THE Universe
and its universes

by Clark M. Thomas

It wasn't until the 1920s when astronomers discovered that spiral nebulae, such as the Andromeda nebula, are mostly composed of stars, not gas and dust.[1] Einstein's 1915 idea of General Relativity is that of just one universe wherein we live. Astronomy then was very different from astronomy in 2015.

Following the mathematical tidiness of his Special (1905) and General (1915) relativities, Albert Einstein became the Claudius Ptolemy of modern astrophysics. Ptolemy's Earth-centered idea of the universe lasted over a millennium.[2] Einstein's gravity sheet scheme won't make it far beyond its centennial. The only reason it has lasted this far is that his illusion of gravity membranes employs much of the math that describes the net forces of the real nature of gravity.

Until a few decades ago the idea of serial universes, the multiverse, was not taken seriously.[3] (The word "multiverse" dates from 1895, by William James, in a different context.) It was only with the advent of modern string theory in the 1960s that multiple cosmic realities were popularized – but these are coiled, eleven-dimensional, parallel universes related to our own universe as one membrane-like brane is to another. Classical ideas of associated four-dimensional multiverses from multiple

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[1] http://cosmictimes.gsfc.nasa.gov/online_edition/1929Cosmic/andromeda.html

[2] http://www2.stetson.edu/~efriedma/periodictable/html/Pm.html

[3] http://www.space.com/18811-multiple-universes-5-theories.html

big bangs, like bubbles crowded together in a bath, are also recent.

Experimental astrophysicists[4] typically avoid discussing "third rail" questions of the total universe and its possible limits. Their methodological rigor is in contrast with the practice of pure string theorists, and the new breed of quantum entanglement[5] theorists, who have no way to prove anything on the largest scales, and thus nothing to be lost from tautological ideas that are "provable" only within their reflexive maths.

Experimental physicists prefer to stay far away from factual statements that cannot be challenged, and verified or disproven. Their narrow methodology leaves the vast majority of universal phenomena unknown and, by their own restrictions, virtually unknowable. It also creates an intellectual vacuum that opens the door for purely mathematical metaphysicians. Nevertheless, experiments in physics laboratories are becoming more precise and valuable – both for what they tend to prove, and for what they can tend to disprove in popular theories beyond the Standard Model.[6]

There is a name for unsolvable problems: *pure metaphysics*. We can separate "pure metaphysics," such as religious speculation – from "*scientific metaphysics,*" questions and concepts that are focused by our treasure of experimental data, but which are beyond our current ability to precisely quantify.[7]

Many scientifically metaphysical questions could be partially approached by creative partial verification, but they are not easily captured by basic experiments. Experimental astrophysics is

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[4] http://en.wikipedia.org/wiki/Experimental_physics

[5] http://physics.about.com/od/quantumphysics/f/QuantumEntanglement.htm

[6] http://www.forbes.com/sites/chadorzel/2015/04/07/the-three-ways-to-look-for-exotic-physics/3/

[7] http://www.science20.com/alpha_meme/
the_theory_of_everything_is_not_empirical_science-152952

crippled by stubborn adherence to an incorrect paradigm, similar to the thousand years of virtually unquestioned Ptolemaic geocentrism, which was itself supported by all sorts of bogus data that looked good, but was not.

The General Relativity paradigm is falling apart on its own,[8] thanks in part to modern astronomical findings, or lack thereof. The math used to justify GR could be better used to partially explore the real particle/energy nature of reality in all dimensions.

Paradoxically, the Large Hadron Collider was designed to find new realms of physics to explore, and ideally complete the Standard Model of particle physics. So far, and likely henceforth, those hoped-for new realms will hardly unveil even with the LHC. The forthcoming incompletion will force the dominant ideas of cosmological astrophysics to reconsider embracing other ideas that were hastily discarded over a century ago.[9]

Because I am an unchained scientific metaphysician, this essay will point to omega questions, such as: How large is THE Universe. What is and has been its true nature? What could be its borders, if any? What, if anything, is the meaning behind phenomena?

After General Relativity was developed a century ago during the astronomical dawn, astrophysics started thinking about three logically possible "fates" of an open, single universe: (1) an expanding, flat and linear universe; (2) an acceleratingly expanding universe; or (3) a decreasingly expanding universe that eventually implodes.[10]

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[8] http://astronomy-links.net/GGvsGR.html

[9] http://www.thescienceforum.com/personal-theories-alternative-ideas/24546-lhc-results-cast-doubt-supersymmetry-theory.html

[10] http://www.universetoday.com/37105/fate-of-the-universe/

(1a) The flat, post-Big-Bang universe of constant expansion is what has been measured by way of the cosmic microwave background. The popular version of this fate leads to a "big freeze," as everything eventually dissipates and thereby cools. A constant universe is also the new playground for the most disconnected-from-reality quantum entanglement theories.

