

The (detected) ether offers the missing masses of galaxies, and excludes “big bang” up to $z=2$

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Abstract: The existent ether offers the missing masses to the galaxies and should make the universe more massive, but not denser, than it is assumed. The ether is assumed of constant density throughout the universe and such a property should make both: the speed of light to be constant in intergalactic space, (although locally - i.e. close to matter - an influence of gravitational potential is proved to affect the speed of light), and second the constancy of ether density should make any “explosion of space” quite impossible. But a “friction” of the photon in the ether should create the *cosmic red-shift* which was erroneously interpreted as “recession of galaxies” or “big bang”. In this work the constant A of ‘friction’ of photon in ether has been determined by means of 310 SN Ia; the result then is, up to $z=2$, many of the galaxies are receding (maximum velocity $+0.2166 c$) and numerous others are approaching to us (maximum velocity $-0.2166 c$) i.e. the universe don’t show any “big bang”.

1 Introduction

1.1 “Stokes’ (1845) model of ether for annual starlight aberration”

Present author [1] managed to prove theoretically and verify by experiments the existence of forgotten “Stoke’s (1845) [2] -classical luminiferous ether model-proposed by Stokes in 1845 in order to explain annual starlight aberration”. Ether is really proved to be gravitationally dragged by the rotating Earth-Sun system (ether is confined into ‘Roche’s lobes’ and be carried translationally by Earth in its journey in space), giving additionally and one very natural classical explanation to the famous Michelson-Morley null result i.e. without any SRT.

1.2 SRT and GRT out of rule

Nearly stationary relative the traveling Earth, “Stoke’s ether” (SE), is close-around Earth placed into Earth’s Roche lobe. The constancy thus of the speed of propagation of light is now property of Stokes’ ether and it gives no place to the theory of SRT. Of course Sagnac (1913) [3] and Michelson-Gale (1925) [4] positive experimental results had proved directly the presence of SE around Earth. Both of these experiments had found the

Galilean addition of the velocities of their parts, (slowly rotating apparatuses – interferometers-), combined with the local speed c of interfering light rays; (evidently Einstein’s axiom about the *invariance* of the speed of light was out of rule neither Lorentz transformations are applicable and not any four-dimensional “metric” can be founded by these experiments); This mean that and any foundation of GRT by its “GRT space-time metric” is entirely arbitrary and cannot be related to the so called “SRT - metric” (which had been experimentally disproved by Galilean addition of velocities).

Author then had had to re-produce the complete experimental menu of entire “SRT” and “GRT” based in Newtonian and Maxwellian physics only [1, 5].

1.3 The atomic Doppler in ether

For the emitting atom moving in ether (SE) at a velocity u (always smaller than speed c), it appears the much known atomic Doppler effect:

$$\frac{v_{u=u}}{v_{u=0}} = \frac{\lambda_{u=0}}{\lambda_{u=u}} = \frac{\sqrt{1 - \frac{u^2}{c^2}}}{1 - \frac{u}{c} \cdot \cos \Theta} \quad (1)$$

(being in rule independently of SRT) [1, 5]. For moving atoms emitting at an angle Θ_v (Θ is measured from velocity vector \vec{u}).

1. 4 An astronomical Doppler effect for relatively moving “local ether atmospheres”

The above (1) law are out of rule when the emitting atoms are stationary relative the local ether (as SE is). For these atoms emitting into the –relatively stationary – star ether atmosphere (SEA) and for two well separated SEAs being in relative motion, -of recessional velocity v -the one relative to the other, it is proved an astronomical Doppler effect

$$[1]: \quad (z_v + 1) \equiv \frac{\lambda_{v=v}}{\lambda_{v=0}} = \frac{v_{v=0}}{v_{v=v}} = e^{\frac{v}{c}} \quad (2)$$

in this astronomical Doppler of ether atmospheres of the stars, we have:

$$\ln(1 + z_v) = \frac{v}{c} \quad (3)$$

It is important in the case the relative velocity v of the SEAs can be freely exceed the local speed c of light (!).

2 More properties of ether

2. 1 Ether is incompressible and also must be a super - fluid:

The original function of the ether was to support the vibrations of the waves of light and after Maxwell to carry and the E/M waves. Although ether is assumed to be of very low density yet it regarded to be incompressible (as liquid of constant density). It is attracted by gravity. The fact that it does not alter essentially the periods of our planetary system means that ether must present ultra low friction i.e. it presents properties of a super fluid.

2. 2 Ether is “black matter” that completes the missing masses of galaxies:

We have to remember that the calculated missing mass of our own galaxy (as well and of other galaxies) is nearly 10 times

greater than their optically observed masses.

2. 3 Ether is and in intergalactic space and makes universe greatly as massive.

If ether propagates light inside our own galaxy it also has to propagate light and between galaxies; this mean that intergalactic space have to be completed by the ether; (remember it regarded as a liquid of constant density – incompressible- throughout its extent completing the missing masses of galaxies). This should make and entire the universe to acquire a greatly increased mass.

2. 4 Ether makes more difficult any expansion of universe.

The presence of ether should make the universe greatly as massive (but not denser than it is assumed). The galaxies now are presumably plunged into the universal ether (and galaxies have impregnated with this ether too). The result is that galaxies have to subject to a kind of “universal buoyancy” due of the presence of the universal ether medium; but since the impregnated –with ether medium- galaxies are sufficiently denser than clear ether the mentioned universal buoyancy appears to have no effects.

1) Conclusively with ether inside the universe there should be too much more mass to be set in motion for any universal expansion theory.

