Exploration

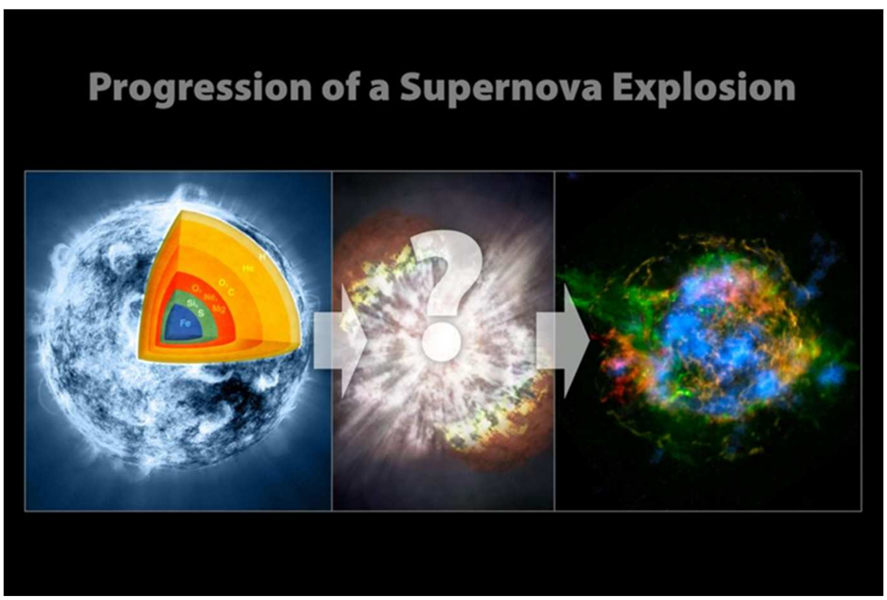
The Accelerating Universe, Dark Energy & the Alpha Variation (Part I)

Anthony Bermanseder*

Abstract

The experimental data collected by the various supernova observers, and under utility of the Hubble Space Telescope to track the brightness variations of discovered supernovae type Ia to the conclusion, that distant supernovae are between 20% and 30% dimmer than expected and as a consequence of their measured redshift they appear to be further away than theory permits. An interpretation of this discovery implies, that the universe's expansion is accelerating; the measured redshift depicting a distance further away for a dimmer brightness than anticipated by theory. Why is there a redshift gap between z=0.11 and z=0.30 approximately? Does this imply a scarcity of supernovas in this redshift interval or is there a cosmological reason for this gap? Is this cosmological reason at the core of the Dark Energy implication and the 'factuality' of an accelerating universe? This paper shall elucidate the cosmological nature of Dark Energy and the inferred accelerating cosmology of an accelerating universe, stipulated to begin some 5-6 Billion years ago and as a change from a measured deceleration from light speed in the early universe.

Keywords: Accelerating universe, dark energy, alpha variation, Hubble Constant, supernovae.



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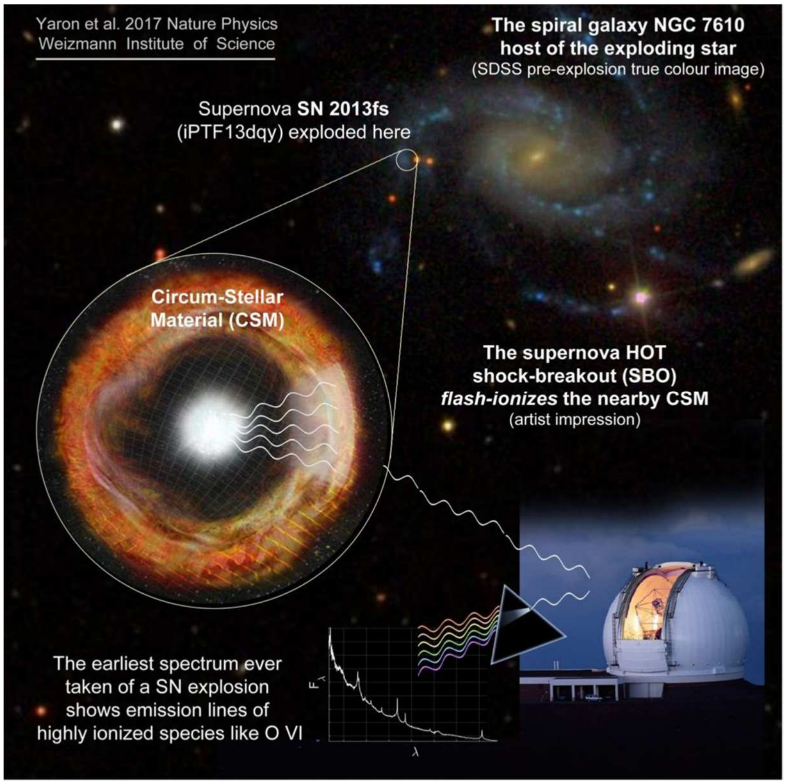
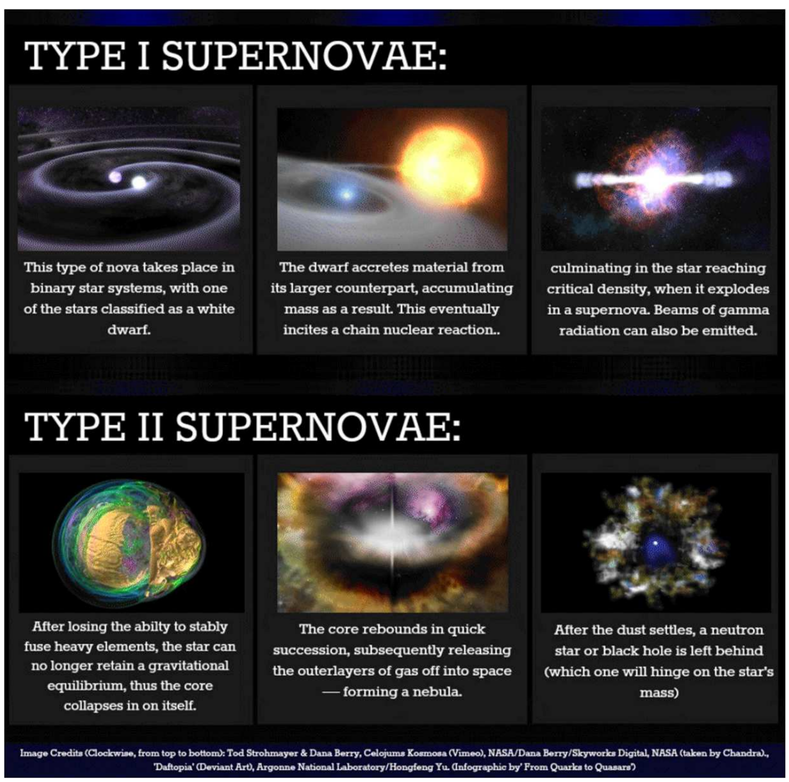

