

## **“Origin”**

**Dedicated to Plato and the wisdom of the ancients, from whom the multiverse idea originated**

**By Alex Reynolds**

With the recent computer models pointing to an oscillating universe as the most likely scenario, I'm wondering if there are multiple parallel universes that oscillate at the same time. Let's say that they all big bang at the same time-- so imagine a spindle-like structure, where time lines all converge on the big bang and diverge after each big bang. Maybe every time we have a big bang we go into a different time line and another parallel universe goes into our time line to replace it. So basically all the possibilities exist at the same time and we just get shuffled around after each big bang. Why do these universes converge on the same big bang? Because they all share the same laws of physics and they're quantumly entangled. This what I call "Layer 1"-- the layer of alternate time line universes-- universes which all share the same laws of physics-- so their large scale structure is the same-- but which can differ in minor details (like the time lines of people, for example.) This is what I would call "the local multiverse" (borrowing the name from our own local cluster of galaxies, which then form part of the Virgo supercluster, connected to each other through thin, curiously cosmic string-like filaments [hint, hint], but which are separated from other superclusters by large voids-- which might be how what I call the omniverse is also arranged on the large scale.) The evidence for these as well as cosmic strings may have been found in the recently discovered "cold spot" in the Cosmic Background Radiation (keep reading.)

This doesn't exclude the possibility of other multiverses with their own physical laws and constants and perhaps some consisting entirely or mainly of antimatter (what I call Layer 2 of the omniverse, which consists of other multiverses, like our own, but with different laws of physics and thus not quantumly entangled with our own but perhaps with the satellite universes of their own multiverse), or even the idea of child-universes, branching and finally pinching off the main one, and connected to each other through blackhole-wormhole pairs (the entire multi-multiverse or the OMNIVERSE might be connected in this way) with each of these possessing different physical laws, although I do feel that as the universes expand and then finally contract, the connections get severed and each universe goes its own way-- perhaps to create even more child-universes to make up for the connections that have been lost. I'm thinking this happens through the act of matter being swallowed by black holes; instead of disappearing forever-- it emerges on the "other side" in a new child-universe. It may or may not keep its original constituency, depending on whether or not the physical laws and constants in the child-universe are the same as the ones in the parent universe (if they are the same, the new child-universe will become quantumly entangled with the parent-universe and big bang at the same time-- this would be how a multiverse builds up its array of satellite universes; if not, then the child-universe will go its own way and likely establish its own multiverse but remain part of the

same supercluster as the parent multiverse but not the same "local" cluster.) Also, the larger the black hole, the more matter it can swallow, and thus the larger the child universe on the other side. This would also be a function of the black hole's age-- the older the black hole, the larger the child universe on the other side. As far as connections eventually being severed, this could be linked to the black hole evaporation process, first described by Stephen Hawking.

As a matter of fact, if one asks the question, "What sparks a big bang?" -- one of the stimuli that lead to it could be the collision of two branes, one expanding rapidly as the result of an inflationary period of expansion just after its own big bang-- leading to a chain reaction causing other big bangs in its vicinity. Think of it as a row of dominoes, one falls and others follow. These universes can be thought of as black holes in their own right, as the edge of the universe would be an event horizon, from which not even light can escape. As a matter of fact, this goes along well with my idea that child universes were born at the other end of blackhole-wormhole pairs--matter got sucked into a black hole in another universe, passed into the wormhole, accumulated until there was enough of it to make a singularity, and then some trigger-- like a brane-on-brane collision (caused by ZPE induced action in the bulk-- similar to what it does in our space-time as dark energy)-- brought about a big bang. In this case, we could have formed inside a wormhole, but the resulting universe would actually be a black hole. The blackhole would be a singularity on the outside but not the inside-- since different laws of physics apply on the outside. (This could also be the case with black holes within our own universe and would show how and why singularities form-- a black hole event horizon is simply a border between different laws of physics and the reason that it's a singularity is because the laws of physics are different on the outside vs the inside. In the case of "local" black holes we're on the outside trying to look in and in the case of our own universe we are on the inside trying to look out! This would take care of the "first" big bang in an oscillatory cycle-- but how to keep them going? Well, all those universes in layer 1-- which are "reflections" of the same universe (much like mirrors in a funhouse all represent reflections of the same thing)-- just with alternate timelines-- perhaps the expansion and then contraction of these alternate timelines of the same physical universe is what keeps the oscillatory nature of the big bang going! What keeps the universe from suffering an entropy related heat death during its expansion phase? Curiously enough, the same thing which stimulates the massive expansion-- dark energy (that is, ZPE triggered action on space-time.) Just as the universe is about to be ripped apart, a turnaround occurs and only one causal patch is retained as our universe. This patch is completely devoid of all matter-- including no particles-- and only contains dark energy-- and its entropy thereby vanishes. The process of contraction of this much smaller universe takes place adiabatically with constantly vanishing entropy and with no matter including no black holes (which pinched off and disintegrated before the turnaround.) In effect, the universe "comes back empty"- - which avoids the problems of excessive structure formation, massive black holes etc.-- all of which would have produced a premature bounce back to avoid

violating the second law of thermodynamics. Coming back empty during its contracting phase leaves the universe to freely oscillate an infinite number of times!

Im envisioning four layers to reality from our point of view (or hierarchies of higher dimensions, if you will)... the first layer includes our universe and all that lies within and includes all the parallel universes that have identical laws of physics and constants to our own (and that converge and diverge with our universe at each big bang), the second layer would include all the child universes and all the multiverses with their own laws of physics and constants and their own parallel universes, the third layer would be the gravity brane from which gravity emanates and the fourth layer would be "the bulk" or what fills the void between the other layers. The four layer hierarchy seems particularly attractive to me (especially since the Universe seems to love grouping everything in fours-- including the fundamental forces and the number of dimensions in our own universe.) The gravity brane underlies everything, and this would be from where gravity originates and is the glue that holds everything together, as well as being the reason space-time curves and dips around objects of mass, as the gravity brane pulls mass "downward" (see my post "What lies beneath Space-Time.") This model also explains dark matter and dark energy (see Quintom Scenario) as just being manifestations of the gravity brane and ZPE respectively, as they interact with our universe, whether it be through blackhole-wormhole pairs, WIMPs (weakly interacting massive particles) or by some other means.

