The Triple-quasar is an optical image of Milkyway, Andromeda and Triangulum galaxies – implies expansion in the direction of Dark Flow

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Abstract:
Based on the concept that light follows a circular path of radius 2.5 billion light-years, here I show that the triple-quasar LBQS 1429-008 is the 10.5 billion years old image of 'Milkyway, Andromeda and Triangulum' galaxies. From this, the position of our galaxy at two different times can be ascertained, and the direction of expansion of the universe can be estimated. The 'surprise finding' is that the direction thus obtained is in agreement with the direction of so-called 'Dark flow', implying the possibility that the expansion is due to actual motion of bodies, and hence ΛCDM model is wrong.

1. Introduction:

The standard cosmological model (ΛCDM) visualizes metric expansion of the universe. In such a model, the motion of galaxy clusters with respect to the cosmic microwave background should be randomly distributed in all directions. However, using WMAP data, Alexander Kashlinsky[1] *et al* have found evidence for a possible non-random component in the motion of galaxy clusters; this is referred to as 'dark flow'. This implies the possibility that expansion is due to actual 'physical motion' of bodies.

An alternate model, explained in my previous papers, visualizes expansion as a consequence of 'actual motion' of galaxy-clusters. Also, the model visualizes that light follows a 'circular path', and so the returning rays can create past images of bodies that have moved out. So, based on that model, it becomes possible to ascertain 'the direction' in which the universe in our region expands. Comparing it with the direction of the 'Dark Flow', we can come to certain conclusions.

2. The alternate model – more details:

The alternate model is based on Classical Newtonian Physics with the following modifications: (i). Motion at speed 'c' is a property of matter [2] and (ii). Force is reaction to this motion[3]. It follows from these that the 'natural energy' of any body is $mc^2/2$, and that motion of all bodies, including light, is confined (due to reaction) to closed paths. That is, light follows circular path [4] and galaxy-clusters follow 'closed helical paths'. The helical paths take the clusters away, as far as possible, from the center of the universe and then bring them back, as close as possible, thus creating a pulsating universe [5].

The speed of a cluster increases as it moves outward (the energy required comes from its internal energy). At any given time, the speeds of the clusters are directly proportional to their distances from the center of the universe. The outward component (of the speed), starts from zero, reaches the maximum at halfway of expansion, thereafter decreases and reaches zero, the expansion thus coming to an end. The planar component starts with the minimum, and reaches the maximum by the time expansion ends. The ratio of the two components is the same for all clusters, and at halfway, this ratio is 50:50.

The outward component of the speed of the 'cluster at the boundary' gives the speed of expansion of the universe. At halfway of expansion, its speed is $2\sqrt{2}c/\pi$ and the speed of expansion is $2c/\pi$. At the end of expansion, its speed is 'c'. However, the boundary is the limit beyond which radiations are not present, and the clusters remain well within the boundary that no cluster attains the speed 'c'. Outer clusters have excess energy and inner clusters have shortage of energy, and a cluster having 'natural energy' remains at the exact midway between the boundary and the center of the universe.

Light takes 15.64 billion years [4] for one revolution and the universe takes 62.76 billion years to complete one pulsation [5]. That is, by the time light completes one revolution, expansion reaches halfway. The expansion has now reached almost halfway [5]. At halfway of expansion, the speed of the 'exact middle cluster' is $\sqrt{2}c/\pi$ (that is, 0.45c) and both components (of its speed) are equal to c/π. We belong to a middle region cluster [5] having 'near-natural energy'. The theoretical G of Earth [6] provides proof for this.

Galaxies and galaxy-groups revolve around the intergalactic center, and so their motions are affected by the parent cluster; but the parent clusters do not orbit around a common center, and so the motions of galaxies are unaffected by other clusters. The Laniakea Supercluster [7] controls the motions of Milky way and local galaxy-groups, and so we can identify it as our 'parent cluster'. The circular path of light limits our observation to nearly 5 billion light years (BLY), the diameter of the path of light, and so what we observe is a small region of the universe.

The speed- time graph of expansion[5] can be given by the relation, $(t^2/a^2) + (v^2/b^2) = 1$. Here, 't' is the time measured from halfway of expansion, and 'v', the speed of expansion at time 't'. The constant 'a' is the time required for expansion to reach halfway (15.64 billion years) and constant 'b' is the speed of expansion at halfway ($2c/\pi$). From the equation, the distance moved out by the boundary during expansion can be given by the relation, $\pi ab/2$, and is equal to 15.64 BLY. The speed- internal-energy ratio of clusters [5] changes from 1:5 to 1:1 during expansion.

