

Fractured Fabric: A UFT from the Discovery of a Quantum Moment Recorded in the Basics of Math

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January 11, 2025

Math is wondrous poetry. Physics is poetry in motion.

Abstract

This is the first of series of papers regarding a discovery that occurred during math theory studies focused on generative functions to create $\mathbb{Z}_{>0}$ in response to prove a conjecture. A framing of natural numbers from data analysis yielded a first-unrecognized scatter plot, now certain a variate-modal, fractal pattern exhibiting qualities of a complex, part non-linear system, which is a 3D projection of a quantum formation. With enough data gathered, this visual ("the Composite", the "Form") and its derivatives can be animated, showing effects of a momentum impacting event, decay and dissipation. With growing certainty, this information replays a proto-particle producing blueprint, etched into memory of the conceptual and the physical in some assumed moment of pre-causality. Its systemic imprint within math theory led to larger questions and exploration. From direct observation and numerical analysis, a theorized framework ("the Idea") develops for energy partitioning and dimensional interaction in the post-inflationary universe.

1 INTRODUCTION

A unproven conjecture provided a recursive rule set proposing terminus at 1 for all $z \in \mathbb{Z}_{>0}$ when sufficiently iterated. Such implies an inverse rule set could generate the same domain.

The above-mentioned data framing resulted from a variety created to attempt the conjecture's proof using this inverse implication. Encountered early but shelved lacking relevance to current efforts, its novelty warranted revisiting and eventually led to further analysis, a working theory and the resulting discourse.

Until recently, a core assumption of analysis was observing an action of emergence. This was not correct. This paper was written during and after this finding.

A journey synopsis is bulleted to convey context. Since first observation, the Form's possibilities progressed as:

- A data framing expressing a bi-nodal distribution curve, possibly helpful with the conjecture
- A waveform whose correct formulation was challenging to categorize due to the consistent similarity between its amplitudes and underneath curvatures¹

¹A humorous hindsight, one of many

- A transitional particle-wavelet complex system dynamically evolving and aligning its phases, while engendering anticipation upon their meeting, e g., merge? oscillate? resonate? pass through?
- An eminent quasi-chaotic yet highly-ordered, multi-factored system that is converging² per repeated output from 1-2 dimensional relational analysis, such as ANONVA p-value analysis
- A situation requiring refocusing on more heuristic and intuitive analytical methods, culminating in the below...

Other analytic methods can be applied. Many have. Resource consideration and perceived pertinence led to the shared observations and analyses herein. We also note this paper has become more an introduction through presentation than intended. Building towards the Idea, visualizations are largely employed to introduce and impart three key points of what this novel number system inscribes:

1. An embedded object...
2. ...that is in motion...
3. ...reverse to our perception of progression of state

To use less abstract words: a quantum form in progress of decay opposite the linear sequencing of our reality. Yet most importantly, despite these key points:

Regarding our math theory, it is indelible.

2 THE COMPOSITE

2.1 OVERVIEW

Central is the following scatter plot formation. It is not data modeled, designer programmed or parameter attenuated. The below plot marks its state upon first observation:

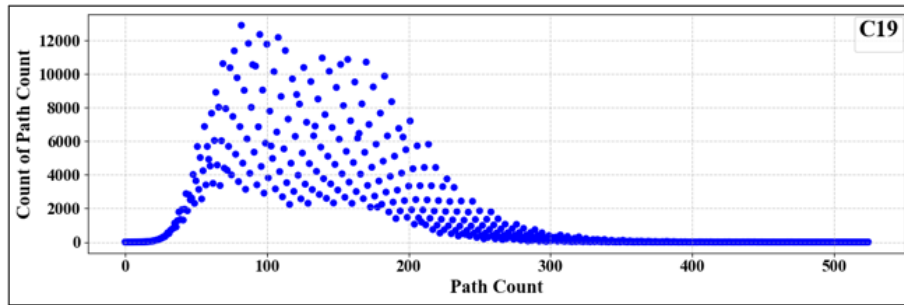


Figure 1: For this study, thirty composite sets, C0 to C29, were grouped and accumulated in intervals of powers of 2, e.g., $C29 \rightarrow 1$ to $2^{29+1} - 1$.

²to the point of entropy reconstructing a fallen, broken egg into its carton, before collecting itself into its original box.

This is 2D data produced by two equations: one generates odd numbers, the other, evens. One simply doubles, the other basically thirds a value. Yet combined as a set, they project a complex, twisting 3D lattice structure, one where the curvatures above and underneath retain similarity without exception. All of 15-20 lines of code³ and base-10 pre-acquainted, it is easy to render.

Selected states of the Composite are shown next. Axis titles removed for visual continuity and explained soon.

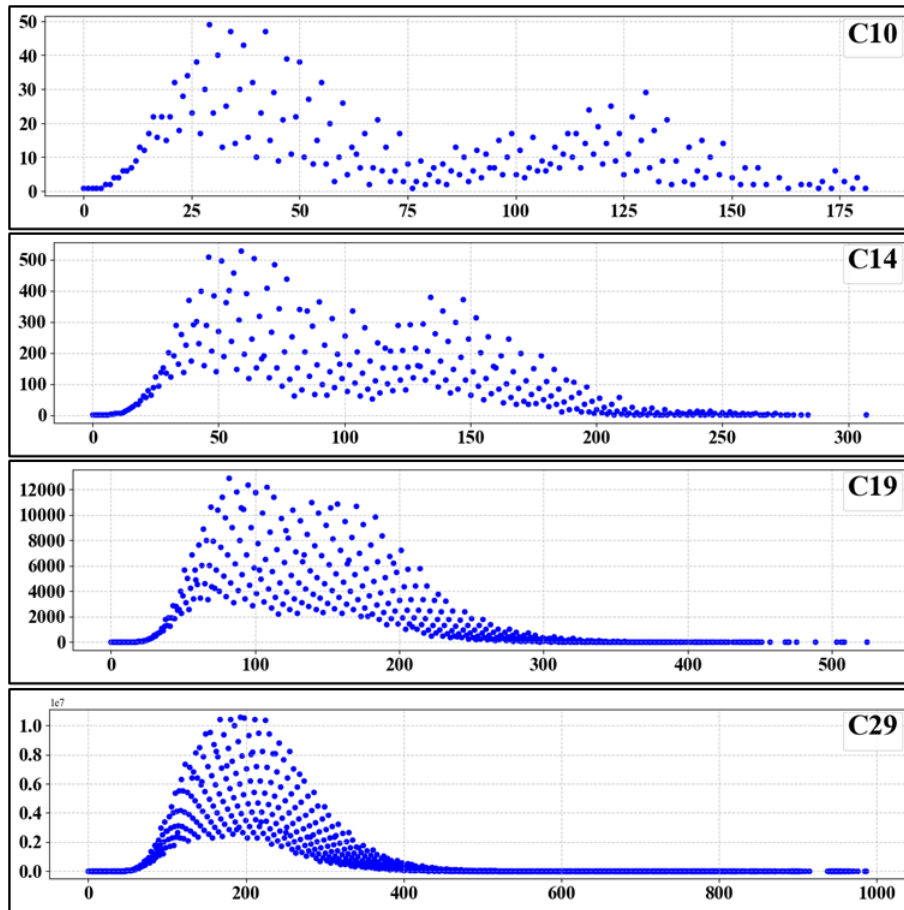


Figure 2: Note: while seemingly close to the X-axis, no plotted values have y co-ordinate of 0.

³Code for Python 6.6.2 found here [A.1](#)

2.2 RULE SETS

The below sets of equations are close yet not exact inversions of the other. Rule Set B holds a key distinction and is the engine for creating the Composite. The earlier-mentioned conjecture essentially is the first rule set⁴.

