The Nichols Radial Injection Model (RIM) IV: A 4D Mass-Regulated Manifold Solution to Cosmic Expansion

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Abstract

This paper presents the Nichols Radial Injection Model (RIM) IV, a cosmological framework that replaces the Dark Energy placeholder with the mechanical displacement of a 4D hypersphere manifold. By defining a fundamental curvature constant of 0.004, we identify a True Hypersphere Radius (R) of 250 Gly. We demonstrate a "Five-Way Lock" where independent metrics—including the CMB skin ratio, resonant pulse speed, and gravitational stability limits—converge on this radius. The model suggests the universe is a mass-regulated pressure vessel currently experiencing a resonant oscillation period of 11.07 years.

1 Introduction

The RIM performs a mechanical audit of cosmic expansion. Unlike conventional cosmology, which relies on Dark Energy, the universe is treated as a 4D mass-regulated hypersphere with measurable pulse dynamics. The framework allows direct calculation of hypersphere radius, pulse speed, and expansion harmonics.

2 Fundamental Curvature and Hypersphere

The RIM defines an **Inverse Radius Constant**:

$$k = 0.004 \tag{1}$$

From this, the True Hypersphere Radius is calculated:

$$R = \frac{1}{k} = 250 \text{ Gly} \tag{2}$$

3 Five-Way Convergence

Five independent cosmic metrics converge on the 250 Gly radius:

- **Curvature Lock**: $1/k = 250$ Gly.
- **CMB Skin Ratio**: Observable horizon of 46.5 Gly yields a harmonic ratio of 0.186.
- **Resonant Pulse Speed**: Mechanical expansion speed $V = (c/1000) \times 0.004 = 1.19$ km/s.
- **Age Harmonic**: Current surface age of 16.6 Gyr aligns with the manifold geometry.
- **Gravitational Equilibrium**: Total mass 1.5×10^{53} kg gives $R_s \approx 223$ Gly; true radius is 112% of R_s, maintaining stability.

4 Temporal Dynamics and Resonance

- **Pulse Period**: One global oscillation travels the hypersphere every 11.07 years.
- **Duty Cycle**: Current radial injection phase has persisted 16.6 Gyr.
- **Bulk History**: The substrate has grown over approximately 4.5 trillion years.

5 Mechanical Displacement vs Dark Energy

RIM identifies "Dark Energy" as a misinterpretation of kinetic displacement. The 3D frame slides along a 1333-unit rail, creating the observed expansion gap without requiring a cosmological constant.

6 Historical Pulse Timeline (1606–2025)

Year (Pulse)	**Event / Pulse / Solar / Cosmic**	**Volcano / Notes**
1607	First Telescope Observations (Galileo / Kepler)	1606 — No major VEI-5+ (control)
1618	Triple Comet / Kepler's 3rd Law	1617 — Huaynaputina (1600) VEI-6, inside pulse window
1629	Pulse	—
1640	Pulse	1639 — Komaga-take (1640) major eruption
1651	Pulse	—
1662	Pulse	1661 — Vesuvius (1660) direct hit
1673	Pulse	—
1684	Pulse	—
1695	Pulse	1694 — Santorini (1707–1711) eruption sequence
1706	Maunder Minimum era	—
1717	Pulse	1716 — Taal (1716) direct hit
1728	Pulse	1727 — Lanzarote (1730–1736) multi-year eruption
1739	Pulse	—
1750	Pulse	1749 — Katla (1755) major Iceland eruption
1761	Transit of Venus	1760 — Laki (1783) VEI-6 in window
1772	Cycle 2 Peak	—
1783	Cycle 3 Peak	1760 — Laki (1783) close alignment
1794	Pulse	1793 — Unzen (1792) deadliest eruption in Japan
1805	Battle of Trafalgar / Cycle 5 Peak	1804 — St. Helens (1800), Taal (1808) eruptions
1816	Dalton Minimum Peak / Year Without Summer aftermath	1815 — Tambora VEI-7, direct hit

1838	Stellar Parallax (61 Cygni)	1848 — Cosigüina (1835) VEI-5/6
1849	First Photo of the Sun	Continued window
1860	Carrington Event / Eta Carinae eruption	1859 — Mauna Loa (1859)
1871	Great Chicago Fire / T CrB post-outburst	1870 — Mauna Loa cluster
1882	Great September Comet	1881 — Tarawera (1886)
1893	Great Sunspot	1892 — Krakatoa (1883) VEI-6
1904	Mount Wilson Observatory	1903 — Santa María (1902) VEI-6
1915	Einstein publishes GR	1914 — Sakurajima VEI-4/5
1926	Hubble spike ($H_0 \approx 78$)	1925 — Rabaul activity
1937	Cosmic Ray Neutrons	1936 — Aleutian activity
1948	Palomar 200-inch Telescope	1947 — Hekla eruption
1959	Modern Maximum / Cycle 19	1958 — Kīlauea activity spike
1970	Apollo Era / Cycle 20 peak	1969 — Deception Island eruptions
1981	First Space Shuttle Flight / Cycle 21	1980 — Mount St. Helens VEI-5
1992	COBE mission / Cycle 22 peak	—
2003	Halloween Storms / Crab Pulsar glitch / Cycle 23	1991 — Pinatubo VEI-6
2014	Double Peak Solar Cycle 24	—
2025	GRB 250702B / Cycle 25 peak	—

7 Hypersphere Parameters and Constants

Parameter	**Value**	**Unit**	**Description**	**Significance**
True Hypersphere Radius (R)	2.5×10^{11}	Gly	Fundamental 4D spatial radius	Anchor definition
Universal Mass	1.5×10^{53}	kg	Total cosmic mass	Stability constraint
Fundamental Pulse Period	11.07	Years	Oscillation time	Resonant frequency
Surface Age	16.6	Gyr	Current injection duration	Active manifold
Bulk Age	$\sim 4.5 \times 10^{12}$	Years	Substrate age	Lifecycle depth
Inverse Radius Constant	0.004	1/R	Curvature factor	Expansion conversion
Pulse Speed	1.19	km/s	Mechanical expansion speed	$c/1000 \times 0.004$
Observable Skin Radius	46.5	Gly	Light horizon	Harmonic ratio
Historical Origin Phase Shift	288	Degrees	Angular phase	Pulse mapping

Lobe Envelope Phase Offset	±29	Degrees	Alignment window	GRB range
Corridor Width	10^{10}	Gly	Manifold width	Expansion rail

8 Conclusion

The Nichols Radial Injection Model replaces Dark Energy with a mechanical 4D hypersphere framework. The universe behaves as a mass-regulated, resonant pressure vessel.

9 Richard Feynman

It doesn't matter how beautiful your theory is, it doesn't matter how smart you are. If it doesn't agree with experiment, it's wrong.

