

Introduction to the NeoClassical Interpretation: Quantum Steampunk

Shiva Meucci, April 20th, 2020

ABSTRACT

In a previous paper we outlined a series of historical touchpoints between classical aether theories and modern theoretical physics which showed a shared conceptual lineage for the modern tools and methods of the most common interpretations and fluid based “Hydrodynamic” treatments of an electromagnetic medium. It was proposed that, though the weight of modern experimentation leaves an extremely narrow and convoluted window for even a reconceptualization of a medium, all of modern physics recognizes a plethora of behaviors and attributes for free space and these physics are interchangeable with modern methods for treating superfluid-like continuums. Thus the mathematical equivalence of the methods do not comprise alternative physics but an alternative *interpretation* of the same physics. Though many individual components describing a “neo-aether” or “quintessence” are available, an overarching structural outline of how these tools can work together to provide an alternative working overview of modern physics has remained undefined. This paper will propose a set of introductory concepts in the first outline of a toy model which will later connect the alternative tools and conceptualizations with their modern counterparts. This introductory paper provides the simpler “100-miles out” overview of the whole of physics from this perspective, in an easily comprehensible, familiar and intuitive, informal dialog fashion. While this paper grants the largest and loosest introductory overview, subsequent papers in this series will address the finite connections between modern physics and this hydrodynamic view.

INTRODUCTION

The starting point of this interpretation is an open question in physics. The one-way speed of light has never successfully been tested and therefore the isotropic or anisotropic speed of light is a dividing line between Einstein-Minkowski relativity and Lorentz-Poincare relativistic aether theory which has never been experimentally decided. Therefore it is only popular science, not experimental science, which has provided mainstream science a preference based upon metaphysical arguments alone instead of experimentation.

The second major point of interpretation that follows directly from the first, lies in quantum mechanics and the “collapse” of the wavefunction. The question of how, where, when and why such a phenomena exists has led to various speculations which are held in wildly varying levels of esteem or ridicule based upon the specific collection of academics present.

The final point is the impetus to pursue new avenues of interpretation. From the ad hoc nature of dark matter and energy to the vacuum energy catastrophe and other difficulties of marrying gravitation with the quantum realm, modern theoretical physics has produced some of the most reliable and precise predictions mankind has ever known and simultaneously some of the very worst disagreements between prediction and empirical evidence that science has ever recorded... by many orders of magnitude.

It is through the lense of these undecided points of science that alternative perspectives become very necessary explorations. Let us now explore the finite set of gates or “conceptual

slalom poles” defined by these questionable points in theory. Specifically our starting place is the alternative interpretation of relativity theory which holds that the commonplace metaphysical argument against a relativistic aether is unfounded and demonstrably incorrect. Through this exploration, the alternative path physics would have taken from this bifurcation point in history, should become clear, and the cast it would have given to the past century of physics should provide an obvious model through which the reader can follow or even predict the subsequent deviation points of interpretation. Namely, the second major deviation is the superiority of the de Broglie-Bohm interpretation of QM which would naturally follow from superfluid/supersolid interpretation of relativistic aether or “quantum vacuum.” Further it is necessary to identify the reason why one metaphysical interpretation was preferred over another and this relates to a crucial decision made some 200 years ago in physics.

In the context of such a large and complex system such as theoretical physics, the many points that must be connected in such an extremely divergent interpretation can be so daunting as to seem impossible. Like a puzzle, however, a starting point for fitting the pieces together is found via producing an outline which hints at a more complex and definitive arrangement.

In this paper, a positive focus upon construction of an alternative model instead of a negative focus upon providing falsification of the current model at each point, will allow the outline of a very large overarching structure for a toy model which constitutes a self-reinforcing picture. This first pass must remain broad enough to cover the entirety of physics and is best initially conceived in terms of a bare skeletal structure which will obviously need subsequent passes to achieve any level of merit beyond well supported conjecture. The finer points of examination must be saved for subsequent papers after the more vague but interconnected pathway is first firmly established. There is a problem of scale of examination with very large problems which can only be solved by separate examinations at various levels of granularity such as is seen when looking at the interaction of organ systems in medical science versus looking at the functioning and development of organ cells in microbiology.

While the prior history paper answered the questions “Could that work at all with what we now know?” from the perspective of the conceptual lineage of tools and methods of modern science, herein we will answer the question, “How would that whole system work together with what we know now?” from the perspective of known behaviors of fluid-like systems and the analogies revealed in the tools and mathematical treatments explored in the prior historical paper. This explanation will therefore tie together the bare skeleton while subsequent papers will grant a view of the interrelationship of the “organ systems” that work together for a full neoclassical interpretation in the context of the larger full system of interconnected scientific speciality areas. Afterwards ever more granular approaches can be made by numerous authors to make the second pass of the finer connective tissues and system integrations.

Summarizing: The pathway that can be taken from a relativistic standpoint merely requires accepting Lorentz's kinematics require a preferred frame which can initially be ascertained (as Einstein pointed out) via gravitational influences. Therefore we discard isotropic light constancy in favor of "anisotropic constancy effects." Then general relativity can be reassembled from MacCullagh, through Mie to Hilbert and described via Cosserat continua. This subtly shifts quantum theory to allow reintroduction of Kelvin's vortex atoms and J.J. Thomson's

model for valence. (Meucci 2018) Then, some of the developments of string theory can be salvaged through the introduction of vortex filaments which are naturally present in superfluids. Thus wave particle duality becomes explicable in terms of cavitation effects in the primary substance (aether) as an analog to the “bouncing” seen in the “walker” experiments.

1) Overview

Well Known Starting Points for the Overarching System of Theoretical Physics

“Einstein starts from the hypothesis that the laws will look the same to all observers in uniform motion. This permits a very concise and elegant formulation of the theory, as often happens when one big assumption can be made to cover several less big ones... But in my opinion there is also something to be said for taking students along the road made by FitzGerald, Larmor, Lorentz and Poincaré. The longer road sometimes gives more familiarity with the country.” — J. Bell

An interpretation is not a description of a wholly new set of ideas, it is a rehashing of old established ideas from a slightly altered starting point. Thus, numerous well established ideas can be leveraged in building a scaffolding for a workable system that still agrees with modern findings and experimentation. Those building blocks are, of course, relativistic physics and quantum theory, but each of these is altered from the starting point established above: *The presumption that the one-way speed of light is anisotropic while only the two-way speed of light is isotropic.* This leads us to a “preferred frame theory” but one significantly different from previous incarnations and more in agreement with Einstein’s later, more matured work.

The second major point of alteration which follows naturally from the first, is the de Broglie-Bohm or “pilot wave” interpretation of quantum mechanics. In a newer view of this interpretation of QM combined with the presumption of a physical medium, the “walker” experiments of Couder and Bush, et al, become even more useful and meaningful in exploring the mechanical underpinning as a causal mechanism for otherwise mysterious quantum behaviors.

From these two seemingly small presumptions, a host of additional new information becomes visible in an aether model which is not visible in standard interpretations. For instance, some who are very well versed in relativity might recognize that there is a “shadow version” of the calculations of relativity that is discarded. Specifically, in Lorentz-Poincare relativistic aether, the well known effects of time-dilation and length-contraction appear, but additionally *time-contraction* and *length-dilation* also become a viable perspective in this interpretation, thus intimating that there would be more information available in physical reality than we currently use if this alternative preference is superior. Furthermore, this change extends into questions of

relativistic considerations of quantum mechanics which may intimate virtual particles in the previous case which can now be ignored in the alternative interpretation. Additionally, in QM there is the Bohmian interpretation of “action” at a distance as no action at all, but simply revelation of pseudo-local information that is being imparted by the medium which only appears random because of complexity.

Navigating the very narrow and convoluted gates of modern physics.

To follow the singular thread that can navigate the maze of requirements of this interacting set of systems and experimental results, and then tie it all together into a workable and interactive whole, we must travel back in science history to nearly a century before relativity to MacCullagh’s rotationally elastic aether. As covered in the previous paper, MacCullagh’s work allowed Kelvin to simultaneously finish his model of the vortex atom as well as defend Maxwell’s work from accusations of being ad hoc or without mechanism. This thread wends its way up through Kelvin and Larmor to Lorentz’s relativistic aether and thus influences Einstein the first time, and then through another path it fuels Mie’s 4D continuum and is therefore the basis of Hilbert’s work and collaboration with Einstein in finalizing General Relativity, thus playing a seed role a second time in the work Einstein is most credited for.

MacCullagh’s aether reached its highest point of development through the work of the Cosserat brothers in 1909 to extend Kelvin’s aether model found in the little known paper “On a Gyrostatic Adynamic Constitution for Ether” and represents the final and most complete work we can currently use that was directly intended to reveal aether dynamics. By its other name “micropolar elasticity,” it has been used to describe the dynamics of superfluid systems and as such, their description of aether can most easily be categorized as a superfluid or “supersolid.”

Forward from this point in history, inviscid fluid behaviors enter the quantum picture through Madelung’s “Quantum hydrodynamic interpretation” which demonstrates an ability for a superfluid treatment to achieve equivalence with standard probabilistic models of QM, but if we assume that Madelung’s superfluid is not precisely a Cosserat continuum, we have some level of deviation that must be accounted for.

This deviation and the “particle paths” produced by Bohmian physics will be explained via extending the inferences of the prior art of Kelvin and the Cosserats and observations in fluid mechanics and exploring a more continuous and emergent mechanism for the existence of what we label as “particles.”

Finally, to understand why these two deviations would have occurred, we will travel even further backwards in physics history to a single presumption made by Fresnel which colored the next century of physics and eventually led to difficulties that eventually led to the abandonment of aether. One simple exchange in a formula, which changes nothing numerically, leads to revolutionary change in the metaphysics the formulas describe. Only by making tiny

adjustments this far back in history can the cumulative adjustments down the line give additional wiggle room within the extraordinarily tight confines of what is already understood in physics.

The Required “Touchpoints” Required to Relate and Compare the Interpretations.

Now that we have identified the two most crucial interaction points of the constancy of light and the conceptualization of wave-particle duality and the way they would deviate from modern theory, we’ve established a basic starting point and basis for this construction of a skeleton for a toy model.

The next step in providing information for this interpretation can be given by establishing a necessary set of general worldviews through a basic question and answer dialog about some of the most fundamental concepts in physics. This simple framework, including numerous speculative hypotheses, will provide a large scale exploration of the consequences of these deviations from orthodoxy. While the final goal is to return to a model which is mostly a perfect analogy to modern understanding, the most wildly divergent language and views can act as a set of critique points in need of defense, specification, or elimination in subsequent papers.

