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Temporal No-Linearity: An Alternative to Dark Energy

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Abstract

Mathematical compatibilities and constraints of a hypothetical 5D space-time with time referenced by two coordinates (3-2) have been revisited in detail in several recent papers. It has been prescribed from the GR the compatibility constraints of the FLRW metric in each temporal brane, to be restricted to Closed Universes, Smooth Initial Singularities, and "Open CTC". In a first view, this leads to leaving these works considering mathematical games discarded by the Standard Candles data. However, if time would be referred by two coordinates, they would not be linearly related, and it will be mathematically stated that space-time may not be flat in any case because time-like branes geometry will never be. If so, the time scale "lived" over a two-time dimension geodesic necessarily is not constant over its linear projection on one of both coordinates. Consequently, the correlations between Redshift and Distance Modulus—Distance Ladder—may be corrected by a synchronization function (if a no-linear two-time geodesic trajectory over a "warped temporal geometry" is linearly divided into constant segments, then their projections are not linear in any case). We apply an example of time-trajectory over the time slices, matching the Standard Candle data for a Closed Universe dominated by matter (>90%) in a bulk 3-2 configuration, with open temporal branes and smooth singularity. If time can be referred by two coordinates, then there is no need of Darkness to explain astrophysical data and Universe can be closed.

Keywords

Closed Universe, Multidimensionality, Time-Like Dimensions, No-Linear Time, Accelerated Expansion, Smooth Big Bang

1. Introduction

Every truth is certain only inside its paradigm. Data can certify consistency, even they do not certify the exclusivity of an interpretation but in reference to its assumptions. The interpretation of the observational data on SNeIa & GRB, as an acceleration of Expansion, is true within its relativistic 3-1 paradigm.

Within this paradigm the Horizon's Problem, Dark Energy, Dark Matter, baryonic decay [1], relativistic determinism, the entropy of the black holes, galactic macro-singularities, and multiverses, can be considered, as consequences pending to solve by insisting with additional hypotheses, or also as symptoms of the need for a paradigm change, in any case, to which unification target also points.

A single temporal dimension kidnaps GR into determinism: if Relativistic Mechanics were considered from two or more time dimensions, the temporal branes would be nothing more than a frame of a statistical population of potential time trajectories, defined by temporal geometries (equivalent to microstates). If this temporal geometry would be flat and unique, then time trajectory would be linear, recovering 4D.

FLRW Metric, Cosmological Deceleration, Causality (CTC), Well-posedness, more symmetries for more equations, tachyons and phantom particles, dimensional compactification, have been often considered as "pathologies", reason for disinvestment in multitemporal theories. But alternatively, they may also be considered as limiting conditions that alternative interpretations of the astrophysical data available must meet. They can also be clues to finding time-geodesic function that eventually may converge with SR.

There had been alternative interpretations of SNeIa & GRB data: Effects that may influence the extrapolation of the maximum brightness (subclasses of SNeIa and influence of metallicity [2] [3]; Incoherent Light, [4]; Tired Light, Variable Speed of Light (VSL), [5]; and/or variable G at cosmological scale, MOG [6], MOND [7] [8]. Beside all those speculations, maybe Type Ia Supernovae are not compelling as standard candle that much as it has been said, like in 2014J [9], [10]. This paper will analyze if time can be referred to two no-linear related coordinates, a closed universe with smooth singularity and no-flat open temporal geometry is possible.

2. FLRW Metric

The application of the Campbell Theorem in its weak statement to a multitemporal configuration allows a unique solution in which any Friedmann-Lemaître-Robertson-Walker, -FLRW-, metric can be embedded in a 3-2 Ricci Flat Space, maintaining the symmetry group. Within the multidimensional paradigm, assuming Friedmann's Model, the detailed analysis in [11] of the metrics states the compatibility of relativistic equations with temporal branes in Universes of three spatial and two temporal dimensions (3-2), with certain restrictions. From [12]:

From a 5D = 3-2 Paradigm, FLRW metric as a constrain, states in [13]:

- The Universe must be closed: decelerated Scale Factor. For a generic equilibrium combination of matter, radiation, and the cosmological constant, with an adiabatic index

$$\omega_{\max} \le 1/2, \text{ if } \epsilon = -1 \Rightarrow k = +1 \quad (1)$$

- The necessary and sufficient condition for the absence of particle horizons is a "Smooth Big Bang" (asymptotic to the *v*-axis): the proper time derivative of the expansion factor $R(t)$ must be finite and not diverge faster than R^{-2}. The Horizon Problem would be an answer to a wrong question (asymptotic to a *v*-axis parallel).
- Inside a 5D Universe, a temporal trajectory function $\tau = \Psi(t)$, such as the hyperbolic examples in **Figure 1**, cannot be constant or linear in any case. Any linear relationship between temporal coordinates -a straight line in the temporal plane u/v in **Figure 1**, by rotation and/or translation would reset the 4D configuration.
- Then 5D space-time can never be always flat, though there is a no-linear time geodesic trajectory. It can seem to be approximately flat on the asymptotic phases over the *v*-axis (in **Figure 1**, at the smooth BB process, or even in its tired old phase; in **Figure 2**, which represents another alternative $\Psi(t)$, not included on the Bona *et al.* paper, only in its stabilization process). From this assumption, if the Universe seems to be 4D at low redshift, it may be because we are in an asymptotic stabilization evolution, very similar to a horizontal straight line (dots in **Figure 1**). $\Psi(t) \approx$ constant.
- Any function that relates temporal coordinates, $\Psi(t)$, will represent a trajectory in the temporal geometry always longer than its projection on any axis, or any straight line $\Psi = a + bt$, (see **Figure 1**, with hyperbolic examples). A billion-year living over the trajectory τ for a 5D observer will be projected to less than a billion-year at the *v*-axis set as t; and the other way around, a year from a 4D assumption measure, t, will be translated to more than a year over τ if the observer does not synchronize clocks.

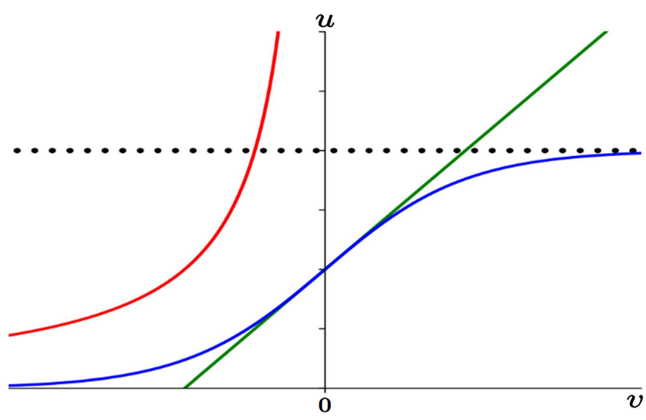

Figure 1. Timelines in the time plane of the bulk M-metric, each one leading to different FLRW projected metrics. The big-bang singularity is here the $u = 0$ line. The straight line corresponds to the standard pure radiation model (recovering 4D by rotation & translation). The other two lines correspond to FLRW models without a big bang, with an initial accelerating (inflationary) phase and a final decelerating phase. The deceleration is not apparent (see the text for the detailed calculation in [12]). In the hyperbolic tangent case, the inflexion point corresponds to a pure radiation phase.

$$t_2 - t_1 < \int_{t_1}^{t_2} \sqrt{1 + (\Psi'(t))^2}\, dt \tag{2}$$

From a Bulk of three space-two time dimensions, if we experience a single time trajectory at a constant rate taken over $\tau = \Psi(t)$; when we measure time with a constant clock, we state a constant "length" of a time-lapsed segment of $\Psi(t)$. This time-length cannot be projected linearly on a constant scale over the single time v-axis; which will mean that the moment in history in which an event occurs will be apparently further on time for the one who takes brightness and redshift as measures of a certain event from the 4D assumption (constantly projected v-time-scale), than for the 5D assumption (constant time-scale over the time trajectory $\Psi(t)$). In this case, we will have to apply a synchronization function:

$$z(t) = \frac{1 - R(t, \Psi(t))}{R(t, \Psi(t))} \tag{3}$$

The single time coordinate assumption drives to a constant Scale Factor, eventually modified by an extra accelerating rate to fit observational data. Though graphically, the measures will stand over the flat expectative, or also can be represented with a variable look back time scale shrinking z (**Figure 3**). From 3-2 perspective, a constant time over Ψ, would have not a constant projected t over the u-axis, which is precisely the assumption of 3-1 perspective, or the other way around, if we size assuming constant t, Scale Factor over Ψ would never be constant.

Suppose the Universe has a configuration of at least two temporal dimensions. In that case, the Distance Ladder assuming 4D would be affected by a correction due to a no linear decelerating Scale Factor, depending on the shape of $\Psi(t)$ and always maintaining the inequality for any function representing the association between both time coordinates. From 3-1 assumption, c 10 Bly ago, were "quicker" for our today's clock (length over v-axis), but from 3-2 assumption, constant for the same clock if used by then (length over $\Psi(t)$). As an analogy, a clock held by a near-c traveler would seem "slower than a second per second" from our clock point of view (if both "seconds" are from different clocks, one on the rocket and the other on the lab), being both clocks identical. In this case, they have a well-known synchronization function by SR.

In the opposite direction in the v axis, the farther from the BB smooth process, the more linear-like approximation in both hyperbolic examples of **Figure 1**. In a naive analogy 2-1D, from our clock point of view (t over v-axis), it could be imagined for an external observer as a time-bubble seeming to grow very fast at the beginning and slowing with time, or in look-back-time, accelerating growth of the Universe at high z (enlarging the apparent distance between z, because the shortest projected time by then). But for a clock measuring at each moment, evolving with the age of the Universe, it would seem to be a constant Expansion rate.

For an observer from 3-1 assumption, rules and clocks always size the same c-length, even if he uses his rule and clock 10 By later. This is not true for a 3-2 assumption, and this do not mean that c is variable, but it may seem variable if the observer do not consider that his rules and clocks are subjective and dependent on the Scale Factor.

An observer conditioned by the 4D assumption (projected time trajectory over a constant scale at v-axis) would include a synchronization bias concerning a 5D observer, considering a constant scale over the time-like geodesic correspondence between time and redshift. Thus, adjusting the observational data of the SNeIa & GRB is only to choose a correct hypothesis of $\Psi(t)$, representing in its relation to the Distance Modulus, μ, an axis with redshift according to time scale on the trajectory, τ. Setting the lifetime of the Universe to 1:

$$\frac{1}{z_\tau + 1} = \int_{\frac{1}{z_t+1}}^{1} \sqrt{1 + \left(\Psi'(t)\right)^2}\,\mathrm{d}t \tag{4}$$

With z_τ, (τ), and z_t, (t) we do not mean to say there are two redshifts, but a different time scale transformation between z and look-back-time, depending on the 3-1 (t) & 3-2 (τ) paradigms: how old is z at the relative scale of the other dimensional assumption.

$$\frac{1}{z_\tau + 1} \;\&\; \frac{1}{z_t + 1} \tag{5}$$

Being z_τ, the redshift where the μ has to be considered from a 3-2 bulk perspective at the scale of z_t (as a translation of z on the time axis, but from each perspective, the size the same z in different time scales).

If time has two coordinates, maybe space is not always flat, but for sure, time is not flat and follows a non-linear trajectory in a warped temporal surface, but we use the projected time to site an event. By ergodicity, the 4D clock may overestimate the look-back-time-distance. It must be corrected because c is the distance over time events and may seem to happen further than they do if we assume constancy of the denominator. This will always happen for any $\Psi(t)$, but the bias quantification will depend on the time-geodesic shape. From this assumption, SNeIa & GRB data may not be interpreted as an Acceleration of Expansion but as an asymptotic stabilization of the second temporal coordinate in a matter-dominated Universe.

