

On GRB 090423 And The M&L Universe

Rothwell Bronrowan
physbron@t-online.de

This paper contains some new ideas on the universe.

The Background

On 23rd April 2009 (090423 backwards) a 10-second gamma-ray burst (GRB) was recorded by the NASA satellite "Swift". And because of its enormous red shift of 8.2, this GRB was soon recognized as the oldest ever detected, its origins being put at only 634 million years after the Big Bang.

Having read this within days of its discovery, I quickly checked up on the age of our universe. The agreement was not 100%, but the consensus put it at 13.5 to 14.5 billion years old (another recent assessment has put it at between 13.2 and 13.9 billion years).

It suddenly occurred to me that this discovery said something important about the velocity of the earth and its position in the universe.

I did some calculations.

Taking the date of the GRB 090423 explosion as 650 million years (= 0.65 billion years) after the Big Bang and putting the age of the universe at 13.65 billion years, for the sake of simplifying the calculations without leaving the accepted bounds, I quickly concluded the following:

Given that 13 billion years have passed since the explosion, if this had occurred on the far side of the Big Bang (furthest point) the rough position of the earth today would be $(13 - 0.65 =) 12.35$ billion light years from the Big Bang. If, however, the explosion occurred on this side of the Big Bang (nearest point), the earth is now at a distance of $13 + 0.65 (= 13.65)$ billion years from the Big Bang.

Furthermore, we know that the earth first appeared on the scene around 4.54 billion years ago, i.e. some $(13.65 - 4.54 =) 9.11$ billion years after the Big Bang. At this time the "light" from the explosion was $(13 - 4.54 =) 8.46$

billion years old and at a distance of between $(8.46 - 0.65 =) 7.81$ and $(8.46 + 0.65 =) 9.11$ billion light years from the Big Bang.

This in turn means that when the earth first appeared this light must have been at a distance of between $(9.11 - 9.11 =) 0$ billion light years and $(9.11 - 7.81 =) 1.3$ billion light years from the earth.

In other words, based on the maximum distance, the "light" from the explosion must have taken 4.54 billion years to close this gap of 1.3 billion light years, which in turn means that the velocity of the earth would have to have been $((4.54 - 1.3) \times 100/4.54 \approx)$ at least 71.4% that of light, or $(300,000 \times 71.4\% =) 214,200$ km/s.

And not only that, the earth would then be right on the outskirts of the universe!

The first problems with these calculations are that

- a) the (orbital) velocity of the earth is thought to be only about 30 km/s, and
- b) the earth is not regarded as being anywhere near the "outskirts" of the universe.

So I confronted a few scientists with these details, asking for their explanations. Were my calculations wrong?

Yes they were. All agreed that such linear calculations could not be made. This would be to consider things in terms of a universal frame of reference. But there was no such thing, only countless other frames of reference. All of those who responded were namely relativists.

One of those contacted, one of the top handful of scientists mentioned in connection with GRB 090423 (let's call him "Our Scientist", or OS for short), went into the matter in slightly greater detail. The following points were made by him.

The Criticism

- 1) Unless one applies relativity, calculating cosmological distances, times, etc. makes no sense.
- 2) It makes no sense to talk about velocity unless you have a frame of reference for it.
- 3) The orbital velocity of the earth around the sun is 65 km/s (most Web references give 30 km/s, but working at the forefront of his field, OS should know), or around the galaxy is -200 km/s.
- 4) Hubble's law tells us that the velocity of cosmological objects is proportional to their distance and that, despite exceptions, those at the edge of the visible universe are moving away from us at close to the speed of light.