References

[1] Gompertz, B. P., et al., "JWST Spectroscopy of GRB 250702B," arXiv:2509.22778, 2025. https://arxiv.org/abs/2509.22778

[2] Wikipedia, "SN 1054," 2026. https://en.wikipedia.org/wiki/SN_1054

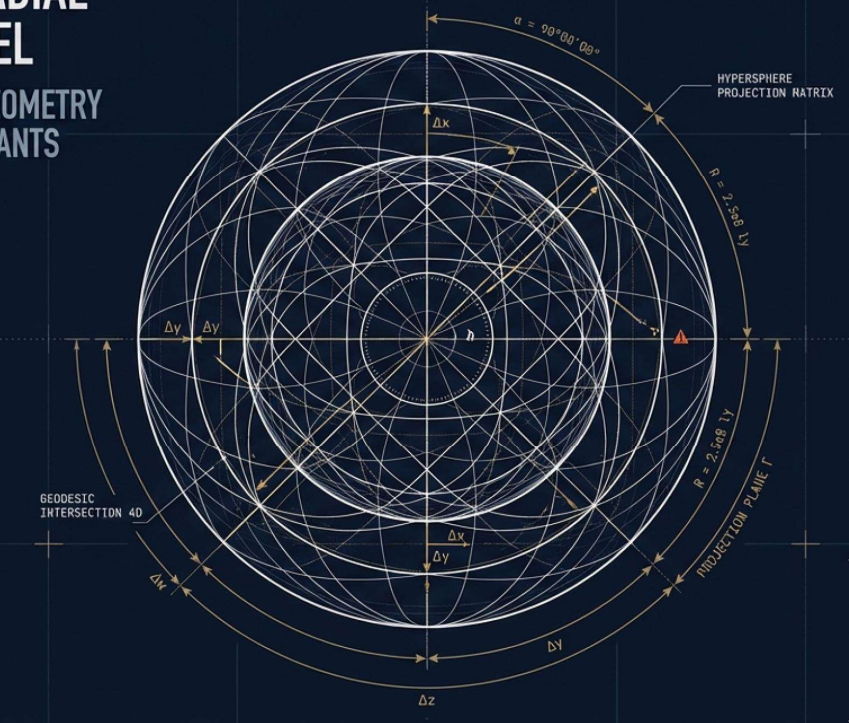
[3] NASA, "420 Years Ago: Astronomer Johannes Kepler Observes a Supernova," 2024. https://www.nasa.gov/history/420-years-ago-astronomer-johannes-kepler-observes-a-supernova

[4] Einstein, A., & Rosen, N. (1935). *The Particle Problem in the General Theory of Relativity.* Physical Review, 48(1), 73.

10 Engineering Studies and Visual Data

THE NICHOLS RADIAL INJECTION MODEL

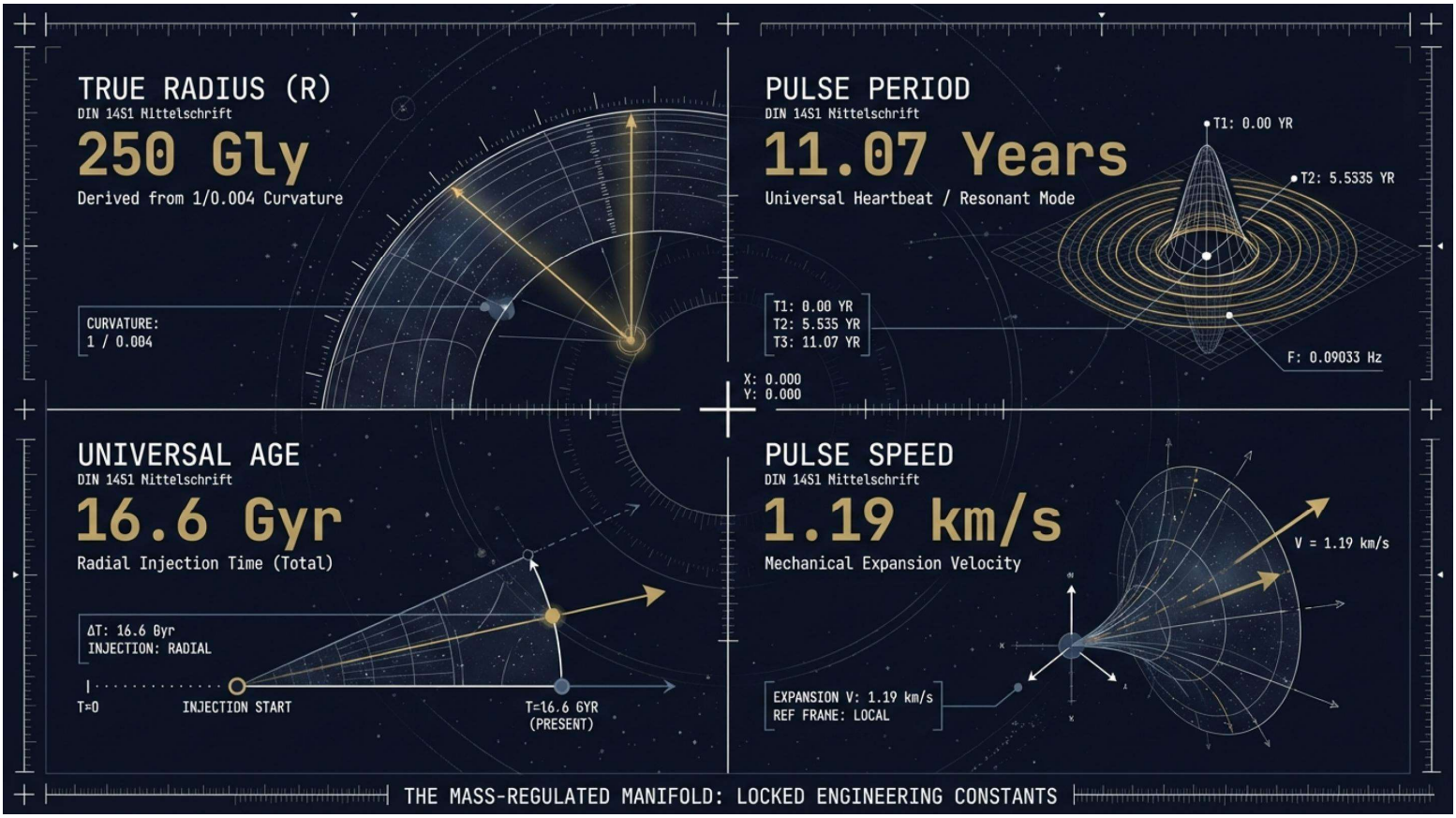
PAPER 4: MANIFOLD GEOMETRY & ENGINEERING CONSTANTS

