand the universe, but no mechanism is provided here. Here the solution is split into two parts: mechanism and energy to drive the mechanism. We provide a solution for the latter, thus half ways there.
4. There is no limit to the size of a rotor wave. A standing rotor wave is possible and is highly undetectable until intersected with.
5. If two equal but opposite rotor waves were superimposed, the *effect* of this is to net cancel their effect. However, **the two super-imposed waves continue to exist**. This is a way of hiding and storing waves/energy.

8. Fields and Particles

Opinion: It may be possible that dium are where the important scientific study should be focused, instead of the current particle based research, even for the search for intelligent life. Ie; it's possible the non-particulate universe is where the important action is, the particles being mere flotsam.

9. Extra - Razor and Question

1. Patricks Razor - **Natural dimension XYZ+T cannot be denied existence without also removing the x, y, z and t variables from equations.** The Dium is what provides these variables in the first place.
2. Patricks Question - What is natural dimension made of?

Many models use the X,Y,Z and T coordinates yet don't declare the 3-D volume is a real thing. Being required to declare the dimension up front as a thing of type Dimension existing in Nature forces the Dium TOE to then consider what are the properties of this Natural object. However, the strict modeling rules don't go the extreme in Philosophy that would require a Blank Slate to first begin with an Alphabet and Language (Syntax and Semantics) before using words; no need to go that far, but that extreme is noted and the choice is that it is unnecessary. Besides, if we did go to that Philosophical extreme, it would be circular to start with "first we will assume the English Alphabet", because that uses English already to say we will subsequently use the English language. The intent is not to criticize Philosophy, its role in inquiry has a place, just that brevity is also important.

Note 2: There is no mention in the Dium TOE of "brane" nor "membrane" nor "M-Theory" because those are connected to String Theory and the Dium TOE does not intersect with that model. The Dium TOE is specifically limited to 3-Space (tridium) with time progression, and two competing models Type 1 and Type 2 of time. In the Communication “Space is an Object in Nature” it is argued that while the “strings” dimensions in String Theory (unidium) vibrate in 3-D spacetime (tridium) or in the Bulk to represent a particle/wave, the Dium TOE continuous natural dimension tridium also supports oscillations which are a kind of vibration, yet without requiring strings or unidium. The concept or metaphor or principle of a vibration could possibly be entirely subsumed by the tridium property of oscillation, thus potentially mapping much of String Theory in the Dium TOE which requires only 3 spatial dimensions with time progression, a far simpler model.

Furthermore, regarding Many Worlds and Multi-Verse, it should be pointed out that the Dium TOE doesn’t disprove those, but merely makes the observation that those can’t be proven from the Axioms of the Dium TOE. Proof of those two models is left to others. Still, it should be noted that tridium, being continuous and with stretch property, can provide a little support for these two models in a way. Any single 1cm sphere of tridium could be stretched to the size of a full universe outside in a higher container quadium or the Bulk. That newly expanded universe can have a 1cm sphere to repeat endlessly, accounting for where does the tridium come from for Many Worlds and/or Multi-Verse. Those don’t need to be expanded from one, not child of, but simply observing continuous natural dimension can do that. This is what “continuous” means, just like the Real number line can be stretched to the ends of the universe and there is no running out of Real numbers. Take 1cm of that stretched Real number and repeat it. The property of “continuous” allows for this. This is also how the energy of space doesn’t dilute in the accelerating expansion of the universe, there is always more tridium that can expand, and in the Dium TOE tridium is energy, so it can’t dilute.

How the Dium TOE Fits with Other Physics Cosmological Models

Note 1 - The Dium TOE does not necessarily exclude nor disqualify other Cosmological Physics models of our 3-D Universe with Time Progression. As such it can coexist with several other models. It is unnecessary to discard these other models as they seem to already have the Mathematics within them to be correct, but just aren't Theories Of Everything. Those models and how the Dium TOE coexists with them are:

1. Classical Mechanics - Galilean transformation and Isaac Newton's Dynamics including the formula for gravity, all these valid for slower, non-relativistic velocities.

2. James Clerk Maxwell’s equations of electromagnetism. This doesn’t need help from the Dium TOE.

3. Albert Einstein's Special Relativity and General Relativity and Field Equations. Only a slight addition of a Rest Velocity against Space Itself is what the Dium TOE contributes, else SR/GR is fairly tight. A possible weakness in SR/GR is that there is not allowed a universal frame of reference, only specific observer's inertial frames. There is not allowed in SR/GR a universal "what happened", only "what can be measured by an observer in a reference frame". This Lorentz Invariance is challenged and even refuted by the CMBR dipole anisotropy which every inertial frame can measure itself against. But this doesn't mean throw it all away, relax it to allow a Rest Frame against Space. It should be pointed out that Gravity in GR has space curved, proven by the famous eclipse with star light curved due to the Sun's gravity, but the Dium TOE density explanation of gravity would do the same to starlight and is conceptually easier to grasp. When dium is a thing, it is easy to imagine how its density is thinner closer to the Sun or planet. But when space is nothing it is pretty difficult to imagine nothing density changing. AE's field equations seem to keep being proven repeatedly, keep them.

4. Periodic Table of the Elements. This doesn't need help from the Dium TOE.

5. Standard Model of Particle Physics and Quantum Mechanics (QM, QFT, QED, QCD). The Dium TOE would accept the 12 quarks and leptons, but has a different interpretation of what the bosons are that mediate the forces, and Higgs field is merely Axiom 3 with gravity attraction described differently, retaining a curved space but the curve is merely density but not space pressure. The Dium TOE itself doesn't explain the mystery of the 3 Generations of Matter, but the author takes a crack at that in "Dium TOE Solutions To 12 Intractable Challenges in Physics And Cosmology : Space Object, Dark Matter, Dark Energy, Nothing, Time, Vacuum Catastrophe, Neutrino Oscillations, Particle-Wave Duality, Velocity Against Space, Three Generations of Matter, Double Slit Experiment, and "Nobody Really Understands Quantum Mechanics""[4]. The 3 Generations of matter *could* be a 3-wave train of time, only our generation stable and the other 2 slightly out of our time or even *phase*, but with Neutrinos able to "oscillate" across all three trains or *fronts* and thus curiously change their mass. It's entirely hypothetical, and that their uniqueness without charge is likely their mechanism to achieve that.

6. Werner Heisenberg's Uncertainty Principle. The assumption in it is that a particle is the smallest unit and there is uncertainty in both its measured position and/or momentum, the measurement apparatus itself disturbing either of these two. But the Dium TOE continuous natural dimension has continuity infinitely smaller than a particle, so as a particle moves through the continuum there may be a trace left however small. Such a trace may provide information of the particle which traversed that continuous natural dimension volume. Thus, the continuous natural dimension has a sub-particle scale and sub-Planck scales, allowing for the possibility of Certainty to return to Physics. It may return Certainty for Particles, and maybe not for continuous phase tridium. Ie, the Uncertainty Principle may have to move down to the infinitely small continuity of tridium, but allow Certainty at the level of particles and waves and/or Planck scales. Or not, TBD. In the Dium TOE Max Planck's scales would need to be adjusted to be applicable only to particle phase of dium since those scales obviously aren't a limit to continuous phase dium which has no lower bound.

7. The rest of all the Euclidean Geometry, Non-Euclidean Geometry, Algebra (al-jabr, Muhammad ibn Musa al-Khwarizmi) , The Calculus (Isaac Newton and Gottfried Wilhelm Leibniz independently), Descarte's Cartesian Plane, Albert Einstein, Max Planck, and any others I failed to mention who invented the Geometry and Mathematics necessary to all the models referenced in this paper deserve credit.

Constraints of Discrete Properties and Continuous Natural Dimension

Particulate-based (corporeal) beings who have experience based on particle collisions naturally want to apply the properties of particle physics to the continuous diums, but that is erroneous. The continuous phase of tridium is not constrained nor limited by the laws of particle physics even though particles are phases of the dium. Examples:

1. Air pressure in an atmosphere is an expression of free particle collisions, but the continuous phase of tridium doesn't have pressure. The continuous phase tridium can contain a planet with an atmosphere. The atmosphere itself has air pressure, but this pressure is not pressure of the continuous phase tridium.

2. Temperature in a solid, liquid, gaseous or plasma phase material is an expression of free particle collisions. Particles are the solid phase of tridium. Collisions belong to particles. But the continuous phase of tridium itself has no temperature.

3. A collection of discrete material atoms in gaseous phase in tridium, such as an atmosphere, can be expanded volumetrically and the constant number of objects themselves will retain their individual sizes, but the gaps between the objects will increase. Generalizing, any discrete region that is expanded to larger region will form gaps between the original discrete objects. Examples: A hot air balloon gas flame heats the contained air which expands to lesser density, some air escapes out the unsealed balloon, resulting in more gaps between the atoms now moving faster, and the balloon rises.

A Lot About Nothing, No Thing, and No Dimension

Definition 3: The word "Nothing" or "No thing" is overloaded in English with at least 3 uses and is described in the Paper "Dium TOE Solutions To 12 Intractable Challenges in Physics And Cosmology...":

1. **Weak Nothing** - An empty cardboard box on Earth is full of air and em-waves passing through it. There is a lack of solid and liquid phase matter in this volume, but allowing for gaseous phase such as atmosphere and vapor as long as the vapor is not a fog, and allowing for electromagnetic waves to be traversing the volume, and anything else non-visible and non-interacting traversing it like neutrinos. Thus, it is said the cardboard has nothing in it.

2. **Medium Nothing** - The purest sense of a dium like tridium in the continuous phase, no particles nor waves, the dium is quiescent, not jiggling. It may be necessary to allow the dium to be jiggling to match our tridium universe. Thus, the cardboard box in space has Medium Nothing.

3. **Strong Nothing** - Lack of dimension itself. For example, there is no proof of 5-D through Infinity-D higher level diums. We'll assume those (5+)-D diums are Strong Nothing, don't exist. It is simpler to assume they don't exist since we cannot prove they exist, than to assume they exist yet cannot prove they exist, the latter requiring tremendous extension allocation. In the planar universe bidium, if it had a hole without bidium, that hole could be called Strong Nothing. Such a hole lacks bidium, so planar life forms or flatlanders could not travel there, and no light traverses it. Matter in bidium Flatland cannot cross into

Strong Nothing because matter is the solid phase of bidium. No coordinates exist in such a hole. A line segment in flatland whose length is larger than the circumference of the round hole cannot pass through the hole, the best that can be done is the line segment mysteriously wraps around some invisible "Strong Nothing".

Analogue or Metaphor of Strong Nothing - There is an incomplete analogy to Strong Nothing that is easily demonstrated by people with eyeball vision. The blind spot of each eye is ~1.5° degrees below and 12-15° degrees ear-ward from the center of visual focus. In vertebrates it originates where the optic nerve exits the eye ball at the back and lacks rods and cones, except in Cephalopods which have a superior evolution. If one closes or blocks one eye, with one hand outstretched in front wiggle a finger while moving the hand towards the blind spot. The peripheral vision will sense the wiggling finger, but when the finger is in the blind spot the wiggling is gone. Note that human single-eye vision is not a picture and the blind spot isn't black. Even a black spot on white paper in your peripheral vision away from the blind spot registers as being present with a lack of color. But the blind spot is effectively analogous to lack of dimension where dimension is X-Y coordinates. There is a hole in the dimension where nothing registers. It isn't even black which is called the absence of light. There is simply no dimension there to even register no color (black).

The color black is the absence of light photons in the visual field. Lack of a visual field is lack of visual dimension; no dimension to color it black. Fortunately, two eyes combine to make up the human visual field so the other eye fills in this hole in the other. The human field of vision is about 200° degrees wide and about 135° degrees vertical. Outside of this around the back is effectively a "blind-region", nothing registers because there are no rods nor cones capable of receiving photons from behind your head. This is an incomplete analogy as here the visual field is called a "dimension" and it has Cartesian Coordinates, but is entirely contained within the tridium 3-D space. So the visual field isn't a dium. A dium is reserved for a universe.

Basic Axioms and Properties of Diums in Principle

In every N-dium universe any subset is bounded by its dium. Here we "walk across the dimensions" from lower to higher establishing a repeating pattern whose base case is 0-D zedium and point. This does not say each dium exists in nature, but merely establishes a pattern or law from lower dimension into our tridium universe which we know exists. Diums here are universes, not mere abstract geometric objects whose limits can be explored elsewhere.