The way to integrate this into M-theory's 11 dimensions is to consider the first two planes of reality having access to a total of 8 dimensions (6 spatial dimensions and 2 temporal ones) with the third plane being the single dimensional gravity brane and "the bulk" consisting of two dimensions-- one spatial dimension and one temporal ("imaginary time") dimension. This gives us a total of 8 spatial dimensions and 3 temporal ones (11 total dimensions) that make up the whole of the omniverse. The second time dimension is very useful, since it explains the arrow of time and allows FTL as well as time travel, but two temporal dimensions cannot exist in the same universe (as they would cancel each other out-- much like matter-antimatter interactions), however FTL and time travel become accessible through blackhole-wormhole pairs, which bridge the gaps between the different layers and through the bulk. Recent computational evidence seems to indicate that universes with 4 dimensions are favored over other combinations, and my omniverse would allow for that-- as the first layer would have the 3 regular spatial dimensions plus regular time, and the second layer can have a maximum of 3 distinct spatial dimensions plus 1 distinct temporal one (for a total of  $[3+1] + [3+1]$  or the 6 spatial + 2 temporal dimensions I mentioned earlier.) The bulk consists of 1 spatial dimension and 1 dimension of imaginary time-- imaginary time being a concept introduced by Stephen Hawking to help iron out the difficulties introduced by having a big bang singularity. Having imaginary time helps to answer the question "What happened before the Big Bang(s)?"-- because imaginary time existed before any of the big bangs and extends the

timeline to before the creation of the universe. The gravity brane consists of only one dimension and this, perhaps, is what makes gravity so intense there-- the fact that all of its power is concentrated in a single dimension-- and also what makes it so diluted in our 4 dimensional universe (it isn't just a matter of distance but also of concentration.) Time travel and FTL would both be possible through the bulk's one spatial dimension and imaginary time-- as a matter of fact, this is exactly what the universe did during its inflationary period when it expanded at many times the speed of light through the bulk (but to do it now we have to find a conduit into and out of the bulk-- perhaps that's what blackhole-wormhole pairs do, linking different universes as well as different points in our own universe via a bridge through the bulk-- and the reason why gravity is so strong in and near black holes is because they provide that direct link between our universe, the bulk and the gravity brane which lies beyond.) What creates the attractive force between the gravity brane and the universe(s)? We can find that answer within the world of D-branes and M-theory. All elementary particles are thought to be vibrational states of quantum strings and D-branes are extended objects upon which open strings can end. D-branes are classified by their dimension.... for example a D0-brane is a single point, a D1-brane is a line (or string), a D2-brane is a plane, etc-- all the way up to D9-brane in M-theory. (Since every brane sweeps out a  $[p+1]$ -dimensional world volume as it propagates through spacetime, there is always one less than the maximum number of dimensions and its referred to as the P-Brane in M-theory.) There are also D(-1)-branes which are localized in both space and time, and called instantonic branes. With the development of M-theory, an extra dimension appeared and the fundamental string of string theory became a 2-dimensional membrane called an M1-brane (or supermembrane). This is what I refer to as "the bulk." What are D-branes made of? Large collections of tachyons (particles that travel faster than light), coherent in a way that reminds us of photons in a laser beam. Tachyonic fields indeed arise in many versions of string theory. In general, string theory states that what we see as "particles"—electrons, photons, gravitons and so forth—are actually different vibrational states of the same underlying string. The mass of the particle can be deduced from the vibrations which the string exhibits; roughly speaking, the mass depends upon the "note" which the string sounds. Tachyons frequently appear in the spectrum of permissible string states, in the sense that some states have negative mass-squared, and therefore imaginary mass. If the tachyon appears as a vibrational mode of an open string, this signals an instability of the underlying D-brane system to which the string is attached. The system will then decay to a state of closed strings and/or stable D-branes. If the tachyon is a closed string vibrational mode, this indicates an instability in spacetime itself. Generally, it is not known what this system will decay to. However, if the closed string tachyon is localized around a spacetime singularity the endpoint of the decay process will often have the singularity resolved. The tachyons carried by open strings attached to D-branes in string theory reflect the instability of the D-branes with respect to their complete annihilation. The total energy carried by these tachyons has been calculated in string field theory; it agrees with the total energy of the D-branes, and all other tests have confirmed this. Material objects,

made of open strings, are bound to the D-brane, and cannot move "at right angles to reality" to explore the Universe outside the brane. The force of gravity is not due to open strings; the gravitons which carry gravitational forces are vibrational states of closed strings. Because closed strings do not have to be attached to D-branes, gravitational effects could depend upon the extra dimensions at right angles to the brane. This would be how the gravity brane exerts its influence upon our universe, as well as others. In the same manner, this is how connections can be established between different universes/multiverses (and perhaps this is what blackhole/wormhole pairs really are as they bridge the gap across the bulk.) Now let's say we have two universes, identified as brane 1 and brane 2. We can easily imagine strings stretching from brane 1 to brane 2 or vice versa. (In most theories, strings are oriented objects: each one carries an "arrow" defining a direction along its length.) The open strings permissible in this situation then fall into two categories, or "sectors": those originating on brane 1 and terminating on brane 2, and those originating on brane 2 and terminating on brane 1. In addition, a string may begin and end on the same brane. A string has a minimum length: it cannot be shorter than the separation between the branes. All strings have some tension, against which one must pull to lengthen the object; this pull does work on the string, adding to its energy. Because string theories are by nature relativistic, adding energy to a string is equivalent to adding mass, by Einstein's relation  $E = mc^2$ . Therefore, the separation between D-branes controls the minimum mass open strings may have. Furthermore, affixing a string's endpoint to a brane influences the way the string can move and vibrate. Because particle states "emerge" from the string theory as the different vibrational states the string can experience, the arrangement of D-branes controls the types of particles present in the theory. One straightforward mechanism for a string interaction is for two strings to join endpoints (or, conversely, for one string to "split down the middle" and make two "daughter" strings). The masses of these strings will be influenced by the separation between the branes. The reason objects with more particles have more mass in general (of course this also depends on the nature of the particles - and strings) is because they have a higher quantity of strings. The string theory landscape also gives us some ideas regarding how many multiverses might be possible in omniverse. In string theory, the number of different landscapes in false vacua ( a local minimum, but not the lowest energy state, even though it may remain stable for some time-- until it is tunneled to a lower energy state by quantum fluctuations or the creation of high energy particles) is quoted as  $10^{500}$ -- The large number of possibilities arises from different choices of Calabi-Yau manifolds and different values of generalized magnetic fluxes over different homology cycles. Chaotic Inflation theory outlines several different scenarios in which multiverses can either expand, contract or even die through the "natural" selection of different laws of physics within each multiverse that causes its boundaries to behave in different ways (for example, in some of them, the universe's "bubble" bursts as it spontaneously tunnels into a lower vacuum state!) What causes these bubbles to form in the first place? The energy of the ZPE in the form of quantum fluctuations, which will form many bubbles of false

