# A More Cohesive Model of the Universe

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## Abstract

Big bang evidence is overwhelming and most scientists agree our region of space contains matter that began to expand from a small point some 13.8 billion years ago. Yet, the accepted Inflation model has encountered several misfit anomalies and to accommodate them its proponents have had to invent some dubious new physics. It's becoming increasingly clear, however, even to adherents of that model, that their magical physics can't predict anything and therefore leaves nothing they can legitimately call a theory. We now have a groundswell of researchers who are openly rebelling, but cannot overcome the ivory tower fortress defended by those vested in the current model.

This paper focuses on anomalies challenging that Standard model. When analyzed as a set, their analysis yields insights for developing a model that more closely matches the data. This alternative model sets aside the unproven physics the current model requires in order to deal with its problems. It's based on the assertion that dark energy; matter/antimatter disparity; microwave background texture; early genesis of stars and galaxies; and anthropic conditions are a coherent body of evidence that suggests the big bang did not occur in an empty void, but took place in a much older and larger universe.

While some details of this model may not pass muster, its fresh perspectives expose new avenues of exploration and shows how Einstein's universe—having only three spatial dimensions and one time dimension—can easily accommodate every phenomenon we observe, with no need for supernatural dimensions, warp-speed inflation, or mysterious vacuum energies.

**Keywords:** Anthropic conditions, antimatter disparity, Big Bash model, dark energy, dark matter, Electric Universe, gravity, magnetohydrodynamics, quantum mechanics, radioactive decay, singularities, Z-Pinch

## 1. Introduction

The goal of the Inflationary Hot Big Bang model is to determine how the big bang gave rise to our universe[1]. That model, with its adjustments and extensions, has prevailed since the 1980s and is broadly accepted as the standard or "concordance model" of the universe; with concordance implying the model is in agreement with evidence researchers have presented. There is a growing number of protesters, however, who say the model is *not* consistent with the findings.

In 2004, 34 scientists endorsed "An Open Letter to the Scientific Community" in which they complain about "fudge factors" plugged into big bang theory in order to explain findings that are discordant with the concordance model[2]. It was published in *New Scientist* and announced the formation of an "Alternative Cosmology Group". That letter has since been endorsed by more than 500 scientists and institutions[3].

Among the most visible and vocal protesting groups is an organization called "The Electric Universe (EU)"[4]. Their primary message is that the Standard model tends to ignore the many electromagnetic phenomena that might better explain its anomalies.

One common complaint is that the Inflation model has become so mathematically abstract that one can't find tangible connections between the math and verified physics. This makes it difficult, if not impossible, to visualize how physics drives that model's machinery. Its math is often based on the assumption that external forces impinge on our 3D universe from spatial dimensions whose existence cannot be verified. It's now vogue to explain anomalous findings as results of vector forces emanating from these supernatural dimensions. Proponents for "String Theories" say their approach is warranted, because the list of viable and more tangible 3D models has been exhausted[5].

This paper takes exception to that view and introduces an unexamined model that requires only three spatial dimensions. But first, I need to explain where this model parts company with the Inflationary Hot Big Bang model.

The essence of the Big Bang model was introduced by Georges Lemaître in 1927, when he said the expansion of the universe might be traced to a "primeval super-atom", prior to which neither space nor time existed[6]. That theme is the underlying foundation of the 1980 Inflation model and "creation of the universe" remains the basis for Inflationary Hot Big Bang theory[1][7].

Big bang nucleosynthesis (BBN) theory presents convincing evidence the big bang produced basic particles that are evolving into heavier elements[8]. However, what BBN theory does not present is evidence that the big bang produced *all* of the universe's matter. Current theory, then, is based on the arbitrary assumption the big bang created the universe; yet, there's a growing body of evidence that our big bang did *not* create the universe.

We now have two generations of scientists who were nourished on the notion the big bang *did* create the universe. Big Bang Creationism put cosmology theory in its current rut and encouraged followers to accept the unproven physics mathematicians conjured. Sadly, their phantasy physics has become popular and its contagion has now infected quantum physics. Fortunately, we still have researchers who have not abandoned the rigors of critical thinking. My concern is that less disciplined theoreticians have taken over the lucrative and influential field of science edutainment, promoting fantasy worlds and making it difficult for public viewers to tell the difference between real science and the unbounded realm of science fiction.

So, before anyone reaches for their shopworn "SHOW ME THE MATH" rubber stamp, I'll remind them that it's the mathematical "proofs" of a "*Big Bang = The Universe"* assumption, that obfuscates the many bugs in that theory.

The purpose of this new model is to present a realistic perspective that better fits the evidence. The science community spent eight decades analyzing and tweaking current big bang theory and will likely be debugging this broader scoped model long after my expiration date. This paper presents evidence the big bang did not create the universe and provides a fresh model that negates that creation assumption. It introduces a simpler, but much larger universe, whose three spatial dimensions are entirely adequate to explain everything we observe.

The challenge that stimulated this effort stems from the long list of mysteries for which the standard model either has no answer or provides dubious answers that are not disprovable. The questions these mysteries pose are:

- How can there be structures that are older than the big bang?
- How can structures be larger than the cosmological principle allows?
- What causes dark energy?
- What caused our big bang?
- What will become of our expanding big bang?
- Why is there 100,000 times more matter than antimatter?

- What caused the cosmic microwave background's texture?
- What caused the early genesis of stars and galaxies?
- How did improbable anthropic conditions evolve in just 13.8 billion years?
- How might gravity relate to electromagnetism?
- What's gravity got to do with quantum mechanics?
- What is dark matter?

This work treats those mysteries as compatible puzzle pieces that fit together nicely in a more cohesive and comprehensive picture of the universe. While each of these mysteries has undergone considerable analysis, I've never seen an analysis of their commonalities. This qualitative analysis is both my goal and my methodology. I'll describe the puzzle pieces in more detail as we broach their topics. When assembled, they produce an image of a simpler universe whose workings are more logical and easier to visualize.