These examples demonstrate containment principles that higher diums may conceptually contain lesser diums geometrically, but that doesn't imply flatland nor lineland exists inside of tridium. It is merely to demonstrate the limits of the bounds of lesser diums are less than higher diums. Furthermore, this doesn't explore that a line could be 90 degrees through a plane, because that would imply either a higher container volume or the Bulk to allow that. Conceptually it is an easy thing to imagine, but there is no actual evidence such things exist or are real. It is preferred to Keep It Simple Sir, no higher diums needed yet.

1. Diums cannot extend outside their own dimension.

1. In a 0-D universe a point cannot extend out of its zedium point.
2. In a 1-D universe a line segment cannot extend outside of its unidium line.
3. In a 2-D universe a plane area cannot extend outside of its bidium area.
4. In a 3-D universe a volume cannot extend outside of its tridium volume.

1. A point can exist in a unidium, bidium, tridium, and higher diums.

2. A line segment can exist within a unidium, bidium, tridium and higher diums.
3. A plane area can exist within a bidium, tridium and higher diums.
4. A volume can exist within a tridium, quadium and higher diums.

2. The finite extensions like line segments, areas and volumes are bounded at their perimeter when they are within their same rank dium:

1. A point occupies all the extents of a zedium.
2. A line segment in a unidium has two end points which bound the interior of the segment from the exterior of the segment.
3. An area in a bidium has an exterior edge which is a curved line which bounds the interior of the area from the exterior of the area.
4. A volume in a tridium has an exterior surface which is a warped plane which bounds the interior of the volume from the exterior of the volume.
5. A N-extension in a N-dium has an exterior (N-1) extension which bounds the interior of the N-extension from the exterior of the N-extension. (Generalized)

3. An N-extension (line segment, area, volume) within a same rank dium (unidium, bidium, tridium) has an interior which is bounded within the same rank dium, but is unbounded in a (N+M)-D (higher) dium.

Examples:
1. A sealed fluidic line segment leaks its interior when in a plane.
2. A sealed fluidic area leaks its interior when in a volume.
3. A sealed fluidic volume container leaks its interior when in a quadium.

1. Linear segment beings who travel to the plane universe will spill their interior segment into the area because 2 points can't contain a line segment in bidium.
2. Areal plane beings who travel to the tridium universe will spill their interior area into the volume because a line can't contain an area in a volume.
3. Human beings are near sealed volume containers. Travel into the fourth dimension would be fatal as the surface container (skin) of the volume can't contain a volume when inside a 4-dium (Quadium) region.

From these simple examples we have this Proof:

Proof our 3-D Universe isn't inside a 4-D Block Time (Type 1 Time in the Dium TOE)

Proof our universe of tridium with Time-Progression isn't the quadium Type 1 in the Dium TOE or aka 4-D Space, aka Block Time.

Here the proof is the same argument starting in a 1-D universe (line) with a container which is a region (line segment) bounded by 2 points. The bounds are always objects of 1 less dimension, so it is a 1-D line segment bounded by 0-D points. Interior is the what is bounded by the outer bounds. Repeat this for each of 2-D and 3-D containers. The 3-D container will be the proof.

1-D Container placed in a 2-D universe.
All 1-D containers (line segment) with fluidic interior leak their internal fluid in a 2-D Area because the fluid which is constrained by a points is not constrained when that line segment is in a plane area. The higher dimension exposes the lesser-D container interior.

2-D Container placed in a 3-D universe.
All 2-D containers (circles) with fluidic interior leak their internal fluid in a 3-D Volume because the fluid which is constrained by a line is not constrained when that area is in a volume. The higher dimension exposes the lesser-D container interior.

3-D Container placed in a 4-D universe.
All 3-D containers with fluidic interiors leak their internal fluid in a 4-D Quadium because the fluid which is constrained by a surface is not constrained when that volume is in a Quadium. The higher dimension exposes the lesser-D container interior. Since we do not observe sealed containers in our reality leaking their interiors, this constitutes proof that Time in our Universe is not 4-D Type 1 allocated history and future time (Block Time).

4. A N dimensional container cannot fully contain a N+1 (higher) dimensional object.
examples:

1. A point cannot fully contain a line.
2. A line cannot fully contain plane.
3. A plane cannot fully contain a volume.
4. A volume cannot fully contain a quadium.
5. A N-D cannot fully contain an (N+1)-D. (generalized)

5. A N dimensional container can fully contain a N-1 (lower) dimensional object.
examples:

1. A N-D can fully contain an (N-1)-D object.
2. A quadium can fully contain a volume.
3. A volume can fully contain a plane.
4. A plane can fully contain a line.
5. A line can fully contain a point.
6. A point can contain itself.

6. Higher Abstract dimensions are always possible at right angles to N-D objects.
examples:

1. At right angles to a point is a line extension.
2. At right angles to a line is a plane extension.
3. At right angles to a plane is a volume extension.
4. At right angles to a volume is a 4-D extension.
5. At right angles to a 4-D is a 5-D extension.
6. At right angles to a N-D is a (N+1)-D extension.

But, just because one can imagine in the abstract that right angles can exist to any dium doesn't mean that such a higher dium exists in reality. The difference is abstract versus reality. We have proof of tridium with time progression, no more.

Analysis

At right angles to volume could be 4-D time future and history in opposite directions. Just because we can conceive of a time future and past doesn't mean the extension is a reality that exists. The storage for 4-D future and history cannot seemingly be proven by lower 3-D spatial dimensional creatures unless someone can travel to the future and bring back something not yet invented, or travel to the past and bring back something like a dinosaur egg. There is danger in using higher dimensional diums to solve problems in the present dium because the higher dimension cannot be arbitrarily traveled to for inspection. One can remember history but that is abstract, not real now nor is remembering history the same as traveling back in time. There is no proof of travel back into history and paradoxes present when a change would be made that prevents the existence of something in the future, yet that exists in the present with a clear history back to its inception, now broken by the change made by the time traveler back into the past. Such a disconnect would be a physics violation as effect becomes disconnected from cause.

About the "Bulk" referencing higher dimensional membranes. The word "bulk" has many different meanings. In dimensions it can mean the higher 4th or if time is a full dimension then the 5th and potentially higher dimensions containing our 3-D spacetime or tridium with time progression. The name given to higher diums as containers of our tridium or quadium universe. Conceptually there are abstract higher dimensions which contain our universe. Those higher dimensions are called "The Bulk". There is no evidence nor proof of the actual existence in reality of "The Bulk". It seems convenient to assume it exists as higher dimension cannot be disproved, but that isn't proof of existence. Even "wormholes" make use of this higher dimensional "bulk" to tunnel through a flat sheet of paper folded in half and with a straw stuck through both sheets, or even a wormhole in 3-D space (tridium) going into the 4th or maybe 5th to exit our space/tridium and attach to a distant place as if tridium is folded in the Bulk.

There are some limits of the abstract "bulk" which is a Strong Nothing or a higher dimension or all the higher dimensions. A 3-D particle cannot exist in the Bulk because the Bulk is abstract and dimensionless. If a higher dimension is needed for a 3-D particle to exist in, define that N dium and declare its existence and then there is the burden to prove it exists in Reality. Don't just rely on the dimensionless Bulk to tunnel wormholes through. The Dium TOE is about where we are certain of. The Bulk has a lot of unknowns and little proof.

A particle is a phase of tridium (with time progression), therefore it cannot exist outside of tridium in higher nor lower dimensions.

Regarding the 17-24 fields in Quantum Field Theory (QFT) of the Standard Model of Particle Physics, the Dium TOE continuous natural dimension object tridium subsumes all those fields, which were abstract anyways. In QFT the 17 can be counted as: the 12 fermion fields (6 quarks + 6 leptons) and the 5 boson fields (photon, 3 Weak Guage Bosons W-, W+ and Z, and gluons, 1 Higgs field). However some count 24, this isn't settled yet: the 12 fermion fields (6 quarks + 6 leptons) and 12 boson fields (8 gluons + 3 weak + 1 photon).

Each field in QFT is assumed to occupy all 3-Space and "overlay" on each other, overlapping. It is convenient to use dimensional-reduction presentation methods and reduce from 3 to 2, showing a Cartesian plot laying flat in 3-D space with grid lines and a 3-D bump in that grid which is meant to represent the particle or boson. All 17-24 fields thus can be visually represented as overlapping grids like this, perhaps colored different to distinguish them, with bumps as particles. Dimensional-reduction is merely a presentation technique, not reality, just as an X-Y plot of atmospheric temperature by altitude is a good representation but is abstract. The plot or the 2-D field should not be considered as reality. If QFT fields span 3-Space, then they should be representable as 3-D plots. What is the "bump" in 3-space? The bump which is a particle should be a representation within the volume where it actually exists.

While it is convenient in QFT to represent particles like this, the Dium TOE makes an effort to eliminate all the fields and use simple properties of tridium for gravity, charge, magnetism, strong and weak forces (variants of each other), and the Higgs field. See the Communication "The Dium TOE Subsumes All Fields Implicitly" [5], included.

Magnetism in the Dium TOE is considered to be actual loop flowing of tridium. The magnetic field lines in popular diagrams are retained in the Dium TOE but instead of being mere representation of field force, they become actual traces and amount of flow of space/tridium. Now that space is a thing in the Dium TOE, it can flow, something quite impossible for "nothing" or the "void" to do. Furthermore, because magnetism is loop-flowing tridium, it moves through a source through a destination. Neither source nor destination is a "sink", and a proof is provided which rules out Magnetic Monopoles [6], and included. By making space, which was prior "nothing" or a "void" or "vacuum", into a continuous natural thing allows for it to have significant properties. This is another advantage of the discovery that Space is an Object in Nature [7], included.

The document "On Applying the Dium TOE [8] covers almost all of this, included.

Any good new Theory Of Everything of course should explain things simpler. The reduction of 17-24 fields into the tridium properties is a significant simplification. Also simplified are the forces as mere properties of the tridium. But the Dium TOE excels beyond simplification. It can be used in a way no other current TOE can to extrapolate farther into new ground: On The Design of the Gravity Drive Attraction Engine [9], patent pending provisional, included. This is simply putting matter-antimatter annihilation to practical use of its warp, not its heat energy release. Capture the heat energy, store and release it later. The warp will attract as gravity naturally does. Furthermore, in a space ship the warp pulls all matter forward; the ship and occupants equally, so inertial effects are neutralized. Near-instant acceleration, deceleration and turns are the properties of a ship powered by the gravity drive. *It's possibly the measure of intelligence of a species in the galaxy/universe is if they have figured out gravity drive yet. Humans prior figured out wheel, balloon, steam, gasoline, electric motor, flight, jet, rocket and ion drive; one more to reach gravity drive.*

As the Dium TOE is a Reality-Class model vs Predictor-Class model [10], this is detailed, included. This establishes that all models of the Cosmos and Physics have two types they can be: Predictor Class and Reality Class. A model can be neither, one of the two, or both. Modern Physics with the Standard Model with Quantum Mechanics and General Relativity are Predictor class. QM is a highly successful Predictor Class model and has many applied uses. But Predictor Class models aren't necessarily Reality Class and they shouldn't be expected to answer the Standard Reality Class question: "What is natural dimension made of?".

In fact, in QM there is a phrase that expresses this sentiment, “Shut up and calculate!”. That is supporting evidence QM isn’t Reality Class. Just because a model isn’t Reality Class doesn’t mean it isn’t useful. Use it, just don’t confuse it with Reality. The bizarre case of Schrodinger’s cat being both alive and dead simultaneously (superposition) is all the evidence needed that QM isn’t Reality. Of course the cat is one or the other, proven when measured. Asking a Predictor Class model to perform Reality Class tests is not what they are designed for. It is okay to ask if Schrodinger’s cat is alive or dead before measuring in the Dium TOE model because it is Reality Class, but to only measure the cat’s health in QM. The Dium TOE has explicit Theorem 1: Natural dimension continues to exist when observers stop measuring it, and the supporting trivial proof by indirect method, included.

General Relativity is closer to Reality Class than QM by far. This is why AE often argued that “God doesn’t play dice with the Universe”, that QM’s probabilities aren’t Reality. Einstein’s General Relativity doesn’t requires probability functions like Schrodinger’s equation uses.