- 5) The "edge" of the universe, in relativistic terms, is actually just the maximum distance from which light can have reached us, given the age of the universe. The universe itself could be much larger.
- 6) The question as to where the earth is located in the universe doesn't therefore make much sense, since we don't know the full size of the universe.
- 7) By definition, the earth is at the centre of "its" universe, which is a sphere of radius = *age of universe* x *speed of light*. This applies to every "centre", or point of observation.
- 8) All such spheres have the same radius.
- 9) Objects at the "edge" of any universe, which are moving away from the observer at nearly the speed of light, have their time dilated, i.e. their clocks will run slow, as compare to the observer's clock, at the centre of this universe.
- 10) Although GRB 090423 exploded when the universe was only about 630 million years old, this was in its frame of reference; in ours, it (the universe) was a lot older and therefore much larger.
- 11) Add a speck of "light travel time" and suddenly everything becomes consistent with standard Big Bang cosmology.
- 12) The current belief, that the universe is about 13.65 billion years old, must not be taken to imply that the radius of the universe is restricted to being 13.65 billion light years. It is believed in astrophysical circles that the universe has undergone a period of expansion at rates greater than those of the speed of light.
- 13) The speed of light is merely the limit within the observer's universe.
- 14) Two bodies at opposite "ends" of this observer's universe (i.e. at 180°) may have relative speeds of more than the speed of light ($>c$), which is nevertheless "permissible" because they are not within each other's universe.
- 15) In terms of distances, the calculations that tend to be reported in the press are often oversimplified and even misleading.
- 16) There is no absolute frame of reference. This is a basic principle of relativity.
- 17) Questions relating to the velocity or the location of the earth in space can therefore only be answered in terms of *other* frames of reference, or not at all.

It's not often that one comes across such a concise summary of beliefs from an active member of the scientific community.

So let's take advantage of this and look at these points more closely. And as we will soon see, matters are not as simple as OS thinks, nor are they as clear as I previously thought.

Counter Arguments

Each of the points made in the above criticism will be dealt with in this section, though not in chronological order. Before addressing these, however, a quick word on the prevailing Big Bang theory.

This theory was first proposed in 1925 by the Belgian physicist and astronomer George Lemaître [1894-1966], and published by him two years later. The name "Big Bang" is said to have been coined by the English astronomer Sir Fred Hoyle [1915-2001] in 1949, during a radio broadcast. Hoyle himself still believed in the steady-state theory, which has meanwhile been replaced by the Big Bang theory.

The steady-state theory envisaged no start and no end to the universe, which instead was seen as being fairly static and unchanging - and infinitely large.

One problem seen with the steady-state theory was the belief that, if the universe was so endlessly large, the sky should be completely filled with starlight. A response to this point was that when stars "die" their light eventually vanishes. As for the light from very distant new stars, this first takes a long time to reach us. There was also the idea of "dark matter" (postulated in 1934 by Fritz Zwicky) that could be responsible for blocking out the light from some stars.

The Big Bang theory won the day, however, because astronomy seemed increasingly to support the idea of an expanding universe. And by reversing "time" in association with contraction, Lemaître traced the past universe back to a dense "centre".

This had "exploded", scattering matter and light in all directions and creating the expanding universe. Hence the term "Big Bang".

The idea of putting a finite age to the universe is therefore also one that is inseparably bound up with the Big Bang theory.

Initially it was thought that the force of gravity would slow down this expansion, eventually even reversing it to form a contracting universe, which would then return to its initial condensed core, where the whole procedure would begin again.

Calculations undertaken by astronomers, based on the numbers of stars, then challenged this theory. There were too few stars to account for the force of gravity required for such contraction.

Others countered - again - that there were more stars than could be seen. These were blocked out by the dark matter, which itself was presumably very massive (in fact, dark matter has even been said to account for 80% of all matter in the universe!). The argument continues, though the current tendency is to see the universe as expanding for ever.

So our starting point is an explosion at the centre of the universe.

Although, as said above, we will not address the points made by OS in chronological order, we will nevertheless begin with

Point 1 Unless one applies relativity, calculating cosmological distances, times, etc. makes no sense.

The first startling thing that this comment makes apparent is that [relativists dismiss the ability of non-relativists to calculate cosmological distances, times, etc.](#) at all!

Although all justification for this point will be refuted in the context of the theory discussed here, it nevertheless raises a very serious practical issue. In fact, it may even explain why, although more and more scientists are now challenging an increasing number of Einstein's theories, few of these seem to occupy senior positions.

Many influential journals now also refuse to publish articles that are critical of relativistic thinking. One consequence is that the readers of these journals soon come to believe that there are no such articles and that there is no alternative viewpoint.¹

When relativists group together in this way to prevent publications and viewpoints critical of their positions, they seem to do so in the conviction that, after so many years of such widespread acceptance, their theories simply can't be wrong.