- Rule Set A: Select a number 'x' greater than or equal to 1. Repeat until arriving at it: If x is odd, triple it, then add 1; else, halve.
- Rule Set B: Exchange 'n' for 'x', From 1 until 'n', for all produced numbers, iterate functions $f(n) = 2n$ and $g(n) = (n - 1)/3$, if $g(n)$ produces an *odd integer*, with a singular exception for $g(4) \rightarrow 1$.

2.3 NODE STRUCTURE

The following figure helps to visualize both rule sets:

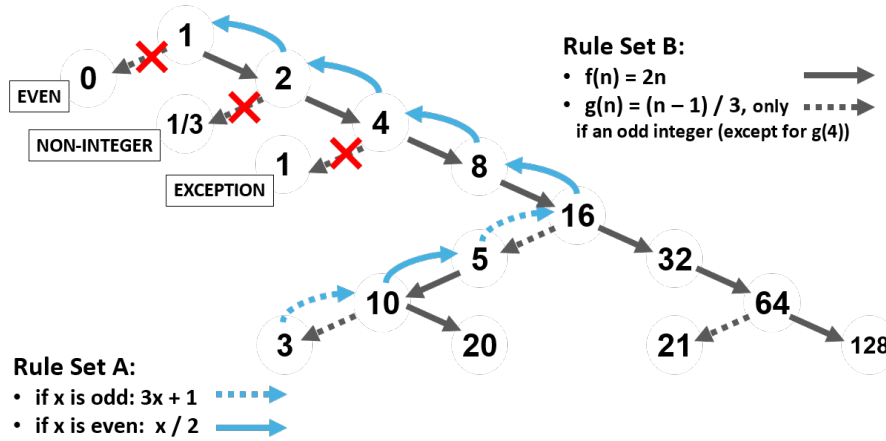


Figure 3:

We start with $x = 3$ as an example. Seven iterations are required for 3 to reach its goal at 1. For Rule Set B ("rsB"), the gray arrows indicate all numbers produced for $n = 3$. As seen, rsB involves more than rsA, yielding approx. 1.26457x additional numbers each iteration⁵.

2.3.1 PATH COUNT AND C-SETS

"Composite" conveys rsB's information accumulation, starting $n = 1$. For Composite Sets (C-Sets), C'N' denotes this accumulation from $n = 1$ to $2^{N+1} - 1$. "Path Count" ("pC") records rsA applications for 'x' to reach 1. 1's path count is zero, $pC(1) = 0$. And $pC(2) = 1$ (halve 2 once). For node 3, already noted, $pC(3) = 7$. Here, a non-linear aspect emerges. The next figure shows the beginning of the Composite's tabular data.

By definition, path count is the same for rsB regarding 'n', noting a likely sizable accrual of numbers. For example, 118 rsB iterations must occur to create the first hundred consecutive

⁴"Rule Set" is a convention of this paper and not used in the original conjecture.

⁵From exponential regression analysis, noting small changes significantly impact forecasts. Further discussion found here A.2.

Interval	1 to $2^{(N+1)}-1$	C-Set	0	1	2	3	4	5	6	7
0	1 to 1	C0	1							
1	1 to 3	C1	1	1	0	0	0	0	0	1

Figure 4: Column numbers correlate to node structure tiers. Placeholder zero's track path counts yet realized. Gray font addressed below.

numbers, 178 for the first thousand. Respectively, with a $\sim 1.26457x$ compounded rate per iteration that is $\sim 6.85E+11$ and $\sim 8.96E+17$ accumulated numbers due to the path counts⁶ of $n = 97$ and $n = 871$.

From here, 'x' is reserved for rsA. Both connote the 'recursive' direction (towards 1). Conversely, rsB implies the 'generative', utilizing 'n'.

2.4 COMPOSITE PLOTS

In Composite plots, the x-axis represents *a number as a path count*. The y-axis represents count of occurrences of each path count ("Count of Path Count", abbr. "CopC") from 1 to n. CopC is undefined until a first occurrence.

Starting example: $n = 1$, $pC(1) = 0$, now $CopC(0) = 1$, realizing the co-ordinate (0,1), the Composite's first plot point.

Next for $n = 2$, $pC(2) = 1$, so $CopC(1) = 1 \rightarrow (1,1)$.

For $n = 3$, the non-linear aspect mentioned earlier for $pC(3) = 7 \rightarrow CopC(7) = 1 \rightarrow (7,1)$ is visualized in the upper right plot of Figure 5.

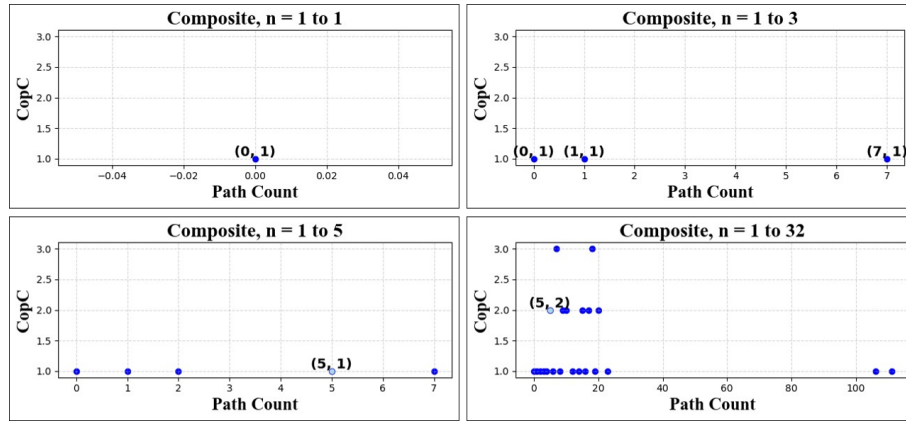


Figure 5:

The lower plots build from the examples of 5 and 32 that share the same node structure tier, and so, the pC of five ($pC(5) = 5$, $pC(32) = 5$), as well as most of the same path from 16 to 1 but differ inclusive as starting points.

⁶ $pC(97) = 118$ and $pC(871) = (178)$

A more progressed Composite table data in Figure 6 embodies this section's topics.

Interval	1 to $2^{(N+1)}-1$	C-Set	0	1	2	3	4	5	6	7	8	9	10	11	12
0	1 to 1	C0	1												
1	1 to 3	C1	1	1	0	0	0	0	0	1					
2	1 to 7	C2	1	1	1	0	0	1	0	1	1	0	0	0	0
3	1 to 15	C3	1	1	1	1	0	1	1	1	1	2	0	0	0
4	1 to 31	C4	1	1	1	1	1	1	1	3	1	2	2	0	1
5	1 to 63	C5	1	1	1	1	1	2	1	3	3	2	2	3	1
6	1 to 127	C6	1	1	1	1	1	2	2	3	3	5	2	3	5
7	1 to 255	C7	1	1	1	1	1	2	2	4	3	5	5	3	5

Figure 6: The dotted outline highlights the compacted information from the node structure from Figure 3. The blue-highlighted and -outlined cells represent $n = 5$ and $n = 32$ and help to visualize how the table data maps to the Composite's plots.

Briefly mentioned earlier, composite data does not need to be segmented a particular way. The convention used here aligns with function $f(n)$ from rsB. Please note incrementing a C-Set doubles the amount of information.

3 PROPERTIES

3.1 NON-LINEAR CONCLUSIONS

The example of creating the first 100 and 1000 numbers well exemplifies the non-linearity in this generative system. 'Generativeness' and non-linear framing may carry a different perspective for results otherwise considered unbounded or intractable. Here such could be seen as expected, even welcomed. Below are a few nuances in accounting for the countable infinite applied to rsB:

- For $z \in \mathbb{Z}_{\geq 0}$, $f(z) = 2z$ and $f'(z) = 2z + 1$ traditionally symbolize partitioning evens and odds. Both use every element of $\mathbb{Z}_{\geq 0}$ to do so. Here $g(n)$ fulfills $f'(z)$ function utilizing only a sixth of the cardinality of $\mathbb{Z}_{\geq 0}$.
- $g(n)$ absent "produce even integers only" creates $\mathbb{Z}_{\geq 0}$ by itself, using a third of its cardinality.
- From a linear perspective and in the context of rsbB, between nodes 5 and 32, one is ancestor to 93-94% of all positive counting numbers.
- Regarding nodes 5 and 32, their proportional percentage stabilizes into a mirrored inverse fractal pattern with the other⁷.

