

## FURTHER SPECULATIVE CONSIDERATIONS

This document deals with some ideas which are more speculative and exploratory than those presented in papers I and II and is a work in progress. To facilitate exploration of novel ideas, it is also a less formal presentation, being written in the first person and conversational in tone. Over time ideas have come and gone from this document, several being added to the proposed Entrained Spatial Medium Gravitational Sink Model as they became better documented and others discarded as not having stood the test of time.

### Energy of the vacuum

Terms like “borrowing energy from the vacuum” only make sense if one realizes that there is something real there from which to borrow. For example using the uncertainty principle to explain how short lived virtual photons which supposedly “doesn’t really weigh anything” can exert a force through photon exchange doesn’t add up. On the other hand, it is not incoherent to postulate the existence of a very real medium to which we are normally electromagnetically blind. A virtual photon may be a short lived peak of disturbance in that medium which permits us to detect its impact

Now that dark matter and dark energy and the Einstein constant are in vogue, a number of people are looking at the Casimir effect more seriously, which is reasonable. Einstein’s constant was initially added in an ad hoc manner, then removed, and added again in what appears to me to be another ad hoc manner. I have no problem with these ad hoc procedures, as a component of guess and by golly efforts to understand very difficult problems, including the need for renormalization in QM and attempts to resolve an apparent error of  $10^{55}$  or more in the calculations for the energy density of the vacuum. By the way, I would not bet my life that lambda is constant throughout the expansion of the universe as conventional wisdom assumes.

### Einstein and Fizeau

In his book *Relativity*<sup>(5)</sup> Einstein, using his theory of addition of velocities based on special relativity, derived the formula  $\mathbf{W} = (\mathbf{w} + \mathbf{v})[1 - (\mathbf{vw}/c^2)]$ , which he asserted was to the first order of approximation the same as Fizeau's (Fresnel's based on Fizeau's experiment) formula  $\mathbf{W} = \mathbf{w} + \mathbf{v}[1 - (\mathbf{w}^2/c^2)]$ . I believe that Einstein was mainly trying to show that at low velocities special relativity gave the same results as the Fizeau/Fresnel formula.

For what it's worth, the proposed model does likewise at least in form (See Table A in the model for meaning of symbols). Its formula for the *measured velocity* for radially falling light is:  $\mathbf{c}_f = \mathbf{v}_p + \mathbf{v}_g[1 - (\mathbf{v}_p \mathbf{v}_g/c_o^2)]$ . For rising light, *two processes are opposed* and the later portion of the expression on the right becomes negative:  $\mathbf{c}_r = \mathbf{v}_p - \mathbf{v}_g[1 - (\mathbf{v}_p \mathbf{v}_g/c_o^2)]$

These formulas can be combined as  $c_c = v_p \pm v_g [1 - (v_p v_g / c_o^2)]$ . This result is not too surprising and may not signify much.

## The Graviton

One of the differences between GR and QM is the character of the graviton<sup>(11)</sup>. In GR it is a unit of curvature while in QM it is a particle. Meanwhile the QM assigns the phonon to sound as the carrier of force. In Paper I the nature of the graviton is not defined, but my intuition is that it may be like the phonon and as such bridges QM and GR. The hidden variables<sup>(12)</sup> approach to uniting QM and GR could easily be derived from my model and by treating the graviton similar to a phonon.

## Electromagnetism and the theory of everything

The handed rules of electromagnetism tell me that nature has a personality at the deepest levels. No theory of everything will be complete until the cause of this behavior is explained in full. Just as the behavior of the “by the wind sailor”, Velella velella, a hydroid like animal of the oceans which always veers to the right in a wind or current, is a result of its structure and just as the rotation of light by various chemicals reflects their structure, I suspect that the behavior of electromagnetism probably reflects underlying structure. Likewise, for the concept of spin. Point particles cannot have spin. But a structured particle can. See comments on dimensions below.