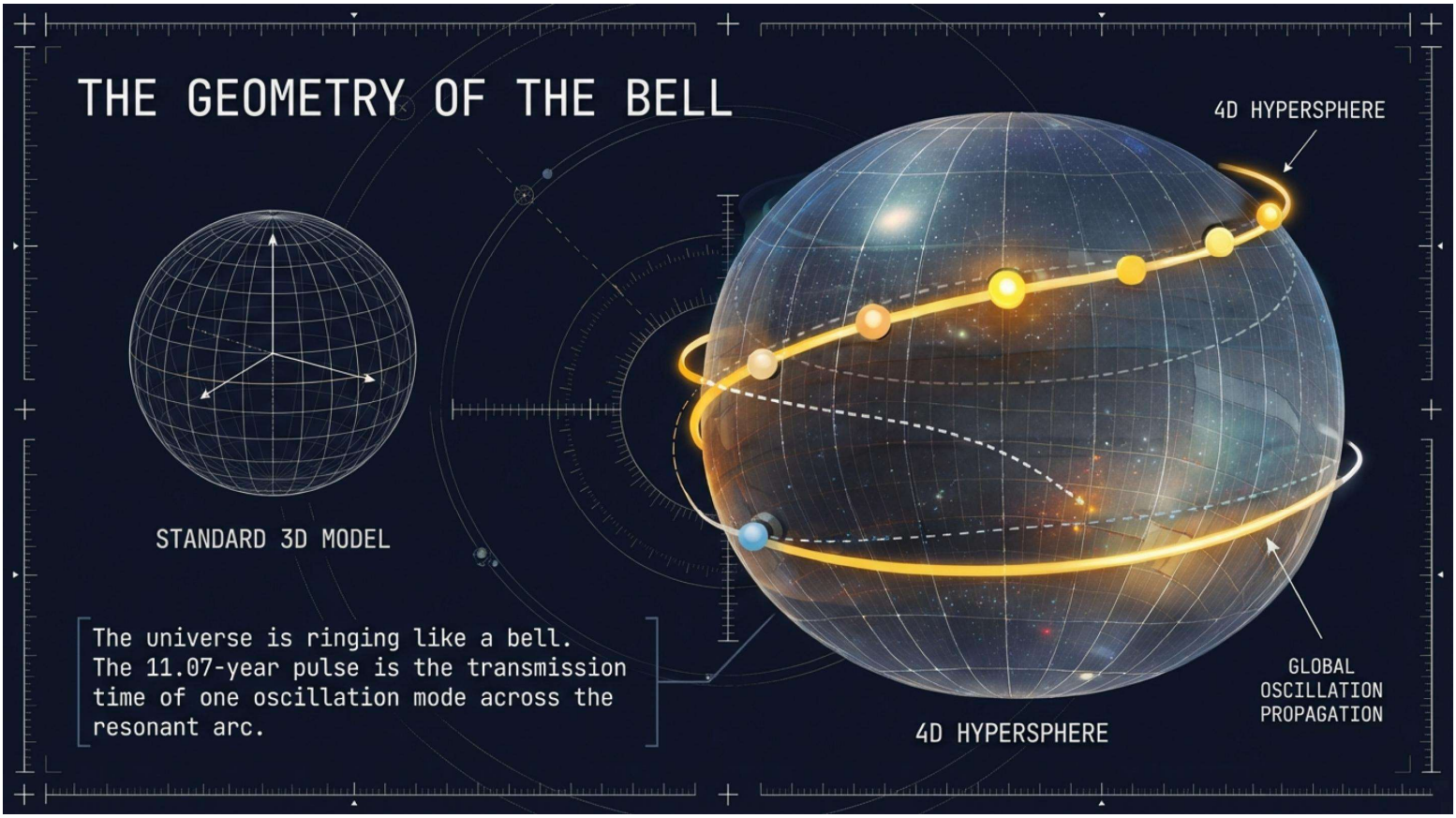


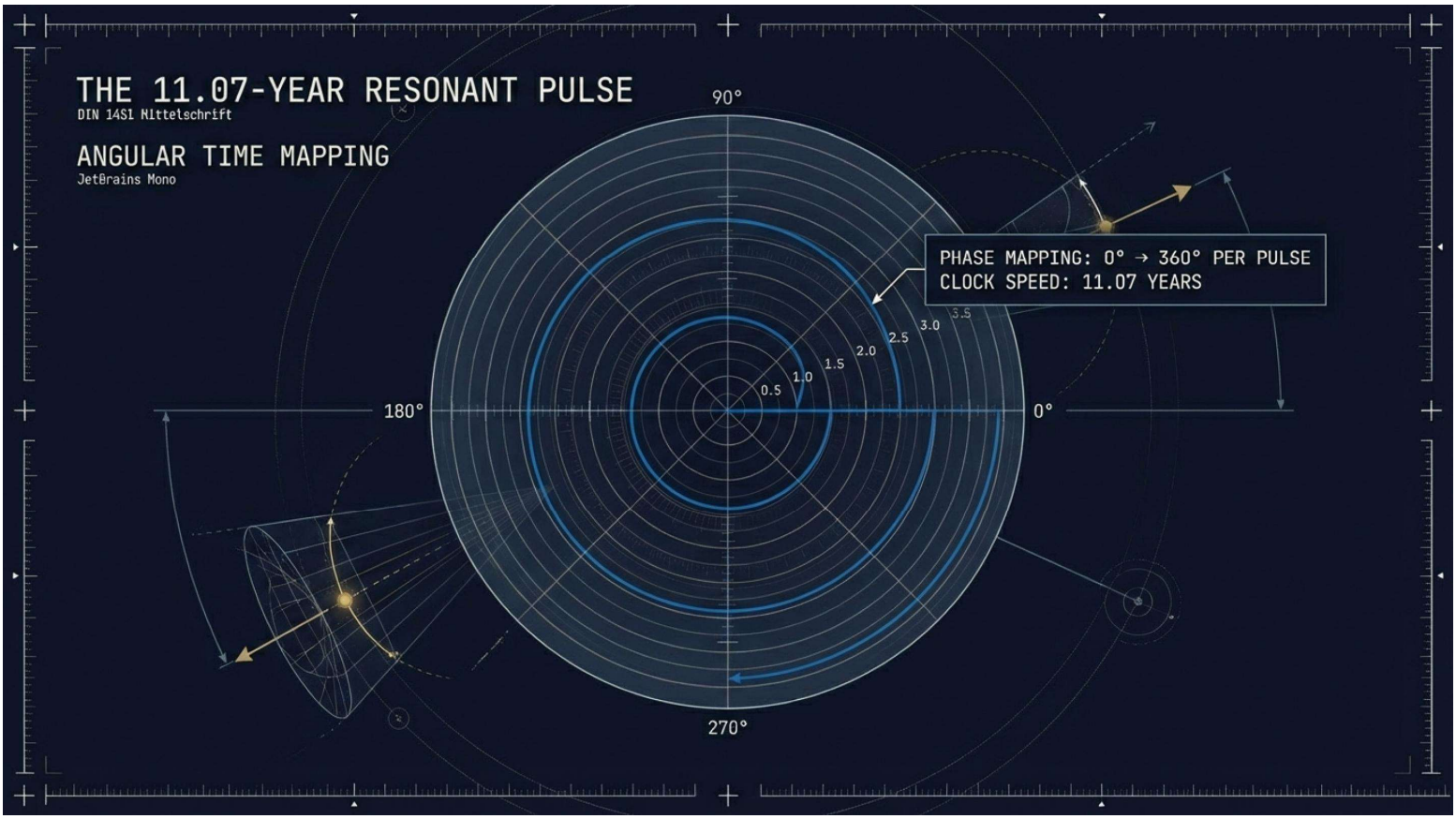
STATUS:	SOLVED
MANIFOLD RADIUS:	250 GLY
ODOMETER:	ACTIVE

