The Big Bash Alternative Model of the Universe

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Abstract

Evidence of a big bang is overwhelming and most scientists accept that we live in a region of space that began its expansion some 13.8 billion years ago. The currently supported model of the universe, however, has encountered several anomalies that are not well accommodated by that model. This paper presents an analysis of these anomalies and presents an alternative model that seems to better fit the data. It also provides an architecture that's predictive of much additional evidence we might expect to encounter in the near future.

This new model is based on the view that dark energy; matter/antimatter disparity; cosmic microwave background texture; anthropic conditions; and the genesis of early stars and galaxies are a coherent body of evidence which suggests that the big bang did not occur in an empty void.

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 model 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 inconsistent with recent 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 the May 22, 2004 edition of *New Scientist* and announced the formation of an "Alternative Cosmology Group". Subsequently, that letter has been endorsed by more than 500 scientists and institutions[3].

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

This paper takes exception to that view. But first, I need to acknowledge the great respect I have for the mathematical talents dedicated to making the current model work. Their sophisticated quantitative analyses are both rigorous and collaborative.

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:

- What causes dark energy?
- How can there be structures much older than the big bang?
- How can there be structures larger than big bang theory allows?

- 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?

This research treats those mysteries as puzzle pieces that should fit together nicely in a more cohesive model. These pieces have undergone much *quantitative* analysis by others, but I'd never seen a *qualitative* analysis of what they have in common; so this qualitative analysis became both my goal and my methodology. I'll describe the pieces in more detail as we broach their topics. When assembled they produce a coherent universe that's as simple as Einstein hoped it might be.

It was the late 1998 introduction to dark energy that triggered my research; so I'll begin with that topic.

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[4]. (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.) 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.

The mysterious force accelerating this expansion is referred to as "dark energy". From our perspective dark energy 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.

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

This alternative model posits that the big bang took place within our universe's preexisting 3D space. That would mean our big bang is but a local event and it seems that such events would be common in such a huge and ageless universe. There is much evidence to support this notion. While it's not unreasonable to assume the big bang marked the birth of the universe; researchers present a growing body of evidence that the universe is much older than 13.8 billion years.

A.K. Lal and R. Joseph's 2010 paper, "Big Bang? A Critical Review", focuses on a large body of research covering Great Walls and Great Voids that take five to twenty times longer to form than the age of the big bang[5]. They make the point that since the average relative velocity of moving galaxies is about 300 kilometers per second, there hasn't been nearly enough time since the big bang for these huge structures to form; especially since much of that mass has had to reverse its outward flow in order to become part of these 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."

The Sloan Digital Sky Survey (SDSS) project includes an international consortium of scientists and an awesome array of instruments that produce sky maps and a huge database researchers mine to reveal increasingly refined images of great cosmic structures[6,7]. Some exceed the size theoreticians believe the big bang is capable of generating[8].

The cosmological principle says the big bang is expanding uniformly and therefore its mass should be distributed fairly uniformly throughout its volume. Large and small blobs of matter should also be distributed evenly; with a limit to how big any galactic structures can get without unbalancing the system. Theoreticians say the upper limit of this structural size is no more than 1.3 billion light years across. Yet, researchers analyzing SDSS data find a structure 4 billion light years across.[9]

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's so big it marked the start of an HLQG subclass of Huge-LQGs. 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: "Since the larger universe incorporates our own big bang structure, then its upper structural limit is at least as massive our big bang, which contains more than 10^{22} solar masses".

When we attempt to supersede a model intellectual giants have vested their lives in, we soon realize the daunting task at hand. One difficulty lies in finding a point of common agreement from which to diverge. After many revisions, I've concluded it's best to introduce this story in the 1929-1950 timeframe, when cosmology approached a fork in the road.

In 1929 Edwin Hubble presented evidence that the known universe is expanding. That led to the struggle between steady state theorists and big bang theorists in which big bang evidence prevailed. Today we're seeing evidence that the universe is much older and larger than the big bang. My story begins at the juncture from which steady state advocates and big-bangers diverged. It consolidates their models. *Instead of describing how the big bang spawned our new universe; it describes how our old universe spawns big bangs.*

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

Growing singularities that cause big bangs

Galactic superclusters are the most gravitationally attractive objects we see inside our big bang. These are gigantic groupings that contain millions of galaxies clustered in strings, sheets, or walls that can be 100 million to several billions of light years across. Clusters will 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 the standard model posits, even the largest superclusters will grow to but a tiny fraction of the big bang's mass, since their trajectories show them to be accelerating radially outward and away from one another. The big bang's gravitational mass is not sufficient to ever pull them back together again.