However, did Albert Einstein admit or declare spacetime was an object in nature? Did he say that spacetime was a continuous natural object of type Dimension? Did he say spacetime was what transmitted electromagnetic waves? Did he say space has compression, twist and loop-flow properties? He seemingly said early on that spacetime was ether, and then later refuted that, so perhaps he did both. But ether is less than continuous natural dimension object. Can one get credit for calling spacetime ether, but then also get credit when declaring it isn’t, or is the latter rejection of ether a “correction” and thus credit for refuting the ether error. But refuting ether isn’t affirming continuous natural dimension object. Ambiguities like these are some of the reasons the Dium TOE begins with the formal modeling rules UP FRONT, no sneaking around them. Dimension and its properties MUST be declared because all models start without dimension, else ambiguity results which has allowed Physicists in GR to both conclude spacetime isn’t a thing in nature, and also that it is a thing in nature.

In the Dium TOE big picture, the Dium Order diagram in the Dium TOE page 1 of 2, far right center, shows how dium is the base of nature. All of particles and forces and fields are higher level properties of the dium. Aggregations of particles Protons and Neutrons are the next level up. Atoms and the Periodic Table of the Elements are next higher, and then compounds of those. Aggregates like meteors, asteroids, planets, stars, galaxies, and galaxy clusters follow to the Universe.

The Einstein Field Equations (EFE) relate how the curvature of space is related to matter. Can a simplification be made? At low velocities the EFE reduce to Newtons law of gravitation. But can the EFE be simplified at all the higher velocities?

In the Dium TOE the properties of tridium are continuous, particulate and constant. Constant is unchanging, conceptually like history if Type 1 (block time), but Type 1 isn’t assumed (and seemingly refuted elsewhere in this paper). Particles are compressed tridium with a literal twist (charge), and held that way as if Constant phase was applied, but annihilation with its antiparticle charge will release both the mass and charge. Continuous phase has elastic, flowing and twist for gravity, magnetism and charge respectively. In the Dium TOE the Strong force is considered to be merely a special fixed hook shape of tridium whose arc is a fractional 1/3 or 2/3 positive/negative of a whole twist, conceptually like a fish hook. The Weak force W+, W- and neutral Z bosons are considered to not be actual particles but compression in tridium which rapidly compress inward and then rebounds back to neutral space, accounting for the high if fleeting “mass” of the Z equal to a whole Iron atom. In fact the energy of this Z bounce/rebound compression might be put to to use in the “Design of the Gravity Drive Energy by Annihilation of Matter and Antimatter” communication, included. If the compression vectors are perfectly inward/outward without twist, that is the neutral Z. If a twist is involved, that is the W+ or W- depending if the inward twist is positive or negative. The twist takes some of the energy that would be devoted to compression, about 1/9th of the mass of the Z is subtracted off

to get the mass of the W+-, this was explored in "The Dium TOE Subsumes All Fields Implicitly", included. Only elastic stretch (gravity) seems to have the long distance range. Twist (charge) and loop flow (magnetism) are seemingly shorter range except when combined as an electromagnetic wave, but such em-waves are effectively constants transported long range, not like stretch which is volumetric long range. This Dium TOE interpretation of Nature needs more work to see if it can provide a simplification to the Einstein Field Equations, preferably less Math and leaning towards Geometry.

Regarding LIGO detection of Gravity Waves, there is a fine point that needs to be explored. Exactly what is this wave? The https://www.ligo.caltech.edu/page/gravitational-waves web page says:

> Gravitational waves are ripples or vibrations in space-time (the fabled "fabric" of the Universe) caused by massive objects moving with extreme accelerations. In outer space that means objects like rapidly rotating lumpy neutron stars, or neutron stars or black holes orbiting around each other ever closer at ever increasing rates and eventually colliding, or stars that blow themselves up (a supernovae). These ripples travel through space at the speed of light in all directions from their source, dissipating in strength with distance, and passing through everything in their paths.

From this definition, it seems like the gravity waves are an emanation from the colliding objects. The Dium TOE can offer a slightly different interpretation. In the Dium TOE gravity is a compression of space. This compression extends infinitely in all directions but is reduced at distance to be negligible far away, meaning the gravity may not be detectable at large distance away. But the tension or stretch of space is there, it is only a question of being able to detect it. Two black holes of mass M1 and M2 are assumed to merge into a combined CM black hole of mass M1+M2 = CM + Egw where CM < M1+M2 and Egw is the mass energy difference released as a gravity wave(s). The extra energy Egw that is missing from CM is released as energy of the gravitational wave emitted in 3-space.

The Dium TOE would interpret this differently. The two masses M1 and M2 are from far, far away effectively a single M1+M2 unit, just as the Earth close up is distinct atoms but far away can be modeled as a unit centered at the origin of the planet. At this far distance space has the tension of this compression in it. When the two combine they transition from M1+M2 to CM which is less than their sum. Less mass is less gravity, so the stretch of space is less. The tension of space will decrease outward at the speed of light going in all directions. The Dium TOE says this wave is merely a re-tensioning of space from tighter (more gravity) to less tighter/taut. The Dium TOE interprets that the leading front of this wave longitudinal wave is returning space outward. Prior M1+M2 masses stretched space to them, after merger the combined lesser mass un-stretches space releasing the tension outward. Once the wave has passed, the tension or stretch of space should be less than before. A dimensionally-reduced 2-D rubber sheet stretched taut and pinched compression (not a ball indentation) has stretch/tension which is released when the pinch is relaxed.

The evolution of the tridium in extreme time forward and backward is accomplished by Axiom 4 and Theorem 4, the latter that a static universe has to remain static because if it changes from static to dynamic time, it took time to introduce that change, but it was assumed static to start. Since we are dynamic, the initial assumption of a static universe was false. This generalizes to time progression has been forever. Therefore, it can be concluded the Big Bang was not the start of our universe; time didn't begin then. Also, Axiom 4 is the conservation of dium so space cannot have been created at the Big Bang, it had to exist prior. From these we have arguments that the Big Bang wasn't the beginning. A most likely scenario is the Cycling Universe from a prior U-1 universe collapsing all or part to become our U(0) universe, which itself will at some future time collapse back to "refactor" or re-formulate a U+1 universe, then U+n infinitely forwards. Similarly there were prior U-n universes infinitely to the past. Our universe seems to be Cyclic, with the Big Bang initial start replaced with a Big Bounce or Big Rebound from the prior universe. The Z boson itself is modeled at the tiny scale of space and time as such a rebound in the Dium TOE, similar except for scales.

The Dium TOE Electromagnetic Wave Oscillation

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

The Twisting Oscillation Back and Forth

The Dium TOE models electro-magnetic waves (em waves) as an oscillating twist of tridium one direction, then back in the other, repeating endlessly or until the em-wave is absorbed.

In such an oscillation there are two properties that are of interest. One is the rate of motion of the twisting and the other is the amount of twist. A the diagram on right the view point is looking down from above the axis of oscillation rotation spin. This is not the QM spin in the Standard Model.

In the #1 diagram at the right a volume of space is a sphere and its diameter is the wavelength. That volume has no twist relative to adjacent space at exactly when the motion, showing by solid arrow, is at maximum rotational speed. It is crossing neutral (no twist). This is maximum twist speed, and Dium TOE loop flow is magnetism, so this magnetic field is at maximum. As there is no twist, the charge and electric field is at 0.

In #2 at right, the rotational velocity has stopped and the arrow is now a solid dot indicating no rotational velocity. No rotational velocity is no loop flow, so the magnetic field is 0. Compared to adjacent neutral space, this sphere has a twist which has maximized. Twist of space is charge so the electric field has maximized.

In #3 the rotational velocity has increased to maximum in the opposite direction of #1 to undo the twist completely. Maximum rotational speed is max loop flow so the magnetic field is at maximum. Space has no twist at exactly this point, so there is no charge nor electric field.

In #4 the rotational velocity has stopped as in #2, the arrows turned to dots indicating no rotational velocity. The twist shape has reached maximum opposite of #2, so the charge and electric field is at maximum.

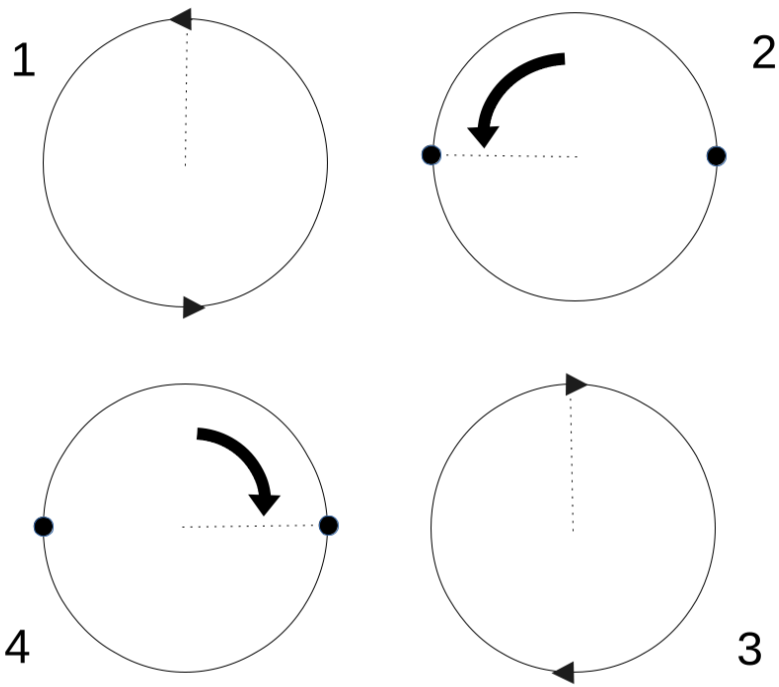
The next state is back to #1. This oscillation is a property of tridium. While it would be convenient to think of this as a rubber ball, there is no compression of space because compression of tridium is gravity and em-waves don't exhibit gravity. It seems to simply be a foundation property of tridium that it can oscillate this way without a way to derive it from basic properties. In this diagram the maximum angle of twist at #2 and #4 is 90 degrees, but that is merely for demonstration. The actual amount of the maximum twist is TBD, it could be higher or lower.

Because one of electric and magnetic fields maximizes when the other is 0, this is different from the popular plots which show both electric and magnetic fields maximizing simultaneously in phase opposite of each other. The Dium TOE stands by its model of one maximizing when the other is 0 and that the plots of these fields need correction. This would be a way to refute this model of the em-wave.

The exact shape of twist in 3-D is not provided, only that there is a neutral with no twist and a maximum twist. The relation of the twist at center to edge to outside edge isn't presented. The Dium TOE Definition 15 allows for rotor waves as an oscillation, and then declares the em-wave is a rotor wave.

An Oscillating Twist in Tridium

Looking down from above along axis of rotation/spin.



Rotation velocity (small arrow) vs internal twist shape (arc arrow). Each maximizes when the other is 0.

1) EM wave has no twist but crossing neutral fastest in oscillation. No electric field, max magnetic flow/field.
2) EM wave at max twist so 0 rotation movement, maximum volume twist. Max electric field, 0 magnetic flow/field.
3) EM wave has no twist but crossing neutral fastest in oscillation other direction. No electric field, max magnetic flow/field.
4) EM wave at max twist other direction so no rotation movement. Max electric field, no magnetic flow/field. Return to 1.

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The Dium TOE Particle-Antiparticle Creation

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

The Combined Twist and Compression

The Dium TOE models matter and antimatter creation, or a particle and its anti-particle, as a simultaneous combination in tridium of a twist and a compression of space at the same exact place.

At the right top diagram there is a side view looking towards a compression in 3-D space. The compression grid looks the same from the front view. The side view shows an oscillation twist such as from a gamma ray (highly energetic electromagnetic wave). If this were a simulation the rotation would oscillate back in the other direction, but here we have frozen time to see the rotation at just this instant.

The Side View would be looking from the right towards the left of the Front View. The Front View shows the rotation going from top towards the reader outside the picture and then back into the picture down. If continued the rotation arrow would go around the bottom and up the back side of the objects and come up to top. It's conceptually like a wheel spinning such that if on a table it would approach you, in this oscillation only.

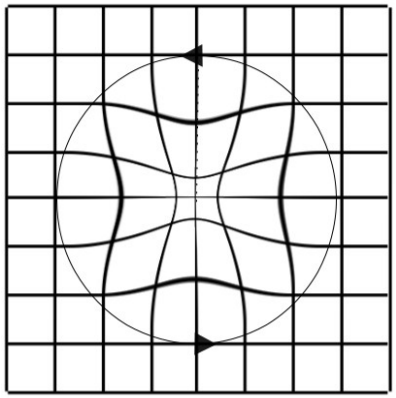
The twists and compressed space somehow break in half and are nearby each other. Two charged particles can't occupy the same space, perhaps that is why they spit. Their proximity with opposite charge can bring them back together to unravel (annihilate). If the particle is an electron/positron pair, then if another particle hits either that can move them apart to live longer, else their opposite charges may draw them together to annihilate. If it is a quark/anti-quark pair, these don't live by themselves so another quark would have to hit one and stick together, and if three (2 Up, 1 Down) intersect they are called a Proton. Ditto if 2 anti-Up and 1 anti-Down to form an anti-Proton.

