Cosmology in Crisis

- ***Appeal to Authority fallacy***
- ***False Analogy fallacy***
- ***Confirmation Bias fallacy***
- ***Suppressed Evidence fallacy***
- ***Persuasive Definition fallacy***
- ***Exclusion fallacy***
- ***False Cause fallacy***
- ***Wishful Thinking fallacy***
- ***Falsifiability fallacy***
- ***Straw Man fallacy***

Cosmology is concerned with the origin and nature of the large-scale universe, which has captivated mankind for millennia as we have gazed up at the stars in wonder. Our rapid advancement in many areas of science and engineering, over the past century in particular, has also greatly advanced modern cosmology. Yet, despite these advances, there are also many controversial, troubled, and unexplained claims, theories and beliefs in our current picture of the universe. The reason for this can be traced to a series of erroneous beliefs that have built upon one another as they have become incorporated into cosmology, leading to an ever more distorted view of our universe.

In order to address this situation we begin with an overview of the history and beliefs that have led to our current understanding – as officially presented. This will then serve as the foundation for a deeper look at this story, allowing for a rethink of many of the legacy ideas that are now taken as established and even unquestionable fact, but which have actually created a highly distorted picture of our universe.

The Official Cosmological Story

Early in the 20th century, Albert Einstein proposed a new theory of gravity, known as *General Relativity Theory*. Although Einstein's theory was increasingly being considered as possibly the final word on the

nature of gravity, it had little practical utility since its equations, largely abstract and unsolvable, produced results that differed negligibly from Newton's theory of gravity except in very subtle or extreme scenarios. So Einstein endeavored to apply his new theory to the grandest scale of all – modeling the overall universe.

But, when he did this, he found that his equations only produced a universe where all the stars either contracted together or expanded apart – in stark contrast to the static and unchanging universe that was widely assumed at the time, and that Einstein also believed to be the case. So, as author of the theory, he simply added a term to his equations that forced a static universe.

This was the official version of *General Relativity Theory* until about a decade later, when astronomer Edwin Hubble (1889–1953) discovered that the galaxies were all moving away from us and from each other. He came to this conclusion by noting that light from distant galaxies was shifted to lower frequencies, presumably in similar manner to how sound waves shift to lower frequencies when a sound source is moving away – the well known *Doppler Effect*. This apparently equivalent effect that Hubble observed in starlight was then termed the *redshift*, denoting a shift toward the low-frequency end of the visible spectrum where red light is found. Hubble formalized his velocity-based redshift conclusion, producing an equation relating velocity with distance, now known as *Hubble's Law*:

$\boldsymbol{V = HD}$, where $\boldsymbol{V}$ is velocity away from us,
$\boldsymbol{D}$ is distance from us,
$\boldsymbol{H}$ is the *Hubble Constant*.

Einstein was very reluctant, as were many, to let go of the long-held idea of a static universe, but Hubble's evidence eventually convinced him that all galaxies were speeding away from us, and apart from each other. At this point, Einstein removed his added term – now known as the *cosmological constant* – from his equations and strongly distanced himself from it, famously calling it his greatest blunder. This left his original *General Relativity* equations free to describe a universe where everything was expanding apart, to match Hubble's observations.

It was not long before it was realized that this new view of the universe also meant the galaxies would have all been progressively closer to each other further back in time, and possibly even all clumped together at some distant point in the past. It was eventually decided that this could only mean there was an actual creation point for the universe and all matter and energy within it, which exploded outward, resulting in the universe that we now see.

Many people – scientists and laymen alike – were strongly divided over this issue. Some held onto the static, infinite universe concept and rejected the idea that the universe was expanding apart from a creation event, while those who accepted Hubble's observations and conclusions were themselves divided over whether this implied an exploding creation event or some other explanation.

The *Static Universe* notion eventually fell out of favor in light of the redshift evidence, leaving two main ideas – either an exploding creation-event, or the concept that, as the galaxies expand apart, more matter and energy comes into existence in the gaps, replenishing space with continually developing stars and galaxies. The latter idea, championed by cosmologist Fred Hoyle (1915–2001), is called the *Steady State* theory, while Hoyle disparagingly referred to the former idea as a "*Big Bang*" theory, which became its official name.