In my paper "Faults in Michelson-Morley"² I show, amongst other things, that there is a serious error in Michelson's mathematics which was overlooked by Lorentz and remained undetected for well over 120 years! One good argument against the attitude of the previous paragraph.

The Michelson-Morley experiment is so important to relativists because relativity is based on its supposed findings. In examining these findings, however, many important aspects seem to have remained completely unconsidered - or were perhaps not even noticed. One such aspect is the fact that the *same* "zero result" accounted, thanks to Lorentz, for a value for *length contraction* in 1887 that was half that accounted for by the 1881 experiment. And both are wrong!

How can I make such a claim? The reasons are also given in the above-mentioned article. Still more important in this context, however, is the proposal of a test for *length contraction* made in "An Experiment for Length Contraction"³.

At the time of writing the latter article I was uncertain whether this test could already be made or whether one might have to wait for a dozen or two dozen years until a

¹ All the more reason for us to be thankful for the General Science Journal!

² *Faults in Michelson-Morley*, Rothwell Bronrowan, General Science Journal, 20.05.2010

³ *An Experiment for Length Contraction*, Rothwell Bronrowan, General Science Journal, 14.06.2010

suitable base had been set up on the moon. I meanwhile have good reasons for supposing that it *is* already possible.

The test involves measurements between the earth and the moon. In certain positions *length contraction* should account for a difference in the distance between these planets of 4 cm, based on the *length contraction* value accepted by Lorentz.

What I didn't know until recently was that reflector plates had been left on the moon during the Apollo 11 mission in 1969 and that these have meanwhile been used to make earth-moon distance pulse measurements to an accuracy of 2.5 cm!!

I recently wrote about this to three scientists directly involved in this field of work. One has replied to say that he is too busy to look into everything that people write to him. The other two have not replied.

Have relativists these days become too timid to put their theories to the test?

This in passing.

I have gathered the remaining 16 points into 8 different groups.

Point 3 The orbital velocity of the earth around the sun is 65 km/s (most Web references give 30 km/s, but working at the forefront of his field, OS should know), or around the galaxy is -200 km/s.

The only remark I wish to make in connection with this point - referring back to the above remarks on *length contraction* - is that the orbital value given here by OS would serve to restore the result of the 1881 experiment, as opposed to that of the 1887 experiment proposed by Lorentz. This, however, is sheer coincidence!

Point 2 It makes no sense to talk about velocity unless you have a frame of reference for it.

Point 6 The question as to where the earth is located in the universe doesn't therefore make much sense, since we don't know the full size of the universe.

Point 16 There is no absolute frame of reference. This is a basic principle of relativity.

Point 17 Questions relating to the velocity or the location of the earth in space can therefore only be answered in terms of *other* frames of reference, or not at all.

All of these points insist on one's having a specified frame of reference and prohibit the idea of one's accepting a universal frame of reference.

The reason for rejecting a *universal frame of reference* seems to be the belief that this is incompatible with the first requirement, i.e. of having a more specific frame of reference.

I fail to see this point. If one can have two non-identical frames of reference that do not entirely exclude each other - as in the case of two persons side by side, or on neighbouring planets - why can one not have a third frame of reference that includes both of these, and all other frames of reference too, for that matter?

Would such a frame of reference be a *universal frame of reference*, however? This appears to be another of those questions that relativists never seem to ask.

Not that it's important. Other options for "getting around" this prohibition might be a) to take the speed of light itself - which according to Einstein is the same in all frames of reference - as one's basic frame of reference, or b) to take the centre of the Big Bang as one's initial - and expanding - frame of reference.

Even these options are not essential, though, since - unlike OS - many of us see no need to communicate in an untypical (= relativistic) manner.

It's not that I don't see what OS is trying to say, but taking a closer look at the following points we will soon notice that they don't make all that much sense.

Point 4 Hubble's law tells us that the velocity of cosmological objects is proportional to their distance and that, despite exceptions, those at the edge of the visible universe are moving away from us at close to the speed of light.

Point 7 By definition, the earth is at the centre of "its" universe, which is a sphere of radius = *age of universe* x *speed of light*. This applies to every "centre", or point of observation.