2) Any “universal expansion of space” should leave back not an empty “geometrical space” but instead a physical space full with ether i.e. universe have to do both: to “increase the mutual distances of the galaxies” and simultaneously to generate –from zero- large and large quantities of ether medium; (the opposite i.e. a volume of universe filled with ether and another volume empty of it seems to be improbable altering locally the physical properties of the universe. If the intergalactic space had really been increased without the production of new

ether this should mean that ether can change its density leading to enormous changes of the speed of light.

3) If the intergalactic space had had really been increased this should mean that new ether medium - "black matter" had had really to be created (from zero) throughout the universe (which again should attract back the galaxies or universe).

3. Erroneous "balloon...physics"

In the well known example for the explanation of the "expansion of space" we read: ... "on a small balloon are pointed the galaxies and a small sinusoidal line is drawn to present a traveling wave train of light or photon; after the blowing up of this balloon we see the pointed galaxies to be separated by greater distances between them and the sinusoidal line to be much longer i.e. the sinusoidal line appears to acquire a greater wavelength".

Above explanatory game is only a game but not physics. The wavelength has not been increased due to a Doppler effect of the source, -moving in ether-, neither due to some other causes, -as suitably moving receding reflectors in ether creating successive Doppler effects-, but it was increased due to "adiabatic rarefication of the ether"!

Astronomers and cosmologists believing in "big bang" theory assume that expansion of the space happens really, and they start their papers with following equation coming from "balloon physics":

$$z + 1 \equiv \frac{\lambda_{OBSERVED(NOW)}}{\lambda_{EMITED(PAST)}} = \frac{R_{DISTANCE(NOW)}}{R_{DISTANCE(PAST)}} \quad (4)$$

They apply above equation to the CMB wavelengths, they note:

$$z + 1 \equiv \frac{\lambda_{OBSERVED(NOW)}}{\lambda_{EMITED(PAST)}} = 990..or..1100$$

(the first number (990) corresponds to the ratio of a assumed temperature 2700 K of "big-light-flash" divided by the present-day temperature of 2.725 K of CMB and

the second (1100) to the ratio of an assumed temperature of 3000 K of "big-light-flash" divided by the present-day temperature of 2.725 K of CMB; this assumed "big-light-flash" occurred, - according to the delivers in the "big-bang" theory-, at about 380.000 years after "big bang").

Thus from the CMB they conclude that

$$\frac{R_{DISTANCE(NOW)}}{R_{DISTANCE(PAST)}} = 990..or..1100$$

The current "big-bang" theory speaks about expansion of space between galaxies but with galaxies and atoms keeping their own original dimensions.

We have to follow carefully the laws of the new "balloon physics": this should mean that the wave-train has acquired and an increased "vibration - amplitude" of the order (990 or 1100 -times of the original vibration amplitude-) and also an, -of -same -ratio, increase of the "third dimension" of the wave train. This should lead to a flat destruction of physics about these wave trains i.e. ether might not propagate such a photon (with 990 or 1100 times larger its vibrational amplitude and its other third dimension). But alas the "cosmic microwaves" don't appear today at all a difference from rest ordinary light and other artificially produced E/M microwaves that are carried by ether; it means that the "original cosmic radiation" might not be subjected at all to any such "cosmic geometrical expansion".

On the other hand such a large "geometrical expansion" of the wave train would be obtained only by a sudden 'rarefication' of the carrying -the-light-ether but when this "geometrically expanded" photon or wave train is found again in a volume with 'normal ether' it will suddenly turn back in its original dimensions (wavelength, frequency, and speed c). That this will happen is owed in the property of "expanded space" to not affect the initial local frequencies; the atoms and their dimensions and

frequencies are left unaffected by the “space expansion”; the electrons vibrate unchanged and even if suddenly the ether be rarefied (enormously and adiabatically) to create a “geometrical expansion” of the wave train it is absolutely correct that when this wave train be inserted again in a volume with ‘normal ether’ (at the vicinity of our own galaxy) then it immediately will be followed the inverse procedure of effects i.e. the wave train will acquire its own ‘original non - expanded’ dimensions due of the “unaffected frequencies” i.e. the geometrically and greatly red-shifted initial photon, it will suddenly become equally blue-shifted, -into normal ether-, making its total red-shift $z=0$. That this is the case it becomes evident in the following ‘water-fall’ example.

4. The ‘water fall’ example

Let us imagine an A-lake being high up and a second B-lake being at a lower altitude between them there is a water-fall (falling in a strong gravitational field). In A and in B lakes the wave crests of the water waves have always the same wavelength (read: normal water, -normal ether-, ordinary wavelengths) while during the falling of the water the wavelength of the water crests has greatly been increased (read: “rarefied water”, –“rarefied ether”-, “geometrically expanded wave-length”).

This example shows that, even in a “adiabatically-expanded” ether, the light-train with the geometrically expanded wavelength cannot for ever maintain its lengthened wavelength but instead close to a galaxy where ether becomes (or be) ‘normal’ it immediately will turn to its original wavelength; the basic equation (4), of “big-bang” is entirely out of rule!

$$z + 1 \neq \frac{\lambda_{OBSERVED(NOW)}}{\lambda_{EMITTED(PAST)}} \neq \frac{R_{0DISTANCE(NOW)}}{R_{DISTANCE(PAST)}}$$

5. Lack of economy and difficulties in “big-bang” theory.

We have to recognize that entire the theory of expansion of the universe is based essentially only in one observation i.e. of the ‘red-shift’ of galaxies. Modern people had assumed initially a Doppler interpretation to the red-shift phenomenon; but since it was happened to all directions from us (our own galaxy was appeared again as the center of universe!) that is way it soon turned to the “expansion of the universe”; the “big bang” theory was created.