The actual amount of rotation is either 1/3, 2/3, or full circle, producing a 1/3, 2/3, or full 1 charge with the direction of corkscrew twist being the positive or negative of the pair, one positive and negative each time because the corkscrew twist is cut in half. That leaves two equal and opposite cork-screw twists. Neither twist is a duplicate of the other no matter what direction it is viewed from. From the tip of each viewed through its central axis each corkscrew is the equal twist but opposite direction accounting for equal and opposite charge. It may be possible to normalize twist so that 1/3 is actually 1, 2/3 is 2, and 1 whole is 3. The twist may or may not be literally in thirds.

The mechanism of how charge (twist) and compression combine to make a particle is expected to be like this. The compression of space without charge would rebound back as in the Z boson. But when twist is present at the maximum compression, the combination is a twist compression. The mechanism that holds it together is that the tension of compression wants to unravel, an outflow of space. But if space expanded it would expand the charge to a larger charge which isn't allowed because twist has to oscillate back to neutral, not to a larger charger. Thus these two field effects keep each other in check. This is evidenced in the Standard Model where the particles (quarks and leptons) which have mass also have charge. The neutrinos lack charge twist, and in fact their mass is variable, one neutrino changes into another, no charge to prevent that. This doesn't address why quarks and leptons have their mass value.

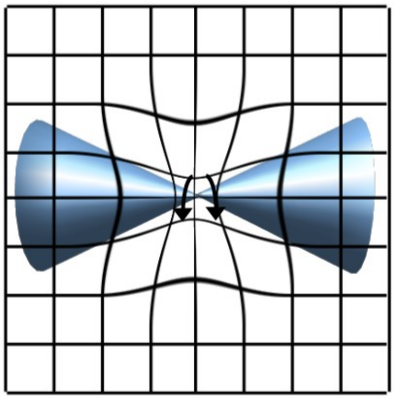
A Twist and Compression Together

Side View

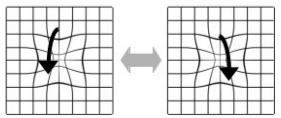


An oscillation makes a twist in tridium, and when coincident with compression.

Front View



If the twist is great enough and the compression great enough it becomes a twist-pinch of space.



Anti-Particle Particle

The twist-pinch breaks in two halves, equal and opposite cork-screw twist, same compression mass, 2 particles.

The Dium TOE Subsumes All Fields Implicitly

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

See Richard Feynman's explanation of fields to explain that particles and forces are incomplete: https://www.youtube.com/watch?v=O2kemSh_mUg . Continue when you are comfortable with the concept of a **distributed field**, but not too comfortable because you have gained action across distance but now have N fields which are good for measuring but are not reality. He says there are many independent fields overlaid on 3-space, but the fields are not space.

The Dium TOE basically agrees with mostly everything Feynman said, BUT goes 1 step farther. Near the end of his presentation, he says at 22:45 sec into the video, "What Physics does not yet know is whether all fields arise from a smaller set of principles, or whether they are fundamental in their own right."

The Dium TOE answers this in that all "fields" are merely **properties of the continuous natural dimension** object we call "3-space" or tridium. Thus, a "field" is merely **a label given to the property of space** which can be measured. A "field" is almost synonymous with an "aether", but neither are needed when space/dium itself has properties which subsume those.

Boiled down simpler, in the Dium TOE (see Dium TOE Communication):

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1. Gravity is compressed space. But do not assume space has pressure (H1).
2. Charge is twisted space, like an ice cream cone or hook, towards a point.
3. Magnetism is loop-flowing space, field lines are actually flow lines.
4. Strong: Up quarks have 2/3 charge, a literal 2/3 circumference hook twist of space extruded 3-D, 240 degrees. Two Up quarks can hook each other and their like charge repels, keeps hooks tight, one Down quark attracts both, thus a Proton is stable long term.
5. Strong: Down quarks have -1/3 charge, a 1/3 opposite circumference twist 120 degrees extruded 3-D, not a full hook, but one Up quark loosely hooks both. The Neutron is unstable, 15 minute lifespan when left alone and it decays because it bounces around until it unhooks/decays.
6. Weak: Z particles are merely a quick compression of dium, rebounding back to neutral, no twist of space because no charge. This is a gravitational moment.
7. Weak: W+/- are the same as Z but literally with a twist, aka charge. Combine a compression of space and twist simultaneously, that is the W+/-.
8. The Higgs Field is merely **Axiom 3**: dium is fundamental energy by existence, not relation. Space itself **IS** energy; not **HAS** energy by the sum of particles/fields.
9. The Big-Bang is not the beginning of space and time, because Axiom 2; space cannot be created from nothing, and Axiom 5; time is Tn-1, Tn, Tn+1.
10. The 3 Generations of matter are likely a 3-wave-train in time, 4th possible.

Heuristic 1: Do not constrain a continuous model with discrete principles.

The Big-Bang model is too literal in that "the farther in the past the closer things were together". It is not necessary to extend that to a universe smaller than a proton, because then one has to add inflation to repair that.

The common dimensionally reduced presentation of gravitationally curved space as a flat rubber sheet with a ball causing a dip is flawed. If N-1 dimensional reduction is used, the model has to be to stay within the N-1 resulting dimension, not retain N effects. Explain gravity within 2-sheet/plane.

Discrete Quantum Mechanics w/Planck scales is not continuous, but is still useful. The dium has a rest-frame against space itself, see CMB dipole anisotropy.

Space is constantly being compressed and twisted in the small. When these intersect at the right amount, a particle/anti-particle form, and when a particle and anti-particle touch they annihilate, returning to neutral space. These temporary short-lived compressions of space, even without particles forming and annihilating, combined may be the supposed "**Dark Matter**" or more correctly **excess gravity**, because compressed space is gravity. Matter was assumed.

Annihilation releases energy as particle motion and a hypothesized dynamic gravitational warp. Particle motion hides the warp. Filter out the particles with a matter barrier to isolate the warp. The filter will get hot; store and drain/eject when full of heat. CERN/Fermilib/SLAC needs to repeat annihilation tests to isolate the warp. When confirmed, will trigger the building of **warp-drive spaceships** v<c.

Only annihilation has the warp, so limit the equation to Energy of annihilation Ea:
Ea = Ep + Ew Energy of annihilation = Eparticles + Ewarp

It is well known that matter mass equates to energy in E=mc^2. This has been used to show that matter and antimatter annihilation (complete conversion) is the most efficient energy conversion known, more than fusion, fission and chemical. An annihilation powered rocket uses far less mass than a chemical rocket.

What is not well known yet is how much of the Ewarp is either already in that equation Ea = Ep inside Ep, or if it has been overlooked and needs to be added to it with Ew to be Ea = Ep + Ew. Current models of applying the Ea in rocketry is to exhaust the particles out the bottom of the rocket to equally propel the rocket forward, the principle of chemical and ion propulsion. Attraction by warp is lost in this model since the particles excitement pushes apart opposite of the warp attraction. But if the warp is isolated, it can then attract as warps do by definition. Constants are left out of Ep + Ew. It may be possible that Ew = 9xEp because the Z = 91GeV/c^2, but add twist charge and W+- = 80GeV/C^2, 1/9th less.

No. 007E, 2025-12-22 revised 2026-01-03

The Dium TOE Rules Out Magnetic Monopoles

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

In modern Physics, magnets have North and South dipoles. But there is often a prediction of a "magnetic monopole", a magnet or particle with only a North or South magnetic pole and the field lines all radiating outward or inward from the center. Physicists have searched for this monopole with no success. Even when a dipole magnet is cut in half, there is not a North-only half nor a South-only half. Both halves becomes smaller magnets each with North and South poles each. The inability to explain this is effectively unsolved, evidenced by scientists continuing to search for magnetic monopoles. Even the initial Big Bang inflation hypothesis of the universe from 10^{-36} - 10^{-32} seconds was partly designed to eliminate the expectation of predicted magnetic monopoles. Significant effort has been expended searching for or ruling out magnetic monopoles.

IF the Big Bang happened THEN inflation was needed partly to rule out magnetic monopoles. The Dium TOE rules out magnetic monopoles, and uses Big Rebound without inflation.

The magnetic monopole is trivially ruled out in the Dium TOE[1]. A flow of 3-space (tridium) goes through the magnet from South to North. The dimension itself is flowing. Because it is a flow, the outflow has to be matched with an inflow, else what left South would be devoid of space (tridium)[Def]. North outflow loops around to be the inflow at the South pole. It is a tuple; S to N within the magnet, N to S external looped. Because it is a flow from S to N within the magnet and what moved has to be replaced, a natural loop flow results.

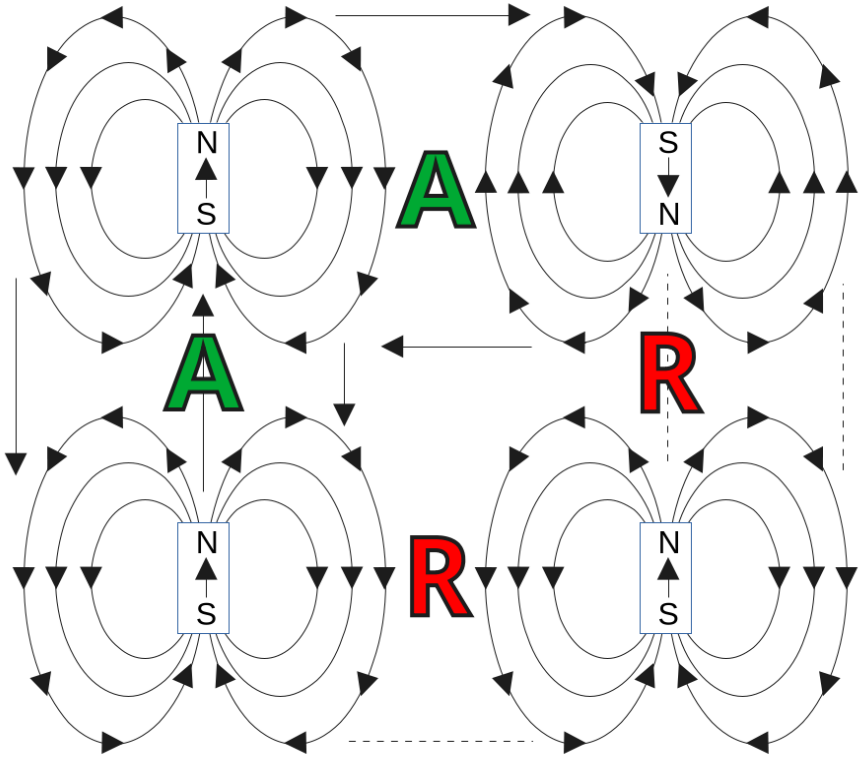
As per the Dium TOE which is theoretical, loop flow of the tridium (aka 3-space or continuous natural dimension) is called magnetism. The magnetic "field lines of force" in physics diagrams showing the direction and strength of the magnetic field are interpreted differently in the Dium TOE; the lines actually trace the "flow" of tridium. The dimension itself is in motion, but not carrying the coordinate space with it so matter doesn't get pulled into the loop flow. Loop flow in a magnet in tridium is toroidal in shape. This loop flow doesn't compress space, else that would be called gravity. In order to not compress space/tridium, the amount of outflow has to equal the amount of inflow and it has to flow back around to connect in a loop, the diverging North side outflow to the converging South side inflow. Loop flow cannot flow through a different loop flow, the flows cannot cross, but they can join. Dium TOE loop flow allows for magnets in motion through space as if at rest.

When two same axis NN magnets are close side by side, the arrows of flow are aligned, but the magnets repel because the top and bottom of the loops oppose direction of flow. When two oppose axis NS magnets are close side by side, the arrows of flow are opposite, but the magnets attract because the top and bottom flows can join. Two same axis NS magnets inline attract because the outflow of lower aligns to inflow of higher (left 2 in diagram).