vacuum that inflate into miniuniverses with random characteristics. Each universe within the omniverse can have a different set of constants and physical laws, which are subject to selection-- which determines each region's components (like galaxies, stars and planets and their arrangements-- like clusters, atoms, molecules, etc.) based and dependent upon the survivability of the quantum components within that region. The end result will be a finite number of universes with physical laws consistent within each region of spacetime-- and which exist for periods of time dependent upon those physical laws. Some might have life of a form different from ours; others might have no life at all or something even more complex or so different that we cannot even imagine it. Obviously we are in one of those universes with life. Due to quantum uncertainty energy fluctuations such as electron and its anti-particle a positron can arise spontaneously out of nothing but must disappear rapidly. The lower the energy of the bubble, the longer it can exist. A gravitational field has negative energy. Matter has positive energy. The 2 figures cancel out provided the universe is completely flat. In that case the universe has zero energy and can theoretically last forever. Variants of the bubble universe model postulate multiple false vacuum states, which result in lower-energy false-vacuum "progeny" universes spawned, which in turn produce true vacuum state progeny universes within themselves-- which is very similar to my model of parent-child universes. Important use of D-branes has been in the study of black holes. String theorists have constructed models in which a black hole is a very long (and hence very massive) string. Strings combined with brane theory sounds quite intriguing.... you can already see these networks on a much larger scale when you look at images of superclusters of galaxies and see how they're arranged in a string like network that bridges the gap between huge voids. Strings with closed loops, like the graviton, are completely free to move from membrane to membrane. Of the four force carrier particles, the graviton is unique in this way. Researchers speculate that this is the reason why investigation through the weak force, the strong force, and the electromagnetic force have not hinted at the possibility of extra dimensions. This is yet another way in which gravity is different from the other forces. Also wondering if that's how gravity propagates itself across universes (as does ZPE to achieve a balance between the bulk and the multiverses).... if the gravity brane is indeed one dimensional, the concept of one dimensional strings propagating its influence through the bulk and into the multiverse via blackhole-wormhole bridges/strings would be analogous to the existence of superclusters of galaxies (universes) with large voids in between (the bulk) bridged by filamentary structures (strings). I agree with this-- the microscale and macroscale phenomena we see are connected together in some way.... whether it be the empty space inside the atom or the void between superclusters or whatever in between. Consider what happens inside an atom, outside and between atoms, etc., is likely the same "connective tissue" that makes for the "voids" between galaxies and galaxy clusters. Nature seems to have a theme of repeating structures, no matter what the scale-- it shows that something very fundamental is at work which underlies it all.

Now what existed before the very first big bang? An interesting question! It

seems to make sense that whatever existed before the very first big bang caused the big bang itself, and was the origin of all matter and energy not only in our own universe, or the multiverse, but the whole omniverse itself. Zero Point Energy, being the ground state of energy in a vacuum, is a very good candidate for that role. In my model, ZPE is the energy state of the bulk, and it acts as the fuel to spark the fires of creation, so to speak. In an oscillating universe, the big bangs would be able to sustain themselves once the first one got started (or at least until they got back to the "singularity" stage), but they would need that initial creative spark in the beginning, and I can see that's where ZPE comes in. It would originate in the bulk, as that is the background under which all the big bangs occur. This also helps to solve a problem in physics which has been considered "unsolvable"-- namely, why doesn't the ZPE density of the vacuum change with the volume of the universe? My answer to this would be-- clearly because ZPE originates from outside the universe, in the bulk, and so the expansion of the universe doesn't affect the density of the ZPE. I believe that ZPE emanates into our universe (and other universes) through quantum foam and other types of blackhole-wormhole constructs and that, eventually, a balance is reached between ZPE outside and inside the bulk and the omniverse (this balance would also be the reason the predicted mass of the quantum vacuum has little effect on the expansion of the universe and why the energy density of the dark energy component is of the same magnitude as the density of matter) and this density is maintained with only a slight variance (seen as the Casimir Effect and vacuum fluctuations) until we get close to the next big bang. Perhaps at this time, a rapid change in the density of ZPE inside the universe is what causes the next big bang. And this would also help explain another so-called "unsolvable problem"-- why doesn't the large constant ZPE density of the vacuum cause a large cosmological constant? Because a balance is achieved between the ZPE values inside the universe(s) and outside in the bulk! Because the cosmological constant was created in order to explain the expansion of the universe (that is, "dark energy") we kill two birds with one stone: since both are the results of the interactions of the gravity brane and ZPE upon the universe(s)! As a matter of fact, just as dark matter can be explained as an interaction between the gravity brane and our universe (via strings), so can dark energy be explained as an interaction between the ZPE of the bulk upon our universe to maintain an equilibrium density. Perhaps blackhole/wormhole pairs on the large scale and quantum foam on the small scale are vehicles of both (they are, after all, merely reflections of cosmic strings.) Black holes might be the gravity sink that cause the intense gravitational display of dark matter and wormholes might be the conduit that brings massive quantities of energy (as ZPE and in other forms) into our universe, which is attributed to "dark energy." And on the microscale, quantum foam can do both-- resulting in the Casimir Effect, which displaces matter and energy, albeit in very small degrees, but across vast distances of space-time and across the omniverse. And, in addition to ZPE being the originator of the big bang(s), and so the source of all matter and energy in the multiverse, I theorize that the dimensions can be unified, just like the fundamental forces can (and that other multiverses in the omniverse might have

