Relative motion of our contracting Big Bang and atomic dark matter ratios

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The motion of objects within our Big Bang, and those not comoving with it, are modelled based on a tired light hypothesis. The results imply there is no need for dark energy or the expansion of space, that 105% of the red shift observed is due to tired light and 5% to the contraction, rather than expansion, of our Big Bang. Suggestions are made for the identification of objects in each category. Ratios are estimated for volumes of dark matter that have atomic forms relative to all dark matter, based on a pre-fermion hypothesis.

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I. INTRODUCTION

Two hypotheses on the origins of the universe were proposed from both top-down cosmological and bottom-up pre-fermion routes [1, 2]. One hypothesis [1] was based on the proposal that the Big Bang is not the whole universe, but only a volume within it. Other failed big bangs have occurred both within our Big Bang and outside it. The red shifts observed are either of objects that are comoving parts of our Big Bang or of non-Big Bang components, the latter assumed to be either mostly stationary, or our Big Bang is in overall motion relative to them.

The tired light aspect implies that a component of the red shift observed is due to the viscosity suffered over the distance travelled by photons emitted. The frequency independence of such energy loss by photons was shown in the same paper, to be based, more precisely, on the spiral-path travelled by the pre-fermion components of the photons, rather than straight-line photon distance travelled.

The other hypothesis [2] suggests that normal matter fermions are loops composed of three meon/anti-meon pairs per fermion and that other pair-number loops are dark matter. The paper proposed that meons and anti-meons are the only real objects in the universe, having Planck-size properties and exist only as merged pairs, as the background to the universe through which all relativistic motion occurs, or as pairs within loops, which are the only objects that can be observed.

Loops of three pairs are 3-fold asymmetric (quarks) and symmetric (leptons). Loops of other pair-number are dark matter and have different asymmetries and symmetries so cannot successfully bind stably with 3-fold symmetry loops. Only loops with odd symmetries can form atoms.

II. SIGNIFICANCE and OBJECTIVES

The significance of the tired light hypothesis is in providing an alternative interpretation to the currently accepted version of a Big Bang implying accelerated expansion that requires dark energy to explain the red shift observations at higher red shifts.

The tired light modelling suggests that the Big Bang components are contracting rather than expanding and that the contraction blue shift is hidden by the viscosity red shift of tired light over distance. This would be the case regardless of our Big Bang having no external motion relative to the failed big bangs.

The modelling also shows that the accelerated expansion interpretation is not supported when the two factors of tired light and relative comoving motion are accounted for, nor is there a need for the expansion of space since all relative velocities remain below light speed.

The significance of the pre-fermion hypothesis is in explaining, in terms of a physical pre-fermion-based framework of loops, how much dark matter could be atomic.

The objective of both of the hypotheses is to produce one overall system for describing the universe from the longest scale to the shortest scale using only the simplest possible physical system.

III. OUTLINE

The cosmological analysis uses the distance to objects as its starting point and combines that with the relative motion of those objects, ignoring peculiar velocities of any sort. The two possible categories of object are treated differently only in that comoving, or ‘internal’, objects have relative velocities set by the equivalent of a Hubble constant whereas the ‘external’ objects have their velocity set by the overall motion of our Big Bang itself with respect to them.

External objects (failed big bangs) are considered to have no Hubble type expansion, centred on themselves or relative to Earth – the latter being considered to be representative of the relative motion of our Big Bang. Similarly, there is no consideration of any expansion of space.

The term ‘internal’ does not imply that those objects are closer than the external objects, only that they are comoving parts of our Big Bang.

The values for the tired light fractional energy loss f_L and the adjusted Hubble expansion/contraction rate H_v are then adjusted for a reasonable fit versus observations.

For the atomic dark matter hypothesis, the possible numbers of meon-pairs in a loop, formed for all possible pair-numbers, is investigated to calculate the ratios of those which could form nucleon stacks with ±½ *h* spin versus those that could not. The effect of including the possibility of a 1-pair as a loop of dark matter or atomic dark matter is also considered.