Debate and controversy swirled around both the *Steady State* theory and the *Big Bang* theory for decades, with each side inventing modifications to their favored theory in efforts to resolve serious flaws that arose in each. Then, in 1964, faint microwave radiation was detected arriving from outer space in all directions, known as the Cosmic Microwave Background Radiation (CMBR), which was rapidly declared to be the predicted afterglow from the *Big Bang* event. The prediction was that as the universe expanded, all forms of radiation from the *Big Bang* explosion would have been stretched, or redshifted, over billions of years down into the very low-frequency microwave range, suggesting an average temperature of deep space of about 3 degrees above absolute zero. This matched very closely with the CMBR detection. This discovery was awarded a Nobel Prize, with another Nobel Prize given to the later COBE satellite project, which detected subtle variations in the CMBR from orbit that cosmologists claimed matched the large-scale structure of the universe.

This apparent confirmation of a key *Big Bang* prediction, along with the proposed corrective modifications to the *Big Bang* theory itself over the years, now greatly fortified this notion of a universe expanding from an explosive creation event. Further combining this with Hubble's redshift observations, amidst the apparent overall support of Einstein's *General Relativity* theory, finally resolved the debate. The *Steady State* theory was now laid to rest along with the *Static Universe* theory, leaving the *Big Bang* theory as the official scientific viewpoint. The resulting *Big Bang / expanding universe* concept presented a very compelling and convincing picture, which is now the mainstream scientific position today.

However, despite its acceptance, major problems still continued to emerge with this picture. For many decades there had been persistent and increasing claims that the motion of galaxies did not agree with Einstein's *General Relativity Theory*. These discrepancies were not trivial, with both the rotation and clustering of galaxies suggesting there would have to be between 5 and 50 times more matter in the universe than was known or even postulated to exist, if Einstein's calculations were to match observations. Few were willing to question Einstein's theory of gravity, so the conclusion was that the "missing matter," as it was called, must *actually* be there despite being completely unexplained and undetectable, and it was eventually termed *"Dark Matter."* This issue, that regular matter apparently makes up only a small minority of the matter in the universe, with the vast majority of matter being completely foreign, invisible and undetectable – not absorbing, emitting, reflecting or blocking light or any other forms of radiation – remains a complete mystery even today.

Further, more recently, cosmologists have determined, from distance and redshift measurements, that the speed at which the galaxies are expanding apart is not slowing down due to gravity, as expected, but *speeding up* instead. This apparent energetic acceleration somehow pushing the galaxies apart ever faster has been termed *"Dark Energy,"* and is not only also a complete mystery, but is said to be the most dominant element of the universe – far greater than all previously known matter and energy. And, in apparent confirmation of this view, the Hubble Space Telescope has recently produced the most distant picture ever taken of the early universe, the Ultra Deep Field photo, which is said to show a very different universe of the first primitive forming galaxies.

Cosmologists also increasingly represent Dark Energy as a prediction of both Einstein's *General Relativity Theory* and *Quantum Mechanics*. Recall that Einstein had added a term, the *cosmological constant*, to his *General Relativity* equations to try to force a static universe, only to later remove it as his greatest blunder. It turns out that if this term is added back, in a slightly different manner, it could be considered a *Dark Energy* term that is apparently accelerating the galaxies apart. Further, one of the many strange conclusions of *Quantum Mechanics* is that the vacuum of empty space – pure nothingness – has energy, and this energy of nothingness may also be the *Dark Energy*. If so, this would solve an enormous problem that scientists have been struggling with for decades – the fact that Einstein's large-scale *General Relativity*

theory is completely incompatible with the small-scale theory of *Quantum Mechanics*.

So, although this picture of the universe certainly has its problems, it was inspired by Einstein's *General Relativity Theory*, it is apparently backed by Hubble's redshifts, the CMBR afterglow, and the Ultra Deep Field photo, and the related *Big Bang* theory has also been altered to presumably address its flaws. Further, it may finally link *General Relativity* and *Quantum Mechanics*, and even appears to have identified two completely new phenomena in nature – *Dark Matter* and *Dark Energy* – that seem to be the dominant components of the universe. *Dark Energy* even seems to validate Einstein's "greatest blunder" as a brilliantly prescient recognition of its existence, while also validating the bizarre concept of "vacuum energy" in *Quantum Mechanics*.

When presented this way, it can seem as if cosmology has made enormous progress in unearthing many deep truths about our universe, despite the equally enormous mysteries it has also generated. But has modern cosmology truly been this successful in uncovering the secrets of the universe, or is it a patchwork of troubled theories and fallacious beliefs in a state of deep crisis? It turns out that a closer look at each of these issues reveals a very different picture.