On further theoretical verification of the model, it was found that the period of revolution of all parent-clusters have to be 31.38 billion years. That is, during pulsation, each cluster completes exactly 2 revolutions; so by the time expansion reaches halfway, a cluster completes half a revolution. So the radius of the helical path at any given time is such that it will take 15.64 billion years to revolve through 180^{o} at that radius with the speed at that time. As the middle cluster possesses exact natural energy, its internal-energy, speed, diameter of the path, etc. at any given time can be ascertained from the model (table-1).

Table: 1

Changes in energy, speed, etc. of exact Middle-cluster during expansion

(Energy of the cluster = $mc^2/2$. Energy locked inside atoms[6]= $mc^2/4$ nearly; remaining = $mc^2/4$)

	Beginning	Halfway	End	Remarks
Internal Energy	83.33%	59.47%	50%	(of $mc^2/4$)
Energy due to speed	16.66%	40.53%	50%	(of $mc^2/4$)
Speed 'v'	0.2887c	0.4502c	0.5c	(from above)
Outward component	0	0.3183c	0	(c / π)
Diameter of helical path	2.8743 BLY	4.4822 BLY	4.9784 BLY	($15.64v \times 2/\pi$)
Distance moved outward	----	3.91 BLY	7.82 BLY	($\pi ab/8$, $\pi ab/4$)

The Laniakea Supercluster, our parent cluster, is 0.52 BLY wide now, and this goes very well with the diameter of the helical path of middle-cluster at halfway. The displacement of this cluster from its initial position can be calculated as follows. At the beginning of expansion (ref. Fig-1), the cluster remains at O, where the orbit diameter is 2.8743 BLY. In 15.64 billion years, it completes half a revolution (through 180°), and reaches P, where the orbit diameter is 4.4821 BLY. During this period it moves outward (in the direction of expansion shown by arrow) through a distance of 3.91 BLY. So displacement OP is 5.3681 BLY at 43.25° to the direction of expansion.

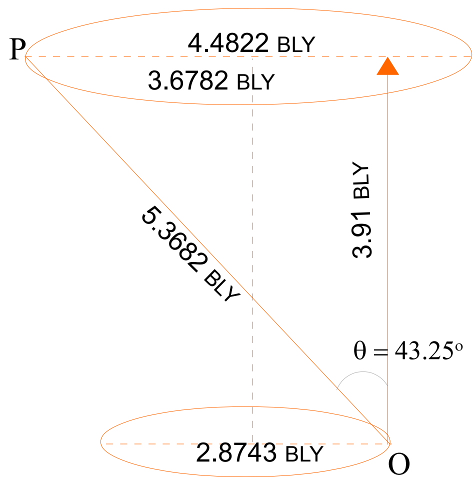

Fig-1. Displacement of Laniakea Supercluster in 15.64 billion years

3. **Object-image pairs:**

The circular path of light limits our observation to 5 BLY (7.82 billion years in terms of time taken by light). Objects that appear to remain beyond that distance are past images of bodies which earlier remained within the limit. That is, in such cases, what we observe are returning rays. In some cases, it is possible to see the direct rays emitted by that object, and thus we will be able to observe both the body and its past image. From the position of the image, the past position of the object can be ascertained, and by knowing the positions of the body at two different times, the direction of expansion of the universe in our region can be estimated. As there are a large number of objects which appear to be far beyond the limit, there can be a number of such object-image pairs, especially in the case of quasars which are distant objects. However, only one such pair could be identified so far, and the direction is estimated based on that.

4. **The Local galaxy-group and the Triple quasar as an object- image pair:**

In the last 15.64 billion years, our parent cluster has been displaced through a distance of 5.3682 BLY. So the rays emanated from the local galaxy-group (Milkyway, Andromeda and Triangulum), a few billion years after expansion started, will now be crossing our path, and we will be seeing its image as a distant source. The Triple quasar [8] LBQS 1429-008 is a possible candidate that can be the image of our local galaxy-group, as light from that quasar takes some 10.5 billion years to reach us and the objects around it have some similarity with the objects around the local galaxy-group.

Based on the alternate model, quasars remain at the centers of large galaxies. These are not stars, but contain very dense elements. The previous contraction makes them extremely hot, and as expansion starts, these get cooled, release radiations, and become the first blackholes [9]. 10.5 billion years ago, that is, 5.14 billion years after expansion started, Milkyway, Andromeda and Triangulum galaxies were much closer, and hot quasars remained at their centers. Whether the Triple quasar and the local galaxy-group constitute an object-image pair is verified by calculating the displacement (based on the proposed model) of our galaxy-group in the last 10.5 billion years in two different ways.