IV. OUR BIG BANG

In the following analysis, there are two categories of objects, those that are within our own Big Bang and those that are not. The former are comoving and are termed ’internal’ and the latter ‘external’. The equations determining which objects should be categorized as belonging to either category are explained below, but determining which object belongs in which category through observation is more difficult and is only briefly considered here.

Previous work [1] looked at the total red shift of internal Big Bang objects and considered them as composites of tired light over distance and a slower rate of Hubble expansion – without the expansion of space.

Given these assumptions, the following represent how the Z shifts of internal or external objects are defined with respect to their distance from Earth,

Internal objects have total red shift Z_{t_int} of

$$(Z_{t\_int} + 1) = (Z_v + 1)(Z_c + 1)$$

where the two component Z shifts are Z_v, due to relative velocity v/c between Earth and our, expanding or contracting, Big Bang at an expansion or contraction rate of H_v over distance D in light years (Ly), being

$$Z_v = H_v D$$

and Z_c , due to the distance D travelled by emitted tired light that experiences a fractional energy loss due to viscosity of f_L each light year, being

$$Z_c = f_L D$$

In the recent paper [1], the size of f_L was set by reference to the value of the Hubble constant H_o , using 70 kms^{-1} Mpc^{-1}. This equated f_L to a value in light years of 7.15896 x10^{-11} Ly^{-1}. The adjusted value of Big Bang expansion was then lowered to a positive level H_v of 11.3 Kms^{-1} Mpc^{-1} in order to align reasonably with observed Z shift data.

External objects use the same formula except that Z_v is replaced by Z_{ext} , in the extreme, either directly towards or away from the Earth

The resultant Z shift graphs in the previous paper were misinterpreted to show the increased gradient of the modelled total red shift as potentially supportive of accelerated expansion of our Big Bang when using a positive value for H_v.

Subsequent analysis undertaken has shown that a better fit is found by using a higher rate of fractional energy loss combined with a negative expansion rate for H_v. This is shown in Figure 1, using f_L as 8.4 x10^{-11} Ly^{-1} and H_v as -4.7 x 10^{-12} Ly^{-1}.

The resultant total internal red shift Z_{t_int} line is green and curves downwards. Note the graph has its axes reversed from normal convention in order to compare Z shifts more easily since it is the distance to objects that mainly produces their red shifts. The downward curve in Z_{t_int} indicates that at greater distances the relationship between Z shift and distance alters to appear as if the rate of any expansion were increasing – although it is not. This supposed increase is an artifact of the combining of the two Z shift sources, due to viscosity producing tired light and to the contraction of our Big Bang.

It is necessary to have both Z components because each alone only produces straight line Z values versus distance. It is the combination of the two that results in a downward compounding curve that reflects what is observed.

Figure 1 also includes lines for an H_o expansion, the purple line, as a comparison, and two line representing the motion of our Big Bang at 0.02 c with respect to the failed big bangs, the latter assumed to be mostly stationary. The blue line represents motion of our Big Bang away from external objects and the red line represents motion towards external objects. Those external objects will all have Z_{ext} shifts between the two lines if there is any Big Bang relative motion.

The figure of 0.02 c does not imply that this is a good fit with observation. That figure has only been used to ensure that the $\boldsymbol{Z_{ext}}$ (towards) and $\boldsymbol{Z_{ext}}$ (away) from lines are not obscuring each other in the graph. The analysis neither confirms or denies any external velocity of our Big Bang with respect to the failed big bangs. The angle of slope for $\boldsymbol{Z_{ext}}$ when $\boldsymbol{v_{ext}}$ = 0 is $\boldsymbol{f_L}$ = 8.4 x10^{-11} Ly^{-1} which is the same tired light value as for any object in 'empty' space. As shown before [3], there is no such thing as empty space and the actual value of $\boldsymbol{f_L}$ will depend on the local density of the background, through which a photon is passing, which is increased in the presence of energy concentrations.

Within the data generated it is clear that it is difficult to identify which objects are in which category – internal or external. As mentioned before, the term 'internal' does not imply that those objects are closer than the external objects, only that they are comoving parts of our Big Bang.