No-flat Universe in Expansion of the time-like coordinates are consistent with the equations of the GR in a decelerating Universe and the FLRW metric, guaranties Causality if $\tau = \Psi(t)$ is open and asymptotic. Although, before proposing a time geodesic trajectory shape -like those in **Figure 1**, that will make consistent the hypothesis with astrophysical data, a "pathology" remains unsolved.

3. Well-Posedness

Adding a dimension increases the mathematical cost, which is already very expensive in terms of symmetry assumptions. Even for 4D which implies ten equations, but 5D raises the number to 15 and needs more symmetries to determine the system. With no extra conditions PDEs may become ultra-hyperbolic. We propose to add a temporal geodesic trajectory hypothesis, open-asymptotic-$\Psi(t)$, that must deductively postulate symmetries for including them into GR equations, maybe due to an extra conserved quantity, which will determine the system of differential equations.

That means the requirement for NLT to add a hypothesis, but by the way, the same happens to be in the Acceleration Interpretation, which also needs a supplement in 4D Paradigm: Dark Energy. In both cases, graphically acceleration or deceleration can alternatively be represented as a no-linear scale from constant z to t, to an apparent variable z to constant t, (Figure 3), shrinking v scale if there is some kind of energy in such a shape that drives to a tipping point from concave to convex at $z \approx 0.64$ *i.e.*, due to the radiation + matter dynamic as t^n ($n < 1$), while Dark Energy is supposed to be growing as e^t), or expanding the v-axis scale if there is some kind of gravitational brake.

Another way (fictitious but didactic) to formulate and visualize the time-v-axis variable scale in terms of corrected apparent look-back time to redshift, stretching the double-time geodesic over v-axis by an apparent non-constant time rate, which means an apparent VSL (not real in 5D, but this could be the interpretation from a 4D assumption). That means, that if we set as constant $8\pi G/c^4$, which relates the second derivative of the metric tensor $G_{\mu\nu}$, with the relativistic energy-momentum tensor, $T_{\mu\nu}$ has to remain constant, G would apparently be variable to the 4th power of the apparent change of c, just if so, from 4D assumption. This might have observable consequences in enormous stars and black hole sizes for high z.

That apparent $G(t)$ would be time-dependent only if we use our day clock and would also drive us to consider the no-baryonic Dark Matter interpretation, which would be interpreted from 3-2 bulk, as a consequence of clocks desynchronization (apparent G variation to the 4th power of c). In fact, observational data indicate that if extrapolated to the Transparency Event, the CMB peaks should be attributed, at least to a much greater extent than nowadays, to baryonic dark matter. But *"Dark matter had less influence in the early universe. Observations of distant galaxies carried out with the VLT suggest that they were dominated by ordinary matter"* [1].

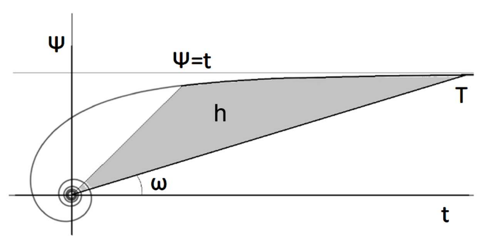

Figure 2. v/t; u/Ψ. Additional hypothesis for $\Psi(t)$ no linear time geodesic in a no flat temporal geometry, in polar coordinates $T = B/\omega$, being T, linear time as a 4D assumption. "Temporal rotation" is only a semantic analogy to describe a simplification for warped-time geometry, not a physical description.

Another "possible clue" to constrain the translation between a symmetry hypothesis and a temporal geodesic trajectory function proposition $\tau = \Psi(t)$, for well-posedness purposes, may be entropy. Entropy increases if the matter can clump together, releasing potential energy and creating clusters that further unbalance the contents. As the mass is finite, CMB entropy would be finite (to the square), proportional to a hypersurface (Holographic Principle, [14]). Wheeler&DeWitt already postulated an analogy with the Universe Wave Function [15].