## Some problems with the present conventional wisdom of theoretical physics

I have with a problem with the accepted explanation of twin paradox. I feel that the conventional explanation for the lack of aging of the twin sent into space as compared to that of the one who remained on earth is a little quixotic. According to SR both should see the other as accelerating and acquiring a higher velocity, so each should see the other as younger when they meet again. The conventional answer is that the fellow in space reverses direction. But that does not wash. Reverses direction relative to what? If there is no background space then relativity dictates that both should see the other reverse directions. Clearly here both must be using the earth's reference frame for the given explanation to work or there must be a background frame. The proposed model avoids this conundrum by referencing the universe as a whole during any stage of expansion as a background reference frame.

Physicists are well aware of these problems, but given the difficulties reconciling GR and QM one might think they might be a little more open to rethinking the basics. Talking to theoretical physicists is often like trying to nail Jell-O to the wall. For example, one might challenge the proposed by asking “With reference to what does the spatial medium drift?” while at the same time maintaining that GR does not need such a reference for curvature as it is an intrinsic property. Hold on a minute! What's good for the goose is good for the gander.

## Some cows and a cat

The finite speed of light justifies the concept of spacetime and leads to *observer based differences in the appearance of realities*, consistent with Einstein's dream about the farmer, his cows, and the electric fence<sup>(4)</sup>. However, I find the description of the flow of the electric current in that dream to be faulty with the result that the cows all jump at the same time while the farmer and Einstein would see them jump in opposite sequences. I regard the time delays in observations as a measurement problem which does not change the underlying reality, only the perception

An analogy would be an object that looks different in size to observers at different distances from it, but which has only one size in reality. Another has to do with reflected images of myself in a double paneled window when it is dark outside and I stand in different positions in my exercise room. In one position I see two of me with the front image being bigger and to the right. When I move a few feet the bigger image moves to the left. Yet I think that I am real and not particularly schizophrenic.

Beckmann asks us to consider two trains side by side whose tracks lead to a precipice. When one commences to move a passenger may not initially correctly detect which train is moving though his fate might hang in the balance. One of these trains has acquired additional momentum while the other has not.

This brings me to a related issue: the so called observer dependent reality based on waveform collapse. I am assuming that the reader is familiar with the Schrodinger cat parable in which a cat is put in a chest along with a radioactive substance from which a radioactive particle can be emitted by chance and kill the cat. Now silliness goes berserk with the supposed belief that the cat is neither alive nor dead until the chest is opened. What the heck does putting a chest around the cat have to do with the events that occur?

The idea that something does not exist unless it is observed by a humans - who have existed for the merest twinkle of an eye in the history of the universe - is absurd on the face of it. According to this thinking the universe could not exist until humans came on the scene. But humans owe their existence to a preexisting universe. A particle does not know if it is being observed by a human. Most animals and events never are. In any measurement the particle does not interact with humans, but photons or other particles, etc. Einstein also believed in an objective reality independent of observation

## Time reversal

A statement that "time flows backward during contraction of the universe" is equivalent to the nonsense statement that "time flows backward whenever a clock pendulum changes direction". I would observe that the only meaningful definition of time reversal would entail the precise retracing of every chemical, atomic and nuclear reaction in exact reverse order, with a film of all world events being run backwards being a good analogy. That certain Feynmann diagrams picture time as flowing backwards is a clue, along with the need to renormalize, that there is more to learn.

## Dimensions

At times it is useful to treat the gravitational field of the Earth as if it originated from a point, but the Earth remains a three dimensional object. In other cases certain problems are more easily solved by treating situations as functioning on surfaces. But a car traveling from California to New York remains a three dimensional object traveling on a three dimensional Earth. I assert that all matter and space has at least three dimensions and no less. *There are no two dimensional, single dimensional, or zero dimensional objects or processes in reality.*

Focusing on less than three dimensions may be useful as an interim measure, but is always incomplete and a number of mysteries disappear when once this fact is accepted. An example is the passing of 70.7% of a monochromatic beam of light through two polarizing filters oriented at a 45 degree angle with respect to each other. A good deal of the mystery associated with the diffraction of electrons through slits disappears when one considers that the sides of the slits are composed of three dimensional atoms with three dimensional electrons in three dimensional orbits emitting electromagnetic waves which must influence the electrons being scattered. Both Van Flandern and Steven Rado<sup>(6)</sup> have recognized the need to deal with waves three dimensionally. Even a surface wave on a body of water has three dimensional aspects to it.