their own fundamental forces, depending upon the laws of physics in those multiverse(s) and how the gravity brane and ZPE act upon them.) Perhaps that one spatial dimension and one temporal dimension of the bulk are the source of all the dimensions (the one spatial dimension being the source of all 8 spatial dimensions and the one imaginary time dimension being the source of all 3 temporal dimensions), just like ZPE was the source of all matter and energy in the omniverse.

So, to summarize, before the big bang(s) we had ZPE and the one spatial and one temporal dimension of the bulk, as well as the gravity brane (whose actions in conjunction with ZPE upon the early stages of the big bang caused the fundamental forces to emerge-- and thus they were the "originators" of the latter.) So, once again, the number 4 crops up in the creation equation (ZPE, 1Ds, 1Dt, Gravity). The fact that temporal dimensions are considered separately from spatial ones just like gravity is considered separately from the other fundamental forces creates a neat kind of symmetry that makes me think that gravity and time are related and intrinsically linked (since time emerged from the other 3 local dimensions first, just like gravity emerged from the other 3 local fundamental forces first.) At some point in the far flung past, the four elements of the creation equation were all united (interesting that the concept of 4 elements comes up!) and that would have been before the gravity brane came into existence (the gravity brane probably came into existence at the same time the one temporal dimension of imaginary time separated from the one spatial dimension in the bulk-- and might have even been caused by it, and the result might also have caused the generation of ZPE and/or been caused by it [or both, in true oscillatory fashion!], which ended up resulting in the big bang(s)... so now you see how everything falls into place and one thing leads to another-- like a cascade effect, or dominoes!) The gravity brane's actions upon the universe(s) would be the reason why we have blackhole-wormhole conduits in the first place (the actions of the gravity brane on objects of mass causing space-time to curve, and in the case of objects of "infinite" density causing them to separate from space-time entirely, and wormholes being created to channel the matter-energy that gets sucked in to create a new balance, which also results in the creation of child universes and an expansion of the multiverse!)-- and the reason why a region which is considered an area where laws of physics "break down" can now be explained when one considers extra dimensional space and what exists outside of space-time, so our known laws of physics are just a subset of something greater, from which they originated. As a matter of fact, if transversable wormholes can be generated or manipulated using ZPE, it would be poetic justice-- as we'd be using the original energy of the omniverse to travel within it and through space and time! The extra dimensions were always there, but they don't make themselves apparent until a singularity forms-- like a big bang OR a blackhole-wormhole pair-- or something else which originates from beyond our universe, like ZPE or gravity, enters the picture. On every day scales, we can make do with classical physics, as these are a suitable approximation of reality. But when we get to larger and larger scales (or smaller and smaller) we finally

realize that they are just that-- approximations. In that way, they mimic the universe itself. Because, just like our laws of physics are a subset of something greater, so is our universe and its dimensions and forces. Just like what's considered infinite/undefined in the mathematics of our universe, isn't such on a higher level. On a higher level, and yet also more fundamental-- an interesting and circular relationship! So the order of creation would have been: bulk->gravity brane->big bang(s)->multiverse(s). A journey through a transversable wormhole would be pretty awe-inspiring, not just because of where we were going, but what we were going through-- something which not only predates all of existence-- but was also the cause of creation!

And now, we come to the matter of the holographic principle-- which states that all the information in the universe (matter, energy, dimensions, forces) etc. can be stored on one boundary of the universe. How would such a large amount of data be stored? Not as difficult as you might think-- as this is merely restating the fact that all of our dimensions, forces, matter and energy emerged from some basic factors from which they sprung. The holographic principle makes a great deal of sense to me. Why? Because the universe seems to be symmetric on a vast range of scales-- from the atom, to the solar system to the galaxy, to superclusters, and perhaps all the way up to the ultimate level-- the omniverse. This repetitiveness of scales indicates to me that there is something much simpler that underlies all of this, and everything else is a projection of something very fundamental....that everything we see around us is just a reflection of this hidden underlying fabric-- which is where the holographic principle comes in. Interestingly enough, just to show how convergent different areas of research within cosmology are, fractal universe theory, which presents the universe as a clumpy structure, rather than homogenous, also seems to give a nod towards the holographic principle, as it indicates the 4 dimensional large scale of the universe can be represented in only 2 dimensions on the Planck scale and fractal space-time to boot, and suggest that the dimensionality of space evolves with time. Using noncommutative geometry, fractality also arises in this approach to quantum gravity, and time becomes an emergent property that naturally arises in this formulation. Not only that, but it seems the universe might be fractal on the largest of scales also-- since the evolution of peaks in the bulk's ZPE led to the creation of bubble universes. And analoging the holographic principle to ZPE like pen to paper-- that seems to make a lot of sense to me also. Zero Point Energy, in being the quantum ground state of a vacuum, the original energy of the omniverse, would be the omniverse at its most fundamental level-- from which all else emerged. The ZPE would be the holograph of all matter and energy and the bulk of all the dimensions and forces (through the action of the ZPE.) Since dark matter represents the aggregation of ZPE, and since dark matter leads to the organization and structure of galaxies, ZPE is responsible for the organizational nature of our universe. Perhaps the clustered nature of the galaxies also thusly represents the structure of the omniverse on a much reduced scale (since the supermassive black holes at the centers of galaxies could be gateways into other universes).... in other words, we can see a holograph of the omniverse from