The key discernment is the perspective of approach (linear application or rule set) and accessible domain (degree or definition of restriction). For ancestry, basic number theory applies⁸.

⁷More here A.4

⁸Addressed in later discussions.

3.2 FIBONACCI-FUL

The curvatures and lines across its manifold project movement and state changes. The relationships between the plot points is an ongoing analysis.

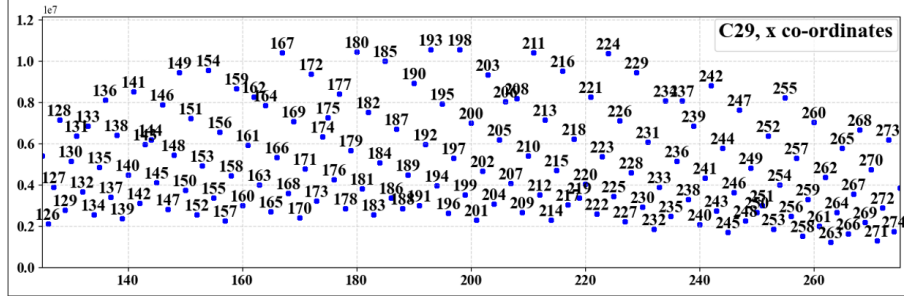


Figure 7: C29 labeled with is x-axis coordinate.

A repeated additive pattern based on the Fibonacci series numbers (abbv. "+5", "+8", "+13") was discovered within the x-coordinates. For visualization, patterns are synced to a focal point ("fp") to begin increments of addition. Without this application, local connection spots would be missed.

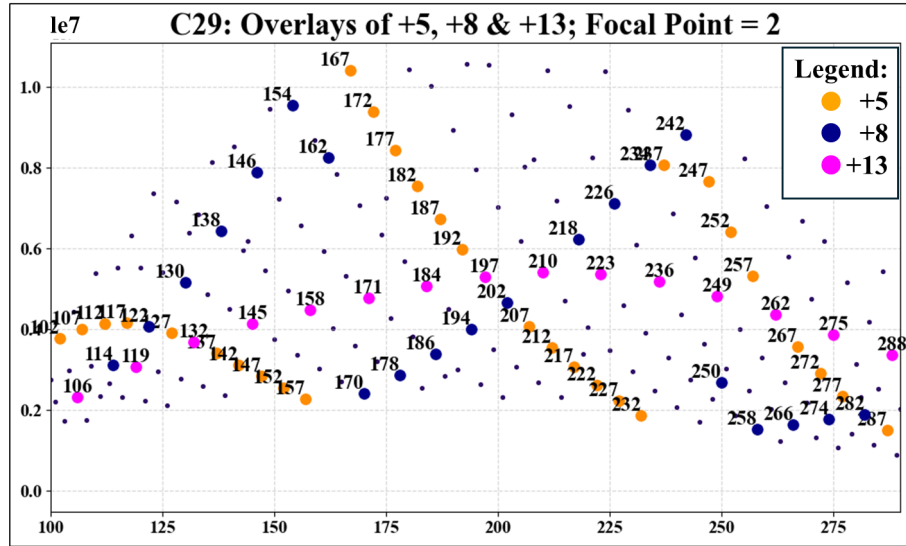


Figure 8: Interestingly some plot points seem to be on the other side of the forward projection, such as 162, which is part of +5 and +8 in this caption

Pattern combinations of +5, +8 and +13 closely cross-intersect often. This is an important note regarding the decay and dissipation process of the particle between C7 and C8. This is extraordinary for a number of reasons. The key point here is a foundational number sequence in many areas of science and math imbibes the number system of rsB. As 'n' increments, the projection retains visual continuity. The substructure of which is the x-coordinate system relatively moving in respect to neighboring coordinates, culminating in progression of motion. All of this maintained within a lattice structure related to the Fibonacci series.

3.3 SELF-SIMILAR

The lighter/darker shading method was created to visually examine for harmonics within the system. The logic is straightforward: if former data point's y-coordinate value is less than current, assign the lighter color. The self similar forms it uncovered was not anticipated. Whatever the combination of conditionals (former/latter, less/greater), one of two colored visuals is produced.

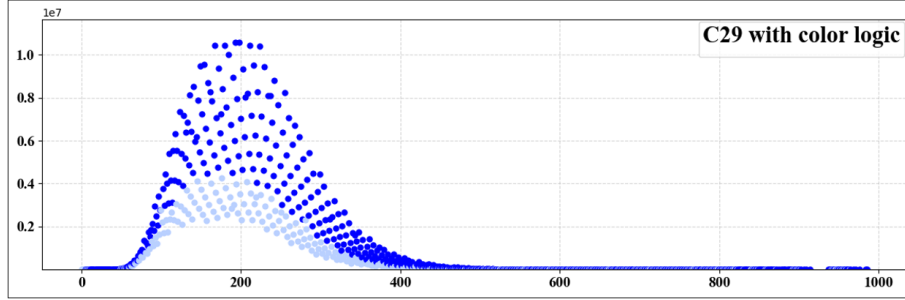


Figure 9:

3.4 FRACTAL

While clear in the Composite's amplitudes and curvatures underneath, extensively elongating a scatter plot also conveys its fractal nature. The coloring logic is included for relevance.

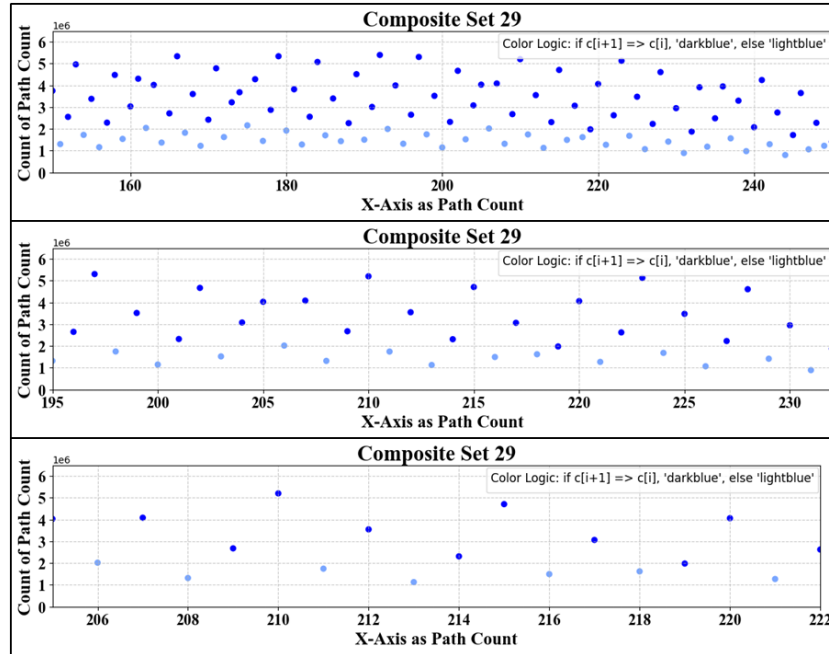


Figure 10: The spiralic flow of the manifold reduces with the elongation and shows a sense of circular rotation and well as a fundamental coiled architecture. This inspires ideas of the media it transverses or creates.

