

A Case for a Fluid Substrate
www.aethernitatis.net

Last update: 04-14-2006

Please go to the link above to check for the latest version availability

Index

| | |
|--|----|
| Introduction | 3 |
| Ubiquitous Waves | 3 |
| Solidity vs. Fluidity | 6 |
| Fizeau's Experiment | 10 |
| The Michelson & Morley Experiment | 11 |
| Dayton Miller's Ether-drift Tests | 17 |
| The Ideal Gas Law | 20 |
| Superfluids | 20 |
| Equations calling for a fluid medium | |
| i. Aerodynamics & "Mass increase" | 22 |
| ii. Einstein's mature reflection | 26 |
| iii. Fluid Electromagnetism | 28 |
| iv. Quantum Mathematics & Fluidity | 31 |
| ...and ever-more evidence: Coherent States, Plasma & Genesis Probing | 34 |

“In the end, The Universe will have its say.” - Sir Fred Hoyle

Introduction

The concept of space may be one of the most widely discussed in the history of human thought. Innumerable philosophers and many scientists (although acting as true “natural philosophers”) have dedicated some of their works to defining space and exploring its properties, trying to elucidate the qualities that appertain to its nature. A common issue of debate, for example, is whether space is an ontological entity itself, or simply a conceptual framework needed in order to think about the world.

Although this purely metaphysical approach is most important because of its role as a shaper of the root-level starting point of any scientific physical theory of Nature (among other matters), the focus of this article will be on the observed characteristics of space and the *empirical evidence* for space as a kind of fluid medium. When all of these findings are considered together, the physical existence of a fluid-dynamical causal substrate becomes hard to deny.

This said, it should be clarified that even though the objective approach will be stressed, this does not imply that reductionism (in the form of materialism, or positivism, for example) is the end goal of the text (and site).¹ In fact, the scientific/reductionistic mindset will always be balanced with a holistic vision.

As a final remark, it seems opportune to point out that the argument will be presented in a cumulative form, so *the reader’s patience is kindly requested so that the argument can be completed before judgement is cast.*

Ubiquitous Waves

As it was mentioned in the Introduction to this site, the only interpretations of physical phenomena that will be considered valid are causal mechanisms. In other words, just as logical rigor is necessary for a valid mathematical model, causal rigor is needed for a valid model of physical reality (even though purely *quantitative* models can be falsified if their numerical predictions do not fit the empirical results, the abandonment of causality renders **any qualitative interpretation** un-predictive and therefore unfalsifiable).

The causal mechanism that characterizes *wave propagation* has been known for centuries. In fact, any child who has swum in a pool or played with a slinky already knows intuitively much of the causation behind waves. In a celebrated physics textbook it reads:

Mechanical waves originate in the displacement of some portion of an elastic, deformable medium from its normal position, causing it to oscillate about an

¹ Quite the contrary: all observational evidence presented here can be understood using non-foundational models (via *vision-logic* for example, as suggested by *Ken Wilber* in his books), thus avoiding a priori the well known drawbacks that pervade reductionistic mindsets (this fascinating way of mapping reality will be addressed in a different article).

equilibrium position. Because of the elastic properties of the medium, any local disturbance is transmitted from one layer to the next, and therefore propagates through the medium.

Mechanical waves are characterized by the transport of energy through matter by the motion of a disturbance without any corresponding bulk motion of the matter itself. The properties of the medium that determine the speed of a wave are its inertia and its elasticity. It is the elasticity that gives rise to the restoring force on any part of the medium displaced from its equilibrium position; it is the inertia that tells us how this displaced portion of the medium will respond to the action of the restoring force.²

This explanation can be readily accepted after examining in detail wave propagation phenomena in media such as solids, liquids or gases. All the aspects discussed in the above quoted paragraphs are equally valid in any of the mentioned media. Although many things can be said about waves, the most important fact relevant to this essay is that *the causal mechanism of wave propagation requires a physically existent wave-conducting medium to render possible the physical existence of such phenomenon*. Furthermore, the substrate must be “an elastic, deformable medium”, in order for the “restoring force” to exist, thus enabling the disturbance to propagate. Rephrasing this last sentence, it can be said that *causality requires the substrate to be pressurized*.

Even though any thinking person would agree that these requirements are virtually self-evident, orthodox physicists regularly claim that “some waves do not require a physical medium in order to exist”. It is of utmost importance to stress the following: *to accept such a statement requires abandoning all understanding altogether*. It is clear that to understand waves through discarding their causal substrate is inevitably impossible because an abstract categorical juxtaposition of something that cannot exist is not an understanding at all (symbols can be combined satisfactorily regardless of whether the content of those symbols are compatible. In other words, a “medium-less wave” makes linguistic sense, but not causal sense). Indeed, even professional physicists do not understand what a wave is without a waving medium. The only way to **understand** a wave is as a travelling disturbance in a compressible (i.e. “waving”) medium.

“A wave avoids a void because a void cannot wave”³

There is no conceptual way around the waving medium enacting the waves other than to ignore conceptual understanding altogether and deal exclusively with empty mathematical abstractions—such as the method of Standard Physics. Although the *quantitative relations* are indeed of crucial significance in such a technological society as the present one, the abandonment of causality in *qualitative* modelling of physical phenomena is unacceptable if any understanding is desired. Consequently, taking into account that the proposed modus operandi of this site is to interpret observations *via strict causation*, the “medium-less wave” claim will be considered as a categorical absurdity, and will be therefore rejected.

Consider now the observed characteristic properties of waves (all waves have common behaviour). The properties are: *reflection* (the change of direction of waves, due to

² D. Halliday, R. Resnick, *Physics*

³ Gerald I. Lebau, *What it all is and Why*, p. 12

hitting a reflective surface), *refraction* (the change of direction of a wave due to them entering a new medium), *diffraction* (the spreading out of waves, for example when they travel through a small slit), *interference* (the addition of two waves that come in to contact with each other), *dispersion* (the splitting up of waves by frequency) and *rectilinear propagation* (the movement of waves in straight lines). It should be noted that, with the exception of maybe the first or the last one, *if any of these aspects are observed in a given experiment, then a wave phenomenon is being manifested* (this pattern-matching-through-analogy attitude is one of the main factors that made physical sciences possible in the first place).

Having delineated some of the basics for wave propagation, it is now appropriate to introduce a key fact about waves. This fact is the following: even in the best vacuum currently available, it is empirically found that *waves propagate at every level of observable reality*. It is a well known fact that electromagnetic radiation (in the form of light or radiant heat, for example) can propagate through a zone devoid of atoms. This type of radiation is known to be a wave phenomenon because it shows empirically *all the six characteristic properties of waves*.⁴

Considering that electromagnetic wave systems will travel through *every place* that has ever been *observed*, it is completely reasonable to assume that waves will propagate through any *existent* spatial zone (to assume the contrary would seriously violate Occam's Razor since it would be to hypothesize an unobserved phenomenon). This inductive assumption imposes an extremely significant consequence: *causality requires a pressurized wave-conducting medium to exist everywhere*. Paraphrasing, an absolute void (something like "pure nothingness") is a non-causal impossibility. Any person educated in basic metaphysics could refer to this by stating that "the concept of nothingness is self-negating, thus it cannot exist".

All this simple line of reasoning along with its conclusion is nothing new at all. Many philosophers like Thales and his ylem, Heraclitus and Parmenides, Aristotle with his "nature abhors a vacuum", Plotinus, Descartes, and most remarkably Spinoza and Leibniz had views completely resonant to this notion of space (a "somethingness" or "plenum", in contrast to a "nothingness" or "vacuum"). To be fair, some atomists believed in the aether, many Pythagoreans proposed continuity of the absolute for the most part and even modern theorists (in their "reality made of math" worldview) believe in "space-pervading (mathematical) fields". This concept of a mathematical field ought to be ascribed to the neo-Pythagoreans, and although it was included in the list just for the sake of completeness, it should be quite evident that a strictly causal theory of physical reality must explain such a conception at a deeper level by means of rigorous causation.

⁴ This said, it should be stressed that the "all-or-nothing" behaviour of light observed when it interacts with matter, which is commonly associated to the "wave-particle duality" *interpretation*, is not being swept aside as an unwanted problem. All the raw evidence concerning this issue can be re-interpreted in a realistic, non-classical manner, where waves *are actually* spread out and their "particle-like" behaviour is a function of the harmonic quantization of energy proper of the constituting atoms of the interacting matter. Understood this way, *all* the paradoxical "weirdness" of quantum interpretations *disappears* to be replaced with simple and causal comprehension. A proper treatment to this subject is given in the article on the quantum.

Solidity vs. Fluidity

With respect to physics in particular, theories circa the late XIX century reasonably postulated (using analogy) that, just as water waves must have a medium to move across (water), and audible sound waves require a medium to move through (air), so also light waves require a medium, the "luminiferous ether" (Huygens can be considered the first scientist who seriously considered light's wave-conducting medium as a part of a working physical theory, in the late 1600's). Consider the following historical overview excerpt:

Even in Newton's day there were two theories as to the nature of light. The Dutch physicist Huygens regarded light as a wave of some kind, while Newton regarded a beam of light as a stream of very small corpuscles which were emitted by a luminous body. The masterly exposition of the corpuscular theory by Newton and the great authority of his name maintained the theory in a dominant position until the beginning of the 19th century when the work of Young in England and Fresnel in France completely displaced it and gave to the undulatory theory a dominance which it has held to the present time. According to this theory all space is *filled* with an ether which has the *properties of an elastic solid*, and light consists of *transverse* vibrations, like the waves on a stretched string, in this medium. Notwithstanding the properties assigned to the ether, large solid bodies, like the earth move through it without disturbing it in any way [my emphasis].⁵

First of all, it is appropriate to point out that even though the causal requirement for electromagnetic wave propagation has been employed to conclude that "an all pervading wave-conducting medium must fill all space", it is more accurate and less redundant to say that space *is* this medium, rather than that it is *filled by* the medium. To really explain the advantages of this view, it is quite evident that some metaphysical argumentation is needed.⁶ Despite the fact that the mentioned distinction is relevant for many reasons, the main point of this article remains unchanged whatever view is adopted.

The most relevant part of the quoted paragraph refers to the assumed properties of the luminiferous ether: it was conceived as an isometric elastic solid. It is also important to consider the obvious fact that solid bodies can move through the ether without any kind of detectable perturbation from it. These two statements taken simultaneously are contradictory to common sense. Under any theory, a solid object moving through a wave-conducting material background must displace and deform that background material very readily, else be hindered and constrained in its own movement. A solid is a phase of matter characterized by resistance to deformation, but there was no observed resistance to the movement of objects through the ether. An ether that offers effectively zero resistance to any objects travelling through it necessitates the properties of *fluid* deformability, compressibility and displacement in order for the object to move freely (unless of course one were to hypothesize a sort of material duality between a ghostlike solid ether and a tangible solid matter. But then you have a rather Cartesian problem on your hands as to how this ghost can interact with our sensors when it is convenient for it to do so, such as in the reception of a radio signal, or light on the retina, and then to fail to interact when an object moves through it).

⁵ W. D. MacMillan, *A Debate on the Theory of Relativity*, p.49

⁶ This topic will be addressed thoroughly in the article on the Nature of Matter.