Yaron et al. 2017 Nature Physics
Weizmann Institute of Science
The spiral galaxy NGC 7610
host of the exploding star
(SDSS pre-explosion true colour image)
Supernova SN 2013fs
(iPTF13dqy) exploded here
Circum-Stellar
Material (CSM)
The supernova HOT
shock-breakout (SBO)
flash-ionizes the nearby CSM
(artist impression)
The earliest spectrum ever
taken of a SN explosion
shows emission lines of
highly ionized species like O VI
F_λ
λ


TYPE I SUPERNOVAE:
This type of nova takes place in binary star systems, with one of the stars classified as a white dwarf.
The dwarf accretes material from its larger counterpart, accumulating mass as a result. This eventually incites a chain nuclear reaction..
culminating in the star reaching critical density, when it explodes in a supernova. Beams of gamma radiation can also be emitted.
TYPE II SUPERNOVAE:
After losing the abilty to stably fuse heavy elements, the star can no longer retain a gravitational equilibrium, thus the core collapses in on itself.
The core rebounds in quick succession, subsequently releasing the outerlayers of gas off into space — forming a nebula.
After the dust settles, a neutron star or black hole is left behind (which one will hinge on the star's mass)
Image Credits (Clockwise, from top to bottom): Tod Strohmayer & Dana Berry, Celojums Kosmosa (Vimeo), NASA/Dana Berry/Skyworks Digital, NASA (taken by Chandra)., 'Daftopia' (Deviant Art), Argonne National Laboratory/Hongfeng Yu. (Infographic by' From Quarks to Quasars')

A white dwarf star is important as a distance indicator for the cosmic distances. Should it be in a binary system with another star in mutual orbit about each other, then mass can transfer via magnetic activity from the companion star and the Chandrasekhar limit referring to gravitational collapse of about 1.5 solar masses or 3x1030 kg might so become exceeded and the white dwarf explodes as a supernova type Ia.

Supernovae class Ia show no helium absorption in their spectra but show a strong absorption of singly ionized silicon atoms at about 610 nanometers; supernovae class Ib have helium lines, but no silicon lines and supernovae class Ic have neither; hydrogen is absent in all supernovae spectra type I. Supernovae spectra change significantly, varying in brightness, as the explosion synthesizes heavy elements, such as gold, iron and oxygen in the thermonuclear reactions.

Supernovae class II are rarer and show significant hydrogen absorption and are thought to collapse into a neutron star or Black Hole, having a pre-explosion mass of over 8 solar masses.

The brightest supernovae are of type Ia and the uniformity of their light curves allows calibration of their apparent brightness with their 'standard' true brightness, the luminosity so serving as an indicator as to their distance by astronomical distance-luminosity calibrations.

About one supernova class Ia explodes in a typical galaxy every 300 years, so in observing a large sample of about 3600 galaxies, one such explosion per month should be seen. The experimental data collected by the various supernova observers, and under utility of the Hubble Space Telescope to track the brightness variations of discovered supernovae type Ia, now converged in 1998 to the conclusion, that distant supernovae are between 20% and 30% dimmer than expected and as a consequence of their measured redshift they appear to be further away than theory permits.
An interpretation of this discovery implies, that the universe's expansion is accelerating; the measured redshift depicting a distance further away for a dimmer brightness than anticipated by theory.

Closer analysis of the redshift data shows an expected distribution of luminosity, calibrated to their distances in the Chilean Cala-Tololo data, up to a redshift of about 0.11 and with a redshift-gap until a redshift of 0.3; after which the 'High-Z's' begin to show the 'curving away' from a predicted decelerating expansion rate in concordance with an Euclidean flat universe of Einsteinian General Relativity.
The highest redshift recorded in 1998 was that of 'supernova Iae' at (z=1.1) by the 'High-Z-Team'. Why is there a redshift gap between z=0.11 and z=0.30 approximately? Does this imply a scarcity of supernovas in this redshift interval or is there a cosmological reason for this gap? Is this cosmological reason at the core of the Dark Energy implication and the 'factuality' of an accelerating universe?

This treatise shall elucidate the cosmological nature of Dark Energy and the inferred accelerating cosmology of an accelerating universe, stipulated to begin some 5-6 Billion years ago and as a change from a measured deceleration from light speed in the early universe.

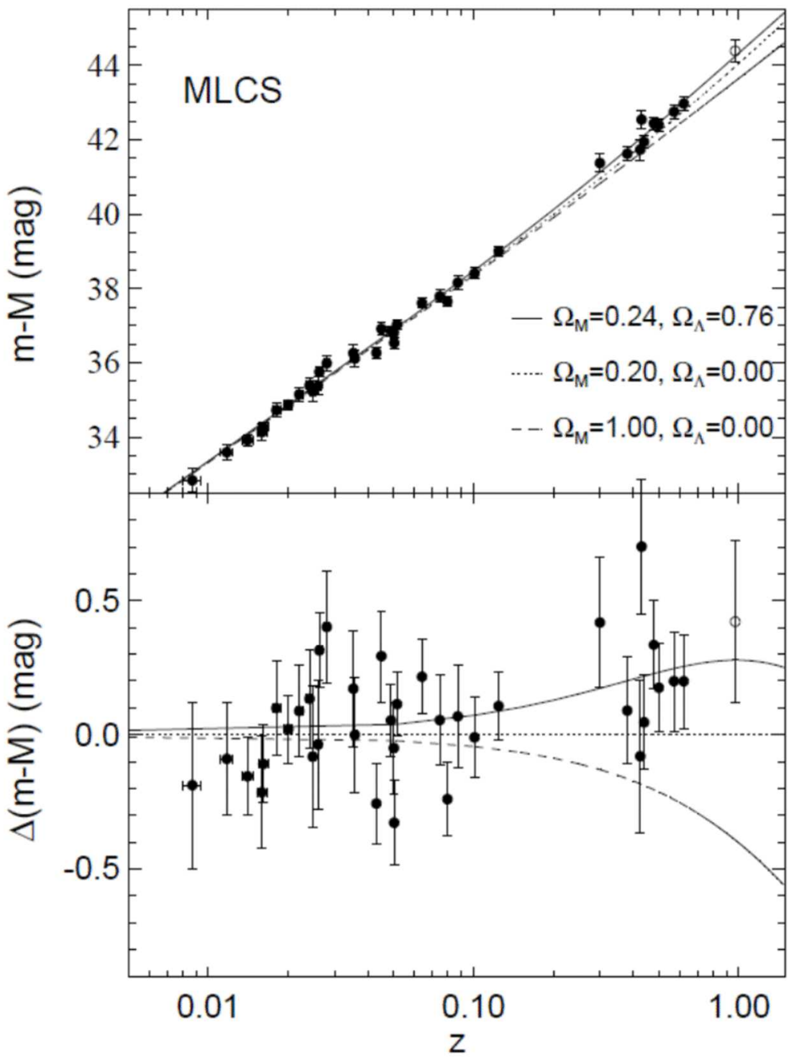


Figure 5: $\Delta m_{15}(B)$ SN Ia Hubble diagram. The upper panel shows the Hubble diagram for the low-redshift and high-redshift SNe Ia samples with distances measured from the template fitting method parameterized by $\Delta m_{15}(B)$ (Hamuy et al. 1995, 1996d). Overplotted are three cosmologies: "low" and "high" Ω_M with $\Omega_\Lambda = 0$ and the best fit for a flat cosmology, $\Omega_M = 0.20$, $\Omega_\Lambda = 0.80$. The bottom panel shows the difference between data and models from the $\Omega_M = 0.20$, $\Omega_\Lambda = 0$ prediction. The open symbol is SN 1997ck ($z = 0.97$) which lacks spectroscopic classification and a color measurement. The average difference between the data and the $\Omega_M = 0.20$, $\Omega_\Lambda = 0$ prediction is 0.28 mag.