Superclusters contain millions of black holes and countless chunks of 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 one super massive black hole. However, since our clusters are accelerating outwardly, 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 sufficient to source big bangs—like our own.

Black holes squeeze captured particles until they collapse and can no longer move. In the process the black holes' heat gets squeezed out. Stephen Hawking tells us that the more massive a black hole becomes, the lower its temperature gets[10]. 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 goes on to say that a black hole will continue to absorb more mass than it emits 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 the mass of our big bang—and it had a temperature near absolute zero, it would be the most stable mass imaginable. What sort of natural 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 a big bang. Well, ultra-massive black holes are pretty heavy particles and it looks as though gravity would be the only force capable of smashing them. This Big Bash model requires *two* such singularities to produce each big bang.

In this model gravity sparks all of the heat, pressure, electrostatic, and electrodynamic energy forms when it bashes black holes together to create big bangs. It also quiesces these 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 finally subdues their motion and quenches their heat by crushing them into neutron stars and then black holes, sometimes 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 skeletal structure of the universe is being assembled in the composite images of the SDSS Galaxy Map and, as mentioned, is already beginning to reveal a structure much older and larger than our local big bang. What we're seeing is a 3D cobweb which, if shrunk down, would resemble a stringy cotton candy sort of fluff, whose strands of galaxies are of varying thickness. We should find this web extending as far as our instrumented eyes will ever see.

The picture is one of intertwining streams of galaxies whose intersections form dense galactic superclusters. Their concentrated masses are continuously compacting matter and reeling in their galactic strings. The thinning filaments—pulled in opposite directions by opposing masses—will eventually break, creating great tears in the cosmic fabric and forming islands of web segments. Over trillions of years each island gets rendered down to a cloud of dense matter rotating about an ultra-massive singularity that has already started moving toward other great masses.

When super-duper clusters run low on nearby matter to sweep up and the surrounding space becomes relatively empty; most of their stars and galaxies get consumed by black holes and the black holes centrifugally spin down and merge into massive singularities; creating gravitational focal points for other singularities to home in on.

Black holes have an event horizon, called the Schwarzschild radius, in which matter entering this radius cannot escape. A black hole with half our big bang's mass would have a Schwarzschild radius of 3 billion light years; so two such black holes would come into one another's grasp while still 6 billion light years apart and their event horizons start to overlap. This double bubble will continue to rip off and draw in material from beyond its periphery.

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 product of their masses is huge and as their speeds approach light-speed, relativity's mechanics tell us their effective masses are approaching infinity.

Gravity's particle accelerator has an amazing feature, however, and during the last hour or so, while the singularity distances are closing 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 very near zero, gravity's force continues to ramp up and also approaches infinity as the two singularities pancake and splatter; transforming two of the coldest and most inert objects in the universe into a hot plasma cloud expanding at about the same speed as the collision.

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 own bash takes the form of a splat and ball of hot plasma, like that of the Standard model; but due to the preexisting universe's background heat and cold dense matter; the system is not smoothly inflating nor does the expansion create the existence of space—as space was already in place.

It's likely the colliding singularities began drifting toward one another long before they had consumed most of their nearby galaxies and it's also likely that millions of these galaxies followed them and were within a billion light years of the point of the bash. These orbiting masses will be prime contributors to the roughness in the microwave background we'll discuss shortly.

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 makes a perfect blotter for soaking up the spilled heat of big bangs.

Matter/antimatter disparity

One unanswered question the Standard model has is: why does the observed universe contain 100,000 times more matter than antimatter[11]? Since the Big Bash model provides a glimpse at what precedes big bangs; we'll examine the question from that standpoint. 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 the belief big bang 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 void, but occurred in a universe that imparts its own biases. If singularities involved in our bash were not half antimatter to begin with, then smashing them together won't necessarily generate 50% antimatter. While it's not unreasonable to expect some positrons and antiprotons to form during the bash, they should be nominal and fleeting—as they are today. The Inflation model's expectation that matter and antimatter should form equally is an expectation that stems from attempting to grow a whole universe from just one big bang.