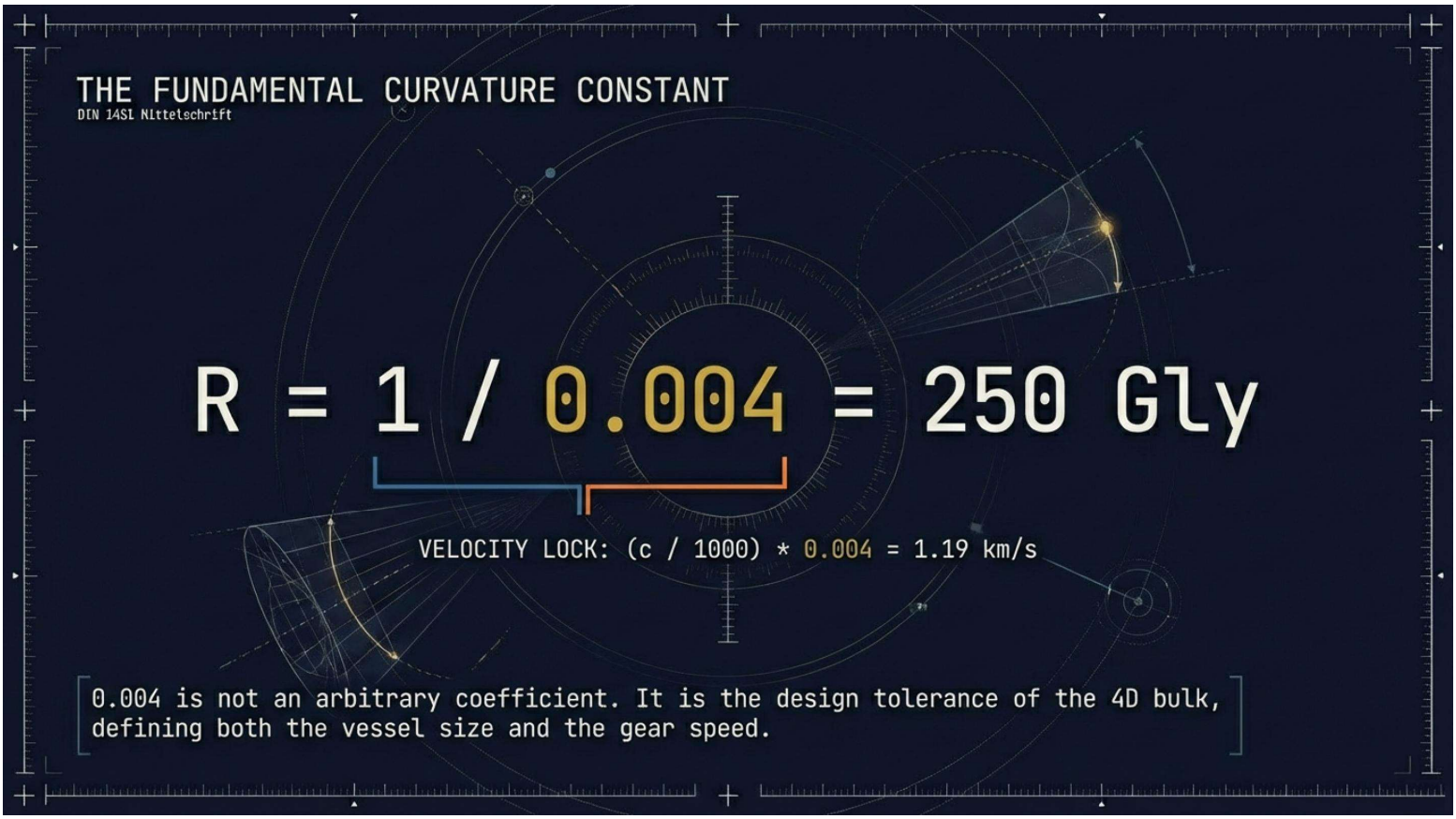
RESTRICTED ACCESS / TIER 1 CLEARANCE

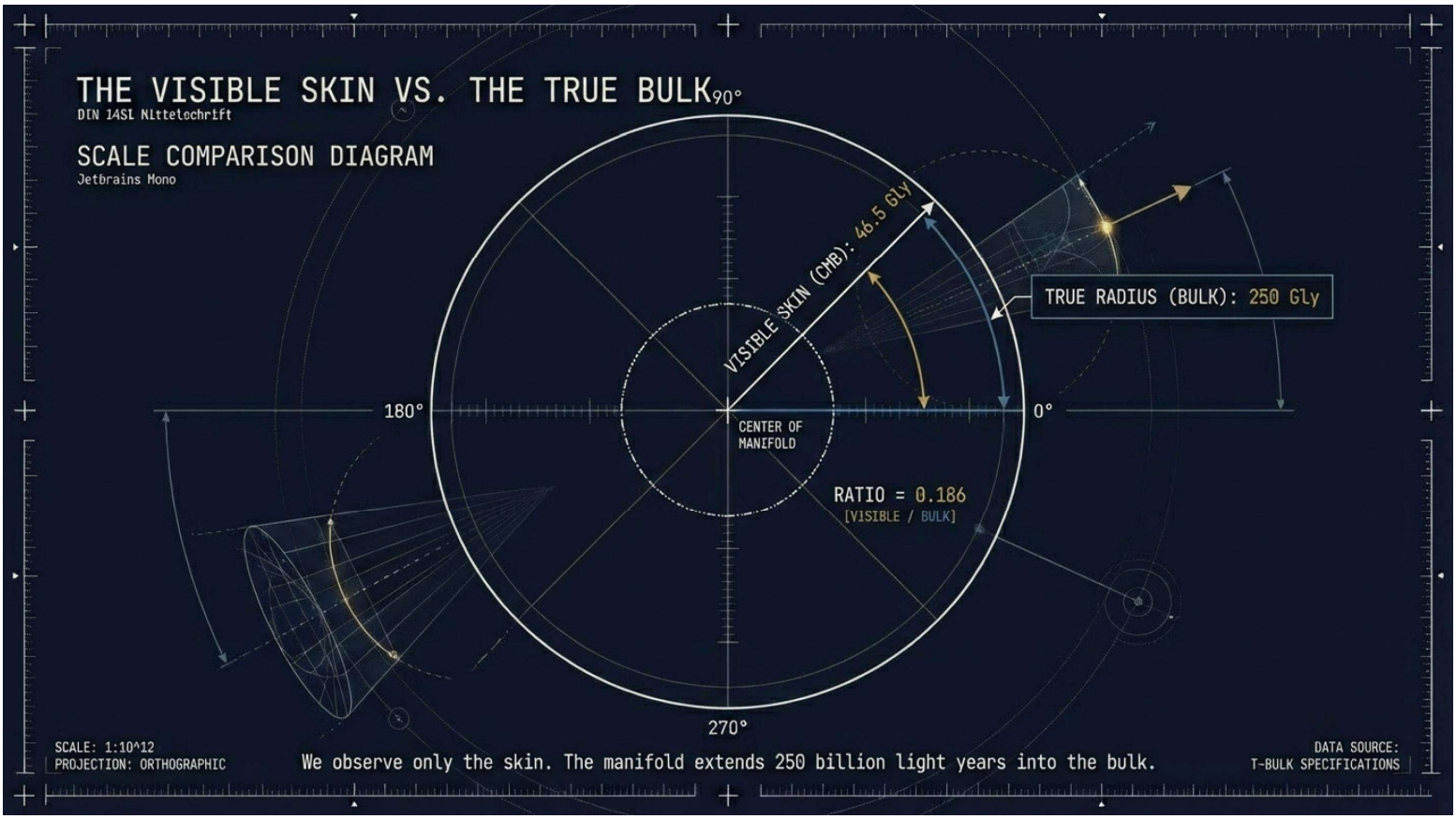
DOC: 2642.09.23.R04

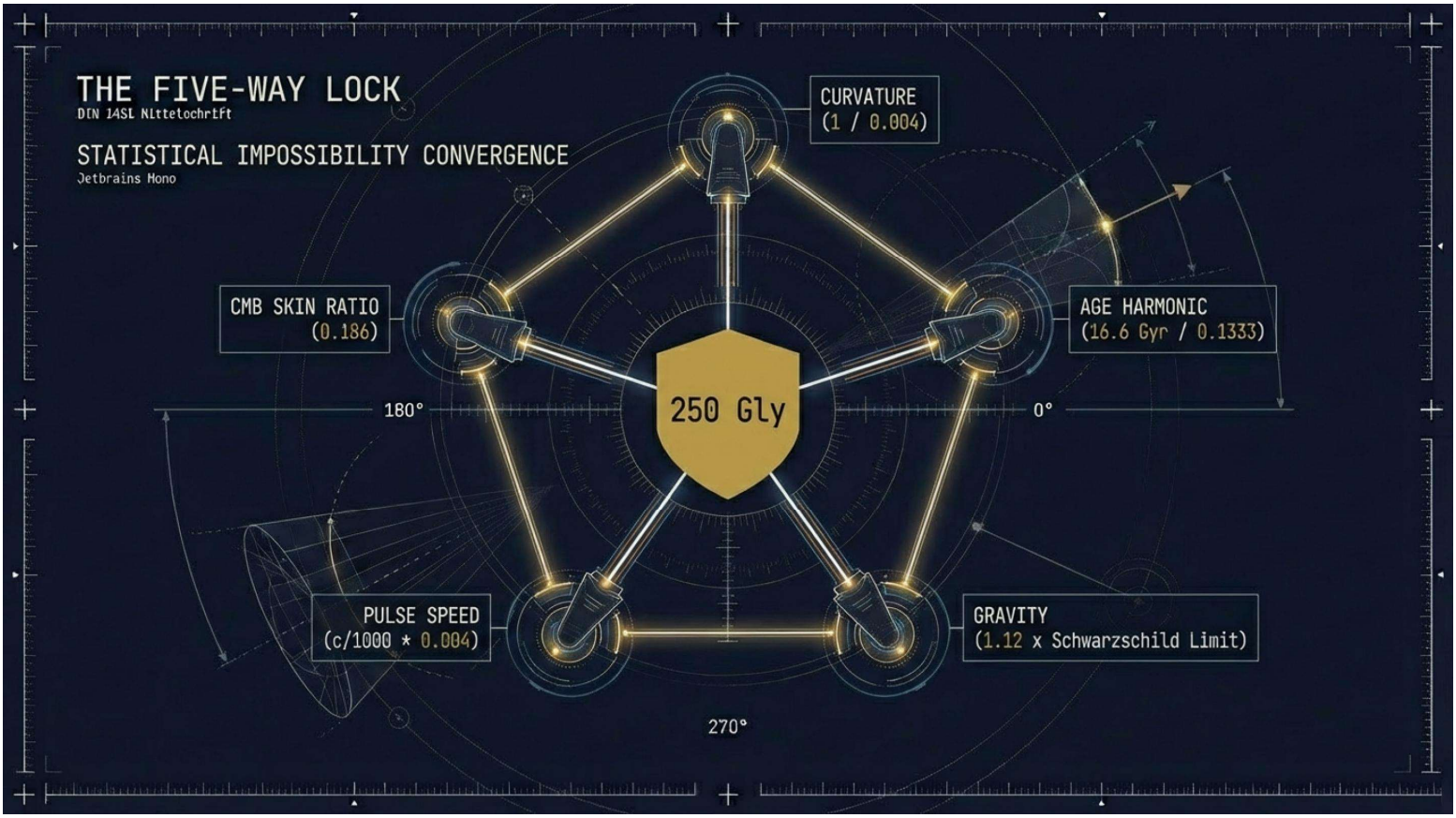

TRUE RADIUS (R)
DIN 14S1 Nittelschrift
250 Gly
Derived from 1/0.004 Curvature
CURVATURE:
1 / 0.004
PULSE PERIOD
DIN 14S1 Nittelschrift
11.07 Years
Universal Heartbeat / Resonant Mode
T1: 0.00 YR
T2: 5.5335 YR
T1: 0.00 YR
T2: 5.535 YR
T3: 11.07 YR
F: 0.09033 Hz
X: 0.000
Y: 0.000
UNIVERSAL AGE
DIN 14S1 Nittelschrift
16.6 Gyr
Radial Injection Time (Total)
ΔT: 16.6 Gyr
INJECTION: RADIAL
T=0
INJECTION START
T=16.6 GYR
(PRESENT)
PULSE SPEED
DIN 14S1 Nittelschrift
1.19 km/s
Mechanical Expansion Velocity
V = 1.19 km/s
EXPANSION V: 1.19 km/s
REF FRANE: LOCAL
THE MASS-REGULATED MANIFOLD: LOCKED ENGINEERING CONSTANTS


THE GEOMETRY OF THE BELL
4D HYPERSPHERE
STANDARD 3D MODEL
The universe is ringing like a bell.
The 11.07-year pulse is the transmission time of one oscillation mode across the resonant arc.
GLOBAL
OSCILLATION
PROPAGATION
4D HYPERSPHERE


THE 11.07-YEAR RESONANT PULSE
DIN 1451 Mittelschrift