But for me there should be lack of any economy in universe if such an expansion should be in rule. The situation becomes today even worse if we add the data from Ia super novas (Ia/SNe) which has been interpreted as revealing: “an... unexpected acceleration of the expanding universe as if gravity have been greatly smaller than a repulsive mysterious *A-energy* emerging from vacuum (also called *Dark Energy*“).

Cosmologists use easily the names *A-energy* or *Dark Energy* but they know nothing about their sources.

6. Tired light theories

6. 1 Tired light due of interaction of light with matter (failed theory).

From the literature we read that initially Zwicky, Tolman and Hubble as well, had tried to explain Hubble’s law: “*the observed red-shift of a galaxy is proportional of the distance of the galaxy from us*”. The phrase ‘proportional of the distance’ leads a physicist to think about “tired light theories”. They thought that, during the very long travel of photons and for some unknown reasons, the photons should lose some portion of their initial energy; this energy loss of photon had to be analogous with the traveled distance. Zwicky had proposed a simple exponential law for the decrease of the energy of the photon:

$$E(x) \equiv E_0 \cdot e^{-\frac{x}{R_0}} \quad (5)$$

$E(x)$ is the energy of photon at distance x from galaxy, E_0 is the energy of photon at the emitting galaxy and R_0 was called (*resistance of the space*). Zwicky had treated the interactions of light with electrons which, as he had reasoned, it should create and a blurring in the pictures of galaxies. But today a more careful reasoning on the phenomenon of “light interaction with matter” proves that the observed cosmic red-shift cannot be owed to this cause. Really let us assume a beam of coherent light to interact with ‘matter’ then there have to occur the following cases: 1) the interacted photon escapes from coherent beam and it means that the image of the galaxy is clear, 2) the interacted photon be re-emitted to the direction of the telescope then we have clear image of galaxy but not appearance of any red-shift 3) let the interacted photon changes slightly its frequency while it be propagated to the telescope. Due of Planck's accumulation of photons of the same frequency and phase (=Bose-Einstein), the frequency shifted photon after a small path will acquire an opposite phase (relative the phase of the beam) this has result the said photon to be pulled out from original beam. In any way the frequency shift should not be observed.

Let the coherent beam of light was crossed by rare matter, then the non-interacted light be reduced exponentially while the frequency shifted light be increased continuously in intensity! But there is a much more complication as the presence of interacting matter should continued some of the shifted light starts to be re-shifted again. The final result is to be appeared a variety in red shifts in the initial beam. A percentage has to have its maximum red-shift, another percentage has to have a medium red-shift and another percentage should show low or zero red-shift (!!!). All these have to be observed in the same beam if the theory of interaction with matter was correct.

Conclusively the cosmic red-shift must not be assumed at all as a result of collisions of light rays with any intergalactic plasma or matter.

6. 2 Tired photon due to friction in ether (new proposed theory).

We have proved the existence of the ether as the carrier of the waves of light. Then a ‘friction-force’ in the vibrators of the ether appears to be quite possible. It is assumed here that the ‘friction-force’ f , on each one vibrator of the ether, is proportional to the momentary velocity \dot{s} of the vibrator [2]: i.e.

$$f = \alpha \cdot \dot{s}$$

The work of ‘friction force’, of a harmonic vibrator, is given by:

$$dW \equiv f \cdot ds = (\alpha \cdot \dot{s}) \cdot (\dot{s} \cdot dt)$$

The «friction work» per unit of time i.e. dW/dt is responsible for the energy loss of the vibrators (this “friction-energy” must increase locally the “internal temperature” or “internal energy” of the ether, creating from time to time material particles according of course of the known law of ‘mass-energy equivalence’ and the validity of other known constrains (as conservation of electric charge, etc). In classical terms we have a decrease of the kinetic energy of the vibrator

$$\left| - \frac{dE_{kinetic}}{dt} \right| = \left| \frac{dW}{dt} = \alpha \cdot \dot{s}^2 \right| = A \cdot E_{kinetic} \quad (6)$$

This means that

$$- \frac{d(h\nu)}{dt} = - \frac{d(h\nu)}{dr} c = A \cdot (h\nu) \quad (7)$$

and

$$- \frac{d\nu}{\nu} = \frac{A}{c} dr \quad (8)$$

this relation express the variation of the frequency of the propagating photon; by

integration we obtain an exponential expression -like Zwicky's relation (5) -.

$$\nu = \nu_o \cdot e^{-\frac{A}{c}r} \quad (9)$$

Where ν_o is the frequency of the traveling photon at the source and ν is its frequency at the receiver, and r is the distance between source and receiver, A is friction constant (expressed like Hubble's constant in Km/s/Mpc).

Thus we get a «red shift» from the far distant galaxies, due to their own «tired photons»:

$$(z_r + 1) = \frac{\lambda_r}{\lambda_{r=0}} = \frac{\nu_{r=0}}{\nu_r} = e^{\frac{A}{c}r} \quad (10)$$

This relation is written in the form of a series:

$$z = \frac{A}{c}r + \frac{1}{2}\left(\frac{A}{c}r\right)^2 + \frac{1}{6}\left(\frac{A}{c}r\right)^3 + \dots \quad (11)$$

According to this theory the constant A resembles Hubbles' constant (in the first power term) but its meaning has nothing to do with Doppler interpretations and systematically expanding universe. As we said the constant A , is related to the friction forces inside the universal ether and by no means is referred to any assumed recession of galaxies from the Milky-Way.