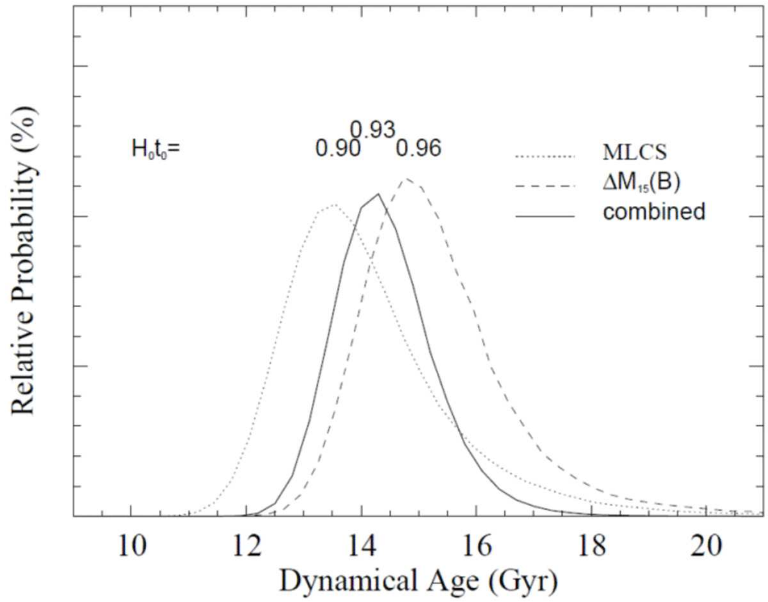


Figure 8: PDF for the dynamical age of the Universe from SNe Ia (equation 19). The PDF for the dynamical age derived from the PDFs for H_0, Ω_M,Ω_Λ is shown for the two different distance methods without the unclassified SN 1997ck. A naive average (see §4.2) yields an estimate of $14.2^{+1.0}_{-0.8}$ Gyr, not including the systematic uncertainties in the Cepheid distance scale.

The stipulated 'Age of the Universe' of 14.2 Billion years corresponds to the latest measurement of the 'Hubble Constant' of the Planck Mission (2013-2018) for a more distant universe and a Hubble Constant of so 67.8 km/Mpc.s; but in discrepancy with measurements of about 74.0 km/Mpc.s for the nearby universe (Magellanic Clouds so 162,000 ly away {z=0.0093} NASA-ESA and Gaia Space Telescopes 2013-2019).

For a linear expansion $H_o=c/R_{max}$ =1/Age of Universe and so gives 1000(3.26) ly/67.8 = 14.4 Gy for the Planck Mission and 1000(3.26) ly/74.0 = 13.2 Gy for the Gaia Space-Telescope.

Measurements in the nearby universe so infer a younger Age for the Universe and measurements in the universe further away imply an older Age of the Universe.
Is the nearby universe related to the 'Local Flow' for redshifts below a critical value, say related to the z=0.11 value measured for the apparent acceleration of the universe, caused by the negative pressure of the Dark Energy?

Indulge yourself in a thought experiment and travel with the expanding event horizon, the boundary of the universe (which has no boundary in the curved overall sense, all locations being centered self-relatively), this then becomes the looking back in time to the origin of the Big Bang.

You then experience the receding origin of the singularity slowly moving away from you and relative to you as 'stationary observer' at the event horizon, your own recessional velocity of (22% of (c)) is nullified and must be accounted for in your calculations of the recessional universe you are observing.

A description of the universe as decelerating with precise deceleration parameters given in a balancing of a gravitational omega, a quintessential lambda and a Milgrom parameter points to a possible variation in the Electromagnetic Fine-structure constant Alpha. The Dark Energy crystallizes as a negative pressure however embedded as a positive quintessence in a multi-dimensional cosmology linked to the manifestation of 10-11-12 dimensional supermembranes.

$$\mathbf{\Lambda(n)/R_H(n/[n+1]) = -4\pi GP/c^2 = G_oM_o/R_H{}^3(n/[n+1])^3 - 2H_o{}^2/(n[n+1]^2)}$$

and $\Lambda = 0$ from the formulation of General Relativity in Einstein's field Equations:

$$R_{\mu\nu} - \frac{1}{2}g_{\mu\nu}\,R + g_{\mu\nu}\Lambda = \frac{8\pi G}{c^4}T_{\mu\nu}$$

for the Einstein-Riemann tensor

$$G_{\mu\nu} = R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu},$$

Energy Conservation and Continuity

dE + PdV = TdS =0 (First Law of Thermodynamics) for a cosmic fluid and scaled Radius $R=a.R_o$; $dR/dt = da/dt.R_o$ and $d^2R/dt^2 = d^2a/dt^2.R_o$

$dV/dt = \{dV/dR\}.\{dR/dt\} = 4\pi a^2R_o{}^3.\{da/dt\}$

$dE/dt = d(mc^2)/dt = c^2.d\{\rho V\}/dt = (4\pi R_o{}^3.c^2/3)\{a^3.d\rho/dt + 3a^2\rho.da/dt\}$

$dE + PdV = (4\pi R_o{}^3.a^2)\{\rho c^2.da/dt + [ac^2/3].d\rho/dt + P.da/dt\} = 0$ for the cosmic fluid energy-pressure continuity equation:

$d\rho/dt = -3\{(da/dt)/a.\{\rho + P/c^2\}\}$ ....(1)

The independent Einstein Field Equations of the Robertson-Walker metric reduce to the Friedmann equations:

**$H^2 = \{(da/dt)/a\}^2 = 8\pi G\rho/3 - kc^2/a^2 + \Lambda/3$
....(2)**

$\{(d^2a/dt^2)/a\} = -4\pi G/3\{\rho + 3P/c^2\} + \Lambda/3$ ....(3)

for scale radius $a=R/R_o$; Hubble parameter $H = \{(da/dt)/a\}$; Gravitational Constant G; Density ρ; Curvature k ; light speed c and Cosmological Constant Λ.