## Infinity, mathematics and chance

I am not aware of any infinite thing, only processes. When one divides by zero, one is saying, "I can decide not to divide as many times as I wish." Likewise, there is no limit on the number of times one body can orbit another if wear and tear, friction, etc. can be eliminated. Nor is there any theoretical limit on how long something can last, if certain laws of nature are suspended. Likewise there is no limit on how far an "island universe" can expand into the nothingness beyond, save for any internal constraints possessed by the universe itself. But there is no scientifically documented infinite thing.

Mathematics is a powerful language without which we would not understand much of the world as well as we think we do today. Even ad hoc mathematical approaches have lead to profound insights, but a warning flag should go up when ad hocness is stacked upon ad hocness. As with any other language when pushed to extremes, math is prone to misstatements. Because one can describe a pink elephant verbally does not require nature to provide one. Nor is nature obligated to provide singularities, time to run backwards, or the laws of cause and effect to be suspended, just because such processes can be described mathematically. Beautiful simple formulas exist which describe centrifugal and Coriolis forces, yet no such forces exist in reality, both being expressions of inertia. Too often it appears that mathematical mysticism sometimes replaces old fashioned superstition.

Chance, whether we apply it to the toss of a coin or radioactive decay or any other event, is the name we use when the number of causes are so numerous or the chain of events is so long or obscured that it is difficult to track cause and effect meaningfully and one must

resort to statistics. That does not excuse scientists ceasing to think in terms of cause and effect.

## Nature recycles

Einstein's island universe is explainable using cause and effect if it recycles. So is a universe which is embedded in a larger superverse. Universes could appear and disappear much as sunspots do on the surface of the sun and be explainable in terms of cause and effect. The author's understanding is that Guth's inflationary universe is postulated to have arisen from such a superverse. If so why Guth made the statement about the universe being "The ultimate free lunch" beats me. Based on the laws of cause and effect and inertia, there must be an *eternal*, but *finite* existence whose character changes, recycles, or fluctuates between Alpha and Omega entities. It may be that the personality expressed during each cycle is not identical. The concept of a *serial multiverse* is perfectly consistent with cause and effect. So is the concept of multiverses embedded in a superverse. But our island universe or the superverse has to be eternal or finite to be explainable by cause and effect. One universe is probably all we can hope to understand, though if the evidence for a Big Bang and a universe which is expanding at an increasing rate still holds, a reasonable inference is that our universe may be embedded in something greater.

The calculations showing that the expansion is speeding up depend upon measurements of the Hubble redshift and the assumption of the existence of standard candles. It may be that Bill Sumner's paper "On the Variation of Vacuum Permittivity in Friedmann Universes" is relevant to the mystery presented by those calculations.<sup>(7)</sup> *By the way, should the speeding up of the universe hold true with its implication of an antigravitational force, an additional argument against singularities is provided.*

## Nothing leads to dimness

One of the most bizarre concepts in modern cosmology is the idea of the universe appearing out of nothing as the result of a quantum fluctuation. If nothing exists, what is there to quantum fluctuate? Mathematically you can multiply by 0 an infinite number of times and the result is still 0. Some intellectual giants point out that there was an eternity for this to occur and purport that given enough time even the most improbable events occur. But these are the same folks that say that there was no time before the Big Bang. Some disrespectful persons have called this notion "The Theory of Quantum Flatulation". Shame on them!

Related to this is the concept of singularities with reference to infinite mass in zero space. Recently Carlos Barcelo, Stefano Liberati, Sebastian Sonego and Matt Visser have proposed that material black stars may form instead of black holes with quantum effects such as vacuum polarization and internalized space preventing the formation of black holes, at least in some instances. This is more consistent with the ideas of Paper I.

A recent concern challenging the intellect of some scientists these days is: "How does one weigh nothing?" I guess these and the preoccupation with time reversal and extra dimensions and infinite parallel universes reveal that humans, including scientists, are prone to superstition.