It must be noted that the constant A have to be independent of the direction of the incoming light and also independent of the distance of the galaxy (and its Z). If our theory of 'tired light' is correct, we have to consider instead of a systematically variable Hubble parameter $H(z)$, the constant:

$$A(z)=A(0)=A$$

or the same think :

$$\frac{A(z)}{c} = \frac{A(0)}{c} = \frac{A}{c} \quad (12)$$

For any galaxy G, being at the distance r and having a radial recession velocity $v = \dot{r}$ (relative to us), its red-shift is

given by the following relation -emerging from the combination of (2) and (10)- :

$$(z_G + 1) \equiv \frac{\lambda_{r,v}}{\lambda_0} = \frac{\lambda_{r,v}}{\lambda_v} \cdot \frac{\lambda_v}{\lambda_0} = e^{\frac{Ar+v}{c}} \quad (13)$$

and

$$\ln(1 + z_G) - \frac{v}{c} = \frac{Ar}{c} \quad (14)$$

6. 3 Gross correction due to 'red-shift'

The spectra of distant galaxies are sufficiently elongated bands of radiations. Each frequency of the spectrum of a red-shifted galaxy has been divided by factor $(1 + z)$. This has the consequence the wavelengths of the emitted beam to be elongated and thus their beam carries, each moment, $1/(1+z)$ times (fewer) photons (where half a wavelength equals a photon); meanwhile due of the red-shift of the body the inserted photons in the beam are only the $1/(1+z)$ of the initial number of photons (while the fraction $z/(1+z)$ is "inactivated" in far spectral red end). Thus the number of active photons of any red-shifted source is reduced -or be divided- by the factor: $(1 + z)^2$.

The distance modulus $\mu \equiv m - M$ determines the distance D of a star due of the known geometrical inverse square law, -by means of the well known relation-:

$$\frac{\mu - 25}{5} = \frac{m - M - 25}{5} = \log D \quad (15)$$

(m is the apparent and M the absolute magnitude at 10 pc). If E_{10} be the absolute brightness of a star at 10 pc, E is its apparent brightness at distance D:

$$\frac{E}{E_{10}} = \left[\frac{10}{D_{pc}} \right]^2 = \left[\frac{10^{-5}}{D_{Mpc}} \right]^2 \quad (16)$$

but if the star of a given initial absolute brightness be red shifted it will be absolutely more dim: i.e. $E_{10}/(1 + z)^2$ and thus it have to be found in a closer distance r given by the relation:

$$\frac{E \cdot (1+z)^2}{E_{10}} = \left[\frac{10}{r_{pc}} \right]^2 = \left[\frac{10^{-5}}{r_{Mpc}} \right]^2 \quad (17)$$

comparing (16) and (17) we get

$$r = \frac{D}{(1+z)} \quad (18)$$

The relation (18) gives a gross correction of the distance of a source showing a red-shift z .

But the distance of a galaxy is determined more accurately by the exploding S/N Ia at its maximum epoch. In “maximum epoch” the Ia appears a explosive blue-shift to the observer; from law (1) (for $\Theta=0$) it is:

$$1 - Z_{blueshift} = \frac{\lambda_u}{\lambda_0} = \frac{1 - \frac{u}{c}}{\sqrt{1 - \frac{u^2}{c^2}}} \equiv B$$

In maximum epoch the exploding velocities are as low $u \approx 9000 \text{ km/s}$ (with $B \approx 0.97$) or high as $u \approx 28000 \text{ km/s}$ (with $B \approx 0.91$) [6].

When the S/N Ia red-shift z comes from the superposition of a pure galactic red-shift z_G and the Ia’s blue explosive shift: we have the relation:

$$1+z \equiv (1+z_G)(1 - Z_{blueshift}) = (1+z_G) \cdot B$$

After the above, relation (18) becomes for S/N Ia (at its maximum epoch):

$$r = \frac{D}{(1+z_G) \cdot B} \quad (19)$$

From relation (19) and (14) we get the ratios v/c of recessional velocities (+-) of galaxies:

$$\frac{v}{c} = \ln(1+z_G) - \frac{D}{(1+z_G)} \left[\frac{A}{B \cdot c} \right] \quad (20)$$

There was used the combined data for all the 310 S/N Ia (only “silvers” have been

excluded). These data was combined from:

[7] Riess *et al.* February 2004 data. This data is taken from Table 5 of <http://arXiv.org/abs/astro-ph/0402512>.

Published as Riess *et al.*, *Astrophysical Journal* **607**: p.665-p.687 (2004), and

[8] Davis *et al.* 2007 (*astro-ph/071510*), this is the combined data from:

[9] Wood-Vasey *et al.* 2007 (*astro-ph/0701041*) and

[10] Riess *et al.* 2007 (*astro-ph/0611572*).