Point 8 All such spheres have the same radius.

Point 9 Objects at the "edge" of any universe, which are moving away from the observer at nearly the speed of light, have their time dilated, i.e. their clocks will run slow, as compare to the observer's clock, at the centre of this universe.

Point 13 The speed of light is merely the limit within the observer's universe.

Point 14 Two bodies at opposite "ends" of this observer's universe (i.e. at 180°) may have relative speeds of more than the speed of light (>c), which is nevertheless "permissible" because they are not within each other's universe.

There is a growing following these days for rejecting the validity of *Hubble's law* and *Hubble's constant*, on a number of grounds. If we accept both here for the sake of the argument, however, we can depict the above claims diagrammatically as follows.

Take three such universes (B, C and D):

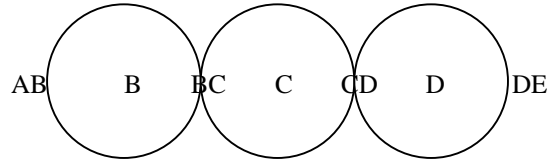


Fig. 1

Here, B, C and D are at the centres of their respective universes, while AB, BC, CD and DE are all aligned in a row at the intersections of these universes.

Now according to Hubble ([point 4](#)), AB and BC are moving away from B at almost the speed of light. Looking at things in BC's universe, however, B and C are both moving away from it at almost the speed of light. CD is also moving away from C at almost the speed of light. So does this mean that CD is travelling at almost 3x the speed of light with respect to B, or at 4x the speed of light with respect to AB?

The answer is presumably that one can't say, since nothing can ever be said, from C's point of view, about - for example - B or D. Or put another way: *frames of reference prohibit calculation and imagination!*

As for their times ([point 9](#)), notice that AB's clock is slower than B's clock, as is BC's. But only as seen from B. If we look at things from BC, it is now B's clock that is running more slowly than BC's. So which clock is actually running slower, B's or BC's? This is a question we mustn't ask, however. The answer is, that it depends on where you are looking from. Or put another way: *frames of reference force you to ignore - or even accept - contradictions!*

Notice too that BC is moving away from both B and C at almost the speed of light. So are the universes B and C moving away from each other?

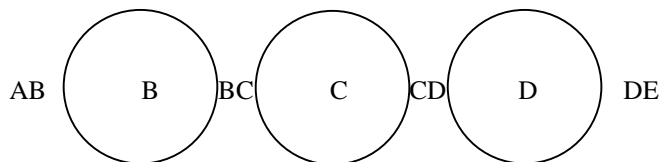


Fig. 2

This is another question that can't be answered, since the universes are external to each other. And it makes no sense to ask a question that can't be answered. Or put another way: *frames of reference force you to ignore questions that might have proved helpful!*

By ignoring these relativistic restrictions we have found ourselves able to discuss them without making "no sense". We can also see that accepting them would prohibit at

least one of our proposals for a *universal frame of reference*, though we may not understand why relativists find this helpful.

Point 7 will be taken up again in the remaining segments of this section.

It's difficult to take the next three points too seriously.

Point 10 Although GRB 090423 exploded when the universe was only about 630 million years old, this was in its frame of reference; in ours, it (the universe) was a lot older and therefore much larger.

This is a great point! When GRB 090423 exploded, the universe was only about 630 million years old in its frame of reference, in ours - which didn't yet exist! - it was a lot older.

If this has to be taken seriously, what OS appears to be saying is that when we speak of "light" from an object that exploded when the universe was (say) 650 million years old, we cannot translate this into our "age" for the universe, i.e. $13.65 - 0.65 \neq 13$.

But this is not what most of us understood from the reports on GRB 090423. In fact it's not what the press understood either. To which comment OS replied:

Point 15 In terms of distances, the calculations that tend to be reported in the press are often oversimplified and even misleading.

How could it be otherwise?

Point 11 Add a speck of "light travel time" and suddenly everything becomes consistent with standard Big Bang cosmology.

The term "light travel time" is one I haven't been able to clarify, even in the web. From what I found, it might possibly be defined as "light years + space expansion".