Gas has a dynamic configuration in the position of all its molecules, although its entropy is calculated according to the number of possible configurations (besides they are used to measure, thermodynamics does not pretend that they all exist in Parallel Universes). Each macrostate would be constituted by equivalent configurations of temporal evolutions on two dimensions, gravitationally consistent of all the masses, and the destiny would not be written (Recurrence Theorem). However, its patterns would be predictable with some probability, and multitemporal would allow a GR with time-arrow.

Another clue to propose a $\Psi(t)$ hypothesis is the question of how a linear Bang transforms into a generical orbital and spinning movements (maybe Kolmogorov turbulence?). We know that at present, everything inside rotates, but the Universe itself seems not to have an Angular Momentum. But was it so at the Big Bang smooth process? Is it possible to consider an Angular Momentum Conservation to income a symmetry at the very BB moment, but not now? Observations about Universal Angular Momentum or Expansion recommend using a $\Psi(t)$ function that becomes flat after the BB smooth process: $t \approx \tau$ reaching stationary state in our days (shape-like hyperbolic tangent case in **Figure 1**).

Another possibility to elucubrate a synchronization function is to consider c as the initial Scale Factor, declining R with expansion due to gravitational friction and momentum conservation, and apply then Special Relativity -SR- synchronization between clocks at different R' (a clock for the observer at a lower R -now-, would size quicker apparent c at the early times). But applying backwards from present up to $z < 10$, will get a very low slope with a high error and with a far point at CMB, and it may not give more than the shape of the tail of an undefined function.

Those and more 5D well-posedness requirements, hints and elucubrations, could be an open frame to additional hypotheses taken as restrictions to be fulfilled for any temporal geodesic trajectory with a more or less known tail. Here are some possibilities to speculate about the determination of equations through an additional synchronization function Ψ. With those "clues", we will propose here an extra hypothesis to determine the system only as an example. But even the SNeIa & GRB data provide an observational shape that can be inversely fitted just approximating a statistical regression, to be understood lately through a conservation law or not. Even hyperbolical tangent examples, with appropriate parameters, will fit astronomical data, but why that shape? $\Psi(t)$ to determine PDEs remains open, and many propositions may fit data in closed universes without Dark Energy.

4. First Shot

The range of possibilities is wide, and we have tried several "temporal geometry speculations" [16]. Between the many options, our "first shot" is to be consistent with the Gödel Universe plus an initial Novikov conjecture for a single event (Big Bang as a White Hole born from a "Higher Dimension Mother Black Hole", inheriting its entropy, mass, charge, and angular momentum, but losing a dimension) [17]. Several models even proposed a switching between space and time nature of coordinates inside a Black Hole.

By analogy with the family of geometric solutions for the movement of a particle according to a central force, inversely proportional to the cube -(3 coordinates)- to its distance to the origin (Cote's spiral), the First Shot additional function has been to test if a synchronization due to Hyperbolic Time Spiral with h proportional to constant Λ/Ω, it fits with data. We do not claim that this is the solution, but this one we will see it fits.