To understand the main reason why the classical ether was postulated as a solid (rather than the vastly more reasonable fluid ether), it is necessary to recall the conclusion from Thomas Young's interpretation of the phenomenon of polarized light. Until the early XIX century, the wave theory proponents regarded light waves as purely longitudinal (pressure waves, similarly to sound waves in air). Around 1820 Thomas Young, in his letter to Francois Arago, proposed an addition to the wave theory of light: in order to satisfactorily explain the polarization phenomenon, light should be regarded as a transverse wave, and not as a longitudinal wave.⁷ An in depth analysis of the different types of interpretations that have been offered for the nature of light throughout history, and a purely causal and realist model for the phenomenon of light as well will be given in the Nature of Light article. Suffice to say here that the transverse wave interpretation by Young was readily accepted back then by the scientific community, and has been held to this day.

With this in mind, consider the following “common knowledge” statement: transverse waves are due to shearing deformations and since deformations cannot be produced in fluids, *fluids cannot support transverse waves*.⁸ This is the main belief that caused most of the scientists of the era to support the odd premise of the ether's solidity.

In 1864, James C. Maxwell first presented to the Royal Society his equations, which together describe quantitatively the behaviour of both the electric and magnetic fields. The waves in his electromagnetic field theory are transverse waves, as postulated by Young in his theory of light propagation. Consequently, the theories of both Maxwell and Young required a physical medium that could propagate the shearing deformations (the transverse patterns) through it, and because it was “common understanding” that fluids couldn't support transverse patterns, then the ether **had** to be (somehow) a solid.

This peculiar conclusion was not held by every scientist of the era, though. Lord Kelvin demonstrated in 1887 that a vortex saturated region of a fluid is capable of sustaining transverse waves.⁹ Other physicists (like Maxwell) were also in favour of a fluid ether, yet the great majority of the scientists at this critical point in the history of knowledge considered that light transverse patterns were only able to propagate through a solid medium.

Maybe the best attempt to explain the hypothetical counter-intuitive ether's property of solidity was given by George Stokes, who developed a model in which the ether might be (by analogy with pine pitch) rigid at very high frequencies and fluid at lower speeds, thus the Earth could move through it fairly freely, but it would be rigid enough to support light.¹⁰ Although initially this can seem a plausible interpretation, immediately it will be found to be a superfluous effort due to an accident of the linear agglomeration of scientific empirical data through history.

[Note: most of the remaining part of this section was borrowed from Joel Morrison's essay, “Scientific Revolution: An Imperfect Reaction to the Accumulating Errors of

⁷ D. Halliday, R. Resnick, *Physics*, p. 1580

⁸ C. Bennet, *College Physics*, p. 56

⁹ Lord Kelvin, *Math and Physics Papers*, iv, p. 308

¹⁰ Wikipedia, *Luminiferous Aether*, http://en.wikipedia.org/wiki/Luminiferous_aether

Science”¹¹, in which he argued that the linear sequence in which scientific data is accumulated affects in dramatic ways the outcome of scientific history. He then goes on to show that the events that led up to the ill-fated M&M experiment and Einstein’s discarding of the ether are just such an accident of the linear agglomeration of scientific data, and indeed this error should be revisited and resolved.]

If we were able to brutally simplify such a concept, it could be said that a theory is merely a model that makes sense of a given set of data. Given this, what might happen if a theory is developed with a missing key piece of data? It is reasonable to believe that there are good chances that the model will be erroneous at its core. Take as an historical example of this the model for the solar system before Galileo’s observations. What happened ultimately to that model after Galileo aimed his telescope to the skies? While thinking about this, consider the following scientific finding made in 1999, published at the Science Daily site:

Superfluid is shown to have property of a solid

EVANSTON, Ill. --- Northwestern University physicists have for the first time shown that **superfluid helium-3** -- the lighter isotope of helium, which is a liquid that has lost all internal friction, allowing it to flow without resistance and ooze through tiny spaces that normal liquids cannot penetrate -- **actually behaves like a solid in its ability to conduct sound waves.**

The finding, reported in the July 29 issue of the journal Nature, is the first demonstration in a liquid of the 'acoustic Faraday effect,' a response of sound waves to a magnetic field that is exactly analogous to the response of light waves to a magnetic field first observed in 1845 by British scientist Michael Faraday. The acoustic effect provides **conclusive proof of the existence of transverse sound waves -- which are characteristic of solids but not of liquids -- in superfluid helium-3.**

“[...] it is significant [their discovery] as **the first observation of a previously unknown mode of wave propagation in a liquid -- one that is of the type you would expect to see in a solid**” [my emphasis].¹²

The scientific report speaks for itself. In this most crucial piece of observational evidence, scientists have clearly demonstrated that *the “fact” that fluids couldn’t support transverse patterns is erroneous*. A superfluid can indeed hold these patterns because it is *effectively non-inertial and is thus non-dispersive*. Consequently, a superfluid’s ability to propagate transverse patterns through itself not only eliminates the need to postulate a solid ether, but at the same time simply explains why the aether offers effectively zero resistance to the objects travelling through it: superfluids are *frictionless and inviscid*.

As it will be shown later, a superfluidic aether transforms a *failed* Michelson and Morley experiment into a *confirmation* of the aetheric model (mainly that’s because the trapped superfluidic aether inside the sealed experimental chamber is approximately at rest with respect to the interferometer). Considering that the (almost) null results of this

¹¹ <http://home.comcast.net/~anpheon/html/AnpheonIntro2003.htm>

¹² <http://www.sciencedaily.com/releases/1999/07/990730072958.htm>

experiment (which were considered a failure in the solid model, as it will be explained later) led to Einstein's denial of the existence of the aether which ultimately ended in the abandonment of causality in favour of mathematical abstractions, it is critical to understand that the sequence of the discovery of empirical facts can dramatically influence the path that science will take in a given period of time (a course that can be drastically altered by the so called Scientific Revolutions; refer to Kuhn for details).

For instance, Einstein's Special Relativity was conceived to fix the failed assumption that the ether was a solid. Had scientists initially postulated that the ether was a fluid, the Michelson and Morley experiment wouldn't have been considered a failure and there never would have been any need for Relativity Theory. *Had the scientists known the facts that we now know, Relativity Theory would never have been invented.*¹³

All this is quite a remarkable example of the consequences of the linear character of scientific data accumulation. But even though it is evident that history itself cannot be changed, the inevitable errors due to its linear flow can certainly be corrected. Looking backward to this critical era for science, with a more comprehensive set of crucial scientific data available, it should be mandatory to revise one of the most critical mistakes in the history of science and state that ***the ether is not a static solid, but a dynamic fluid.***

While this may be true, in such an early instance it would be completely understandable to question the validity of a statement like this, because it should be apparent that a firm conclusion regarding the proposition that the aether is fluid cannot be made without taking into consideration other well known experimental data such as the results from tests like the Miller ones, for example. An overview and analysis of the evidence pertinent to this proposition will be given in the following sections. The only reason to present such an assertion at this part of the text is to make clearer later explanations. It is assumed that the reader will finish the article before drawing his conclusion about the strength of this case for a fluid substrate.

Before ending this section, it should be mentioned that there was another argument in favour of a solid ether. Newton demonstrated that the propagation speed of a wave in an elastic medium is directly proportional to the rigidity of the medium. It was reasoned that a medium which transmits a wave at approximately 300,000,000 meters per second should be unbelievably rigid.¹⁴ This said, it is important to understand that although the proportionality between the speed of a wave and the rigidity of its conducting medium is true for atomic media, it is evident that the aether is not "made of" atoms and thus it doesn't necessarily have identical wave-conducting properties to that of atomic matter.

An insight for the perceived speed can be gained when comparing astronomical events with quantum (and sub-quantum) ones. At a scale much bigger than our own, movements seem to us to take forever, thus it can be intuitively reasoned that at a scale much smaller than our own, actions should appear to us to be almost instantaneous. This is indeed what it is observed, with phenomena such as the transition of an electron "energy level" or the propagation of light through the sub-atomic conducting medium, both events apparently instantaneous to our subjective standards. However, it must be mentioned that the working out of the explanation to this issue is beyond the scope of

¹³ Einstein's theories will be analyzed thoroughly in the Special and General Relativity article.

¹⁴ F. Blatt, *Principles of Physics*, p. 739

this paper since an understanding of the self-similar model of matter is required, so for this reason the previous temporary appeal to intuition is offered. A rigorous account of this problem will be addressed in the article on the Nature of Matter.

Fizeau's Experiment

In 1810 François Arago attempted to measure the extent to which corpuscles of light (Newton's theory was still the favoured model back then) would be refracted by a glass prism at the front of a telescope. He expected that there would be a range of different angles of refraction due to the variety of different velocities of the stars and the motion of the earth at different times of the day and year. Contrary to this expectation, he found that there was no difference in refraction between stars, between times of day or between seasons.¹⁵ In other words, Arago found out that, near the surface of the planet (where he did his experimentation), light's wave-conducting medium is statistically at rest with respect to the Earth.

In 1818 Augustin Fresnel examined Arago's results using a wave theory of light. Fresnel offered as an explanation for refraction the idea that the ether in matter is denser than the free ether. Accordingly, to make sense of Arago's results, Fresnel postulated that material objects would "drag" aether with them; from his theory he mathematically deduced a "drag factor", with the amount of drag as a function of its refractive index.

The first scientist who obtained evidence for an aether drag was Hyppolyte Fizeau, a French physicist. Consider the following review of his experiment:

In 1859 Fizeau in France devised an experiment to test the law of the drift of the ether with matter, which had been proposed by Fresnel. Light from a source S falls upon a mirror set at 45 degrees. From the mirror two beams of light passed through a lens, thence through apertures and through a water-filled tube. Another lens and mirror then caused the light beams to return through the tube, the paths being interchanged. It will be seen that the one beam travelled through the water in both directions with the flow of water, while the other moved against the stream. At the point of observation the crests and troughs of the light waves of the two beams came together in such a way that a system of interference bands was produced. Now, when one of the beams was retarded over the other, the whole system of bands moved across the field of view. The arrangement was an exceedingly delicate one, and by it Fizeau found that **when the speed of water reached 2 meters per second he could observe the shift while with 7 meters per second he could measure it. This experiment was repeated by Michelson and Morley in Cleveland in 1886 with precisely the same results.** Apparently the correct conclusion to be drawn from the experiment is that an ether exists and that transparent matter carries the ether with it to a measurable extent.¹⁶ [my emphasis]

These experimental results clearly show that light suffers a slight but certain drag when travelling through a moving atomic medium such as water. The existence of

¹⁵ Wikipedia, *aether drag hypothesis*, http://en.wikipedia.org/wiki/Aether_drag_hypothesis. Please note that both stellar aberration and the Airy-Hoek experiment are addressed in the Nature of Matter article.

¹⁶ W. D. MacMillan, *A Debate on the Theory of Relativity*, p. 68

interference patterns means that the two light wave fronts arrived at different moments, and because they both were emitted at the same time and the speed of any wave with respect to its conducting medium is constant, it must be concluded that one ray travelled through more aether than the other. From this it is seen that moving atomic matter (water in this case) drags aether with it. When this dragged aether moves, the measured light speed alters also. *The simple fact that the aether moves is enough to conclude that it must be fluid-dynamical, in contrast to solid and absolutely static.*

It should be stressed that the existence of a drag evidences a *physical interaction* between atomic matter and the aether; the relationship between these two entities will become clear after examining other vital experimental facts. To conclude, it maybe important to mention that the drag coefficient derived by Fresnel was confirmed by this experiment: the theoretical drag calculated exactly matches the value measured by Fizeau in his experiment.¹⁷

The Michelson & Morley Experiment

It is commonly believed that the Michelson and Morley experiment, which took place in 1887, unequivocally proved the non-existence of light's wave-conducting medium, the ether. As it was explained earlier, to draw such a conclusion would eliminate the only conceivable way to understand undulation phenomena, since waves cannot be conceptually/causally explained without a medium to do the waving. Since to abandon causation is to abandon understanding itself and in view of the fact that one of the main humble aspirations of the author is to help reinstate a causal framework as the core of the physical sciences, a reconsideration of this assertion is in order.