Question	Answer
<i>What is the cause of all physical matter and phenomena?</i>	Matter is caused by rotational knot-like configurations of the single extant substance or fabric of the universe historically called “Luminiferous Ether,” or more recently simply “Aether.”
<i>What is energy?</i>	Energy is a term relating to both configuration and motion of aether.
<i>What is electromagnetism?</i>	It is an expression of wave-vortex duality in aether. A wave in any medium has requisite torque and half-rotation effects necessary for particles to rearrange themselves in response to disturbances from equilibrium..
<i>What is electricity?</i>	The flow of aether along an axis of rotation.
<i>What is magnetism?</i>	The <i>structured</i> configuration of the lines of force created by the flow of aether.
<i>What is a “line of force.”</i>	An outdated term for a vortex filament found in aether which is common to superfluids.
<i>What is gravity?</i>	The aggregate effect of rotation in aether, related to the unstructured and unaligned presence of vortex filaments. It is a measure of the rotational activity of the aether.

<p><i>What is an atom?</i></p>	<p>A topological phenomena in which a vortex filament is in a knot-like configuration because of a harmony of phases which allows energy to flow in a loop and feed back upon itself in a pattern of resonance.</p>
<p><i>What is an energetic particle?</i></p>	<p>The interaction of a wave with the local inhomogeneity of the medium caused by vortex filaments present accomodating a superposition of numerous waves traversing the same area of aether.</p>
<p><i>What is the commonality between atoms and energetic particles?</i></p>	<p>The rotational speed of a given vortex filament is governed by local stress energy. Vortices that are spun to speeds beyond a certain threshold open up into cavitations. The stresses present are a measure of local energy present and will cause cavitations in the vortex filaments when a threshold is reached and these cavitations are concomitant with the wave phenomena as the medium accommodates the stresses represented by the waves. The point-like location of a particle is determined by pre-existing rotational centers of vortex filaments combined with wave interference at the conjunction of vortex and waves..</p>
<p><i>What is the difference between an energetic particle like a photon, which is massless and a massive particle?</i></p>	<p>A feedback loop for energy allows greater stresses and rotation rates to be present in a location. This makes massive particles the center of large collections of vortex filaments to accommodate this rotation and they are, in aggregate, responsible for gravitational effects. Only configurations of aether which are topologically capable of supporting a resonant area for storage of rotational energy in a specific area of space can create the effect of mass. Those particles which appear only from wave interactions with pre existing filaments do not perform this function. Therefore primarily only knots are massive whereas more stringlike configurations are not. (Soliton “particles” can arise because of the interaction of rotation with the local properties of the medium and may represent the “weird” area between massive and non-massive particles)</p>
<p><i>What is the difference between a magnetic field and a gravitational one?</i></p>	<p>Gravity is a total aggregate amount of aether rotation in a given area without regard to the structure of the rotation. (Random filaments) Magnetism is the phenomena of long regular and aligned vortex filaments which give a semi-regular structure to the surrounding space.</p>
<p><i>Why is time different in one place from</i></p>	<p>Time is a measure of change which is mediated by aetheric or what would usually be called “electromagnetic” interaction. The local</p>

<p><i>another? Why does gravity bend light? How does a particle lose energy falling into a gravitational field?</i></p>	<p>properties of the medium are responsible for this interaction in combination with any movement through the medium. The speed of light in a gravitational field is altered by the additional rotational characteristics of a medium close to a gravitational body. Additional vortex filaments present act as “rigidity” of the medium which, lowered, slows all vibrations and interactions within the medium. Extra steps of complexity to accommodate superposed waves in an area leads to reduced reaction time of the medium.</p>
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These few short answers should outline a body of strong inferences and paint a white space picture that extends to a much larger set of questions regarding well established physics and how it might be cast in hydrodynamic form in every way.

Addressing Areas of Primary Concern and Contention.

“We choose to examine a phenomenon which is impossible, absolutely impossible, to explain in any classical way, and which has in it the heart of quantum mechanics. In reality, it contains the only mystery. We cannot explain the mystery in the sense of “explaining” how it works. We will tell you how it works. In telling you how it works we will have told you about the basic peculiarities of all quantum mechanics.” - Richard Feynman on the double-slit experiment

In the previous paper we topically addressed the interchange of discrete and continuous treatments of phenomena with phonons as a primary example. This demonstration of the ability to smoothly transition between discrete and continuous, however, does not address the disquiet that naturally arises in attempting to resolve well-established working perspectives with radically new ones. The breadth of application of well-known structures outweighs individual new examples when it comes to the natural feeling of “understanding” and intuition that grows from long exposure to such a successful model like we find in modern physics.

While a rotationally elastic aether is a somewhat easy transition from gravitational field theories, the wave-particle duality and indeterminacy of quantum mechanics doesn’t easily translate, so one must ask, “How could one look at the same experiments and see fluid motions where complex particle interactions and behaviors have been so successful?” How does one get fluid motions from the well defined particle interactions specific to quantum mechanics? One must ask, however, “Can we consider statistical treatments truly ‘well-defined’ or are they simply reliably useful heuristics?”

The only place to start is from experiment. Though Feynman’s statement above was initially true, the double slit experiment and all the other strange behaviors it exemplifies are, however, *no longer inexplicable* from a “classical” perspective in the vein of how Feynman used the term.

It is now completely describable from a number of perspectives which have become ever more clear with developments in our understanding of deterministic chaos and also with the help of Yves Couder's "walker" experiments which have been fantastically replicated and explored by John Bush at MIT.

The first, simplest, workable partial explanation is simply that the particulate nature of energetic particles is entirely an emergent property of electromagnetic interaction with border conditions in the phenomena we call matter. When one considers the brownian-motion-like chaos of a surface, the waves incident upon this irregular surface can be funneled down to the "valleys" of that surface like the insides of a concave mirror focusing energy which must reach a peak threshold at the bottom to overcome the natural state of the atom so as to spin it up to a higher energy state which can then be detected. This supposes threshold-based existence of energetic "particle" events that only occur as an epiphenomena of detection/interaction events.

This utterly wave-based explanation runs into a mild trouble attempting to explain distinct multi-interaction traces of particle motion through fog chambers other than to suppose that the first interaction with matter concentrates and redistributes the energy in a very localized area that narrows the possible area the subsequently re-emitted wave can spread over before being absorbed again and thus, limiting the area next interaction can occur in thereby leading to a repetition whose general trajectory was defined by the first particle able to absorb the wave energy and re-emit it. (more border condition effects) However, the irregularity of the proposed media, caused by rotational effects localized as vortex filaments - which are presumed ubiquitous - may allow for non-linear wave effects and therefore, soliton-like behaviors in even subatomic "particles."

We will return to the emergent "cavitation" particle hypothesis again later but we must first start at the most crucial beginning of the history of aether that led to its eventual downfall. Certain definitions and presumptions of Fresnel.

2) Primary Historical Starting Point of Theoretical Deviation

Fresnel's initial discovery of relativity: The index of aether drag AKA the velocity addition formula.

Fresnel set out, specifically to solve the mystery of refraction in consideration of Arago's experiment (Whittaker 1909, pp109) and arrived at a calculation for a hypothesis of partial aether drag which was consistent with Arago's experimental results, which is called the coefficient of aether drag.

As Max von Laue showed, Fresnel's coefficient of aether drag is equivalent to the relativistic velocity addition formula. This equivalence is certainly due, in part, to the use of vector addition

in both cases. It is the explanation of what the vectors are and mean in physical phenomena, however, that is radically different.

A direct historical influence and connection from Fresnel's aether drag to relativity can be shown via Lorentz's citation of W. Veltman's 1870 era investigations (specifically his 1873 paper) of the motion of light in moving media with respect to Fresnel's drag theory, in Lorentz 1895 paper. (Newburgh, 1974) Einstein mentions this connection at various times, such as in a letter to Carl Seelig as quoted by Born.

Furthermore, Einstein wrote [1] to Shankland that Stellar aberration and the Fizeau experiment "were enough" for him to develop the special theory of relativity and earlier [2] wrote that the Fizeau experiment, was "a crucial test in favour of the theory of relativity."

Thus the history of relativity and the history of the aether have the same starting point in Fresnel's development of the aether drag hypothesis.

Returning to Lorentz's citation of Veltman, in examining Mascart's repetition of Hoek's experiment, Veltman's contribution was to more directly elucidate a mechanical reasoning for the fact that refraction would appear independent of motion. It is the first hints at a *mechanical reasoning* for an illusion of light's constancy.

At a small fraction of light's speed, the influence of aether drag would not be large enough to be experimentally demonstrated in most any 19th century experimental setup (and most 20th century ones) *when the situation is to remain stationary and allow the motion of the earth through the aether cause the effect*. However, moving an object such as water through the experiment, like occurs with Fizeau, with respect to the aether could show an effect. This truth is counter-intuitive until one considers that there are two sides to a vector addition and adding to one side is very different from adding to the other when they are far from equal. The issue is effects across two dimensions or more can be examined as though at right angles to each other. This categorization and differentiation of 19th century experiments as "Type I" and "Type II" is first discussed in detail by Newburgh. (Newburgh, 1974)

Another way to think of this vector addition situation is to think of a right triangle with two legs of very different lengths. Let's say 10 ft versus 10,000 feet. If I add 10 feet to one end versus the other, is *the hypotenuse* altered by the same amount? Originally the hyp=10,000.005 and when we double the 10 side to 20 the hypotenuse only increases to 10,000.02 but when we add only 10 to the 10k side, the hyp=10,010.005.

Footnote:

[1]R. S. Shankland, Am. J. Phys. 31, 47 (1963).

[2] A. Einstein, Relativity. The Special and the General Theory, (H. Holt and Co., New York, 1920). pp. 45-49, 61.

This staggering difference separates type 1 experiments where there is motion between the parts of the experimental apparatus such as viewing stars through a telescope with stellar aberration and doppler effect or Fizeau's experiment, and type 2 experiments such as the Michelson-Morley where only the aether wind is expected to produce the effect. In type 1, speed is added to the "larger side" of light's speed and in type 2, the speed is added to "smaller side:" motion with respect to light.

Fresnel's tiny error: The "missing semi-colon" in the "program" of physics.

Unfortunately, it may be one small issue caused by Fresnel that simultaneously promoted and held back the physics of the 20th century. Upon accepting Young's proposition that the refractive powers of a transparent body depend upon the aether contained within them he assumed that the aethereal *density* of in any body is proportional to the square of the refractive index.

Thus the assumption that a wave traveling in a *more dense* (instead of less rigid) aether found in objects will travel slower was then codified in his early attempts to predict how much light would be carried along by a transparent body. The success of his mathematics and the proof provided by the Fizeau experiment hides the problem of the rationale of the mechanics presumed. By choosing to focus on density instead of rigidity, aether theory may have been doomed to failure from this point forward. Not because of the physical reality of the aether, but in the presumptions about its features. The nature of the mistake allows the math to come out correctly but shifts the direction of developments after that point in the wrong direction. This one single failure of metaphysical interpretation may have led to apparently contradictory views about aether and its eventual abandonment. This is like a small bug that allows a program to continue to function and only fail under certain circumstances. Such failures may lead to an ever expanding stack of small workarounds as the exceptions are dealt with after the fact instead of correcting the original error. This continues until the whole program becomes fundamentally unstable after multiple upgrade cycles.