## 2. Structures that are older than the big bang

The standard model posits that large and small masses should be distributed somewhat uniformly throughout the universe. However, it's now apparent that there "is far more large-scale structure in the universe than the Big Bang can explain[9]." In big bang creationism, all matter should be flowing outward from the center of the big bang; so in order for huge galactic clusters and Great Walls to form, much of this mass would have to slow its outward momentum and perhaps even reverse its direction. That takes a really long time! Astronomer Thomas Van Flandern said, "To form these structures by building up the needed motions through gravitational acceleration alone would take in excess of 100 billion years."

A.K. Lal and R. Joseph gathered the results of several such large structure investigations and they also conclude that many Great Walls and Great Voids took five to twenty times longer to form than the age of the big bang[10]. "…there are galaxies crashing into each other from every conceivable direction. There are in fact rivers of galaxies flowing in the wrong direction." There hasn't been nearly enough time since the big bang for these structures to form; especially since much of that mass has had to reverse its outward flow in order to become part of the structures. While astronomers claim data from a host of astronomical instruments confirms the Inflationary Big Bang model; Lal and Joseph say, "… these claims are based on interpretations of data which are guided by the belief that there is no alternative explanation. Hence, rather than the data shaping the theory, the theory of the 'Big Bang' dictates how data are interpreted and even which data should be included vs. ignored."

While it was not unreasonable to assume the big bang created the universe; we see increasing evidence the universe is much older than 13.8 billion years. This new model posits that the big bang took place within our universe's preexisting 3D space; meaning our big bang is but a local event. Later we'll explore how such events are just a part of the universe's observable machinery.

## 3. Structures that are too big

The Sloan Digital Sky Survey (SDSS) project includes a huge consortium of scientists and an awesome array of instruments that produce sky maps and a database that researchers mine to portray increasingly refined images of cosmic structures[11,12]. Some exceed the size theoreticians believe the big bang is capable of generating[13].

The cosmological principle says that on a sufficiently large scale the universe is homogeneous and isotropic, so its mass should be distributed fairly uniformly throughout its volume, with a limit as to how large a big bang structure can get[14]. Theoreticians say this upper limit is no more than 1.3 billion light years across; yet SDSS data has uncovered a structure that's 4 billion light years across[13].

A recent classification has been added to accommodate new structural groupings. It's called large quasar groups, or LQGs. These are walls of galaxies that contain large numbers of quasars. In 2012 an LQG was discovered that marked the start of a Huge-LQG subclass. This first HLQG has a mass greater than $10^{18}$ solar masses and is 4 billion light years across.

I call it the *first* HLQG because instrumentation for identifying such structures is just evolving and, if this Big Bash model has merit, we'll find structures 10,000 times more massive than this HLQG. The logic behind this assertion is: "The larger universe incorporates our own $10^{22}$ solar mass big bang, so its upper structural limit is at least as massive our big bang". The discovery of these huge structures doesn't mean the universe is not homogeneous and isotropic or that the cosmological principle is wrong. It merely means that mathematicians did not use a sufficiently large scale when they calculated the limits of the universe's isotropy.

At this point, I've already presented the most glaring arguments supporting my conclusion (and the conclusions of others) that our big bang did *not* create the universe. Most of the following arguments merely complement and substantiate that conclusion. For those not yet convinced that our 3D space was already here before the advent of the big bang; I would recommend they follow the ongoing findings of the SDSS project and its successors, as it provides a river of information flow that will ultimately produce a more persuasive conclusion.

In 1929 Edwin Hubble presented evidence the known universe is expanding. That led to a struggle between steady state and big bang theorists in which big bang evidence prevailed. My story revisits the juncture from which steady state and big bang advocates diverged. It hybridizes their models. Instead of describing how the big bang spawned our *new* universe; it describes how our *old* universe might spawn big bangs.

## 4. Dark Energy

It was the late 1998 introduction of this subject that triggered my suspicions and this research; so let's examine dark energy:

The 2011 Nobel Prize in Physics went to Saul Perlmutter, Adam Riess, and Brian Schmidt for their discovery that the big bang's expansion is accelerating[15]. More accurately, the prize was awarded for their discovery that the *universe's* expansion is accelerating; as the Inflation model posits that the big bang *is* the universe.

The mysterious force accelerating this expansion is referred to as dark energy and, from our perspective, it behaves like negative gravity. So when dark energy modulates the expansion, we find an early decelerating expansion caused by the big bang's own gravitational mass; then—several billion years later—the dark energy causes a gradual reacceleration. There is no apparent mechanism to stop this expansion and, from appearances, the universe's three spatial dimensions are in the process of becoming infinite—if they weren't already infinite.

This sort of decelerating and reaccelerating velocity profile is a common characteristic in the field of ballistics. Here's a simple example:

If we shoot a projectile to earth from our moon, the moon's gravity decelerates the missile until earth's gravity becomes dominant; then the projectile reaccelerates during the remainder of its journey to earth. If our view beyond the departing missile were obscured, the way big bang matter obstructs our distant view of the universe, we'd sense that the missile had encountered a negative gravity; the same sense we get when observing our reaccelerating expansion. So the big bang's expansion has the same velocity profile we'd expect to see if our big bang is surrounded by other colossal masses that share its 3D space.

This reacceleration in all directions indicates there's more mass in any given direction beyond our big bang than there is within it. The masses of, and distances to, these outlying attractors would be random, so our expansion would not necessarily be uniform in all directions. Thus, in an all-natural 3D world, dark energy supports the hypothesis our big bang took place within a much older and grander universe.

## 5. What causes big bangs?

Our big bang fits very neatly into a greater universe who's observed processes produce even more big bangs—or more descriptively, *big bashes*.

Galactic superclusters are the most gravitationally attractive objects we see in our big bang. These gigantic groupings contain millions of galaxies clustered in strings, sheets, and walls that can be billions of light years across. Clusters continue to grow in mass for as long as there are nearby objects to attract and merge with. But if our big bang had contained all of the universe's matter, as current models posit, even the largest superclusters will grow to but a tiny fraction of the big bang's mass; for their trajectories are accelerating outward and away from one another. The big bang's mass is not sufficient to pull them back together again.