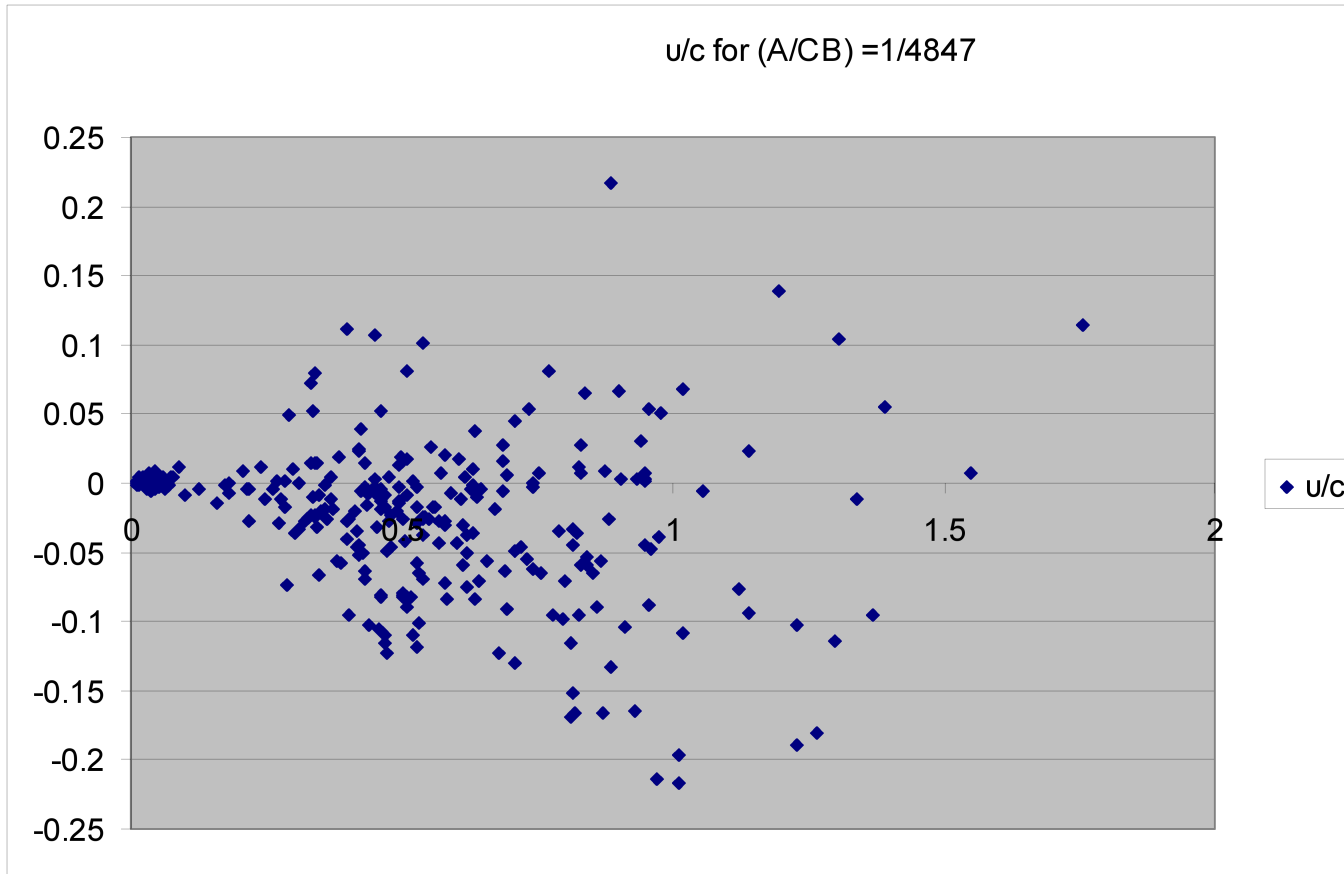
due of some inherent differences between the data in ‘distance modulus’ and in ‘red-shifts’ there have taken necessarily the average values.

From relation (20), the ratio v/c of the recessional (+-) velocities of the above 310 galaxies have been calculated and the common factor ($A/B \cdot c$) has been taken here equal to $1/4847$ i.e.

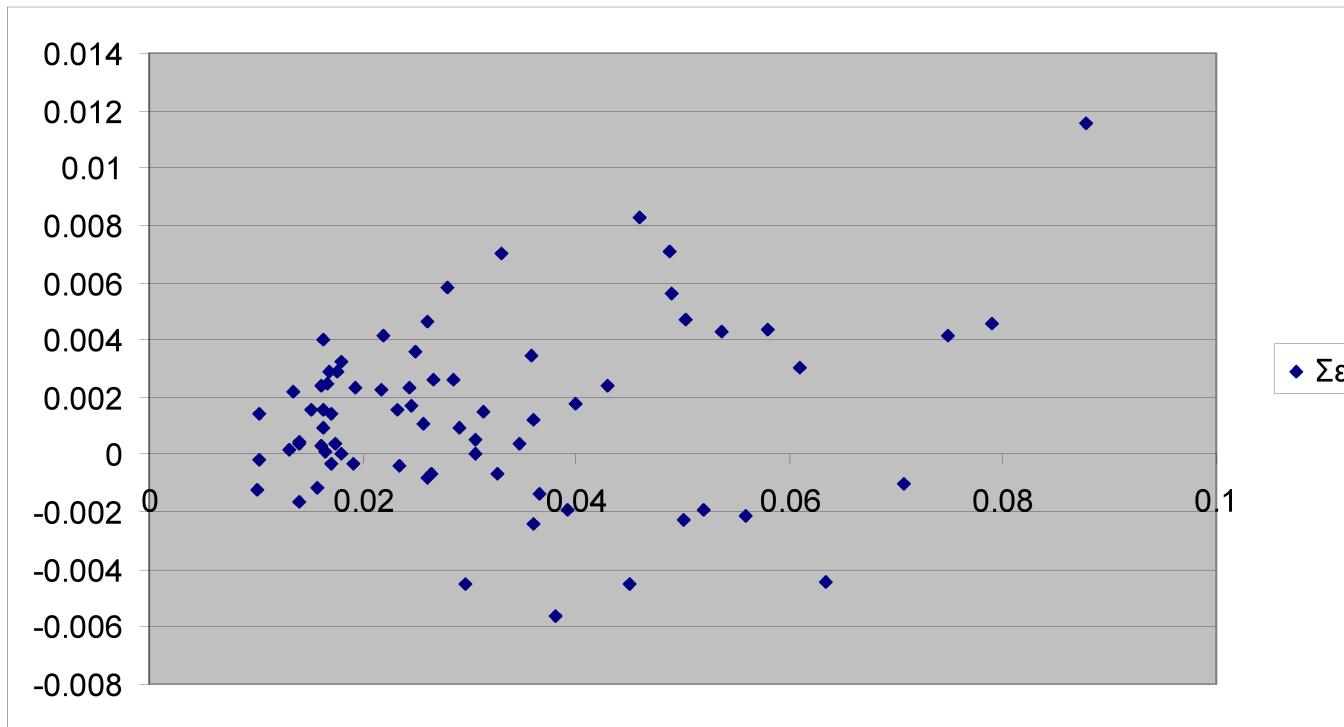
$$\left[\frac{A}{B \cdot c} \right] = \frac{1}{4847} \quad (21)$$

