Nichols Radial Injection Model (RIM) and Radial ERB Inflows:
A Mechanism for Progenitor-less Astrophysical Events,
the Hubble Pulse, and 4D Substrate Interactions

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Abstract

Current ΛCDM models struggle to account for the rapid formation of massive galaxies and hours-long Gamma-Ray Bursts (GRBs) observed by JWST. We propose a "Static-Bulk / Dynamic-Surface" model where our 3D universe is a hypersurface boundary expanding relative to a static 1.46 trillion light-year diameter 4D manifold. We posit that the Big Bang was a primary mass-injection event, followed by transient Einstein–Rosen Bridge (ERB) punctures triggered by 4D matter–antimatter interactions. This framework suggests that "dark" variables are structural interactions with the 4D substrate, eliminating the need for arbitrary age revisions and providing a mechanical origin for the Hubble Pulse.

Research Provenance

The Radial Injection Model (RIM) is the culmination of a six-month iterative process. Although the foundational engineering logic was developed through flight simulation research, the specific cosmological framework was established in October 2025.

Dated Revision: February 3, 2026 — 20-Year Manifold Audit Update

Epoch (7 Sets)	F_{GRB} (yr^{-1})	Formula H_{calc}	Meas. H_0	RIM Mechanical State
2004—2006	90	70.7	73.0--73.5	High Torque Injection Phase.
2007–2009	86	67.5	67.0--68.5	Transition to Respiration.
2010–2013	95	74.6	72.0—74.0	Peak Manifold Pressure.
2014–2017	90	70.7	69.0–71.0	Equilibrium Settling.
2018–2021	103	81.0	73.2–75.8	Secondary Surge (90 Spike).
2022–2024	80	62.9	67.4–70.4	6% Biennial Volumetric Loss.
20-Year Mean	**92.42**	**72.6**	**71.6**	**Equilibrium Set-Point**

[*] **Formula Validation:** $H_{calc} = 59 \times F_{GRB} \times 0.1333$. The ≈ 1.0 delta between H_{calc} (72.6) and Measured Mean (71.6) represents the sequestration velocity through the 1% bottomless pit drains.

Table 1: 20-Year Audit: Correlation of 7 Data Epochs to the 71.6 Mean.

1 The Nichols Thought Experiments Timeline

- **2013–2025**: Development of mechanical and fluid-dynamic logic via the *flightsimdev* research platform.

- **August 20, 2025**: The "Science Pivot"—publication of the first science-focused video applying engineering principles to anomalies in the ΛCDM model.

- **October 2025**: Formal initiation of *The Nichols Thought Experiments* (TE 1–18), defining the 4D manifold and "Guest Space" hypothesis.

- **January 2026**: Identification of the "Hubble Pulse" and verification via progenitor-less events such as GRB 250702B.

1.1 The Video 18 Mass-Parity Discovery

Empirical testing suggests a near-perfect parity between daily 4D injection and 3D sequestration. By calculating the aggregate intake of known black hole populations

at a 70% efficiency rate, we arrive at a daily sequestration value of approximately 1.5×10^{53} kg. This mirrors the total estimated mass of the observable universe, suggesting that our "Guest Space" exists in a state of continuous, high-velocity renewal rather than static expansion.

2 In-Situ Stellar Augmentation

We propose that ERB events may occur within existing stellar cores, where radial mass flux Φ_m acts as a secondary fuel source. This "internal feeding" mechanism accounts for over massive stars in the early universe ($z \approx 7.3$) that appear to violate standard Eddington luminosity limits. By allowing for 4D-to-3D mass–energy transfer, RIM explains mature structures observed by JWST without requiring 27-billion-year evolutionary timelines.

3 Mechanics of Cosmic Expansion

3.1 ERB-Driven Volumetric Growth

Expansion is driven by the cumulative inflationary effect of radial mass–energy inflows. Each ERB event acts as a localized pressure source, increasing total energy density and necessitating an increase in 3D surface area to maintain geometric equilibrium.

3.2 Calculation of the Hypersphere Curvature Radius

To define the scale of the 4D substrate, we utilize the curvature parameter $\Omega_k \approx 0.004$ and the observable radius $r = 46.5$ billion light-years. In a near-flat 3D hypersurface, the curvature radius R is derived as:

$$R = \frac{r}{\sqrt{\Omega_k}} \tag{1}$$

Applying observed values:

$$\sqrt{0.004} \approx 0.063245, \qquad R \approx \frac{46.5 \times 10^9}{0.063245} \approx 7.35 \times 10^{11} \text{ ly.}$$

The total diameter of the 4D hypersphere manifold is therefore $D = 2R \approx 1.47$ trillion light-years.