within our own universe! Or in other terms, the "son" (our Universe) is a reflection of the father (the omniverse). Analysis of the large scale structure of the universe seems to indicate that there is both randomness and a hierarchical structure at work-- this would perhaps indicate the influences of both quantum fluctuation and organized structures beyond the universe influencing the structures within our own universe (in other words, both ZPE and gravity.) Dark matter-- and thus the gravity brane and ZPE would influence where superclusters formed, and dark energy-- and thus ZPE-- would influence the formation of supervoids. This duality seems to mimic the duality of curved space time and quantum foam-- creating yet another universal symmetry. And the idea that the omniverse is reflected in the large scale structures of our own universe continues this theme of symmetry at all levels. Continuing the theme of symmetry inside and outside our universe, the recently discovered cold spot in the cosmic background radiation has been hypothesized to indicate the presence of a parallel universe quantumly entangled with our own. If proven true, this would be the first proof of the multiverse and a major nod towards string theory. Along the same lines, the "Great Attractor" might prove to lie towards the center of mass of a supercluster of multiverses (if our galaxies can be organized into superclusters interspersed with supervoids, why shouldnt the omniverse be organized into superclusters of universes separated by supervoids of the bulk?) Its interesting that the holographic principle was first used to describe all the information stored in a black hole using its surface area, not its volume and shows that our universe has much in common with more conventional black holes, and perhaps the black holes we detect in our own universe are the beginnings (or signs) of new universes in other dimensions. The one dimensional bulk would fit in perfectly with the idea of an oscillatory universe-- as the most often cited example of a one dimensional shape is a mobius strip, which loops back upon itself, both beginning and ending at the same point. Thus, the bulk (and ZPE by extension) has no beginning and no ending. The looping occurs over such a long interval, though, that the bulk appears "flat." How can so many dimensions be "written" on a one dimensional bulk? Simple, the dimensions are compactified! This resolves the issue of why the universe "inflated" so quickly in its early period very well. Not only was it the action of ZPE upon space-time, but since our dimensions are compactified, the inflation seems much more rapid than it really was (from the perspective of the bulk.) We have been looking for compactified dimensions, not realizing that we ourselves exist inside of them!

While the bulk's ZPE contains the entire history of the omniverse, our universe's own history would be written on space-time, as the ZPE of the cosmic background radiation, which displays the history of our own particular big bang. Not only that, but in the cosmic background radiation is also written the period of explosive expansion known as "Inflation"-- much like earth's sediment preserves the fossil record. As a matter of fact, since the bulk and its ZPE represent an early history of the omniverse itself, exploration of it through wormholes should be even more awe-inspiring since we would see a "fossil record" of all of Creation itself-- along with energy signatures of different multiverses in various

stages of expansion or collapse-- and maybe even in the process of big banging!

I theorize the dimensions and forces emerged from the same common "ancestor"-- and yet another symmetry was born-- the four forces and the four dimensions-- with gravity and time being the two "black sheep" that don't fit in with the rest. If ZPE is fundamental to all the energy in the omniverse, and the bulk to all the dimensions, then the actions of the ZPE upon the bulk would be from where the forces arose (including the gravity brane!) And what makes gravity so different from the other forces-- one, it separated first, and two, it originates on its own brane. And imaginary time, the original time of the bulk, would also have arisen from interactions between the ZPE and the bulk. Before the omniverse there would have just been the bulk and its zero point energy-- vacuum fluctuations of virtual particles, if you will-- winking into and out of existence. It was on the surface of this dynamic "vacuum" that the omniverse was written. And since the ZPE wasn't spread out equally, where it clumped and aggregated and started to accumulate for more than a few trillionths of a second instead of "melting" away is where the first seeds of the omniverse were born. Perhaps we still see a "holograph" encoded into our space-time of where these aggregates are located (the aggregates to new universes in the making perhaps)-- in the form of dark matter. And the actions of the gravity brane on these massive clumps are what makes dark matter so mysterious. The idea of aggregates coalescing into the first seeds doesn't sound too different from the first vestiges of life appearing on our planet does it? The universe is symmetric on so many scales!

I had posted a diagram in an earlier post about the substructure of our universe on the microscopic level (under "Quantum Foam") and looking at all the peaks and valleys of this structure, it's conceivable that entrances and exits into and out of the bulk lie in these peaks and valleys and that's how virtual particles wink into and out of existence as they go from one part of the universe to another (or between universes) and explain the Casimir Effect. This would preserve the law of conservation of mass-energy while also keeping the Heisenberg Uncertainty Principle in place, as one couldn't be certain of exactly where these particles would be at any given moment, but at the same time, no virtual particle would be created or destroyed, they would just be reshuffled from one place to another within the omniverse. Quantum foam gives us a window into the world beyond space-time into the bulk and ZPE, just as much as looking at the most distant galaxies gives us a view into what the universe was like just after the big bang. And this is the reason why different laws of physics apply on the subplanck scale-- laws which existed before there were dimensions and forces-- laws that predate our own universe! ZPE even occurs on the subplanck scale, in the form of virtual quark pairs that account for the majority of the proton's spin. Blackhole-Wormhole pairs would just be quantum foam peaks and valleys on a higher level (as a matter of fact, when thinking of the possible differences in blackhole-wormhole pairs that link us to second layer universes and multiverses [those with physical laws and constants different from our own] and other parallel universes