Differentiating (2) and substituting (1) with (2) gives (3):

$\{2(da/dt).(d^2a/dt^2).a^2 - 2a.(da/dt).(da/dt)^2\}/a^4 = 8\pi G.(d\rho/dt)/3 + 2kc^2.(da/dt)/a^3 + 0 = (8\pi G/3)\{-3\{(da/dt)/a.\{\rho + P/c^2\}\} + 2kc^2.(da/dt)/a^3 + 0$

$(2(da/dt)/a).\{(d^2a/dt^2).a - (da/dt)^2\}/a^2 = (8\pi G/3)\{-3(da/dt)/a\}.\{\rho + P/c^2\} + 2\{(da/dt)/a\}.(kc^2/a^2) +0$
$2\{(da/dt)/a\}.\{(d^2a/dt^2).a - (da/dt)^2\}/a^2 = 2\{(da/dt)/a\}\{-4\pi G.\{\rho + P/c^2\} + (kc^2/a^2)\} +0$ with $kc^2/a^2 = 8\pi G\rho/3 + \Lambda/3 - \{(da/dt)/a\}^2$

$d\{H^2\}/dt = 2H.dH/dt = 2\{(da/dt)/a\}.dH/dt$
$dH/dt = \{[d^2a/dt^2]/a - H^2\} = \{-4\pi G.(\rho+ P/c^2) + 8\pi G\rho/3 + \Lambda/3 -H^2\} = -4\pi G/3(\rho + 3P/c^2) + \Lambda/3 - H^2\}$
$= -4\pi G/3(\rho + 3P/c^2) + \Lambda/3 - 8\pi G\rho/3 + kc^2/a^2 - \Lambda/3\} = -4\pi G.(\rho + P/c^2) + kc^2/a^2$

$dH/dt = -4\pi G\{\rho+P/c^2\}$ as the Time derivative for the Hubble parameter H for flat Minkowski space-time with curvature k=0

$\{(d^2a/dt^2).a - (da/dt)^2\}/a^2 = -4\pi G\{\rho+ P/c^2\} + (kc^2/a^2) + 0 = -4\pi G\{\rho + P/c^2\} + 8\pi G\rho/3 - \{(da/dt)/a\}^2 + \Lambda/3$

$\{(d^2a/dt^2)/a\} = (-4\pi G/3)\{3\rho + 3P/c^2- 2\rho\} = (-4\pi G/3)\{\rho + 3P/c^2\} + \Lambda/3 = dH/dt + H^2$

For a scale factor a=n/[n+1] = {1-1/[n+1]} = 1/{1+1/n}

$\mathbf{dH/dt + 4\pi G\rho = - 4\pi GP/c^2}$ .... (for $V_{4/10D}=[4\pi/3]R_H^3$ and $V_{5/11D}=2\pi^2R_H^3$ in factor $3\pi/2$)

$a_{reset} = R_k(n)_{AdS}/R_k(n)_{dS} + ½ = n-\sum\prod n_{k-1}+\prod n_k +½$

Scale factor modulation at $N_k=\{[n-\sum\prod n_{k-1}]/\Pi n_k \}$ = ½ reset coordinate

$\{dH/dt\} = a_{reset} .d\{H_o/T(n)\}/dt = - H_o^2(2n+1)(n+3/2)/T(n)^2$ for k=0

$\mathbf{dH/dt + 4\pi G\rho = - 4\pi GP/c^2}$

$-H_o^2(2n+1)(n+3/2)/T(n)^2 + G_oM_o/\{R_H^3(n/[n+1])^3\}\{4\pi\} = \Lambda(n)/\{R_H(n/[n+1])\} + \Lambda/3$
$-2H_o^2\{[n+1]^2-¼\}/T[n]^2 + G_oM_o/R_H^3(n/[n+1])^3\{4\pi\} = \Lambda(n)/R_H(n/[n+1]) + \Lambda/3$
$-2H_o^2\{[n+1]^2-¼\}/T(n)^2 + 4\pi.G_oM_o/R_H^3(n/[n+1])^3 = \Lambda(n)/R_H(n/[n+1]) + \Lambda/3$

For a scale factor a=n/[n+1] = {1-1/[n+1]} = 1/{1+1/n}

$\mathbf{\Lambda(n)/R_H(n/[n+1]) = - 4\pi GP/c^2 = G_oM_o/R_H^3(n/[n+1])^3 - 2H_o^2/(n[n+1]^2)}$ and $\Lambda = 0$
for $\mathbf{-P(n) = \Lambda(n)c^2[n+1]/4\pi G_onR_H = \Lambda(n)H_oc[n+1]/4\pi G_on = M_oc^2[n+1]^3/4\pi n^3R_H^3 - H_o^2c^2/2\pi G_on[n+1]^2}$

For n=1.13271:............ - $(+6.696373\text{x}10^{-11}$ J/m$^3)^*$ = $(2.126056\text{x}10^{-11}$ J/m$^3)^*$ + $(-8.8224295\text{x}10^{-11}$ J/m$^3)^*$

Negative Dark Energy Pressure = Positive Matter Energy + Negative Inherent Milgröm Deceleration (cH_o/G_o)

The Dark Energy and the 'Cosmological Constant' exhibiting the nature of an intrinsic negative pressure in the cosmology become defined in the overall critical deceleration and density parameters. The pressure term in the Friedmann equations being a quintessence of function n and changing sign from positive to negative to positive as indicated.

For a present measured deceleration parameter q_{dS}=-0.5586, the DE Lambda calculates as -6.696x10^{-11} (N/m^2=J/m^3)*, albeit as a positive pressure within the negative quintessence. A Revision of the Friedmann Cosmology: https://cosmosdawn.net/index.php/en/

The two research results in the Alpha-Variation and the 'Accelerating Cosmos of the Dark Energy' are closely related.
In this analysis, the universe is not accelerating, but appears to do so because of the inter-dimensional intersection of the EMR parameters of the spectroscopic measurements. And it appears to accelerate for a specific redshift interval, which also is responsible for the measured Alpha-Variation, the 'dip' in Alpha is like a redshift becoming a blueshift for a specific epoch.

This cosmological analysis of the phenomena predicts, that supernovae type Ia with a redshift above 1.84 will be measured to conform to the theoretical predictions for a decelerating and flat super cosmos. The appearance of an accelerating cosmos is a limited phenomenon, relevant for a specific and unmapped redshift interval from (z=0.343 to 0.291), with interval (z = 1.080 to 1.840) imaged in the interval (0.343 to 0.291) with a variation maximum for the mapping at the Arpian limit (z_{arp} = 0.25045).

In particular, it has already been noted, that Supernova Iae, also known as SN1998eq with redshift 1.1 is less anomalously dimmed than the nearer ones; just as is predicted here for all the more distant ones. SN1997ff with redshift 1.7 is one of the most distant supernova found by Adam Riess in 2001 by the Hubble-Space-Telescope at the time of this writing and whilst the argument can be made that acceleration decreases with distance, the actual location in relationship to the cosmological redshift remains constant in a 'slowing down from faster' or 'speeding up from slower' , if the decisive measuring stick is the expansion of the universe under constancy of light speed (c); demanding however a 'Redshift-Correlation-Correction'.