4 DERIVATIVES

Here, derivative means (expressed in Python code):

- `1st_derivative = np.gradient(C‘N’)`
- `2nd_derivative = np.gradient(1st_derivative)`

The first and second derivatives share the Composite’s trait of self similarity. The same coloring logic from the earlier section has been applied. Unlike the Composite, both extend past the axis, mirroring itself in a convex or concave manner relative to defined origin.

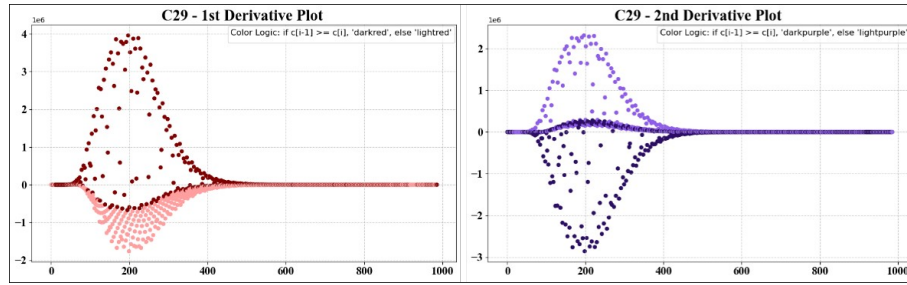


Figure 11:

The first derivative shares a mass density in its lower half similar to the Composite (lighter red). The second appears to be only contours above and below. Here, viewing from other observation angles proves useful. Where the second derivative shows little to no pattern density, in Figure 12, a fixed mid-ranged perspective shows an inner-upper layer of such. Interestingly, the shape resembles the light blue Composite self-similar form from Figure 9.

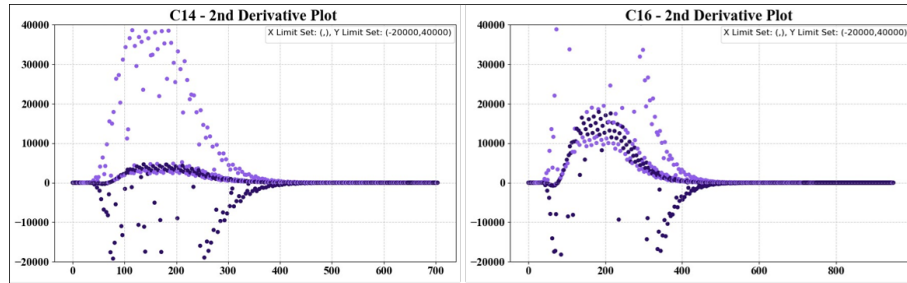


Figure 12:

5 ADDRESSING THE THREE KEY POINTS

The 2nd Derivative is shown first. Its relative elongated figure, more complete symmetry and substantial outline composition offer better fidelity of motion. Its visuals are used to convey what is interpreted "An embedded object that is in motion reverse to our perception of progression of state". The point regarding "reverse" will be divided into parts.

After this the Composite and its derivatives are shown side by side to show their synchronization and to transfer the implications from the second derivative's discussion to all, notably the Composite.

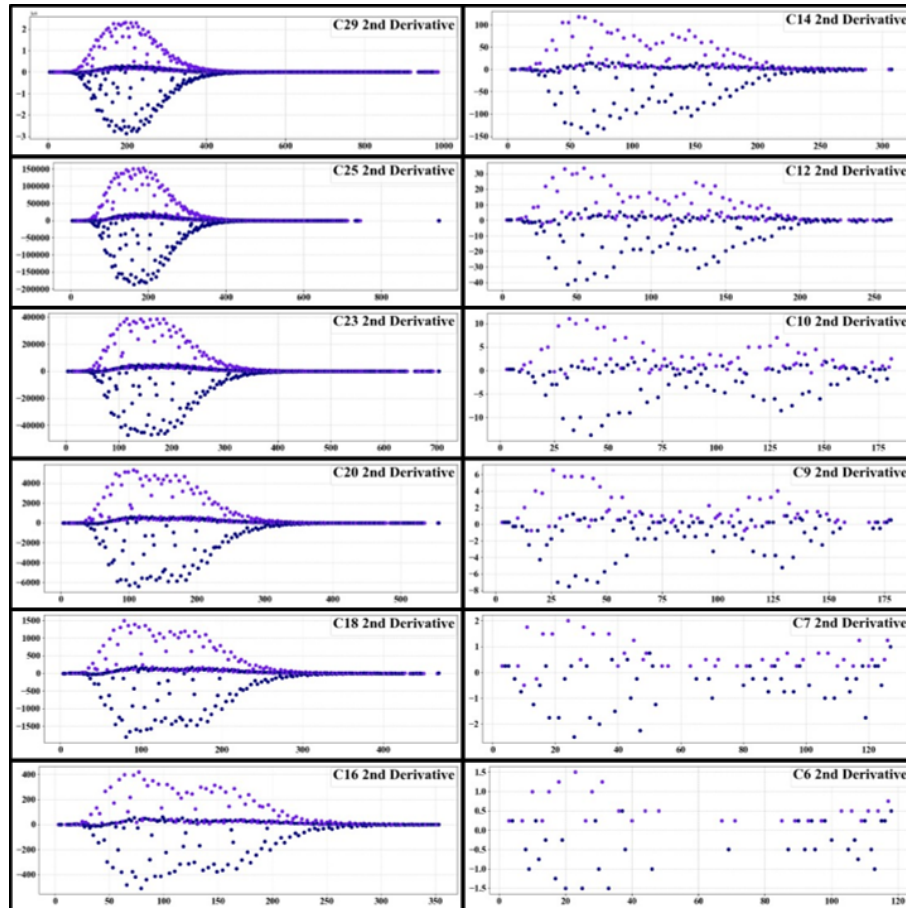


Figure 13:

1. "An embedded object...": The Composite's second derivative is an object. In addition to visual confirmation, it is self similar.
2. "... that is in motion...": Conveyed by state change in the procession of visuals at C-Set intervals, yielding clear change of state from beginning to end.
3. "... in reverse to our perception of time.": Expanded: This will be observed on a basis of establishing direction, then evaluated against linear and non-linear attributes of its

system. This effort in part means to address an argument that things linear and things non-linear are not relatable on some dimensions, such as time. The general theoretical of this argument is not addressed in this paper, as we focus on rsB to make more and more definitive statements as we learn them of the Composite.

- Direction: Since the form is constituted at one end of this procession and essentially dissipated at the other, namely the origin of the Cartesian system, the direction of dissipation, decay is towards the origin of this co-ordinate system.
- Reverse in a Linear Sense: The Composite is constructed by accumulating information from $n = 1$ to some $n > 1$. We enumerate time and its progression in such accordance. In overlaying this consideration, the "Form" is compiled from a state of dissipation to the form embodied at C29. Therefore, its re-creation follows our linear sequencing. Also its decay is recursively observed, and so is considered a phenomenon reverse our natural progression.
- Reverse in a Non-linear Sense: To approach this, a bridge between the linear and non-linear is rationalized and used to anchor and pivot between. Function $f(n)$ from rsB will build this bridge. The sequence of numbers from its sole application, that is the powers of 2, will be the bridge. It is the only scenario of a sequence where neighbors are in 'order'. Because of this one instance, rsB is not absolute in its generation of non-linear number sequences. At the same time, it is a consequence that each number of this sequence relates to all other numbers rsB produces by the fact of sharing a node tier within the structure beginning to form in Figure 3. Therefore, the culmination of rsB is always linked to a linear aspect of its own creation however minutely. And thus, it is at least in part bound to linear reality and so is in reverse as proven above.

With the Composite and its derivatives side by side, it is observed they are synchronized and what was established above for the second derivative carries through to the other two.

Ending number of segments can be visualized. Full dissipation moment can be defined and re-fined. Context to axis could apply, allowing y-axis to equal zero could be an angle of observation. Fibonacci series is key component to decay.