The object used in the previously described paper is one example of this categorization difficulty. As part of the internal object grouping, the Seyfert galaxy 2E 3934 has an observed $\boldsymbol{Z}$ of 0.06145. If representing $\boldsymbol{Z_{t\_int}}$, this would imply that it has D of 7.78x10^8 Ly. However, as part of the external object grouping relatively moving at 0.01 c, using the same value as $\boldsymbol{Z_{ext}}$, either towards or away, implies a distance of between 6.5 and 9.0 x10^8 Ly. It is not clear which group it falls within, and this extends to many objects.

What is required is further analysis and a consideration of which objects fall clearly within one grouping or the other. This would allow some identification of other features that could identify objects that are not so clearly categorized. One possible constraint appears to be that comoving objects do not exceed, with the modelling values used here, a $\boldsymbol{Z_{t\_int}}$ of about 4.

Given that this model is very different to the accepted version, that the comoving objects may be constrained in such a way does not detract from the hypothesis because the exterior objects are not constrained in the same way, so $\boldsymbol{Z}$ shift values above 4 exist. The constraint does however suggest that there may be an identifiable volume to our Big Bang within the total universe.

Figure 1 also shows that the discrimination between which objects would fall on which lines is unclear below $\boldsymbol{Z}$ around 0.5 and is only slightly better around $\boldsymbol{Z}$ of 1.0.

It should be noted that no relative velocities to any objects, either internal or external, ever exceed light speed. This is a construct of the relativistic treatment of the velocities implied by the $\boldsymbol{Z}$ shifts.

The values used here suggest that 5% by size, if not by direction, of the $\boldsymbol{Z}$ shift of objects is due to the rate of contraction of our Big Bang and 105% is due to the viscosity effect on photons that produces tired light.

The results here suggest that there is no acceleration of the expansion of our Big Bang – it actually fits better as contracting and the acceleration appearance is deceptive – and therefore there is no requirement for dark energy.

If the failed big bangs were able to be correctly identified, then a direction of travel, if any, of our Big Bang could be established, possibly as well as the centre of it. It may also be the case, dependent on parameter values that may provide a better fit to data, that our Big Bang volume is the same as the total volume of the universe and therefore all the failed big bangs are within our Big Bang volume.

If this model is accurate overall, and we are in the contracting phase, then our own Big Bang has already turned into a failing big bang.

It may be that these expanding and contracting cycles have appeared simultaneously over time amongst other failed big bangs. The time taken for each big bang to reach its turning point to start contracting depends on the amount of initial inflation that sets the resultant loop sizes versus the gravitational effect of those loops sizes [2]. The smaller the loop frequencies (the greater the inflation amount), the less the gravitational pull to contract and the longer the cycle will last.

V. DARK MATTER RATIOS

As was shown recently [3], matter is split into the two categories of normal matter and dark matter by the number of meon-pairs within a meon-loop.

Loops with three meon-pairs are our normal matter and all other pair numbers are dark matter. It is assumed initially that no loops can be formed from a single pair.

The ratios of various number-loops can be estimated based on their pair-numbers and their probabilities of forming [4].

This will give the following summation of the number of loops $N_{loop-weighted}$ across all n sets of pair-numbers, initially including 1-pair loops in the calculation, to be

$$nN_{loop-weighted} = \frac{n}{1^2} + \frac{n}{2^2} + \frac{n}{3^2} + \cdots + \frac{n}{n^2}$$

$$= n(1 + \frac{1}{2^2} + \frac{1}{3^2} + \cdots + \frac{1}{n^2})$$

$$= n\frac{\pi^2}{6}$$

where each set is based on the whole number of available pairs being used for each, which produces a total that is n

times too large, although when calculating a ratio this effect will cancel.

For the ratio of normal matter to total matter $R_{m/all-m}$ this, excluding 1-pair loops, gives

$$R_{m/all-m} = (\frac{1}{3^2})/[\frac{\pi^2}{6} - 1] = 0.1723 \quad \text{or } 17.23\%$$

VI. ATOMIC DARK MATTER

Previous papers [2] have explained that only odd-number pair-loops can form atoms because their balanced stacks have to contain one loop of each asymmetry that will be matched overall by an orbiting symmetric loop of equal and opposite charge to the stack total charge.