The Michelson and Morley interferometry experiment was planned and carried out to detect the Earth's movement through the ether, and consequently to establish unambiguously the ether theory as a scientific fact. The favoured ether model back then was accepted as a premise for the experiment, so from this hypothesis and via the theories of classical physics, scientists were able to predict precise results for the tests.

The basic idea of the experiment can be summarized in the following way. It was believed that the "space-filling" solid ether was absolutely motionless (as if "attached" to Newtonian absolute space). It was known from astronomical observations that the Earth orbited around the sun at an average speed of approximately 30 km/s. From that ether hypothesis and this empirical fact, it was concluded that there should be a detectable relative motion between the Earth and the absolutely static ether (in this scheme, any moving object such as a laboratory on Earth moved through the unmovable ether and conversely, an observer in the laboratory would see the ether passing through the laboratory walls as if they were not solid at all, like they were not actually even there, similar to a "ghost" going through a wall).

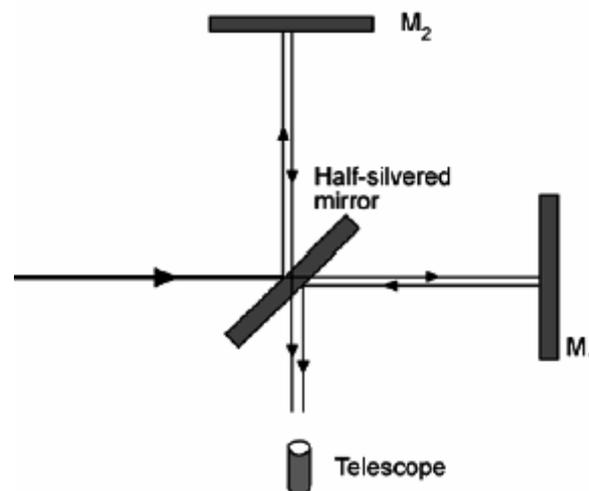
Considering that this "ether wind" had to have a definite direction at a given time of the year and that it was also assumed that light speed was constant with respect to the immobile ether, it was reasoned that there had to be a way to measure the relative motion between the ether and the Earth (this is analogous to the effect of wind on sound

¹⁷ Carel van der Togt, *From Paradox to Paradigm*, "The experiment of Fizeau and the dragged ether" chapter, www.paradox-paradigm.nl

waves: upwind, it will appear that sound is travelling slower than the constant speed of sound relative to the medium that is travelling through. Downwind, the effect would be the opposite: it will appear that sound is travelling faster than the sound speed relative to the conducting medium). This difficult task was initially taken by Albert Michelson in 1881.

Consider the following overview of this critical experiment:

In his design, Albert Michelson made use of the interference that occurs between light waves. In Michelson's apparatus, monochromatic light from a source was sent toward a beam splitter—a partially silvered mirror—where half of the beam continued on to mirror #2 while the other half was reflected along a perpendicular path toward mirror #1. A compensating plate placed in path #1 assured that both beams passed through equal thicknesses of glass. Following reflections at the mirrors the beams returned to the beam splitter where they joined and travelled to the telescope. Because the two rays are not exactly parallel and the wavefronts are not exactly plane the observer would not see all light or all dark, but rather a set of interference fringes—alternating dark and light parallel lines.



With his interferometer, Michelson would have been able to measure movement through the ether by noting the change in the position of the fringes as the apparatus was rotated. To understand this, first think of yourself to be at rest with the interferometry. From the instrument's point of view, it is the ether that moves, creating an ether wind which would push against the light beams. If the Earth moves in the direction of path #2, then the ether wind will be felt in the opposite direction. Beam #2 will act like a sailboat sailing first against the wind and then with it. It will travel slower when it opposes the ether wind but faster when the wind is at its back. In contrast, Beam #1 travels perpendicular to the ether wind on both parts of its trip. Because the ether wind affects each beam by different amounts there is a difference in the times it takes the beams to travel along their respective paths. That difference shows up as a fringe pattern.

The sole presence of the fringe pattern, however, does not allow measurement of Earth's motion. That is accomplished by rotating the entire instrument. As the two beams change their orientation with respect to the ether wind, their travel times

change. That causes the fringes to move or shift from their initial position. By measuring the fringe shift as the interferometer rotated, it should have been possible to measure Earth's velocity through a stationary luminiferous ether, or, from the laboratory perspective, the velocity of an ether wind across a stationary interferometer.¹⁸

Michelson combined forces with Edward Morley and spent a considerable amount of time and money creating an interferometer with more than enough accuracy to detect the drift. In their experiment the light was repeatedly reflected back and forth along the arms, increasing the path length to 11m. At this length the drift would be about 1/6th of a fringe. To make that easily detectable the apparatus was located in a closed room in the basement of a stone building, eliminating most thermal and vibrational effects. Vibrations were further reduced by building the apparatus on top of a huge block of marble, which was then floated in a pool of mercury. They calculated that effects of about 1/100th of a fringe would be detectable.

The mercury pool allowed the device to be turned, so that it could be rotated through the entire range of possible angles to the "aether wind". Even over a short period of time some sort of effect would be noticed simply by rotating the device, such that one arm rotated into the direction of the wind and the other away. Over longer periods day/night cycles or yearly cycles would also be easily measurable .

Ironically, after all this thought and preparation, the experiment became what might be called the most famous failed experiment to date. Instead of providing insight into the properties of the aether, it produced none of the effects to be expected if the Earth's motion produced an "aether wind". Although a small "velocity" was measured, it was far too small to be used as evidence of aether, did not seem to vary in a day/night or seasonal pattern, and was within the range of an experimental error that would allow the speed to actually be zero. *The apparatus behaved as if there were no wind at all—as if the Earth had no motion with reference to a medium* [my emphasis].¹⁹ [...] Other versions of the experiment were carried out with increasing sophistication. All of these also returned the null result.²⁰

Any scientifically minded person knows that a failed experiment implies failed premises. The main premises for this experiment were the following:

- i. A continuous material medium called “the ether” different in kind to ponderable matter fills all space and is absolutely motionless (it is an isotropic elastic solid).
- ii. Light waves propagate through the ether at a speed which is always constant with respect to it.
- iii. The classical principle of relativity (the principle of addition and subtraction of velocities) holds true for all relative motions, including the motion of a wave-conducting medium and the waves within it.

¹⁸ *The Gale Encyclopedia of Science, 3rd Ed., p. 2545*

¹⁹ A. Michelson and E. Morley, *Philos. Mag. S.5, 24 (151), 449-463 (1887)*

²⁰ Wikipedia, *Michelson-Morley experiment*, http://en.wikipedia.org/wiki/Michelson_morley_experiment

It is an empirical fact that the speed of any wave is constant with respect to its conducting medium, so light should not be an exception. Similarly, it is also observed that the classical principle of relativity always holds true in experiments with any wave-conducting media (such as air or water, for example) and waves within it, so there is no reason at all to assume that light should behave differently.²¹ Of course, if nature had decided that one of the last two premises should be false, then so be it. But before surrendering to conclude that this has to be the case however, the much weaker and debatable first premise should be addressed.

In fact, after analyzing this experiment in retrospect, the answer is quite clear. With the previously missing critical puzzle piece that completely eliminates the need to postulate such a counter-intuitive “ghostly” ether now at hand, it should be evident that the falsified premise is the first one, that is, that the ether is an absolutely static solid. Indeed, this is what most scientists of the era concluded, resulting in some of them to propose an ether that is dragged along with the Earth. However, this theory was thought to be in conflict with phenomena such as stellar aberration²², and eventually the temporary inability to make sense of the Michelson and Morley experiment results in a realistic way led Einstein to his alternative to Lorentz’s Theory of Relativity, in which he prematurely discarded the ether concept altogether (only to completely recant his decision later, as it will be shown).

With all this said and in light of the evidence available at the moment, it is important to consider which outcome would be expected of the experiment if the first premise is changed so as to state that *the aether is an effectively massless, inviscid, frictionless and non-dispersive compressible fluid-dynamical continuum*.

To be able to address this issue though, a new concern which stems from this premise must be dealt with first. With the aether being dynamic in nature, the question that arises is whether the solid walls of the chamber in which the interferometer was placed would or would not restrain the flow of such a fluid substance through them. In order to address this question, some philosophical argumentation seems appropriate since an understanding of the very nature of both the aether and “common” matter should enlighten the decision of whether these two entities could interact or not in a situation like this. Even though the full account²³ is beyond the scope (and intention) of this article, the argumentation can be summarized in the following way.

[Note: while the subsequent paragraphs deal with pure philosophy (with *ontology*, in particular), it is important to keep in mind that the focus of this article is on the *observations*. The answer to the interaction issue could be inferred by analyzing the

²¹ Actually, premise (iii) has its somewhat obvious limits. The classical principle of relativity holds true whenever all other things are *linearly* equal (which they never really are). For example, in the most common illustration of this principle, you have to neglect nonlinearities such as air-resistance on the moving ship for the addition of velocities to absolutely hold. In the M&M and other similar experiments however, all nonlinear effects were controlled so as to make them negligible.

²² Throughout more than a century since then, however, many scientists have proposed realistic explanations for stellar aberration using an Earth-entrained model of the aether. Maybe the most notable example is Carel van der Togt’s, a Dutch engineer (www.paradox-paradigm.nl). His explanation among with other plausible ones will be investigated in the Nature of Matter article.

²³ A thorough causally-coherent explanation of the relation between the aether and atomic matter is given in Gerald. I. Lebau’s groundbreaking book, *The Orb* (1965). A future article will address this most important subject as well.

Fizeau experiment, the Miller tests, the Ideal Gas Law, atomic superfluidic phenomena and the “mass increase” phenomenon, among other empirical facts (all this evidence will be reviewed throughout the article). The following rationale is given here primarily because it helps to make sense of the observational data being reviewed herein, as it enables the objective-approach in the form of the present case to deeply resonate with a much broader and holistic meta-paradigmatic context. This said, it would be unfair to take this brutally condensed summary as a full account of the philosophical vision that it represents; a thorough description of this model can be found in www.spinbitz.net].

In contrast to reductionistic models such as the dualistic “a-toms and void” view of the Universe which was inherited from Democritus and has been adopted by science for centuries by now, a non-foundationalist theory does not assume that there has to be a “root” level (without deeper structure) from which all reality is composed [“elementary” particles (the modern a-toms) have been experimentally found to have a “wave nature”, thus evidencing sub-structure within them and demonstrating that they are not elementary at all]. Given that foundationalist models of epistemological justification have been found to possess serious logical errors, a non-foundationalist and hence non-reductionist model is necessary. Indeed, non-foundationalist models are most compatible with the scientific evidence as found, for example, at the root of quantum and complexity sciences. In such a non-reductionistic scheme, the root is truly *rootless*, and the “determinate in principle,” being infinite in depth, is therefore truly “indeterminable in practice” as we know from the empirical data.