The 'de Broglie' inflationary model, where a supermembrane epoch ends in time instantaneity as the EpsEss heterotic superstring, which then expands with a decreasing recessional velocity towards a 'de Broglie' boundary as macro-quantization in 10D, but beginning with light speed (c) under guidance of Special Relativity can be applied.

Other inflation scenarios, such as chaotic inflation had proved untenable by the experimental data and the microwave background pointing to a zero curvature and to a flat universe. The macro quantization of the heterotic superstring, also known as HE(8X8) constitutes the 'conifolding' of the higher dimensions, either as a 6D-Calabi-Yau manifold or as a 7D-Joyce-Sphere, relative to 10D-C-space and 11D-M-space respectively.

Observational Evidence from Supernovae for an Accelerating Universe and a Cosmological Constant

To Appear in the Astronomical Journal

Adam G. Riess[1], Alexei V. Filippenko[1], Peter Challis[2], Alejandro Clocchiatti[3], Alan Diercks[4], Peter M. Garnavich[2], Ron L. Gilliland[5], Craig J. Hogan[4], Saurabh Jha[2], Robert P. Kirshner[2], B. Leibundgut[6], M. M. Phillips[7], David Reiss[4], Brian P. Schmidt[8] [9], Robert A. Schommer[7], R. Chris Smith[7] [10], J. Spyromilio[6], Christopher Stubbs[4], Nicholas B. Suntzeff[7], John Tonry[11]

ABSTRACT

We present spectral and photometric observations of 10 type Ia supernovae (SNe Ia) in the redshift range $0.16 \leq z \leq 0.62$. The luminosity distances of these objects are determined by methods that employ relations between SN Ia luminosity and light curve shape. Combined with previous data from our High-Z Supernova Search Team (Garnavich et al. 1998; Schmidt et al. 1998) and Riess et al. (1998a), this expanded set of 16 high-redshift supernovae and a set of 34 nearby supernovae are used to place constraints on the following cosmological parameters: the Hubble constant (H_0), the mass density (Ω_M), the cosmological constant (i.e., the vacuum energy density, Ω_Λ), the deceleration parameter (q_0), and the dynamical age of the Universe (t_0). The distances of the high-redshift SNe Ia are, on average, 10% to 15% farther than expected in a low mass density ($\Omega_M = 0.2$) Universe without a cosmological constant. Different light curve fitting methods, SN Ia subsamples, and prior constraints unanimously favor eternally expanding models with positive cosmological constant (i.e., $\Omega_\Lambda > 0$) and a current acceleration of the expansion (i.e., $q_0 < 0$). With no prior constraint on mass density other than $\Omega_M \geq 0$, the spectroscopically confirmed SNe Ia are statistically consistent with $q_0 < 0$ at the 2.8σ

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Further intensive study of SNe Ia at low ($z < 0.1$), intermediate ($0.1 \leq z \leq 0.3$), and high ($z > 0.3$) redshifts is needed to uncover and quantify lingering systematic uncertainties in this striking result.

6. Conclusions

1. We find the luminosity distances to well-observed SNe with $0.16 \leq z \leq 0.97$ measured by two methods to be in excess of the prediction of a low mass-density ($\Omega_M \approx 0.2$) Universe by 0.25 to 0.28 mag. A cosmological explanation is provided by a positive cosmological constant with 99.7% (3.0σ) to >99.9% (4.0σ) confidence using the complete spectroscopic SN Ia sample and the prior belief that $\Omega_M \geq 0$.

2. The distances to the spectroscopic sample of SNe Ia measured by two methods are consistent with a currently accelerating expansion ($q_0 \leq 0$) at the 99.5% (2.8σ) to >99.9% (3.9σ) level for $q_0 \equiv \frac{\Omega_M}{2} - \Omega_\Lambda$ using the prior that $\Omega_M \geq 0$.

3. The data favor eternal expansion as the fate of the Universe at the 99.7% (3.0σ) to >99.9% (4.0σ) confidence level from the spectroscopic SN Ia sample and the prior that $\Omega_M \geq 0$.

4. We estimate the dynamical age of the Universe to be 14.2 ±1.5 Gyr including systematic uncertainties, but subject to the zeropoint of the current Cepheid distance scale used for the host galaxies of three nearby SNe Ia (Saha et al. 1994, 1997).

5. These conclusions do not depend on inclusion of SN 1997ck (z=0.97), whose spectroscopic classification remains uncertain, nor on which of two light-curve fitting methods is used to determine the SN Ia distances.

6. The systematic uncertainties presented by grey extinction, sample selection bias, evolution, a local void, weak gravitational lensing, and sample contamination currently do not provide a convincing substitute for a positive cosmological constant. Further studies are needed to determine the possible influence of any remaining systematic uncertainties.

https://arxiv.org/pdf/astro-ph/9805201.pdf

And the 'de Broglie' inflation quantizes Einstein's field equations of General Relativity in their Friedmann formulations; the Milgrom parameter becoming acceleration: $\{d^2r(n)/dt^2 = -2cH_o/(n+1)^3\}$ and the distance-scale factor parametrizing as: $\{r[n] = R_{max}(n/(n+1))\}$ and the velocity as: $\{dr(n)/dt = c/(n+1)^2\}$; the parametric constant for dimensionless cycle time is: ($n = H_ot$ for $dn/dt = H_o$).

And so knowing the present cycle time (n_p=1.1327117) via an arbitrary Mean-Alignment-Time or MAT, relative to a phase shifted proto universe and set as (Midnight, November 4th, 1996, Canberra, Australia, local time); the present universal speed of recession is calculated as 0.2198c or (22% of c), which then maps a self-relative 'Arpian redshift' as the renormalization for the receding event horizon, mirrored in the Big Bang singularity; (z_{arp} = 0.25045).

We also calculate the 10D expansion of the universe as (53.111% or a radius of 8.963 billion lightyears), increasing to (113.27% or 19.12 billion lightyears [ly]) for the 11D universe. The Hubble-Oscillation so defines the nodal Hubble-Constant: (H_o=1.877728045x10^{-18} 1/s*) or 58.04 Hubble Units [km/Mpc.s]) and the 10D-cosmic asymptotic diameter as (33.752213 billion ly*). The Hubble constant varies between f_{ps} and H_o as $H_o.R_H = \lambda_{ps}.f_{ps} = c$ and is calculated to assume a value of 66.9 Hubble units for the present time coordinate n_p in the cosmic evolution.

The Alpha-Variation so encompasses a period of (2[19.12 - 16.88] = 4.48 billion years) and hence two distance intervals; one from the present epoch (n_p) to a distance 2.24 billion years into the past at the nodal value (n=1) and its 11D-image at (n=1-0.13271...=0.867289).

Relative to the Big Bang Source however, this interval is mapped from (n=0.13271... to n=0.26542...) as a linear double interval; just as two mirrors facing each other would reflect each other in the spacetime 'in between'. This 'in between' becomes our expanding spacetime and we can calculate the relevant distances, using cycle-time n as parameter and the nodal Hubble-Constant as invariant at (n=1).