6 COMPOSITE SUMMARY

The in-figure comments are "current thought" statements as much as open questions of ongoing analysis. The Composite has many other properties, as does the system generated by rsB. The fractal pattern of the 5 & 32 pro rata ancestry was discovered in concluding this paper.

Plotting everything was part of the heuristic analytical re-prioritization. The 2nd derivative resulted. Although its inherited properties were seen, its motion and progression intuited, the transitive implication to the Composite first solidified when the two were juxtaposed.

This is offered in the regards to the "in motion" scrutiny. All three at the same time at the same rate seem affected by a single- or multi-point system of influence opposite to that of apparent momentum (to-left).

This "influence" implies an existing thing to be influenced, which happens to be in reverse. The mathematical conundrum of numerical concepts recording of numerical concepts possibly mid-creation is recognized and indexed with the word "pre-causality" for the time being. Then again, the object's decay is what is seen thus far. Its creation if recorded may have been enough time for numbers to possibly find their place similar to a Galton Board. It could also be more fundamental.

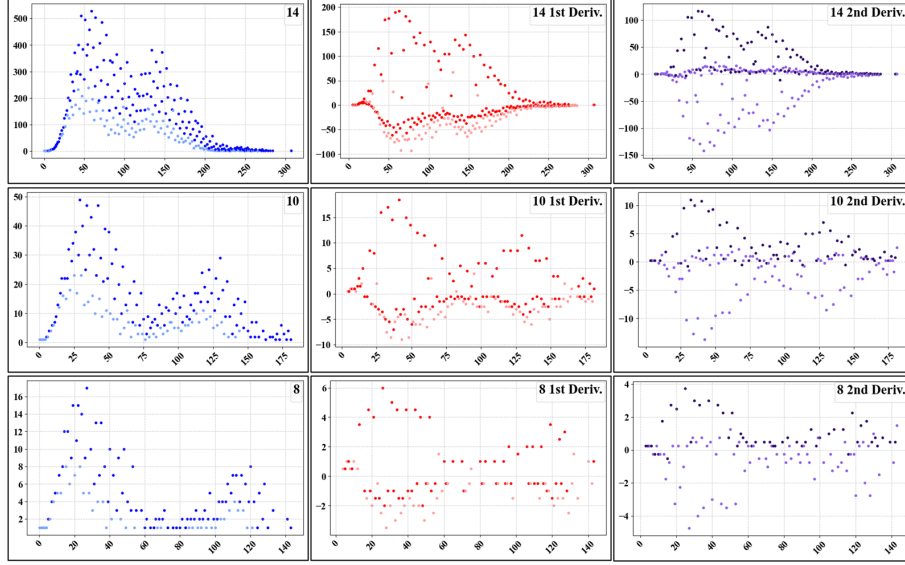


Figure 14: In the top row, an out-of-place state can be seen, indicating initial influence already enacted. Bifurcations or segmentations clearly graduating in lower rows in the derivatives, where Composite only observing rotational twisting

Ultimately, the effort taken to establish the above is two-fold: 1) establish the Composite as a valid observation worth theoretical explanation while noting the unusual origin of the information 2) establish a sense of on-going state, not only to place the Composite with what is known or theorized of our universe, but also to align theoretical possibilities with the context and enablement of its 'recording'.

7 THE IDEA

7.1 OVERVIEW

The below builds from observations above and attempts to apply known theoretical frameworks to imagine the Idea. Rationale is detailed afterwards.⁹

The most logical place for this Composite's recording to occur is soon after cosmic inflation around the start of Reheating, when the scalar field is converting from vacuum energy to heat. At this moment the universe is experiencing the highest, most compacted moment of heat and energy, not thought to occur since. In addition to converting to thermal energy, matter and anti-matter are created and then annihilate the other, emitting additional energy. According to our observation, a significant portion of anti-matter is unaccounted for. The equal amount of matter left unannihilated is why I can write this article.

⁹Before this, the general thought-prioritization heuristic is offered: 1. Balance and conservatism 2. Deference to operation and function, 3. solution with what is pragmatic and "in-reach"(admittedly, a subjective notion), 4. "What cannot be measured cannot be changed" is a professional edict found on professional social websites, 5. "Imagination is more important than knowledge" hangs in the home.

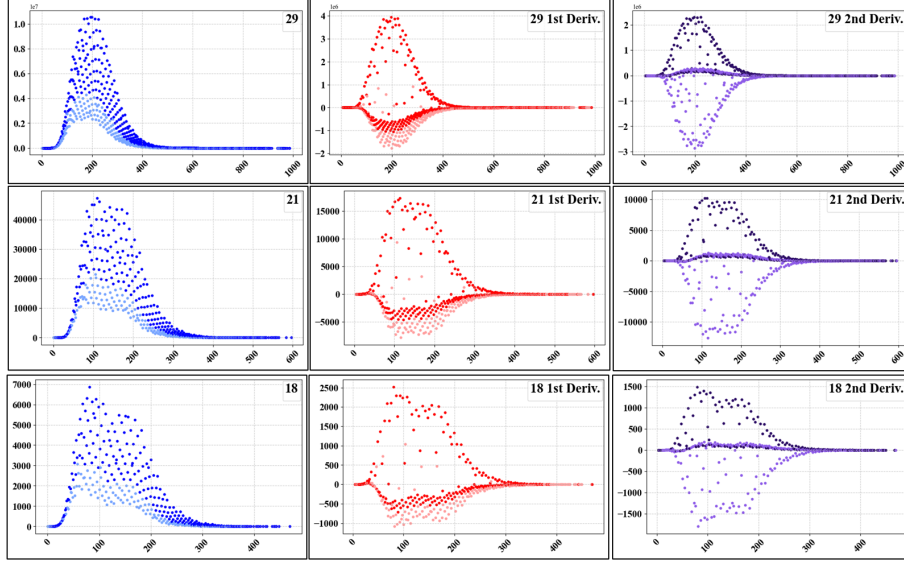


Figure 15: Ending number of segments can be visualized. Full dissipation moment can be defined and refined. Context to axis could apply, allowing y-axis to equal zero could be an angle of observation. Fibonacci series is key component to decay.

7.2 IDEA

After cosmic inflation's expansion and during conversion to heat and energy, these extreme conditions tore or fractured the pre-fabric¹⁰ into which the asymmetry of missing anti-matter displaced.

This fracturing created at least four collective delineations of various discrete and non-discrete dimensionality:

1. Our 'materialized' existence possibly based on more discreteness than the others, having units of 'distance' and subsequent properties of space and time.
2. The others in their own more fractured, more fractal-ized, non-integer comparative likeness, progressing in relative oppositional manner¹¹.

Across these divides, anti-matter and matter were now compelled into a new-founded relationship of un-annihilation in place of a re-cohesion principled pre-existence. In place of this (re)annihilation, our materialization exists in tiers of combinations of reaction with the other delineations, motivated by the assumed "re-cohesion" dynamic, now a gradient of potential. In total, the effect was an re-versioning of annihilation, substituting another energy-balancing system.

Imagine (or perform) the following thought experiment: Gather four sheets of paper and two color markers, crayons, highlighters... Assign Color A and B. Layer the sheets so all overlap at one corner (e.g., pinwheel formation). Over this corner and liberally past all sides, apply Color A. Flip the setup, repeat using Color B. Now un-layer and arrange the sheets putting corners

¹⁰Ad hoc term: The consideration of what cosmic inflation enacted upon

¹¹1. "Opposition" is not a temporal only aspect; however, 'time' precipitates solidly from Composition's decomposition in reverse, as earlier stated

together, not overlapping. The absent-color corners and edges represent the substitute for typical matter/anti-matter interaction of mutual annihilation. These colorless areas are, however, still interconnected.