The Official Story – *Re-examined* (the Early Years)

The Static Universe

An important starting point in this re-examination is the view of the universe that has held sway for millennia, attributed to Aristotle. In this view, the stars in the night sky were all fixed in position on a large sphere surrounding us, which slowly rotated on a daily basis. Although our understanding has come a long way since then, the notion of a universe of fixed stars still remained the dominant view well into the 20th century, even for professional scientists and astronomers – and for very good reason.

To see why this is, imagine a room with a very large, detailed mural picturing the entire night sky, stretching floor to ceiling and wall to wall all around. This is certainly an example of "fixed stars," but of course that is the case for a photographic snapshot. We would have to update the mural daily, if not hourly, to see the dynamics of our universe. Yet, if we did so, we would see no difference tomorrow, or the next day, or even *next year*. The distant stars in our galaxy, and especially the galaxies beyond, are unimaginably distant – far too distant for their motion to be detectable in the slightest, even within a

human lifetime. We do not actually see stars moving amongst one another even in our local rotating spiral galaxy, the Milky Way, and we certainly do not see other, far more distant galaxies either rotating or moving apart. Any image in our minds of such motion can only be from completely artificial simulations or animations created for educational or entertainment purposes.

The only exception to this is for the *very* nearest stars only a *fraction of a percent* out from us across our local galaxy. In this case, it is possible to detect a very slight change in their position relative to more distant stars through the year, but even this is not due to any detected motion of these stars through space, but due to the motion of our *planet* in its yearly orbit. Just as our separate eyes present slightly different views of the world around us, allowing us to see depth at nearby distances, we get slightly different views of the universe by comparing the night sky now versus six months later when we orbit to the other side of the Sun. This is known as the *Parallax* method. This enormous difference in our location, from one side of the Sun to the other in our orbit, is still *extremely* tiny compared to stellar distances, but it is enough to see tiny relative displacements in the positions of the very *closest* stars, using our best telescopes.

Of course, there are other, very different events in the night sky that unfold in lesser timeframes. The motions of objects in our own solar system, such as planets, moons and comets, are one example. The fluctuating brightness of some very distant objects, such as variable, spinning or exploding stars, can also be seen over the course of weeks, days, or in some cases even hours or less. And the Earth itself has a very slow axial precession, or wobble, that causes an apparent drift in the locations of all the stars in unison, in a roughly 26,000-year cycle. But the *actual movement* of individual stars in our galaxy, as well as both the *rotation* and *movement* of the distant galaxies beyond our Milky Way, is visually undetectable. Ancient astronomers, such as Aristotle, were well aware of this fact, but it is not always as obvious to the casual observer today, who may occasionally glance up at a night sky that is constantly changing as our planet rotates, and as the Moon and planets move along their paths. We also increasingly hear claims of an expanding universe filled with dynamics such as rotating or colliding galaxies, and increasingly see completely artificially created animations of such motion, both for educational and entertainment purposes.

So, to keep everything in proper perspective, it is important to realize that cosmologists are working with the very same static wall-

mural picture of our universe, day after day and year after year – as far as the positions and motions of stars and galaxies are concerned. So then, how can it be that cosmologists are looking further out into the universe with ever more powerful telescopes if all they have to work with is this same 2-dimensional wall mural? And how do they even know how far away things are if they only have this 2-dimensional picture of the universe?

What cosmologists mean when they say they are looking further out into space is that they are effectively stepping closer to the wall mural and looking at smaller, dimmer objects in the spaces between the larger, brighter ones. This generally indicates more distant objects, although it is only a very rough first approximation, giving almost no information about specifically how distant these objects may be. Other techniques are used to try to get as accurate an indication of distance and motion as possible, as will be discussed shortly.

When a new, more powerful telescope arrives, such as the Hubble Space Telescope, it does not literally take us on a visual journey deep into the universe, but merely gives us the same wall-mural picture, though with more sharpness and detail, and often better brightness, contrast and color. So, in a sense it is seeing further, but only in the sense that it allows cosmologists to effectively walk right up to the wall mural and examine the tiniest objects where none may have been visible at all in the previous mural. Our very best telescopes even allow the equivalent of examining the mural with a magnifying glass to see the most tiny, faint, and presumably distant objects. But it always remains the same static, 2-dimensional picture of the universe overall.