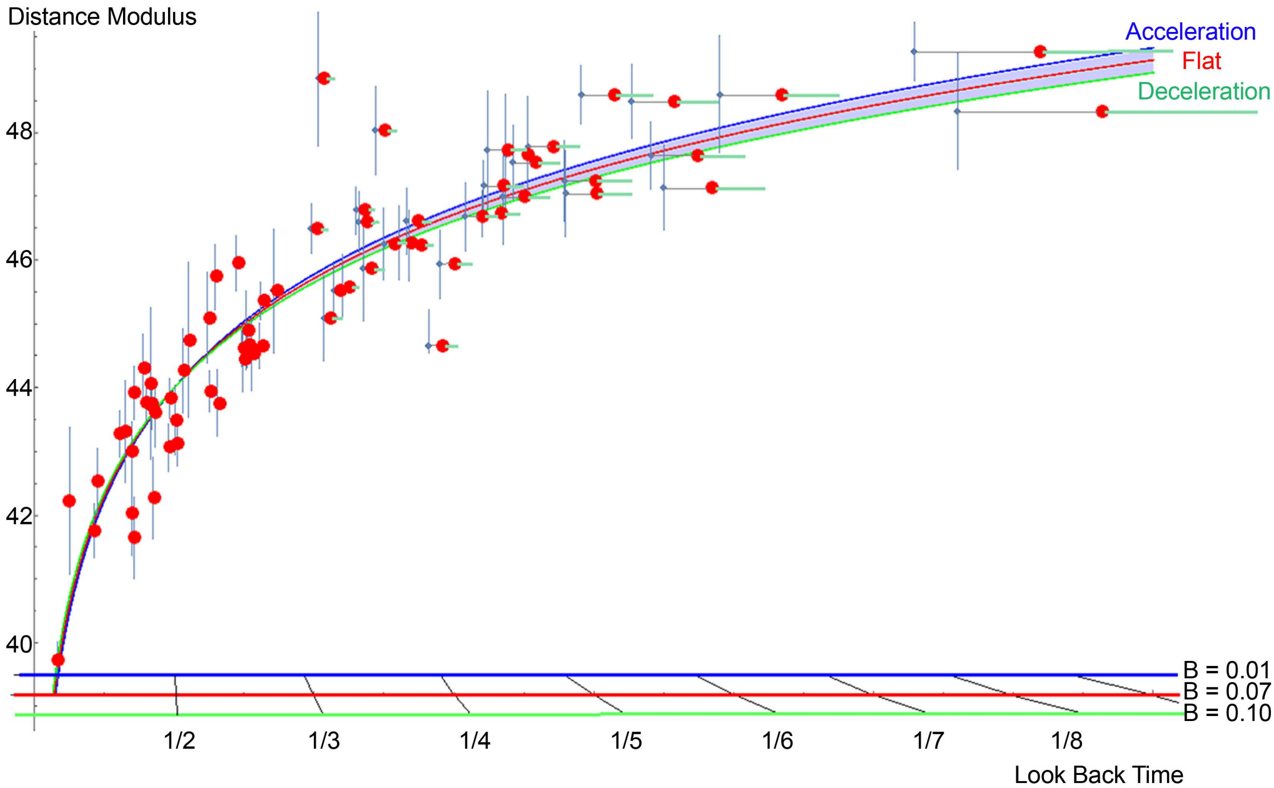

Figure 3. From (6) equation solution. Small-Blue dots with blue error bars are the GRB events over 4D time-scale, same as 5D with $B = 0.01$ (referred to the red axis), and though the blue line is its regression. Big-Red dots are GRB events over 5D time-scale with First Shot $\Psi(t)$ twisting hypothesis -$B = 0.07$ fitted with Flat Universe at constant-scale-, and the red line is its regression. Green regression is fitted with $B = 0.1$ ($\Lambda \approx 95\%$) over the red constant-scale v-axis. Filled in grey is the range of regressions from $B = 0.01$ up to 0.1. Blue regression at the blue scale is red-dashed, so it is green regression at the green scale. As a reference to fit, the dashed red line for a 4D Flat Universe Model radiation/matter: 0.5/0.5 with $\Psi' = H_o = 69.6$ (same as the $2\Lambda/\Omega = 0.07$). So we can set the Legacy No Flat Time Energy hold in its warpness between 0.5 to 9.5%, from Open to Closed Universe, Matter Dominated > 90%.

This "first shot" is not a Rotational Universe proposal because it would need to be space over time (if we could approximate a simplification where time is warped and space near-flat, is it impossible to consider also the evolution of time over space?). Just for the sake of the analogy in losing a dimension (opening PDEs), we must refer to Silk [18], who formally demonstrated that the 4-1D rotational models presented density instability on space-like dimensions when perturbing along the axial axis but stabilized in the perpendicular plane of rotation. An additional space-like dimension would be unstable and would concentrate mass in the vicinity of a disk, folding into a small and constant value (thickness). Analogously to galaxies or planetary systems, it would concentrate time-space in a temporal brane orthogonal to the temporal axis: it would collapse and lose that dimension (orthogonal disc in **Figure 2**).

