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FREEDOM and THE OPEN COSMOS

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(Error Corrected, September)

The Open Cosmos and Paths through Eternity (I)

Firstly, on Freedom itself. We can derive the following statements, with proofs:

FREEDOM IS BOUNDLESS, OPEN and ENDLESS

Proof of the equivalence of these four conditions follows below:

FREEDOM IS BOUNDLESS (A) Proof: 1. All that which is Bound is Not Free. 2. Therefore that which is Free is not Bound. 3. Therefore Freedom is Boundless.

FREEDOM IS ENDLESS (C) Proof: 1. All Ends are Bounds. 2. Therefore All that have No Bounds are Endless. 3. Freedom is Unbound. 4. Therefore Freedom is Endless.

FREEDOM IS OPEN (E) Proof: All that which is Closed is Bound. 2. Therefore All that which is Unbound is Open. 3. Freedom is Unbound. 4. Therefore Freedom is Open.

OPEN IS ENDLESS (G) Proof: 1. All which have No Bounds are Unbound. 2. All which is Unbound has No End. 3. All which Open has No Bound. 4. Therefore that which is Open has No End. 5. Therefore that which is Open is Endless.

FREEDOM IS BOUNDLESS (II) Proof: 1. All Bounds are Ends. 2. Therefore All that are Endless are Not Bound. 3. Freedom is Endless. 4. Therefore Freedom is Boundless.

FREEDOM IS OPEN (II) Proof: 1. Closed is Not Open therefore Open is Not Closed. 2. Open is Not Closed therefore Closed is Not Open. 3. All that is Closed is Bound. 4. Therefore All that is Not Bound is Not Closed. 5. Therefore All that is Boundless is Open. 6. Freedom is Boundless. 7. Therefore Freedom is Open.

FREEDOM IS ENDLESS (II) Proof: 1. All that is Open is Endless. 2. Freedom is Open. 3. Therefore Freedom is Endless.

FREEDOM IS BOUNDLESS (III) Proof: 1. All which is Bound is Closed. 2. Therefore All which is Open is Without Bounds. 3. All Freedom is Open. 4. All Open is Boundless. 5. Therefore All Freedom and All that is Free is Boundless.

OPEN IS FREEDOM (F) Proof: 1. If All Open is Boundless. 2. And All that is Boundless is Free, 3. Then All that is Open is Free. 1a All Bounds are Closed Therefore All that is Open is Boundless. 2a All that is Not Free is Bound Therefore All that is Without Bounds are Free.

UNBOUND IS ENDLESS (i) Proof: 1. All Ends are Bounds (and are Boundings) 2. Therefore All that have No Bounds are Endless.

ENDLESS IS NOT BOUND (J) Proof: 1. All Bounds are Ends. 2. Therefore All that are Endless have No Bounds. (So All Bounds are Ends and All Ends are Bounds.)

OPEN IS UNBOUND (L) Proof: 1. All that is Bound is Closed. 2. Therefore All that is Not Closed is Unbound. 3. All that is Open is Not Closed. 4. Therefore All that is Open is Unbound.

UNBOUND IS OPEN (K) Proof: 1. All that is Closed is Bound. 2. Therefore All that is Unbound is Not Closed. 3. All that is not Closed is Open. 4. Therefore All that is Unbound is Open.

ALL THAT IS ENDLESS IS OPEN (H) Proof: 1. All that is Closed is Ended. 2. Therefore All that is Endless is Not Closed. 3. All that is Not closed is Open. 4. Therefore All that is Endless is Open.

BOUNDLESS IS FREE (B) Proof: 1. All that which is Not Free is Bound. 2. Therefore that which is not Bound is Free. 3. Therefore that which is Boundless is Free.

ENDLESS IS FREE (D) Proof: 1. All that which is Not Free is Ends. 2. Therefore that which is Endless is Free.

THEREFORE we have shown that the following Twelve Statements are True:-

All Free is Endless (C) and All Endless is Free (D) Therefore Free and Endless are Equivalent.

All Boundless is Free (B) and All Free is Boundless (A) Therefore Boundless and Free are Equivalent.

All Endless is Open (H) and All Open is Endless (G) Therefore Endless and Open are Equivalent.

All Boundless is Open (K) and All Open is Boundless (L) Therefore Boundless and Open are Equivalent.

All Open is Free (F) and All Free is Open (E) Therefore Open and Free are Equivalent.

All Endless is Boundless (J) and All Boundless is Endless (i) Therefore Boundless and Endless are Equivalent.