Point 12 The current belief, that the universe is about 13.65 billion years old, must not be taken to imply that the radius of the universe is restricted to being 13.65 billion light years. It is believed in astrophysical circles that the universe has undergone a period of expansion at rates greater than those of the speed of light.

In attempting to understand this point I suddenly realized that our current view of "the universe" is oversimplified and mistaken.

The last sentence under point 12 might be interpreted in two ways:

- 1) that there was a period in the past during which the speed of light was greater than it is today;
- 2) that there was a period in the past during which the speed of matter was greater than the speed of light.

OS being a relativist, we can well suppose that he would reject the first of these options in favour of the second.

Taking the centre of the Big Bang as our point of reference, therefore, our view of the universe to date has been that of a sphere expanding in all directions at the speed of light, the "edge" of this universe being the "surface" of this sphere.

If we are now talking about a period in the past during which the speed of matter was greater than the speed of light, however, we are no longer talking solely about the "light" universe described above, but also about a "matter" universe, coupled with the postulation that this matter universe is or was larger, now and/or in the past, than the "light" universe.

So let's call our light universe [the L universe](#) and our matter universe [the M universe](#).

As regards the idea that the M universe initially expanded more rapidly than the L universe, this is difficult to imagine. Normally we see light in the form of explosive energy being emitted in association with matter separation. Such light has a far greater velocity than the matter. Now we are supposed to accept the idea of matter acquiring a velocity greater than that of the light emitted and presumably propelling it?

If we do accept this, there is no reason for supposing that the cause of this "matter separation" need be attributable to explosion. It may have been caused by something else.

If, on the other hand, we have matter separation without explosion, why the need for light at all, at this early stage? If we assume, for example, that the matter separated for (say) 20 billion years at speeds of less than the speed of light, before stars and light came on the scene, would this not also account for the phenomenon - whatever it is! - that OS obviously accepts a need to account for in terms of his "expansion at rates greater than those of the speed of light"?

Another important question arises here, too: "How traceable would this leave our Big Bang?"

No, this suggestion must fall foul of Ockham's razor!

Nevertheless, this point has helped us enhance our concept of the universe, to one consisting of [a larger L universe](#), and [a much smaller M universe](#).

If we now go one step further in accepting that every light *source* is some form of matter, primarily in the form of stars, we can also say that **every light source belongs to our M universe.**

This in turn helps us to show that points 5 and 7 are incorrect.

Point 5 The "edge" of the universe, in relativistic terms, is actually just the maximum distance from which light can have reached us, given the age of the universe. The universe itself could be much larger.

If we now suppose that both of our universes, M and L, have the same age, then it is clear that the first sentence of point 5 restricts itself to the M universe, although most of us - OS too - would normally have assumed that it refers to the L universe. And since anything restricted to the M universe automatically excludes a larger L universe, we can now see that this sentence is incorrect, or at least inadequate.

As for the second sentence, it is wrong to say that the universe *could* be much larger, because it *must* be much larger. This is certainly the case for the L universe, but it also applies to the M universe.

To explain this, imagine light from a source initially at a distance of (say) 1.5 billion years from us has been emitting light for (say) 1 billion years. This light will not yet have reached us.

In other words, **there is always a portion of even the M universe that forms no part of the relativistic universe.** So the *could* has to be a *must*.

Point 7 By definition, the earth is at the centre of "its" universe, which is a sphere of radius = *age of universe* x *speed of light*. This applies to every "centre", or point of observation.

It must now be immediately clear that point 7, as made by OS, makes no sense at all! Even conceding, as we have done, that the "age" of both the L and M universes is identical, multiplying by the speed of light does not give us the size of the M universe.

And we can't multiply by the speed of expansion of the M universe, since we don't know this.

So the relativistic claim that every object is at the centre of "its" universe and that this universe has a sphere of radius *age of universe* x *speed of light* is clearly incorrect!

Summary

In examining the idea of the universe outlined in the criticism given by OS, we have arrived at a very different view of the universe than that held initially.

This in turn confronts us with at least two obvious options:

- (Option 1) The radius of the M universe - expressed in our old-fashioned, common-sense terms - may be as small as 1.5 billion light years, or even less.
- (Option 2) The radius of the L universe - again expressed in our old-fashioned, common-sense terms - may be as large as 130 billion light years, or even more.