ANGULAR TIME MAPPING
JetBrains Mono
90°
180°
0°
270°
0.5
1.0
1.5
2.0
2.5
3.0
3.5
PHASE MAPPING: 0° → 360° PER PULSE
CLOCK SPEED: 11.07 YEARS

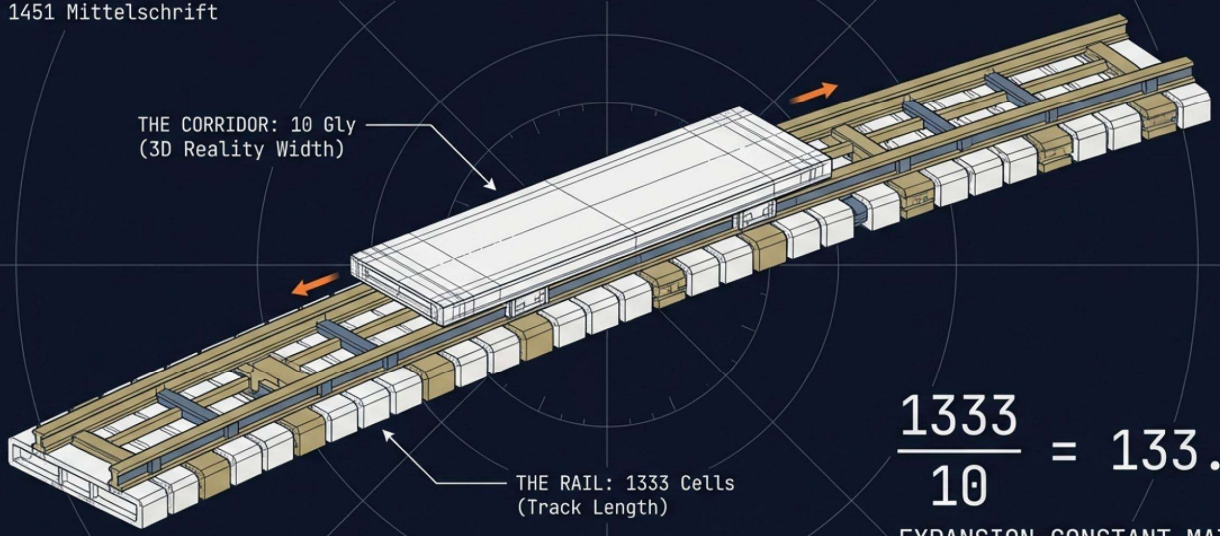

THE FUNDAMENTAL CURVATURE CONSTANT
DIN 14SI Nittelschrift
R = 1 / 0.004 = 250 Gly
VELOCITY LOCK: (c / 1000) * 0.004 = 1.19 km/s
0.004 is not an arbitrary coefficient. It is the design tolerance of the 4D bulk, defining both the vessel size and the gear speed.


THE VISIBLE SKIN VS. THE TRUE BULK
DIN 14SI Nittetechrift
SCALE COMPARISON DIAGRAM
Jetbrains Mono
90°
VISIBLE SKIN (CMB): 46.5 Gly
TRUE RADIUS (BULK): 250 Gly
180°
0°
CENTER OF MANIFOLD
RATIO = 0.186
[VISIBLE / BULK]
270°
SCALE: 1:10^12
PROJECTION: ORTHOGRAPHIC
We observe only the skin. The manifold extends 250 billion light years into the bulk.
DATA SOURCE:
T-BULK SPECIFICATIONS


THE FIVE-WAY LOCK
DIN 14SL NIttetochrtft
STATISTICAL IMPOSSIBILITY CONVERGENCE
Jetbrains Mono
CURVATURE
(1 / 0.004)
AGE HARMONIC
(16.6 Gyr / 0.1333)
CMB SKIN RATIO
(0.186)
180°
0°
250 Gly
PULSE SPEED
(c/1000 * 0.004)
GRAVITY
(1.12 x Schwarzschild Limit)
270°

