

The Growth History of Our Bubble Universe

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I. Singularity Condensation

In the Chaotic Void, energy bodies collided endlessly. One extremely low-probability embedding knocked out a minute ordered structure. It was not scattered. Instead, it continuously absorbed more energy bodies, crossed a critical scale, and formed a self-reinforcing condensation core—the Singularity.

Inside the Singularity was a unique set of "Order"—the compressed seed of future physical laws. Under the sustained compression of chaotic pressure, the Singularity grew denser and denser, until the external pressure surpassed its tolerance limit.

The Singularity was detonated. The internal ordered structure unfurled in an instant into a spherical conversion front—the Rule-Wall.

II. The Engine of Expansion

The Rule-Wall is a continuously running conversion engine. Its outer side contacts the chaotic energy of the Void, forcibly calibrating the posture of every energy unit, translating each from a grammar of disorder into a grammar of order, then releasing it inward as mass-energy conforming to this universe's physical laws.

The continuous injection of internal mass-energy creates pressure from the inside outward; the Rule-Wall's own conversion activity continuously pushes it further into the Void. These two superimposed effects drive the Rule-Wall forward in a self-sustaining manner. This is the fundamental engine of cosmic expansion.

Near the Rule-Wall's conversion front, conversion reactions are violent, and the flow of time is far faster than in the stabilized interior. From the interior observing the boundary, the front recedes at a rate far exceeding the speed of light—this is not matter moving superluminally through space, but the Rule-Wall carrying spacetime itself forward through the Void. The speed of light is an internal traffic rule of the universe and does not constrain the hand that creates the traffic rule.

III. The Frenzy Period

The region around the Singularity was the zone of highest Void energy density. In the early days of the Rule-Wall, conversion was most violent, and the injected matter was most concentrated—from an internal observer's perspective, this was the "Big Bang": the entire universe in a state of extreme temperature and density, with matter and radiation tightly coupled.

After bursting out of the high-density zone, the Rule-Wall entered the open wilderness of the Void, where energy density tended toward the average and conversion entered a steady period. The universe began to cool. The first stars and galaxies began to condense.

IV. Barrens and Ordinary Voids

The Void is not uniform. Sometimes the Rule-Wall advanced into barren zones where energy density was extremely low. There was little to convert. The matter injected during this stretch of expansion was minimal, forming a sparsely populated "void" within the universe.

Such voids are modest in size—under a few hundred million light-years. They still contain a few galaxies within, their boundaries indistinct. They are direct projections of the uneven distribution of Void energy, not products of gravitational clearing.

V. Bubble Remnants and Intermediate Voids

The Rule-Wall advanced past the site of a failed bubble. That bubble's Rule-Wall had long since annihilated; its internal matter was undergoing a long degradation—gradually regressing from order toward chaos.

The degrading remnants still bore the imprint of the old universe's rules. The Rule-Wall could only convert the portion that had already fully degraded and shed its old imprint, forming the very sparse scattering of galaxies and gas within the void. The greater part of the undegraded remnants could not be converted, occupying space yet not participating in this universe's electromagnetic interactions—henceforth invisible.

These voids are somewhat larger—several hundred million light-years—with even sparser internal galaxies, though scattered distributions remain. They are the vestiges of failed universes.

VI. The Life-or-Death Battle and the KBC Void

This is the most spectacular scene in the entire voyage.

The Rule-Wall encountered another active Bubble Universe—likewise a spherical conversion front, likewise expanding, likewise with galaxies turning in its interior. The two Rule-Walls closed in on each other through the Void, and at last made direct contact.

Two entirely different sets of physical laws clashed head-on at the contact surface. Each side tried to calibrate the other's matter with its own rules. The two logics collided and negated each other. The spacetime structure twisted and tore at the line of engagement.

This universe's Rule-Wall was more stable. Its ordered structure withstood the assault, while the opponent's conversion logic began to collapse under the extreme pressure—the Rule-Wall was torn apart, annihilated.

Once the opponent's Rule-Wall ruptured, all the matter of its internal universe was exposed. After the Rule-Wall's annihilation, the opponent universe's Void energy, losing confinement, flowed back in enormous quantities and was captured and converted by this universe's Rule-Wall. This was an engulfment of unprecedented scale.

But the opponent universe's stars, galaxies, and gas—already ordered under the old rules and bearing the stubborn imprint of those rules—could not be converted by this universe's Rule-Wall. They were entirely engulfed into this universe's interior, occupying a vast spherical space, not participating in electromagnetic interactions, invisible, yet retaining their mass.