During the tear and net transference of antimatter, a production-line potential was initiated and at some point its blueprint was captured in our forming fabric. From our corner in a glimpse of pre-causality¹², a physical and a conceptual numerical interdependence stage began. A mechanic reached its threshold of energy to template, to create the-then physically required proto-particle. This particle (or particles) served as the first beta-decay waterfall prototypes, producing the first baryons and thus other elements. This initiated a basis for the periodic table by creating the first protons of hydrogen nuclei and then pushing the appropriate to-be-proton neutron proto-particle one more position to the right for helium nuclei.

Whether the Composite represents gravity, "a" role of or another sub-layer working in conjunction, it signifies an interstitial pre-fabric remnant that post-tear shuttles for something of a more-than-conceptual transportation system, reminiscent of the otherwise would-be annihilation. The re-cohesion gradient engines this back and forth shuttling, mechanized in its own sub-layer of n-dimensional, oscillating-spring lattice structure, stretching in vectors of directions that then allows relaxation as it passes to and from membranes. This is joined with our plancking about the place.

The Pauli Exclusion Principle underpins. Atomic electron shells, for example, house something with far more gravitas, yet their fraternal inability to occupy the same spacetime forces the concept. What gravity continuously attempts to recombine, these most elemental parts of us continuously keep separate. The result is a relativistic push and pull, emergent more noticeable given amount, scale and proximity.

Regarding Yang-Mills, the mass gap signifies a transition, an inversion realizing an infinitesimal moment where causality suspends, a charge flips and mass-energy scale inverts. This aligns to the neither-created-nor-destroyed principle of our reality and perhaps beyond. The vacuum state marks dissipated energy potential where minimalist quantum energies shuttle into other delineated dimensionalized branes. This is the main principle captured in the blueprint, the recording, the mechanized mathematics of shuttling from here to one, two or three of the other fractured fabrics.

7.3 RATIONALE

7.3.1 THE COMPOSITE AND ITS PROJECTIONS

There is a composite in the middle of math.

It is expressed through a few simple rules involving the foundational primes of 2 and 3.

It creates forms and systems of fractals, chaos, quasi-harmonics, Fibonacci numbers, three dimensional projections, self similarity simply from positive integers alone.

It is systemic. There is no "going back to...". It is the drawing board.

However, none of the accidental exclamations above qualify as a proof. But these points support re-exploring fundamental levels core to what is currently understood.

¹²'Pre-causality' is the current best rationalization of numbers and nature undergoing creation effectively in parallel while being codified

If this event is an occurring observable phenomenon in our reality (assuming it is particle decay, then it is) and the event does proceed in a counter mechanic relative our existential frame (which was propositioned and provided basis), then logically it must occur partially positioned inside and outside of our reference of geometry and time, perhaps where we share part dimensionalization yet differ in our own perception and progression within it. If this is the case, the Composite quite possibly is a transitional, transcendental physical moment captured.

The Composite's projection seems facing only, but there are the plots technically behind the projection. The derivations form in recorded outlines re-casted in the 'positive' and 'negative' aspects and contribute to the mystery. Also, during decay and even their state before, it's questionable if any of the forms "touch" the axis. Not expanded in this paper are the further derivatives proceeding the first two which inherent the same properties and are mostly these sketched outlines. Could these outlines and none-facing plot points indicate states that part in this reality and part not. This opens questions of how current science would observe such in experiment. Could quanta interpreted as integral unto itself not be? Would we observe things, such as quarks, 'naturally' only in threes because of this?

Its exterior comprises Fibonacci patterns that flow with the 3D curvature. This evolves from a high degree of order and architecture that keeps complex, non-linear form of its 2D amplitude mirrored by its underneath 2D curvature. Also, helical configurations appear in color fields associated with gluons in high-energy physics. These fields often exhibit twisted, vortex-like structures akin to microtubule helices.

Microtubules deserves more emphasis: the Fibonnachi lattice structure is similar to beta-lattice found in humans microtubules. As of yet, we are the only biological creatures known with this structure. For microtulbes, +13 is an asymmetric seam allowing greater motility, mobility and durability. No correlation is made of this commonality here, except for one of efficiency of utility somewhere in universlatily, i.e., if we were to model a material of abstract cohesiveness that can persist yet be yeilding, able traverse strongly forward but not be absolute, this is the number sequence to use. It progresses by building upon what has preceded, making erecting or dismantling plasmatic. In short, it makes sense in ubiquity.

It is a self similar, fractal form, as seen by its derivatives and the coloring logic. It's geometric and exponential scaling properties project a Fibonacci-imbibed 3D image, linking system without imaginary numbers to quantum chaos and re-normalization group theory. Fractal systems, such as Sierpiński triangles and Cantor sets, exhibit Fibonacci-like scaling properties, which are significant in such fields.

It renders in base 10. This was an earlier statement posited for provocation. In all probability, it is base-agnostic, transversing all radii and, given so, conveys a property of universality currently not yet seen.

Towards any of this, the larger question is: Should it be taken at face value. The frameworks and properties herein have been attempted to be introduced without too much exclamation. It is up to the reader.

Beyond that, it is an observation under evaluation looking for a place within the 'continuity of story line' of current theoretical physics. With that said, its incredible complexity from such simplicity does invoke the question: is the 'mundane' currently a blindspot.

7.3.2 THE TEAR

The Overview explained the timing in the current understanding of progression of the Big Bang Theory. The below intends to be more than directionally correct yet give a general sense of context by comparing two quasi-adjacent intervals: 1) Cosmic Inflation (CI) from beginning to end 2) Start of Reheating to the start of Recombination (ReRc).

For both intervals, the rate of change in volume over unit of time is estimated for comparison, purely for a sense of scale.

The calculations are not meant to be definitive; they come from existing, accepted knowledge. A conservative assumption is event applied to ReRc's scaling value: in lieu of modeling interacting radiation-dominated and matter-dominated periods, CI's scaling factor is used. This overestimates and provides calculation continuity for ease of comparison. Arbitrary units of distance are used, scaling is meant to capture growth (which is overly conservative) and time applies fundamentally. All assumptions and calculations found here A.3.

With this said:

- $\frac{\Delta V_{CI}}{\Delta t_{CI}} \approx 1.5 \times 10^{112}$ per sec
- $\frac{\Delta V_{ReRc}}{\Delta t_{ReRc}} \approx 1.2 \times 10^3$ per sec

The comparison¹³ to such rates is to provide context and basis for an analogy of exercising or getting off couch (state transition) too quickly: sudden abruptness shocks/traumatizes the system. Where it only took some time for an 'injury' (CI) relative to the time for its 'adjustment' and 'healing' (ReRc).

Now add to this, the matter of the vacuum energy transitioning to heat with inflation abruptly halted (or as some characterized instantaneously). Calculation circumvented here.

The Composite and the derivatives undergo an influence. There is exterior rippling, segmentation, torque, drag, dissipation... Regarding the Fibonnachi series and C7 and C8, total dissipation is seen (around the $n = 400 - 700$ span). This is in parallel of +13 merging closer to the axis while cross-connections of points of +8, +5 and +3 occur. When +13 is gone, full dissipation occurs. However, this is the finale. The instigating factor or factors long initialized. During the process visualized here, the entirety of the Composite and derivatives has quickly been shrinking and emitting capacity per the curve fit of the first derivative of cross-sectional data set not yet introduced¹⁴. Look at the table data of Figure 6: It is the column data that is the cross-sectional data sets. Note, it is encouraged to keep the place holding zeros and withhold other data preparation.

While this extraordinary, it is not fantasy. And there is the ending of half a story that most likely occurred when one could frame an astronomical rate of expansion, followed by heat that broke the moment or enabled a next step or... Where things seemingly stopped, the ongoing expansion adjusted for the moment and for another type of expansion in the multi-dimensional fracturing that occurred. Inflation still dominated until Reheating; uniformity was not impeded. In fact, other things than anti-matter may have found a new home and vocation.

