

Antimatter

Clark M. Thomas

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ABSTRACT

Antimatter is a realm of physics that has long been a favorite of science fiction. When two things or forces annihilate each other simultaneously, that is seemingly beyond strange. What causes real antimatter, and how it has worked to help make the visible universe we know and love, is a detective story that this essay elucidates.

Antimatter has been an element of science fiction, but real antimatter exists, and we can make very small quantities of it. When our local universe's Big Bang occurred there was only pure energy bursting forth, even though matter was potential within that energy. That potential was soon expressed as a quark-gluon plasma. After only the first three minutes that incredibly hot quark-gluon plasma energy began to cool enough for hydrogen and helium to emerge.¹ But what kind? Science accepts that both matter and antimatter atoms were statistically equally likely to emerge, so why do we only have matter in our everyday world? This has been a great scientific mystery.

Physicists at CERN's Antihydrogen Laser Physics Apparatus, in Switzerland, examined with lasers 14 antimatter hydrogen atoms (per trial) in a vacuum, looking for surprises. So far, no

1 <https://en.wikipedia.org/wiki/Nucleosynthesis>

surprises. Both antihydrogen atoms and ordinary hydrogen atoms have displayed identical reflections.²

One basic hydrogen atom, by far the most common primordial element, has one proton and one electron. Both matter and antimatter have hydrogen atoms. The ubiquitous *matter hydrogen* has its proton positively charged, and its electron carries a negative charge. With *antimatter hydrogen* atoms the charges are reversed, giving a negatively charged proton, and a positively charged electron. Therefore, whenever one antimatter hydrogen atom and one matter hydrogen atom directly interact they will destroy each other, as each charge neutralizes its opposite. Where have all the antimatter atoms and molecules gone, if they all started out statistically in equal numbers?

It is at this point where current physics hits a wall. There is no convincing theory to explain this major mystery. There are fancy ideas for where elusive antimatter exists, such as in an alternate dimension within alternate universes. When you are speculating and riding the math wave *du jour*, any coherent idea looks good, even though it may not qualify as a viable theory.

A favored working idea for the post-Big-Bang superiority of matter over antimatter is that there was a *slight* preponderance in the number of emerged matter atoms over antimatter atoms. Electromagnetic mutual annihilation occurred concurrent with the dual genesis. There was left a super majority of matter atoms over their antimatter birth mates. That's a good idea with no evidence – but we are left with the suspicion that the genesis of all of these earliest atoms was not purely random. Asymmetrical origin statistics opens up more unanswered questions.

If the “slight preponderance” was random, the net result of an obscenely large number of generated Hydrogen atoms yields a probability curve that is essentially smooth, not a discernible

² <http://www.csmonitor.com/Science/2016/1220/Scientists-use-lasers-for-a-better-look-at-antimatter>

number of very tiny flat surfaces joined together. This curve is what calculus is all about, and so it means that the “slight preponderance” does not fit into practical statistical theory, only into idealistic math. Furthermore, mutual annihilation persists, yielding over billions of years a nearly pure matter local universe.

The best hope in 2017 for nucleosynthesis particle physics is to detect a significant difference between the laser reflections of antimatter hydrogen atoms in a vacuum versus those of regular hydrogen atoms. If some sort of difference is henceforth teased out of the data, that difference could be of minimal or unknown importance, leading to another deep mystery.

Something more is needed – a theory that ties in with 21st century astronomy and astrophysics. This essay is designed to present such an idea, but I admit that it too does not yet rise to the level of a fully developed theory. At least this essay’s viable paradigm gives us another, and possibly superior, window to ponder the matter/antimatter mystery.³

ELEMENTS UNDERLYING THE PARADIGM

If you are tied to the astrophysics of the 19th and 20th centuries, then you may never understand how to unravel this mystery. Physicists have encountered a wall created by insufficient tools. Those tools are in part theoretical, in part observational, and in part experimental. Nuclear physics continues to be baffled by this multifaceted, elusive problem:

(1) If you hold that there never was a Big Bang creating our own visible universe – which you also equate with “the” steady state Universe – you are probably unable to *fully* embrace this mystery. In contrast, there is a strong consensus for a Big Bang producing our visible universe, either alone or within others. I embrace our *local* Big Bang for what we can see.

³ <http://astronomy-links.net/Universe.universes.pdf>

(2) If you firmly hold that our Big Bang universe is the ONLY universe, then you are essentially devoid of tools to unravel the apparent mystery. In contrast, there is a growing opinion among astrophysicists and astronomers that our visible universe may not be all there is. These ideas come in two flavors: **(a)** the idea within string and other theories that vast numbers of universes exist in multi dimensions; and **(b)** the idea of a post-Newtonian monolithic universe with three physical dimensions, as in a sea of bubbles, of which ours is but one:

(2a) The idea of many potential universes (mathematically up to an unimaginable number of imaginable universes) allows for a sub-infinite number of actual universes, many of which could be built around antimatter. The problem is that there is no evidence at all for such romantic speculation, other than clever maths, for which the probability of any one of these speculative universes approaches zero.