## Electromagnetism and knowledge

When one speaks of the speed of light he or she is speaking of the speed of electromagnetism. It follows that electromagnetism in all its forms cannot travel faster than the speed of light (electromagnetism). All forms of material matter consist of compilations of electromagnetic stuff. Thus, it follows that matter cannot exceed the speed of light. Alain Aspect's work and Bell's theorem suggest to me the possibility that non-electromagnetic processes may exist which might at times exceed the speed of light. Bohm's pilot waves may fall into this category.

At any rate, humans and all of their measuring instruments are electromagnetic in nature. I suggest that this is the basis for the uncertainty principle and the apparent wave-particle duality of electromagnetism. When one tries to measure the full personality of electromagnetism using electromagnetism, one is forced into using circular logic and obtains confusing results, but this is no reason to abandon cause and effect. Richard Feynman<sup>(8)</sup> observed that if QED procedures were followed, "...There is no need for an uncertainty principle."

Rapheal Bousso<sup>(12)</sup> of the University of California at Berkeley has derived the uncertainty principle using the holographic limit. But concepts surrounding the holographic limit, that the ability of an entity to store information is a function of its surface area and not its volume, seem to be at odds with the notion in GR that the attractive power of a mass is a function of both its energy density and its pressure. Of course the impact of black holes in their surroundings is related to their surface areas as once mass-energy crosses the event horizon it cannot escape (ignoring Hawking radiation). In all sincerity I would like to obtain a better understanding of the basis for Bousso's thinking.

The uncertainty principle as a mathematical concept may define a limit of possible human knowledge regarding electromagnetic processes, *which is a pretty profound statement*. But some of the screwy ideas associated with the principle, wherein the improbable is rejected and the impossible accepted, need to be treated as the pseudo science they represent.

## Frequencies and wavelengths

Change in wavelength is not always associated with a change in frequency. Only when the velocity of light is constant are the two locked together in an inverse relationship. But Einstein once asserted that the velocity of light varies in a gravitational field. The reader is also alerted to distinguish between a Doppler effect based on a moving emitter such as

an approaching or receding train emitting a whistle and that associated with a photon once emitted from a stationary emitter.

Consider the refraction of light in a physical medium, such as when light passes from air into glass. The *velocity and wave length change*, but the frequency does not. Blue remains blue, but the velocity of light is slower in the glass than in the air. Now consider a wave imposed upon a long string composed of two sections with two different densities. The velocity of the wave is faster in the portion of the string with less density - and the wavelength is likewise longer - than in the portion with greater density, *but the frequency remains constant throughout the string*<sup>(9)</sup>.

Of course in Paper I the velocity and wavelength effects are reversed because light travels faster in a denser spatial medium and slower in a less dense one. Per the proposed model a falling photon will experience a decrease in its internal ability to propagate through the spatial medium as the density of the spatial medium thins. So the head (leading edge) of the photon is continually experiencing more retardation of internal velocity than the "tail" of the photon. Thus, the tail tends to catch up with the head shortening the wave length. But the falling photon will also be dragged at a faster rate due to the increasing flow of the spatial medium. Thus, the head of the photon will tend to pull away from the tail stretching the photon. The two processes cancel so that the shortening of the wavelength by the density gradient is offset by the lengthening of the wavelength by the velocity gradient. In both cases no change in frequency occurs. *The net result is that there is no impact on either the frequency or wavelength of light falling in a gravitational field after it is emitted.*

But the same does not hold for photons rising in gravitational fields. Now as the photon propagates it experiences an increased ability to propagate as the density of the spatial medium thickens. Thus the head of the photon experiences easier conditions for propagation before the tail can and the head pulls away from the tail stretching the photon, increasing the wave length. But the tendency to increase wavelength is no longer offset by the flow of the spatial medium. Indeed it is abetted, for now the spatial flow, which is in opposition to the photon flow, decreases in strength as the photon rises. It is as if someone was easing up on the brakes and the negative dragging becomes less. The effect is that the head of the photon once again pulls away from the tail stretching the wavelength. *No change in frequency occurs, but the wavelength gets longer.*

At first blush it might seem as if gravitational systems could be regarded as generators of increased electromagnetic wavelengths, except that gravitational fields generate their own self-correcting processes. For the moment pretend that the universe is static. Then the condensation or absorption of the spatial fabric in the vicinity of gravitational masses and their associated systems must, as they grow and operate over time, have a thinning effect on the overall spatial fabric outside of and between these systems separate from that associated with expansion of the universe. The result is that light propagates slower through the thinner background spatial medium creating shorter wavelengths as the tail catches up with the head, but no frequency shifts. This process offsets the former process so that no net effect occurs.