Above value of ($A/B \cdot c$) was selected in such a manner to give to the extreme values of v/c equal but opposite values: i.e. $v/c \approx \pm 0.2166$; We see that above value of the ratio ($A/B \cdot c$) fits sufficiently well in the data since it separates the field of 310 galaxies approximately in a symmetric manner.

After above calculations “big-bang” theory seems vanishing since there are numerous galaxies circulating in opposite directions.



Calculated distribution of galactic velocities for $(A/CB) = 1/4847$ in range $0 < z < 2$



Details of calculated distribution of the velocities of galaxies for $(A/CB) = 1/4847$ in the range $0.01 \leq z \leq 0.1$

a/α	S/N	μ or $\langle \mu \rangle$	$(I+z)$				
1	SN 1997 do	< 33.725 >	1.0102	46	SN 1998 cs	36.08	1.0327
2	SN 1998 bp	< 33.205 >	1.0104	47	SN 1991 U	35.535	1.0331
3	SN 1999 cp	33.56	1.0104	48	SN 1996 bl	< 36.15 >	1.0348
4	SN 1997 E	34.02	1.0132	49	SN 1994 T	< 36.015 >	1.03585
5	SN 1999 dq	33.73	1.0136	50	SN 2000 cf	36.39	1.036
6	SN 1991 ag	34.13	1.0141	51	SN 1992 bg	36.17	1.036
7	SN 1992 al	34.12	1.0141	52	SN 2000 cf	36.36	1.0365
8	SN 1999 dk	34.43	1.0141	53	SN 1999 ef	36.67	1.038
9	SN 1995 bd	34.11	1.0152	54	SN 1999 aw	36.54	1.0392
10	SN 1999 aa	34.58	1.0157	55	SN 1990 T	36.38	1.04
11	SN 1994 S	< 34.425 >	1.01605	56	SN 1992 bl	< 36.51 >	1.04295
12	SN 2001 V	< 34.135 >	1.0162	57	SN 1992 bh	<36.9567>	1.0451
13	SN 2001 cz	34.28	1.0163	58	SN 1992 J	36.35	1.046
14	SN 1996 bo	< 33.90 >	1.0164	59	SN 1995 ac	36.57	1.0488
15	SN 2000 dk	< 34.39 >	1.0164	60	SN 1993 ac	< 36.657 >	1.049
16	SN 1997 Y	< 34.535 >	1.0166	61	SN 1993 ag	< 37.075 >	1.05
17	SN 1996 bv	34.21	1.0167	62	SN 1990 af	< 36.765 >	1.0502
18	SN 1998 ef	< 34.17 >	1.01685	63	SN 1993 O	< 37.14 >	1.05195
19	SN 1998 co	34.65	1.0171	64	SN 1998 dx	<36.9467>	1.0537
20	SN 1998 V	< 34.415 >	1.0171	65	SN 1991 S	37.31	1.056
21	SN 1997 cn	< 34.615 >	1.0175	66	SN 1992 bk	37.13	1.058
22	SN 1999 ek	34.28	1.0176	67	SN 1992 au	< 37.305 >	1.061
23	SN 1992 bo	< 34.715 >	1.01795	68	SN 1992 bs	< 37.655 >	1.0634
24	SN 1993 ae	34.29	1.018	69	SN 1993 B	37.78	1.0707
25	SN 1992 bc	< 34.90 >	1.0192	70	SN 1992 ae	< 37.745 >	1.0748
26	SN 2000 B	34.59	1.0193	71	SN 1992 bp	< 37.86 >	1.0789
27	SN 2000 fa	34.9	1.0218	72	SN 1992 br	< 37.915 >	1.0878
28	SN 1995 ak	34.7	1.02195	73	SN 1992 aq	< 38.744 >	1.100967
29	SN 2000 cn	< 35.13 >	1.02325	74	SN 1996 ab	< 39.0967 >	1.124067
30	SN 1998 eg	< 35.34 >	1.02345	75	e 020	39.79	1.159
31	SN 1994 M	< 35.165 >	1.02435	76	SN 1997 I	39.79	1.172
32	SN 2000 ca	35.24	1.0245	77	SN 1997 N	39.98	1.18
33	SN 1993 H	< 35.095 >	1.02495	78	k 429	39.89	1.181
34	SN 1999 X	35.41	1.0257	79	d 086	40.08	1.205
35	SN 1999 gp	< 35.595 >	1.026	80	h 363	40.33	1.213
36	SN 1992 ag	< 35.10 >	1.02605	81	n 404	40.59	1.216
37	SN 1992 P	< 35.62 >	1.0264	82	g 005	40.37	1.218
38	SN 2000 bk	< 35.355 >	1.0266	83	e 132	40.42	1.239
39	SN 1998 ab	35.17	1.0279	84	SN 03 D3bh	40.76	1.249
40	SN 1993 ah	35.53	1.0286	85	04 D3 ez	< 40.815 >	1.263
41	SN 1994 Q	35.7	1.029	86	n 326	40.81	1.268
42	SN 1997 dg	< 36.134 >	1.0297	87	k 425	41.12	1.274
43	SN 2001 ba	35.88	1.0305	88	SN 1999 fw	< 41.005 >	1.278
44	SN 1990 O	< 35.855 >	1.03065	89	p 455	41.1	1.284
45	SN 1999 cc	< 35.8367 >	1.031367	90	03 D4 ag	< 40.95 >	1.285
				91	m 027	41.53	1.286