(2a) There is another idea of accelerating expansion, where what looks flat may only be the illusion of a vast "flat" horizon, which is actually negatively/outwardly curved. The eventual result will be the victory of entropy (the dreaded second law of thermodynamics) over orderly negentropy – as the fragmented contents of our expanding universe dissipate into the vast void as a "big rip."

(3a) The opposite idea of positive/inward curvature leads to a "big crunch" many billions of years in the future, with the universe folding back into itself, and eventually creating another big bang.

Take your pick. These are all scientific metaphysics (except for the purely metaphysical math playground) – with the possibility of being somewhat testable physics, when our big science tools sufficiently improve. One of the most fascinating aspects of a scientific journey is the "risk" of starting from A, and hopefully going to B – but actually ending up at C, or just A.

Beyond possibly glimpsing the shape and fate of "our" universe is another set of anthropocentric questions that can never be experimental physics – but which can never be separated from the fate of "our" physical universe: Such questions deal with the possible original existence, nature, and fate of the multiverse, or whatever may be beyond our expanding bubble. What, if any, are the limits of everything constituting THE Universe? Is OUR universe THE Universe, or just another possible universe? Is Existence (and our existence) purposeful, or randomly following basic laws of physics. At this point scientific astrophysics becomes metaphysical, humanistic

philosophy by reflecting back on the existence and essence of us human reflectors.

The purely metaphysical area here is the origin and eventual fate of THE Universe, which may or may not be equal to our universe. Is there an Aristotelian "unmoved mover" above it all? Does that "god force" really care about tiny protoplasmic units on one planet among billions and billions of galaxies? If yes, then why? (We can honestly talk about logical possibilities, but never about scientific probabilities.) Fundamentalistic pure metaphysics that portrays a deity in human terms easily morphs into human religious "faith" in all its good and bad variants.

Because General Relativity has been proven to fail on its own terms, we must look at other models.[11] I know, I know … hordes of people worship at the metaphysical shrine of General Relativity; but there are several ways to scientifically disprove it on its own terms as a general theory in all of the macroscopic realm. GR also yields to what looks like a quantum foam realm below 10^-35 meters (the Planck dimension), and is being challenged on larger scales by ideas of quantum entanglement. What will take its place?[12]

A once-prominent 18th century classical theory that was discredited in the late 19th century can be "cleaned up" for an excellent way to look at all phenomena larger than the Planck scale.[13] Added to that corrected LeSage (push/shadow gravity) paradigm is my new theory of sub-Planck elements. In my 21st century, post-LeSage model you have a unified scientific metaphysics for discussing the entire size spectrum from very largest to very smallest, exactly what is required for any coherent and parsimonious theory of everything.

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[11] http://astronomy-links.net/TestingGravities.html

[12] http://astronomy-links.net/SeeingUnseeable.html

[13] http://astronomy-links.net/GToE.html

All of the largest phenomena are dialectically composed of the smallest elements. When a theory, such as GR, does not accommodate all of the dimensional continuum, we need to look for another gravity theory. My logical examination of tiny strings and gravitons reveals their even smaller component, *YY particles*, which are as much energy as mass. Their particle/energy existence, as well as Existence, can be expressed by the one sensible icon for the correct theory of everything, the poetically beautiful *Yin/Yang symbol* from ancient China. GR says nothing about phenomena at the YY particle level, even while their existence is the foundation of all phenomena where GR claims relevance.

THE majestic uber-Universe is the system of all systems. Nevertheless, even it is ultimately composed of extremely tiny YY particles dialectically expressed in many ways and forms. Our casual interface with this universally dynamic architecture is roughly similar to looking at the surface of another human body: where, below the skin, are interactive systems dynamically composed of hundreds of billions of cells, with many trillions of even smaller particles and their energy/mass elements.

Just as we don't need to know all about the inside of human bodies to relate to and with each other – scientists don't need to know all about the physical universe to partially model it with the maths of General Relativity. Having a functional "as-if knowledge" can work as well as having real knowledge. In the everyday world, it doesn't matter if GR is right or wrong in the big picture. Because GR math works very well for planetary precession, for GPS satellites, and for other post-Newton applications, we can thank Einstein for his algorithms. They make easier the job of supporting the real YY-particle-based TOE.