Superclusters contain millions of black holes and countless galactic star stuff. It's all compacting into fewer and ever more massive galaxies and black holes. Each cluster will eventually be rendered down to a super massive black hole. However, since our clusters are accelerating outward, it seems there is far more gravitational mass where they're headed; so what could possibly stop their endless growth? It looks like our older and larger universe easily has the means to grow black hole singularities sufficiently massive to source big bangs—like our own.

Black holes squeeze captured particles until they collapse and can no longer move. In the process all the heat gets squeezed out. Stephen Hawking tells us that the more massive a black hole becomes, the lower its temperature gets[16]. He says, "A black hole with a mass a few times that of the sun would have a temperature of only one ten millionth of a degree above absolute zero." He also says black holes will continue to absorb more mass than they emit until the background radiation temperature falls below the temperature of the black hole. At that point the black hole will begin its virtual eternity ($10^{60}$ years) of slow evaporation.

Now, if we had a black hole ten billion trillion times more massive than our sun—on the order of our big bang's mass—with an absolute zero temperature, it would be the most stable mass imaginable. What sort of force could possibly cause such a mass to blow itself to smithereens?

One mission of CERN's Large Hadron Collider is to smash heavy particles together at near light-speed, in order to simulate big bangs. Well, ultra-massive black holes are pretty heavy particles and gravity seems to be the only force capable of smashing them. Nature would need *two* such singularities to generate big bangs.

In this model gravity sparks *all* of the heat, pressure, electrostatic, and electrodynamic energy forms when it bashes singularities together to create big bangs. It also quiesces those energies by squeezing heat out of the atoms in stars, where smaller atoms are transformed into ever more massive, but cooler and less energetic elements. Gravity subdues their motion and quenches their heat by crushing them into neutron stars and black holes, often skipping the neutron star phase. This constant crushing process generates a continuous stream of outward flowing heat in the form of photons and electromagnetic energy.

The structure of the universe is being mapped using SDSS Galaxy Map composite images. As mentioned, this work is already revealing structures that are both older and larger than legitimate big bang components. What we see is a 3D web which, if shrunk, resembles a stringy cotton candy sort of fluff, whose strands of galaxies are of varying thicknesses. I believe we will find these webs to be extending far beyond any distance enclosed in the periphery of our big bang.

The picture is one of intertwining streams of galaxies whose intersections form dense galactic superclusters. Their concentrated masses are continuously compacting and reeling in the galactic strings. The oldest, coldest, and most dense regions of the web will pull hardest and the thinning filaments—pulled in opposite directions by opposing masses—will eventually break, creating great tears in the cosmic fabric and forming vast islands of web segments. Over hundreds of billions of years each island will get rendered down to a ball of stringy dense matter rotating about a massive singularity that has already started moving toward other great masses.

As the islands run low on matter to gather and surrounding space becomes sparsely populated; galaxies will mostly be consumed by black holes that centrifugally spin down and merge in a massive central singularity; creating a focal point for other island singularities to home in on.

Black holes have a Schwarzschild radius (event horizon) in which matter entering this radius cannot escape[17]. The radius is proportional to mass and for each solar mass it amounts to 2.95 kilometers[18]. So, assuming each of our big bang's singularities had $10^{22}$ solar masses, their Schwarzschild radii would be $2.95 \times 10^{22}$ km or nearly 3 billion light years. This lends some scale to the rips in the cosmological fabric and the island of matter surrounding each singularity. Two such singularities would be in one another's grasp while still 6 billion light years apart. Their double bubble event horizon will continue to draw in strings of material from beyond its periphery and ultimately become a single spherical event horizon having a 6 billion light year radius.

Newton's equation for gravity's accelerating force is: $F = G(m_1 \text{ x } m_2)/d^2$, where G is his gravitational constant, $m_1$ and $m_2$ are the masses of our two singularities, and $d$ is their ever closing distance. The masses are huge and as their speeds approach the speed of light, Einstein says their effective masses approach infinity.

Gravity's particle accelerator has an amazing feature, however, and during the last hour or so, while the singularity distances close from a billion kilometers to a nanometer; gravity's force gets cranked up a million trillion trillion trillion ($10^{42}$) fold. And since the radii of singularities are thought to be at or near zero, gravity's force continues to rise and also approaches infinity as the singularities pancake and splatter; transforming two of the coldest, most inert objects in the universe into a hot plasma cloud expanding at about the same speed as the collision[19].

Big bashes become natural phenomena when mass and space are unlimited. Bashes would come in many sizes; coexisting and comingling at all stages of their life cycles. Our bash took the form of a splat and ball of hot plasma, like that of the Standard model; but due to the preexisting background heat and cold dense background matter; the system is not smoothly inflating nor does the expansion create the existence of space—as space was already in place.

In 2013, scientists deploying the South Pole Telescope detected a B-mode polarization in the cosmic microwave background, revealing a twist in gravitational waves that emanated from the big bang[20]. While some have attributed this phenomenon to the Inflation model's inflationary moment, it would appear that the collision of two spinning singularities could just as easily account for these results, with no need for a warp-speed hyperinflationary moment.

The colliding singularities were speeding toward one another while still drawing in strings of galaxies. Forces in their Schwarzschild radii crushed this matter into black holes still surrounding the singularities at the time of the bash. These orbiting masses will be contributors to the rapid galaxy formation and cosmic microwave background (CMB) roughness we'll discuss shortly.

## 6. What is the destiny of our expanding big bang?

Over the past half century researchers have expended great effort to understand the ultimate outcome of the big bang's expansion. They ask: will the big bang expand and thin forever; will the expansion slow, but never quite stop; or will it all collapse on itself in a big crunch?

This model's answer is simply "none of the above". Our big bang is being reabsorbed by the same universe that spawned it. The old cold universe is a perfect blotter for soaking up the spilled heat of big bangs.

## 7. Matter/antimatter disparity

One unanswered question the Standard model has is: why does the observed universe contain 100,000 times more matter than antimatter[21]? Since the Big Bash model provides a glimpse at what precedes big bangs; we'll examine the question in that context. Expectations change when we see big bangs and the formation of singularities as a cyclical process. The notion that big bangs *should* yield 50% antimatter stems from a belief that the big bang's mass was spawned from nothingness, and that nothingness can only generate matter and antimatter in equal quantities.