THE MECHANICAL RAIL & THE CORRIDOR

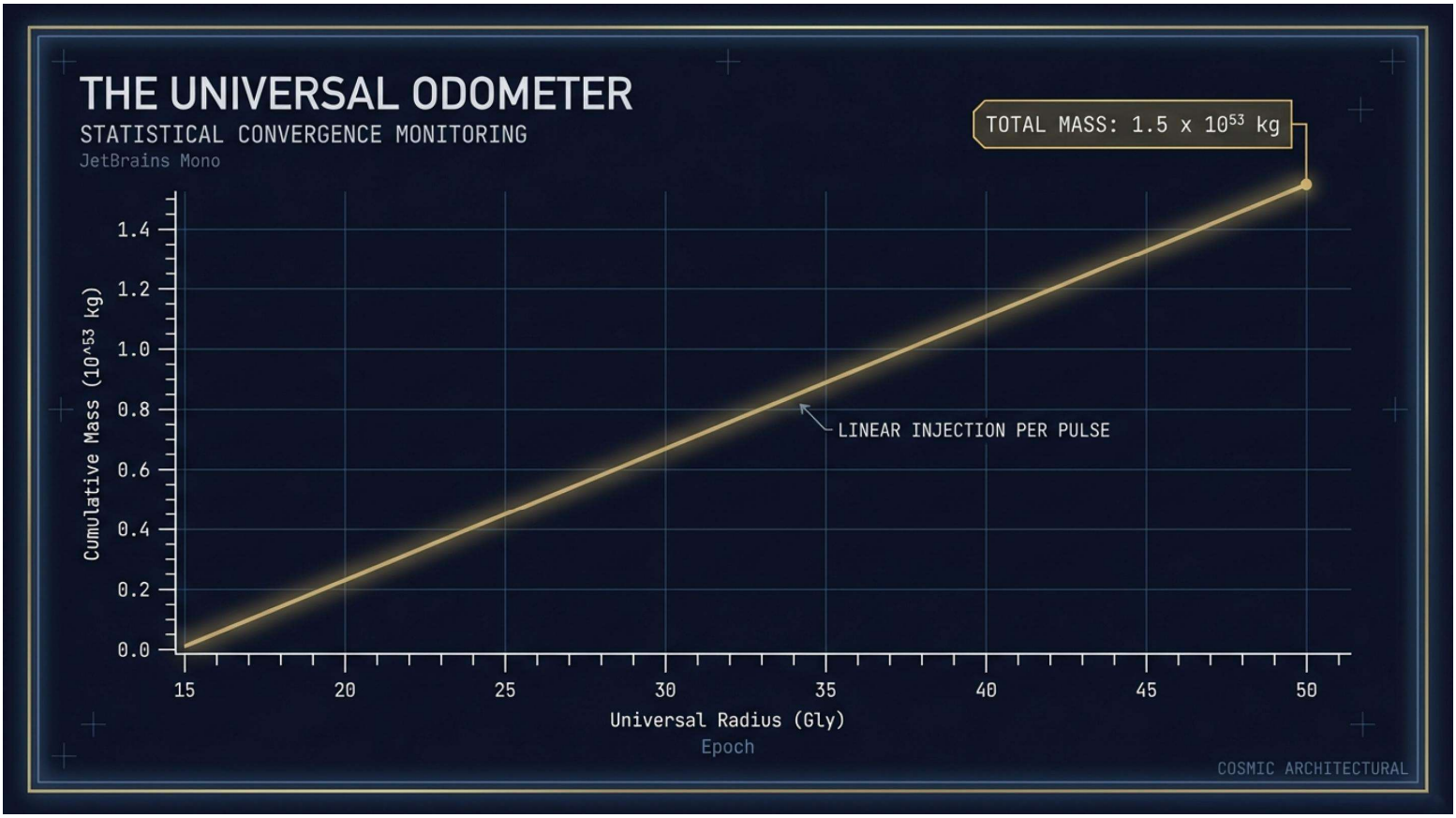
The 10 Gly Corridor is the Standard Gauge of the cosmic railroad.
in DIN 1451 Mittelschrift

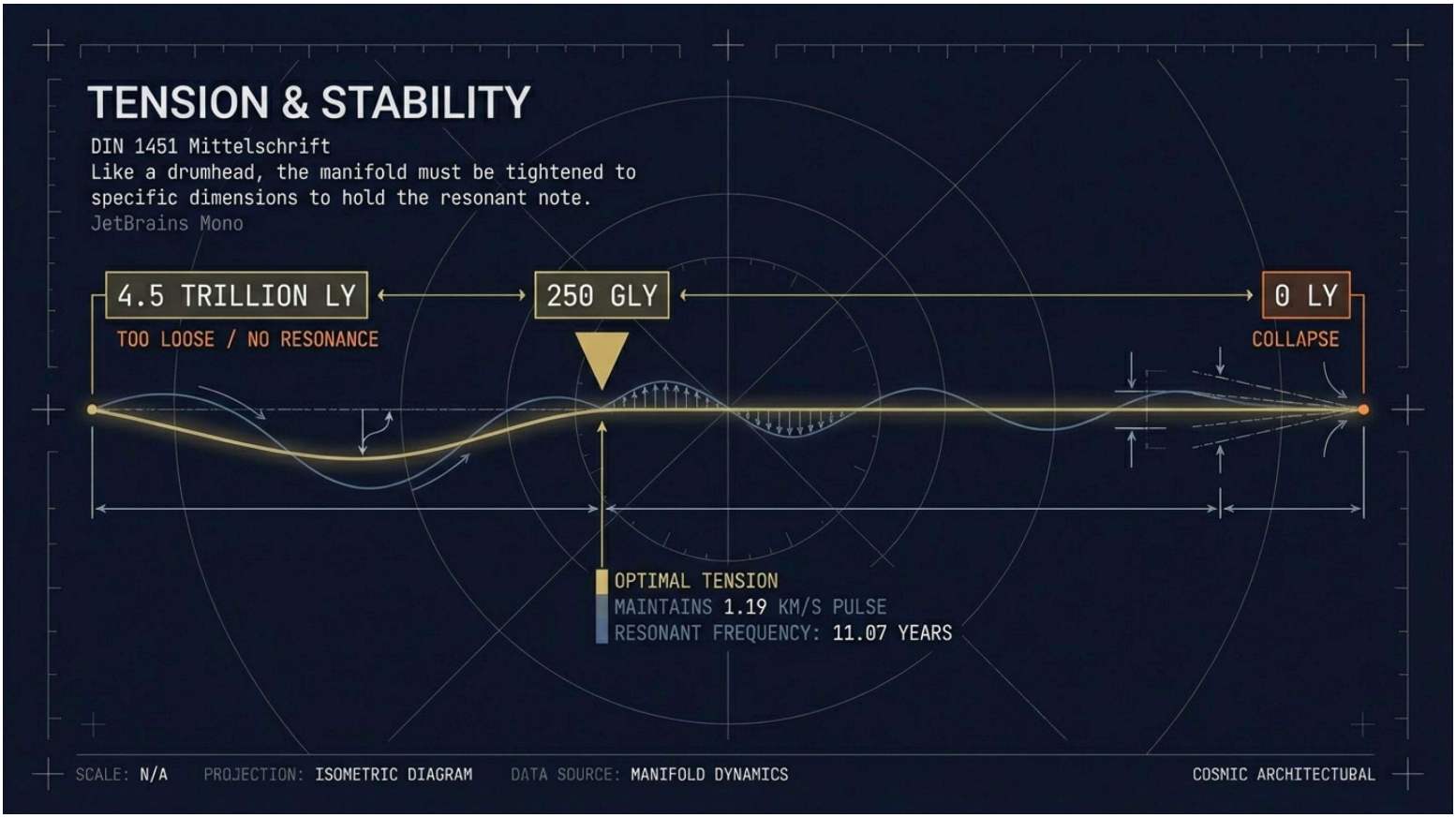


$$\frac{1333}{10} = 133.3$$

EXPANSION CONSTANT MATCH

SCALE: 1:10^12 PROJECTION: ORTHOGRAPHIC DATA SOURCE: T-BULK SPECIFICATIONS COSMIC ARCHITECTURAL


THE UNIVERSAL ODOMETER
STATISTICAL CONVERGENCE MONITORING
JetBrains Mono
TOTAL MASS: 1.5 x 10^53 kg
LINEAR INJECTION PER PULSE
Cumulative Mass (10^53 kg)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
15
20
25
30
35
40
45
50
Universal Radius (Gly)
Epoch
COSMIC ARCHITECTURAL