In order to grasp the meaning of this, it should be considered that while galaxies, stars, atoms and protons do exist, there is no reason at all to hypothesize that reality just “stops” at a given scale; in fact, to do so is in conflict with Occam’s Razor because there has never been any observation of an end to the self-similar patterns of the cosmos²⁴, from macro to micro as our empirical reach continuously extends its indefinite boundaries.²⁵ In few words, the only conceivable way to make sense of a non-foundationalist view of the Universe is to accept *infinity* as the ground of all existence, as the rootless root of reality. In this holistic conception of the Universe, finite things such as “ponderable matter” are merely modifications emerging from ever-deeper layers of evolving/involving complexity proper to the infinite nature of reality.

After updating Sorce Theory (the theory of matter and energy mentioned in the Acknowledgments section of the site) to a non-dual framework, it can be considered a fully causal model because its common sense and empirically-derived axioms have been dissolved into irreducible causation at all levels. This brings Sorce Theory in complete resonance with modern ontology and epistemology because it puts it in a “trans-foundationalist” and “trans-coherentist” framework.²⁶ In his model, Lebau

²⁴ Robert L. Oldershaw analyzes the evidence for a fractal cosmos in his Self-Similar Cosmology site, <http://www.amherst.edu/%7Erloldershaw/>. Another related source (and a very visual one) can be found at: <http://www.fractaluniverse.org/>

²⁵ A fair comparison between the quantity and character of the needed assumptions pertaining the metaphysical propositions of both a finite and an infinite universe has been done by Joel Morrison in a discussion aptly titled “*The Ockham Game*”. This debate will be featured in Joel’s forthcoming book *SpinbitZ* to be found at www.spinbitz.net.

²⁶ Joel Morrison argues in his forthcoming “Sorce Theory: Unlocking the Basement” (see: www.spinbitz.net) that Sorce Theory is strongest in a non-foundationalist and non-reductionist setting (Lebau’s original model displays a subtle continuity-reductionism), and he explicates in great detail the

rigorously explains that the only way to *coherently* make sense of all the empirical data accumulated so far (including the results of the M&M experiment as it will be shown) is to conclude that “ponderable matter” (atoms (**not** a-toms)) are made of a single substance which can be called aether.²⁷

As a summary of the brief philosophical overview just presented, it can be said that *in the face of the evidence that not only atoms exist but also that a physically existent wave conducting medium is required to enact the waves that are observed to propagate through a spatial zone devoid of atoms, a monistic approach to this metaphysical enquiry naturally concludes that both entities (atoms and the “luminiferous” medium) must be two aspects of the same deeper substrate.* This way, Lebau admits as physically existent only *one* highly compressible, pressurized, frictionless fluidic wave-conducting substance, with atoms essentially being stable, resonant, harmonically-equilibrated configurations of such substance.

This can be seen as an alternative to the mainstream science ontological proposition of structureless (fundamental) particles moving through an absolute void (i.e.: nothingness) as the essence of all reality, an hypothesis which is known to not only lead to non-causal modelling (i.e. an abstract mathematical accounting system devoid of qualitative understanding), but also to originate unresolved core dualities and paradoxes (such as the “wave-particle” duality, usually masked with the euphemism of “complementarity”). Sorce Theory takes its conceptual departure before the tacit assumption of the ancient Greek A-tomic (non-divisible) Theory and postulates that “basic matter” is effectively continuous and compressible. It makes a fundamental shift of core premises from the *fundamentally reductionist and multiple* to the *holistic and unified*. This shift turns out to be **absolutely critical** for a coherent and completely causal unification of all of physics. For example, Sorce Theory fluid-dynamical mechanisms easily account for the “wave-particle” duality because it deletes the compulsive need to interpret every quantized event in terms of particles. Hence the paradoxes and incomprehensibilities of modern theoretical physics are removed when the natural solid-bias (i.e. elemental particles) is supplanted by a fluid model.

With all this in mind, it is relevant to point out that, while following the consequences of considering such a substance as the shaper, essence and sole root-level existence of physical reality, Lebau concluded that the aether of which the atoms are made is locked into the inter-atomic structure of solids and that locking-in of the “inter-atomic matrix” is precisely what gives solids their properties, as Lebau explains in exquisite causal detail.²⁸

Finally, the original question can be answered. As the physically existent substance that it is, and of which everything tangible and intangible is made, the aether is not “ghostlike” at all: it cannot move through itself as if it were not there. Also, according to the first theory that unified and causally explained the mechanisms of all observed physical phenomena, the defining characteristic of solids is an inter-atomic matrix of locked-in aether. From this it can be easily seen that the fluidic aether inside the chamber in which the interferometer was placed had to be relatively motionless with

extension of Sorce Theory to a new rootless foundation, giving in turn a new integral model of epistemological justification as well as fleshing out more deeply the causal nature of the ‘basic items.’

²⁷ *The Orb*, p. 103

²⁸ *The Orb*, chapter 41

respect to the chamber, because the local solid walls constrained any global aetheric flow through them (as it will be shown in the following section, there is conclusive evidence that supports this statement).

Considering all that has been said, the expected outcome of the M&M experiment when the aether is conceived as a dynamic fluid can be found without difficulty. If light's wave-conducting medium is approximately at rest with respect to the apparatus, then there shouldn't be any significant interference pattern whatsoever. In other words, the results obtained by Michelson and Morley and all other similar tests where the apparatus was inside a closed chamber are coherent with the fluidic conception of the aether. If such a concept had been used as a premise for the M&M back then, the results would have been seen as a confirmation of the aetheric model, instead of as a failure. It is now evident that M&M did not prove the non-existence of the aether: it merely falsified the solid ether model, but at the same time *was completely consistent with a fluidic conception for such medium*.

Dayton Miller's Ether-drift Tests

Despite the fact that the famous experiment carried out by Michelson and Morley in 1887 is nowadays widely cited for its conclusive "null" results, this experimental research on the ether-drift question is hardly the most significant and detailed ever done. Indeed, this attribution should be given instead to American physicist and astronomer Dayton Miller, whose 1933 paper called "The Ether-Drift Experiments and the Determination of the Absolute Motion of the Earth"²⁹ presents the positive results from more than 20 years of ether-drift measurements, and *still stands today as the most definitive experimental work on the subject of interferometry*.

Edward Morley was not convinced of his own results, so in 1900 he began to work with Dayton Miller on the detection of the ether-drift. Miller developed the largest and most sensitive (and delicate) light-beam interferometer ever constructed, with a considerably longer light-beam path than the one used by Michelson and Morley. From 1906 to 1933 Miller obtained over 200,000 individual readings from more than 12,000 individual turns³⁰ of his interferometer. Throughout his lifetime he wrote various papers presenting this massive amount of solid data which *most strongly supported a measurable ether-drift*, and he successfully defended the integrity of his results from the numerous attacks of his critics, including Albert Einstein (whose Special Relativity Theory (SRT), if Miller's positive results are valid, "collapses like a house of cards"³¹ (in Einstein's own words)). It is appropriate to mention that Miller was the president of the American Physical Society and chairman and member of many physics institutions, so it was indeed difficult for his results to remain unrecognized by the mainstream scientific community.

While he was alive, Miller's research was not successfully undermined by his critics. Near the end of his life though, his results were increasingly ignored by the scientific

²⁹ *Rev. Mod. Phys.* 5, 203-242 (1933) - http://prola.aps.org/abstract/RMP/v5/i3/p203_1

³⁰ A "turn" is a complete revolution of the apparatus that all these interferometry tests made in order to measure the fringe patterns in different azimuthal angles (and thus detect the "aether flow" velocities for different directions).

³¹ Albert Einstein, in a letter to Robert Millikan, June 1921 (in Clark 1971, p.328)

community which was already spellbound by Einstein's SRT. After his death in 1941, however, Miller's results were "refuted" in a 1955 paper by Robert S. Shankland, S.W. McCuskey, F. C. Leone and G. Kuerti, which claimed to be an unbiased and all-encompassing re-evaluation of Miller's experimental data, finding significant errors. While Shankland's paper is still considered by many as the definitive rebuttal of Miller's "uncomfortable" data, a thorough analysis of the paper shows clearly that this is indeed not the case.

A most impressive review of Shankland's criticism (along with critical information about Miller's work) was given in an excellent paper called "Dayton Miller's Ether-Drift Experiments: A Fresh Look"³² by Ph.D. James DeMeo. In his paper, DeMeo contrasts the Shankland team's criticism by a careful examination of the contents of Miller's original publications, demonstrating that Shankland's paper merely revived speculative criticisms which had previously been rebutted by Miller himself while he was still alive. He also shows that Shankland's critique misrepresented Miller's data in many significant ways.

Another noteworthy examination of Miller's data (and Shankland's "rebuttal") was made by Maurice Allais, a French economist and physicist. He performed a thorough statistical analysis of the colossal amount of raw data gathered by Miller (as a Nobel Prize winner in economics, he was more than qualified for the task). He found that his analysis revealed a *considerable and absolutely indisputable internal coherence independent of any spurious effect* (such as temperature as the Shankland paper claimed). For instance, he observed that a *very discernible coherence* appears when one considers variations in the measured azimuths and velocities, not in civil time (as could be present if a thermal effect was radiating from a specific wall, related to solar heating), but in *sidereal* time.³³ He also noticed that all the hodographs of the measured velocities from each different period are *approximately perpendicular* to the directions of the mean azimuths. Finally, he observed that the hodographs deduced from the sinusoidal fittings of the velocities and azimuths changed gradually from one period to another: they attain their maximum dimensions around autumn equinox and their minimum at spring equinox. This last feature shows that *the hodographs depend on the Earth's position in its orbit*. Allais stresses that these results are all the more significant as the considered parameters do not correspond to isolated measurements but to the *mean values of a considerable number of observations*.³⁴

This said, there is a crucial fact regarding Miller's experimentation that should not be overlooked: *Miller demonstrated that the effect disappeared if he put the interferometer in a sealed thick-walled chamber*. His experiments were conducted in structures where the walls at the level of the light-path were open to the air, covered mainly with canvas. Furthermore, his most significant results were obtained when he took his device high atop Mount Wilson (more than 1,700 meters above sea level). Miller was convinced that the effect was consistent with an Earth-entrained model of the ether, so he concluded that at higher altitudes the effect would be more noticeable. Contrast all this with the Michelson-Morley experiment, where the interferometer was inside a basement made of

³² <http://www.orgonelab.org/miller.htm>

³³ Sidereal time is measured using the stars as a reference rather than our sun. A sidereal day is the time it takes the Earth to make one full orbit around the Sun, relative to the stars.

³⁴ M. Allais, "The Experiments of Dayton C. Miller and the Theory of Relativity" and "Very significant Regularities in the Interferometric Observations" - <http://allais.maurice.free.fr/>

stone and it was placed at a relatively low altitude basement location. This guaranteed only a very small (but never completely null) measured result, as it was explained in the previous section.

Several attempts were made to replicate Miller's findings. Many of them obtained close to zero results (all of them carried out in sealed chambers), but some others like the experiment carried out by Michelson, Pease and Pearson in 1929 or the one designed by Kennedy and Thorndike in 1932 resulted in positive readings, which in both cases were presented as "negative" results because the data was interpreted via the back then already falsified solid static ether model, instead of the Earth-entrained one (refer to DeMeo's paper for details). It is important to point out that a very recent confirmation of Miller's results which took advantage of modern technology was achieved by Héctor Múnera, Daniel Hernández, Edgar Alfonso and Germán Arenas, a research team from Colombia's National University. In a paper called "Preliminary Results Obtained with a Stationary Michelson-Morley Interferometer Operated in a Continuous Manner Near the Equator"³⁵ they affirm that, while using YAG and He-Ne lasers as light sources, they observed periodic fringe shifts similar to those claimed by Miller.