Static or Non-Static – Questioning Aristotle

Although Aristotle's *Static Universe* concept stood through the ages, it did have its challenges as our understanding progressed. Newton, for example, struggled with the fact that his attracting gravitational force meant that everything would eventually pull together, given enough time, yet the universe was generally thought to be a huge, eternal, static volume of stars. Newton initially proposed that the universe was also infinite in size, so it could never pull together and would remain static. However, he was eventually persuaded by a colleague, Richard Bentley (1662–1742), that even this would not solve the problem since every bit of matter throughout the universe would have to always be distributed in perfect gravitational balance everywhere. Otherwise, even the slightest imbalance would begin a small local clumping effect, which would further unbalance things, leading to more and more

clumping. Even in an infinite universe there would emerge pockets of ever increasing clumping everywhere throughout it. From our perspective today, we can now see that Newton was describing *galaxies*, which are essentially large collections of stars clumped together, but galaxies were unknown in Newton's time, when the universe was thought to be just one large, fairly uniform volume of stars. So Newton concluded that the universe must indeed be somehow perfectly gravitationally balanced.

Einstein also struggled with this concept since he also believed in the prevailing view at the time, that the universe was static and probably infinite and eternal, but his theory of gravity indicated otherwise. This fact was brought to Einstein's attention by cosmologist Alexander Friedman (1888–1925), and followed from the fact that Einstein's *General Relativity Theory* is essentially a combination of Newton's gravitational theory and Minkowski's space-time theory. This is why *General Relativity* usually agrees with Newton, but also why it highlighted the issue of the overall motion of the universe, due to the built-in *time* dimension of "space-time," which Newton's gravitational equations lack.

Consequently, Einstein was faced with the dilemma that his *General Relativity* equations were only capable of describing a universe where the stars were either all continually contracting together or all continually expanding apart. He realized that the attracting nature of gravity meant the stars could not be expanding apart, but it appeared that even the universal pull of gravity was not causing the stars to contract together either. However, an apparent solution presented itself in a variation of Einstein's *General Relativity* equations produced by astronomer Willem de Sitter (1872–1934), which included the addition of a new term now known as the "cosmological constant." Although this new term was a questionable arbitrary addition that did not follow from Einstein's original derivation, de Sitter combined it with a mass-less model of the universe in a purely abstract exercise that produced an ever-expanding universe. But Einstein believed very firmly in a static universe, and realized he could similarly insert de Sitter's *cosmological constant* into his own equations and tune it, instead, to force the *static* universe outcome he desired.

However, Einstein did not realize that, as Newton acknowledged two centuries earlier, even such an idealized universal balance was impossible in practice, and would still result in the stars contracting together into clumps everywhere. And the apparent problem that gravity should cause the universe to contract into clumps of stars,

which both Newton and Einstein struggled over, is actually not a problem at all once we realize that the billions of galaxies throughout the universe are *precisely* those clumps. But the existence of separate galaxies, each with billions of stars of their own, was still unknown even in Einstein's day, though this was about to change.

Before proceeding, it is important to note that Einstein's addition of de Sitter's *cosmological constant* is increasingly misrepresented today as an early intuition of Einstein's that *Dark Energy* might exist, pushing the universe apart. Instead however, as mentioned, Einstein actually borrowed this term to *prevent* the odd outcome of everything expanding apart, which was one of the unexpected and unwanted outcomes of his *General Relativity* equations, and a possibility Einstein never entertained in a universe of attracting gravity. A *contracting* universe was a possibility, but Einstein rejected this as well, being unaware of galaxies. The addition of this *cosmological constant* was purely an artificial tuning mechanism that allowed his *General Relativity* equations to be arbitrarily adjusted as needed to prevent *either* outcome from occurring. This pure mathematical manipulation to force agreement with a pre-conceived belief was never claimed to represent any new physical phenomenon in nature. Indeed, as mentioned, and as detailed shortly, Einstein later removed the *cosmological constant* in embarrassment, calling it his greatest blunder. The increasing tendency to lend credibility to *Dark Energy* by suggesting it was an early inspiration of Einstein's, in the form of his *cosmological constant*, demonstrates a highly misleading *appeal to authority* fallacy currently in the making.