At (n=0.13271...or 2.24 billion years after the Big Bang; v'/c=0.77940 and z =1.840), relative to the nodal Hubble event horizon and at (n=0.26542... or 4.48 billion years after the Big Bang; v'/c=0.62449 and z =1.080), relative to the nodal Hubble event horizon.

The cosmological redshift epoch between (z=1.080 to 1.840) and corresponding to a 2.24 billion year duration includes the 'peak of galaxies' at (z=1.18) and is characterized in the absolute minimum of the quintessential lambda and the gravitational maximum contractions to form galactic structures and superstructures under the auspices of the Sarkar Constant of 236.1 million lightyears.

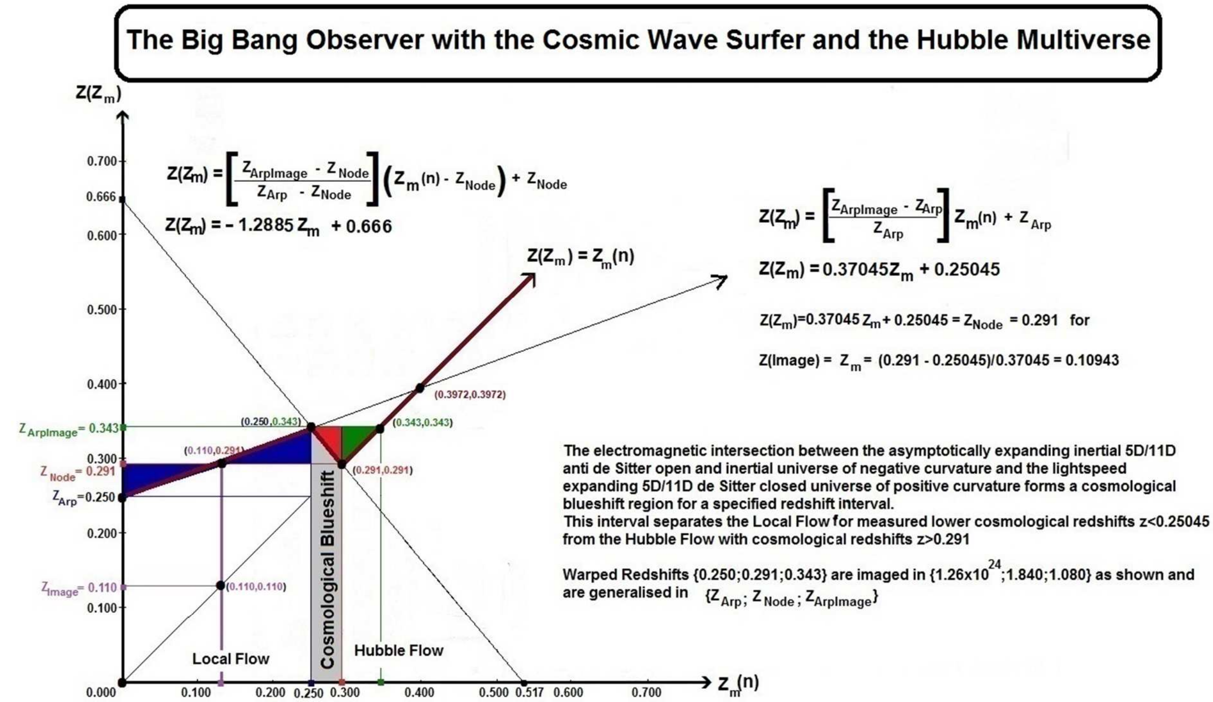
Now looking back at those large redshift values, the lower one coinciding with the redshift of z=1.1 for supernova 1998 Iae, measured by Brian Schmidt of the 'High-Z-Team' must encompass a 'looking through' the imaged z-interval, namely the interval from the node at 2.24 billion years back to 4.48 billion years or the z-interval from (n=0.86729, v'/c=0.28680, z=0.343) to (n=1.0000, v'/c=0.2500, z=0.2910).

In other words, the 11D intersection of M-space intersects 10D-C-space in the two intervals, which form self-relative images of each other.

The 10D Riemann hypersphere is subject to gravitation in mass-parameters and decelerates asymptotically towards its 11D M-space boundary in negative and open curvature, mirroring the asymptotic expansion in perfect flatness of Euclidean zero curvature, however. The EMR-parameters so double themselves in the said interval, an interval which is itself expanding and contracts between the two nodal values of maximum frequency (f_{ps}) and minimum frequency (H_o).

But it is only the EMR parameter that defines this 'oscillating universe', the mass parameter remains asymptotic as defined in the parametric scale factor {$r(n)=R_{max}(n/(n+1)$, with $R_{max} = R_{Hubble} = R_H = 1.59767545\text{x}10^{26}$ m*}.

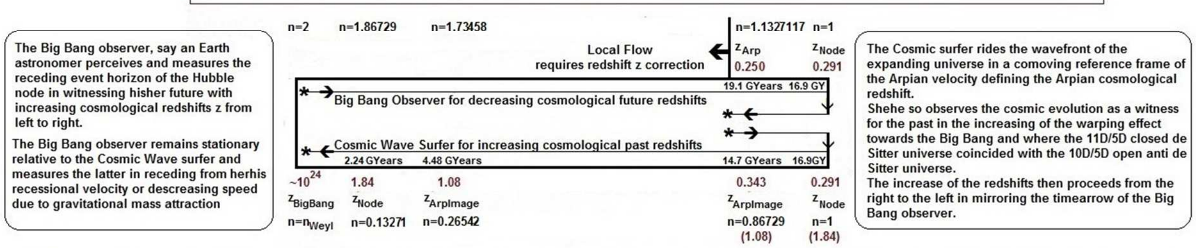
Revisiting the redshift data of 1998, we notice the 'missing redshifts' in the interval from (z=0.11-0.3), with the limiting nodal (z=1.840) mapped onto the nodal (z=0.291) and the boundary image (z=1.080) mapped in its boundary image (z=0.343). The first supernova, beginning to 'curve away' from the decelerating expansion predicted by theory, is at about (z=0.11).