Our big bash didn't take place in a spatial null, but occurred in a preexisting universe that imparts its own biases. If singularities involved in our bash were not half antimatter to begin with, then smashing two such objects together won't necessarily generate 50% antimatter. While it's not unreasonable to expect positrons and antiprotons to form during the bash, they would be nominal and fleeting—like they are today. The Inflation model's expectation that matter and antimatter *should* form in equal parts is an expectation that stems from attempting to grow a whole universe from just one big bang.

The Big Bash model is a steady state universe having far more mass than our big bang and it cycles endlessly. Ancient stars intermix with new stars, so we should eventually find dim white dwarfs that witness to ages far older than the big bang.

## 8. CMB texture, early formation of quasars & galaxies, early reionization, etc.

In their analysis of galaxy makeup, P.J.E. Peebles & Adi Nusser conclude that while Big Bang theory provides a good description of our expanding universe, properties of nearby galaxies "suggest that a better theory would describe a mechanism by which matter is more rapidly gathered into galaxies and groups of galaxies[22]." If everything is expanding uniformly, what would cause galaxies to form so quickly? And if all new matter originated in a ball of heat, what would divide it up into galactic clouds? If it hadn't broken up, the whole system would be a smooth gravitational mass that condenses uniformly to form a central star that becomes a single black hole in a single massive galaxy that smoothly collapses on itself in a big crunch.

Quasi-stellar radio sources, or quasars, are black holes millions to billions of times more massive than our sun. They're active black holes in the process of consuming any gas or stars that fall into their grasp—which is what makes them so bright. They're the brightest objects ever detected and can outshine whole galaxies[23]. Many are found in galaxies still in their formative stages, a few billion years after the big bang; so they're mostly old and exhibit a high redshift.

In 2013 a group of researchers submitted their analysis of an ancient proto-galaxy illuminated within or from behind by quasar ULAS J1120+0641, whose redshift dates it at 772 million years after the big bang[24]. Its gases were not reionized and there was no evidence that star formation had yet begun. A question this situation poses is: Where did such early quasars come from? It appears as though black holes already existed when proto-galactic gas clouds overran them.

Questions others pose are: what gives our big bang its large-scale uniformity and a microwave background temperature that's uniform to a few parts in 10,000; and how did it get such a patchy texture[25]? I'll deal with all these questions in one scenario:

Within the constantly recirculating steady state universe, massive bodies continuously sweep up what they encounter, flinging some of it to distant reaches. Clusters grow denser while the surrounding space becomes progressively emptier. This spatial cleansing process continues until another expanding bash refills the vacated spaces with clouds of new gasses. Those voids remain littered with sufficient debris that any new gas clouds that come along will find plenty of old cold objects from which to seed new stars.

It's a bit of a random happenstance that determines how and when big bashes occur. Each event injects its own personality. While some colliding singularities may consume all nearby matter before bashing other singularities; it seems likely many will still be drawing in strings of galaxies when they collide. The concentrations of mass in the colliding pinpoints should be adequate to draw them together head-on, even while billions of galaxy remnants still orbit them.

When they bash and explode, even before the radiation cloud becomes transparent it starts to overrun billions of black holes in the orbiting debris. As the gas cloud blows past the orbiting matter, both radiation pressure and the passing gravitational mass cause the orbiting material to spiral outward, shredding the cloud, and creating swirls that form primordial galaxies. The new system is born with all the black holes it needs to light up our sky with quasars that eventually settle into the galactic clouds and become their central black holes. This old debris provides the cold lumps we find imbedded in the primordial radiation. It would be this mixing of old and new matter that breathed life into our big bang's smoothly expanding dullness.

It conjures a vision of an exploding cloud, orbited by strings of cold and compressed residue scattered throughout the 6 billion light year Schwarzschild radius. Beyond that radius lies a sparsely populated void that the expanding system has to cross before encountering the dense meniscus walls of ancient galaxy networks. This is where our bash's reabsorption by the old universe begins. The increasing gravitational pull of this old dense matter is a logical explanation for why our big bang's expansion is accelerating.

When ancient black holes pass through dense rotating clouds; instead of orbiting the black holes, the gas plows directly into them and matter accretes prodigiously. Vast radiation sprays form as the black holes become hyperactive quasars. A quasar's relative velocity may either propel it through a gas cloud and on to other clouds, or it may slowly oscillate through a clouds' gravitational center and settle in as its central black hole. Oscillating quasars drag a lot of gas with them and these streams may shape the new galaxies. Short oscillations create simple spirals while longer ones create the whole spectrum of barred spiral galaxies. Once a quasar settles in at its galactic center and becomes part of the centrifugal system its rate of accretion slows significantly, causing the quasar to dim and begin to behave like an ordinary central black hole.

As rivers of ancient galaxies cross the bow of our big bash's expanding wave front, the dense new gas gets deposited throughout the old cold strings of galaxies and these engulfed structures become Great Walls. Having blocked and absorbed much out-flowing gas, great voids remain in their shadows; explaining why we find huge old structures within our much younger big bang. The new hydrogen gas refuels the fusion processes of old cold stars, providing the vitality that lets them blend in with newer stars. Their most notable characteristic would be that they are more metallic and heavier than newer stars of similar size.

Our colliding singularities were equally cold when they made contact and splatted, thus the Big Bash model has a natural means for explaining both the homogenous CMB temperature uniformity and its roughness, with no need for a magical warp-speed inflation event.

Background radiation is part of the entire universe; but our fresh big bang would have an extra concentration within its expanding bounds. Both old and new radiation is omnidirectional and mixing as a single field. We should find a diminished flux density out beyond our big bang's periphery, since the more ancient CMBR would be more dispersed and cooler. This perpetual radiation would rule out Stephen Hawking's notion that black holes will ever evaporate.