This means that as shown in a different previous paper [5] a 5-pair loop has 12 fermion-equivalent loops of which 4 are symmetric lepton-equivalent and 8 asymmetric quark-equivalents. The quark-equivalent charge sizes are 1/3, 2/3, 3/3, and 4/3 with lepton equivalent charges of 0 and 5/3, all as fractions of positive or negative the electron charge size.

How the positive and negative one-sixth electron-sized charges of the meon pairs are placed around the loop define the symmetry or asymmetry of the loop and there will be the equivalent of 5 different asymmetries – or 'colours' in the QCD sense – for asymmetric 5-pair loops. To be overall colourless requires one of each colour loop to be present in a stack. That is what balancing the stack means.

Since each loop has spin angular momentum of $\pm$½ *h*, the total spin for an odd-pair-number stack, whose loops have alternating spin orientations, will always be $\pm$½ *h*. Thus to balance the stack requires a similar size-opposite-charge loop that is symmetric and has a spin of $\pm$½ *h*. In this 5-pair loop example, that is the lepton-equivalent that has charge $\pm 5/3$ and $\pm$½ *h* spin.

This means that all odd-pair-number loops of odd number *k* will be able to form atoms where the central stacks (nucleon-equivalents) are colourless overall and will contain *k* loops of total charge $\pm k/3$ orbited by an electron-equivalent symmetric loop of charge $\mp k/3$. Stacks may have different total charges to their symmetric charged loops, but will not be able balance them orbitally.

What is observed in the equivalent of photon emission/absorption will depend on the mass of the electron-equivalent loop. The photon emitted or absorbed will be a double loop of positive and negative *k*-pair fermion-equivalents rotating in the same sense.

If initial general big bang inflation of loops is related to pair-number then the sizes of such *k*-pair loops would be different to our 3-pair versions. If initial general big bang inflation was related to loop charge then the sizes of such *k*-pair loops would also be different to our versions. However, if the initial inflation was not related to either of those properties, the *k*-pair loops could have the same sizes as our versions because the mass and spin of a loop is independent of the number of pairs in that loop.

So the red shift emitted by different *k*-pair loop photons could be similar to that emitted by our 3-pair loops or different.

The summation of odd-pair number atomic dark matter loops, excluding 1-pair loops, $A_{loop-weighted}$ would be

$$nA_{loop-weighted} = \frac{n}{5^2} + \frac{n}{7^2} + \frac{n}{9^2} + \cdots + \frac{n}{n^2}$$

$$= n(\frac{1}{5^2} + \frac{1}{7^2} + \cdots + \frac{1}{n^2})$$

Since

$$\sum(1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots \frac{.1}{n^2}) = \frac{\pi^2}{8}$$

then

$$nA_{loop-weighted} = n[\frac{\pi^2}{8} - \left(1 + \frac{1}{3^2}\right)]$$

giving the ratio of atomic dark matter to total dark matter $R_{adm/all-m(0)}$ as

$$R_{adm/all-m(0)} = [\frac{\pi^2}{8} - \left(1 + \frac{1}{3^2}\right)] / [\frac{\pi^2}{6} - (1 + \frac{1}{3^2})]$$

$$= [\frac{\pi^2}{8} - \left(\frac{10}{9}\right)] / [\frac{\pi^2}{6} - \left(\frac{10}{9}\right)]$$

$$= 0.12259 / 0.53382$$

$$= 0.22964 = 22.96\%$$

so that, using this definition, dark matter could contain almost a quarter of its components in atomic forms. This figure is likely to be the upper bound since it is impossible that an *n*-pair loop stack could be stable and also have an odd-number *n*-pair symmetric orbiting electron equivalent, since both use *n* pairs each and there are only *n* pairs available in total. The limit for an atomic nucleon-equivalent stack and orbiting loop will be *n*/2. The likelihood of actual atomic dark matter forming will decrease rapidly with increasing pair-number.