(2b) The classical idea of a monolithic multiverse of bubble-like universes is very fertile.⁴ Individual “bubble realms” are being born in their own big bangs; and they have a late stage where they dissipate from externally proximal push/shadow gravity. Eventually each such universe is absorbed by adjacent bubble universes. This elegant model makes sense, and it does not require voodoo Dark Energy. It is an idea supported by evidence within the Cosmic Microwave Background (CMB) – and by a 21st century understanding of how multiverse gravity really works – and by how imagined Dark Energy should be contextually understood. This multiverse is a realistic realm where science can make progress, and is the realm where my paradigm abides.

(3) CMB data suggests the possibility of multiverses, or at least of something massive just outside our own visible universe. If there is one extra-universal mass proximal to our expanding bubble, there could also be something or some-things juxtaposed around all sides of our bubble, and beyond what is proximal.

4 <http://astronomy-links.net/Evidence.for.Multiverse.pdf>

Ubiquity is the likely dimensionality of multiverse symmetry, including the idea that each local big bang would initially produce a sphere of explosion/creation. "Bubbles in the bath" express one simple poetic model for a symmetrical, interpenetrating Universe of universes, which we call the multiverse.

TOWARD A NEW MATTER/ANTIMATTER GENESIS MODEL

A minority viewpoint within astrophysics is that of the steady state visible universe. A few eminent astronomers, such as Fred Hoyle, have embraced this idea for a singular universe; but the evidence for our Big Bang almost 14 billion years ago has won the day, thanks to the CMB. Big Bang models commonly stick with the General Relativity assumption of one expanding universe, and with Einstein's too-clever lambda fudge factor, which is now called Dark Energy (not to be confused with Dark Matter).

The discounted idea of a visible, steady-state, local universe, however, *does* partially fit within the overall idea of a steady-state multiverse – but *not* within a unique local big bang universe. The only permanent thing anywhere is change, so there is an ongoing permanence embracing all local universes, when seen from the multiversal fundamental-frame perspective.

Quantum physicists think of this space-filling matter/energy as the quantum foam, or quantum vacuum within the local universe – an idea which can be expanded to the totality of space (with variable densities) within a multiverse.⁵ However, standard quantum theory envisions individual quantum bubbles only lasting for a Planck Time and achieving a Planck Dimension, and this virtual sea may require more dimensions. My conception is much more elegantly classical:

The so-called quantum foam or vacuum AS I ENVISION IT is composed mostly of essentially permanent Y/Y particles, and their strings, and graviton y/y loops and assorted collections, all with

5 http://www.huffingtonpost.com/entry/what-is-quantum-foam_us_5689c79de4b014efe0dac79d

low kinetic energy, but high potential energy. Relatively static energy/matter multiversal sea components are interpenetrated by *high kinetic energy* omnidirectional multiverse flows of equal Y/Y particles, gravitons, strings, and other tiny push/shadow units. These *flows from all directions average out equally*, which gives push/shadow gravity its consistency and elegance.

We thereby have motion within relative stability. Extremely tiny units, such as for example solar neutrinos, flow at very high speeds and high kinetic energy through our bodies. Such units flow undetected in everyday life, and with very rare interactions that we can measure, except indirectly and grossly with gravity.

To embrace this paradigm we must learn that so-called lambda Dark Energy is a correlating fiction – whereas the accelerating expansion of our visible universe’s outer regions is real. The simple model of push/shadow gravity (from Fatio in the 17th century, and Le Sage in the 18th century) was properly discredited by the end of the 19th century, opening the gravity-theory opportunity door for Einstein’s geometry.⁶

The early error was not in the basic idea of push/shadow gravity, but in how it was understood and expressed in an era of science before what we know in the early 21st century. Once we correct for the billiard-ball errors in the earlier model of gravity – and once we understand how classical General Relativity simply *correlates with* real push/shadow gravity, while *not causatively explaining* it – we are on the right path for all sorts of scientific breakthroughs.⁷

Consider that gravity is a multiverse function of pushing particles, ranging in size from particles at 10^{-39} meters, up to subatomic neutrinos at 10^{-24} m. Within the dimensional universe of Yin/Yang particles are gravitons as I define them.