This Big Bash model is a steady state universe, requiring vastly more mass than our big bang contains in order for it to cycle in perpetuity. Ancient stars have been intermixed with our newer stars and we should be able find old white dwarfs that have cooled and darkened sufficiently to indicate they are much older than the big bang. Black dwarfs are difficult to detect and none have been found yet. If and when they are, they may reveal ages hundreds to billions of times more ancient than our big bang.

For math modeling purposes it seems appropriate to start with a minimal universe, some 10^{14} light-years in diameter and having a billion big bang masses. But, there may be no upper limit to our universe's mass, volume, or age.

Cosmic microwave background texture and early formation of galaxies

In their analysis of the makeup of local galaxies, P.J.E. Peebles & Adi Nusser conclude that while the Big Bang theory provides a good description of our expanding universe, observed 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[12]."

If everything is supposed be expanding uniformly, what caused galaxies to form so quickly? And if all matter originated in a uniform ball of heat, what would divide it up into swirling galactic clouds, each with its own center of gravity that allows it to form its own stars? If it hadn't broken up this way 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 will smoothly collapse on itself in a big crunch.

Another question researchers pose is: what gives our big bang its uniform temperature in all directions and how did it get such a patchy texture if its temperature is so uniform? [12] We'll deal with all three questions with one scenario:

Within our constantly recirculating universe, massive bodies continuously sweep up most of what they encounter, flinging some of it to distant reaches. Cosmic clusters are growing denser while surrounding spaces become more vacant. This local cleansing continues until another expanding bash refills vacated space with clouds of new dust. The voids were randomly littered with old cosmic debris; so the expanding clouds of light gasses encounter plenty of cold dense 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 some of its own personality into the mix. While it seems possible that some of our colliding singularities will have completely consumed all of their nearby matter before bashing other singularities; it seems more likely they will still be soaking up nearby galaxies at the time they collide. The great concentrations of mass within these two colliding pinpoints should be adequate to draw them together head-on, even while millions of galaxies still orbit them.

When they bash and explode, their uniform vapor cloud overruns the uneaten galaxies, which bore holes and slice swirls in the expanding plasma. They would also leave behind the large cold lumps we see in the background of the primordial radiation. The vision this conjures is one of an exploding cloud, orbited by masses of galactic residue concentrated within a billion light years of the blast. Beyond this residue is a mostly void expanse the expanding system has to cross before it encounters networks of old galaxies surrounding the void. This begins our bash's reabsorption by the older universe.

As the cloud of light elements blows past the orbiting galaxies, both radiation pressure and the passing gravitational mass cause the orbiting matter to spiral outward, boring tunnels, shredding the cloud, and creating swirls that form primordial galaxies. Even before the compressed radiation cloud becomes fully transparent it begins to overrun old stars, galaxies, and other orbiting detritus.

Later, 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 the great walls we see. Having blocked and absorbed much of the outward flowing gases, great voids remain in their shadows. This would explain why we find huge old structures in the middle of our much younger big bang.

The new gas refuels the fusion processes of old cold stars and provides the vitality that lets them blend in with their newer surroundings. Their most notable characteristic should be that they are more metallic and heavier than newer stars of similar size.

The sparsely filled void surrounding our big bash may have been only several billion light years in diameter at the time of the bash, as it appears our expanding system is already overrunning dense areas of the older universe. The increasing gravitational pull of this old dense matter is the most logical explanation for why our big bang's expansion is accelerating.

The early expanding system packed a powerful electromagnetic and acoustic wallop. When it overran the nearby galaxies orbiting our colliding singularities, it smashed their stars and planets, creating enormous strings of debris similar to the smaller debris clouds we see around supernova explosions. When the shockwave scatters galaxies, black holes remain intact and get dispersed in the strings of new dust and old stars. Once the expanding plasma cools and thins, external bodies being overrun will mostly remain intact and show up as red or blue shifted objects that are out of character with their surroundings.

Our colliding singularities had uniform temperatures at absolute zero, so their collision yielded a uniform plasma cloud that overran the old cold sky. Its smoothness became perforated and textured while colliding with preexisting matter. This process breathed life into the smoothly expanding dullness, forming proto-galaxies and seeding early star formation.

What provides such hospitable anthropic conditions?

When old planets get smashed by early big bang energies, they squirt out magma and molten metal from their cores; oceans turn to steam; and dense dust clouds resembling those of volcanic explosions generate lightning storms that turn the clouds into virtual chemical factories; thus our big bang 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 helped to connect earthlings to the universe's conscious web of life.