Three other ratios are interesting, depending on what is included in the definition of dark or atomic dark matter. Whether 1-pair loops are excluded or included will alter the ratios. The first alternative ratio $R_{am/non-am(1)}$ of atomic matter to non-atomic matter, with 1-pair loops excluded, will be

$$R_{am/non-am(1)} = [\frac{\pi^2}{8} - 1] / [\frac{\pi^2}{6} - 1]$$

$$= 0.23770 / 0.64493$$

$$= 0.36236 = 36.24\%$$

The second alternative assumption, that 1-pair loops exist as dark matter loops, and are included in the total of all matter, would give the following result for $R_{am/non-am(2)}$ of

$$R_{am/non-am(2)} = [\frac{\pi^2}{8} - 1] / \frac{\pi^2}{6}$$

$$= 0.14207 = 14.21\%$$

Meaning that 14% of all matter, where 1-pair loops are included as non-atomic matter, is made of loops that could form atomic systems with photons absorbed or emitted – even though those photons may not be observable with our 3-pair loop detectors. This latter ratio is not far from the CMB observations [6] of 15.73% as the ratio of baryonic matter to total matter, based on $\Omega_c h^2 = 0.12 \pm 0.001$ and $\Omega_b h^2 = 0.0224 \pm 0.0001$ if the definition of atomic/non-atomic and baryonic/non-baryonic were aligned.

The third alternative ratio is when 1-pair loops are considered to be just a stack on their own, with $\pm$½ *h* spin, when they would be counted as atomic matter. Although this is unlikely, the ratio $R_{am/non-am(3)}$ of atomic matter to all matter is pleasantly simple, being

$$R_{am/non-am(3)} = \frac{\pi^2}{8} / \frac{\pi^2}{6}$$

$$= 0.75 = 75\%$$

suggesting that most matter, using this definition, would be atomic in structure and only 25% truly dark matter.

The analysis overall suggests that dark matter is not as dark as has been presumed to date, since about 23% of it, on a reasonable assumption, can absorb and emit photons.

VII. CONCLUSION

Our Big Bang is contracting, given the modelling factors used in this hypothesis. There is no need for dark energy because the appearance of acceleration of expansion is deceptive. The hypothesis that most red shift is due to viscosity, producing tired light over distance, gives reasonable results that resemble overall the shape of observed ***Z*** shift curves.

Our Big Bang may be in motion relative to failed big bangs, but it will be difficult to separate the components into internal and external categories. If this model is accurate, then our own Big Bang has already turned into a failing big bang.

The lower possible ratio of atomic matter to non-atomic matter at 14.21% suggests that the definitions of baryonic and dark matter need to be reconsidered. The existence, on a reasonable assumption, of around 23% of dark matter in atomic form means that dark matter is not so dark.

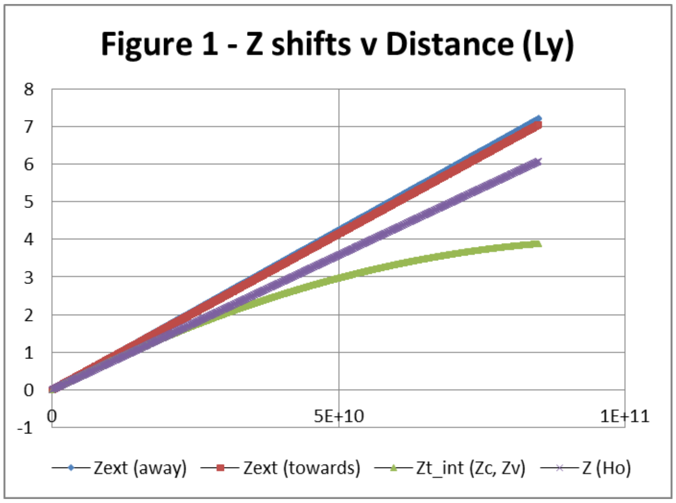
Figure 1 - Z shifts v Distance (Ly)
8
7
6
5
4
3
2
1
0
-1
0
5E+10
1E+11
Zext (away)
Zext (towards)
Zt_int (Zc, Zv)
Z (Ho)

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