Assuming the analogy into this very particular "temporal geometry" synchronization, taken as a first shot example of the $\tau = \Psi(t)$ hypothesis, the assumption could be easily extended to 3-3, losing a third time-like dimension at the Big Bang asymptotic smooth process. All those justifications of the first shot origin are no more than the explanation of the why we have chosen this example, including some conservation law, and not any other with no fundamental motivation, like hyperbolic examples in **Figure 1**, but the proceeding is appliable to any other justification of a different hypothesis, that match requirements. This new example time shape would look as in **Figure 2**.

If we assume ergodicity between space and time expansion, conserved quantity h may be interpreted as proportional to Λ/Ω, and the slope Ψ', as the Hubble "Constant", H_o. Then, choosing an appropriate synchronization between t & τ, we will be able to approach the CMB event in 5D time-scale in terms of the gap between measurements based on the Distance Ladder and based on CMB: around 8%, [19] (Tail slope at that time, **Figure 2**).

Just inside the prospected margin of slope at the projected curves of **Figure 3**. It would be great but quite strange to fix $\Psi(t)$ in a First Shot synchronization, but either this shape will be discarded in the future; in our simulations, it fits surprisingly fine with scare data in high z. In any case, equation (4) translated to polar coordinates has been solved and the relation between survival time dimensions, t & τ, would be:

$$\left(\sqrt{B^2+1}+B\ln\left(1+Z\right)\frac{B+\sqrt{B^2+\frac{1}{\left(1+Z\right)^2}}}{B+\sqrt{B^2+1}}-\sqrt{B^2+\frac{1}{\left(1+Z\right)^2}},\frac{c}{Z+1}\right) \tag{6}$$

Being $B = 2\Lambda/\Omega$, *the shape parameter of the time-Cotes spiral, because ergodicity, proportional to radiation/matter.*

From this perspective, the cycling phase of the spiral trajectory, while time changes from positive to negative values and back again (smooth and asymptotic Big Bang), began before 5% from our age, but as the 13.72 billion light-years are sized from a 4D perspective; this does not mean after CMB of a 5D perspective (in this example around 8% higher scope, fitting with observations). By then, a second measured by a clock may seem -apparently, if we synchronize with nowadays clock- a very much shorter projection of the same second at the same clock (**Figure 2**, negative t & Ψ).

When we set this "first shot time-geodesic example", there is a statistical coincidence between both approaches (4D+ΛCDM & NLT + inverse time trajectory spiral) up to $z \approx 2$, and we have used a sample of higher z-GRB to fit data with hypothesis on a model for regression as $44 + b\ln(z)$. [20]. Without being conclusive, given the wide standard deviation of the scarce data at $z > 1$, in this example, it is confirmed that by moving the apparently higher z_τ in terms of the 4D time-scale, in the Distance Modulus/Look-Back-Time graph, with $B = 0.07$ (best-fitted tuning with a 4D Flat Universe model), the SNeIa & GRB Distance Modulus data are compatible either with accelerated or decelerated Universe, Matter Dominated > 90% (as we have assumed in the additional first shot hypothesis, proportionality between h & Λ/Ω to determine Ψ with the inverse spiral shape).

The more closeness with less matter might be interpreted as a stronger effect of the Λ on the shape of the time spiral over the Ω gravitational "brake" (friction). The 5D perspective allows open, flat, and closed configurations, but to seem Spatially-Flat, Matter ≈ 96.5% & Legacy Time Brane Warp Energy ≈ 3.5%. This does not completely withdraw Dark Energy, but makes unnecessary the acceleration to explain data, only because time is set in two coordinates instead of one and that implies time is not linear if it is not a single dimension.

Flat-like & Warp-like coordinate simplification diversifies the space & time nature of dimensions. Still warpness in a couple of coordinates might produce effects even in space-like dimensions while having lower strength. That may be observable maybe during the early BB process, probably not from our time position.