This means that we must re-work the rationality used to define the math but arrive at the same mathematics. We must re-write the program from that point of error but make almost zero change to its functionality. This is easily done by working with rigidity instead of density.

Let's examine Fresnel's first presumptions:

If C denotes the velocity of light in vacuo and C_1 denotes the speed of light in a given material body at rest so that $\mu = C/C_1$ is the refractive index, then the densities of ρ and ρ_1 of the aether in the vacuum of space and in the body respectively, will be in the relation:

$$\rho_1 = \mu^2 \rho$$

He then assumes that the part that is carried along is the excess in the body over the normal in space. Thus the amount carried along is $(\rho_1 - \rho)$ or $(\mu^2 - 1)\rho$ while the rest of it remains stationary. (Whittaker 1910)

The velocity the center of gravity of the aether in motion with the body moves forward is therefore

$$((\mu^2 - 1) / \mu^2)\omega$$

where ω denotes the component of the closing velocity of the body in question. This was then supposed to be added to the velocity of the light in the transparent body or “medium” in that direction to acquire the absolute velocity of light.

It is this presumption about the cause of wave speed differences that dooms aether to 100 years of misunderstanding.

In Fresnel’s model we are using the rho or density alone without a bulk modulus. Since, when computing wave speed, $v = \text{sqrt}(B/\rho)$ and therefore since density(rho) slows wave speed while B(bulk modulus) increases it, using rho alone is only one of *two* ways to accomplish the same thing. He should have used bulk modulus instead.

This inverts some of the presumptions but, obviously, it can all easily come out basically the same way. The details of this will be explored further in subsequent papers. For the purpose of understanding a hydrodynamic perspective better, we will assume the cause of refraction is a reduction of bulk modulus (rigidity or analog thereof such as rotational speed) instead of an increase of aether density. One can still predict/anticipate the outcome of the Fizeau experiment as Fresnel did.

This still leaves a question of how and why his formula for aether drag was proven to be accurate by Fizeau’s experiment and what this has to do with relativity.

Fresnel assumed that the excess density (the difference between aether in free space and inside a material body) was carried along and this was the cause for the partial aether drag. This difference between two states of aether, however, remains unchanged in quantity when we switch out rigidity for density. There is still a specific numerical difference that remains the same.

It was initially representative of the relationship between the amount of aether inside the object that remains stationary with respect to the aether frame in comparison to the amount that moves along with the material object instead. Instead of this, we can retain the analogy by simply assuming it is the relationship between the total area of the aether affected inside the material body and the amount that remains unaffected. Thus the aether drag hypothesis remains predominantly unchanged but the change in subsequent assumptions can become quite large via accumulations of metaphysical error in subsequent developments. (The theory deviates in a

faulty fashion while the math is still workable.) This alternative assumption above seems to predict that the index of refraction in a material can change via pressure altering the distance between particles and provides a deeper mechanical reasoning for such a change.

3) Modernized Aether Dynamics

Now that we have established a specific deviation point we can give the outline of its effects on history.

From this point forward the specificity of the explanation must be reduced in favor of concision or large scale interconnection of a vast topic. Only answers to the questions which establish an entire system of physics, will be given, without reference to their historical, experimental, and mathematical underpinning. These crucial factors will be addressed in subsequent papers.

First we will address the major touchpoints and then return again to describe the alternative path history would have taken.

Why is Fresnel's mechanic of aether drag and the velocity addition formula the same?

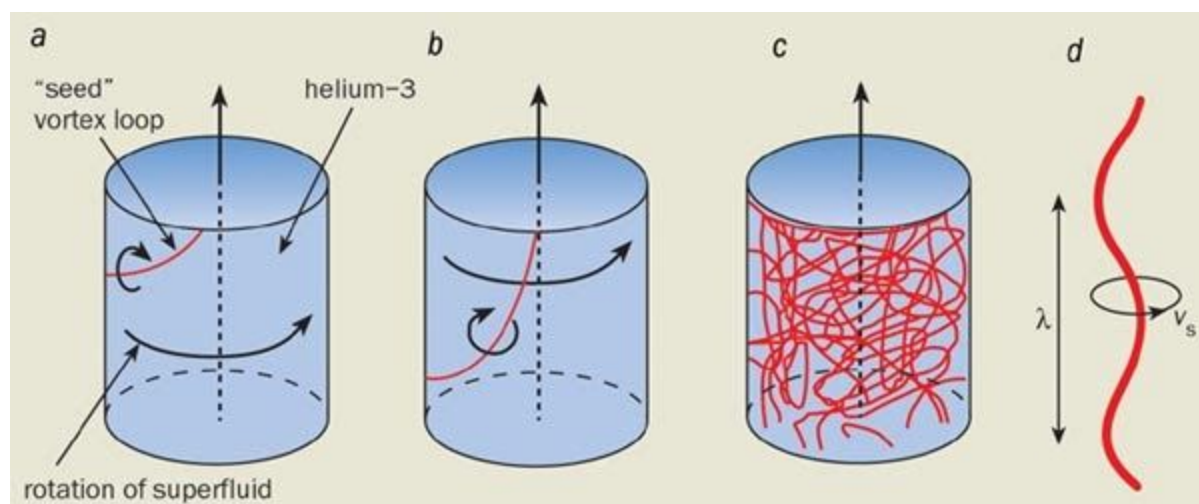
Because it is the first discovery of the underlying mechanism behind the apparent Michelson null. This mechanical impact on physical objects and their interaction with light is a fundamental truth about reality and leads directly to Larmor and Lorentz's "factor of change."

If the reason light undergoes a change in speed (refraction) in a material object is because the medium it travels in is partially changed by proximity to matter, then motion with respect to the medium will cause a partial effect that has the sort of "fall off" effect we see in the velocity addition formula. We will explore more of this connection between the Lorentz factor momentarily.

Returning to the beginning and starting over from the basis of rigidity alterations instead of density.

All of the developments of aether theory from Fresnel forward presumed that aether was more dense inside of a material substance because the results of the Fizeau experiment were perfectly predicted by Fresnel's partial aether drag. Now that we know that we can easily exchange that assumption, all considerations of aether theory during the subsequent century can be turned inside out in a specific way and by doing so, all of the apparent logical conflicts of aether immediately fall away.

Though MacCullagh's rotationally elastic aether is crucial to matching aether to 20th century physics, the most important next point in the history of 19th century physics is Maxwell's equations which descend from Faraday's lines of force concept. Maxwell specifically developed electromagnetism from a "molecular vortex" model as it was called, but in effect he was modeling the lines of force in terms of inviscid fluid mechanics. In a modernized aether theory this directly correlates with the superfluid behavior called "vortex filaments" which are spontaneously formed in superfluids in which waves occur. Lattices of vortex filaments can be formed in uniformly rotating superfluids. This is a function of wave-vortex duality and will serve as the basis for wave-particle duality in a modernized aether theory explanation of quantum mechanics.



Formation of Particles

Just prior to the confusion caused by the Michelson-Morley experiment, Lord Kelvin had finished a many decade long pursuit of a theory of atoms based upon the idea of toroidal vortices. This idea of the underpinning of reality was so prevalent that JJ Thomson was able to give a mechanism for valence based upon the loops or rings of these structures and the way in which they were folded or twisted.

Along with the developments of various contributors, Lord Kelvin's vortex atoms eventually became the basis for knot theory and are partially the basis for a modernized aether theory explanation of particles. This knotted vortex phenomena, however, must be coupled with the mechanism of wave vortex duality, to provide a fuller explanation of particle formation as the storage of energy in a local portion of aether. By necessity, the local motions of the constituent portions of a medium that "waves," are circular and therefore "create" vortices. This is most easily seen in a standing wave set up such that a vortex's speed can be pumped by a wave and a vortex sheds energy in waves. If a checkerboard pattern of standing waves is induced in a shallow wave tank, just below those waves a checkerboard of vortices will also be present.

The artistic pursuit known as cymatics has resulted in video demonstrations of stable geometric wave patterns in fluids which are accompanied by vortex filament knots which are the result of complex patterns of resonance and interference achieved by a particular combinations of frequency and amplitude. These pulsating demonstrations represent an analog demonstration of Kelvin's vortex atoms.

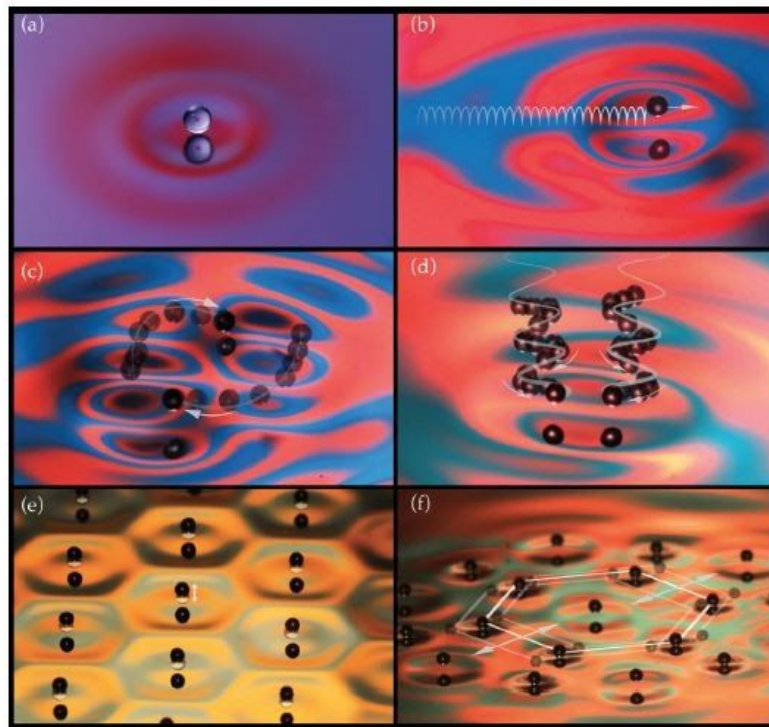


In the video these images are pulled from, the most basic shape created with only two primary waves appears to have a D orbital shaped vortex filament embedded in it.

In these figures, the resonant cavity is formed by the surface tension of the water subjected to a driving sound. One further 2D analog must be examined to explain the transition from 2D to 3D particle formation: These experiments are referred to as the Couder experiments or "walker" experiments in which a fluid bath of silicone oil is driven and droplets of the oil then ride across

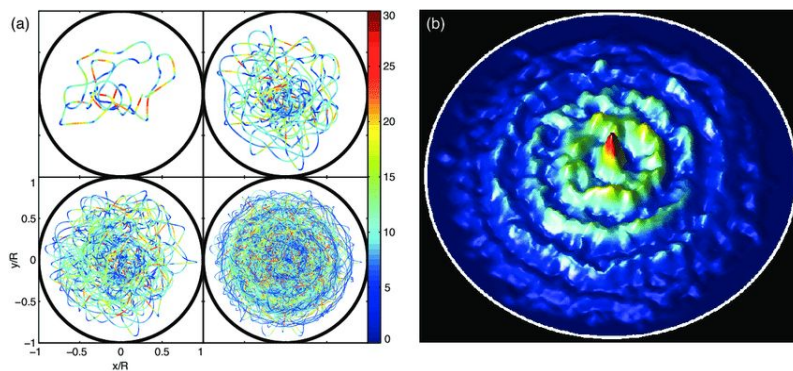
the surface without rejoining the bath.