Considering the facts presented herein and the causality requirements explained at the beginning of the essay, it is inevitable to conclude that a significant amount of aether was moving with respect to Miller's measuring apparatus. This was achieved by locating the apparatus at high altitudes and in open air, circumstances in which the Earth-entrained model of the aether expects some relative movement.³⁶ However, when the experiment was conducted in sealed chambers located near the surface of the Earth, this movement became negligible (the aether flow was constricted by the walls and minimized because of the low altitudes). Without delving too deeply into the theoretical details of the situation, it can be safely concluded that *this critical experimental results unambiguously confirm the fluid-dynamic nature of the aether.*

To close this section, consider this incisive quotation borrowed from DeMeo's highly-recommended paper:

I ask the reader to imagine that Michelson-Morley's 1887 experiment, which ran over *only 6 hours on four days*, had resulted in a claim that "the ether has been detected", and that Dayton Miller had undertaken his *years of work with 200,000 observations* showing "the ether cannot be detected". It does not take much consideration to conclude that — in such a fictional case — Miller would today be cited in every physics textbook as having "proved the ether did not exist", and nobody would refer to Michelson-Morley. The fact that the present-day situation is totally opposite of my example is a testament to the intensely political nature of modern science, and how major theories often develop into *belief-systems*, which demand the automatic suppression of any new finding which might undermine the faith and "popular wisdom" of politically-dominant groups of academics. And that "wisdom" today is: *Space is empty and immobile and the universe is dead.* I

³⁵ Society for Scientific Exploration - 'The Explorer' Summer 2004 (V20 N3 p17)

³⁶ This is because the experiment was carried out in the interface/gradient between the aether which is approximately at rest with respect to the planet (because it permanently belongs to this unit), and the aether which is approximately at rest with respect to the sun (because it permanently belongs to that other unit). See www.anpheon.org for details.

submit, these are unproven, and even *disproven* assertions, challenged in large measure by Dayton Miller's exceptional work on the ether drift.

The Ideal Gas Law

An *ideal* gas is usually defined as a gas that obeys *exactly* a linear relationship between temperature and pressure.³⁷ This empirically derived equation describes the state of an ideal gas and is called the ideal gas law. It combines the primitive gas laws formulated by Boyle, Charles and Avogadro, and its mathematical form is $PV = nRT$, where P stands for pressure, V is the volume, n is the amount of matter in mol, R is a constant called “ideal gas constant” and T is the absolute temperature.

It is a well known fact that no *real* gas actually obeys the ideal gas law precisely. The relationship, however, is accurate for low pressures and high temperatures. From the ideal gas law it can be seen that real gases at very low densities will also be closely described by this equation of state. In fact, a most remarkable relationship is found here: *the fewer number of atoms in a gas, even approaching the state of a vacuum, the more closely the gas approximates the ideal gas law.* This strongly suggests that *the atoms actually get in the way of that which is in fact modelled by the law: the inviscid, fluid-dynamic continuum itself of which the atoms of the gas are composed.*³⁸ The inertia and frictional forces of these gas atoms impart a viscosity which gets in the way of the effectively perfect elasticity of the aether, which causes a deviation of all molecular gasses from the ideal gas law. This interpretation is strengthened further by the experimental findings in the form of atomic superfluidic phenomena, as it will be shown immediately.

Superfluids

Anyone who attended to high school classes will remember that, according to the mainstream interpretation of the states of matter, fluidity is a function of the inter-atomic spaces produced by elastic billiard-ball-like collisions occurring in an absolute void, and indeed that inertial expansion of inter-atomic spaces is part of the very definition of heat. Consequently, when these collisions and motions are considerably reduced in the decrease in temperature, you would expect the fluid to condense as the collision-produced spaces were reduced, causing a liquid to become a solid. However, it could be found surprising by many that, given the proper circumstances, *quite the opposite happens.*

When you cool Hydrogen and certain Helium isotopes (He-3 or He-4) to a specific threshold temperature where the inter-atomic vibratory motion-damping effects become negligible, the liquid becomes a *superfluid*: a fluid characterized by the complete absence of viscosity, thus being effectively frictionless. These superfluids are also known as “quantum fluids” because they operate on what some mainstream theorists call (somewhat ironically) “Collisionless Dynamics” instead of the familiar collision-based concept. While physicists were at odds to explain how the absence of inter-atomic

³⁷ I. Freeman, *Physics, Principles and Insights*, p. 245

³⁸ This was first noticed by Lebau; his reasoning can be found in his books. He also considered this as a strong argument for his conclusion that the “atom-void” theory was fundamentally wrong.

vibratory effects could result in anything but a solid, the reader who has reached this part of the discussion will probably find rather evident what the observations are telling to us.

In his essay that serves as an introduction to the Anpheon website³⁹, Joel Morrison argues that these superfluid phenomena in the absence of inter-atomic collisions is direct evidence that the aether never was a solid, but instead was a frictionless fluid operating at the sub-atomic and inter-atomic level. He explains that with the decrease of the inter-atomic collisions commonly known as heat, the inertial component of the helium atoms can no longer be regarded as important in defining the liquid properties in the standard mainstream, “kinetic-atomic” sense. What is basically happening is that the reduced atomic vibrations allow the atoms to go along with a deeper “collisionless” fluid dynamics, similar to how a raft will go along with the larger motions and currents of the sea. In other words, *through a decrease in temperature, the atomic units have attained a state of “quantum coherence”, meaning that the atoms themselves do not possess their own kinetic vibratory motions that would inertially interfere with the motions of other atoms and with the fluid motions of the frictionless aether from which they are constructed and in which they are embedded.*

In the reduction of thermal-kinetic motions with specific “bosonic”⁴⁰ atoms such as He-4, this frictionless fluid in which these atoms exist and from which they are formed is revealed before our very eyes in the properties it imparts to the embedded atoms and the superfluid states formed therefrom. We can actually *see* the superfluidic properties of the aether in this case because the resonant constitution of the helium atoms can strongly interact with light (i.e.: reflecting it), a phenomenon which was originated and is finally absorbed in other similar resonant structures such as the atoms from which the light source and the detectors are made, thus enabling us to actually see the frictionless fluid nature of the sub-atomic substrate in action (if a plane were flying during a very dark night over a part of an ocean which had a series of battery-powered light buoys scattered in it, it would be easy for the pilot to infer the actual motions of the ocean water from the movement of the buoys, even if he could not directly see the water).

It is opportune to add that while the observations of quantum fluids are a corroboration of the *highly compressible and frictionless* aether model from Lebau, other sources confirm this model as well. For example, in an article called “Hubble Pictures Too Crisp, Challenging Theories of Time and Space”⁴¹ from the Space.com website, astronomers inform us that although Quantum Theory predicts that the Hubble telescope ought to see only pixellated and blurry images when photographing distant objects, it does not. Hubble pictures are crisp and clear, no matter the distance to the object. This means that some light waves propagate through billions of light years with only minimal energy loss (which happens only occasionally on encounters with interstellar hydrogen atoms and is seen as redshift)⁴², suggesting the high degree of compressibility (or “elasticity”) and the super-fluidic nature of light’s wave conducting medium, the aether.

³⁹ <http://home.comcast.net/~anpheon/html/AnpheonIntro2003.htm>

⁴⁰ The concept of “spin” can be explained via causal mechanisms. This will be addressed in another part of the site.

⁴¹ http://www.space.com/scienceastronomy/quantum_bits_030402.html

⁴² This mechanism for redshift is explained in Lebau’s book, “What it All is and Why”.

Equations calling for a fluid medium

i. Aerodynamics & “Mass increase”

Another strong piece of evidence in favour of a fluid aether is found when analyzing the phenomenon of “mass increase”, usually interpreted as a “relativistic effect”. In his book “Aethro-kinematics”, Steven Rado demonstrates a previously unseen similarity between the “mass increase” phenomenon and the aerodynamics theory of compressible flow.⁴³

In order to start exploring this analogy, consider the following brief review of the Mach-number and its role in the theory of compressible flow:

The incompressible fluid theory of classical hydrodynamics has proved useful for the estimation of aerodynamic parameters, and when applied to problems of low-speed flight has yielded sufficiently accurate results. Newton's law of hydrodynamic resistance states that the force opposing the steady motion of a solid body through a fluid medium is proportional to the square of the velocity of the body, its cross-sectional area, and the density of the fluid. It has been found, however, that the flow pattern about a body moving through air at high speeds is affected to a large degree by changes in density resulting from compression or expansion of the fluid (the simplification of incompressibility is no longer allowable).

A consideration of the theory of elasticity as applied to fluids indicates that the effects of small pressure changes in a real fluid are transmitted throughout the fluid in the form of waves which travel at the speed of sound. It may be seen then that the effects of a pressure change which occurs behind the critical point at which the speed of sound has been reached, cannot influence the flow field ahead of the point. Since at the critical point the forward motion of the pressure waves are completely arrested by an air stream velocity equal to the velocity of wave propagation, a wave front is formed, that constitutes a sharp discontinuity in the flow, associated with large increases in pressure, density and temperature and a decrease in the velocity of the moving body.

The speed of sound is taken as a reference velocity, because it is a function of fluid elasticity. As applied to compressible flows, this means that the amount of pressure necessary to cause a given change in density in any given fluid is proportional to the speed of sound in the fluid. Since the pressure is proportional to the square of the velocity, the velocity which a body may attain before appreciable density changes occur is also proportional to the velocity of sound in the fluid.

It is apparent, therefore, that *the flow pattern about a body will be altered by density changes to a degree dependent upon the ratio of the velocity of the body to the velocity of the sound in the fluid.* This ratio is known as the Mach-number

⁴³ S. Rado, *Aethro-kinematics*, p. 256

($M \equiv \frac{v}{c_{air}}$) and is taken as an index of the effects of compressibility on the flow pattern.⁴⁴

The preceding quotation can be summarized in the following way: as the increasing speed of a flying object gradually approaches the speed of sound, the fluid medium experiences an increasing inability to dissipate disturbances. This compresses the fluid in front of the object, which causes an increased density and resistance to the motion of such object.

To account for this deviation from Newtonian hydrodynamics, the German physicist Ludwig Prandtl proposed in 1922 a working formula which was later formally derived by British aerodynamicist Hermann Glauert.⁴⁵ Hence, the equation was named the “Prandtl-Glauert rule”, which is expressed as:

$$C_p = \frac{C_{p0}}{\sqrt{1 - \left(\frac{v}{c_{air}}\right)^2}} \quad (\text{Eq. I})$$

In this equation, C_{p0} represents the incompressible pressure distribution on the object (the one described by Newtonian hydrodynamics), while C_p represents the compressible pressure distribution on the object, which also takes into account the increased resistance at high speeds and thus describes the phenomenon much more closely (the inverse square root factor represents the extra resistance due to high speeds that is not accounted in the incompressible scheme). At low speeds ($M < 0.3$ or $v < 0.3c_{air}$) the inverse square root factor value is approximately 1, thus $C_p \approx C_{p0}$ (the incompressible modelling is allowed at these speeds). At higher speeds ($0.3 < M < 0.8$) however, the inverse square root factor is not negligible anymore, so C_p increases over the C_{p0} value.