within our own multiverse [those with the same physical laws and constants]-- it occurs to me that the macroscopic black hole-wormhole couplets would be the ones to link us to either second layer universes and multiverses OR other locations within our own universe or local multiverse and microscopic blackhole-wormhole pairs would be the ones that ONLY connect us to parallel universes within our own multiverse, as well as other parts of our own universe. Intuitively, this makes sense, as the Afshar double slit experiment, as well as quantum tunneling and teleportation and the Casimir effect are much more likely to redistribute matter and energy across our own multiverse, rather than through second layer universes or multiverses with different laws of physics and constants. Closed timelike curves near black holes could be the side effect of being so close to the bulk and the gravity brane which lies beyond and, as a matter of fact, quantum superposition can be explained as being a closed timelike curve around a microscopic black hole (quantum foam), which enables the particle to be in two places at the same time (from our point of view)-- because its stuck in a local time loop, just like a CTC can generate both future and past time travel on all levels and macroscopic superposition near areas of high space-time distortion, like black holes. As a matter of fact, CTC are a known symptom of being close to an area where two dimensions of time intersect, which would neatly fit into the idea of them occurring near black holes-- where our dimension of time and the one of the bulk intersects. It's interesting that they represent a meeting place of multiple temporal dimensions and the gravity brane-- showing yet another way gravity and time are linked. At present, the only type of black holes known to be good candidates for coupling with transversable wormholes would be Kerr black holes, because their ring singularities create tunnels through which macroscopic travel is possible through the bulk-- to either other points in our space-time, the local multiverse, or even second layer universes. However, given enough energy, we could create artificial transversable wormholes through our own universe's space and time (requires the "least" energy-- relatively speaking), in our multiverse (requires more energy), or even through second layer universes or multiverses (requires the most energy of all, and we would need to maintain some sort of bubble of our own space-time to prevent some type of catastrophe from being in a universe with different physical laws-- which we would need in making a journey through a transversable wormhole anyway, but it would be necessary to keep this bubble intact when we interact with a second layer universe.) How to journey to a universe with different dimensions and/or physical laws? It would be very tricky. If it has different dimensions than our own, then how would we fit our 3 dimensional selves into it-- or for that matter-- how would we even see it? It might just seem like a point particle to us (since it doesn't exist in our dimensions) and we might just seem like a point particle to any life that exists there (which life in another part of our own universe-- let alone another universe entirely-- would probably be so different from us-- would we even recognize it as life?-- especially if it was just made of energy or interstellar dust or with a biochemistry different from ours, or if it existed on a scale vastly different from ours-- that is, we might be like ants to them or vice versa!?) I wonder if our consciousness can be separated from our

physical body (I guess we'll find out when we die-- although some claim to be able to do it through astral projection in dreams or waking states and witness events far away in space and/or time from their physical bodies lol) and if so, then we don't have to obey the same laws since we will be energy instead of matter. As energy, we wouldn't be restricted to our own three dimensional space, nor would we noticeably degrade with time. I've read some serious scientific work that states, to the effect that, if evolution proceeds unchecked, it will eventually lead to beings made completely of energy that think and communicate by the process of transferring electric currents within their energy and passing those currents onto others (in effect, we'd have telepathy, because thoughts would be able to be communicated directly, without the need of a mouth or any other organs-- and at this stage of the game we would have no need for matter at all because the universe would consist mainly of energy.) This discussion is now bridging the gap between science and spirituality, but I do wonder if we have an energy component to our consciousness that can be separated from our physical selves and which can be used to journey into universes with other dimensions and/or laws of physics. Why would we even want to go to universes with different physical laws or dimensions? Aside from the altruistic desire to explore other parts of reality-- I can see a practical reason to do it also. If the physical laws are indeed different and if the fundamental forces are different (maybe up to 11 fundamental forces to match 11 dimensions, the same number of forces in a given universe to match the dimensions in that universe-- like ours?), then its possible that the other universe exists in a higher energy state than our own, in which case we could obtain massive amounts of "free energy" if we could establish an energy pump from that universe to our own (of course, we would have to explore the ethical side of the issue and hopefully not damage that universe or any of the beings that reside within-- and perhaps aid them in establishing their own free energy pump and so on.) I do agree with Penrose, that there is a quantum component to our consciousness (maybe the main component) that might be able to be transferred across space and time and even to other dimensions of other universes. I find it interesting that both he and Jung believe in a collective consciousness that can extend to other dimensions-- like a network of strings (much like the connections between galaxies or universes on all scales-- as well as the bonds that connect atoms together in a molecule.) ESP, if it does actually occur, might be explained as ripples along these strings of consciousness (that are strong depending on our emotional and/or genetic connection to that person-- which might extend to the afterlife, which, if it exists, would just be a higher energy state of a person's conscious energy) that extend through other dimensions and space-time. Which is why it would seem to violate laws of physics when it doesn't violate them if you consider extradimensional physics and the fact that these instincts are buried inside of us and weakened by lack of use and exposure to the physical world. Maybe our mythology had some basis in fact-- and perhaps, this is because we are a part of the universe, and on some instinctive level we have the universe's "memories" of how it began inside of us, but to associate them to everyday things we understand-- that is where mythology and religion came from-- they are basically a diluted version of the