## 9. What provides such hospitable anthropic conditions?

Our big bash inherits a host of heavy and complex molecules from the get-go. There are remnants of older expanding bashes scattered throughout the universe. Their constantly mixing matter creates an anthropic world, loaded with the old and highly evolved molecules necessary to nourish life. These precious molecules are gathered, nursed, and dispersed to planets by the trillions of wandering comets that are ubiquitous and highly mobile throughout the universe. Even manmade molecules may one day enter this stream and spread our legacy to future beings. Perhaps it was beings from distant worlds that designed our programmable RNA and DNA molecules and thus connected earthlings to the universe's conscious web of life.

Now that the internet is connected with cell phones and Wi-Fi; recorded human history is being propagated to the entire universe. One has to wonder if we'll ever have technologies capable of ferreting out the histories of civilizations radiating from other stars.

In a steady state universe, improbable anthropic conditions become highly probable when nature can roll her dice, gather them up and roll them again, for as long as it takes to roll life's lucky numbers. By continuously casting the seeds of the universe's past into the fertile energies of the future, nature could hybridize life into an infinite variety of big bang perennials. It's most advanced life forms may have been able to wend their way through the hazardous maze of these overlapping worlds and allowed their progeny to continue evolving without the necessity of starting over as single-cell creatures.

This model provides a philosophical bonus in that it suggests intelligent life forms may be able to wend their way through the minefield of cosmic hazards that eradicate less capable beings, like the dinosaurs. We have the technology necessary to ward off errant asteroids and will soon be capable of defending against incoming comets. In the long run we'll need to master space travel if our species is to survive. We have time to prepare for the merger of Andromeda with our Milky Way and we know our sun's expansion requires that we develop habitats beyond the earth.

The energy and resources necessary to master space travel are daunting; but the sum of those resources is probably less than that which we waste on war. Our rate of cosmic mastery seems to be limited mostly by mankind's underestimate of its need for peace and cooperation. Hopefully, our collective wisdom will evolve in time for us to save Earth's beautiful and highly advanced life forms.

## 10. Revisiting an electromagnetic gravity

Einstein's Nobel Prize was awarded in 1922 for his 1905 photoelectric transformation of light theory[26]. He concluded his acceptance speech by saying his new passion was to unify general relativity (gravity) with electromagnetism and possibly even with quantum mechanics[27]. He may have been closer to achieving his objective than he realized.

He perceived gravity as a force emanating from matter in proportion to its mass. Perhaps the only thing he missed was gravity's source. In our well-lit universe, all matter resides in a relatively steady field of electromagnetic radiation that seems ample for *inducing* gravity's characteristics. An *induced magnetic gravity* may be all that's needed to provide the unification Einstein sought.

When we sprinkle non-magnetic iron filings near a magnet, its field aligns their magnetic domains and makes them mutually attractive. This is a scalable phenomenon; so if we sprinkle ball bearings in a larger field we get similar results. The field draws the spins of electrons into coherent alignments. It would appear that if galaxies are sprinkled in a huge magnetic field they, too, would feel an induced magnetism and behave like powdered iron's clusters and strings. Intergalactic current flow is immense and may hold the key that opens the door to a magnetically driven gravity that's always attractive, yet may be repulsive beyond extragalactic scales[28].

Ampère's and Lorentz's force laws tell us that when electrical current flows in the same direction through parallel conductors, the conductors become attracted to one another. It would appear that any conductive matter in a unidirectional current would be mutually attractive under these laws. Unidirectional currents flowing through rivers of galaxies would provide attractive forces to all embedded bodies, with no repulsive component within any given river, and thus draw the galaxies and clusters toward one another. The same is true for smaller bodies within the strings of galaxies. On the other hand, gravity may remain attractive, even beyond the bounds of a galactic river. It remains to be seen if the great voids between galactic streams represent areas of gravitational repulsion between the streams. Clearly, there is more than one mechanism to investigate in our search for the source(s) of an induced gravity.

The stars, planets, molecules, atoms, and quarks are all imbedded in cosmic radiation and are also mutually attracted. Having matter immersed in a global field gives everything the relative particle alignment biases necessary to makes it all mutually attractive. Changing juxtapositions of adjacent bodies would alter the electron spin alignments of their matter to maintain their mutual attractions. Such particle alignments might account for asymmetry problems that plague quantum physicists. And yet, strong local magnetic fields can overpower the "weak" global field and still provide repulsive forces.

The force of gravity is proportional to mass and the vast majority of mass is found in atomic nuclei. Perhaps these nuclei have their own polar alignments that are independent of their electron spin directions. The orbital alignments of electrons are influenced more by other electrons than by nucleons, so it would appear that the free-floating nuclei are free to permanently align themselves with all other nuclei in their region of space. This would give them a mutual attraction based on both their mass and the alignment of a global magnetic field. The chaotic field alignments of electrons would not provide sufficient force to overcome the coherent force alignments of atomic nuclei, which provide the mutual attractions of all gravitational matter. There's more to explore here, too.

We have difficulty attributing gravity to electromagnetism, since it seems an electromagnetic field would have two polarities and would provide repulsive forces we don't see in nature. And while physicists often hypothesize about magnetic monopoles that might explain this mystery, we've yet to see evidence that monopoles actually exist. Well, here's a model that bears the semblance of a monopole:

A big bang's electromagnetic pulse generates a spherical radiation pattern whose outer extremes exhibit a single magnetic polarity. It would be a continuum of expanding concentric spheres whose perpendicular electric field stretches radially outward from the point of the bash's impact. The cloud produced by the impact was an electromagnetic plasma, so the sphere is best described as an expanding ball of radially flowing heat and electricity. Negative electrons are much lighter than the positively charged nucleons, so electromotive forces move the electrons more rapidly than the ions. This universal electron flow helps keep cosmic atoms in an ionized state.

The initial radiation ball was so dense that its photons could escape only from its outer periphery—like photons flowing only from the outer surface of our sun. It took some 380,000 years before the central photons could elbow enough space to begin their lightspeed journeys outward. That's when the big bang's inner space finally became transparent. This radiation may provide a continuously stretching and radially polarized electric field that generates gravity, or at least contributes to it. So if magnetic monopoles actually exist, it seems we may be living in one. Even in a monopole, though, every radial is still a dipole.