Droplets walking on a vibrating fluid bath, discovered over a decade ago [1], represent a macroscopic realization of the pilot-wave mechanics proposed for microscopic quantum particles



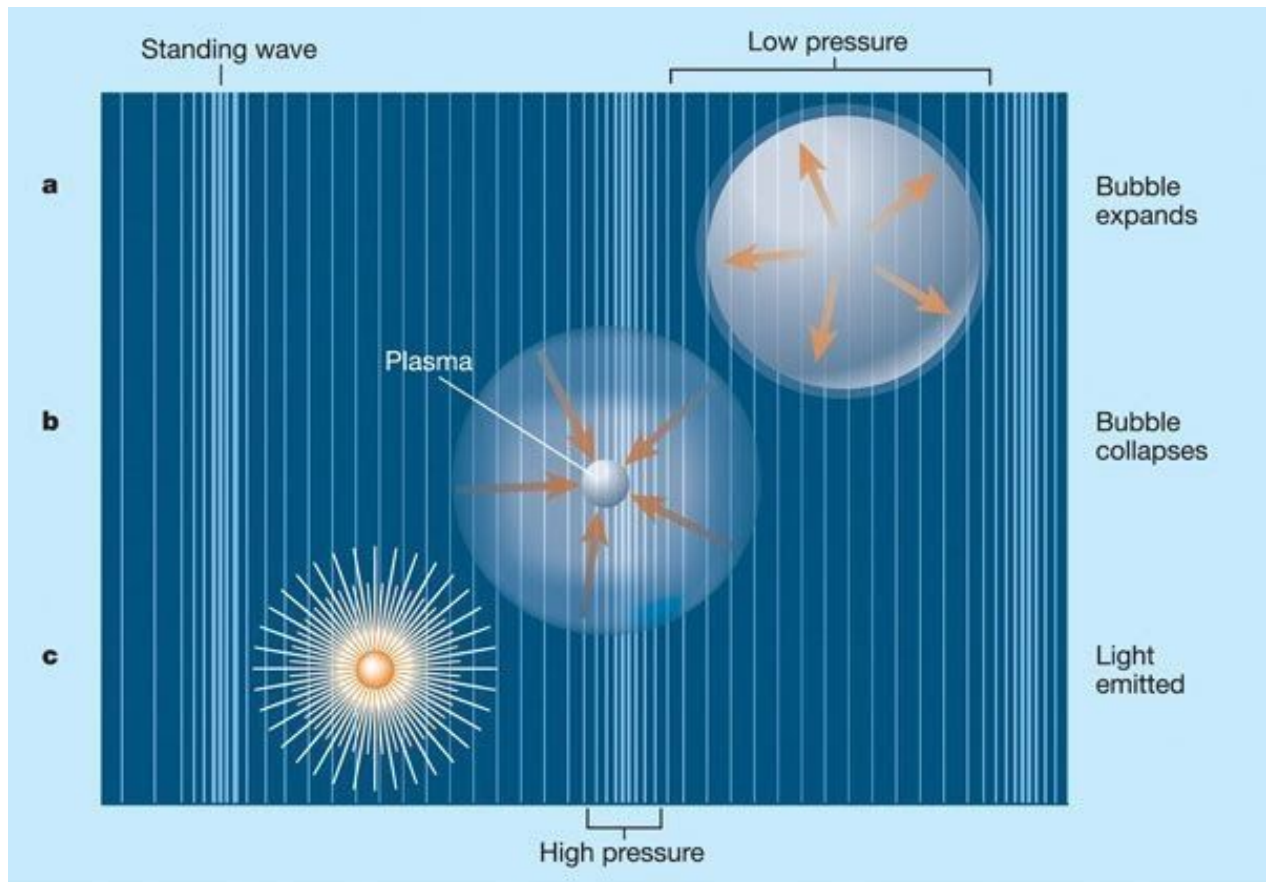
VIDEO 1. (a) A droplet of an approximate diameter of 1 mm bounces on the surface of a vibrating oil bath. (b) For sufficiently large values of the vertical forcing, a droplet may spontaneously self-propel across the interface. Droplet pairs may interact through their wave fields, either (c) locking into orbits or (d) walking side by side in a promenade mode. (e) Multiple drops may organize into hexagonal lattices that (f) destabilize for sufficiently large values of the forcing acceleration. White streaks indicate the (b)–(e) complete or (c), (d), and (f) strobed droplet trajectories. DOI: <http://dx.doi.org/10.1103/APS.DFD.2015.GFM.V0064>

The particle paths evolve as a combination of the local wave created by the previous bounce of the particle superposed with the “nonlocal” driving wave and therefore evolves chaotically within bounds. The continued existence of the droplet is an emergent property of wave convergence.

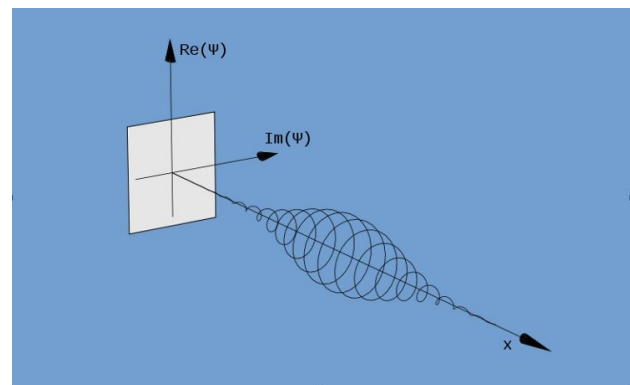


In the present theory, the formation of particles is dependent upon wave stress upon the medium crossing a given threshold which then creates cavitations in the medium. A medium can be stressed beyond a given limit such that it is torn apart. One of the most fascinating demonstrations of this is in the process of sonoluminescence in which a fluid is driven by a wave that exceeds the medium's ability to transmit the wave and a cavity opens. When this cavity slams back together, a tiny light is given off that is believed to possibly be the result of a fusion event.

This analogy provides a mechanism for the definition of border of a resonant cavity that is defined by a combination of the energy present therein and the stresses and reactivity of the medium. This cavitation provides a core mechanism for defining the nucleus of an atom while the presence of knot like vortex filaments provides for the existence of electrons. In both cases, the physical existence of the particle is an emergent property of forces and motions within a medium.



Finally the existence of energetic particles is postulated to be the combination of vortex filaments with waves which cause the filaments to open into cavitations when a threshold is reached, thus the existence of the



particle is dependent upon a combination of factors and threshold values.

Unlike massive particles which trap energy into an infinitely looping flywheel effect via their knot shape, massless particles may only be excitations of the vortex filaments already present in free space.

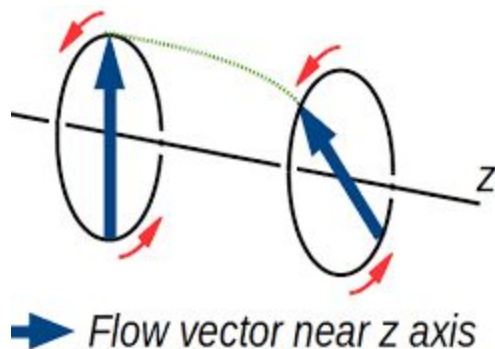
The Unreasonable Effectiveness of Lorentz Invariance

Lorentz invariance is usually directly tied to the constancy of light's speed but the Lorentz transform has been shown to also be applicable to mechanical wave systems in which the speed of sound is substituted for that of light. Brady and Anderson (2015) show that examination of a phase vortex in fluids allows that, while normally a vortex is pinned in a fluid, a phase vortex however can be demonstrated in a fluid in which waves pass by a vortex and the number of crests become uneven on each side of the vortex.

Since the waves travel around a helical/cylindrical path the Lorentz transform becomes viable in this system. One side of the vortex is sped-up and the other slowed down but a deformation of the vortex can allow an averaging sort effect to occur (between speed-up and slow-down) that is much like the effect Lorentz described.



These systems of mechanical waves obviously do not exhibit constancy for the wave speed but the special circumstance created allows the use of Lorentz transforms which infer the constancy of the wave speed in all frames of reference. How can this absurdity be reconciled?

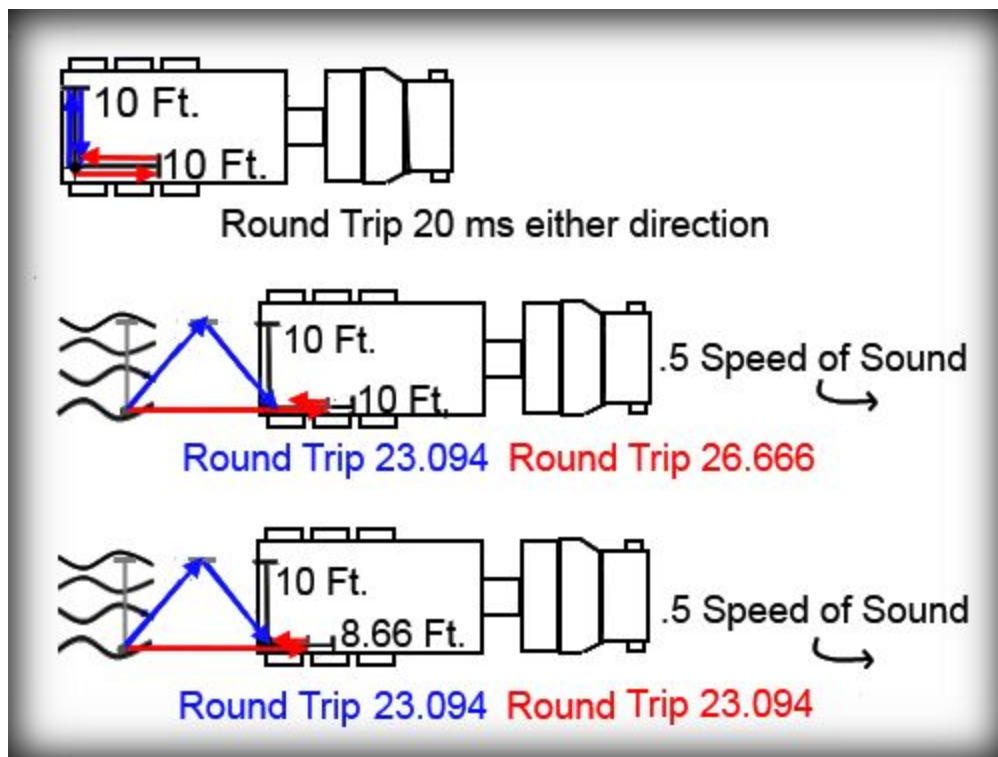


Crucially, Lorentz's initial formulation of the change factor and the transform were based upon the effects of a medium's motion upon wave propagation. The apparent constancy was an illusion created by the deformation of matter. (usually assumed to be composed of vortices at the time)

When considering a phase vortex, two sections of the cylinder surrounding the helix (or cone for a pulsation) can be taken which could give the appearance of a deformed or elliptical conventional vortex from a 2D sliced perspective. This will be a useful concept in the simplified 2D explanations of particles we will examine in a moment.