5. Conclusions

The analyzed papers by Bezares, Bona, Pons-Rullan and Vigano [12], confirm that a bulk 3-2 configuration is compatible with the relativistic equations, with the FLRW metric and with a smooth singularity for each temporal brane, without the need for compactification. The price for the change of the time-scale, the Universe must be closed, but precisely restrictions are fed back because another price to pay is warp-time coordinates that introduce a correction in the Scale Factor that closes the Universe to fulfill astrophysical data. According to this criterion, when translating the Redshift Scale to Look-Back-Time, the Closed Universe is compatible with the Standard Candles data and more than this: it fits quite well as shows the data in **Figure 3**.

Here we provide a procedure to test the additional symmetries needed to determine the equations through its time-like-geodesic. Still we do not claim to have found the conservation laws that adjust the definitive correlation of astrophysical data. For example, we demonstrate that the procedure can give consistent results with a broad spectrum of hypotheses and that Dark Energy is not the only answer. We succeed in fitting the astrophysical data in a Space-Flat, Warped-Time, and Causal and Closed Universe with Smooth BB, as accurate as the Open Universe Dark Energy interpretation (red curve in **Figure 3**).

It may be said that this time brane warping evolution to produce a hyperbolic trajectory is highly speculative. Neither in the single constant time interpretation, nature and dynamics of Dark Energy are not known (Why Dark Energy is not qualified as a "pathology"?). However it would be unfair to demand an alternative interpretation to fix the definitive $\Psi(t)$. Meanwhile, if we consider there must be an additional Dark hypothesis for its dynamics, both interpretations would be at the same speculative level.

We might choose between inventing a 96% Universe with a not known energy and matter, or assume not extra time-like dimensions (other alternatives like variability in constants, anisotropy, magnetic forces,… or even misunderstanding of the SNeIa process, are not considered here), but the latter is not dark, we do not have a Horizon Problem; neither Hiperinflation as so: we can explain no-baryonic Dark Matter ($c\&G^4$), and through it we can understand the Giga black holes on the galaxies centrum, intermediate size black holes -GRB 950830- and the why we are going to size much more massive gravitational merging events in the near future); we can also fill the gap on H_o measurements on respect CMB, and opens GR to statistics of time trajectories or non-linearly warped branes.

As future surveys incorporate more events in $z > 2$ and better measurements of H_o, the regressions will be more accurate, and it will be possible to improve the determination of more universal symmetries with this tool. We will continue to test other $\Psi(t)$ additional hypotheses that adjust the data and incorporate R' and H'_o into the tuning. Still, we already anticipate that space-time ergodicity and a conserved Λ/Ω may be proven consistent, which will not mean there are no other candidates for temporary functions derived from it, particularly SR transformations between observers at different Scale Factor expansion rate.

This is not a rotational and/or a variable constant theory, but an anisotropic an inhomogeneous time hypothesis (which is confirmed by our experience and thermodynamics). Maybe space dimensions can be considered as homogeneous and isotropic, but time has a different nature. $\partial\psi/\partial t$ & $\partial\psi/\partial\tau$. Time rotation is not a movement but a shape: a graphical description by the analogy of an example of a temporal geodesic shape. The Speed of Light, Gravitational Constant or Fine Structure Constant remains "constant" for whenever a clock measures from its own time (not the same inside a rocket or at home), but apparently they are not from 4D time-scale if observers presume the same clock along time as his own clock, just because every clock measures the same length of time. Still our projected clock on a single linear time, do not measures the very far away time properly because it assumes parallel time-like-geodesics. A light-year is constant at the very beginning and now, but from our rules-based in wave-length and clocks set in our days, apparently it is not. $\Psi(t)$ & $\Psi'(t)$, set the bias.

In our understanding, there is something clear: even if they are both highly speculative, No-Linear Time (Space Open, Flat or Closed Universe) fits data as well as Dark Energy (Open Universe) and offers a mathematical path forward. Maybe there is no Dark Energy or no baryonic Dark Matter (apparent variable c, G, H_0 & α), or maybe there are no other time-like dimensions. Surely this "first shot" is not the right one. It is just an example in which its tail fixes data, but other time-geodesics with another conservation hypothesis may be, and we only want to mean that it is not an unquestionable true that the Universe is accelerating.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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