As many equations in fluid mechanics, the Prandtl-Glauert rule is a good quantitative description of the observed phenomenon but it is not a perfect fit to the empirical data. There are other quantitative relations such as the Karman-Tsien rule and the Laitone rule which address this phenomenon while considering also some nonlinearities in the flow, resulting in more accurate results (still no completely precise ones though) at the expense of increased mathematical complexity. Even though these two equations fit the experimental curve more closely, the Prandtl-Glauert rule is considered a good approximation and is still used today for initial estimates of compressibility effects. As a final comment, it may be convenient to mention the fact that at transonic speeds ($0.8 < M < 1.2$), the fluid flow becomes highly nonlinear and none of the three equations mentioned can be applied anymore.

With all this in mind, it is now appropriate to examine the other part of the analogy, the one regarding the “mass increase” phenomenon. Consider a particle travelling through a spatial zone devoid of tangible matter. At low speeds, the particle requires the same amount of force per each unit of acceleration; the classical inertial mass is constant as quantified by Newton’s Second Law: $m_o = F / a$. It has been empirically found,

⁴⁴ Van Nostrand’s Scientific Encyclopedia, p. 48

⁴⁵ J. Anderson Jr., *Fundamentals of Aerodynamics*, p. 420-423

however, that at higher speeds approaching that of light there apparently⁴⁶ exists an increase in the amount of force needed to achieve the same unit of acceleration.

While the raw evidence simply shows an increase in the inertial resistance of the fast travelling object (or maybe just a decrease in differential between the speeds of the “particle” and the impacting magnetic force (see previous footnote)), it has been interpreted as a relativistic increase of its inertial mass. This phenomenon has been modelled in special relativity theory as $m = \gamma \cdot m_0$, where m_0 is its Newtonian inertial mass (its “rest mass”), whereas γ is the well known Lorentz gamma factor and represents the observed increase in the inertial resistance due to high speeds. The expression for the Lorentz gamma factor is

$$\gamma = \frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}, \text{ thus } m = \frac{m_0}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} \text{ (Eq. II)}$$

It should be apparent by now that equations I and II are *virtually identical*. In equation I, C_p represents the fluid *resistance* to the motion of an object flying at a given speed v , while c_{air} stands for the speed of sound with respect to its conducting medium, air. In equation II, m represents the inertial *resistance* that an object offers at a given speed v , while c symbolizes the speed of light with respect to its conducting medium, the aether. It would be unwise to believe that this complete mathematical equivalence does not hint at a conceptual similarity between both phenomena. Therefore, as the quantitative resemblance strongly suggests, it may be concluded that the “mass increase” effect is actually a fluid-dynamical phenomenon. In this scheme, *the increased inertial resistance that a moving object experiences is in fact an increased fluid resistance exerted on the object by the aether*. The basic mechanism for both air and aether resistance was already mentioned before and is conveniently repeated here: a fluid medium equilibrates its imbalances at a specific speed, and when an object moving through it approaches that speed of equilibration, then the substance does not have time to get out of the way and it builds up into a density gradient in front of it, causing resistance.

Before concluding this section, an important clarification must be made. As it was briefly commented before, in a monistic and non-dual paradigm such as Sorce Theory, finite objects such as atoms are conceived as wave-resonant ever-equilibrating harmonically-stabilized fluid-dynamical quantized configurations of relatively (to that scale) homogeneous aether. All the complex equilibrations and resonances proper to units such as atoms occur at the speed of light (the speed of any electromagnetic wave with respect to its conducting medium, the aether). From this it can be deduced that the analogy should not be truly exact, but that it ought instead to be conceived of as a

⁴⁶ As far as the author is concerned, the “mass increase” experiment has only been done with an electron as a “particle”. Consequently, Lebau rejects any mass increase on the terms that the experiment uses magnetic force on a charged particle and therefore *can be simply explained by the change in relative differential speeds between the electron and the speed of the force itself which propagates effectively at c*. Although this explanation may indeed be valid (it should be possible to derive from it a nonlinear relationship equivalent to γ in order to be consistent with the experimental curve), it still has to do ultimately with the equilibration speed of the medium, in line with the main argumentation of this section.

general analogy, and indeed even perhaps a “quasi self-similarity” between the aetheric and the molar levels of fluidity.

In the phenomenon of air resistance, the object is travelling through an inertial atomic medium. The fluidic resistance is ultimately caused by the inertia of the air atoms.⁴⁷ However, the atoms of the flying object (as all existing atoms as well) are equilibrating to the deeper level of fluidity in the local aether (with which they are indeed constituted as equilibrations thereof), not to air. On the other hand, in the aether resistance phenomenon the object and its constituting atoms are travelling through their equilibrating medium, which is effectively frictionless (effectively non-inertial at that level of scale). Consequently, it may be concluded that the fluidic resistance exerted on the travelling object by the aether is not caused by atomic inertia, but because the aetheric density gradient that exists in front of the moving object results in an increased aetheric pressure in front of the object.⁴⁸ When the speed of the travelling object comes within reach of the speed of the waves in the medium, this density gradient (with its aetheric pressure) increases dramatically. It is reasonable to think that the resulting aetheric pressure in front of the object offers resistance for all the equilibrations occurring in the atoms of the object.⁴⁹

Furthermore, it is probable that the fact that an equilibrating structure (such as one of the object’s atoms) is traveling as a whole through the aether at a speed similar to the speed of its equilibrations *tends to destabilize its configuration* because the resonant wave-systems can no longer establish a pattern that allows the coherence of such object as an unit, thus the structure fluid-dynamically responds by decreasing its velocity with respect to the aether in order to regain its stability.⁵⁰

These two explanations seem sensible justifications for the indefinite increase of the aether resistance that a travelling object apparently experiences when it reaches the speed of light. They also explain why the speed of sound is not an unbreakable limit for travelling atomic objects (recall that equation I works only for $M < 0.8$), while light speed seems so. To sum up, even though equations I and II are completely equivalent, the crucial differences between an atomic medium and an aetheric one can explain the slight deviation between equation I and experiment (and thus gives a reason for the slight deviation in the otherwise exact analogy between compressible flow resistance and the “mass increase” phenomenon). In any case, the evidence that this analogy provides in favour of a fluid aether seems to be quite compelling.

⁴⁷ The causal mechanism of inertia is explained in the Sorce Theory books (www.anpheon.org)

⁴⁸ According to Morrison’s “Unlocking the Basement” essay, the aetheric pressure can very possibly be attributed to the inertia caused by the next-deeper (planck-level) root-MU (rMU) as it functions very differently within a higher-level rMU. Indeed, putting the effect back into the context of the holarchy and to the level of the planck rMU brings the analogy closer again, though the difference between inertial-MU effects within higher-level rMUs, and that at the molar level must be explicated. This most interesting expansion will be addressed in the future.

⁴⁹ This justification works for electrons as well. A moving electron is a travelling unequilibrated aetheric density pulse (see www.anpheon.org) and when a density gradient is created in front of it because of its fast movement, its aetheric pressure causes certain resistance to the motion of the electron (because at the same level of scale, both increased density zones exhibit inertia and momentum (refer to the “Unlocking the Basement” essay)).

⁵⁰ An electron is not a self-equilibrating resonant structure, so this explanation does not apply for the experiment carried out using an electron (which is the only particle that was actually used in “mass increase” experiments). However, it can be regarded as a reasonable speculation to explain the eventual experimental confirmation of “mass increase” in units such as atoms.

ii. Einstein's mature reflection

At this point of the discussion, it should not be shocking to the reader to find out that there are indeed several other cases apart from the “mass increase” equation where the abstract mathematical relations that are part of mainstream physics are seemingly modelling a real, physical, fluid sub-atomic substrate, a medium that gives a meta-physical causal structure to our relatively abstract concept of space. Indeed, in an era of science where the causal modelling of physical reality has been entirely neglected while the affinity to the appealing power of numerical predictions via curve-fitted quantitative relations⁵¹ has been progressively increasing to a state where unexplained “Laws”, “Principles” and empty empirically-tuned mathematical formalisms are indeed most of what is left at the core of current physics, it is reasonable to expect some of these relations to actually quantify the physically existent fluid that the previous parts of this article evidenced as real, even if orthodoxy fails to acknowledge any relation at all. As it was previously explained, this stems from the fact that while there are plenty of people who can *do* the math, they are incapable of *understanding* what the math means since there is no qualitative correlation with *sensorial* imagination; a connection which is absolutely necessary to make *sense* of the model.

All of this happened, as should be readily apparent, because physicists were forced by the failure of classical physics (the historical error at the critical juncture of the M&M ether tests) to give up the causal substrate necessary for a visceral and sensorial (sensible) connection to reality, i.e. causal understanding. However, even though contemporary mainstream physicists are unable to publicly consider the physical existence of such a medium because it has been anathema to even mention the “e” word since Einstein’s Relativity Theory was adopted as a dogma⁵², it should be remembered that *Einstein himself said that the “ether” is absolutely necessary for a physical understanding of the “curvature of space” in his General Relativity Theory (GRT) equations.*

In an address delivered in 1920 on May 5th in the University of Leyden, Einstein said that *“To deny the ether is ultimately to assume that empty space has no physical qualities whatever. The fundamental facts of mechanics do not harmonize with this view”*.⁵³ This can be a bit surprising to hear from the man who is the main responsible for the complete abandonment of the ether as a working concept in the physical sciences. Later on in his lecture, he added that in GRT *“the state of the ether is at every place determined by connections with the matter and the state of the ether in neighbouring places, which are amenable to law in the form of differential*

⁵¹ For example, see QED (allegedly the most accurate quantitative model out there) with its “renormalization” little trick.

⁵² *dogma: an authoritative principle, belief, or statement of ideas or opinion, especially one considered to be absolutely true.* Indeed, the use of the word “dogma” is fitting in this case. Herbert Dingle once said: *“It is ironical that, in the very field in which Science has claimed superiority to Theology, for example - in the abandoning of dogma and the granting of absolute freedom to criticism - the positions are now reversed. Science will not tolerate criticism of Special Relativity, while Theology talks freely about the death of God, religionless Christianity, and so on.”* At first glance this may seem like an outrageous claim by the author, but a reader acquainted with the nature of scientific revolutions (see Kuhn for details) will acknowledge this situation as an expected one. In any case and even though a detailed examination of Miller’s data (for example) would suffice, a thorough justification of such a statement will be given in the SRT and GRT article.

⁵³ A.Einstein, Sidelights on Relativity, 1922, p. 11

equations".⁵⁴ This is a most interesting quotation. Einstein asserts that he views the ether and matter as *connected*, and that the state of these connections is quantified by his GRT. Indeed, this is in resonance with a monist conception of physical reality (and with Sorce Theory as well), where matter and the ether are fundamentally the same substance (two entities can only be connected if they share the same causal substrate).⁵⁵ Finally, Einstein concluded that "*According to the General Theory of Relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense.*"⁵⁶ [my emphasis].

In few words, the revolutionary thinker who convinced the scientific community that the ether could be considered a "superfluous concept"⁵⁷ had apparently changed his thoughts quite dramatically! In this belated reflection, he realized that his mathematical map in the form of GRT actually described the state of a physically existent medium. Unfortunately, Einstein's afterthoughts were seemingly too late to counteract the already massive inertia that his rejection of the ether for a "mathematical trick" had engendered in the minds of the scientists back then.

With respect to the nature of Einstein's reincarnated ether, it is difficult to draw a clear picture from what he said in this historic lecture. As pointed out by Joel Morrison⁵⁸, Einstein's conception was not only confused but evidently paradoxical. While he started saying that "...the whole change in the conception of the ether which the special theory of relativity brought about, consisted in taking away from the ether its last mechanical quality, namely, its immobility"⁵⁹, he ended his lecture by declaring that "*The idea of motion may not be applied to it*"⁶⁰.