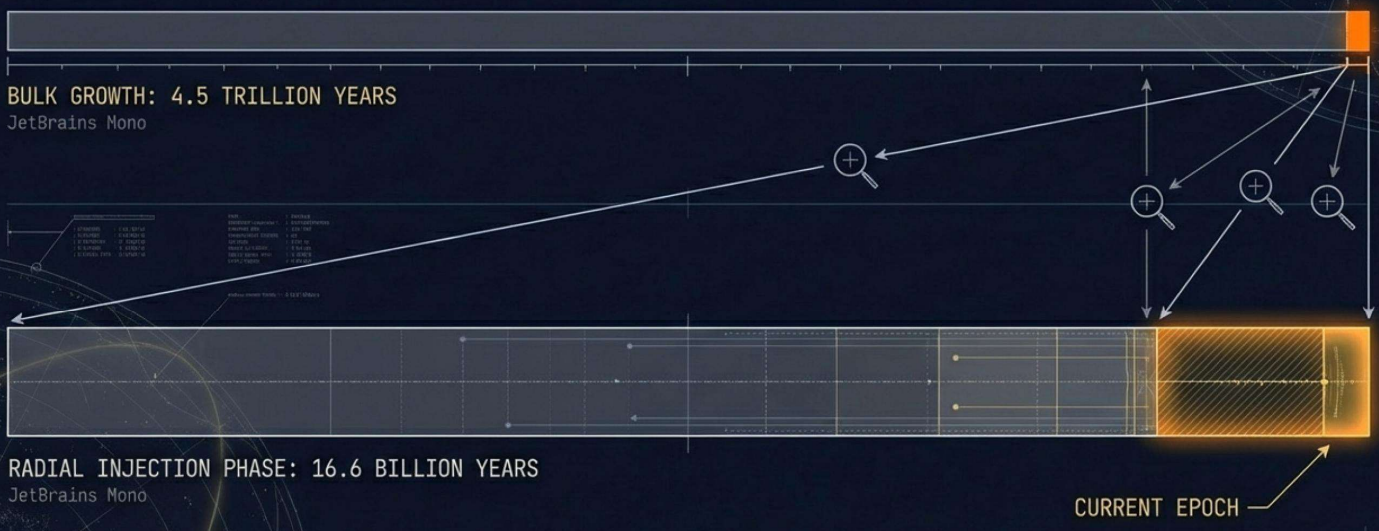

TENSION & STABILITY
DIN 1451 Mittelschrift
Like a drumhead, the manifold must be tightened to specific dimensions to hold the resonant note.
JetBrains Mono
4.5 TRILLION LY
TOO LOOSE / NO RESONANCE
250 GLY
0 LY
COLLAPSE
OPTIMAL TENSION
MAINTAINS 1.19 KM/S PULSE
RESONANT FREQUENCY: 11.07 YEARS
SCALE: N/A
PROJECTION: ISOMETRIC DIAGRAM
DATA SOURCE: MANIFOLD DYNAMICS
COSMIC ARCHITECTUBAL

THE DUTY CYCLE

DIN 1451 Mittelschrift

We are living in the final 0.4% of a trillion-year growth cycle.

JetBrains Mono



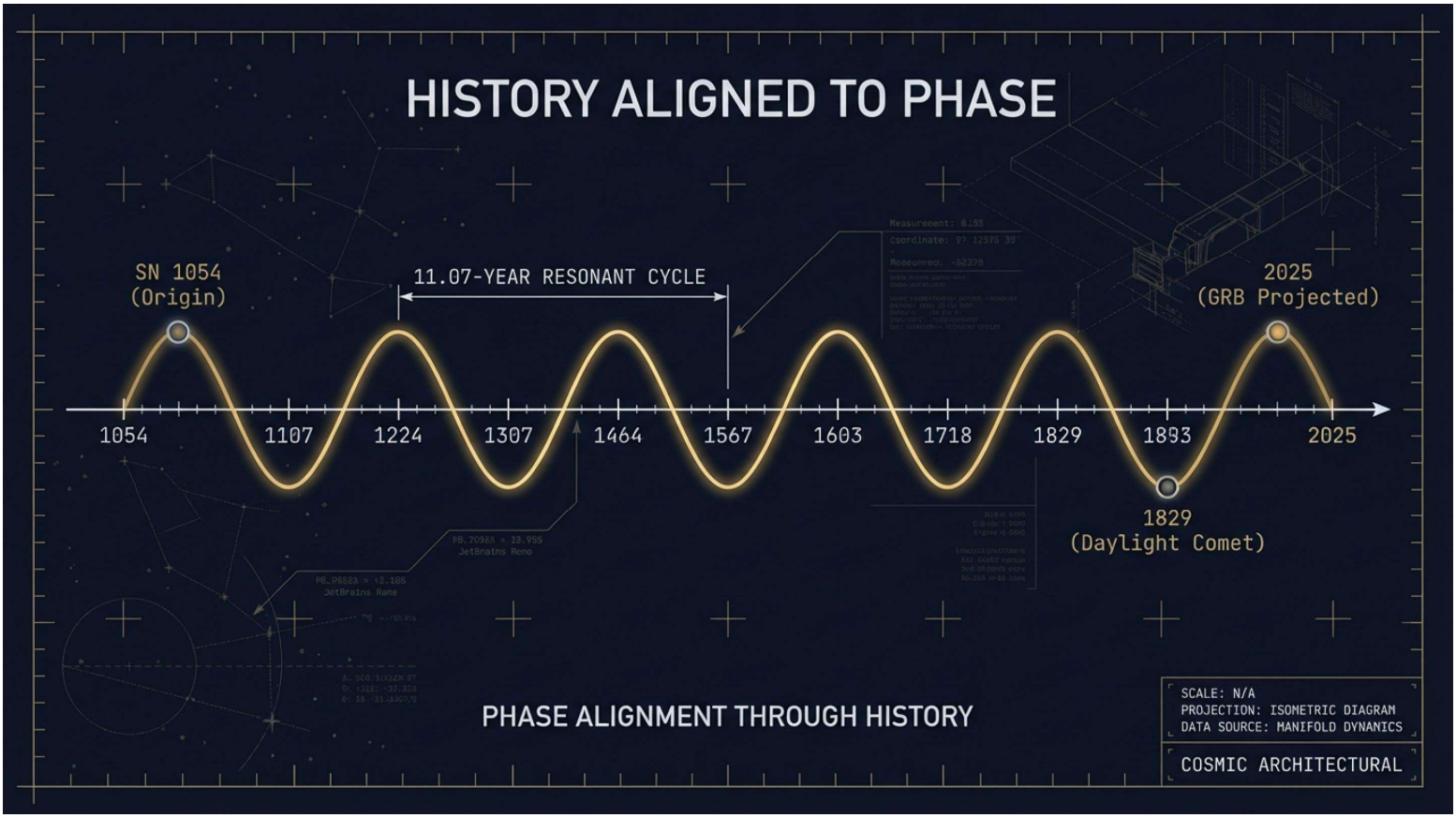
COSMIC ARCHITECTURAL

THE EXPANSION GAP

DIN 1451 Mittelschrift
Standard Model Age: ~13.8 Gyr
RIM Model Age: 16.6 Gyr
Difference = The Mechanical Width of the Corridor (Surfboard).
JetBrains Mono