Therefore : 1. Freedom is Boundless, Endless and Open. 2. Boundless is Free, Endless and Open. 3. Open is Free, Endless and Boundless. 4 Endless is Free, Boundless and Open.

All these four Statements are Equivalent.

TESTS FOR THE NO-BOUNDARY HYPOTHESIS

In the unbound Cosmos, heat energy can always drain away from the system completely and return it to 0 degrees Kelvin and the state of Zero Entropy. The fate of the Cosmos is not heat death, as previously assumed, but a freezing return to perfect order and the Free Energy that results from this. Since the dispersal of heat can always be complete in the Unbound Cosmos, because it is unbound and therefore a heat gradient is always possible to disperse Heat, the amount of Free Energy in the Free Order created on cooling to 0 Degrees Kelvin is infinite, as 0 Degrees Kelvin is always reached.

Quantum field effects at 0 Degrees Kelvin or perfect Zero-Entropic Space, ensure that Order is stacked completely, and thus Free Order will be infinite as Coherence always returns to the completely cold system within the Quantum Field State at these low temperatures.

The Conservation Law of Energy assumes a Bound System. When the Cosmos System is unbound however, order is spontaneously generated at 0 Degrees Kelvin and zero Entropy, to which the cooling system always returns when Heat Dissipation Capacity is infinite, because the Unbound Cosmos allows complete Heat Transfer and Dissipation away from the Cosmos.

This order is available as Free Energy for repeated Cosmogenesis over Long-epoch Time Scales.

Thus, If our cosmos meets any one of these four conditions, FREE, OPEN, BOUNDLESS and ENDLESS, then there is endlessly sufficient Free Energy to create an infinite number of new universes from these conditions: and where there would be enough power in the infinite Ordered Freedom to create new universes: And thus these conditions are the endless eternal source and infinite supply of the Free Energy necessary to create the cosmos.

When Heat Dissipation has cooled the System completely, the results of Coherence and Zero Entropy, the stacking of Order for Free Energy, can be observed. Hence these Cosmogenesis effects seen in the coldest regions of Space can only take place when Heat Dissipation is complete, and these Dissipation effects only when the System is unbound. Therefore Zero-Heat Highly-Ordered Free-Energy Cosmogenesis and Freezing, if

seen in these cold regions of the cosmos, form a test of The No-Boundary Hypothesis, which was first Postulated by Stephen Hawking.

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The Open Cosmos and the Paths through Eternity (II)

Following the derivation of Infinite Freedom, proved above by showing that unbound space is therefore free and without limit, and is therefore endless and thus Infinite, we continue the hypothesis to develop Seth Lloyd's ideas of the computing Cosmos. This is extended to form the idea, which can be tested empirically, of a Conserving space both within and outside this limited cosmos, bound as it is by linear time which runs at a finite and limited rate and is therefore bound, at least insofar as time in this Cosmos is limited because time in this part of the Cosmos is linear, with a seemingly fixed orientation of Past to Future.

However. Time Future has a number of interesting features which distinguish it and its place in linear time. Firstly, we have noted that time-Future comes to us without direct thermodynamic cost to time-now or the Present, that is to say we do not have to expend energy to reach time-Future from the instantaneous time-Now. The future simply arrives, from wherever. Secondly, Time-Future is instantaneous in character, arriving as Now or Time-Present and as such is without bound. As such time present is Free, because it is without bounds. Further, Special Relativity shows us that the order of events in this cosmos can be switched so that events which are simultaneous in one time-frame of reference may not be in another frame of time.

These Free aspects of time, features of linear time both in Special Relativity and of the Instantaneous Time-Now, are now extended using the ideas and features of Freedom we have previously explored. For we can postulate that if Freedom is infinite, endless and unbound, then it might form a conserving space of infinite size in which the linear time-limited Cosmos can be spanned and saved, spanning the entire History and Future of the limits of linear time in this Cosmos.

Seth Lloyd has calculated the number of operations needed to treat this Cosmos from the time of Big Bang to the endpoint of linear time when space-time freezes and dissolves at the level of the Planck length. This limited span allows us to estimate the size of the Cosmos as a computing operation. Lloyd calculates the Cosmos to be 10 to the 122-exp. computing operations. We extend this and can calculate that to save the Cosmos in its entirety whilst leaving each element Free to take any path so that all possible permutations are mapped, would need the computing power of Free space-time of 10 to the 122-exp FACTORIAL. This is a simple Combinatoric calculation.

If Freedom is as shown and is indeed Infinite, and the cosmos can be shown to be computational in character, then this Free computational space is available to conserve our linear time-bound Cosmos.