Einstein's space-time curvature is verified by observing solar eclipses and measuring how much the light of background stars bends as it flows past the sun's edge[29]. This bending of light around galaxies and other massive objects is also used for the gravitational lensing of more distant objects[30]. The bending electromagnetic rays focus and concentrate around cosmic bodies in proportion to their masses. This effect is often portrayed as a bowling-ball-like sun bending the trampoline-like mat of space-time. The real picture is more complex, with light emanating from every direction and pinching-in toward heavy masses. It would seem that these concentrated masses are behaving like low-resistance short circuits for cosmic currents.

Molecules and atoms are mostly empty space; so the stars, planets, and people composed of this fluffy matter would feel the weakest aspect of the induced force. Quarks are closer together, so Newton's inverse square law gives nucleons a strong binding force, while their attraction to distant orbiting electrons and other atoms is far weaker.

Physicists say electromagnetism exhibits $10^{38}$ to $10^{40}$ times more force than gravity[31][32]. That doesn't hold up when we consider that the gravitational force of singularities is not only greater than the strong nuclear force, it has enough force to crush nucleons into nothing but cold mass.

The forces of gravity and electromagnetism both approach infinity as the distance between attracted masses approaches zero; and an induced gravity's force limit easily extends to that of the strong nuclear force, when the distance between quarks goes to zero. If gravity seems $10^{38}$ times weaker on earth than the attractive force between quarks, then I'd venture that the earth's atoms are $10^{19}$ times farther apart than their quarks are. Our perspectives change when we view the strong and weak forces as being induced by the universe's pervasive electromagnetic field.

The cosmic microwave background radiation (CMBR) of the more ancient universe would be cooler than our fresh big bang's CMBR and yet still provide a stable electromagnetic field. There would have been many backgrounds before the advent of our big bang and the one we detect now is an amalgamation of the old and the new. So, if background radiation creates gravity, what would that say about the constancy of gravity?

In regard to CMBR, NASA says, "The temperature is uniform to better than one part in a thousand[33]!" Scientists continue their quest to measure Newton's big G to ever greater precision[34]. It's been an embarrassment that we can't improve the accuracy of this fundamental reference beyond 4 decimal places. Well, if CMBR temperature varies by a few parts in 10,000 and this radiation generates gravity, it suggests G may not *be* uniform beyond 4 significant digits.

Big bash singularities would act as entropy's rechargeable batteries. Calculations of this entropy is more complex than it would be in a self-contained big bang, as what we see in our steady state universe is the homogenization of many such systems. If massive singularities contain no heat, then it looks as though mass and energy are completely separable.

Einstein said, “The theory of relativity stresses the importance of the field concept in physics. But we have not yet succeeded in formulating a pure field physics. For the present we must still assume the existence of both: field and matter[35].” Here’s my simple analysis of how mass and energy might each be separate entities and still be accurately portrayed by Einstein’s mass and energy formula.

For mathematical simplicity, assume our two colliding singularities are of equal mass and, being at absolute zero, each has a rest energy of zero. As magnetically induced gravity draws the singularities together, their kinetic energies are each expressed as: $E=\frac{1}{2}\,mv^2$ (half their mass times their velocity squared). Summing their two energies yields: $E=mv^2$. And as they reach their speed of collision, the speed of light, substituting c for v yields a system kinetic energy of $E=mc^2$.

Einstein’s equation very simply describes the kinetic energy of two pure masses being accelerated by an externally induced force, bashing at light-speed, and consolidating this externally sourced kinetic energy, transforming it to the big bang’s internal system energy. Thereby, the universe’s pure electromagnetic energy gets homogenized with its pure mass to become a single big bang entity, limiting the energy transferred to the absorption capacity of the singularity masses. The accelerating force transforms the potential energies within the singularity masses from $E=0$ to $E=mc^2$ and thereafter the total energy of the big bang system becomes expressible as $E=mc^2$.

Black hole singularities are the most concentrated of masses and their temperatures rest at absolute zero. While their cold masses are devoid of energy; singularities are surrounded by Schwarzschild radii that focus vast spheres of background radiation on them. It would appear that such concentrated fields could crush all incoming matter and induce extreme gravitational forces, like the Z-Pinch forces that fusion energy teams are developing[36].

The purpose of Z-Pinch devices is to magnetically implode a 1 to 6mm metallic sphere or cylinder filled with deuterium and/or tritium fusion candidates. The implosions fuse the enclosed nucleons to form helium and generate heat, in the hope they’ll eventually produce more energy than the process consumes[37]. One Z-Pinch model uses ten radially and symmetrically arranged lasers to shine $10^{14}$ watts of power on the capsule being imploded[38]. The principle here is that the lasers’ radiation creates magnetohydrodynamic waves that crush the fuel pellet. In black holes we also have externally sourced light waves that are concentrated and focused on a central mass.

Observations of active galactic nuclei indicates that gas falling inward toward central black holes piles up in accretion disks, compresses, and heats up[39]. “Near the inner edge of the disk, on the threshold of the black hole’s event horizon … some of the material becomes accelerated and races outward as a pair of jets flowing in opposite directions along the black hole’s spin axis.” It would appear that these jets are part of the mechanism that black holes use to squeeze out and vent all their heat.

When huge quantities of charged particles spherically race around black holes and exit at the poles as x-rays and gamma rays, I envision a spherical electric field with a perpendicular magnetic field directed inward toward the black hole. High energy particles surrounding the Schwarzschild radius create an enormous Z-Pinch that crushes any in-falling matter into a dense singularity. The squeezed-out heat gets radiated away via the axial jets. Background radiation is omnidirectional, like a Z-Pinch, and impinges on objects from all directions. Moreover, it encompasses the full frequency spectrum, including powerful x-rays and gamma rays.

It also seems logical that the earth’s gravity might be but a very weak manifestation of this same Z-pinch process. Internally the force is compressive; externally it would be attractive.

As Einstein said in a 1921 lecture, “As far as we are able to judge at present, the general theory of relativity can be conceived only as a field theory[40].” I’ll point out is that the theory seems to intermix radiation and gravity fields in areas that describe time dilation. He says, “An atom absorbs or emits light of a frequency which is dependent on the potential of the gravitational field in which it is situated. The frequency of an atom situated on the surface of a heavenly body will be somewhat less than the frequency of an atom of the same element which is situated in free space (or on the surface of a smaller celestial body).”