This illusion of a wave speed's constancy, however, is only present in two-way effects and not in one-way considerations of the wave's propagation. A simple demonstration can be given in an analog of Michelson type of experiment with sound.

If we presume a material exists that will shorten up in the direction of wind by an amount relative to the speed of said wind, and we presume the amount it shortens in the direction of the wind is by the change factor where the speed of light is substituted for the speed of sound, an experiment can be performed on a flatbed truck constructed of said material and, finally, if our clocks are sound clocks, all of the major effects of special relativity will be experienced by experiments on said truck that are constructed with the special material. In the image below a comparison is made between a shortened and non-shortened result. Sound reflecting material is presumed to be placed at ninety degrees from the origin of a speaker/microphone.



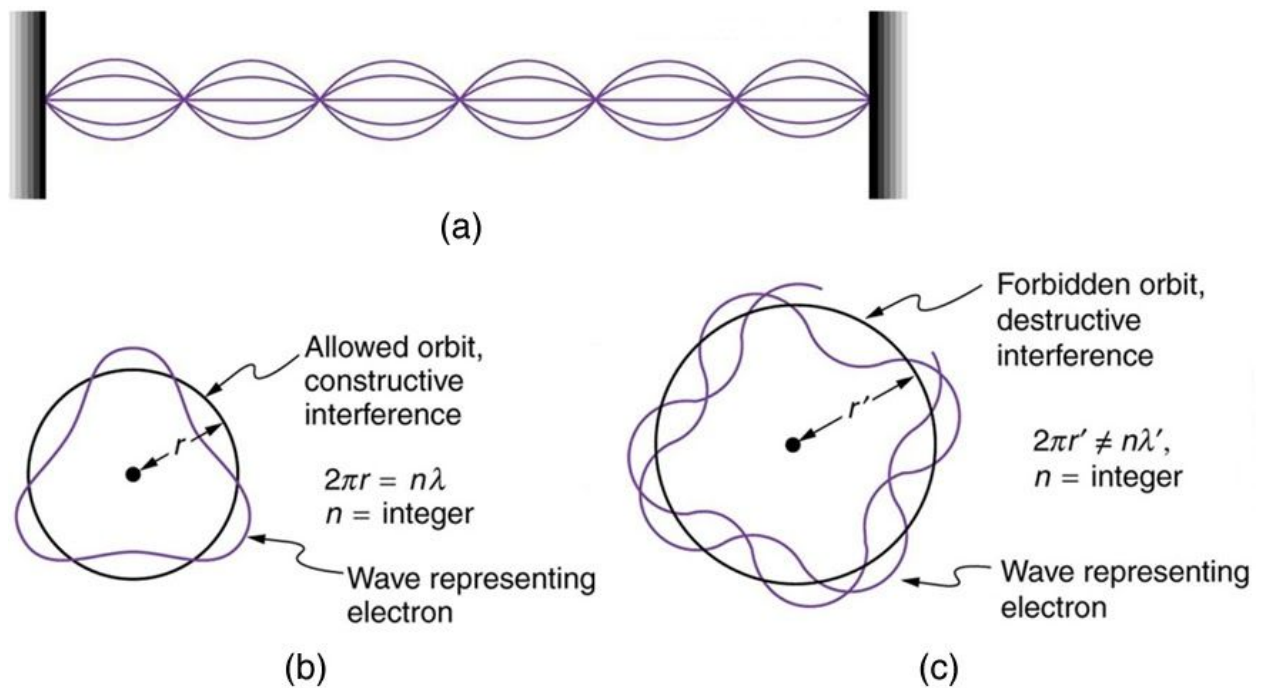
The wind or motion of the truck is obviously causing sound to have a different speed based upon direction but experiments conducted with the special material will not be able to detect this difference if they combine results from both into and against the wind.

Thus, Lorentz's initial time dilation, length contraction and illusion of light's constancy were completely compatible with a preferred frame. The michelson null fits within this relativistic expectation, but also a very small signal would be expected in non-evacuated experiments based upon the drag hypothesis and such an effect was seen in Michelson and Miller's data.

Why should matter happen to contract in just such a perfect manner to match speed through aether? Isn't Lorentz contraction ad hoc?

Not if one considers the wave nature of a particle. If indeed a particle is a storage of energy and is also composed of waves, then the ability to store wave energy is dependent upon resonance. If there is a cycling of energy and that energy is not lost to the environment, it must have a method of returning to origin in a self-reinforcing manner.

What it appears that Larmor suggested and Lorentz explicated was a 2D pattern of resonance for a cavity in motion. (or in the case of a phase vortex, motion with respect to a cavity) There is only one angle at which a wave propagating laterally to the motion of the cavity will return to the moving origin or center after reflection from the exterior border and therefore there is only one specific point at which a wave traveling into and against the motion will rejoin its partner. The pattern of resonance naturally requires and creates a reflective cavity which is of elliptical form. Furthermore, the rotational speed, when combined with the wave motion must allow a harmony between wave motions from center to exterior and wave motions around the exterior circle of the cavity that is in whole numbers. This is the "harmony of phases" first discussed by de Broglie (de Broglie, 1925) and may relate directly to the mechanical underpinning of AdS/CFT correspondence.



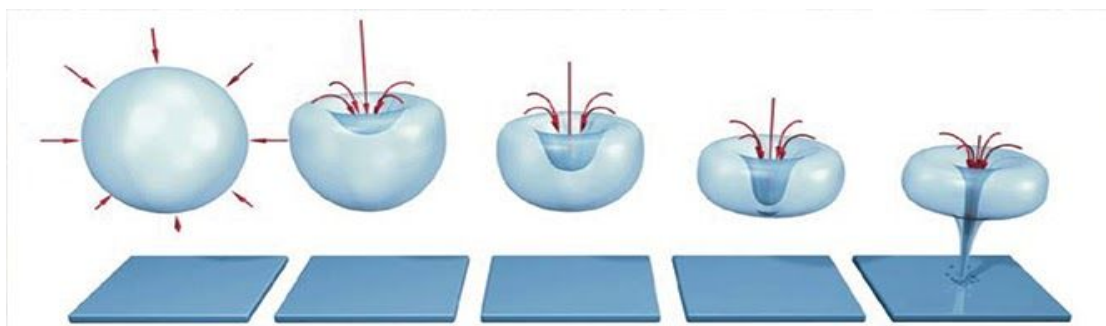
While more complex discussion is necessary to fully outline this mechanism of physical shortening in an aether environment, this short digression should lead to some minor grasp of the proposed hydrodynamic explanation of Lorentz symmetry which will be more thoroughly explored in subsequent papers.

The requirement of maintaining a resonant cavity for a vortex in motion through a fluid is that it is shortened in the direction of travel. This sort of vortex deformation can be seen in simple 2D vortices in motion through a fluid. Uneven flow rates across the edges of the vortex cause both deformation and movement of the vortex. In the case of a simplified 2D analogy under consideration, turbulent boundary layers form in the fluids which have the characteristics suitable for analogy as an aether such as superfluids and plasmas. The boundary of the traveling resonant cavity is therefore a layer of turbulence which separates larger sections of laminar flow and defines the shape of that cavity. The shape of the cavity, in turn, defines the interaction profile between the vortex and the surrounding medium. This deformation of the wave-vortex dual may provide both a mechanical reasoning for the phenomenon of inertia and the reason for the effects of relativity.

It must be reiterated that these harmonics and rotations are extremely gear-like mechanical requirements of inviscid fluid dynamics that directly reflect Maxwell's early observations. Phenomena such as wave-vortex duality are simple necessities of one portion of a substance moving out of the way of another portion of a substance as the portions "gear" against one another.

"The electromagnetic field behaves as if it were a collection of wheels, pulleys and fluids." - James Clerk Maxwell

In the more complex case of a three dimensional analog for cavitation atoms, the cavitation is represented by the walker of a Couder experiment and the complex interaction of the droplet's trajectory and its subsequent impact on the waves created by the previous impact constitute a requirement of a "double solution" first proposed by de Broglie. The uneven distribution of forces present around a collapsing cavitation are responsible for its torus shape and the non-spherical arrangement of the vectors which represent the distribution of stress at the moment of collapse are, represented in our analogy by the angle of incidence of the impact of a walker in motion in the Couder experiments.(Bush et al, 2015)



4) Discussion: Information Theory, AdS/CFT Correspondence & Dark Matter/Energy. A “Neo” holographic universe.

This extensive section below is presented as discussion and an example of how deeply the basic principles of simple reinterpretation above can alter our future explorations of our current theories and reveal new areas of possible scientific exploration.

The implications and assumptions outlined in this possible new view of physics allows for an “interesting vacuum” which influences all of our experiments and is therefore mostly accounted for in modern physics, but only through the lense of its impact *on* our physics instead of describing its direct existence and the implications of a persistent, evolving, non-random substrate inextricably interlocked with physical phenomena. Thus the existence of Dark Matter/Energy is intimated to be tied up in and spread across various aspects of the discussion below via an assumption of the mass-energy-information equivalence principle. (Vopson 2019)

Upon assuming a substrate exists, immediately a vast new world far larger than the one normally considered part of a singular universe appears. This world is made up of a fine web of vortex filaments and fluid motions and the world we consider to be the cause of physics may be “below” this substrate in certain cases when causal hierarchy is considered. That which was thought of as cause may be redefined as effect. However, it will be assumed in this interpretation that the hierarchy is a “tangled” one that is much like the relationship between the guidance of water’s flow by a riverbed and the cutting definition and guidance of that riverbed by the water’s flow. Thus complex self-referential effects require scale based considerations of hierarchy.

Below we will explore the description of a clockwork universe where each gear can be thought of as both upstream and downstream of a given neighbor because of the loop of interaction. There is indeed a loaded spring connected to this clockwork which we typically address via entropy, but we will identify a second spring which is loaded during the unloading of the first in the cycles of clockwork machines actions.

From the pers[pcetive of this new re-coding and reinterpretation of all our known physics, one must assume that the randomness observed in particle motions is not factually random, but instead represented by, and encoded into, the substrate via geometric configurations of relationships between locations of vortex centers, waves, and flows etc. This information is a determinant factor in particle outcomes and may be considered to be stored in both “continuous” and discrete formats, depending on scale, but is directly determining the outcomes of experiments. Instead of randomness being resolved by observations (or some other descendant of the Copenhagen interpretation) or outcomes being part of a process of selecting from infinite branching universes of “Many worlds” types of interpretations, all the additional complexity

required to explain the behaviors of quantum mechanics exist in the constitution, properties, and states of the aether like a great computational machine. However, as an analog processor, things such as the discrete location of a particle is determined by the outcome of complex wave convergences and possible collapse events mediated by threshold conditions, thus the confusing aspects of prior interpretations was a problem with the state of the art in complexity and chaos theory which now give more subtle understandings of emergent phenomena.