The intersection of the Local Flow cosmological redshift correction line for low redshifts z with the nodal redshift constant line determines a measured redshift z(m) as z(m)=z(image)=0.109 as a critical value for the Hubble Flow for high redshifts.
For this value of z then particular unexpected cosmological phenomena, such as quasar redshift anomalies apparently coupling quasar sources with galactic hosts and aberrant spectra and light curves for gamma ray bursters and supernovae can be observed by Terran stargazers unawares about the multivalued redshift regions and their mirroring properties as indicated.

$$H_o = dn/dt = c/R_{Hubble} = n/t = n_{BB}/t_{BB} = n_{Weyl} f_{Weyl} = \lambda_{Weyl} f_{Weyl}/R_{Hubble}$$

$$H_{omax} = f_{Weyl} = 3\times10^{30}\ \text{Hz} \qquad H(n_{present}) = H_o/(2-n_{present}) = 66.9\ \text{km/Mpcs} \qquad H_{omin} = 58.04\ \text{km/Mpcs} = 1.877...\times10^{-18}\ \text{Hz}$$



The dynamic node moves the Hubble event horizon along the basic n-interval $[0\text{-}n_{BB}, 1]$ to superpose the 11D Radius $R_{11}(n)=nR_{Hubble}=R_{Hubble}+\Delta$ onto the oscillating multiverse bouncing between even nodes of the Big Bang observer $\{0\text{-}n_{BB}, 2, 4, 6,...\}$ and the odd nodes of the mirrored and imaged Cosmic wave surfer $\{1, 3, 5, 7,...\}$.
The unitary interval so defines the curvature in $R_{10}(n)=R_{Hubble}\{n/[n+1]\}$ asymptotically and as a function of the expansion parameter $a = R_{10}(n)/R_{Hubble} = n/[n+1] = 1 - 1/[n+1]$

<u>Recessional Velocity:</u> $v'/c = 1/(n+1)^2$ in $1+z = \sqrt{\{(1+[v'/c])/(1-[v'/c])\}} = \sqrt{\{1+2/(n[n+2])\}}$ for $n = \sqrt{\{c/v'\}} - 1 = \sqrt{\{1+2/(z[z+2])\}} - 1$

$v'/c = 1/(n_p+1)^2 = 0.219855$ for $Z_{arp} = 0.25045$ for a present z=0 redshift image for $n_p = 1.132712 = 1+0.132712$ and $2-1.132712 = 0.86728$ (image)

<u>Critical Redshifts:</u>

$Z_{o/arp} = 0.00000$ for $n_p = 1.132712$ and imaged in the limiting $Z_{n\Delta} = 0.34323$ for the Local Flow LF

$Z_{M231} = 0.04147$ for a LF-n=3.91058 for a redshift correction $Z_{M231}(0.04147) = 0.37045(0.04147) + 0.25045 = 0.26581$ for a n = 1.07864 and $n_p - 1.07864 = 0.05407$ as 912.5 Million ly

$Z_{LF} = 0.10943$ for n= 2.022956 for a 'Local Flow' redshift correction $Z_{LF}(0.10943) = 0.37045(0.10943) + 0.25045 = 0.29099 = Z_n$ at the node for a n = 1 = $n_p - 0.132712$; 2.24 Gly from n_p

$Z_{Q3C273} = 0.1583$ with v'/c = 0.1583 and for a n= 1.5134 for a redshift correction $Z_{Q3C273}(0.1583) = 0.37045(0.1583) + 0.25045 = 0.30909$ for a n = 0.94993 = 1 - 0.05007

The position of Blazar Q3C273 is so 1.132712-0.94993 = 0.18278 from the n_p cycle coordinate at a displacement of 2.9202×10^{25} m* or 3.0846 Billion light years from n_p
The nodal mirror of the Inflaton defines a redshift displacement of 2.24 Billion years from the present observer for multiple redshift values for ylemic objects within the Local Flow.

$Z_{arp}(0.25045) = 0.37045(0.25045) + 0.25045 = 0.34323 = Z_{n\Delta}$ for a n = 0.867289 for $n_p - 0.867289 = 0.265422$ and a distance of 4.479 Billion light years from n_p imaging $Z_{n\Delta}$

$Z_n = 0.29099$ for n=1.000000 in Hubble Flow for $Z_n(0.29099) = 0.29099$ for $n_p - 1.0000 = 0.132711$ and a distance of 2.240 Billion light years from n_p

$Z_{n\Delta} = 0.34323$ for n=0.867289 in Hubble Flow for $Z_{n\Delta}(0.34323) = 0.34323$ for $n_p - 0.867289 = 0.265422$ and a distance of 4.479 Billion light years from n_p

$Z_{n\Delta'} = 1.07994$ for n=0.265422 in Hubble Flow for $Z_{n\Delta}(1.07994) = 1.07994$ for $n_p - 0.26544 = 0.86727$ and a distance of 14.636 Billion light years from n_p
$Z_{ni} = 1.84012$ for n=0.132712 in Hubble Flow for $Z_{ni}(1.84012) = 1.84012$ for $n_p - 0.13271 = 1.00000$ and a distance of 16.876 Billion light years from n_p

Any receding cosmological object with a redshift exceeding (z=0.291) can be considered to be moving in the 'Hubble Flow' with a measured redshift (z_m=z), because after a distance of 2.24 billion ly no doubling of the electromagnetic parameters occurs for the distance between the two cosmic nodes.

But we find three z-intervals, in whom we must apply a redshift-correction; set in the images of the boundaries and the nodes. The fixed odd (1,3,5,...) Hubble Node H_o for Protoverse (k=0 in a Multiverse cosmology in parallel time space, but collocal in spacetime:

(https://cosmosdawn.net/attachments/article/29/mathimatia10.pdf)

is imaged in a unitary interval {n: n_{ps}-½-1} and across the Dark Energy Mirror at n=½ in the even (0,2,4,...) Hubble Node of the Big Bang for

$$n_{ps}=\lambda_{ps}/R_{Hubble}=(c/R_{Hubble})/(c/\lambda_{ps})=H_o/f_{ps}=6.259...x10^{-49}.$$

The odd node remains fixed in the multiverse, but allows a transversion of the electromagnetic speed-invariant light path to oscillate between the two nodes in a lower dimensional, say 10D stringed cosmology. The 11D light path so is both reflected into this 10D string space, but also continues into 11D membrane space in the creation for the multiverse generations in a resetting and extension of the initializing parameters of the Big Bang defining the protoverse.

The reflected 11D light path so intersects its own journey from the Quantum Big Bang (qbb), once the first odd node H_o has been encountered so 16.876 Billion years following the qbb genesis.

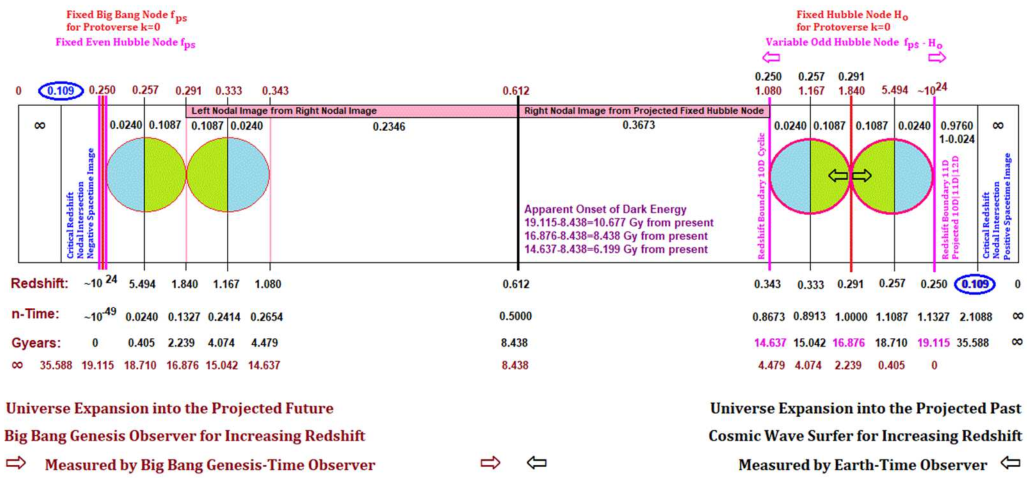
This implies that a second universe for k=1 is generated as soon as the first universe, initiated as k=0 has attained a full covering of the Hubble Event Horizon, set by the Inflaton. A second universe, collocal with the first universe so was created in a second qbb 19.115-16.876=2.239 Billion years ago.

