Has 'dark matter' really been proven? Clarifying the clamour of claims from colliding clusters

John Hartnett

Recently, a paper claimed that direct empirical proof of the existence of 'dark matter' has been finally found.[1] This has been dutifully repeated in the more popular media.[2] It is claimed that this demolishes the criticisms of 'dark matter sceptics' (myself among them) who say that the whole dark matter scenario is the result of incorrect physics being applied to the dynamics of astronomical bodies.

Source: NASA / CXC / CIA / STScI / Magellan / Univ. of Ariz. / ESO

Figure 1. The Bullet cluster was formed from the collision of two galaxy clusters, one more or less passing through the other. The arcs around the two clusters are interpreted as providing direct evidence of the existence of dark matter. However, the very essence of the 'dark matter' concept is that we have *no* explanation for what we observe.

What was found?

Clowe *et al.* claimed that the Bullet cluster (1E0657-558, figure 1) at a redshift of 0.296 is a unique merger of two clusters, and that new analysis just accepted for publication in *Astrophysical Journal Letters* has 'enable[d] a direct detection of dark matter'.[1]

This topic has been in the news and on several websites over the past few days. The arguments all hinge on Clowe *et al.*'s *interpretation* of the gravitational lensing evidence. That is, whether the correct physics has been applied to these visible arcs seen in and around galaxies in the two Bullet sub-clusters (figure 1). The usual interpretation is that it is gravitational lensing,[3] and a reconstruction allows one to correctly locate the dark matter.[4]

Is it really dark matter?

They claim 'direct proof'. That seems to be stretching things a bit, to put it mildly, given the many assumptions and interpretations necessarily involved.[5] In this case they were out to disprove some alternate gravity theories that purport to explain the anomalies which cause others to postulate 'dark matter'. Those theories made predictions and according to their analysis they have found data that contradicts those theories. However, a recent paper[6] claims that this is mistaken, namely that at least one of those same theories can explain the 'lensing' that is observed in this cluster. Yet another[7] takes a combination of one of these alternate theories and assumes a concentration of normal neutrinos in the two clusters but without exotic dark matter.

Even if we were to grant them the disproof, though, it is not a proof nevertheless. Let's be clear here: 'dark matter' is not an explanation for what we see; it's an admission that no one has an explanation. Perhaps a more accurate headline would have been, 'Scientists have proved that they haven't got a clue what the universe is made of', rather than, 'Dark matter revealed'.[8] Because it isn't revealed. But if you give a name to an admission of gross ignorance—'dark matter', 'dark energy'—then you eventually believe you have explained something!

The main problem I see hinges on where the x-ray-emitting gas is. The shock heating from the collision of the clusters might well bias the mass calculations for the normal matter. The determination of the mass from x-ray emission is linked to the assumption of *hydrostatic equilibrium,*[9] and the equation used to calculate the location of the mass is the *collisionless Boltzmann equation*. But by the authors' own admission, the system is *not* in equilibrium. Also, they claim one cluster passed through another,[10] so the x-ray gases are heated to hundreds of millions of degrees, hardly collisionless. That is why it was named the Bullet cluster. There is a clear picture of the x-ray emission shaped like a bow shock wave (figure 1). The article says:

> 'The cluster is also known as the bullet cluster, because it contains a spectacular bullet-shaped cloud of hundred-million-degree gas. The X-ray image shows the bullet shape is due to a wind produced by the high-speed collision of a smaller cluster with a larger one.'

They argue that the separate methods (gravitational lensing, and x-ray emissions) allow the authors to

separate where the normal matter is from where the dark matter is. But still, many assumptions have been applied which may be wrong. So I suggest that the location of the mass is still in question.

Claims of 'direct proof' of dark matter have been made before, and have fizzled.[11] Considering that we live in a part of the galaxy that is meant to be dominated with the stuff and is allegedly six or seven times more concentrated than normal matter, i.e. all around us, what is it? Some claim it comprises heavy neutrinos. If it was standard neutrinos, there would need to be about 10 billion times the amount of the normal matter made from protons and neutrons. Hence the need to look for a massive neutrino. But there are supposed to only be about 20 particles per cubic centimetre! It seems more than prudent to adopt a 'wait and see' approach on this alleged 'proof'.

Another question that might be asked is: if gravitational lensing is correct in the Bullet cluster, why don't we see it in the CMB?[12] After all, cosmic microwave radiation is supposed to come from the background of all the galaxies (supposedly containing putative dark matter) in the visible universe and therefore should be lensed by foreground galaxies—but it isn't.

I believe we need to apply Occam's razor.[13] We should be wary of claiming the existence of anything where *ad hoc* assumptions are introduced to the norm, resulting in a complex system of more components than are really necessary. I suggest that dark matter, dark energy, inflation, etc are such items, ones on which history will ultimately pass unfavourable judgement.