While it is evident that little of value to the understanding can be gleaned from such contradictory statements, Sorce Theory shows how the mathematical abstraction of relativistic "curved space" (the main concept of GRT) can indeed function as a mapping scheme (with quite limited accuracy) for a physically existent equilibrated aetheric density gradient. Indeed, Sorce Theory demonstrates how this density gradient actually *is* a gravitational field, and how it causally gives rise to the gravitational force within "massy" particles and objects embedded within it.⁶¹ Even though theoretical physicists are unable to see beyond their mathematical symbols because they ignore the causal substrate required for qualitative understanding, the GRT equations really describe varying density patterns in the aetheric medium, *a patterning which in turn demands the substrate to be fluid in nature.*

⁵⁴ Ibid., p. 12

⁵⁵ See Spinoza's Ethics. Interestingly, even though this interpretation was likely not the one that Einstein consciously intended, his conception of God was that of Spinoza's. Consider this quote from Einstein: "*I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with the fates and actions of human beings.*" [Telegram of 1929, in Hoffman and Dukas]

⁵⁶ A. Einstein, Sidelights on Relativity, 1922, p. 14

⁵⁷ A. Einstein, "On the Electrodynamics of Moving Bodies", Annalen der Physik. June 30, 1905

⁵⁸ See the Introduction to the Anpheon website.

⁵⁹ A. Einstein, Sidelights on Relativity, 1922, p. 8

⁶⁰ Ibid., p. 14

⁶¹ Refer to "The Orb", for example. This will be addressed in the Relativity Theory article.

iii. Fluid Electromagnetism

While Relativity Theory may be a fine example of one of the big branches of mathematical physics whose equations point to (and indeed seem to intrinsically model) a fluid aether, it is not the only one. Consider now the Theory of Electromagnetism, from which the SRT was originated. All the mathematical relations of this theory can be reduced to a set of four equations named in honour to the Scottish physicist James C. Maxwell, who was the first to develop a comprehensive quantitative model which accounted for all electrical and magnetic phenomena known at his time. Although he believed that the quantitative and the qualitative aspects of his model ought to be considered separately⁶² (because equations can always be worked out to predict the experimental curve independently of *any* conceptual analysis whatsoever), it should be emphasized that Maxwell proposed fluid characteristics for his aether as a conceptual framework for his equations. In other words, *the qualitative foundation for the original Theory of Electromagnetism is fluid-dynamical*.

Starting with his “On Physical Lines of Force” published in 1861 and ending with his magnum opus “A Treatise on Electricity and Magnetism” from 1873, Maxwell openly admitted his uneasiness with the “action at a distance” concept (i.e.: acausality) and always strived to give a mechanical alternative to that notion for any given electromagnetic (EM) phenomenon. In fact, Maxwell’s qualitative interpretations resonate with the point of view of Faraday (one of the greatest experimentalists in the history of science), which was based on hydrodynamic analogies applied to a physically existent medium as a mediator for both electrical and magnetic forces and as a substrate for light and heat phenomena as well.

As a brief summary of Maxwell’s position, consider this quotation from his “A Dynamical Theory of the Electromagnetic Field”, published in 1865:

[...] The first step, therefore, in reducing these phenomena into scientific form [i.e.: obtaining the equations], is to ascertain the magnitude and direction of the force acting between the bodies, and when it is found that this force depends in a certain way upon the relative position of the bodies and on their electric or magnetic condition, it seems at first sight natural to explain the facts by assuming the existence of something either at rest or in motion in each body, constituting its electric or magnetic state, and capable of acting at a distance according to mathematical laws.

[...] These theories assume, more or less explicitly, the existence of substances the particles of which have the property of acting on one another at a distance by attraction or repulsion. [...] The mechanical difficulties, however, which are involved in the assumption of particles acting at a distance with forces which

⁶² For example, consider this quote from his “A Treatise on Electricity and Magnetism”: “*Since, as we have seen, the theory of direct action at a distance is mathematically identical with that of action by means of a medium, the actual phenomena may be explained by the one theory as well by the other, provided suitable hypotheses be introduced when any difficulty occurs*” (section 62). Similarly, when considering the theory of stress in a medium as stated by Faraday as an alternative to “action at a distance” forces (both being qualitative interpretations), Maxwell wrote: “*Any further explanation of the state of stress, by means of the motion of the medium or otherwise, must be regarded as a separate and independent part of the theory, which may stand or fall without affecting our present position [i.e.: the mathematical relations]*” (section 645).

depend on their velocities are such as to prevent me from considering this theory as an ultimate one. [...] I have therefore preferred to seek an explanation of the facts in another direction, by supposing them to be **produced by actions which go on in the surrounding medium** as well as in the excited bodies without assuming the existence of forces capable of acting directly at sensible distances.

The theory I propose may therefore be called a theory of the Electromagnetic Field, because it has to do with the space in the neighbourhood of the electric or magnetic bodies, and it may be called a Dynamical Theory, because it assumes that **in that space there is matter in motion**, by which the observed electromagnetic phenomena are produced. The electromagnetic field is that part of space which contains and surrounds bodies in electric or magnetic conditions. It may be filled with any kind of matter, or we may endeavour to render it empty of all gross matter, as in the case of Geissler's tubes and other so-called vacua.

There is always, however, enough of matter left to receive and transmit the undulations of light and heat, and it is because the transmission of these radiations is not greatly altered when transparent bodies of measurable density are substituted for the so-called vacuum, that we are obliged to admit that the undulations are those of an aethereal substance, and not of the gross matter, the presence of which merely modifies in some way the motion of the aether. **We have therefore some reason to believe, from the phenomena of light and heat, that there is an aethereal medium filling space and permeating bodies, capable of being set in motion and of transmitting that motion from one part to another, and of communicating that motion to gross matter so as to heat it and affect it in various ways.**

Now the energy communicated to the body in heating it must have formerly existed in the moving medium, for the undulations had left the source of heat some time before they reached the body, and during that time the energy must have been half in the form of motion of the medium and half in the form of elastic resilience. [...] We may therefore receive, from datum received from [another branch of science], the existence of a pervasive medium, of small but real density, capable of being set in motion, and of transmitting motion from one part to another with great, but not infinite velocity. Hence **the parts of this medium must be so connected that the motion of one part depends in some way on the motion of the rest; and at the same time these connexions must be capable of a certain kind of elastic yielding**, since the communication of motion is not instantaneous, but occupies time. The medium is therefore capable of receiving and storing up two kinds of energy, namely, the 'actual' energy depending on the motion of its parts, and 'potential' energy consisting of the work which the medium will do in recovering from displacement in virtue of its elasticity.⁶³ [my emphasis]

As it can be easily seen from the quote, Maxwell's EM Field was *physical*, not merely *mathematical* as in the "modern" conception of fields. In addition, the conception of the EM Field that he describes in this citation is not only inherently dynamical but also capable of elastic yielding, the two basic characteristics of a *compressible* fluid.

⁶³ J. Maxwell, "A Dynamical Theory of the Electromagnetic Field", 1865. Quoted in Lebau's "What it all is and Why", p. 108

However, in his final and most comprehensive work, Maxwell held that the motions of electricity were like those of an *incompressible* fluid (in the aspect that the total quantity within an imaginary fixed closed surface remains always the same).⁶⁴ While this may have been a helpful idealization (simplification) that aided Maxwell in his mathematical derivations, it is clear that an absolutely incompressible fluid (something that has never been observed) could not support waves, which are themselves composed of compressions and/or rarefactions of the medium (even “transverse waves” are ultimately compression waves in nature)⁶⁵. On the other hand, he also assumed the hypothesis of perfect fluidity (i.e.: a frictionless fluid) for a specific section of the same publication.⁶⁶ In any case, it is clear that *in Maxwell’s eyes the aether had to be intrinsically fluid* (and indeed it is a reasonable speculation to think that he would have never conceived an aether different to a compressible frictionless fluid medium if he had been able to overcome the reductionistic tendencies that crippled the ability of scientists to see both “ponderable matter” and the aether as two aspects of the same substrate).

Despite the fact that Maxwell never intended to abandon his fluid-mechanical analogies applied to the aether, Einstein wrote his famous paper in 1905, a publication in which he discarded the aether as superfluous (only to totally recant his decision later, as it was previously shown). Even with Einstein clearly stating that GRT actually demands a physically existing aether, mainstream science still decided to elevate Einstein’s aetherless hypothesis to the unquestionable status as an absolute fact.⁶⁷ Hence, while they retained the mathematical core of Maxwell’s work, physicists decided to remove all of Maxwell’s qualitative modelling from their theories since it did not make any sense in a world without an aether. Still, although the state of denial by mainstream science persists, physicists are now “discovering” that the equations of electromagnetism are analogous to those of hydrodynamics (as it was stated earlier, this very likely implies some conceptual resemblance between both phenomena). For example, Ph.D Haralambos Marmanis published a paper in 2005 in which he concluded:

We described the analogy between the equations of electromagnetism and the equations of turbulent hydrodynamics. There is a one-to-one correspondence between quantities in the two cases. This leads us to interpret classical electromagnetism as a turbulent flow field.⁶⁸

Although some of the details of the publication may indeed be novel, the notion that the Maxwell equations apparently model fluid phenomena is not new at all. As a matter of fact, Maxwell equations written in its modern form are represented via two of the most important operations in vector calculus: curl and divergence. Not only are these operations heavily used in the equations of Fluid Mechanics, but they are both usually explained even in pure vector calculus books by means of fluid analogies.⁶⁹

⁶⁴ J. Maxwell, “A Treatise on Electricity and Magnetism”, 1873, section 61.

⁶⁵ An impressive justification of this statement can be found in Steven Rado’s Aethro-Kinematics book, in the section called “About Mechanical Transverse Waves”, p. 286

⁶⁶ J. Maxwell, “A Treatise on Electricity and Magnetism”, 1873, section 822.

⁶⁷ The list of examples that justifies this statement is endless; some of them will be given elsewhere.

⁶⁸ Haralambos Marmanis, *On the analogy between electromagnetism and turbulent hydrodynamics*, October 25, 2005

⁶⁹ Stewart, *Calculus*, 3rd edition, section 14.5

iv. Quantum Mathematics & Fluidity

So far, it is not unfair to state that there seems to be a convergent pattern where the equations of some of the most fundamental mathematical models of theoretical physics appear to be quantifying the fluidic nature of the aether. However, there is still a major branch of mathematical physics that has not been addressed yet: Quantum Theory. This said, consider the following most informative quotation from plasma physicist Eric Lerner's excellent book "The Big Bang Never Happened":

[...] Since the nineteenth century it's been recognized that the equations of electromagnetism are almost identical with the equations of hydrodynamics—the equations governing fluid flow. Even more curious, Schrödinger's equation, the basic equation of quantum mechanics, is also closely related to equations of fluid flow. Since 1954 many scientists have shown that **a particle moving under the influence of random impact from irregularities in a fluid will obey Schrödinger's equation.**

More recently, in the late seventies, researchers found another curious correspondence while developing mathematical laws that govern the motion of **line vortices**—the hydrodynamic analogs of the plasma filaments I have discussed. **The governing equation turns out to be a modified form of Schrödinger's equation,** called the nonlinear Schrödinger equation.