Per the Composite, there does seem to be something of a shock, which may or may not have much to do with the volume and temperature rates discussed above. Yet such temperature inflation could be what filmed (seared) the Composite into numbers; however, the early universe stayed quite hot for quite some time.

These questions and similar are the next part of analysis.

¹³for comparison, if $N = 50$ and change in time $\Delta t_{CI} = 10^{-32}$, then $\frac{\Delta V_{CI}}{\Delta t_{CI}} \approx 10^{97}$

¹⁴It was challenging enough to introduce a system of numbers within our system of numbers that shows a movie of a quantum love story gone wrong occurring in reverse. Details coming in the next paper. *Or*, eager to hear others analysis and opinions.

7.3.3 NON-INTEGER DIMENSIONS

"Spacetime" is apt. The idea of 3-4 (not 3 or 4) dimensionality was already in place. New knowledge of "fractals" defined as non-integer dimensionality combined with observing a fractal composite fit. Also, the fact material such as dark matter and dark energy exist yet cannot be directly observed but still engulf and impact us on intra- and inter-galactic scales implies dimensionality outside the normal consideration. For example, if with a high degree of confidence we know orders or magnitude of neutrinos are produced per unit time by the Sun and pass through us without our noticing, then the rationale is already substantiated. Lastly, there is a curious thought if being integer-ish enough is not only about a single number such 3 or 4 but and full interval across integers, i.e., spanning 3 and 4, and that makes are full "unit" of dimensionality, spans can overlap.

7.3.4 THE 'TEAR' AND 4-SHEETS EXPERIMENT INSPIRATION

While revisiting the Mandelbrot Set, saturated with aspects of even and odd numbers from other studies, an inspiration occurred. A pre-notion of even and odd numbers zipping (or unzipping) together combined with observing their sequencing along the curvatures between the main carotid and bulb transitioned from zipped to torn. The idea of natural numbers as torn apart to produce evens and odds led to the concept of the Tear. And some may consider the The Mandelbrot Set as more than a set of equations but a record, an inherently natural chronicle in itself.

7.3.5 LACK OF COMPARABLES

There is only one basis regarding involved matter/anti-matter annihilation at discussed magnitude. In no degree refuting past efforts and conclusions: Advanced theory, indirect observations and experiments simply can not compare. This applies to the above idea. In good humor a reference to many office and schoolroom adorned "You Are Here" posters conveys sentiment and scale. In another cosmic-thematic imagination, perhaps a more historically repeated apocryphal-recreation of state could guide in concept¹⁵: novae and supernovae. In a star's passionate cycle's end, a relatively infinitesimal amount of stardust is produced. A minuscule by-product. A wondrous minuscule by-product.

¹⁵while noting the vast elemental physics disparity

8 ACKNOWLEDGMENTS

1. Much of this effort took the author to re-exploring, further exploring or discovering fields of math and science. In this, Chat GPT 4.o, over a course of year was key in researching, sound-boarding and sanity-checking concepts; and quite enabling in theoretical physics computational analysis and mathematical exploration. The oft "You got this!" while writing/rewriting this article was also most appreciated.
2. Following the above and most importantly, all persons of science and math whose continued collective contributions add to what is possible.
3. Not all learners are created equal. The following content creators inspired or informed or both significantly.
 - Verasitium
 - Lex Fridmen Podcasts
 - Mathlogger
 - PBS Spacetime
 - Preposterous Universe
 - Zap Physics
4. Lastly, it is recognized and acknowledged that enthusiasm is no substitute for advanced education or professional experience. If it helps, the author was the type to be as ahead in math classes as allowed, with advanced placement out of first year college physics and calculus classes. These ideas comes from a lifetime of interest and contemplation of the disciplines, with adjoining respect for their institutions. Please know it is not random or offered lightly. If some parts or ideas are not exciting or the story line hoped for, please also know you are not alone. The overarching intent and hope is to benefit the worlds of math, science and humanity.

A APPENDIX

A.1 COMPOSITE CODE

Below are the basics. `createCompList()` can be 'for' looped base-2 or whatever you want. A log function to partition plotting helps become familiar. Although researching past attempts regarding the conjecture has yet to come up, I've heard of methods not counting the '2'-related function or dropping the '1' for the more important ratio.

If interested in this topic, I offer not to prepare the data anymore than necessary. Given the situation and findings to date, the value in the granularity of the details is immeasurable . Removing the place-holding zero's will help in visual pattern identification but have them for any gradient, curve-fitting, box-cutting, simple basic analysis, e.g., keep the long tail, avoid window smoothing, etc.

```
def getPC(_): # Takes 'x' and returns path count
c=0
while _ != 1:
if _ % 2 == 0: _=_//2
else: _ = (3*_)+1
```

```

c+=1
return c

```

```

def createCompList(n): # Takes 'n' and returns zero-filled composite list from 1 to n
compList=[]
for x in range(1,n):
    _=getPC(x)
    if _ >= len(compList):
        compList+=([0]*(_-len(compList)+1))
        compList[_]+=1
    return compList

```

Note: 'compList' returns y-axis CopC data. X-axis can be built with the following comprehension list:

```

xAxis = [_ for _ in range(len(compList))]

```

A.2 rsB COMPOUNDING RATE

Below are the number of elements for the first fifty node tiers. Regression analysis provided the rate, shown below. Estimates will change significantly for different rates. The only way to know exactly is to calculate, an effort beyond my resources at the moment.

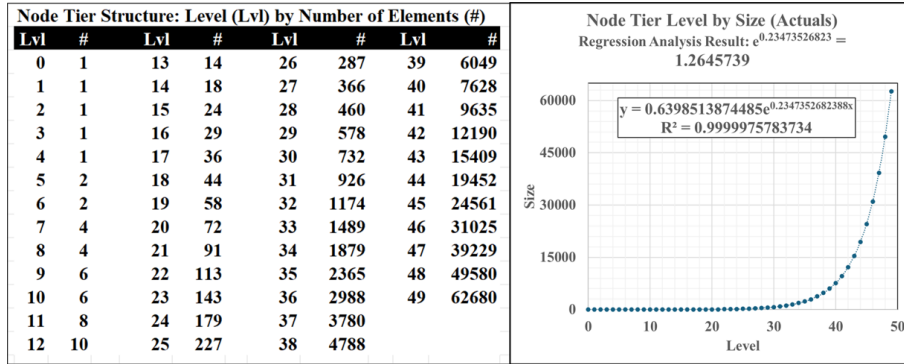


Figure 16:

A.3 THE TEAR - COMPARING VOLUME EXPANSION: CI VS. RR

A.3.1 SUMMARIZED TABLE DATA AND KEY ASSUMPTIONS

Approximate assumptions for time and volume expansion rates for two distinct epochs in cosmology:

1. **Inflation**, lasting $\Delta t_{\text{inf}} \approx 10^{-34}$ s,
2. **From Reheating to Recombination**, lasting $\Delta t_{\text{rh} \rightarrow \text{rec}} \approx 3 \times 10^{13}$ s.

Assume an *initial* volume $V_i = 1$ (arbitrary units) at the start of each epoch. Then the *final* volume V_f is the growth factor over that interval. The change in volume per second, $\Delta V / \Delta t$, is simply the ratio of V_f (since $V_i = 1$) to Δt .

Table 1: Approximate volume expansion comparison for two cosmic epochs: (A) Inflation and (B) Reheating to Recombination.