Atoms absorb light from electromagnetic fields and those fields are more compressed and concentrated around bodies of greater mass. Einstein said denser fields shift the frequencies toward the red, meaning the atoms are slowed by the stronger fields. Therefore, increasing the electromagnetic viscosity slows the atoms, which translate to slower metabolisms, slower clocks, and the slowing of time. Even Einstein’s own description of field behaviors seems to make no distinction between gravity and electromagnetic fields.

## 11. How might an induced gravity connect relativity to quantum mechanics?

The separability of mass and energy at cosmic levels means it’s also separable at particle levels. Therefore, charged particle masses should be separable from both their electric charges and their strong and weak internal forces. This suggests the fundamental forces binding particle masses together may also be externally induced.

Paul Dirac’s 1962 paper, “An extensible model of the electron”, submits that electrons may have a spherical bubble membrane[41]. Quarks had not yet been discovered and he never updated this paper to include them. Dirac may have been correct, and perhaps all electrically charged particles have membranes. While Dirac’s model places charges outside the membranes, it seems reasonable enclose them within. This variance is based on the observation that quark charges don’t neutralize one another on contact when neutron stars squeeze them together under extreme pressure. And when electrons collide with protons they neither annihilate nor neutralize one another; they just exchange a short wavelength photon and bounce[42]. Strong elastic membranes would both isolate charges and impart mass to particles. When neutron stars get massive enough to become black holes; particle membranes would burst, neutralizing their charges and the inert membrane residue becomes the cold dense mass of singularities.

Gerard ’t Hooft described strong force bonds by saying, “The quarks in a hadron therefore act somewhat as if they were connected by rubber bands at very close range: where the bands are slack, the quarks move almost independently, but at a greater distance, where the bands are stretched taught, the quarks are tightly bound[43].” If the elastic quark membranes are bound together by the strong force—an induced electromagnetic force—the stretch of the membranes would exhibit such behavior. We can model this by placing a small strong magnet in each of two small balloons, partially inflating them, then bringing the two magnets together. Pulling the two balloons apart would simulate the force behavior ‘t Hooft described.

Induced magnetism would act as both the strong and weak forces. Gravity’s attractive force between quarks is limited only by distance. When externally magnetized quark membranes get squeezed together in stars, Z-Pinches, or particle colliders; the elastic contact areas enlarge and makes the magnetic holding force adequate to overcome the repulsion of excess positive charges. This increased magnetic contact area compensates for the distances between quark centers not going to zero. Trapped coulomb charges are isolated by membranes, so their spacing can't go to zero either. Their repulsive force is limited by membrane thickness and its dielectric nature.

It's conceivable that neutrinos are exploded bits of membrane matter. If neutrinos are scraps of membranes, with high area to mass ratios, they'd mimic solar sails whose velocities might be sustainable by photon streams. They may gather and dissipate charges as they flow past charged particles. An infinite universe would have plenty of black holes for regathering neutrino dust.

Physicists should investigate nuclear forces as though they are induced forces that are not native to particles. This may also shed more light on radioactive decay.

## 12. Radioactive Decay

If particle charges are enclosed in elastic membranes, that would provide a model for explaining the mechanics of radioactive decay.

When supernovas explode they create implosive pressures on atoms in their central cores and more nucleons get forced into their atomic nuclei than atoms can retain under normal pressures. The pressure would super-cool the quarks in the same manner black holes squeeze out their heat. Once the pressure subsides, most unsustainable nucleons quickly fall away from their overloaded nuclei, but many are temporarily retained. The supersaturated nucleons have created radioactive elements. The pressure has squeezed the quark membranes into compressed and distended oblate spheroids, increasing their magnetic contact surfaces and allowing them to bind more nucleons than they can retain under normal temperatures and pressures.

As distorted membranes absorb radiation, their internal pressures build and they become more nearly spherical, thus allowing supersaturated nuclei to shed their excess nucleons and exhibit radioactive decay. Different radioactive elements have differently shaped nuclei and less stable shapes have shorter half-lives.

An experiment that may substantiate this model would be to cautiously expose radioactive elements to a spectrum of high energy radiation to see if it accelerates their half-lives. If such should be the case, it suggests we may be able to extend the short half-lives of heavy manmade elements by quickly routing them to ultra-cold chambers to curtail their decay.

In this membrane model the strong nuclear force and electroweak force are the same force. The strong force is manifest when atomic nuclei are not stressed by up-quark overload or high internal temperatures and therefore are difficult to pull apart. The weak force becomes pronounced when induced magnetism is marginally adequate to bind the nucleons of radioactive elements and those pressure-chilled nucleons are in the process of absorbing external heat.

Particle colliders detect a family of force carriers referred to as gauge bosons. Most common among these massless particles are the gluons, photons, W bosons, and Z bosons, which are treated as energy fields[32]. In reference to quantum electrodynamics (QED) and quantum chromodynamics (QCD), Richard Feynman said, "It's very clear that the photon and the three W's are interconnected somehow, but at the present level of understanding, the connection is difficult to see clearly—you can still see the 'seams' in the theories; they have not yet been smoothed out so that the connection becomes more beautiful and, therefore, probably more correct."

If nuclear bonds are, indeed, the results of an externally induced electromagnetic field; then the breaking of those externally induced bonds would generate electromagnetic flux transitions that mimic the behavior of these gauge bosons.

While this gravity bridge between relativity and quantum physics may seem a bit far-fetched, it does provide a plausible placeholder that matches many of the observations. It would be great, however, if those more knowledgeable in quantum mechanics could either enhance or replace this membrane particle model.

## 13. Dark matter

Dark matter behavior may also be attributable to electromagnetism.

The rotational behaviors of large structures, like galaxies and galactic clusters, suggests they have more mass than they appear to. In 1937, Fritz Zwicky said, "The essential feature is a central core whose internal *viscosity* due to the gravitational interactions of its component masses is so high as to cause it to rotate like a solid body[44]." Far more mass might allow the extremities of galaxies to rotate around their centers as fast as more central matter does; which is faster than outer matter should rotate without flying off in space. If there is extra mass, it neither emits nor absorbs electromagnetic radiation, so it's referred to as dark matter. The problem is: we can't find any dark matter[45]. Physicists even seek it down at quantum levels.