Further, the exploration of the intersection of energy, entropy, and information which is an active field of inquiry in physics, may now be explored with a new set of tools and perspectives, and those new perspectives and tools may be applied to re-examine the curious issues of dark matter and energy.

To apply the neoclassical interpretation's perspective as a new methodology, basic concepts of information storage and processing in the aether substrate must be established and the mechanism of symbolic reference must be explained in terms that can relate to quantifiable energy in the physical world.

AdS/CFT Correspondence

Above we postulate that particles emerge as cavitations in the substrate because of the convergence of waves which results in pushing rotational features of the substrate beyond a threshold.

Further explaining this idea, one can presume that some features of particles and black holes are shared and that particles are emergent black hole phenomena at the quantum scale. This further infers black holes are spaces empty of the aether substrate. (Or transitioned to a fundamentally different state) These concepts lead to unexpected possibilities for a fluid dynamics model which can allow information integration and the reversal of entropy via resonant phenomena. Using the observations below, one can suspect that there may exist an entropic cycle that is much like the hydrologic cycle. Ancient people believed water always moved downwards because they underestimated the action of evaporation happening out in the oceans and something similar could one day be discovered true of modern people in their observations of negentropy. Perhaps the assumption that rare effects in a deterministic system are responsible for the nonzero spontaneous order found in "fluctuation theorem," instead of simply low probability events, might also lead to a discovery of a place/situation in the universe where the exception and rule inevitably must by mechanical requirements trade places.

With a cavitation version of particle formation, the emergent aspect of a particle's existence, however, may be such that interaction is required for the cavitation event to occur even though sub-cavitation energy, as rotation, is extant in that locale before interaction and addition/amplification of energy occurs. (through constructive interference) Thus a collapse event may still need to be mediated by interaction. The important feature difference, however, is

the existence of the vortical filaments and their organization structure in the local substrate as a mechanics which govern outcomes instead of some pale ad hoc concept of “randomness.” The existence of Kelvin’s vortex atoms or the movement of subatomic particles is defined by the knotted or unknotted aspect of these vortex filaments and the linear vs cyclical movement of energy. These qualities determine the characteristic interactions between waves and vortices that result in vortex pumping or dissipation and a complex dance of interaction required for the existence of an atom and the constituents which must now be thought of as areas more than things, even under a purely mechanical regime.

If we now consider the similarity of black holes to cavitation particles, we can begin to explore the holographic principle (Susskind 1995) in a completely novel way. Specifically, as a fully everted version of the normal concept of AdS/CFT correspondence. The 2D surface which holographic principle supposes “borders and encircles our world” is, in this new concept, partially present on the outside black holes, but more importantly that fuller complete 2D surface that borders our universe is also present on every particle. Black holes are simply large enough for us to sense the presence of the 2D surface which is all around us in the form of the vortical filaments and their convergences into *quantum* black holes. This cannot be easily visualized as just a simple sphere eversion but perhaps more like a balloon animal with numerous twisted smaller regions between. The visualization of the nested twisting patterns of DNA into chromosomes, for example, may also be of use for visualization.

So the perspective described is a position that our perspective is twisted up and inside out and the exterior surface of the universe is right here beside us and inside us. Matter is the exterior surface of the universe and the rest of the universe of fields and interactions are bouncing off that surface to self-generate that/those surface(s) in other locations in a way we think of as a fractal. The surfaces participate in the creation of other surfaces (emergent particle creation) much like the Couder/Bush walkers in the hydrodynamic analog experiments’ droplets contribute to their own future existence with each bounce.

Recapitulating, in the walker experiments the droplet bouncing and the droplet’s very existence requires the driving force of the agitation of the pool it bounces along. However, its existence is dependent upon the energy present *but more importantly the form* of that energy pattern determines the outcome and the existence of the droplet as a single droplet. That form of the energy was created by previous bounces of the droplet. Every interaction with the surface alters the droplet’s future existence and the energy being reused and reformed is a necessity of its very existence. The walker becomes its own “2D surface” from which it will again receive input later. The information from the previous droplet defines the existence of the next. (without which the droplet would rejoin the bath and cease to exist)

The cycling of the droplet’s bounce is created by gravity but in the case of a cavitation atom it is the restorative force of the medium opposing the displacement energy present.

An atom is therefore conceived as a flywheel that directs the movement of energy in a way that results in repeated pulsations which may be full cavitations in some circumstances, partial in others, and the duality of wave and particle is simply an aspect of the emergent nature of such a cavitation. This is further compounded by the duality of wave and vortex which is a far more sensible and intuitive duality than common concepts of wave-particle duality. Furthermore the information required to determine the existence and character of a single walker is spread out upon the bath on which it bounces upon and is not contained within each droplet alone nor in the local area.

Furthermore, applying these lessons to our model, the entirety of the 3D universe is encoded in 2D, collectively, on all the black holes, including the ones that occur as simply particles winking in an out of “existence” and because that “single” surface twisted around us interacts with itself, we see the fractal or “holographic” aspects of the universe. Our difficulty of observation stems from the fact that we are made up of a foam of “surface” and that surface is wound around itself into an absurdly complex tangle and webbing. Therefore it is difficult to envision it as a 2D surface because our own perspective is inside out and most likely not just twisted but actively and rapidly and actively *twisting*.

The aether in between matter which we call “space” is the real and hard substance and matter is the ephemeral exterior boundary, not the other way around. However it is crucial to understand that space and matter are dual aspects of a singular system.

It is simply a necessity of perspective that we break these two sides of one coin down into smaller subsections and labels for examination.

Energy, entropy, and information

In this section we will claim that, given energy is defined above as motion or changes to the medium, then as the configuration state of the universe is made more complex by dissipative processes carried out in the aether, the resulting effect of the normal turbulence effects in the medium is the creation of additional vortex filaments: additional complexity of the medium. This is the conversion of free energy into information resulting in increased Shannon entropy which is simultaneously thermodynamic entropy.

However, for this section we ask the reader to invert their experience of reality. Let us assume that, instead of entropy occurring because of a “relaxation” to the mean, that entropic processes are, instead, tightening, tensioning, or winding of the universe across a (conceptually) central tensive line. Let us presume a middle point of actual relaxation exists between conventional concepts of free energy and entropy such that the tension-like qualities of the medium shift back and forth across this conceptual line like a wave’s crests and troughs shift back and forth across a central line. Crucially, this conjecture about entropy will contribute to and define the “bulk modulus” and rotational qualities of the medium and gravitational considerations. Further, this

assumes a large scale “tightening and loosening” of the medium at galactic scales is possible and a small scale mechanism of tightening or loosening at the electromagnetic wave level such that there are scale-based entropic qualities to a given region of space. The mean entropic quality of space may be higher or lower in one area of the universe compared to a given galactic mean or local cluster mean.

The *apparent* conversion of free energy into information via additional complexity of the aether medium results in the conclusion that information is interchangeable with energy in a direct and unambiguous fashion. Specifically, however, because we now posit that energy and information should be linked as aspects of a singular entity, this “conversion” can be seen as a state transition instead of conversion. However, it may be necessary to differentiate two additional categorizations of information “raw” and chaotic vs the more “useful” orderly type information capable of doing work: Potential energy. It is a special category of information/configuration capable of locking tension to one side of the tensive line. It is the way in which free energy and entropy are held separate from one another. The two sides of the “tensive line” that information shifts across may be related to the self-reference required for energy to become localized in 3 dimensions versus the evolution of the 2 dimensional aspects of the universe. A synchronized harmonic type of multi-layering of information which is fractal in nature versus a more mundane linear organization.

However, the lower dimensional terminology used thus far has been for the purpose of conceiving of simple fluids, whereas considerations of simultaneous configurations of a 3D space, as described, actually requires four or more dimensions. This understanding of dimensionality as additional “slicings of the cake” versus additional copies of “the cake” is an important distinction for understanding the fuller implications.

Energy trapping and multi-layered data.

When we assume that an atom is a “flywheel” which stores complex 3D (spinor-like) rotation in a single location instead of allowing it to dissipate into additional vortex filaments, this shows us that a given configuration of structure and rotation can result in a halting of the entropic process that converts energy (as information in a cycle) into additional complexity information of the vacuum. (in a more linear form encoded into vortex filaments) This configuration of rotation and shape we call an atom can be converted into the opposite form of information across the central line proposed above.

The concept of “useful information” we have equated with potential energy is what allows the universe to physically exist in a three dimensional fashion. Privileged configurations which leverage the properties of the universe to create persistent structures from energy via feedback loops and resonance. All of which are dependent upon symmetries of timing and location.

Said in another fashion, an atom can be considered a form of potential energy which, by the nature of its configuration, retains “tension” to one side of the entropic line as information on the

material size of the tension line whereas the vortex filaments represent a form of information on the other side of the central tensive borderline where our descriptions of entropy describe the transition from one side of this border to the other.

This tensive line however, may simply be conceived as the difference between the 2 dimensional and 3 dimensional aspect of our universe. The requirements of circulation in a 3D world are “less linear” and more complex than the rotational characteristics of 2D rotations. In 3D rotations merging of vortices is prevented whereas merging of vortical structures occurs automatically upon a 2D border.

This merging of vortices which share a 2D border is a crucial mechanism of order and negentropy discussed below.

Potential energy and “useful” information.

This constitutes a new perspective on the concept of potential energy. There are some configurations of the physical universe which are privileged over others such as a coiled spring such that a conversion via kinetic process can result in an increase in entropy and subsequent encoded information in the substrate. Useful information is potential energy. We will define the constraints of useful information below.

First it must be noted that the conception of inertia proposed in the theory above, in which vortical shape and phase alignment is the nature of the effect, gives us a mechanical reasoning for it which is based upon the relational configuration of the various parts of the particle or atom in question. It's data. Therefore the nature of potential energy, as seen by relational position in a gravitational well, fundamentally determines configuration and therefore data aspects of an object.

Above we have established fundamentals regarding physics at a granularity below the level of consensus considerations and we must establish the same for a discussion of information in this context.

Thus we will claim that “raw information” is simply geometric relation or configuration. *Symbolically Representative* information however, - and therefore “useful information” - which can have an effect on the universe, is achieved by the process of duplication of shape or “mirroring.” One of the most salient examples of representation can be seen in the literal translation of a line of light detected on the surface of the retina to a physical row of brain cells activating in the visual cortex as a line. Representation of shape via duplication, however, has a more important function in physics: reflection of waves and the creation of resonant cavities. This in turn leads to the localization and preservation of energy within that locale. Reflection is a crucial aspect of useful or representative/symbolic information.