The expansion of the universe is another matter which independently causes a “shallowing of gravitational wells”<sup>(10)</sup> with the passage of time, that is the overall thinning of the spatial medium weakens the propagation of gravitational forces, but this should affect the head and the tail of a propagating wave simultaneously. The expansion does cause a redshift as the result of stretching.

## **EVEN FURTHER LIGHT HEARTED CONSIDERATIONS**

### [More on Dimensions](#)

**In the end the silliness which follows has a sober point.**

Caution needs to be used in discussions involving the dimensions of space be they one or twenty six. For example, a theoretician may say, "Imagine that you are in a two dimensional space", etc. It probably is not possible to do so with any more certainty than one can really understand what it is like to be a horse. Humans are stuck with being creatures of three or four dimensional space or spacetime. There are no documented two dimensional spaces. The fact that it is convenient to use a single dimension or two dimensions in solving certain problems does not reduce reality to one or two dimensions any more than imagining a blue donkey makes such a creature real. The same applies to the use of additional dimensions.

Some of this is intriguing stuff, though it's a little like mental masturbation. For instance, draw a line and one has created a theoretical one dimensional object. (In real life it has three; but what the heck?) Bend it into a circle and one does not have a two dimensional object; but a homogeneous isotropic closed one dimensional object. Take the area of a plane and shape it into the surface of a sphere (*this should be done in private*) and one does not have a three dimensional object; but - you got it! - a homogenous isotropic closed two dimensional one. My heart can't take much more of this, but hang in there! We can use a balloon - which is what Einstein likened the universe to - and which by the way is really a sphere with a hole in it - so it is a homogenous isotropic closed three dimensional object. You see, whenever you have one of those homogenous isotropic closed things, you wind up with one less dimension than a regular ordinary thing. So we need a 5th dimension or the universe cannot be one of these isotropic things. Darn, I may have gotten confused and mixed up my terminology along the way, which kind of puts a damper on the whole mess. Anyway, following this logic an infinite series of higher dimensions is obviously necessitated.

**What some people ignore is the nature of human psychology where upon Humans are able to imagine themselves looking at themselves from outside themselves. They aren't really out there or are they?**

*But I have gotten far too frivolous.*

## REFERENCES

- (1) Tom Van Flandern, 1993, *Dark Matter, Missing planets and New Comets*, North Atlantic Books
- (2) Petr Beckmann, 1987 *Einstein Plus Two* Secs. 2.7, 3.1 & 3.2
- (3) Paul Marmet, <http://www.newtonphysics.on.ca/>
- (4) Joao Magueijo, 2003, *Faster Than the Speed of Light*, Perseus Publishing
- (5) A. Einstein, December 1916 *Relativity*, Translated by Robert W. Lawson, Published by Prometheus Books 1995.
- (6) Steven Rado 1994, *Aethro-Kenematics*, Aethron Publishing Co.
- (7) William. Q. Sumner, 1994 *The Astrophysical Journal*, Vol. 429, No 2, Part 1 *On the Variation of Vacuum Permittivity in Friedman Universes*
- (8) Richard P. Feynman, *QED The Strange Theory of Light and Matter*, Princeton University Press 1985
- (9) F. J. Blatt, 1983 *Principles of Physics*
- (10) Wayne Hu & Martin White, Feb. 2004, *Scientific American: The Cosmic Symphony*
- (11) Lee Smolin, 2001, *Three Roads to Quantum Gravity*.
- (12) George Musser, Sep 2004: *Scientific American: Was Einstein Right?*
- (13) Carlos Barcelo, Stefano Liberati, Sebastian Sonogo and Matt Visser, October 2009, *Scientific American: Black Stars, Not Black Holes*.
- (14) Arthur Eddington, 1920, *Space, Time & Gravitation*