Rule 1: Magnets seek to join flows as a simple symmetric principle fact.
Rule 2: A loop flow cannot cross another flow, that is resisted, but a flow can join a flow to eliminate opposite arrows.
Heuristic: The Continuous model is not constrained by Discrete principals. Eg; there is no tridium "pressure" and magnets don't compress/stretch tridium, that is gravity.
Definition: Empty tridium is vacuum, still tridium, aka Weak Nothing. Lack of tridium is lack of dimension, aka Strong Nothing[2]. Matter cannot exist without a dimension container since matter is merely a phase of tridium which is the foundation.
Tridium can have simultaneous flow(magnetism), stretch(gravity) and twist(charge).

Magnets are Dipole: North and South

Dium TOE interpretation: *tridium (3-space) is flowing!*



R - Repels, outflow to outflow and/or inflow to inflow.

A - Attracts, N outflow to S inflow, both.

1. https://intractablestudiesinstitute.org/communications/TheoryOfEverything.pdf
2. https://intractablestudiesinstitute.org/Papers/DiumTOESolvesAll.pdf

Theoretical.

Space is an Object in Nature

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

Supporting Evidence for Space as a Natural Object.

Definition: Space = The 3-Dimensional volume with time progression that is a property of, and even the definition of, our natural universe.

Definition: natural object = something that exists in reality, not an abstraction.

1. In the Big-Bang Theory, space initially was very tiny, then expanded. If it is not a thing, how can it expand? Only a “thing” can expand.

2. Albert Einstein said space can warp as the gravitational field of bodies with mass. If space can warp as gravity, then it must be a thing to have that property. If space was no-thing it can’t have properties because properties belong only to things or processes.

3. Gravitational Waves are ripples in space. If space can support a ripple as a gravitational wave, then it must be a thing to have that property. If space was not a thing, it can’t have properties because properties belong only to things or processes. It is illogical to say both that space is not a thing, but that space has properties.

4. The String Theory, even though it is theoretical and unproven, models strings as vibrating 1-dimensional objects. If it’s a vibrating dimension, it must be a thing. Physicists have difficulty accepting a 3-D volume object can exist when the evidence is all around us, but string theorists accept vibrating 1-D strings exists when there is little evidence of them. The stronger case of existence is for 3-D space object.

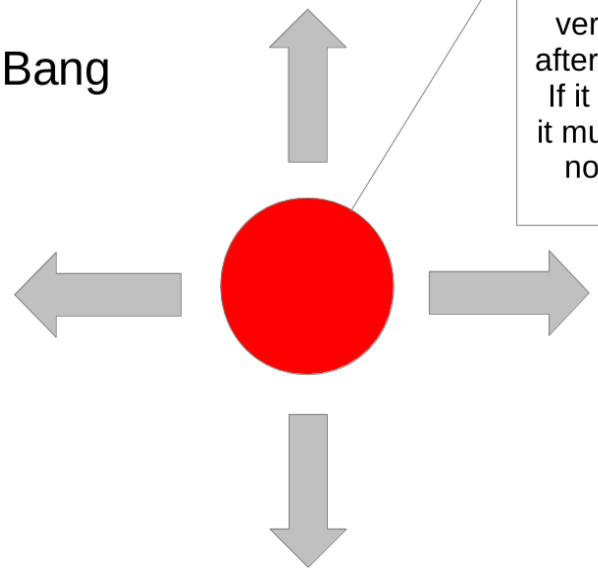
5. The Cosmic Microwave Background Radiation data shows a red-shift in one direction and a blue-shift in another direction. This is evidence of a standard cosmic rest frame, even if locally moving as per expansion or contraction. Such a rest frame is also naturally the cosmic natural dimension rest frame. See the Communication “An Experiment in Relativity: Time Dilation and Space” to find the cosmic rest frame at your locale.

6. Fields – If space itself is the fields of gravity, electromagnetic, and charge, then it's a thing to have these properties. But even if space is space and fields are independent in the space, then space contains the fields and thus space is the container. A container is a thing that exists, not a no-thing.

The kind of thing that space is:

1. Property of volumetric extension.
2. Property of temporal progression.
3. Property of container of particles.
4. Property of container of fields.
5. Property of gravitational wave propagation.
6. Property of warp as gravity around mass.
7. Property of supporting matter-antimatter creation and annihilation.

What space isn't:
1. Space cannot be nothing.
2. Space obviously cannot be a particle.



No. 007B, 2017-06-07

On Applying the Dium TOE

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

Many complex things in Physics become simpler in the Dium TOE.

1) The hardest question "What is natural dimension made of?" is answered: **continuous natural dimension** object. It is a natural dimension object which is in fact the universe. See http://intractablestudiesinstitute.org/c/TheoryOfEverything.pdf and http://intractablestudiesinstitute.org/c/SpaceIsANaturalObject.pdf.
2) "**Nothing**" is distinguished between Strong and Weak Nothing. Weak Nothing is what most people mean when they say "nothing", such as nothing in the box which is yet full of air, or nothing in the box in space except 1 trillion neutrino particles passing thru it. Weak Nothing = dium empty of particles. Strong Nothing = Not Even Dimension (NED) itself.
3) **Dark Energy**'s energy component is simply natural dimension itself (dium) with Axiom 3 that defines dium AS energy, not merely HAS energy. The mechanism of accelerating expansion of space could be merely a perceptual effect of time slowing down as space expands/thins out. Spatial thinning may be analogous to time slowing, as time slows in higher gravity.
4) **Dark Matter** or "excess gravity" is the remnant static dimple wave (Def19) left over when its particle is separated from it. Alternatively it could be gravity as space thins out from expanding universe.
5) **Neutrino Oscillations** are the dium dynamic dimple wave Def18 (oscillating compression/decompression of space itself). Standard particles with charge aren't mass-dynamic, they become static with constant mass, but dynamic compression cycle is dynamic mass. Charge may prohibit dynamic mass oscillations.
6) The **3 Generations** of Matter in the Standard Model are likely a **3-wave train in time**, somewhat analogous to a tsunami wave train, but may be longitudinal, perpendicular, torsional, or 2 or all 3 simultaneously. It may be that fewer and more generations were/are possible in the past/future.
7) **Gravity** is a density variation in the dium usually centered on a particle. Together they are called a particle with mass. The mass is expressed entirely in the warp, not the particle. The **Higgs field** permeating all space is merely dium with energy from Axiom 3 (A3).
8) **Charge** is a static twist in natural dimension. The shape is TBD.
9) **Mass** is a measure of the amount of warp/decompression of dium.
10) Particle **Spin** may be an actual rotation about the time axis.
11) **Inertia** is the resistance to instantaneous motion change of a particle when struck by another particle because the extended warp of dium would have to instantly displace. But warps attract warps. It takes time for the particle to shift its warp, the greater the warp the more time it takes to displace that larger warp volume. However, when warps attract warps the particle is displaced without inertial effect because the entire warp is displaced simultaneously.
12) **Relativity** is supported within the Dium TOE, except that there is defined a rest velocity against space itself. An Experiment in Relativity shows how to find rest velocity against space.
13) **Quantum Mechanics** is a **Predictor Class** model of discrete things, not of continuous natural dimension. QM can predict what will happen, but not what reality is, nor should it be required to.
14) **String Theory** assumes multiple 1-D string loops which vibrate, but the 3-D dium can vibrate too. The Dium TOE's rich set of properties may be able to subsume ST vibrations without 1-D Strings.
15) **Multi-Verse** cannot be refuted with the Dium TOE.
16) **Simulation Universe** is reduced to its base with **Def13**.
17) The energy for **Many-Worlds** becomes trivial (A3), but a larger problem is revealed in **Combinations C** of all the probable states, possibly the largest and fastest growing number ever anywhere.
18) The problem of matter and anti-matter pairs of particles **appearing from nothing** is solved as these do not emerge from Strong Nothing (NED), but emerge from Weak Nothing which is dium itself. Ditto in reverse, **annihilation** returns back to the dium. Matter-antimatter particle annihilation may create a temporary warp of dium. When directed in front of a spaceship, that will attract the ship forward, see http://intractablestudiesinstitute.org/c/AdvancedSpaceshipDesign.pdf .
19) The **Strong and Weak forces** of the **SM** might be derivable.
20) The **Two-Slit** experiment might be explainable when factoring in the dium to that experimental.
21) **Entanglement**: Cut 1cm wire in 2. Measure 1. Now know other size.

No. 007D, 2021-03-12

The Design of the Gravity Drive Attraction Engine

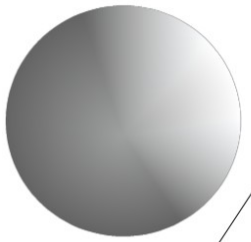
A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

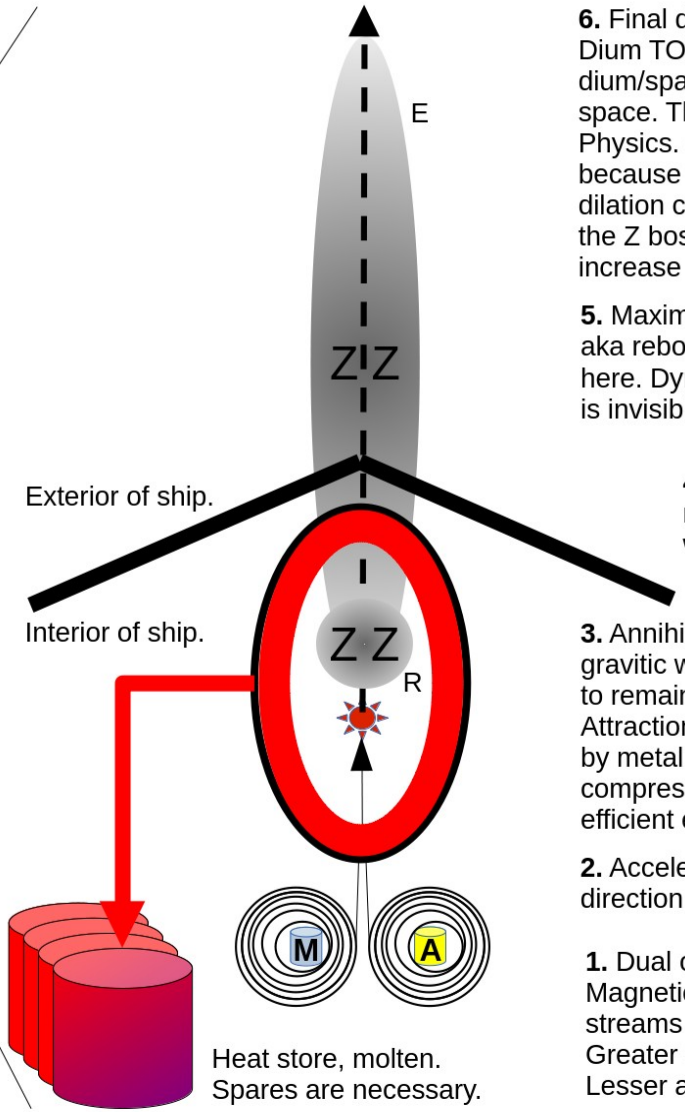
Gravity Drive Engine v3.2 explained both by Dium TOE and Standard Model Z Bosons (Weak Force)

IF alien space ships are real, THEN it makes logical sense to reverse engineer that engine from the observed properties! (A hypothetical)
THIS MAY BE THE FIRST ALIEN TECHNOLOGY SOLVED BY A HUMAN BEING!

Top View : Ship



Side View



Heat store, molten.
Spares are necessary.

Note1: 99% reduction of weight compared to conventional chemical Aerospace rockets. Only nose cone remains.

Note2: v1 and v2 of this gravity engine are in ebook “Penzar – Journal of Advanced Ideas”, Rael, P., 2011, Amazon

6. Final decay of Z bosons here, aka end of warp of space/dium. In the Dium TOE there can be a dynamic “warp” of space which compresses dium/space, and which if not held compressed will rebound back to neutral space. This correlates to the Z boson in the Standard Model of Particle Physics. CERN Z bosons are too short-lived and few to exhibit useful gravity because they collide head-on, canceling relativistic velocity. Einstein’s time dilation can slow down the Z boson decay to be useful. If it is preferred for the Z boson reaction to be entirely contained (R), slow velocity and/or increase angle of collision.

5. Maximum warp here (Z) from relativistic time-delayed Z-boson creation, aka rebound of space/dium. Attraction of material ship and occupants to here. Dynamic attraction point is always regenerating further ahead. Warp is invisible, colored grey here only for illustration.

4. Hull of ship doesn’t inhibit warp of space (gravity) (Z bosons) moving forward. Ship hull ideally presents a symmetric surface when viewed along axis of arrow for equal attraction.