By sowing the universe's fertile past with seeds of the future, nature hybridizes life into an infinite variety of big bang perennials. It's most advanced life forms may be able to wend their way through the hazardous maze of these overlapping worlds and thereby allow their progeny to continue evolving without the necessity of starting over as single-cell creatures.

What generated early quasars and what caused reionization?

Quasi-stellar radio sources, or quasars, are black holes millions to billions of times more massive than our sun. They are active black holes in the process of consuming any gasses, stars, or other black holes that fall into their gravitational grasp—which is what makes them so bright. These powerful objects far outshine whole galaxies and are among the brightest objects ever detected. Many are found in distant galaxies we see in their early formative stages, within a few billion years after the big bang; so they exhibit a high redshift.

In March of 2013 a group of researchers submitted their analysis of an ancient proto-galaxy illuminated by quasar ULAS J1120+0641 and whose redshift dates it at 772 million years after the big bang[13]. The surrounding gas was still mostly non-ionized and there is little evidence of heavier elements to indicate that star formation had yet begun. One question this research poses is: if stars had not yet begun to form, then where did the massive black hole that became the quasar come from?

If the black hole had formed within the galactic cloud, its evolution would have brought it through star formation and supernova processes, just to create a *stellar mass* black hole. Then it would need to continue consuming gas and/or stars for many millions more years before becoming the mass of a quasar. That much heat radiation should ionize most of the galaxy's hydrogen, yet the hydrogen was not ionized.

It would appear that the massive black hole already existed when the proto-galactic gas cloud overran it. The dense new gas had only activated the quasar a few million years earlier and the quasar did not yet have time to ionize the galactic cloud.

A universe that continuously smashes objects would be thoroughly littered with debris like the asteroids and comets that litter our solar system. Black holes would also make up a goodly portion of this cosmic litter. Mixing new and old bashes will amass conglomerates that would be anomalous to an isolated big bang.

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. The oscillating quasars drag a lot of gas with them and these streams might shape the clouds into barred spiral galaxies. Short oscillations create simple spiral galaxies while progressively longer oscillations 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 will slow significantly, causing the quasar to dim and begin to behave like an ordinary central black hole.

A bash's newly expanding cloud constantly overruns older objects. Huge quantities of old black holes accrete the new gasses and form quasars by the billions. While their masses texturize the cosmic background, the extreme collective quasar radiation reionizes the new gas.

Discussion

One objective of this model is to support a postulate 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 three spatial dimensions.

There is also much more for quantum physicists to explore in 3D space. The subject of a pervasive and omnidirectional electromagnetic field comes to mind.

Singularities are concentrated masses and the pervasive background radiation rules out any tendency for them to evaporate. Their pure mass is distinct from energy, but they are surrounded by huge Schwarzschild radii that focus the inflowing radiation. These awesome electromagnetic fields crush all incoming matter and provide extreme gravitational forces.

This suggests mass and energy may not be truly transmutable. All energy forms flow into black holes, yet, black holes seem to expel only electromagnetic radiation. If that's the case, it seems electromagnetism is the only true force and the source of all other forces. That would lead us to question Einstein's equivalence of mass and energy and prompts this scenario regarding his famous 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 to one another, their kinetic energies are each expressed as: $E = ½ mv^2$ (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: $E = mc^2$.

Einstein's equation very simply describes the kinetic energy of two masses being accelerated by an externally induced force, bashing them at the speed of light, and injecting its energy into the resulting big bang. Thereby, the purest energy of the universe gets homogenized with the purest mass of the universe. The accelerating force of electromagnetism transforms the energies of the exploding singularities from $E = 0$ to $E = mc^2$. It's only thereafter that we can say the total energy of the big bang is expressible as $E=mc^2$.

This separability of mass and energy at cosmic levels means it's also separable at particle levels. Therefore, charged particles are masses that are separable from both their electric charges and their electromagnetic forces. This suggests any force that binds particles together is externally induced. Let's examine that concept:

Cosmic background radiation is part of the entire universe, but our big bang has an extra concentration within its expanding bounds. Both old and new radiation is omnidirectional and intermixing as a single field, with a diminished flux gradient just beyond the big bang periphery.

When we sprinkle iron filings near a magnet, its field causes the non-magnetic filings to become temporary magnets and attract one another. This phenomenon is scalable; so if we sprinkle galaxies in a magnetic field; they, too, become attracted to one another—like powdered iron clumps and strings. Stars, planets, and quarks are also immersed in this field and are attracted to one another by its *induced* force.