The displacement of our parent cluster in the last 10.5 billion years can be calculated as follows. The outward component of its speed at any given time is half that of the boundary (being a middle cluster), and can be calculated using the equation given earlier, and is equal to $\sqrt{(2x15.64t - t^2)}$ x 0.020352 c, where 't' is time measured from beginning of expansion. The planar component increases slowly up to halfway of expansion that we can take its change to be nearly linear till that time. The distance moved out in the direction of expansion in each billion-year period can be calculated approximately by taking mid-time speed as the average speed. Thus the speed of the cluster after 5.14 billion years, the orbit diameter at that time, the distance moved out by that time, and the distance moved out during the next 10.5 billion years can be calculated (Table 2).

Table - 2

The speed (in 'c') of our parent cluster from the beginning of expansion

Time in Billion years	0	0.5	1.5	2.5	3.5	4.5	5.14
Outward component	0	0.0798	0.1360	0.1726	0.2007	0.2234	0.2359
Planar component	0.2887	0.2896	0.2915	0.2934	0.2953	0.2972	0.2984
Speed	0.2887						0.3804

Distance moved out in 5 billion years = 0.0798+0.1360+0.1726+0.2007+0.2234 = 0.8125 BLY

Distance moved out in 5.14 billion ears = 0.8125 + 0.0328 = 0.8453 BLY.

Distance moved out in the next 10.5 billion years = 3.91 – 0.8453 = 3.0647 BLY

The orbit diameter after 5.14 years = 15.64v x 2/π; v = 0.3804c; so diameter = 3.7875 BLY.

In 5.14 billion years our cluster moves out through a distance of 0.8453 BLY from its initial position at O (Fig-1), and reaches A (Fig-2), where the orbit diameter is 3.7875 BLY. During that period, it would have revolved through an angle θ. In the next 10.5 billion years, it moves out through a distance of 3.0647 BLY, and completes half a revolution (180°) and reaches P (Fig-2). So the displacement in last 10.5 billion years, AP, works out to be 4.7279 BLY at 49.59° to the direction of expansion (ref. below).

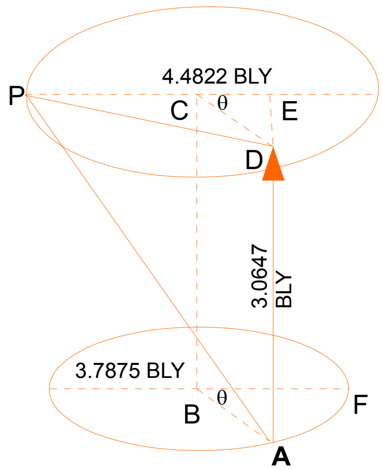

Fig-2: Displacement of Laniakea supercluster in the last 10.5 billion years

In Fig-2,

$AP^2 = PD^2 + AD^2 = PE^2 + DE^2 + AD^2$

Angle θ = (180/15.64)x5.14 = 59.156°.

CD = AB = 3.7875/2 = 1.8937 BLY

DE = CD sinθ = 1.6259 BLY

CE = CD cosθ = 0.9709 BLY

PE = PC + CE = (4.4822/2) + 0.9709 = 3.212 BLY

So, $AP^2 = 3.212^2 + 1.6259^2 + 3.0647^2 = 22.3529$

AP = 4.7279 BLY

Angle DAP = $\cos^{-1}$ (3.0647/4.7279) = 49.59 °

Now we will calculate the displacement of our galaxy based on object- image positions. In the given figure, the two circles represent the path of two rays emanating from A. After 10.5 billion years the rays converge at P. An observer at P will then see the 10.5 billion years old image of A, and it will appear to be at T, at a distance of 10.5 BLY in the opposite direction. In another 5.14 billion years, the rays will

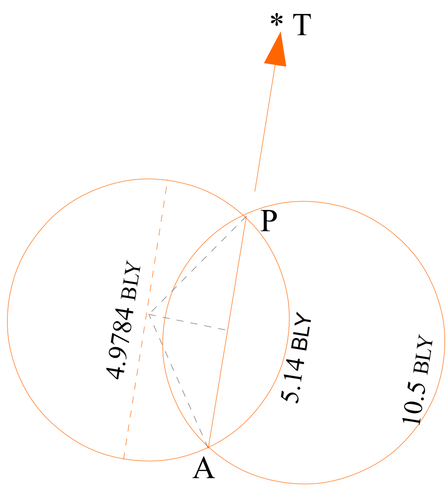

Fig-3: Displacement of Milkyway based on object- image positions reach back at A. So the distance AP works out to be 4.2743 BLY (refer calculation). So, if our 'local galaxy-group' remained at A some 10.5 billion years ago, and is now at P, then we will see its past image at T as 'the Triple quasar', and the displacement is 4.2743 BLY, that is, 0.4536 BLY less than the parent cluster. This difference is due to the motion of our galaxy within the cluster

As the center of the parent cluster is 0.25 BLY away from us as at present, a difference up to 0.5 BLY can be considered to be normal. Here the difference is within that range, and thus the displacement calculated in two different ways agree. That is, the positions of Triple-quasar and our local galaxy-group agree very well to be considered as an object- image pair.