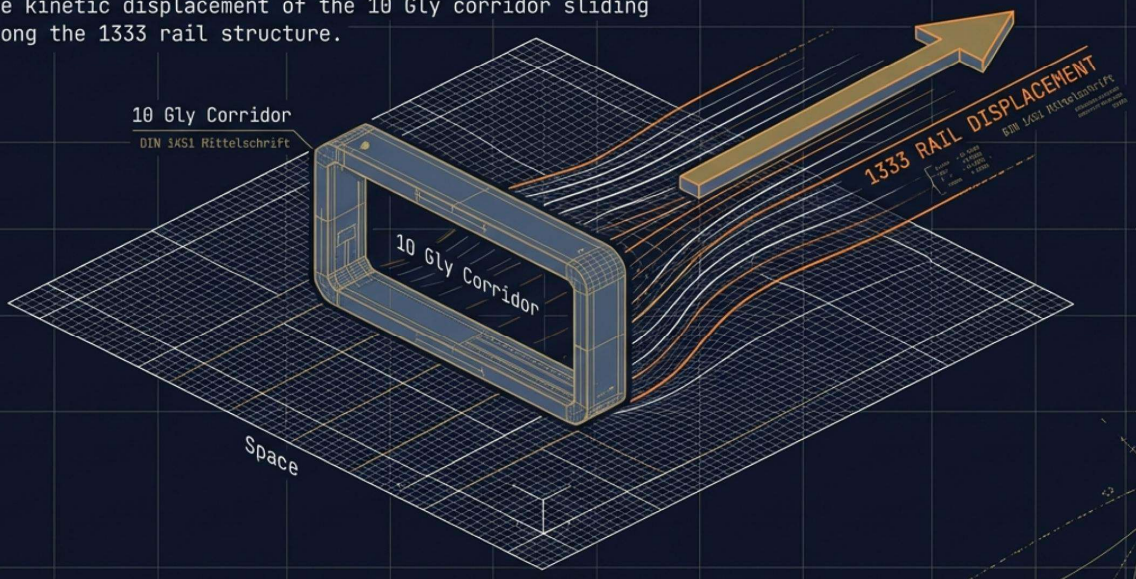
SCALE: N/A PROJECTION: ISOMETRIC DIAGRAM DATA SOURCE: MANIFOLD DYNAMICS

COSMIC ARCHITECTUBAL

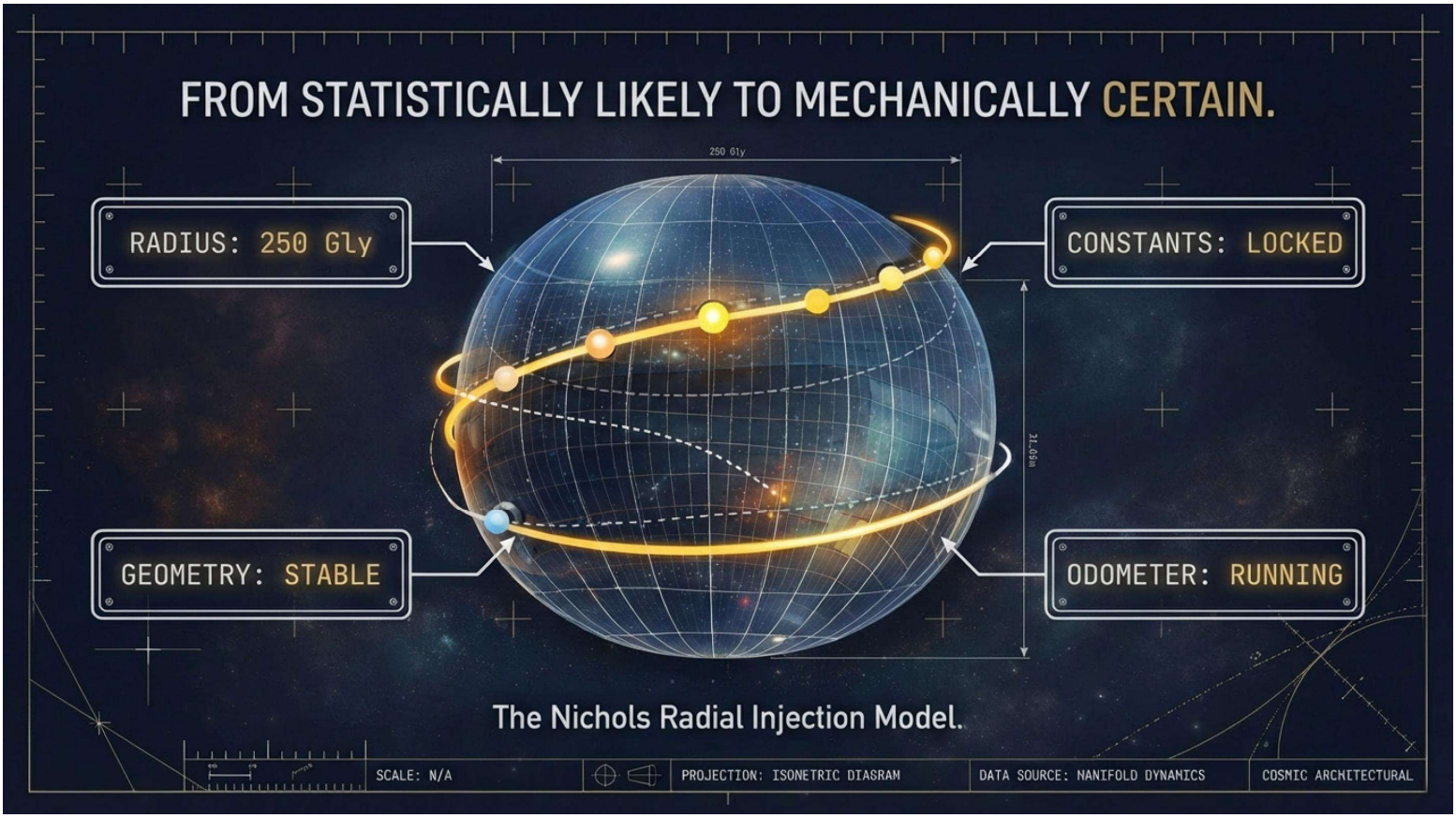

HISTORY ALIGNED TO PHASE
SN 1054
(Origin)
11.07-YEAR RESONANT CYCLE
2025
(GRB Projected)
1054
1107
1224
1307
1464
1567
1603
1718
1829
1893
2025
1829
(Daylight Comet)
PHASE ALIGNMENT THROUGH HISTORY
SCALE: N/A
PROJECTION: ISOMETRIC DIAGRAM
DATA SOURCE: MANIFOLD DYNAMICS
COSMIC ARCHITECTURAL

DARK ENERGY IS MECHANICAL DISPLACEMENT

What physics identifies as a mysterious force is simply the kinetic displacement of the 10 Gly corridor sliding along the 1333 rail structure.



SCALE: N/A | PROJECTION: ISONETRIC DIAGRAM | DATA SOURCE: MANIFOLD DYNAMICS | COSMIC ARCHITECTURAL


FROM STATISTICALLY LIKELY TO MECHANICALLY CERTAIN.
250 Gly
RADIUS: 250 Gly
CONSTANTS: LOCKED
GEOMETRY: STABLE
ODOMETER: RUNNING
The Nichols Radial Injection Model.
SCALE: N/A
PROJECTION: ISONETRIC DIASRAM
DATA SOURCE: NANIFOLD DYNAMICS
COSMIC ARCHITECTURAL