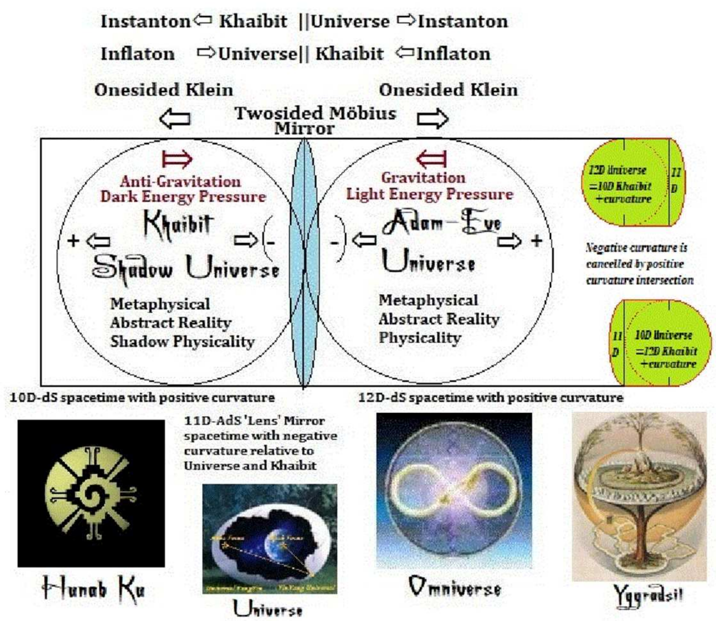
As the spacetime for k=0 was created by the first Inflaton, the second universe became superimposed onto the first, already existing universe in a multi-dimensional spacetime defined by the 10D-closed cosmology of de Sitter positive curvature, albeit expanding as a 11D-open cosmology of Anti-de Sitter negative curvature.

At the critical node (n=1) the positive gravitational pressure from the perspective of a present day cosmological Earth-Time observer, measuring the universe backwards in time for increasing cosmological redshifts - is balanced by a negative Dark Energy pressure from the perspective of a relative present day Big Bang Genesis observer, measuring the universe forwards in time for increasing cosmological redshifts.

A superposition of the two self-relative observers, then cancels the curvatures to result in an overall Euclidean-Minkowskian flat cosmology. This congruence or qbb entanglement so enables the origin of the Dark Energy to derive from a quasi-negative spacetime, here termed as a Shadow Universe Khaibit.

Khaibit so expands spacetime from its own singularity contraction of no space and no time as given by the Instanton parameters of supermembrane $E_{ps}E_{ss}$.





This 'singularity interval' so is a collocal point space in the Shadow Universe and is defined by the boundary value of the redshift of the string space, given by the n-coordinates of the oscillating de Sitter cosmology.

In the Anti-de Sitter cosmology of the refracted-continuing 11-dimensional light path, the light path defines the multivalued coordinates for the Hubble Node oscillation within the unitary interval as given by kth universe embedded within the omniverse.

The entirety of space in any multiverse, so can be considered as a 'singularity point space' relative to Khaibit, the Shadow Universe, containing or embedding within its higher dimensional extent lower dimensional or compressed-conifold spacetime.

The boundary ($z_{arpimage}$=0.343, z_{node}=1.080) is imaged as the 10D-boundary image (z_{arp}=0.25045) in the 10D-nodal mirror of (z_{node}=0.291, $z_{arpimage}$=1.840) and the present 11D-boundary mirror of (z_{arp}=0.25045, $z_{BigBang} \sim 10^{24}$) images the Big Bang-0D-10-11D 'singularity point space' in the shared nodal 10D-11D-boundary (z_{arp}=0.25045).

If (v'/c=0.22), then (z_m=z_{arp}=0.25045 as the variation maximum) and at the event horizon, where z_m=0, the $z(z_m)$=z_{arp} and az_m+b=0.291 for z_m=$z_{nodalintersection}$=z_{ni}; subsequently (b=z_{arp} & az_{ni}=0.04055) and a the gradient of the 'Local Flow', given in the equation: $z(z_m)=az_m+0.25045$ for the present epoch.

The intersecting redshift interval for the present time spans the $z(z_m)$ range from (0.291 to 0.343) for the z_m-interval from (z_{ni} to 0.25045) with positive gradient (0.343-0.291)/(0.25045-z_{ni})=(0.052/(0.25045-z_{ni}) and letting this gradient define the intersection of z_{node}=z_m=z_{ni} and where $z(z_m)=z_m(n)$ for $z_{red}(z_m)$ = 0.37045(z_m) + 0.25045 = 0.291 = z_{node} gives **z_{ni}=0.10943** for gradient (0.34323-0.25045)/0.25045 = 0.09278/0.25045 = 0.37045, so defining the

Redshift-Correlation-Equation: $z_{red}(z_m) = 0.37045(z_m) + 0.25045$

The intersecting blueshift interval for the present time spans the z_m-interval from (0.25045 to 0.29099) for the same range with a negative gradient (0.34323-0.29099)/(0.25045-0.29099)=-0.05224/0.04054=-1.2885) and a linear Blueshift-Correlation-Equation:

$z_{blue}(z_m) = -1.28804(z_m) + 0.666$ = Cosmological Blueshift Region

Then the 'curving away' from the deceleration model at (z=1.11) becomes a consequence of the redshift (z_{ni}=0.10943) forming a nodal image from positive space in negative space to indicate redshift coordinates below the boundary coordinate given by zarp = 0.25045 as the redshift of the universes expansion for the age of the universe determined by the speed of recession (v) of its 11-dimensional surface boundary by $n = \sqrt{\{c/v\}} - 1 = \sqrt{\{1 + 2/(z^2+2z)\}} - 1$

The relativistic redshift formula suffices, because the expanding space of the universe in the Instanton is parametrically set by the Inflaton as the light path for the nodal Hubble oscillation - poetically called as the 'Heartbeat of the Mother Universe' or the 'Breath of Baab Universe' within the 'Breath of Abba Khaibit. The Hubble Law Hubble Constant = Recessional Velocity/Distance or H = v/D = constant is used to estimate the cosmological distances. The cosmological redshift so is comoving with the recessional velocity given by v/c and the redshift z= v/c as a proportion of lightspeed c for a recessional velocity v is approximately linear for z<1 and so the Local Flow as distinct from the Hubble Flow here considered.

(*Continued on Part II*)

Received May 21, 2019; Accepted June 26, 2019