3. Annihilation. Fast moving particles stretch time for Z bosons to maximize gravitic warp (mass) outside ship. Slower particles result in entire process to remain inside reaction chamber, still functions but less efficient gravity Attraction. Heat from annihilation is contained and absorbed/ablated by metal (eg; copper, iron) and is collected in heat store tank. Warp compression of space (massive Z bosons) begins. Annihilation is more efficient energy conversion than fusion, fission and chemical rockets.

2. Accelerators point matter/antimatter streams to annihilation point in direction of desired travel. Apparatus can be on a gimbal.

1. Dual opposite mini accelerators for Matter and Antimatter, or LAC guns. Magnetic containment bottles each for symmetry. Angle T of particle streams can vary:
Greater angle T annihilates closer to bottom, **rounder** (R) warp.
Lesser angle T annihilates closer to top, more **elliptical** (E) warp.

No. 020F, 2024-12-16 updated 2025-03-20

Scientific Cosmological Models

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

The Instititute's position on cosmological physics models is that there are two important criteria that models should be checked for (explain and predict are grouped together):

- predict testable phenomenon
- be reality

A model of reality should meet at least 1 of the above criteria to be useful. Modern science tends to value the predictive ability of a model more than the qualitative reality models. These two criteria are analyzed in a table below.

Modeling Rules:
1. Initial state is no thing, not even dimension, and zero assumptions.
2. All entities including dimensionality must be declared before used.
3. Assumptions may be used, as long as they are declared.
4. Minimize assumptions, but no less than necessary, and no limit.
5. Definitions can be used and are substitutions of word(s) for word(s).
Definition 1- Axiom is an assumption.
6. Hypothesis can be used, can be either proven or dis-proven.
7. Conjectures can be used, expectation of proof but none given.
8. Opinions can be used but have no rigorous value.
Note: #1 a blank slate is a slate thing: cannot have even that at start.

PREDICTOR

REALITY	False	True
False	There are an **INFINITE** count of these subjective models. These models are less useful to science as they lack predictive ability AND have no connection to reality. Faith is usually needed to use these models. These models are difficult to prove. The two main categories within here are deity and non-deity. This model can evolve to Predictor and/or Reality when it makes testable predictions or answers the SRQ. Examples are: I. Technical models 1. String Theory of vibrating dimensions. 2. Aether Theory - the luminiferous aether that “fills the void”. II. Deity models [not scientific, usually subjective] 1. Creation myths (turtle back, genesis, eden, deity(s), egg, ...) 2. Post-death “heaven/hell” and/or reincarnation, souls, ghosts, etc.	**PREDICTOR** - There are an **INFINITE** count of predictor models. These models are very useful to science as they make predictions that are testable. Answers the question: “how much” with equations? Some predictor models can never be reality models. Often the model isdeduced from data as an equation(s) or geometry, but other times is a pure guess. Testable predictability is critical. Examples are: 1. Newtonian mechanics 2. Quantum Mechanics 3. Relativity 4. Standard Model of particle physics 5. Atomic Theory 6. etc
True	**REALITY** - There is only **ONE PHYSICAL REALITY.** To be a reality model it must answer the Standard Reality Question: ***What is natural dimension made of?*** This model is useful to grasp reality itself. It must start making predictions after time, thus it must *evolve* to become a dual Reality-Predictor model. *1. The Dium Theory of Natural Continuous Dimension --evolved-->*	**THEORY OF EVERYTHING** The reality model that can also make predictions is the best possible. Determinant: You will know the model is a TOE when questions like “What is natural dimension made of?” are directly addressed clearly upfront by the model. 1. The Dium Theory of Natural Continuous Dimension

No 13. 2013-12-31, Revised 2015-02-18

The Unit Vector Relation of Velocity to Time Rate of Progression

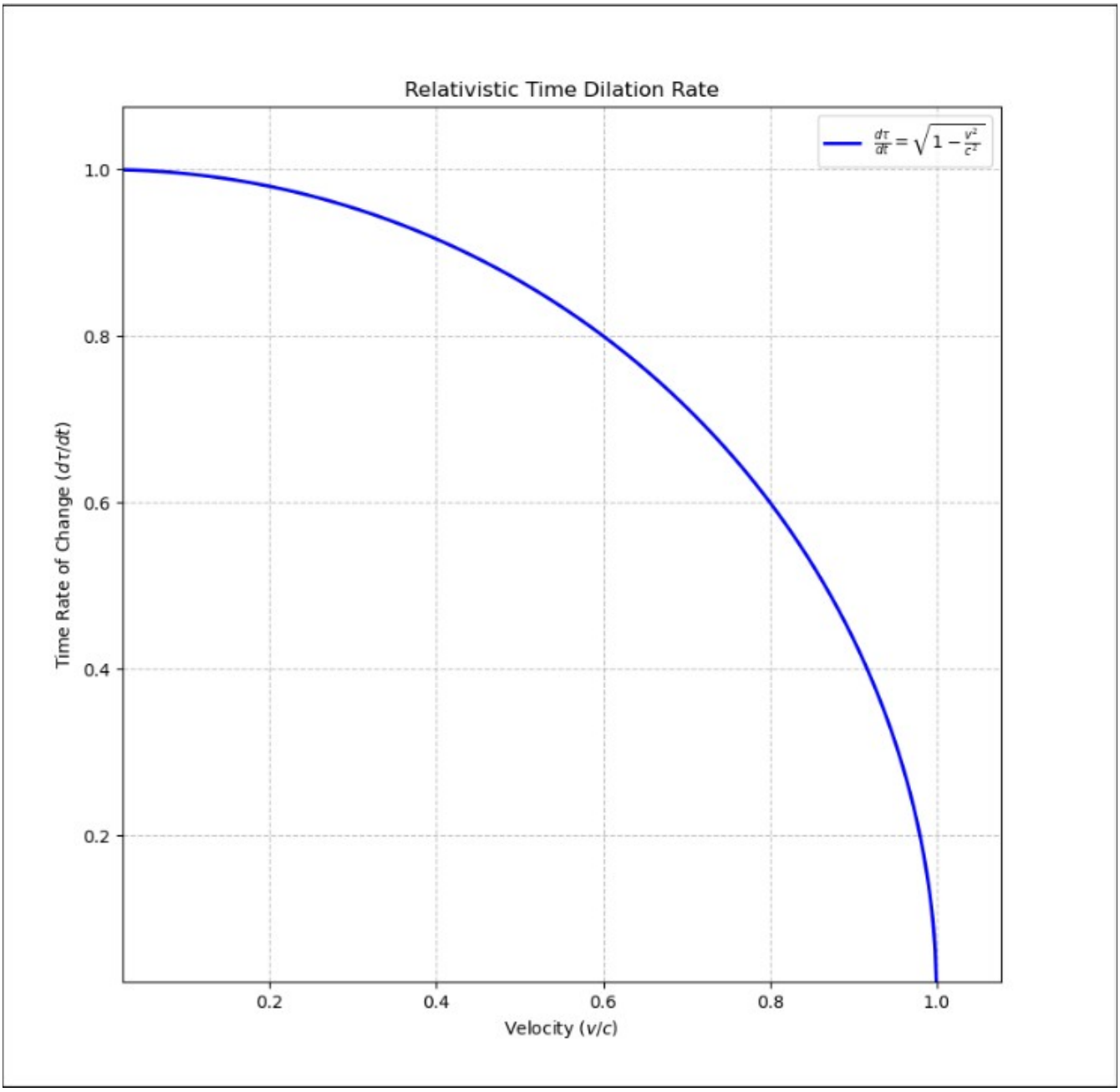
There is another simpler way to think about objects stopped or traveling in space from velocity v=0 to v=c. Every object gets an abstract vector where all of XYZ are combined into a single vector A representing the combined X, Y and Z velocities against the rest frame v=0 against space. Add a vector T for time to this unit vector A, both are a Unit Vector as per this plot below.

Normalize velocity on the horizontal axis so that maximal velocity is 1 without units; 1=c in this unit vector. Also normalize velocity to account for v=0 at 0. Also normalize time on the vertical axis so that maximum rate of time is 1 and when time rate is stopped that is 0. Because the arc is a circle, both cannot be at the origin at the same time, the arc doesn't intersect the origin. One cannot be both at rest velocity against space and time stopped.

The AT vector is still a Unit Vector which accounts now for both maximum velocity and 0 time, and no velocity (v=0) and fastest time 1. As a unit vector it is easy to see how any increase in A (space) velocity has to reduce T to remain a unit 1. Also when A (XYZ velocity) is reduced to 0, T becomes maximal unit 1. These are not linearly related, there is not a straight line from both points on each axis. A reduction of m of A (velocity) does not add m to T (time). This is a Unit Vector, a quarter of a circle connects these two points.

Plotted on a graph with horizontal axis as velocity with origin 0 and position 1 as v=c, and the vertical axis as time rate with origin 0 at stopped time (vertically no time) and 1 as maximal time rate, then as a Unit Vector this upper right quadrant is positive velocity and time, the unit vector AT is merely 1/4 of a circle with radius 1 centered at the origin. Both points along the horizontal and vertical axii are correct; maximal velocity c is where the circle intersects right-most the horizontal A axis and the time rate T of the AT vector is 0, confirming at maximum velocity c time stops. Ditto when velocity is at the minimum v=0 on the horizontal axis at the origin, the Unit Vector AT is at the most vertical axis maximum 1, confirming that time rate is fastest when v=0 in the rest frame against space.

This also shows that from the origin on the horizontal A axis a tiny movement right m causes a far smaller amount of reduction in T because the circle is still mostly flat in this range. This matches reality where we see that time dilation is hardly noticeable when velocity is small near the origin. But when velocity is near c like at A = 1-m, the circle is nearly vertical at the horizontal axis meaning that any slight change in velocity near 1 (near v=c) means a big change in time.


Relativistic Time Dilation Rate
$\frac{d\tau}{dt} = \sqrt{1 - \frac{v^2}{c^2}}$
Time Rate of Change ($d\tau/dt$)
1.0
0.8
0.6
0.4
0.2
0.2
0.4
0.6
0.8
1.0
Velocity (v/c)

Three Proofs Of a Rest Velocity Against Space

First there is a check if a rest frame velocity against space isn't ruled out by Special Relativity (SR) nor General Relativity (GR), only that it is exceedingly difficult or perhaps intractable to find that rest frame. This hypothetical Rest Frame against space is clearly demonstrated on the plot of normalized velocity by normalized time rate of progression at v=0 . This plot has velocity normalized to horizontal 1 at MAX v=c, MIN 0, and rate of fastest time progression normalized to vertical 1 at v=0, and time stops when v=c.

The Question of a Rest Velocity Against Space Itself

Q: Google, does special relativity rule out a rest velocity against space?

A: Special relativity does not strictly disprove the existence of an absolute rest frame:

1) Relativity of Inertial Motion: The core principle is that there is no preferred, "absolute" state of rest. An object's speed is always measured relative to another observer.

2) Superfluous Concept: While you could hypothetically assume an absolute rest frame exists, it is functionally useless because it cannot be verified or detected.

3) Lorentz Invariance: Special relativity requires that physical laws remain the same for all observers, regardless of their constant velocity, which contradicts the idea of a single "true" rest frame.

4) The Ether Discarded: Special relativity dispensed with the concept of the "luminiferous ether" - the supposed medium filling space against which absolute motion could be measured.

1. For the question "Is there a rest velocity against space itself?" Special Relativity says no, or that the question is meaningless. Actually it says there is "no preferred absolute state of rest". That doesn't necessarily mean it doesn't exist, just that it is "not preferred". The word "preferred" is an adjective. Take that adjective out and "no" with it, and that can allow it. SR also assumes that space is nothing, not a real thing, a complete lack of things like a vacuum except for particles and waves. But the tridium of the Dium TOE is a substantial thing.

2. Regarding the rest frame against space (tridium) being superflous because it cannot be verified or detected, three proof are included which prove it can be verified and detected. It is almost always the case that seemingly impossible or at least intractable challenges cannot be solved, until they are solved. Then the original impossibility is rephrased correctly as being merely highly challenging but not impossible.

3. Regarding Lorentz Invariance, the CMBR dipole anisotropy was not known to exist when this postulate was created. If the CMBR dipole anisotropy was know at that time, it would have been able to clearly see that all observers can in fact measure their velocity against CMBR,

and that CMBR and all newer photons have standard velocity making CMBR photon velocity non-unique, and thus all observers at velocities v where $0 = v < c$ can find their velocity with the CMBR dipole anisotropy. There are two key concepts here: 1) the CMBR provides the standard temperature of all their photons from all directions in the sky, and 2) the CMBR photons travel at the same velocity as all newer photons in the universe regardless of the newer photons temperature/frequency or age. Combined, the CMBR is not a unique frame as all photons share it, and CMBR will provide the temperature which different velocities will distinguish themselves with as dipole anisotropy.