Physicists say electromagnetism seems to be 10^{39} times more forceful than gravity. That doesn't hold up when we examine the gravitational forces of a pair of colliding singularities. Both electromagnetism and gravity have a force that approaches infinity as the distance between masses approaches zero; and gravity's force limit easily extends to that of the strong nuclear force, when quark masses come into contact with one another. If gravity seems 10^{39} times weaker on earth than between quarks then I'd conjecture quarks must be 10^{20} times closer together than atoms are. Our perspectives change when we view the strong, weak, and electromagnetic forces as being induced by an overlaid field.

Einstein's curvature of space-time mimics the perspective that electromagnetic radiation is attracted to—and focuses within—massive objects in proportion to their mass-density. Quarks are pretty dense and singularities are even denser.

Paul Dirac's 1962 paper, "An extensible model of the electron", purports that electrons have a spherical bubble membrane[13]. Quarks had not yet been discovered and he never updated this paper to include them. I'd suggest Dirac was correct and further suggest that *all* electrically charged particles have membranes. While Dirac's model places charges outside the membranes, mine encloses them within. This variance stems from the observation that quark charges don't annihilate one another on contact when neutron stars squeeze them together under extreme pressure. Strong elastic membranes would both isolate charges and impart mass to particles. When neutron stars get massive enough to become black holes the membranes burst, neutralizing their charges, and the inert membrane residue becomes the cold dense mass of singularities.

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 sustained by photon streams. They may gather and dissipate charges as they flow past charged particles. An infinite universe has plenty of black holes for gathering this neutrino dust.

Differentiating between mass and energy makes it easier to imagine how induced electro-magnetic energy can act as both the strong and weak nuclear forces. Gravity's attractive force between quarks is limited only by distance. When externally magnetized quark membranes get squeezed together, either in stars or by the collision forces of particle accelerators; their contact surfaces enlarge and their holding force becomes adequate to overcome the repulsion of internally trapped charges. This membrane-flattening increases the magnetic holding force sufficiently to compensate for the fact that the distances between quark centers can't quite go to zero. Trapped charges are isolated by membranes, so their spacing can't go to zero either. Their repulsive force is limited by the membranes' thickness and dielectric nature.

Quantum physicists should investigate nuclear forces as though they are induced forces that are not native to particles. This will also shed new light on radioactive decay.

Dark matter behavior may also be attributable to electromagnetism. The rotation of large structures like galaxies and galactic clusters suggests they have far more mass than they appear to. This invisible surplus mass allows the extremities of these structures to rotate around their centers as fast as central matter does; which is faster than outer matter should rotate without flying off in space. This extra mass neither transmits nor absorbs light, so it's called dark matter. The big problem is: we can't identify any dark matter. Physicists even seek it down at quantum levels.

While the Big Bash model does provide a means for depositing old heavy matter in galaxies that would otherwise be lighter, my conjecture is that dark matter is not matter at all. Instead, it's a magnetohydrodynamic force behavior that appears when the radiation of stars ionize the gas in their galaxies and causes rotating matter to behave like it's suspended in a viscous jell.

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[14].

"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[15]. From Alfvén's perspective, this field strength would be more than 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.

While the Big Bash model does not require an accelerated inflation to explain either CMB texture or its uniform temperature; it does have an opportunity for this inflation. When the bash boils the singularity masses; it injects its heat and electrostatic charges into this froth and forms quantum particles. So, if an inflationary event did instantly increases the volume of the big bang, it would be at this explosive popcorn moment.

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. Big bashes act as entropy's rechargeable batteries. 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 peculiarities. It will take far more work to back-track this complex system and explore its beginnings than it took to rewind and examine our relatively simple big bang.

This model provides a philosophical bonus in that it suggests sufficiently intelligent life forms may be able to wend their way through the minefield of cosmic hazards that eradicate less capable organisms like 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 those we waste on war. Our rate of cosmic mastery seems to be limited mostly by humankind's underestimate of its need for peace and cooperation. Hopefully, our wisdom will evolve sufficiently in time for us to save Earth's highly evolved life forms.

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.

This Big Bash model is being introduced in its entirety for the first time and likely contains flaws, either in theory or presentation, that need to be addressed. The author welcomes input and will respond to as many e-mails as he can.

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