From an internal observer's perspective, this is an enormous defect roughly two billion light-years in diameter: sharp boundary, near-perfect spherical shape, interior matter extremely sparse. Astronomers call it the KBC void.

The back-flowing Void energy, after conversion by this universe's Rule-Wall, formed a very small number of scattered galaxies within the void—this is why the KBC void still contains extremely sparse solitary stars. They are not remnants of the old universe but products of back-flowing Void energy re-converted after the old universe's annihilation.

It is not a void. It is the battlefield site of a cosmic-scale life-or-death war. We won. We devoured the opponent. We are floating at the center of this victory monument.

VII. Collisions and Temperature-Density Anomalies

The Rule-Wall also experienced local collisions with other active bubbles. Such collisions may have occurred many times. In the long voyage history of the Rule-Wall, glancing encounters with active bubbles are not isolated incidents.

The contact surfaces were spherical local regions millions of light-years across—large-area surface contacts, not point contacts. The collision energy was diffusely distributed and could not be focused into a point-like gravitational source. Neither side leaked internal matter into the other.

What the collisions left on the Rule-Wall were diffuse temperature and density anomalies—on the CMB, possibly manifesting as large-area faint hot spots or cold spots; in the large-scale distribution of galaxies, possibly manifesting as structural discontinuities. Since such events may have occurred multiple times, the temperature anomaly pattern on the CMB may not be the result of a single collision but the superposition of traces from multiple collisions.

These traces are visible and diffuse, not invisible, focused, point-like gravitational sources.

VIII. Singularity Engulfment and the Great Attractor, Primordial Black Holes

As the Rule-Wall advanced, it engulfed a Singularity still in condensation. The high-density Void energy around the Singularity was violently converted, but the Singularity core itself penetrated the Rule-Wall intact—it was too dense, too ordered to be dismantled.

This foreign body fell into the universe's interior: not participating in

electromagnetic interactions—its "Order" was written under old rules—thus entirely invisible. Its mass was extraordinarily enormous—all the energy the Singularity had attracted during its condensation period. Its volume was minuscule, its density near-infinite.

It became an immense, invisible gravitational source, tugging on galaxies within a range of hundreds of millions of light-years—the perfect explanation for the *Great Attractor*.

If the Singularity core is subsequently enveloped and accreted upon by this universe's matter, forming an event horizon, it becomes a primordial supermassive black hole—not a product of stellar collapse, but a primeval relic that existed before this universe's birth.

It must be noted: Singularity cores engulfed into this universe's interior have lost the capacity for self-eruption. The triggering condition for eruption is the sustained disordered high pressure exerted by external Void chaotic energy. This universe's interior is an ordered space already converted by the Rule-Wall and contains no such chaotic compressive environment. Therefore, these primeval Singularity cores cannot self-detonate within this universe into new Bubble Universes—they can only persist permanently in the form of naked gravitational sources or black holes.

IX. Penetration and Anomalous High-Energy Particles

The Rule-Wall is not absolutely perfect. It has an upper limit to conversion efficiency. It has localized weak points. Extreme high-energy chaotic turbulence in the Void sometimes penetrates directly through the conversion front, breaking into the universe's interior without calibration. This energy retains its primordial chaotic nature, does not obey this universe's physical laws, and manifests as "ghost particles"—cosmic rays with such extreme energies they cannot be explained by any known acceleration mechanism.

There is also a milder form of penetration: a portion of chaotic energy is partially

calibrated during the penetration process—neither fully chaotic nor fully ordered, but "semi-finished." These incompletely converted penetrants, after entering the universe's interior, may participate in gravitational interactions but not electromagnetic ones, becoming one source of the invisible mass pervading the environs of galaxies.

X. The Eternal Voyage

Over thirteen billion years have passed. The Rule-Wall still advances, but the density of Void energy has greatly declined. Expansion slows. In time it will enter the Breathing State—conversion continues, but accelerated expansion has ceased. The advance of the Rule-Wall and the supply of Void energy maintain a dynamic equilibrium, neither expanding violently outward nor collapsing inward.

The Rule-Wall has witnessed: the violence of the Frenzy Period, the desolation of the barrens, the vestiges of failed bubbles, the life-or-death engulfment of another living universe, the thermal imprints left by multiple brief collisions, the intact implantation of Singularity cores, the continuous penetration of chaotic fragments.

All of this is carved into the large-scale structure of the universe. The voids, the Great Attractor, the primordial black holes, the anomalous cosmic rays—they are not products of internal gravitational evolution. They are the log of the Rule-Wall's billion-year voyage, the ineffaceable wake upon the skin of the universe.