4. The Aether Theory was properly eliminated by SR. But that theory was that the “luminiferous aether” was a "very fine fluid which filled the void". It (aether) was the medium which transmitted light, just as an atmosphere or liquid or solid is needed to transmit sound. Surely the aether/ether can remain refuted AND there can be a rest frame against tridium so long as tridium can transmit light and electromagnetic waves. One of tridium’s properties is that it can transmit em-waves. It can also transmit longitudinal, compressive waves as LIGO has seemingly proven.

But these are two extremes from absolute nothing vacuum to “a very fine fluid that fills the void”. In between these is the Dium TOE continuous natural dimension object named tridium after its discovery (which is worthy of the Nobel Prize in Physics). It is far more than a "nothing", and far less than a fluid which fills the void, in fact being both the "nothing" and the "void. This little "wiggle room" between nothing and a very fine fluid is exactly where tridium fits. There is no need for an aether medium filling the void to transmit light since tridium already transmits light and electromagnetic waves. No need for an aether with nothing left to do. Transmitting light is a mere property of tridium, just as tridium transmits gravitational waves, another property seemingly proven by LIGO. See the analysis of Weak Nothing, Medium Nothing, and Strong Nothing.

When proven, this Rest Velocity against space itself, the tridium, does not necessarily disqualify Special Relativity nor General Relativity, nor does it confirm a Newtonian aether or ether or luminiferous aether which "fills the void". Here are the major points:

1. In my opinion the aether which "filled the void" was properly eliminated.
2. In my opinion the Michelson-Morley experiment did detect a velocity against tridium, not the aether, but a Math error which was reported to him was seemingly ignored.
3. General Relativity needs a slight adjustment that there is a rest velocity against space itself, not that there is merely a CMBR rest frame. The evidence is plainly there in the CMBR dipole anisotropy whose velocity vectors are subtracted before further analysis is done. The CMBR points the direction measured against tridium (space) itself. Further analysis is below of this CMBR dipole anisotropy and also an experiment which will also show velocity against tridium (space). General Relativity is on solid ground with time dilation near gravitational bodies and also as velocity increases, both proven with atomic clocks at elevations and also in GPS satellites, and the curvature of space by massive bodies like stars, and numerous other confirmations.

Proof 1 - Proof by Logic of Space Rest Velocity

If there is a Maximum velocity v=c (speed of light), then there has to be a Minimum velocity v=0 against which the Maximum is measured against. Two photons traveling opposite each other represent the maximum velocity c in opposite directions. Right down the middle equidistant from each departing photon and remaining equidistant from each is the rest velocity along that axis. It may be difficult to identify this position, but its existence can't be denied because it is between to identical extremes.

It also follows logically that if there is a Maximum velocity v=c at which speed the rate of time passage stops, then there must be a Minimum at v=0 corresponding to when the rate of time passage is at Maximum. This is easily seen in the plot of normalized velocity v=0 to v=c=1 versus normalized rate of time passage also from 0 to 1. If time slows as velocity approaches c, then in reverse time must increase as velocity approaches 0, and at velocity=0 is exactly when the rate of time progression is at its Maximum. Time is already moving from the past to the future at a rate, all matter is brought along "kicking and screaming" at maximum rate normalized to 1 when velocity is 0, and lesser as the velocity increases. See the normalized Unit Vector relating velocity to time progression at the end for a simple geometric model of how these are related, and the lesser of one is the greater of the other.

Physical matter is limited to be able to approach but not reach the speed of light. Photons (electromagnetic waves, em-waves) can travel only at the speed of light (assuming a vacuum of space). All photons in the universe travel at v=c, even the most ancient CMBR to the most recent flashlight photons. All parallel, nearby photons have constant velocity with each other and side-by-side photons remain side-by-side throughout their journey. Parallel nearby photons in a line will remain in a line at constant distance in a constant gravitational field. The photon in front cannot increase nor decrease its distance from the photon behind it. If transmitters with flashlight can be at all the possible velocities from v=0 to v<c, how can each photon instantly be at v=c? There has to be "something" which the photons sets their velocity to in order to travel at constant c. That "something" was presumed to not exist as the vacuum of space was modeled as "nothing" or a "void". Lacking the dimension itself as it was assumed to be nothing, then Relativity said photons would always be measured at v=c by observers, the next available object left aside from "nothing". But if space or the so-called vacuum or "void" or "nothing" is in fact a continuous natural dimension object "tridium", then this is the thing (of type Dimension) which the photons set their velocity against. All the intermediate velocities from 0 to c are also measured against tridium. With tridium, a continuous natural dimension object as space, the velocities can be measured against it, replacing nothing or the "void" or vacuum.

Regarding the claim that all inertial frame are the same, this is clearly not true in the real universe. In conceptual space it can be made true with a blank slate and N spaceship moving about in their own inertial frame, all seemingly equal inertial frame relative to each other. But that isn't the universe we exist in. We have galaxies, stars, planets, asteroid and meteors. Starting from traveling at near velocity c as would be evidenced by passing objects like planets and stars, slowly accelerate towards all those objects passed by eventually matching their speed, and then finally returning back to pass them in the opposite direction, a simple trip from near c down to 0 and back to near c. Somewhere near the middle of that journey when the velocity matched that of the stars was close to the rest frame. But as the galaxy rotates that has to be subtracted. The Milky Way and Andromeda galaxies are gravitationally attracting each together, that velocity also has to be subtracted. The Local group, Virgo Super Cluster and the Laniakea Ultra cluster itself are in motion. Perhaps the combined average of large scale motion will likely match the rest velocity v=0 of space itself. Or simply check the CMBR dipole anisotropy and run the 6-Twins experiment to find the rest velocity in your part of the universe. If space is expanding then rest velocities are only local to perhaps the Local Group our galaxy is in.

Proof 2 - CMBR Dipole Anisotropy Proof of Rest Velocity Against Space

1. It is proven fact the faster something moves, the slower time passes for it, from GPS satellites whose atomic clocks are subtracted an amount depending on their velocity and also altitude.

2. If the faster speed is slower time, then slower speed is faster time, but velocities are relative, except photons always travel at constant c.

3. The slowest speed is the fastest time.

4. The slowest speed is 0 velocity against space.

5. The Cosmic Microwave Background Radiation em waves are all at same temperature, and wavelength with very minor deviation.

6. The Rest (0) velocity against space is when the CMBR em-waves are measured to be the same temperature (or wavelength or frequency) in all directions.

7. The actual measured CMBR anisotropy reveals the velocity against space and direction.

8. The CMBR anisotropy (or bias) velocity is we are moving 369.8 km/s towards the border of constellations Crater and Leo, the opposite is the direction where we came from.

9. The CMBR anisotropy 369.8 km/s is added/subtracted to raw CMBR first, then further analysis is done on the rest-frame CMBR data.

10. This CMBR Dipole Anisotropy is the 2nd way to measure rest velocity against 3-space tridium [11].

Velocity Relative To 3-Space Tridium

A Communication of the Intractable Studies Institute

Patrick M. Rael, Director, IntractableStudiesInstitute.org

As per google search about Michelson-Morley's 1887 Physics experiment:

The 1887 Michelson-Morley was a crucial, scientific failure that disproved the existence of the "luminiferous aether" a hypothetical medium thought to carry light waves across space. Using an interferometer to detect the Earth's movement through this medium, Albert A. Michelson and Edward W. Morley found no significant difference in the speed of light, regardless of direction, a "null result" that paved the way for Einstein's special theory of relativity.

This is a good conclusion, even if arrived at incorrectly. The luminiferous aether was supposed to be some "substance" which "filled the void" in space. That is, there is the void of space itself, and the luminiferous aether which filled it, some "very fine fluid" as it was described. All these descriptions of the aether were that it was a thing, filled the void of space, and Earth moved through it. Naturally the thinking was that it should be possible to measure the velocity of Earth as it revolves around the Sun and rotates against the aether.

What the Michelson-Morley experiment should have detected is the velocity of the interferometer through the tridium, or space. Surprisingly, the article declares after the fact that the experiment was expected to detect fringes of value 0.04 fringes, corrected later to 0.02 fringes, and **0.018 observed**:

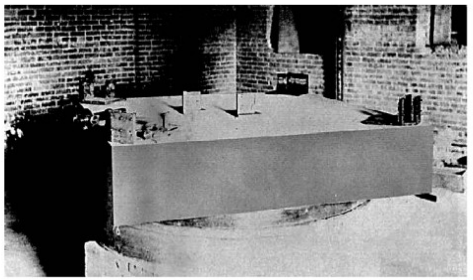
*However, Alfred Potier (and later Hendrik Lorentz) pointed out to Michelson that he had made an **error of calculation**, and that the expected fringe shift should have been only **0.02 fringes**.*

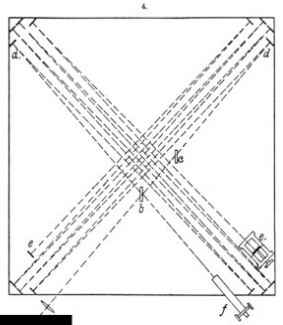
In the Dium TOE, continuous natural dimension, dimension-ium or dium or tridium, is the dimension itself. It is a continuous object outside the bounds of Particle Physics. The tridium defines the extension of space, and its properties give rise to the particles and fields. This is described in the Communications "Dium TOE: What Natural Dimension is Made Of" and "The Dium TOE Subsumes All Fields Implicitly". Dium itself, without any "very fine fluid" filling it, can carry waves as LIGO has proven space itself carries gravity waves. There is no need for an aether fluid medium to carry light waves when the tridium itself already can do that. Good riddance to the aether. Also, good riddance to the 1-2 dozen fields of Quantum Mechanics, those aren't needed and are as useless as the aether when tridium's properties subsume these exact fields.

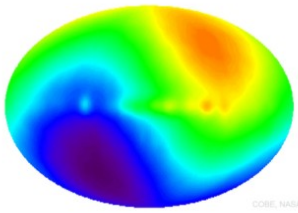
Obviously, as the CMBR Dipole Anisotropy proves, an experiment in a rocket ship can determine its velocity against space itself, all is **not** relative. Keep GR/SR, they work, but modify to allow a rest frame against space itself. See An Experiment in Relativity: Time Dilation and Space using time dilation of clocks.

Perhaps the most astonishing thing about this experiment is that while it correctly rules out a luminiferous aether wind, it should have (or did) detected a velocity against space itself, against the tridium, which has since been confirmed in the speed of the Solar System relative to the Cosmic Microwave Background Radiation, CMBR, rest frame of about 370 km/s (230 mi/s) in the direction of the Constellations Leo and Crater. The CMB Dipole Anisotropy is the proof that it is possibly to measure velocity against space itself. The photons or electromagnetic waves of the CMBR and all photons travel at the same speed. A pair of photons traveling together in parallel will not surpass each other. No photon can catch up to another. All photons in the M-M interferometer test travel at the same speed as the CMBR photons, therefore the experiment either did work but was misinterpreted or had too much imprecision to work. Repeat the experiment using two perpendicular photons, two detectors instead of fringes and eliminate mirrors!

Cosmic Microwave Background radiation or photons are universal, meaning they pass by every point from all directions. A velocity of 0 m/s relative to the CMBR means there would NOT be any CMBR dipole anisotropy towards Crater/Leo constellation nor away from opposite at Aquarius. Since there IS dipole anisotropy of the CMBR radiation, it can be concluded that the doppler shift in frequency is simply that the Solar System is moving through the CMBR rest frame. As every photon external of CMBR matches velocity with the CMBR photons, it can be concluded ALL photons in the Universe have a constant velocity against space itself, removing a specific CMBR-only rest frame since it is not special or unique. This is the position of the Intractable Studies Institute.







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Proof 3 : 6-Twins Astronauts Experiment in Relativity

1. The Twins-Paradox is that a twin on Earth or base remains there while the other twin travels very fast away from Earth in a spaceship. Upon returning home the space twin has aged less. All Earthlings aged the same, the space traveling twin clock slowed. This is a proven fact! The faster one travels the slower the clock ticks. But now the question is does direction of the traveling twin in space out and back matter? Direction of travel out and back can only matter if there is a rest velocity against space itself.