Abandoning the Static Universe

In the decade following the publication of Einstein's *General Relativity Theory* there was much activity in astronomy and cosmology. Powerful new telescopes were being built and many new ideas and observations were being made. As mentioned, Friedman noticed that Einstein's equations produced a universe where all the stars were only either contracting together or expanding apart. Georges Lemaitre (1894–1966), a clergyman and mathematician, further claimed that Einstein's equations implied a universe that burst forth from a tiny "primordial atom," and rapidly expanded outward. Meanwhile, astronomer Vesto Slipher (1875–1969) was investigating the nature of the swirl-shaped nebulae found throughout the night sky, which we now know to be galaxies but which were then believed to be swirls of gas and dust. Slipher noticed a redshift in the light from these nebulae, and noted it

as a possibly important discovery, but was unsure about the meaning of it. Also, an indirect method for determining the distance to faraway stars and even fairly distant galaxies had arisen, based on the rate of brightness variations in a certain type of star, known as *Cepheid Variable* stars. All of these ideas were about to converge, due to the work of cosmologist Edwin Hubble.

Hubble was doing research using the most powerful telescope in the world at the time, and noticed several very significant properties of the wispy nebulae. He found that they were not actually wisps of gas and dust among the stars, but entire collections of stars themselves. He also located a Cepheid Variable star in one of the largest and brightest nebulae, now known as the nearby Andromeda galaxy, and, based on the new technique of determining distance based on brightness variation, he determined that this nebula was much farther away than any known star. All individual stars known at that time were inside our galaxy, which is about 100,000 light years across, yet the distance to the Andromeda nebula worked out to be several *million* light years. This meant the many nebulae he could see through this powerful telescope were likely all separate collections of a great many stars, and that the collection of stars around us – the Milky Way – was merely one such collection among many. The idea of a universe composed of many separate, distant galaxies was born.

Hubble further explored the redshifted starlight that Slipher discovered, and noticed that the redshifts increased with increasing distance to ever further galaxies. He identified enough of a pattern in his data to conclude that redshifts always increased directly with distance. And, most significantly, Hubble also concluded that it was valid to equate the redshift of light with the well-established frequency shifts in sound waves as a sound source speeds away, known as the *Doppler Effect*. If true, this would mean all galaxies are moving away from us, and doing so with increasing speed the further they are from us. And since there is no reason for us to have such a special central role in the universe, this would mean all galaxies are speeding away from *each other*. This would mean all galaxies are expanding apart – apparently the very notion that Friedman showed *General Relativity* produced, before Einstein added de Sitter's *cosmological constant* and tuned it to force a static universe.

This, of course, caught Einstein's attention, who then visited Hubble to discuss these new revelations. Lemaitre heard of this meeting and joined Einstein and Hubble to present his idea of a universe expanding outward from a "primordial atom." By the end of

this meeting, there was unanimous agreement that the universe was apparently expanding apart, still coasting outward from an immensely powerful explosive creation event long ago. It was after this meeting that Einstein renounced his addition of the *cosmological constant*, as it could now clearly be seen as an inappropriate and erroneous addition, particularly if his equations were to now describe a universe that is expanding apart.

This flurry of discovery, and convergence of ideas, did undoubtedly produce a compelling and exciting new view of the universe, but was it correct? If so, why has cosmology continued to struggle with this picture through the decades, producing mysteries such as *Dark Matter* and *Dark Energy*, and if it is not correct, can this be demonstrated before proceeding with this story? Indeed this view of the universe can be clearly shown to be *incorrect* by taking a closer look at Hubble's assumption that redshifts in starlight indicate velocity.

The "Redshift = Velocity" Assumption

There are *three* main problems with Hubble's contention that redshifted starlight indicates velocity away from us.

The ***first*** problem is that this is a conceptual leap based on perceived similarities to the completely different phenomenon of Doppler Shifts in sound. Sound is merely compression waves that are solely a feature of the medium of air itself. And, there are actually two very different physical causes for a frequency-lowering Doppler Shift due to movement through air. One cause is when the *sound source* is moving through the air, literally *creating* more spread-out compression waves in the air behind it as it moves along, which then reach us as longer wavelengths that produce lower tones. The other cause is when *we* are moving away through the air instead, so the *unchanged* compression waves are continually catching up to us from behind as they are conducted at their usual speed through air, resulting in each wave taking longer to pass us, producing a lower tone. These two physically different scenarios have different Doppler equations that calculate different lowered frequencies even though the relative separation speed is the same in both cases.