6 <http://astronomy-links.net/Gravities,BlackHoles,BigBangs.pdf>

7 <http://astronomy-links.net/correlation.and.causation.pdf>

These gravitons in my model are *not at all* the same as what obsolete tractor-beam string theory envisions. However, these gravitons are involved in both push/shadow gravity *and* why photons launch at the speed of "c".⁸

Misnamed Dark Energy is not an expansive ether force.⁹ Rather, it is simply the result of concentrated matter (dark and baryonic) from proximal universes increasingly and partially shadowing our expanding matter from multiversal push flows approaching the edge of our own universe. Because gravitational push particles are omnipresent and omnidirectional within the multiverse – our distant universal regions are being pushed by *differential pressures* more toward the increasingly proximal shadowing regions of nearby universes. This concurrently happens relative to the increasingly weak shadowing effect of our own increasingly distant universal mass.

This dialectic explains why matter within our visible universe increasingly accelerates toward the edge of our creation bubble. There are signals in the Cosmic Microwave Background that support this elegant idea. This "net dark energy" without outward pushing Dark Energy operates everywhere within and among all of the multiverse's individual bubble universes.

MATTER, ANTIMATTER, and ELECTROMAGNETISM

There is an important particle/resonance called the *Higgs boson*. The crowning achievement of the physicists at the Large Hadron Collider was to produce and find a very small number of these extremely ephemeral bosons. The Standard Model of particle physics has such particles (or quantum wave resonance) to explain how primordial atoms and molecules formed from the energy plasma generated by our local big bang.

8 <http://astronomy-links.net/RealTOE.pdf>

9 <http://astronomy-links.net/ethers.html>

One huge problem: From where did all those short-lived Higgs bosons come? An easy answer is from the Y/Y sea filling the multiverse before our own Big Bang. Don't give this matter-creating task to a bearded god. We still have not answered the matter/antimatter apparent dilemma.

Finding out what's going on in all levels of a multi-story building requires a knowledge of what's going on at its foundation level. Among particles, the "first story" is within the sub-Planck (smaller than 10^{-35} meters) region. Mathematically, possible negative space exponents could go forever toward negative infinity. However, we may not need to go very far within Planck to discover the very smallest actual units, and therefore the most important particles. I call these truly elemental units Yin/Yang particles, which are individually around the 10^{-39} m scale, and which combine matter and energy within each spherical unit.

These elemental energy/particles can cohesively form granular loops superficially like a bubble-bead necklace, forming what I call Yin/Yang gravitons – or they can form cohesive linear chains that could falsely appear (if we had the tools to barely see them) from a distance like two-dimensional strings. However, these apparent strings and loops are all adhesive collections of 3D Y/Y units capable of expressing both primary and secondary EM.

I have previously discussed electromagnetism (EM) in relation to gravity. Whereas gravity rules the larger dimensions, EM rules the smallest dimensions. Both gravity and EM overlap in some intermediate dimensions. Push/shadow gravity acts as if it were a one-way force; and EM operates either to attract or repel.

Inside individual Y/Y particles is *PRIMARY EM*, where there is non-polar attraction, but not repulsion. (The EM internals of each Y/Y particle may require smaller dimensions.) When two of these spherical Y/Y particles touch they adhere from mutual primary EM because they are not dipolar. Strings of Y/Y particles can express bipolarity at their two ends. This is how primary and secondary EM are both similar and separate.

Furthermore, Coulomb's Law¹⁰ applies both to primary EM and to "regular" EM, which I call *SECONDARY EM*. Both Coulomb's Law and Newtonian gravity exhibit the inverse square relation involving the distance between centers of mass and their mutual attraction. That is why a minor planet, such as Ceres or larger, would gravitationally become spherical – and also why a Y/Y particle is also spherical by Coulomb's Law.

Again, why matter and not antimatter? The multiverse long ago sorted out these opposing EM populations. Matter won out over antimatter many eons before the birth of our own bubble universe.

When our Big Bang launched it took place inside a pre-existing sea of particles and nucleons (dark and baryonic), nearly all of which were already matter as we know it. It didn't "matter" that Y/Y particles alone can go either way. The Higgs bosons that penetrated our earliest plasma soup were pre-existing matter generators. Their resonance from the multiverse determined that the earliest condensed energy in our bubble was likewise matter.

Because the multiverse is a never-ending cycle of creation and dissipation, the Law of Conservation of Energy and Matter (the First Law of Thermodynamics) is never violated. It is doubtful that the Second Law of Thermodynamics applies at this truly Universal level.¹¹ Neither law mandates matter or antimatter among nucleons.

From the omniscient, all-embracing perspective the multiverse itself is the unmoved mover.¹²

10 https://en.wikipedia.org/wiki/Coulomb%27s_law

11 <http://www.physicsplanet.com/articles/three-laws-of-thermodynamics>

12 https://en.wikipedia.org/wiki/Unmoved_mover