92	03 D3 ba	40.56	1.2912	138	SN 1997 Q	41.99	1.43
93	SN 1996 J	41.01	1.3	139	SN 1998 ba	42.36	1.43
94	g 055	41.39	1.302	140	d 089	42.05	1.436
95	d 117	41.42	1.309	141	d 097	42.1	1.436
96	n 278	41.16	1.309	142	SN 1997 aw	42.57	1.44
97	SN 1997 ac	41.45	1.32	143	SN 1997 ce	< 42.075 >	1.44
98	03 D1 fc	< 41.215 >	1.331	144	03 D3 aw	< 42.06 >	1.449
99	e 029	41.51	1.332	145	SN 1997 ai	42.1	1.45
100	d 083	40.71	1.333	146	SN 1995 az	42.13	1.45
101	SN 1997 bj	40.92	1.334	147	04 D3 gt	41.35	1.451
102	04 D3 kr	41.45	1.3373	148	SN 1999 ff	42.29	1.455
103	SN 2001 iw	40.71	1.34	149	SN 1992 Q2	42.67	1.459
104	g 097	41.56	1.34	150	HST 04 Yow	42.21	1.46
105	04 D3 nh	< 41.57 >	1.3402	151	SN 1998 ac	41.82	1.46
106	m 193	41.29	1.341	152	SN 1999 Q	42.56	1.46
107	d 149	41.63	1.342	153	03 D3 cd	< 42.17 >	1.46085
108	h 364	41.32	1.344	154	03 D3 cc	< 42.26 >	1.46285
109	03 D1 bp	41.5	1.346	155	m 158	< 42.58 >	1.463
110	h 359	41.89	1.348	156	e 108	< 42.28 >	1.469
111	e 136	41.62	1.352	157	04 D3 df	< 42.24 >	1.47
112	04 D2 fs	< 41.64 >	1.357	158	SN 2000 ee	42.735	1.47
113	04 D3 fk	< 41.535 >	1.3579	159	SN 2000 ec	< 42.765 >	1.47
114	d 093	41.73	1.363	160	SN 1997 P	42.46	1.472
115	n 263	41.56	1.368	161	SN 99 S	42.81	1.474
116	SN 04 D2 cf	41.67	1.369	162	SN 2002 dc	<42.1934 >	1.475
117	03 D3 ay	< 41.735 >	1.37095	163	SN 1999 fn	42.38	1.477
118	SN 1996 K	42.02	1.38	164	SN 1995 K	42.48	1.478
119	g 052	41.56	1.383	165	SN 1995 ay	42.37	1.48
120	SN 1995 K	42.07	1.388	166	SN 2000 eh	< 42.405 >	1.49
121	SN 2001 iv	40.89	1.397	167	g 160	42.38	1.493
122	g 142	41.96	1.399	168	SN 1996 ci	42.25	1.495
123	SN 1995 aw	42.04	1.4	169	h 319	42.4	1.495
124	d 085	41.96	1.401	170	03 D1 ax	< 42.345 >	1.496
125	k 448	42.34	1.401	171	e 149	42.23	1.497
126	04 D2 fp	< 42.01 >	1.415	172	SN 1999 cj	< 42.735 >	1.5
127	SN 1997 am	42.1	1.416	173	SN 1999 U	42.75	1.5
128	k 485	42.16	1.416	174	SN 2000 dz	< 42.745 >	1.5
129	SN 1997 bh	41.76	1.42	175	h 283	42.49	1.502
130	g 133	42.22	1.421	176	03 D1 au	< 42.58 >	1.5043
131	h 342	42.18	1.421	177	p 524	42.43	1.508
132	f 235	41.78	1.422	178	SN 1997 as	< 41.915 >	1.508
133	SN 1996 E	< 41.6905	1.425	179	g 120	42.3	1.51
134	b 013	41.98	1.426	180	SN 99 U2	42.83	1.511
135	e 148	42.25	1.429	181	SN 1997 bb	42.83	1.518
136	04 D2 gb	< 41.885 >	1.43	182	d 084	42.95	1.519
137	SN 1996 U	42.33	1.43	183	04 D2 gc	42.44	1.521