Due to the motion within the cluster, the direction of displacement of our galaxy can vary from that of the parent cluster. The variation is maximum when the direction is along OP (ref. fig-4) and zero when it is along O'P'. The maximum variation works out to be $\theta = 1.9^{\circ}$ (ref. calculation). The expansion of the universe, obtained earlier, is at 49.59° to the direction of displacement of the parent cluster. As the Triple quasar is in the direction of displacement of our galaxy, the direction of expansion, based on the alternate model, is between 47.69 to 51.49 degrees towards any side from the direction of Triple quasar.

In Fig 3,

The radius of the circle = 4.9784/2

= 2.4892 BLY

Angle subtended by arc AP,

$\theta = (360/15.64) \times 5.14 = 118.31$

So $AP = 2.4892 \times \sin(\theta/2) \times 2$

$= 4.2743$ BLY

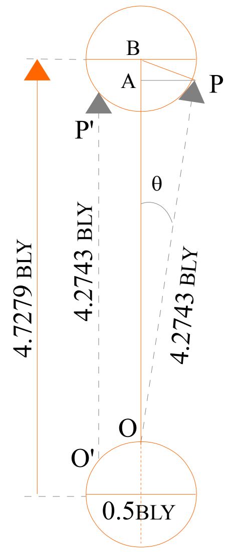

Fig-4: Direction of displacement of Milkyway

In Fig-4,

OP = 4.2743; BP =0.25; OB = 4.4779.

$OA^2 = OP^2 - AP^2$

$AP^2 = BP^2 - AB^2$

$AB^2 = (OB - OA)^2$

So, $OA = (OP^2 - BP^2 + OB^2) / 2OB$

$= 4.2719$

$\cos\theta = OA / OP = 0.99945$

So, $\theta = 1.9^{\circ}$

5. The Dark flow and the direction of expansion:

The direction of the dark flow [10] identified by Alexander Kashlinsky and others is along a path roughly centered on constellations of Centaurus and Hydra . The direction of dark flow with reference to Triple quasar can be ascertained from their positions (Table:3).

Table:3

Angle between Triple quasar and the Constellations Centaurus and Hydra

	Right ascension	Declination
Position of Triple quasar	$14^h\ 32^m$	$+01^{\circ}\ 06'$
Position of Hydra (average values)	$11^h\ 36.73^m$	$-14^{\circ}\ 31.9'$
Position of Centaurus (,,)	$13^h\ 04.27^m$	$-47^{\circ}\ 20.7'$

Angle between Triple-quasar and Hydra = 46.1° (using online angular distance calculator)

Angle between Triple-quasar and Centaurus = 52.1° (,,)

Thus the direction of dark flow is between 46.1° and 52.1° from Triple quasar 'towards Centaurus and Hydra'. The direction of expansion obtained from the alternate model is between 47.69° to 51.49° 'towards any side' from Triple quasar. Thus we can find that the direction of expansion obtained from the alternate model is in very good agreement with direction of dark flow, implying that 'dark flow represents the direction of expansion of the universe in our region' and also that 'expansion of universe is due to actual motion of galaxy clusters'.

6. Conclusion:

The alternate model (proposed in my previous papers) visualizes an expansion caused by actual motion of galaxy-clusters; it also visualizes that light follows circular path. Based on these, it has been shown that the Triple-quasar and our local galaxy-group form an object-image pair: the Triple-quasar is the 10.5 billion-years old image of 'Milkyway, Andromeda and Triangulum' galaxies. From the positions of this galaxy-group at two different times (present and 10.5 billion years ago), the direction of expansion is found to be between 47.69° to 51.49° to the direction of Triple-quasar towards any side. The direction of 'dark flow' is between 46.1° to 52.1° to that of Triple quasar towards the constellations of Centaurus and Hydra. From this, it is concluded that 'dark flow' represents the outward motion of galaxy-clusters in our region of the expanding universe, and thus provides observational evidence for the alternate model.

However, the direction of expansion thus obtained is based on both the alternate model and the 'dark flow'; to arrive at the direction of expansion from the alternate model alone, more such object-image pairs have to be identified. Also, Kashlinsky and others are not fully confident regarding the direction of flow: [10] there is some possibility that it is in the reverse direction. The alternate model requires the flow to be at 10^8 m/s, whereas the speed they have obtained is in the range 10^3m/s; this may be due to the model dependency of their calculations. Again, there is the possibility that my finding is a chance coincidence; but, based on the same model, the Earth- moon distance has been correctly predicted [5], and this reduces the probability of chance coincidence.

Reference:

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