While the Big Bash model has a means for depositing old heavy matter in galaxies that would otherwise be lighter, I suspect dark matter is not matter at all. Instead, it's a magnetohydrodynamic force behavior that is manifest when radiation ionizes galactic gasses. This would provide the "internal viscosity" that Zwicky described.

In 1970, Hannes Alfvén won the Nobel Prize in physics "for pioneering the study of galactic magnetic fields generated by the electrically conducting plasma that pervades the universe: such magnetohydrodynamic waves are now known as Alfvén waves." Alfven's paper, ELECTRICITY IN SPACE, describes two experiments that demonstrate these electromagnetic waves[46].

"If you tap the side of a vessel containing a pool of mercury, the surface quakes and ripples as if it were alive. We found that when we placed such a pool in a strong magnetic field of 10,000 gauss, its behavior instantly changed. It did not respond to jarring of the vessel; its surface stiffened, so to speak. The magnetic field gave a curious kind of viscosity to the mercury."

His second experiment used a tank of mercury in which the bottom of the tank contained vanes that could be moved back and forth like the agitator in the bottom of a washing machine. "In the absence of a magnetic field, the slow oscillation of this agitator, stirring the mercury at the bottom of the tank, will not disturb the surface of the mercury at the top of the tank; the mercury molecules slide past one another so that the motion dies out before it proceeds very far up the tank." … "When a strong vertical magnetic field is applied to the tank, however, the motion at the bottom is quickly communicated to the top."…

"To be sure, the magnetic fields in the stars are very much weaker than the 10,000 gauss of our experiment (the sun's general field is estimated at between 1 and 25 gauss). But our theory tells us if we made the vessel larger, we could produce the magneto-hydrodynamic effects with a smaller magnetic field; the magnetic force required would decline in proportion to the increase in size of the vessel. Hence in a star, which is, say, 10 billion times as large as our experimental vessel, the magnetic field need be only one 10-billionth of the laboratory field. The stars' fields are much stronger than this."

Alfvén describes how this principle applies to the interior of the sun, but doesn't scale it up further to apply to galaxies. Galaxies have a trillion times our sun's diameter. Using Alfvén's linear scaling, this suggests it would take only 25 pico-gauss to stiffen the interstellar medium and coerce a galaxy's outer stars to rotate in step with its inner stars. He said, "Furthermore, there are good arguments for assuming that a weak magnetic field (some millionths of a gauss) pervades all of space."

Recent research has verified that galactic field strengths are on the order of $10^{-6}$ gauss[47]. From Alfvén's perspective, this strength would be adequate to generate the dark matter behavior we see in the rotations of galaxies and galaxy clusters; given the enormous timescales available to harness momentum and gel in this behavior. One might even expect a magnetic meniscus to form around galactic peripheries. These, too, would help minimize the number of speeding stars that get flung out of their galaxies.

Induced magnetic forces, magnetohydrodynamics, and other electromagnetic phenomena give us plenty of tangible ethereal mechanisms to master before we invest heavily in the realm of unproven physics—though the alternative has yielded great returns on edutainment investments.

## 14. Predictabilities

While matter at the periphery of our big bang is so red shifted it's difficult to detect; even more distant blue-shifted objects may be approaching us and should be quite visible. The Hubble Space Telescope is providing Deep Field photos that use the gravitational lensing of massive galaxies to resolve ever more distant objects[48]. It's interesting to note that that Deep Field photos all seem to be speckled with tiny blue dots. Some of them may be young blue stars in the lensing galaxies, but it will be interesting to determine if some are more distant galaxies that are headed our way. It should be possible see incoming galaxies from far beyond the fringes of our big bang.

As technology lets us see farther out through deep field peepholes, we should find ever more distant objects peering back at us. The mixing of matter from multiple bashes will yield objects described as anomalous to the Inflation model, but will make sense when viewed in the context of a larger universe. This dynamic churn creates unlimited possibilities. Its splats impinge on one another the way Set Theory's spheres overlap to blend unique domains, each having its own predictive peculiarities.

## 15. Discussion

One objective of this paper is to support an axiom that: given unlimited mass and energy, plus sufficient time; all permutations and combinations of mass and energy are possible within a single, unbounded, three-dimensional space. Hopefully, presenting this 3-space inexhaustibility will lure the world's mathematical genius back to our tangible world of three spatial dimensions.

There is also much more for quantum physicists to explore in 3D space. The pervasive and omnidirectional electromagnetic field comes to mind, as all particles are immersed in it. If one were to pursue the commonality between gravity and the other forces, the externally induced electromagnetism of the universe would be my nomination as the common denominator. It seems that the constant expansion and contraction of magnetic fields would be an efficient means for powering a perpetual motion universe.

There is far more to learn about our electromagnetic spectrum, especially at high frequencies. When we contemplate how virtually every frequency streams to us simultaneously from every direction and delivers a degree of signal fidelity from every galaxy, star, cell phone, radio and TV station, etc., we can appreciate what an amazing fabric this ethereal background is made of. Some frequencies may have the task of vibrating atomic nuclei, to make their electrons elliptically orbit like hula hoops. And it must be some sort of magnetic hysteresis that makes electrons toggle between specific orbits when hit by a burst of energy.

It seems that the inward radiation of magnetic energy around singularities meets the definition of a monopole; and when singularities bash and their heat and radiation start to flow outward from the inside, these monopoles begin to turn themselves inside out and reverse their polarities.

It will take far more work to back-track this more complex universe and seek its beginnings than it took to rewind and examine our relatively simple big bang. While this Big Bash model provides a means for generating big bangs, it does not attempt to explain the creation of the universe. That yarn remains for future theorists to unravel.


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## Author Contributions

Countless amateurs and professionals contributed to my views over the past 65 years. This modeling of their work took place within my own imagination and I am solely responsible for having documented it. I welcome input and will respond to as many e-mails as I can keep up with.

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