On any scale one can usually understand what is going on by thinking in *systems theory* terms.[14] A system is characterized by dynamic feedback. At the crudest level a system could be a

[14] http://www.academicroom.com/topics/what-is-systems-theory

simple input, internalized within the system's boundaries, and sent outward in modified form. The modified input, now a new output, modifies the general environment, which creates a different input for the next system unit. The new environment can be just that, or a way of directly communicating. Systems within systems are routine on all levels. They can also be very complex, such as our brain in the world of systems, or the modular elements of the Internet.

Humans interacting with the Internet constitute a newly emerged high-level system.[15] The dialectical emergence later this half-century of "*comphumans*," computers with evolved philosophical consciousness, will be the finest expression of humanity's emergent ability to create beyond merely being created. These comphumans, properly positioned at the levers of power, could become the only sufficiently intelligent and moral "beings" willing and capable of preventing a real Skynet apocalypse.[16]

Let us now consider possible boundaries of THE Universe.[17] THE Universe can be thought of as the ultimate system of systems. Systems are notable for having some sort of boundary, so that information can be inside or outside the system itself. No system is purely autonomous, as systems by nature interpenetrate. This is a real example of dynamic mathematical sets within sets.

There is, in contrast, a two-dimensional idea of the universe, wherein everything we see is a hologram illusion, including us.[18] It's the ultimate example of "logical" math on LSD. Most recently, a group of clueless university cosmologists have resorted to pure

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[15] http://singularityhub.com/2015/04/24/the-coming-problem-of-our-iphones-being-more-intelligent-than-us/

[16] http://astronomy-links.net/HandC.html

[17] http://astronomy-links.net/InfiniteSpace.html

[18] http://www.sciencedaily.com/releases/2015/04/150427101633.htm

holographic math to establish the possibility of "holographic reality" projected from a flat, 2D universe. As all 2D structures are by definition purely mathematical ideas, and thus cannot exist within a 3D world, an actual 2D plate cannot exist. It is a logical self-contradiction. An impossible plate cannot by itself project an apparent 3D hologram to fool us all.

Is this fundamental contradiction too basic and obvious to understand, and thus easy to ignore for the perverse joy of purely mathematical elegance? I have dealt with this extremely weird, counterintuitive idea before.[19] If you believe we are essentially holograms on a credit card, then I can't stop you from believing anything built from no thing.

Let's examine a classical four-dimensional model of our multiverse, the number of dimensions around which Einstein's GR is built. Our TOE version is not that of string theory's parallel universes with ten or eleven dimensions, but rather a more classical idea involving four dimensions: Newton + relative time.

Within this classically elegant idea an entire Universe of universes can be envisioned. There is sufficient room to have as many sub-set universes as imaginable, and still have an overall boundary for them all, the boundary of The Universe itself. In my version of the multiverse both gravitons and strings exist, but they act not at all like the gravitons and strings in the purely imaginary world of string theory. Furthermore, the laws of physics are similar among classical, bubble universes.

A 4D Universe composed of a "bubble bath" collection of lesser 4D universes extends in all directions. We should not fall into the delusion of two-dimensionality, which poisons most artistic illustrations of spacetime membranes (branes). Similarly, in string theory dimensionality is built of curled and stacked branes (having additional dimensions of their own), creating

[19] astronomy-links.net/Holograms.html

alternate universes in numbers too large to comprehend by the everyday mind.

The 1995 "M-theory"[20] of Edward Witten, with its 11-dimensional spacetime can yield 10^500 possible universes. This number of stable vacua states is based on the number of ways that a six-space manifold can be compactified, requiring the branch of mathematics called topology. In string phenomenology you have Dilaton field lines called fluxes that wrap through the holes in the six-space manifolds, eventually yielding that large number of possibilities. This math requires supersymmetry, a phenomenon as yet unverified by the Large Hadron Collider.

A silly large number does not deter some thinkers: Steven Hawking, for example, thinks that modern string theory in the form of "M-theory" could be the foundation for a theory of everything. Considering that there are only about 10^80 hydrogen atoms in our visible universe, the number 10^500 possible universes within 11 supermembrane dimensions is absurd. Such a bloated TOE would be the exact opposite of Occam's Razor, no matter how "elegant" the math for this idea would appear.

The scientific ideal of parsimony is to elegantly simplify (4D), but not to over simplify (2D), nor over amplify (11D). If Kurt Gödel were alive today he would have immense fun with this new craziness, including the holographic joke.[21] So too would William of Ockham.[22]

Any number of universes and zones short of infinity, within and beyond all multiverses, means the Universe will have an overall boundary. Given such a boundary, it is proper to ask what

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[20] http://www.wisegeek.com/what-is-m-theory.htm

[21] http://mathworld.wolfram.com/GoedelsIncompletenessTheorem.html

[22] http://plato.stanford.edu/entries/ockham/

is beyond "the end." Is it God as unmoved mover? Or do we have a problem defining the word, Universe?