However, for the purpose of Shannon information considerations, simply the differences and complexity possible within some medium determine its ability to store information thus we separate raw information from symbolically relevant information. More uniformity is less information. The ability to store more data is considered a less entropic state therefore a more uniform substrate is less entropic because more data or differentiation can be introduced to encode additional data.

According to a traditional story, the term 'entropy' was suggested by John von Neumann to Shannon in the following terms: *"You should call it entropy, for two reasons. In the first place your uncertainty function has been used in statistical mechanics under that name. In the second place, and more importantly, no one knows what entropy really is, so in a debate you will always have the advantage."* (Tribus and McIrvine 1971, p. 180).

While further, in-depth discussion of the relationship between Shannon and thermodynamic entropy in this context will eventually be required, for this discussion let us simply draw attention to the additional microstates available in a Planck scale medium. Restating previous postulates, as the free energy is dissipated, that dissipation is encoded as information in the aether substrate and this is the process of entropy. So, it is crucial to note here that the definition of energy as motion given earlier in this paper does not account for concentration into 3 dimensional cycles or dissipation into linear motion, of that motion, which is the expression of entropy. However, it should be evident that there is apparently a continuum between the dimensions inferred here.

There is, however, a distinction to be made between these two types of information in that useful representative information is capable of impacting the world in a particular fashion: As potential energy. We are defining the lowest form of representation as a special transition point.

When considering that matter is interchangeable with energy and we can use matter to guide energy we must here also note that it is accepted that energy can act upon other energy when it is in a different state. The definition of 2 dimensional properties of motion and 3 dimensional properties of motion in the substrate constitute a border that allows special types of interaction between more linear motions or "energy" and the more three dimensional motions of the substrate (energy) thought of as material. Symbolic representation, as reflection, allows transition from raw information into useful information. From chaos to order and from useless energy to useful energy as potential energy.

From the most basic idealization of representation as borderlines which can reflect, we've made a simple transition from lines to circles and perhaps defined a method for progression from one dimension to two.

The coiling of a spring is obviously a particular configuration state that is superior to another in some way. It is a configuration that could evolve into a different state towards greater entropy but does not. "Meaningful information" has the capacity to focus the flow of energy in the

universe into less probable and more concentrated states via resonance phenomena. The principles of the universe that allow three dimensional matter to exist are reflectively represented and instantiated in the configuration of flows and relationships in an atom.

The simple stresses of mechanically stored energy in the simple conformation energy of a molecule are dependent upon resonant structures of atoms and their ability to define borderlines and reflect. The ability to reflect is the ability to trap motion and bind it to relative location. In this way, symbolic representation as the physical capacity of reflection relates the most basic aspects of energy and information.

Mechanics of Negentropy

The reflection phenomena of greatest interest for this discussion, however, is the mechanism of spontaneous order originally called "Huygen's odd sympathy" now usually referred to as coupled oscillation. While negentropy is usually considered only local and indeed we must admit the 2nd law of thermodynamics may still hold at a universal level, the method by which entropy is factually reversed in our everyday experiences by life processes etc, must be explored at the quantum level.

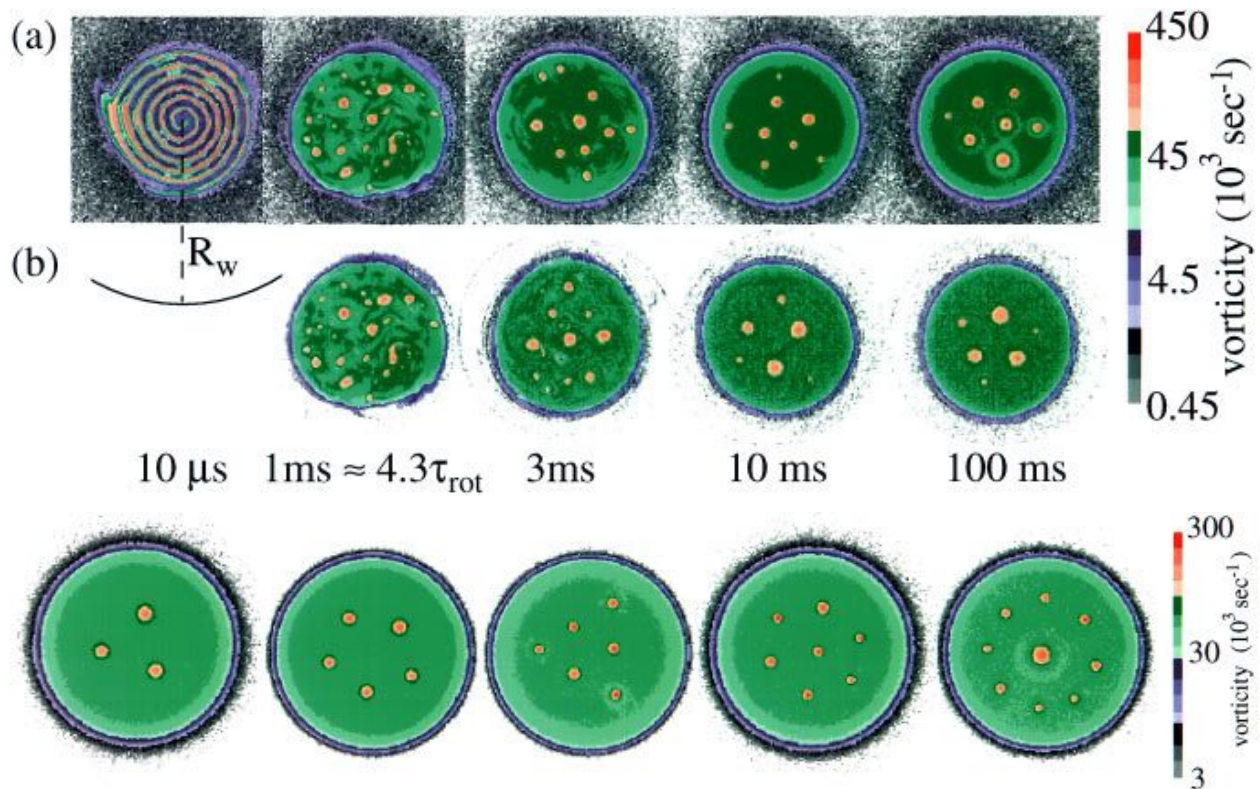
Because of the quality of the universe as a clockwork machine inferred by this model, the reversal of entropy must also consequently remove complexity from the medium as the changes to physical phenomena are simultaneously and inevitably changes to the surrounding medium. The most basic type of organizational action in the universe, then, must be the joining of two vortex filaments into a singular filament, thus combining their rotational motion.

The most interesting and crucial action of coupled oscillation is to remove minute differences in phase between oscillators of similar frequency. Given the property of wave-vortex duality is an inescapable situation in this model, this leads inevitably to the joining of vortices as well. However, there is a necessity of "space between gears" that will allow adjustments to occur in a clockwork system, thus the existence of cavities in the medium may also be conceived of as the necessity of these organizational events of vortex joining and phase difference annihilation. However the rotational characteristics of two vortices joined are then added together. Two vortices joined is simultaneous joining of separate waves and thus we have an explanatory reasoning for the phenomena of lasing. Instead of the temporary increase of amplitude granted by interference, actual phase differences collapse two waves into a single wave. Increase in rotational characteristic is simultaneously an increase in amplitude.

Restating, it is therefore the ability of meaningful representative information to allow resonance effects to occur, thus meaningful representative information, can affect the entropic state of the universe in a particular direction. The method by which this ordering phenomena occurs however, is via the reduction of microstate availability in the medium, mediated by vortex merging. As the minute difference between phases of the waves that are dual with the vortex filaments are reduced by the coupling phenomena, the number of vortex filaments can be

reduced but for this phenomena to occur, the 3D fluid flow must intersect a 2D surface.

It has been demonstrated in plasmas that spontaneous order will arise from what is normally considered a disorderly turbulent flow when the vortices are bordering a 2D surface. (thus considered 2D vortices) These events are called plasma vortex crystals and may be analogs to the stable geometric phenomena that result in cymatics experiments if one accepts the conjecture that the coupled oscillation phenomena plays a pivotal causal role in the ordering via the reductive process seen in converting many phases/frequencies to a single phase/frequency such as in resonance based technology like lasers.



Returning to the concept of information, the configuration of an atom is stable information capable of self reflection. Therefore all information itself is first based upon configuration and second based upon the relationships created by configuration. Whether information is static such as the configuration of an atom or dynamic is simply a question of whether or not changes occur to the universe. These changes to the information as it evolves are considered energy and the entropic conversion from self-reflective processes -which cause motion in cycles capable of stability - to those processes of motion that lose a dimension of cycling (from spinors to more simple rotations) and are therefore a more linear motion is the commonplace "entropy." This, strangely, appears to be a loss of information *compression* or multi-layering as the self-reflective holographic system is capable of storing more information in less total medium through symbolic reference.

Summary of information duality of the universe

First we claim that all matter and energy can be broken down to configurations of parts of the universe and the changes of that configuration. For instance, kinetic energy is simply motion which is a change of the relationships between the things that exist in the universe. Electrical energy is conceived of as a form of kinetic energy. Thermal energy is widely accepted as a form of kinetic energy. These are dynamic forms of information. Chemical energy is widely accepted as a form of potential energy. Mechanical conformations or “configurations” are also a form of potential energy. This is a *special form* of static information. Thus in the energy domain what we have is only potential or kinetic. However information/configuration of a special form - that which harmonizes with the universe - is capable of locking information into the third dimension. This is not simply static information but orderly static information.

We can grant the usefulness of the division between potential and kinetic. When we think of matter-energy equivalence, the model above makes it clear that we can further state that matter must be considered a form of that special static information called “potential energy” and thereby categorize the universe down into just these two forms of energy.

However it appears, thereby, we have two types of static information, raw basic information which extends down to location of planck scale units of length and then the second kind of static information which is special and allows ordering because of the ability to reflect and therefore represent via duplication of form.

In the third dimension the vortex filaments are information in motion and therefore energetic whereas the collection of the wrapping into resonant structures causes them to have a location and become static via capture and aggregation of energy. Thus the static or dynamic aspect of a given atom, for instance, depends upon the scale of focus.

What is raw information? From the perspective of this theory it may be composed entirely of 2D surface area which can then, via reflective process and subsequently resonance and harmony, be wrapped and twisted into 3D forms.

Gravity and Information

Because we have defined all matter as a form of energy, as motion, that is instantiated as rotation of the aether in filamentary loops with pulsating cavitation and also stipulated a universe which is a clockwork, the “gearwork” of matter’s existence requires that local areas of nearby aether *also* contain rotational characteristics which are instantiated as vortex filaments connected to and part of that physical existence. A pulsating torque in the location of an atom is matched by the reactionary pulsating torque in the nearby filamentary network. However the

number, location, and rotation rate of a given filament contributes to the distribution pattern of the rotational characteristics and subsequently, cavitations in the aether can allow a level of “slippage” to occur between the planck scale “teeth” of this gearwork.