Other aspects of linear time indicate that Linear time's physics is bound, and therefore countably limited. Time present can be viewed as a Discontinuity or Fracture in time, since both time past and time future are bound through time present as time-Now, through which time is linear. This discontinuity is a countable bound. As such, treated as a Mathematical Discontinuity, linear time can be instantaneously spanned across this discontinuity by Continuous freedom treated as a conserving and Infinite Mathematical Field with an extra quality: Namely that this Scalar Freedom Field is Both Bound And Free.

Note that bounds are limited because they are bound, and unbound continuous fields are bigger in size and can thus span all sets made of bound and crossed and discrete countable elements.

We further develop the mathematics of each of the Conservation Laws which shall provide us with experimental tests for the Infinitude of Freedom and its presence both in and outside the cosmos as an integrally Free-and-Bound Mathematical Field, in which our cosmos is conserved. The name Omnium has been given to this Space by Professor Roger Penrose

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Calculation

We start by calculating the size of the Cosmos from the Age $A(t)$ of the Cosmos from the origin of the Cosmos at Big Bang, to the Present, in the unit Seconds:

$$A(t) = 4.4150 \times 10^{17} \text{exp (Seconds)}$$

Then we calculate the number of Planck Time-lengths of the cosmos from the Planck Time-length in Unit Seconds $P(t)$, so that we arrive at the total Number of Planck time-lengths in the cosmos in its history. This is a simple division.

$$P(t) = 5.39106 \times 10^{-44} \text{exp (Seconds)}$$

$$\begin{aligned} \text{So that } A(t)/P(t) &= 4.4150 \times 10^{17} \text{exp} / 5.39106 \times 10^{-44} \text{exp} \\ &= 0.818942 \times 10^{61} \text{exp (Number)} \end{aligned}$$

Then we take the size of the cosmos, in Computational operations (given by Seth Lloyd), noting that this number is the number of operational Units of Freedom in the Cosmos, Ops.

Then with a simple division of the second of these by the first, we arrive at the number of Ops Freedom there is for each unit Number of Planck Time-lengths, that is to say, Units of Freedom for each of the smallest Planck Time-length units of the cosmos.

$$\text{Ops} = 10^{122} \text{exp}$$

$$\begin{aligned} \text{So that Ops/ (At/Pt)} &= 10^{122} \text{exp} / 0.818942 \times 10^{61} \text{exp} \\ &= 1.221087 \times 10^{61} \text{exp (Number of Degrees of Freedom)} \end{aligned}$$

This final figure is nicely within range of 10^{61}exp (with a 20% margin), and is certainly of the correct order to make the following observation:-

The value we have just calculated allows us to say that there are circa 10^{61}exp Degrees of freedom for each Planck Time-Length of the cosmos and prompts the following observation:-

For each Planck Time-length Operation as a single Degree of Freedom (of number 10^{61}exp), there is space within the size 10^{122}exp FACTORIAL Operational Degrees of Freedom to Permutate with each and every other position across the full range of the cosmos. Further the full set of Permutations must fall OUTSIDE the size of this Cosmos of a total of 10^{122}exp since 10^{122}exp FACTORIAL is greater in size

than both my calculation of the saving of $10(61) \exp \text{ FACTORIAL}$, from the Historical size of the cosmos , and Seth Lloyd's $100 (122) \exp$ size of the cosmos itself.

We can now Postulate that the size of the Conserving Field for permutating each Historical element of the Cosmos at each and all positions, is $10(61) \exp \text{ FACTORIAL}$ Ops.

Further and as a Corollary: We note that $10(122)\exp$ is the number of ops as calculated by Seth Lloyd, in the whole of our Cosmos, so that the Cosmos's Conserving Field, for the cosmos of the size calculated by Seth Lloyd, is outside our Cosmos too.

We can deduce that, because the Age of the History of The Cosmos (Time-Past) was the number used to calculate its Historical size, then the size of the Future-Saving field must be bigger than $10(61)\exp \text{ FACTORIAL}$, so that the Saving Field must lie Outside the size of this Cosmos for both the cosmos in its History, and the Seth Lloyd Limit of $10(122) \exp$ Ops.

Finally, we see that, however large the size of both the Historical and Future Saving Reciprocal Mathematical Field and the Free Field needed, which I propose and postulate, it is less than the INFINITY which instantaneously imparts both Freedom and the Reciprocal Mathematical Saving Field for our Cosmos. For as I have shown, Freedom Unbound is of Infinite size.

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REFERENCES:

[1] The Universe as Quantum Computer. Seth Lloyd. arXiv: 1312.4455v1 [Quant-ph] 16 Dec 2013