But light is physically nothing like sound waves. It does not travel within or relative to any medium, and, according to Einstein's *Special Relativity Theory*, no distinction can be made between the light source and the observer moving. Indeed, the physical nature of light is still not even solidly explained in our science, considered both a medium-

less wave and a particle in *Quantum Mechanics*, so neither the physics nor the math of the Doppler Effect in sound translates to light.

The use of frequency shifts in radio waves, such as in police radar or the tracking of spacecraft, does not apply to light either, since high-frequency radiation such as light is physically very different from the low-frequency radiation of radio waves, according to the discussions in Chapters 4 and 5. Motion-induced shifts in lower-frequency radiation can actually be *physically* explained for the first time from this new perspective, in a manner somewhat analogous to the compression bands of sound, but not so for higher frequencies. This distinction can even be seen in today's science, which speaks of photons of light and of higher-frequency radiation, yet not generally referring to "radio-wave photons."

Also, although in today's theory the lower-frequency radio waves (with much longer wavelengths) should also be considered huge quantum photons of electromagnetic energy, each many meters in length, such oddly enormous "radio photon" descriptions are discarded in favor of the "wave" description exclusively. And indeed, devices that use light to measure distances or speeds operate on a very different principle than radar, sending out bursts of light and measuring their *return time*, rather than measuring *frequency shifts* within the light itself. Also, redshifted starlight is increasingly represented as a consequence of "stretching space-time" rather than actual motion *through space*, further removing redshift physics from the physics of either sound or radar.

Moreover, the very high redshifts of the more distant galaxies suggest relative velocities that far exceed light speed, which is impossible according to current beliefs, based on Einstein's *Special Relativity Theory*. Cosmologists dismiss this concern by, again, considering the presumed redshift velocities to arise from space-time stretching, rather than motion *through space*, claiming that no such speed-of-light limit need apply. Yet this is an arbitrary and extraordinary claim that lacks the corresponding degree of scientific justification, and which would also be entirely unnecessary without Hubble's velocity interpretation.

The ***second*** problem with Hubble's "redshift = velocity" assumption is precisely that it is an *assumption*. Not only was there no solid scientific explanation or precedent for this assumption, but it was also not made based on rigorous experimentation. Instead, it was *inferred* from extremely distant observations of redshifted starlight along our line of sight out into space. From this, Hubble merely

assumed that there exists a physical principle in nature where the frequency of starlight is intimately linked to the motion of stars through space.

This assumption has even been extended to the concept of *blueshifted* starlight, said to be an opposite shift toward *higher* frequencies at the *blue* end of the spectrum when stars move *toward* us, analogous to higher tones from approaching *sound* sources. Cosmologists speak of the rotation of galaxies, which cannot *actually* be seen at all since any such motion that may exist is far too slow to be seen directly, even in a human lifetime. But it is claimed that galactic rotation can be *inferred* from regions of both greater redshifts and regions of "blueshifts" within galaxies, presumably indicating portions moving away from us and moving toward us respectively. However, the increasing redshifts of overall galaxies as they presumably speed away ever faster with distance would completely counteract such tiny motion-induced blueshifts if they occurred. Indeed, closer examination of these claims shows that cosmologists do not actually detect "blueshifted" starlight in these galaxy rotation claims, but rather, regions of *lesser redshift* than the overall galaxy. This is *assumed* to indicate motion toward us that would *presumably* appear as actual blueshifted starlight if the overall galaxy were stationary, but all of this is pure assumption, being *neither* verified rotational motion *nor* actual detected *blueshifted* starlight.

This logic could even be used to claim that the occasional *entire galaxy* is speeding toward us, indicated by an *overall* "blueshift." For example, consider a number of galaxies that have all been determined to be the same distance from us, and whose redshifts have also all been found to be similar except for one that has a significantly lesser redshift. According to Hubble's "redshift = velocity" assumption, this galaxy has a slower velocity than the others, despite being out amongst them, and so must have relative motion away from them, and, therefore, toward us. Using this string of logic, a nearby galaxy with a lesser overall *redshift* than others at that distance might be represented as having an overall *"blueshift,"* and speeding *toward* us. The fact that our indirect distance determination may be in error, or that Hubble's "redshift = velocity" assumption is flawed, or that no *actual* blueshift was directly detected, is not considered here. These examples suggest caution in summary claims that may contain sizable assumption, reinterpretation, and even flawed theories and procedures.