truth. I'm not a religious person, but I am spiritual. I believe that religion was always used as a way of trying to understand the unknown-- there is truth to it, but it's watered down. I think we hold the key to the truth within ourselves-- for we are a part of the truth that we are seeking. But our environment makes it difficult to unlock it, because we really have nothing to compare it to. Its like my earlier analogy of cavemen trying to figure out how to design and run a car-- they simply don't have the real world experience to be able to do it, although in principle the knowledge of how such a machine would work (in basics) is probably programmed into their brains. We might have to transfer our consciousness into a being that exists in another Layer 2 universe because we would need their senses in order to perceive their environment and we would need their bodies in order to cope with their physical universe (even if the dimensions are the same, different physical laws might mean that the size of everything is different-- for example cosmic rays could be the size of planes and planets the size of pimples or the universe might be mostly composed of antimatter, or time might progress much faster or slower or not move at all, if they have a different temporal dimension from ours.) Of course, if we don't want to face an ethical dilemma, we would need their permission first-- perhaps an exchange of equal length would be in order! The really interesting case would be if some of our dimensions from our universe were present in an alternate universe, but not others-- like, for example, if they had length and width but substitute a different dimension for depth. In that case, their universe would seem flat as a pancake to us! Or if the dimension of time is different-- it would be frozen in place right at the beginning, according to our senses. Hence the need for projecting conscious energy into the bodies of that universe's own residents. As far as time travel is concerned within Layer 1 or Layer 2, this is an interesting idea, and I believe you can invoke MWI here--- going backwards in time would merely get you onto a different timeline and different layer 1 universe (of that particular multiverse), parallel to the one you left. Also, in extradimensional theory, there is an extra dimension of time invoked which would remove many of the paradoxes involved with time travel-- either backwards or forwards. I believe Kaku found a way around the problem of the earth moving in space while we were time traveling and the problem of taking "information" from our universe to another one-- I'll have to look into that. Its on mkaku.org It might also involve transferring our conscious energy into another being (preferably ourselves-- if its in a parallel universe.) The time bubble I mentioned would probably work like the Alcubierre space warp bubble, which would enable superluminal speeds by distorting space-time and riding it like a "wave"-- the similarities of both constructs shows how superluminal travel and time travel are instrincally linked. And then we have the matter of closed timelike curves-- which means gravity has to be thrown into the equation also. After reading what Linde wrote concerning the ability to construct a universe within a laboratory (or a collider) and not have it wreck the universe we're in because it would curve in upon itself and basically look like a subatomic particle, it got me thinking--- what if our universe is just a subatomic particle in someone else's much larger universe? And what if our subatomic particles are nothing more than tiny universes (on our scale)-- and the reason why we cant see any structure in

particles like the electron, the positron, etc-- is because they contain their own physical laws inside themselves-- but on the outside, they obey the laws of our physical world (We've seen this kind of thing before, as Quantum Mechanics gives way to Newtonian physics on the every day level and Einsteinian Physics on Relativistic scales-- one is basically a subset of the other.) It doesn't seem very likely at all, but I find this idea whimsical and it would in some sense solve the antimatter question-- as one could envision a universe made up of the equivalent of an electron would be composed of mainly matter and one the equivalent of a positron would be mainly antimatter. Perhaps the omniverse is layered in this way also (something we've seen at the subatomic level when comparing electrons to muons to tauons) and if that was the case, more than likely we'd be an "in between universe" with many underneath us and many above us also. Comparing ourselves to whatever superverse lies "above us" perhaps their atoms are nothing more than clusters of universes, densely packed near the center (and with the large empty spaces inside the atoms mainly composed of ZPE and bulk), with the nucleus packed like the way the center of our own galaxy is packed, and molecules are nothing more than superclusters of multiverses with blackhole-wormhole connections (chemical bonds?!) between them. This idea is really far out there-- but it's interesting to think about nonetheless. Perhaps the nuclear force is merely the equivalent of our gravitational force on the scale of a microuniverse (one that appears to be a subatomic particle on our own scale.) In that case, the strong nuclear force, would bind the microuniverses together (gravity propagated through strings made of gluons creating blackhole-wormhole pairs?) and the weak nuclear force would break them apart in the process of fission (dark energy?) The elements-- not to mention subatomic particles-- that would exist in these realities would be extremely exotic and nothing like ours-- not to mention their laws of physics! I decided to leave this out of my theory for fear of making it much more complicated, but I thought that perhaps the bulk and the zpe within it also undergoes a "big bang" but at a much larger timescale than the rest of the omniverse (though the omniverse big bangs would also be an integer divisor of the bulk/zpe big bang-- the ones that are stable and long lasting, anyway).... the problems that arise here include the fact that if this is correct, you then have to have something outside the bulk and something even more fundamental than ZPE on the outside of the omniverse, more dimensions, etc, and then our omniverse becomes just one of many. At which level would this stop? Would it just go on ad infinitum or what? I know in the physics community there are some who believe that quarks aren't the fundamental form of matter and that preons are what quarks are made of. (I have even seen some state that preon stars could prove this, just like quark stars were astronomical proof of quarks.) Again, when does it stop? What exactly is fundamental-- or does that word even have any real meaning? Maybe the deeper we look, the more we will see that nothing is fundamental and everything is made of something simpler and everything also makes up something more complex-- a puzzle inside a paradox inside a conundrum inside a... It would mean the bulk oscillates and omniverse oscillates at frequencies that are integer divisors of the bulk oscillation-- goes on

indefinitely at higher levels and lower levels (maybe inside black holes-- which contain their own microuniverses?)-- the gravity brane makes the bulk oscillate (inside black holes for microverses also-- as microbulks)-- there are other bulks within their own omniverses inside the superbulk that also do this-- each with their own physical laws, dimensions, forces and constants. Of course, the gravity brane would be the one which they all had in common on different levels, it would just manifest itself as a different force on each level (like the strong nuclear force, for example.) This completely sidesteps the idea that perhaps our own universe was generated in some sort of laboratory somewhere by I guess you could call it "God" but I would just call it some bum with too much time on their hands! The thing is our universe and everything inside it seems to huge to us but to someone on the outside it might be the size of a point, in their own dimensions. And according to some cosmologists, one way a creator could give us an idea that they made us would be to make some laws of physics that behave according to some exact numbers-- and these "special numbers," called constants-- would hold the key to what they were trying to communicate (because math is the universal language.) One other theory I would like to mention is Kris Shield's double manifold theory which holds that our universe can be divided into two compartments, one with matter and the other with antimatter, and the two big bang at opposite parts of their respective timelines, with ZPE the boundary or domain wall between the two. Is it possible that matter would be converted directly to antimatter and vice versa as it "crossed over"? If that is the case, I can see how ZPE would be the boundary, as energy is neither matter nor antimatter. Would we be able to travel back and forth? (errr, afterlife and reincarnation in their natural state for both sides and limbo for the barrier in between? I don't know if I want to attempt to go there in a "forced" state lol) Would we be able to utilize this duality as a portal to travel to other portions of our own universe via extradimensional space? I remember back a few years ago reading about an old theory concerning a dual universe structure in which we were one universe with always subluminal speeds, and there was a luxon barrier where everything traveled the speed of light and then there was the tachyon universe where everything always traveled over the speed of light. Im wondering if we could apply this to Kris' theory in a novel manner. Let's say that the reason we cant see anything on the other side of the manifold is because, from our perspective, everything on the other side has imaginary mass and always travels at superluminal velocities, and the reason why they cant see us is because of the same thing. So, we think THEY are made of tachyons and have imaginary mass and they think WE are made of tachyons and have imaginary mass. And the luxon wall where everything always travels at the speed of light would be the ZPE (now that gives going "into the light" new meaning-- and the reason spirits/ghosts never seem to age, for they would be traveling at the speed of light in limbo aka the ZPE!!) Besides the idea that "the other side" would always seem to be traveling at superluminal velocities (which in reality neither was), another reason it would evade detection is that from our side it would seem to violate causality and to be traveling backward in time (which they would think we were doing instead-- if they could see us being "reborn"!)