2. Another way to measure velocity against space itself is using a variation of the Twins experiment to put each twin in their own space ship and they depart in opposite directions from base station and return to base. Upon return, compare the twin's clocks. If direction of travel doesn't matter (purely relative) then the clocks will match, but if direction matters (ie; the base was moving against space itself at start) then the clocks differences will reveal this.

3. There are 6 twins, 6 spaceships, 3 pairs = 6 twins, 2 twins per axis, 3 Axii XYZ, and one base ship which is not assumed to be at the rest velocity against space itself.

4. There are no universal Axii, just define 3 Axii XYZ. The twin pairs each depart along each axis in ships away from the other twin leaving base behind. Axis X, Y, Z twins.

5. The 6 space ships initially accelerate quickly away from Earth or base to high velocity, coast a long time, quickly decelerate an equal amount of fuel, turn the ship around 180 degrees, then reverse the accelerate/coast-long/decelerate back to base.

6. When the 3 pairs of twins return their clocks are compared against each other per axis only, for faster or slower. There is no need to compare against the base clock.

7. Since "the faster one travels the slower is time", combining the 3 slower clock vectors will point away from rest velocity. Combining the 3 fastest clock vectors will point to rest velocity because "slower velocity is faster clock".

8. The 3 XYZ slower clock vectors point the way to the rest velocity against space, the slower clock is direction and delta size is a related to velocity. In only 1 case will all the twins have the identical matching clocks; when they and their base station before start were already at rest velocity against space itself.

9. Furthermore, the universal CMBR wavelength and temperature can be continuously measured looking forward and backward from each ship on its journey. As each ship orientation is reversed at the farthest extent away from base, the measure of CMBR will also flip to front=aft and aft=front. The plot of the CMBR frequency change will also reveal velocity against space itself. It's possible for each ship to perform a full sky map CMBR, but technically only front and aft directions are necessary as all 3 axii are covered.

10. As further proof of this, while each ship is coasting away after the initial acceleration, since it is going faster v than base, its clock is slower, which we assumed is true from the Twins Paradox. Let a sub-experiment be performed where each ship is going to be a "new-base station" with 2 sub-ships to repeat this experiment while the ship is "moving" along this same axis the ship is pointed towards. Both sub-ships depart opposite directions along the same Axis. The sub-ship pointing in the same direction as new-base will be moving faster (not necessarily 2v) and should experience slower time (the faster ship is slower time). But the one pointing opposite of the new-base ship has a dilemma. If all is relative and direction doesn't matter, then it departs new-base just as the other sub-ship in the other direction, both clocks should go SLOWER relative to new-base, meaning both sub-twin’s clock age slower than their new-base. But here is the

CONTRADICTION: this sub-ship is also going to approach or match the velocity of original base which has a FASTER clock rate than ship. This sub-ship clock twin pointed back to original base has to both have a SLOWER and FASTER clock rate than new-base ship if all is relative. Both cannot be true.

The solution is that ALL IS NOT RELATIVE. Time progression slows and increases for the travelers complicating what they will measure. But in the end it isn't what they will measure, it is what how much time elapsed when they returned home. A single traveling twin is simple, but all 6 traveling in 3 Axii demonstrates the contradiction. The only way out is that each base originally has a velocity against space itself and when all those are accounted for the contradiction will evaporate. There is a fundamental rest velocity against space, but the original base may or may not have been at that rest frame v=0 against space itself, revealed by the CMBR. Therefore as each ship departs on its journey and performs their sub-experiments, all their CMBR frequency plots will ultimately reveal how fast or slow their clocks were against the rest velocity of space. For example, if it were known that the original base was itself in motion at velocity v against space itself in direction axis +X, then the 2 ships which travel opposite along X will have one clock slower which traveled faster than v in the direction +X, and the other a faster clock as it matched the rest frame -X against space for a considerable time.

In the 6-Twins experiment, one could argue that once the ships are moving away from the base station that the spaceship in motion not only has slower time rate but also increased mass. The increased mass of the ship seemingly makes the rocket less efficient to propel the increased mass with rockets. This argument is countered by the fact that the fuel itself has mass which also increased, so as it is propelled backward by f=ma then its increased mass increases the force, countering the increased mass of the ship. These effects only become significant as velocity increases to relativistic high speeds.

As pointed out in the Communication "An Experiment in Relativity : Time Dilation and Space" [12], these are thought experiments, but they can and should be tested in reality. In thought experiments it is easy to say, "Suppose a base station is stopped against space". But in reality how is that determined until a rest frame is proven to setup this initial state of stopped against space? Fortunately, the 6-Twins experiment is designed exactly for that case, when the initial velocity against space of the base station isn't known. However, if it is argued that this experiment cannot proceed until the base station velocity is known to initially account for Earth's rotation at surface and Latitude, Earth's orbit around the Sun, Solar System's velocity around Milky Way, Milky Way's velocity towards Andromeda, Local Group's velocity in larger cluster, and the overall velocity of the super cluster to the Great Attractor, then that effectively proves the initial point: direction of the ship traveling out and back will matter, all is not simply relative to the base station.

An Experiment in Relativity: Time Dilation and Space

A Communication of the Intractable Studies Institute

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6-Twins Test for Time Rate relative to Space

Abstract: Does velocity in space cause time-lag relative only to observers as per Einstein's Relativity, or does time slow relative to space itself? A test can be done to determine definitively if there is a time rate proportional to space itself, and which merely *seems* as if it is relative to observers. It is known that a space ship at near-c velocity that stops and then resumes near-c velocity in opposite direction will have slow time, faster time, then slow time again. A scaled variation of the twin-paradox test can test this where any observed bias in direction will be evidence of rest velocity relative to space itself.

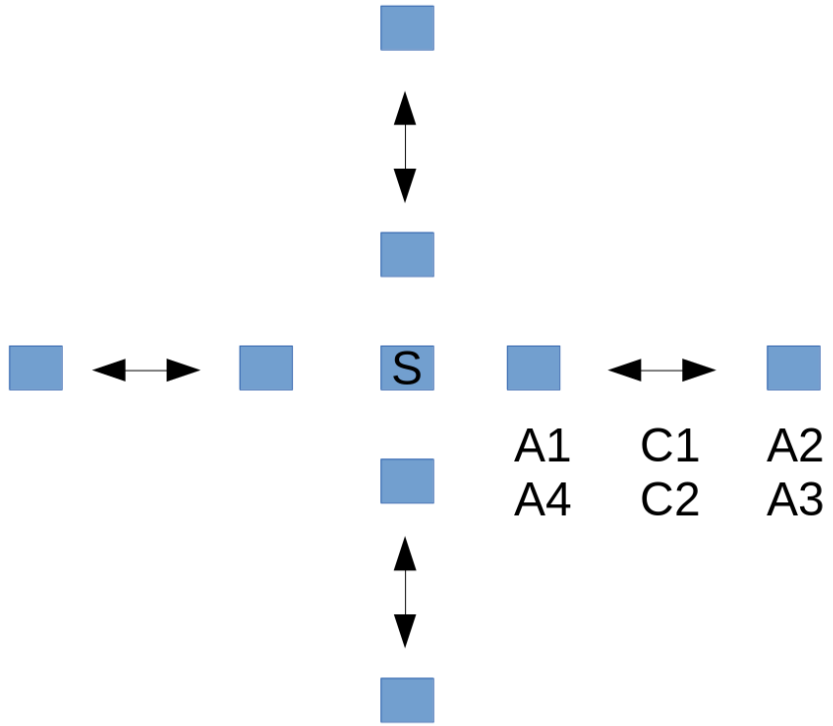
It is understood that if 1 "clock" is sent on a fast spaceship far away and then returned, that clock will have lost time compared to a "stationary" clock. This is the "Twin-Paradox" experiment. But does the direction of travel affect this experiment? An experiment can be done in 3 axii X, Y, and Z, with 2 opposite directions for each, making 6 ships clocks travel out and return. Each ship will be identical in construction, the only difference is the direction they travel. They accelerate initially A1 away from center ship S, coast C1, decelerate A2, accelerate A3, coast C2, decelerate A4 and then are back to the center ship. Minimize gravitational effects by testing far from gravity sources.

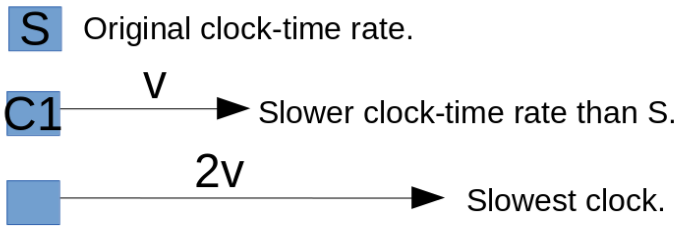
If direction doesn't matter, the clocks in all 6 ships that traveled should match each other in time lag since they all accelerated and traveled at the same speed and acceleration. Comparison to the stationary clock S is irrelevant.

If the 6 clocks return with different time lags, then direction matters. One explanation is that the clock-ships can be traveling at a velocity relative to space itself. Note that time dilation relative to space itself can still partially support the concept of pure relativity of time dilation relative to observers, this test will determine where these two diverge. If, at the start, the test must be "calibrated" to find the "rest frame", that proves the point, as the concept of the "rest frame" is relative to space itself.

Proof: Do the full test and compare the returned clocks. Time diffs can be used to find a vector to rest space. The faster of each pair of clocks points toward rest velocity.

Analytical Proof (thought experiment): If at C1 coasting right at velocity v there was another ship at 2v same direction, with a clock going slower due to higher velocity, then from the ship doing C1, it could repeat this experiment where it itself is the center, launching ships right and left. The one right that matches hypothetical 2v above must have slowest clock, the one left will match original central ship S faster clock, thus the direction will matter. This is trivially obvious. This test does not require visible observations of any other ship in motion as those observations aren't trustworthy.





With the addition of a Rest Frame against space itself regardless of an observer's inertial frame of reference, it seems likely to be able to return to events that happen in the Universal Rest Frame. Even simultaneity should be able to make a return as simultaneity against the Universal Rest Frame with a standardized fastest Universal Clock Time. When all became relative to observer's inertial frames, simultaneity was lost. Now it can return.

Conclusion

The Dium TOE offers a different interpretation of what is happening in our Universe ranging from the infinitely small, lesser than the Quantum Mechanics Planck-scale, to the entire universe itself, effectively the *Spacetime* of Albert Einstein, and infinite time past and future. This is called tridium; continuous natural dimension object with time-progression. But it goes further in some ways and lesser in others. It goes further by modeling it explicitly as a real object in Nature, the natural universe container tridium. In this model one cannot simply cut to the Math as Albert Einstein's General Relativity and Quantum Mechanics does; the surprising tridium properties have to be explored like particulate, continuous and constant phases, and continuous properties like compression (gravity), twist (charge), loop flow (magnetism). Quite surprisingly, the other forces are then variations of these, as the quark's charges have 1/3 and 2/3 twists as "hook-like" objects, +- charge as matter/antimatter inward corkscrew twist opposites. And the Higgs field itself is relegated to a mere Axiom 3 that energy itself is tridium, answering here the formerly unanswered question of what is energy itself that other things relate to in $E=mc^2$. Proofs are provided to: eliminate Block Time 4-space, that magnetic monopoles can't exist, and then all 17-24 fields of QFT are reduced to tridium, but keep using QM and QFT for predicting, just not for understanding. Advancing further is a guess as to what the three generations of matter are. If that didn't exceed your limit then three proofs are offered to measure a Rest velocity v=0 against this tridium space, dealing a blow to Lorentz Invariance and Special Relativity, but keep using LI and SR with this slight "tune". Outside the box, add the applied dium Gravity Drive attraction engine; try that with GR+QM. Combined, all this is an effective re-modeling of the Real Universe while retaining the best or at least the most certain parts of prior models. Use prior models like GR/QM to *predict* what will happen, but use the Dium TOE to *understand* it.

This effort has been entirely unfunded.

References:

[1] https://intractablestudiesinstitute.org/communications/TheoryOfEverything.pdf
[2] https://intractablestudiesinstitute.org/communications/DiumTOEElectromagneticWave.pdf
[3] https://intractablestudiesinstitute.org/communications/DiumTOEParticleAntiparticleCreation.pdf
[4] https://intractablestudiesinstitute.org/Papers/DiumTOESolvesAll.pdf, Rael P., 2021
[5] https://intractablestudiesinstitute.org/communications/TheDiumTOESubsumesAllFieldsImplicitly.pdf
[6] https://intractablestudiesinstitute.org/communications/TheDiumTOERulesOutMagneticMonopoles.pdf
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