Additionally, there are other more straightforward explanations for redshifted starlight, raising questions of a *suppressed evidence* fallacy,

where potentially more viable alternatives are dismissed or not properly explored or considered. One example is the fact that a wide variety of materials, such as many types of plastic, cause frequency shifts in light shone through them. And it is well known that "empty space" is actually filled with gas and dust, accounting for far more of the mass of the universe than stars and planets. Therefore, it might not be surprising if distant starlight became dimmer and more redshifted as it passed through millions of light years of space. This point becomes clearer with a diagram of Hubble's claim, now known as *Hubble's Law*:

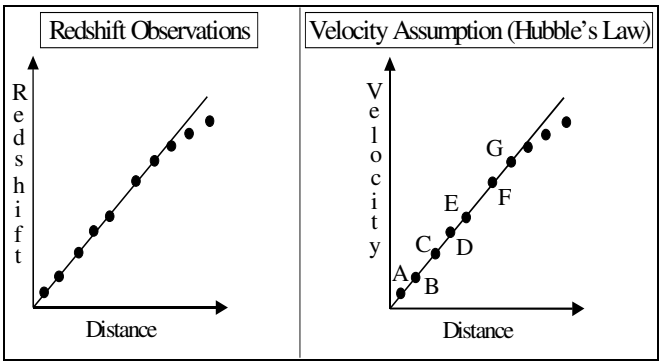


Fig. 6-13 Hubble's Law – The "Redshift=Velocity" Assumption

As shown in the left-hand frame of figure 6-13, the redshifts in starlight from distant galaxies increase directly with their distance away from us. Hubble's plot was actually far more scattered, but he drew a straight-line approximation through his plot, which was later found to be justified as observations continued over the years. An important note is that this left-hand graph is based on direct measurements of redshifts in starlight, with no presumption of their cause.

Another important point to note from this *redshift vs. distance* plot is that there is nothing particularly surprising or extraordinary about it. It does not necessarily represent a literal new law of nature, but merely a fairly common, roughly linear variation of an observation with distance. Many processes follow such a pattern, such as the dimming of a flashlight at ever-greater distances in a fog, or the increasing weight of a high-rise building as it is built higher and higher. There are many such secondary processes that vary in the roughly linear fashion shown in Figure 6-13, but they are not each considered newly discovered laws of nature. The flashlight brightness could deviate somewhat from this general rule if the fog has variations in thickness,

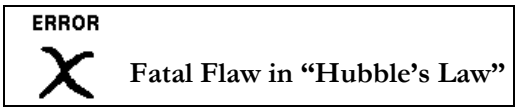
and the regular increase in weight of the high-rise could vary somewhat if some floors differ in design. This allows for variations to occur in the plot that reflect actual real-world variations, even though the overall trend may be a straight-line relationship with distance.

Such would be the case if redshifts were the result of some *other* effect than velocity – some property of the intervening space, for example, which light travels through for many *millions* or even *billions* of years to reach us. Many other observations suggest such an interpretation, such as *Quasars*, which are objects with extremely high redshifts, and which also appear surprisingly bright. The "Hubble Law" interpretation requires that these objects *must* be speeding away at tremendous velocities near the speed of light, and *must* be at correspondingly remote distances. But if quasars were truly as distant has Hubble's Law requires, their *actual* brightness at the source would have to outshine *ten entire galaxies* like our own, which is the current belief of cosmologists, despite being mystified about what could power such an output.

But if quasar redshifts instead resulted from a property of their region of space, such as an unusual density or composition of gas and dust, they could be relatively nearby with a moderate *actual* brightness. The nature of their region of space may greatly redshift their light while dimming it far less than being at a great distance, meaning they need not have near-light speeds and mysteriously outshine ten galaxies. Also, quasars can be seen shining in very high-frequency x-rays, which does not correlate with the extreme redshift toward low frequencies seen in their visible light.

It *is* possible for segments of the electromagnetic spectrum to be shifted differently if redshifts are due to some *other* effect occurring within the intervening space, but not for Hubble's Law of motion-induced redshifts, which must apply equally to all frequencies. It must be stressed that Hubble's new *law of nature* is a very different matter. It is an enormous leap from observing that something appears to cause a redshift in starlight with distance in a general straight-line trend, to a new *law of nature* stating that starlight shifts its frequency *directly* due to the movement of stars and galaxies through space. This caution is especially pertinent since many significant exceptions and variations from Hubble's "law" exist, while distance also cannot even be definitively seen and verified, but only indirectly determined or even subjectively judged.