184	SN 1997 H	42.56	1.526	230	03 D1 co	<43.585 >	1.679
185	SN 2002 hr	43.01	1.526	231	g 240	43.04	1.687
186	04 D1 ak	42.49	1.526	232	h 300	43.09	1.687
187	SN 2001 jp	<42.7605 >	1.528	233	03 D1 fl	< 43.18 >	1.688
188	n 285	42.63	1.528	234	04 D2 iu	43.42	1.691
189	d 033	42.96	1.531	235	p 454	43.53	1.695
190	03 D3 af	< 42.81 >	1.532	236	03 D4 cz	< 43.16 >	1.695
191	SN 99 N	42.85	1.537	237	SN 04 D2 sp	43.42	1.707
192	SN 1997 eq	42.66	1.538	238	04 D3 is	43.71	1.71
193	f 011	42.66	1.539	239	SN 2001 ix	43.05	1.71
194	f 244	42.72	1.54	240	04 D1 aj	43.46	1.721
195	SN 2000 eg	41.96	1.54	241	04 D3 fq	< 43.52 >	1.73
196	SN 2000 fr	< 42.675 >	1.543	242	SN 2002 kd	< 43.11 >	1.735
197	04 D4 bq	< 42.71 >	1.55	243	HST 04 Rak	< 43.36 >	1.74
198	04 D3 hn	< 42.465 >	1.5518	244	SN 1998 bi	43.35	1.74
199	SN 04 D1 ag	42.7	1.557	245	04 D2 ja	43.58	1.741
200	f 041	42.72	1.561	246	04 D3 ks	43.36	1.752
201	SN 1996 I	< 42.805 >	1.57	247	SN 04D3oe	43.64	1.756
202	SN 2001 iy	<42.875 >	1.57	248	SN 2001 fo	43.12	1.771
203	SN 03D4 gl	42.65	1.571	249	SN 1997 ez	43.81	1.778
204	SN 1997 af	42.86	1.579	250	03 D4 fd	< 43.645 >	1.791
205	SN 1997 F	43.04	1.58	251	SN 2001 hx	43.88	1.798
206	03 D4 gf	42.85	1.581	252	SN 03 D fq	< 43.795 >	1.8
207	SN 1997 aj	42.63	1.581	253	SN 04 D4 dm	44.13	1.811
208	03 D1 aw	< 43.095 >	1.58185	254	SN 2001 hy	43.97	1.811
209	03 D4 gg	< 42.81 >	1.592	255	SN 1999 f j	< 43.755 >	1.815
210	h 323	43.01	1.603	256	SN 2001 j f	44.09	1.815
211	03 D4 dy	< 42.745 >	1.604	257	04 D3 nc	43.72	1.817
212	04 D3 do	< 42.90 >	1.61	258	03 D4 cn	44.14	1.818
213	e 138	42.99	1.612	259	04 D3 lu	< 43.745 >	1.8219
214	04 D4 an	< 43.115 >	1.613	260	SN 1998 J	< 43.60 >	1.828
215	SN 1995 ax	42.85	1.615	261	SN 1996 cl	43.96	1.828
216	f 231	43.05	1.619	262	04 D3 cp	43.62	1.83
217	SN 1996 H	43.11	1.62	263	SN 1997 ap	43.85	1.83
218	04 D3 co	< 43.205 >	1.62	264	SN 2001 hs	43.55	1.832
219	03 D4 dh	42.94	1.6268	265	HST 05 Spo	< 43.43 >	1.839
220	SN 1998 M	< 42.94 >	1.63	266	04 D4 bk	43.88	1.84
221	e 140	42.89	1.631	267	SN 2003 eq	43.86	1.84
222	n 256	43.09	1.631	268	HST 04 Man	< 43.94 >	1.854
223	g 050	42.77	1.633	269	SN 1997 ek	44.03	1.86
224	03 D4 at	< 43.29 >	1.633	270	03 D1 ew	43.95	1.868
225	SN 2003 be	<43.0167>	1.64	271	SN 03 D1 cm	44.28	1.87
226	04 D3 cy	< 43.275 >	1.643	272	SN 2001 fs	43.75	1.873
227	e 147	43.1	1.645	273	SN 2001 hu	< 43.895 >	1.882
228	SN 1997 R	43.27	1.657	274	SN 2001 jh	<44.225 >	1.884
229	SN 2003 bd	< 43.17 >	1.67	275	SN 1998 I	42.91	1.886

276	SN 2003 eb	< 43.62 >	1.9	295	HST 04 Eag	< 44.50 >	2.02
277	03 D4 di	< 43.865 >	1.905	296	SN 1999 fk	< 44.30 >	2.056
278	04 D3 gx	44.21	1.91	297	HST 05 Gab	44.65	2.12
279	04 D3 ki	44.43	1.93	298	SN 2002 ki	< 44.74 >	2.14
280	SN 2003 xx	< 43.95 >	1.935	299	HST 04 Gre	< 44.42 >	2.14
281	SN 2003 lv	< 43.87 >	1.94	300	SN 1999 fv	44.19	2.1945
282	SN 1999 fm	< 43.995 >	1.949	301	HST 05 Koe	< 45.15 >	2.23
283	03 D4 cx	< 43.975 >	1.949	302	HST 05 Lan	< 44.95 >	2.23
284	SN 2002 dd	< 43.9934 >	1.95	303	SN 2003 az	45.2	2.265
285	04 D3 ml	44.14	1.95	304	SN 2002 fw	< 45.1167 >	2.3
286	SN 2003 es	< 44.28 >	1.954	305	SN 2002 hp	< 44.56 >	2.305
287	HST 04 Tha	< 43.83 >	1.954	306	SN 2003 dy	< 44.95 >	2.34
288	SN 04 D4 dw	44.18	1.961	307	HST 04 Mcg	< 45.21 >	2.37
289	HST 04 Pat	< 44.65 >	1.97	308	HST 04 Sas	< 44.88 >	2.39
290	HST 04 Omb	< 44.19 >	1.975	309	SN 2003 ak	45.3	2.551
291	SN 2001 jm	43.91	1.977	310	SN 1997 ff	< 45.3967 >	2.755
292	04 D3 dd	44.7	2.01				
293	HST 05 Str	< 44.75 >	2.01				
294	HST 05 Fer	< 43.97 >	2.02				

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