Furthermore, the gravitational characteristics of a given portion of aether are directly proportional to the gross or mean rotation rate of the aether in the area under consideration. However, the complexity of a given area of aether is defined by the number of vortex filaments which may be more numerous and weaker in rotation as complexity increases while retaining the gross or “mean” rotational characteristic.

As the rotational characteristics of a massive body are dispersed and distributed in a sphere around it by inverse square law, the rotational characteristic of the aether and therefore gravitational effect is reduced. Thus “rigidity” or bulk modulus of the aether is also proportional to the gravitational potential and the speed of light which governs the speed of all processes is altered, subsequently leading to familiar time effects related to gravitation. These effects may simply be mediated by the additional path length created for a physical wave (EG:electromagnetism) that must traverse complex rotations of a fluid or by a more complex process near the planck scale.

Therefore as a wave of a given energy enters an area of higher rotational characteristic, deeper in a gravitational well, or exits the well into an area of lower rotational characteristic, the “energy” of the wave (as basic motion of the medium) is altered in proportion to the difference in local rotation therefore something basic remains static and nothing is truly gained by a wave exiting a gravitational well. Thus questions of how a wave entering a substance like glass can be slowed and then immediately sped up again upon exiting become more mechanically reasonable and intuitive.

That static or invariant quantity component may simply be information. If conceived of in particle terms, the rotational characteristics of the particle are subject to comparison to the rotational characteristics of the bulk of local aether which is altered by the existence of other gravitational entities. Upon falling deeper into a gravitational well, the particle’s rotation rate, when compared to the local aether, is reduced and thus the conventionally defined “potential energy” is reduced by this reduction of differential between the particle’s rotation and the local environment’s bulk rotational rate. (IE: rotational speed combined with total aether volume in rotation) This seems to equate directly to total 2D surface area or raw information within a given proportional area.

If one conceives of a single atom as a hairy entity with numerous vortex filaments looping it and many extending into the local aether, the total number and/or strength of those extending from it as it falls into a gravitational well is altered as the differential between itself and the surrounding aether changes.

This is the mechanical way in which gravity is mediated, like buoyancy, as the “tension” (bulk modulus) of the aether outside two gravitational potentials in contact with each other is greater

than the point at which the fields are in contact, thus there is a sort of “pushing” from the outside that draws the fields together across a gradient.

In the instance of a black hole versus a single particle, the rotational speed of the local aether created by and surrounding the black hole is great enough to overwhelm and thus unwrap the looped vortices of a given atom thereby add its vorticity and energy to the black hole and cause it to be transformed from a three dimensional entity to a 2D entity without losing the bulk/raw information. The total surface area inside numerous vortex filaments that are contained in a small area of 3D space within a given atom are converted to a great deal of surface area along a 2D surface.

Thus we see that the changes of position of the aether inherent in the rotational characteristic that defines an atom are the information of said atom and the information, therefore is maintained as a particle is merged with a black hole. That rotational characteristic we typically conceived of as energy still extends into the aetheric space surrounding the black hole, however the conversion from 3D to 2D radically alters the information storage space.

The static self-referential information of the atom's configuration which allowed short, looping, self-reinforcing, resonant motion, is transformed into and added to more linear motion along the surface of the black hole and merging of vortex filaments occurs but it still contributes to the total rotational tensioning of the aether around the black hole because of the of the gear-like interlocking of aether. The static information and potential energy of the atom's 3D form is transformed into a more dynamic informational form when it is unwrapped as it transitions from 3D to 2D. Potential energy as static information, is converted into less useful dynamic information as conventional energy when complex rotational configurations (spinor-like) of motion are reduced to simpler linear configurations of rotation.

So, the question to be asked here is if information has gravity. If an atom has potential energy and that is considered information as 2D surface wrapping into a 3D, then yes potential energy as a 3D form has gravity in the form of causing a **spherical concentration** of rotational energy. Gravity is the local mean rotational characteristic and its localization and concentration to a sphere is what makes it noticeable.

...but what if that sphere is unwrapped? What about more linear forms of energy which are swirling and encoded into the aether as the complexity of additional filaments by the entropic process? What of vortex filaments which can revert into less complexity of the vacuum and therefore be transitioned into free energy via vortex merging at the surfaces of emergent quantum black holes?

Does the reduction or increase of entropy result in changes to gravity? There is a separation of our normal concepts required here in that if we split an atom, there is a conversion from potential cyclical self-reinforced energy to linear motion conventional energy. The loops of motion become lines of motion and the 2D surface areas are allowed to spread away.

The energy, being dissipated into a larger area causes the gravity, as rotational characteristic, to take up more total space but it is not lost or reduced. The conversion into a more entropic state does not reduce the total rotational characteristic of the universe. The information contained in the single atom is now spread out and the information is spread out.

One must ask what determines the border of a given sphere of influence for bulk rotational characteristic in a section of space. The consideration of gravity may be scale dependent. Therefore the informational changes created by entropic processes are like the conversion process at the surface of a black hole: a conversion alone.

This consideration leaves us to ask, in this interlocked clockwork set of surfaces, does sharing of total information content, mass, and energy occur as objects enter gravitational proximity through sharing the total 2D surface and raw information content of the area of space?

5) Summary of the Neoclassical Interpretation

This interpretation historically starts approximately 200 years ago with a small change to the concept and interpretation of “Aether Drag” which still predicts the crucial Fizeau experiment. By adopting the rotationally elastic aether of MacCullagh, many issues in modeling vortex atoms and even electromagnetism in an inviscid fluid are solved and this hydrodynamic “supersolid” medium will provide a basis for all phenomena.

Faraday's lines of force are taken to be representative of vortex filaments found in the superfluid behaviors which constitute a close analogy for the “luminiferous aether.” This fluid is postulated to be turbulent and chaotic in areas with little discernible pattern to the lines of force while giving way to more coherent organized structures which are currently conceived of as electromagnetism. Thus electromagnetism is the result of larger scale organization of laminar flows whose turbulent boundary layers organize into coherent vortex filament groups which become more easily detected by their stronger interaction with certain types of matter.

The vortex knot-like nature of matter leads to alterations of local aether rigidity or “bulk modulus” of the substance, thus altering the speed of wave transmission aka the speed of light. This leads to not only the index of refraction but also eventually to the average amount of vorticity of the medium (number of free vortex filaments) and therefore the phenomena of gravity.

The next major point of interpretive deviation in the history of physics is the adoption of Lorentz's kinematics of material bodies coupled with Poincare's electromagnetism. This version of Lorentz invariance is a preferred frame theory which gives the same results as special relativity where the constancy of light's speed only holds in experiments which are bi-directional and therefore the constancy of light is not isotropic in one-way considerations. Further, this

expectation supports the small sine wave of readings detected in the original Michelson Morley data and the subsequent Miller data because they were performed with white light in a non-evacuated chamber and were therefore subject to the small effect of aether drag predicted by Fresnel which is relative to the index of refraction in air.

This adoption of relativistic aether results in both length contraction and time dilation. The time dilation component being simply mediated by the necessity of electromagnetic interactions being transmitted by a medium which, when in motion, retards the relative speed of light in a directional manner with respect to a locally dominant frame. Thus all phenomena ranging from electron transport in cells to the transmission of forces in clock gears will be slowed by the extra path length light must traverse.

It is assumed that the large scale distribution and motion of this medium does not allow for a pure and simplistic preferred frame, but only via the average motions of innumerable currents and flows can such a locally dominant frame be determined as is true in any large scale complex fluid medium.

The relativity of simultaneity, therefore, along with the concept of a reified and traversable 4th dimension is discarded in favor of a virtualized fourth dimension which provides a balanced perspective required in the absence of the knowledge of a specific location of a shared "preferred frame."

The development of Cosserat continua is adopted as the preferred base tool for the treatment of the electromagnetic superfluid medium and is regarded as the starting point for combining general relativity with quantum mechanics during the coming process of the neoclassical revolution.

The proven compatibility with MacCullagh's aether on which Kelvin's, and subsequently the Cosserats' work, is based was proven by Mie's four dimensional generalization of MacCullagh's aether, and Hilbert's subsequent use of it, to nearly simultaneously arrive at the equations of general relativity.

The relationship of gravity and inertia is proposed to be mechanically represented by the deformation of particle cavities caused by the uneven flow speeds and forces upon them while gravity itself is a measure of overall complex vorticity of the medium which results in alterations to the bulk modulus of said medium. The apparent equivalence of gravity and acceleration is yet to be explored but is proposed to be related to the deformation of given vortex caused by flow differences around the vortex knot and the relationship with harmonics which are necessary for a toroidal knot configuration of vortices to retain its configuration of wave-vortex duals.

Moving on to quantum mechanics, the packet-like behavior and particle like nature of energy is an emergent quality of the combination of local stresses or changes in rotation and other properties of the medium while the borders themselves are defined by threshold values that

result in phenomena such as cavitation and most importantly resonance and harmony which requires whole number relationships.

By using the analogy between the Couder walker experiments, the hydrodynamics of aether are revealed and the de Broglie “double solution” can be further developed to update the mechanics of pilot wave theory and clarify the nonlocality of effects which rely upon the emergence of local effects in combination with the “global” driving waves which are an ambient source of energy which may be representative of zero point energy.

Entanglement experiments which correlate spin are interpreted as experimenter bias in interpretation of data created by point particle interpretations. The “local hidden” variables are only partial data dependent upon global circumstances to create the emergent particle event.

Final summary discussion:

Thus all “spooky actions at a distance” and other non-deterministic outcomes are discarded and a fully mechanical and deterministic universe is recovered in theoretical physics. No longer do photons propagate at infinite speed within their own frame nor do any waves (a behavior not an existence) in the universe “wave” without a medium.

However, in lieu of purely stochastic determination of effects such as particle location, a hyper complex structured fluid provides information, via its physical configuration properties, for attractor basins and various other “Chaotic” system dynamics and a Shannon entropy interpretation of thermodynamic entropy becomes more appealing. Questions of spontaneous organization and mechanisms of coupled oscillation are dependent upon configurations of information and the connection between energy and information can be more deeply explored via this viewpoint.

Furthermore, the exterior surfaces of the particles of this system may perhaps be construed as the 2D holographic surface from which the three dimensional world is projected in a new self-referencing version of the holographic universe. Whereas the internal cavitations representative of the internal space of a particle can be construed as the “outside” of the universe. This viewpoint further construes black holes as massive cavities, which, like a single particle, are internally composed of no aether.

Numerous questions can be easily answered via the system of mechanisms described in the neoclassical interpretation. For instance, aberration of starlight occurs across multiple boundary layers found in the heliosphere and the magnetosphere by familiar means of the aberration of the angle of incidence of waves crossing boundary layers. Finally, the largest area of undefined work lies in redefinition of the entire zoo of particle discoveries which, according to this viewpoint are hyper abstracted analogies to subtle aether effects. The analogies allow the mathematical separation and combination of effects along lines which hide the larger fluid dynamical interactions they are composed of.

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