Generally in science when two different phenomena obey the same or very similar mathematical laws, it means that in all probability they are somehow related. Thus it seems likely that both electromagnetism and quantum phenomena generally may be connected to some sort of hydrodynamics on a microscopic level. [...] However, I think there are additional clues, some developed from my own work, which indicate that plasma processes and quantum mechanical processes are in some way related.

First and foremost are Krisch's experimental results on spin-aligned protons.⁷⁰ Qualitatively, **the results clearly imply that protons are actually some form of vortex, like a plasmoid.**⁷¹ Such vortices interact far more strongly when they are spinning in the same direction—which is certainly the behavior Krisch observed in proton collisions. Because vortex behavior would become evident only in near-collisions, the effects should be more pronounced at higher energies and in more head-on interactions—again, in accordance with Krisch's results.

A second clue lies in particle asymmetry. **Particles act as if they have a "handedness," and the simplest dynamic process or object that exhibits an inherent orientation is a vortex. Moreover, right- and left-handed vortices annihilate each other, just as particles and antiparticles do.**⁷² [my emphasis]

⁷⁰ Krisch, Alan D., "Collisions between Spinning Protons", *Scientific American*, vol. 257, n. 2 (Aug. 1987), pp. 42-50. This experiment demonstrates a violation of the basic assumption of QCD that quarks act independently within a proton (this was clarified to the author by Joel Morrison).

⁷¹ Krisch's results strongly suggest a concentrically layered spheroidal (if spherical/toroidal) nucleus, such as that proposed by Sorce Theory. This relationship will be explored elsewhere.

⁷² Eric J. Lerner, "The Big Bang Never Happened", p. 369, quoted in the Introduction to the Anpheon website.

There is not much to add to such a succinctly presented series of arguments. Considering all of them simultaneously as a cumulative argument, they provide very strong support to the claim that quantum mathematics actually quantifies fluid phenomena. Moreover, this conclusion is strengthened even further when a key concept of Quantum Electrodynamics (QED) named the *quantum vacuum* is considered.

In their continuous exploration of the consequences of their abstract mathematical models, modern physicists have concluded (quite confusedly because their lack of causal understanding) that space is more a *plenum* than an absolute vacuum: they claim that the equations predict that space is teeming with normally undetectable “zero-point” energy in the form of electromagnetic radiation fields (the “zero-point field”) and very short-lived “virtual particles” (the “Dirac Sea”) popping in and out of existence from what they think is the “void”. As it ought to be expected from non-causal modelling, the mechanism that explains *how* these “virtual particles” come into and out of existence (how they are “created” from the void) remains completely unexplained by mainstream theory (and this is without even taking into account the fact that this claim violates the most basic philosophical principle which states that *nothing comes from nothing* (i.e.: the void), a concept that is summarized in the “Principle of the Conservation of Energy”). Actually, it would be unreasonable at this point to overlook the fact that the mathematical insight in the form of the “quantum vacuum” is probably pointing towards the existence of a physically existent dynamic quantum-level substrate, a medium whose inherent mobility justifies the concept of such “virtual particles” (as soon as the ever-present particle-bias is recognized and consequently abandoned, it is easy to see that these short-lived “virtual particles” are not really particles at all but simply *wave resonances* in the aether).

There is one last piece of information that should be included, a fact which indeed solidifies the preceding claim and helps to unify the presented case as a whole. Consider the following quotation from Russian low-temperature physics theorist Grigory Volovik’s book “The Universe in a Helium Droplet”:

According to the modern view the elementary particles (electrons, neutrinos, quarks, etc.) are excitations of some more fundamental medium called the quantum vacuum. This is the new ether of the 21st century. The electromagnetic and gravitational fields, as well as the fields transferring the weak and the strong interactions, *all represent different types of collective motion of the quantum vacuum*. [...] Among the existing condensed matter systems, the particular **quantum liquid-superfluid $^3\text{He-A}$ most closely resembles the quantum vacuum of the Standard Model.**

[...] This similarity based on common momentum space topology allows us to provide analogies between many phenomena in quantum liquids and in the quantum vacuum of the Standard Model. [...] However, in the low-energy corner **they are described by the same equations** if written in a covariant and gauge invariant form.

[...] Our ultimate goal is to reveal the still unknown structure of the ether (the quantum vacuum) using our experience with quantum liquids. [...] The realization of a quantum liquid with the completely covariant effective theory at low energy

requires some effort. We need such a 'perfect' quantum liquid, where in the low-energy corner the symmetries become 'exact' to a very high precision, as we observe today in our Universe.⁷³ [my emphasis]

In this critical citation from a publication which could easily be regarded as a key shaper of the current frontier of mainstream theoretical physics⁷⁴, Volovik not only acknowledges that all the fields of modern physics can be interpreted as motions of a consequently dynamic quantum vacuum, but also that *the closest "ponderable matter" analogue to the quantum vacuum is found in superfluid He-3*. Furthermore, in some particular situations *both entities are quantified by exactly the same mathematical relations*. Finally, as it was explained in the "Superfluids" section and is again confirmed by Volovik in the last paragraph of the quotation, *the existence of inertia-containing atoms in superfluid He-3 is the reason for its departure from the "symmetry" of the "quantum vacuum"* (in superfluid He-3, the existence of resonant structures in the form of helium atoms restrict the fluid-dynamics of the underlying the aether, such as compressibility and mobility in general).

Considering now the fact that the quantum vacuum is mathematically modelled as a superfluid, it is not a stretch to say that the aether is living a sort of a comeback in modern theoretical physics in the form of the quantum vacuum. While this may be true, it is crucial to understand that both the erroneous conceptual framework in the form of extensionless and structureless elementary particles as the fundamental building blocks of Nature as well as the contradictory denial of the physical existence of the substrate that the fluid equations actually quantify still persist at the foundation level of mainstream physics models. As it was explained before, it is indeed imperative to correct these problems at the core of the physical sciences in order to achieve a consistent understanding of physical reality.

⁷³ G.E. Volovik, *"The Universe in a Helium Droplet"*, section 33 (Conclusion), as quoted in the *Introduction to the Anpheon website*.

⁷⁴ Volovik won one of the world's most coveted prizes for physics in 2004: the Simon Memorial Prize, which is often an indicator of future Nobel recognition. Notice, however, that this should be taken only as an argument that supports the statement that this is a footnote of; it should not be necessarily taken as a sign that his theoretical ideas considered in their totality are among some of the best that men can currently offer. For instance, he indeed seems to be ignorant on the developments on Plasma Cosmology which, in line with Ockham's razor, removes the need to hypothesize the existence of unobservable "black holes" and all its hypothetical consequences that he attempts to relate to superfluid phenomena in his book.

...and ever-more evidence: *Coherent States, Plasma & Genesis Probing*

In addition to all that has been shared so far, there is an ever-increasing amount of current experimental research that is also pointing towards the main thesis of this article: the existence of a fluid sub-atomic substrate. Some of these recent scientific publications have been gathered in the News section of the Anpheon website.⁷⁵

For instance, all the “coherent states” research (such as BECs, “fermionic condensates” or “supersolids”) strongly supports the fluid conception of the aether, for similar reasons to the one given in the “Superfluids” section. Consider this quotation from Joel Morrison:

A BEC is simply a group of a certain class of atoms (bosons) which, when cooled, will possess relatively little intrinsic oscillatory motion. This is abstractly identified with the concept of “integer-spin” and in the case of atoms, it simply means that there is a fluid-dynamic, wave-harmonic balance of internal energies so that the inter-atomic oscillations in a normal sample of bosons are due mainly to thermal energy. When the sample is cooled the oscillations due normally to heat have ceased and the group moves as a whole because bosons do not possess much in the way of intrinsic oscillations. *This is what a single quantum state actually is—the unification of inter-atomic motion.*

[...]

From within the Sorce Theory paradigm, the properties of condensed matter physics which continue to surprise the experimental physicists are entirely expected and they simply reveal the limited applicability of the kinetic-atomic concept of fluids. Once the uncertainty of the quantum mechanisms has been replaced with causal knowledge now forbidden by the Copenhagen dogma, such experiments become quite simple to understand and indeed are entirely expected. What is revealed is that the sub-quantum medium itself is a continuous, compressible, frictionless fluid and it is only the motions of the embedded atoms—themselves highly compressed structures made out of this sub-quantum medium—that cause the limits of motion, friction and compressibility seen in molecular/atomic fluids. When the atoms possess random thermal agitations, then the inertial motions become dispersive and emergent as friction and viscosity. In the absence of such inertial collisions, however, there is no inertial dispersion of fluid motion and we are left with the uninterrupted properties of the sub-quantum medium itself—we end up with a frictionless, compressible, continuous (if inhomogeneous) fluid-dynamic medium.

Another clue for a fluid substrate comes in the recognition that more than 99% of the “ponderable matter” in the observable universe is in the state of plasma, the fourth state of matter.⁷⁶ A plasma is basically an ionized gas (i.e.: a fluid). This said, if the Universe is truly infinite and *self-similar* (as the evidence gathered by Rob Oldershaw for his Self-Similar-Cosmological model strongly suggests), *the ubiquitous fluidity in the form of matter in plasma state that we find in the observable Universe must echo the nature*

⁷⁵ <http://home.comcast.net/~anpheon/anpheonNews.html>

⁷⁶ See Ph.D Anthony Peratt’s “Plasma Universe” website for a quick overview of plasma facts: <http://public.lanl.gov/alp/plasma/universe.html>

of matter at all the unbounded levels of scale. Indeed, plasma phenomena seem to be indefinitely scalable. Thus, with the aether being all the (infinite) material substance that exists beneath our “quantum” level of scale, a truly fractal Cosmos actually demands the aether to be fundamentally fluid.

To conclude this article, I would like to invite the reader to ponder this last bit of research which baffled the mainstream physicists who carried it out. Assuming that the reader has acknowledged most of the evidence presented so far, these results may not be surprising at all for him/her. And perhaps, as have I, the reader will by now even find *the observational support for a fluid substrate truly overwhelming.*

Physicists create a 'perfect' way to study the Big Bang

Engineering and Physical Sciences Research Council

Physicists have created the state of matter thought to have filled the Universe just a few microseconds after the big bang and **found it to be different from what they were expecting. Instead of a gas, it is more like a liquid.**

[...] Not just any old liquid, either. **Its collective movement is rather like the way a school of fish swims 'as one'**⁷⁷ and is a sign that the fluid possesses an **extremely low viscosity, making it what physicists call a perfect fluid.** In fact, tentative calculations suggest its extraordinarily low viscosity makes it the most perfect fluid ever created.

Researchers had confidently believed it would be something like 'steam', consisting of free quarks and gluons. **"No one predicted that it would be a liquid,"** said Professor John Nelson. [...] **"This aspect was totally unexpected,"** said Professor Nelson.

[...] Instead of the 'every-particle-for-itself, free-for-all' that is expected from a gas, the researchers saw **evidence of collective movement** as the hot matter, formed at RHIC, flowed out of the collision site. This indicated stronger interactions between the particles than expected, leading to the belief that the quark-gluon plasma is behaving like a liquid.

[...] The unexpected nature of this new state of matter is leaving physicists wondering if the current theoretical models can support these surprising new experimental results.⁷⁸ [my emphasis]

⁷⁷ Refer to the previous quotation (the one by Joel Morrison).

⁷⁸ <http://www.spacedaily.com/news/bigbang-05a.html> . Originally published at: <http://www.epsrc.ac.uk/PressReleases/PhysicistsCreateAPerfectWayToStudyTheBigBang.htm> (seems down at the moment of writing this article)