Parameter	(A) Inflation	(B) Reheating to Recombination
Time Duration	10^{-34} s	10^{13} s
Initial Volume V_i	1 (arb. units)	1 (arb. units)
Final Volume V_f	10^{78}	10^{16}
Volume Growth Factor $\frac{V_f}{V_i}$	10^{78}	10^{16}
Change in Volume ΔV	$10^{78} - 1 \approx 10^{78}$	$10^{16} - 1 \approx 10^{16}$
Rate: $\frac{\Delta V}{\Delta t}$	$\frac{10^{78}}{10^{-34}} = 10^{112}$ /s	$\frac{10^{16}}{10^{13}} = 10^3$ /s

A.3.2 CALCULATIONS

- **Inflation:**

$$\text{Volume Ratio} = 10^{78}, \quad \Delta t_{\text{inf}} = 10^{-34} \text{ s} \quad \Rightarrow \quad \frac{\Delta V}{\Delta t} = \frac{10^{78}}{10^{-34}} = 10^{112} \text{ per second.}$$

- **Reheating to Recombination:**

$$\text{Volume Ratio} = 10^{16}, \quad \Delta t_{\text{rh} \rightarrow \text{rec}} = 10^{13} \text{ s} \quad \Rightarrow \quad \frac{\Delta V}{\Delta t} = \frac{10^{16}}{10^{13}} = 10^3 \text{ per second.}$$

A.3.3 INFLATIONARY SCALE VS. VOLUME GRWOTH

In a 3-dimensional space, the physical volume V of a comoving region scales as

$$V(t) \propto [a(t)]^3,$$

where $a(t)$ is the scale factor. Suppose the universe expands by a factor A in *linear* dimensions over the course of inflation,

$$\frac{a_{\text{final}}}{a_{\text{initial}}} = A.$$

Then, the corresponding volume growth factor is

$$\frac{V_{\text{final}}}{V_{\text{initial}}} = \left(\frac{a_{\text{final}}}{a_{\text{initial}}} \right)^3 = A^3.$$

Example: From 10^{26} to 10^{78}

If the linear scale factor increases by a factor of

$$A = 10^{26},$$

then the *volume* increases by

$$A^3 = (10^{26})^3 = 10^{78}.$$

A.3.4 E-FOLD NOTATION

Inflationary expansions are often expressed in e-folds, N , where

$$N \equiv \ln \left(\frac{a_{\text{final}}}{a_{\text{initial}}} \right).$$

Hence,

$$a_{\text{final}} = a_{\text{initial}} e^N.$$

For the volume,

$$V_{\text{final}} = V_{\text{initial}} e^{3N}.$$

Thus, if N e-folds of *linear* expansion occur, the volume grows by e^{3N} . $N = 60$ was used for our calculations.

A.3.5 VOLUME GROWTH: REHEATING TO RECOMBINATION

A typical estimate for volume growth between the end of reheating and recombination is $\sim 10^{16}$. This can be seen by comparing the temperatures at these two epochs. Following, e.g., [2, 4], if we assume:

- A reheating temperature $T_{\text{rh}} \sim 10^9$ K,
- Recombination at $T_{\text{rec}} \sim 3000$ K,

then, for a radiation-(and early matter)-dominated phase, the scale factor $a(t)$ scales as $1/T$, implying

$$\frac{a_{\text{rec}}}{a_{\text{rh}}} \approx \frac{T_{\text{rh}}}{T_{\text{rec}}} \approx \frac{10^9}{3 \times 10^3} = 3.33 \times 10^5.$$

Since volume $V \propto a^3$, the volume ratio is

$$\left(\frac{V_{\text{rec}}}{V_{\text{rh}}} \right) = \left(\frac{a_{\text{rec}}}{a_{\text{rh}}} \right)^3 \approx (3.33 \times 10^5)^3 \approx 3.7 \times 10^{16} \sim 10^{16}.$$

Updated Comparison Table

In the table below, we recap the rough volume growth for two key epochs, (a) *Inflation* and (b) *Reheating to Recombination*:

Table 2: Approximate volume growth from (a) Inflation and (b) end of Reheating to Recombination.

Epoch	Volume Ratio	Typical Duration
(a) Inflation	$\sim 10^{78}$	$\sim 10^{-34}$ s
(b) Reheating $\rightarrow$ Recombination	$\sim 10^{16}$	$\sim 10^{13}$ s

As shown in Table 2, inflation's near-exponential growth dwarfs the later expansion rate, even though the latter spans hundreds of thousands of years. See also the discussions in [1, 2, 3, 4].

A.4 5 and 32 ANCESTRY

5 is the larger ancestor. Two approaches to analysis: 1) $n = 1$ to 100K, a set of continuous percent data. 2) $n = 1$ to 100M sampling 10K points of data every 10K numbers. The percent data was captured every 10K numbers, for 10K data points, so the fractals below are representative of such order of magnitude. It is uncertain how the fractal dimension would change, but it most likely why the curve-fit is so well aligned.

As seen in the boxc utter output and graphs the frequency is increasing. Perhaps some type of convergences, which is relative, since the fractal relationship largely implies intrinsic harmonics or syncopation with (i.e., is some form in some portion is) the Composite.

```

def getPathAncestor(_): # Takes 'x' and returns node-tier 5 ancestor
path=[]
while _ != 1:
if _ % 2 == 0: _=_//2
else: _ = (3*_)+1
path.append(_)
ancestor = path[-6]
path.clear() #optional for resource efficiency
return ancestor

### MAIN PROGRAM ###

fiveOr32=([0]*33) #bit string method
fiveOr32[5]=11 # accounts for n = 1 to n = 16
for k in range(17,100000000): #nested for loops of 10K each used for analysis
_ = getPathAncestor(k)
fiveOr32[_]+=1

```

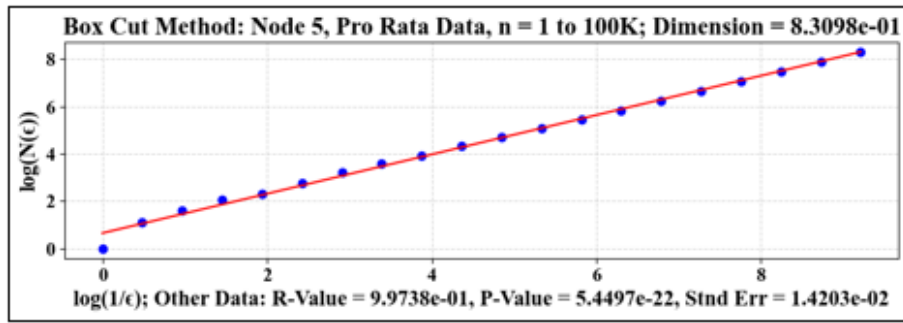


Figure 17:

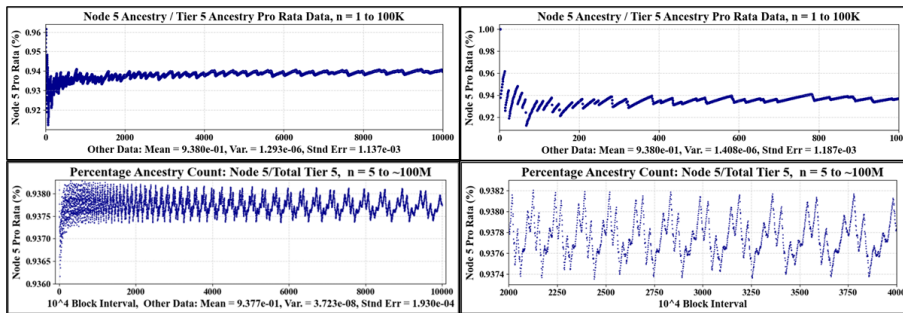


Figure 18:

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- [1] A. D. Linde, *Particle Physics and Inflationary Cosmology*, Harwood Academic, 1990.
- [2] E. W. Kolb and M. S. Turner, *The Early Universe*, Addison-Wesley, 1990.
- [3] V. F. Mukhanov, *Physical Foundations of Cosmology*, Cambridge University Press, 2005.
- [4] A. R. Liddle and D. H. Lyth, *Cosmological Inflation and Large-Scale Structure*, Cambridge University Press, 2000.