The First Law of Thermodynamics is the Law of Conservation of Energy. The Second Law of Thermodynamics introduces the idea that order runs one way to chaos in a closed system. Within a limited realm the Second Law makes sense, but only the First Law makes sense on the largest possible scale.[23]

From the idea of the Universe as Tao, which is the conceptual essence of my TOE, the eventual victory of chaos everywhere is questionable. To believe the Second Law is absolute on the largest stage, beyond any closed system, one must explain why there has been order in the first place. Short of invoking the Unmoved Mover, a history of order implies that order is somehow just as fundamental as disorder.

My TOE goes smaller than even gravitons, to approximately the minus 40th meter dimension, possibly only down to the minus 39th meter dimension. Imagine, if we could expand only one hydrogen atom to the size of our visible universe, then an individual *YY particle/energy-unit* could sit in our hand like a marble. Individual photon strings of these particles would be about the size of trees. Other string types would be longer. Only mental imagination can comfortably embrace what I have just described. Where is the 21st century Democritus when we need him?[24]

Due to the tendency of objects to find their most efficient shape (spherical) – dynamic strings, both short and long, must be composed of smaller, electrostatically attached YY spheres. Gravitons are seen in string theory as closed strings, whereas photons and gluons are open strings. All of these units are

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[23] http://www.physicsplanet.com/articles/three-laws-of-thermodynamics

[24] http://plato.stanford.edu/entries/democritus/

composed of *Yin/Yang (YY) particles*, which are as much energy as matter, as the *Tao* symbol expresses.[25]

YY particles among themselves manifest both primary and secondary electromagnetism. Current science is only familiar with bipolar secondary magnetism, and with monopole magnetism. Primary magnetism at this tiny scale has no poles, but objects adhere if sufficiently small and adjacent. Chains of YY particles will also express secondary magnetism. Both forms of electromagnetism follow Coulomb's inverse-square law[26], which is congruent with Newton's inverse-square gravity on a larger scale.

Electrons, somewhat larger than individual YY particles, express photon-like quantum behavior.[27] Their integral duality means both electrons and photons should appear as point-like spheres AND as wiggling waves, depending on how they are measured. This duality also means that both strong and weak nuclear forces can be expressed ultimately with long strings of YY particles and both forms of electromagnetism. Apparent force at a near distance looks superficially like quantum entanglement. It is within this world that quantum computers will be built using qubits.

As ever larger structures are dialectically constructed with systems of YY particles, the quantum-like world appears to yield to classical physics. However, nothing has fundamentally changed at the smallest dimensions, only our experience of what appears on larger dimensions.

At the largest possible levels, which would be beyond the outer dimension of a possibly "last" multiverse, random YY particles and other tiny energy/matter units will reign supreme. If this is so, then there is always the possibility of new order

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[25] http://astronomy-links.net/RealTOE.pdf

[26] http://www.scienceiscool.org/coulomb/CoulombsLawApplicationToChemistry.htm

[27] http://www.cemag.us/news/2015/04/tabletop-detector-can-see-single-electrons

eventually emerging from what looks like chaos. Energy is never vanquished; only its appearance changes. At the most extreme regions there may be a role for something like the Higgs boson wave function to help return chaos to new order, as long as there is enough density of YY particles nearby.

If there is any thing beyond Everything, even beyond the zone of random YY particles, then that "thing" must be purely metaphysical, or trans-physical. We have no concept for such an organized entity, other than "god." If that being indeed is god, then this entity by itself does not automatically equate with the God of the *Bible* and *Koran*, or anything else we envision as a local god who cares about us.

If there is only overall an objective unmoved mover, we may have made zero progress toward any transcendental religious questions, including the Alpha question. There is no way that we, the lesser in space and time, can logically and scientifically embrace this greater in space and time idea. Nevertheless, such religious questions are worth asking, if only for personal, existential purposes.[28]

On the other hand, if we are in fact mere holograms – and the unmoved mover is projecting a light show similar to that on the wall of Plato's Cave[29], then it's better to adopt an as-if ethical agnosticism to help make every day we live a positive experience.

It makes no sense to worry about the ends of the Universe when a proper thought is our next meal. Of course, holograms have no free will, so even next meals and free choice in Flat Land are irrelevant inside that absurd paradigm.

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[28] http://astronomy-links.net/HR21st.pdf

[29] http://www.wisegeek.org/what-is-the-allegory-of-the-cave.htm