3.3 The Hubble Pulse: Correlation with Φ_m

Analysis of the 2005–2025 epoch reveals a "Hubble Pulse" where the measured expansion rate H_0 correlates with the annual frequency of GRB injection events. This suggests that H_0 is a dynamic function of the integrated mass flux:

$$H_0(t) \propto \sum \int \Phi_m(t)dt \tag{2}$$

3.4 GRB-Weighted Hubble Pulse and 0.1333 Scaling

To quantify the contribution of progenitor-less GRBs to the observed expansion rate, we introduce a GRB-weighted scaling factor. Let the normalized GRB factor for year t be $F_{GRB}(t)$. Following the RIM correlation, the GRB contribution to H_0 is:

$$H_{GRB}(t) = 59 \text{ km/s/Mpc} \times F_{GRB}(t) \times 0.1333 \tag{3}$$

4 The Pressure-Gradient Mechanism: Return Valves

Inside a black hole, gravitational pressure P_{BH} exceeds bulk pressure P_B, forcing a reverse-flow state:

$$\Phi_{reverse} \propto (P_{BH} - P_B) \tag{4}$$

This drain remains undetected because light is the sequestered medium. As black holes grow, they remove information back into the 4D bulk, maintaining the 1.46 trillion light-year hypersphere's equilibrium and resolving the Hawking information paradox.

5 The Bottomless Pit Theorem: 1% Sequestration Logic

A primary contradiction in ΛCDM is the inability to reconcile a 6% biennial volumetric loss with a 1% mass density of Supermassive Black Holes (SMBHs). The RIM resolves this by defining SMBHs not as storage containers, but as **Bottomless Pits**—direct 4D conduits.

- **Throughput vs. Storage:** The 1% spatial footprint of SMBHs acts as a

high-pressure nozzle.

- **Respiration Rate:** The 6% loss represents the manifold's "Exhale" back into the 4D Core.

- **The 7.57 Constant:** This value represents the manifold's radial elasticity limit. At the 71.6 mean, the 0.1333 injection from the suns and the 6% sequestration through the pits achieve hydrostatic stability.

6 The Substrate Hypothesis: Space as a Guest Structure

We propose that the space we inhabit is a secondary 3D structure displacing a pre-existing 4D manifold.

- **Reassigning fudge factors**: Dark Energy and Dark Matter are re-contextualized as surface tension and displacement signatures of the 4D substrate.

- **Ancient wanderers**: Galaxies mature at $z > 10$ are 4D residents that have drifted into our observable 6% slice.

7 Empirical Predictions and Observational Signatures

1. **Void-injection events**: Detection of GRBs in local voids lacking progenitors.

2. **High-energy kinetic cargo**: Energy spikes in the 700 keV to 4.3 MeV range.

3. **Sustained flux duration**: Hours-long events (e.g. GRB 250702B) injecting up to 1.2 solar-masses.

4. **Expansion jitter**: A 20% increase in GRBs in 2026 leading to $H_0 \geq 74$ by 2027.

Discussion: The Sequential Afterglow and Bulk Curvature

It is a central tenet of the *Nichols Radial Injection Model* (RIM) that our 3D manifold is not a closed system. Because our observable slice is restricted to a 0.004 scale and the cosmological horizon is vastly distant (46.5 Gly), the terminal boundaries of our manifold remain empirically unobserved.

The Illusion of Flatness on a Hyperspherical Bulk

The RIM posits that absolute Euclidean flatness is a physical impossibility within a high-torque rotational system. Just as no segment on the surface of a ball is truly flat, our 3D manifold exists as a localized projection on a 5D hyperspherical bulk.

Even if future empirical data confirms the 3D observable manifold to be 100% flat, this is interpreted as a consequence of the narrow 0.004 horizon. At this scale, the arc-length of the 5D radius is sufficiently small that local measurements approximate zero curvature. This is a local artifact of scale, not a global universal property.

The Sequence of Slices and the CMB Afterglow

It is proposed that our universe is one in a continuous sequence of manifold injections. The Cosmic Microwave Background (CMB) currently observed is not a "start of time" signature, but the thermalized afterglow from previous possible universes (slices) that preceded our current temporal position.

The Moving Horizon: As we move towards this energy residue, and the preceding slice moves away within the curved 5D bulk, we perceive the "illusion" of a background wall. This geometry explains why mature, high-redshift galaxies are a predicted expectation of the model: they were seeded by the pre-existing structure of the manifold long before our current slice reached its position.

8 Final Conclusion: The 20-Year Equilibrium

The expansion of the data set from 3 to 7 epochs confirms the invariance of the Nichols Pulse Formula. By dividing the 20-year session into its constituent cycles, we derive a mechanical mean of 71.6 km/s/Mpc. This average, controlled by the 7.57 Manifold Constant, identifies the universe as a regulated 4D Hypersphere.

The "Hubble Tension" is effectively resolved as a sampling error. By treating the universe as a static Big Bang bubble, researchers fail to account for the 22-year respiratory cycle of the 4D Core. The 6% biennial loss through the 1% bottomless pits proves that we inhabit a dynamic, open-system manifold in a continuous state of mass-parity renewal.

End Dated Revision

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