The two things which seem

to violate symmetry are the monodirection of time and the lack of antimatter in our universe. Perhaps we will find a reflection of our universe which balances these out and preserves the symmetries. The double manifold theory would preserve this symmetry because it would seem (from our view, if we could see them!) to be going backward in time (as we would seem to be, from their view) and it would be composed of antimatter (which we would seem to be from their view.) If ZPE is indeed a holograph of our universe (and is written in space-time, which is ZPE), then we can't see "the other side" because all we see is a holograph of our own reality, like a mirror-- and the same goes for them also. In this case, black holes would really be the only source of information-- it's just too bad that they're singularities, which would preclude us from learning-- unless we found or made a transversable worm hole to go there (with the aforementioned protection), that is. Mass would be exchanged between both universes through wormholes and quantum foam-- until it tipped over one or the other universe into a "big bang" and then the cycle would repeat-- this time, for the other universe. The beauty of it is, that it preserves causation and conservation laws all the while producing astounding effects that SEEM to violate causation. And it fits in with my omniverse theory, as each universe (whether it be a layer 1 parallel or layer 2 exotic universe) would have its own alterego-- an "antiuniverse," if you will-- just like each particle has its own antiparticle. Of course getting into the "antiverse" for any particular universe would be highly problematic, as we don't want to be annihilated with all that antimatter around (good thing we have that ZPE barrier)! Exchanging conscious energy with a resident being would do the trick though (ghosts in inanimate form, possessed beings in animate form?!)-- since energy is neutral and can exist stably in any universe or antiuniverse! This duality makes for a yin-yang dual universe (another example of philosophy meeting science-- much like Immanuel Kant's "island universes.") It can also be considered our mirror universe, as it would be an antimatter version of us (and we of them), so all handedness in nature would be the reverse of ours (although we would not retain any memory of handedness in case of reincarnation and so would not notice that-- as a matter of fact, we shouldn't be able to retain any memories-- unless we met someone we were emotionally connected to-- which might be an explanation of "soulmates," etc.-- in which case we might think we'd known them "forever" but without any specific memories, unless something traumatic happened to "shock" our consciousness into remembering them [although latent memories might be brought out with regressive hypnosis]-- which would also occur in the case of ghosts or spirits [if they are real]-- causing them to be trapped in limbo-- aka the ZPE-- never aging because they're energy, replaying their last traumatic memories, and their energy in the "barrier" causing electromagnetic interference, cold spots with their negative energy and, in extreme cases, movement of physical objects-- needing some kind of realization of their predicament to complete the journey into the antiverse, preferably through their summoning and recognition of their "loved ones.") Perhaps the complete set of universes, along with their mirror antiverses (or mirrorverses), microverses and miniverses with their microbulk or minibulk (which are subatomic particles and the "empty" area in between-- which actually contains

zpe-- in those universes), their multiverses (Layer 1 parallel time universes), Layer 2 multiverses (those with different physical laws and/or dimensions) and their bulk and superverses (those in which the omniverse below comprises all the elementary subatomic particles) along with their superbulk should, as a whole, be termed the hyperverses. The only thing all the layers would have in common would be ZPE (called quintessence-- or the "fifth element" by the Greeks and various other cultures-- its intriguing that these historical cultures theorized its existence millennia ago-- which shows me human instincts can deduce a diluted version of the truth, because they are a part of it and the reason its diluted is because they need to associate it with something their culture is familiar with) and the gravity brane, the balance of which (push and pull, expansion and contraction) keep everything together. The big problems we would face in trying to examine a universe with different laws of physics or other dimensions would be, first of all, trying to determine if life exists there (or can exist) and if so, finding a way to communicate with it. Aside from the fact that the intelligent life might be so alien as for us to not be able to recognize it (maybe made of energy) how would we "talk" to it? Perhaps with the only two things our universes might have in common-- energy and math. In other words, sending beams of energy in mathematical patterns-- for example, binary code. In layer 1 parallel universes and in the antiverse, this should be much easier, as there should be humans who speak earth languages in those-- however, we would need to make sure we were "looking" in the right part of said universe (Milky Way galaxy, Orion sector)-- but this is likely to be alleviated by the fact that the blackhole-wormhole connections that would lead us there would probably lead to the same parts of local space that we are in. As you can see, the omniverse has many different paths (cosmological background radiation, strings, holographic principle, multiverse, branes, ZPE, gravity, bulk, blackholes, wormholes, quantum foam, etc.) to the same goal on many different scales (subplanck, quantum, atoms, molecules, planetary systems, stars, galaxies, clusters, superclusters, multiverses, etc., even life itself!-- but what they all have in common (besides having the same underlying fundamental factors) is that they all seek to achieve a balance between what's on the outside and what's on the inside-- and thus, the fate of our universe and of the whole omniverse is, and always has been, as inevitable as it is circular. And the fact that quantum foam and macroscopic black holes might essentially be the same thing on different scales makes it apparent that these would all be features connecting both relativity AND quantum mechanics (and add the unification of gravity through the gravity brane)-- going a long way towards unifying both the microscopically proven quantum theory and the macroscopically proven relativity!