Dark matter—vital for big bang believers

But why all the fuss? A lot has to do with 'big bang belief'. It seems that dark matter is necessary to prop-up the failing paradigm of the Friedmann cosmologies commonly believed by many to describe not only the structure but also the true ('big bang') beginning of the universe. The many well-qualified critics of the big bang have rightly lambasted dark matter and dark energy as 'hypothetical entities' or 'fudge factors'.[14,15] However, to get the theory to work, a universe comprising 22% dark matter is an absolute must. Therefore it has become now an all-out battle to prove that the dark matter sceptics (like me), who dispute the existence of the stuff, are wrong.

Alternative physics

As well as propping up the big bang, dark matter is needed to explain certain motions in galaxies that appear not to follow the laws of physics. It is reminiscent of the proposal around the turn of last century about the existence of a 10th planet, Vulcan. No, not the home of Mr Spock, but a hidden planet that allegedly perturbed Mercury's orbit and thus explained why it did not follow Newtonian physics. But the proposed planet could not be observed, and had a strange quality to it—how could it remain hidden from Earth by the sun, when a planet near Mercury must orbit the sun much faster than Earth does?

Nowadays, this proposal is regarded as quaint, because Einstein's theory of general relativity (GR) explains the orbit of Mercury. That is, rather than introducing a fudge factor that really explained and predicted nothing, what was needed was new physics that *both explained current observations and predicted new ones*.

Dark matter is the Vulcan of today. It is a 'fudge' with unknown properties and strange behaviour, such as being in a non-collapsing halo around galaxies. The equivalent of GR in the Vulcan saga, i.e. the new physics required to do away with this whole 'dark matter fudging', could well be a new theory proposed by Israeli cosmologist/physicist Moshe Carmeli. His 5D space-time-velocity metric explains both galactic rotation curves[16] and the flatness of the universe—without dark matter or other fudge factors.[17] Like Einsteinian relativity did to Newtonian physics, it encompasses today's physics but explains more of the data.

Why this matters

If you believe we live in a universe that is the chance product of evolution (in all senses of the word), then since we are here to observe the universe, you may also believe this universe just happens to be the type that permits life to exist … but ultimately there is no plan. If so, then how can you understand anything outside your own experience or even trust that your thoughts are reliable?[18]

If, on the other hand, you believe we live in a universe designed by a Creator, then we should expect the universe to make sense, and to have defining properties that we can analyze locally and apply globally. These sorts of biblically-based assumptions are what made science possible in the first place,[19] historically. Whether or not dark matter in some form turns out to be real stuff, its 'existence' at present appears to be largely based on an underlying motive to keep a belief system that is fundamentally flawed.

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The 'Lucy child'

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A young individual of the same species as the famous 'Lucy' has just been unveiled.[1] Found in Dikika, Ethiopia, this specimen is remarkably well preserved. It is of a young female, probably about three years old. The 'age' is supposed to be 3.3 Ma. It has taken five years so far to carefully remove much of the skeleton from the sandstone. The job is not complete; there may be years more work to confirm exactly what the foot bones looked like, for instance.

Why it's important

There was much fuss when 'Lucy' (later named *Australopithecus afarensis*) was originally discovered. At last, evolutionists seemed to have a wonderful 'ancestor candidate'—one which supposedly walked upright, and had a near-perfect mix of ape and human characteristics.

However, as inevitably happens with 'apemen' finds, things started to look different as time went on and as anatomists carefully studied the fossil bones of Lucy and other specimens of her genus, *Australopithecus*. Several researchers using objective computer techniques (like evolutionist Charles Oxnard) pointed out that the features as a whole were not intermediate at all between apes and humans. They also pointed out that their method of locomotion was not upright in the human manner, either. Furthermore, the fingers and toes of other specimens of Lucy's kind seemed to be long and curved, like apes that swing in the trees. Their arms were long, like those of tree-climbers.[2]

Keen to hang onto their vision of an 'apeman', it was argued that these were just evolutionary 'leftovers'. It became harder to defend, however, when the Lucy skeleton itself was shown to have the same wrist mechanism (that 'locks' the wrist for knucklewalking) as do chimps and gorillas.[3] Was this also a leftover? If so, why hadn't natural selection eliminated this if it was no longer used?

Photo by Kevin Zim

Skull of Lucy, *Australopithecus afarensis*.

To make things worse for the belief that these were 'man's ancestors', other australopithecine skulls, when the organ of balance was scanned, also gave evidence that they could not have walked habitually upright like humans at all.[4]

Some might have tried to maintain the excitement, based on the evidence that some australopithecines must have had the capacity for at least rudimentary speech. This evidence was that the inside of their skulls had impressions of the pattern on the brain surface, which showed that they had the same sorts of patterns as we do in the areas of our brain used for language. But that evidence, too, faltered when it was shown that the same patterns are there in some living apes too, but are used only for non-linguistic purposes.[5]

Of course, while this evidence was accumulating, countless evolutionary pictures and displays showing 'Lucy' with what were drawn to be 'human-ape' features (e.g. human-looking hands and feet) were piling up, too. Though contradicted by the evidence, it was too hard, it seemed, to modify all those displays.

Better preservation = more information

This latest discovery of an even better preserved[6] specimen of Lucy's kin (it is so similar, that it is not just put in the same genus, but the same species)