And finally, the ***third*** and most critical problem with Hubble's "redshift = velocity" claim is that it contains a clearly fatal logical and physical error that has been overlooked for nearly a century now:



The right-hand frame of Figure 6-13 shows Hubble's now widely accepted conclusion (Hubble's Law) that the more distant the galaxy the faster it is speeding away from us. We also have learned that we do not occupy any special place in the universe, based on a long history of erroneous beliefs that the solar system, or even the entire universe, revolves around us, either figuratively or literally. This realization is considered one of the cornerstone principles in cosmology, as part of the formal *Cosmological Principle*. So, this same *velocity vs. distance* plot in Hubble's Law must be observed from any other galaxy in the universe, which means all galaxies in the entire universe must be expanding apart in this manner, if Hubble's assumption is correct.

The closest example to such a phenomenon is an explosion of fireworks in the sky, where the entire fireball explodes outward, growing rapidly in size. The only way this expanding fireball could keep its uniform spherical shape is if it followed the "Hubble Law" plot, since a doubling in its overall size means the outer fragments must double their *greater* distance in the same time as the inner fragments double their *lesser* distance. This means the outer fragments cover more distance in the same amount of time, and so travel proportionately faster than the inner ones, based on their distance from the center of the explosion.

Incidentally, it is worth noting that this example follows "Hubble's Law" even though it has absolutely nothing to do with the dynamics of redshifts in light and galaxies in outer space, or any new law of nature. But, crucially, there is an absolutely critical detail that is clearly visible in the "Hubble Law" plot, but which has never been given proper attention or consideration. This detail is the fact that as the plot progresses to ever-greater *distances* it also represents observations that are ever further back in *time* as well.

The universe is now believed to be about 14 billion years old, with billions of galaxies dotted throughout it at distances that are so great that we can only reasonably describe them in terms of *light years* – the distance light travels in an entire year. Even the nearest galaxies are believed to be *millions* of light years away, with the majority of them

located *billions* of light years across the observable universe, which extends 14 billion light years in all directions. As such, the points plotted on the "Hubble Law" diagram represent redshift – and presumed velocity – measurements for galaxies at distances of one billion light years, two billion light years, three billion light years, etc. This also means these presumed velocity measurements were occurring one billion years ago, two billion years ago, three billion years ago, etc.

Cosmologists are well aware of this fact, frequently stating that looking out into space is equivalent to looking back in time, yet have failed to follow this understanding through to its inevitable, troubling conclusion. Referring back to Figure 6-13, Galaxy A, spotted one billion light years away, and which was therefore traveling at its observed speed one billion years *ago*, will *now* be more distant, as it continued speeding away over the intervening billion years.

The same is true for Galaxy B, observed at a distance of *two* billion light years, except that it would not only have been speeding away twice as *fast*, according to Hubble, but also for *twice as long* to take it to the present moment, *two* billion years later. If it had been merely speeding away twice as fast for the *same* amount of time as Galaxy A – one billion years – the roughly equal gaps between us, Galaxy A and Galaxy B, would *now* have all grown equally as well, just as in the exploding fireworks example. However, we see the exploding fireworks all at the *same time* and all unfolding equally in the *same amount of time*, but not so with galaxy observations. So, Galaxy B, spotted *two* billion light years away, would have continued travelling for an *additional* one billion years longer than Galaxy A, making the *present* gap between it and Galaxy A far greater than the *present* gap between Galaxy A and us.

Any regularly spaced plot of galaxies along Hubble's straight line shows spacing that existed at a *variety* of different points in the *past*, and actually represents galaxies that would *now* be spaced with *ever-increasing* gaps out from us, in the present state of the universe. This effect would continue with a third galaxy, Galaxy C, spotted *three* billion light years away. As in the uniformly expanding fireworks example, it would have been travelling three times *faster* than Galaxy A, but, unlike the simultaneity of the fireworks analogy, it would have also traveled *three times longer* than Galaxy A, increasing its *present* gaps with the others by an even *further* disproportionate amount.

So, although the gaps all superficially *appear* to be equal in size and presumably expanding apart equally as well, giving a uniform universe

from the perspective of *any* galaxy as required by the *Cosmological Principle*, this is not at all the case. Hubble's "redshift = velocity" interpretation actually describes an *impossible* universe where the gaps grow disproportionately larger with distance – from the perspective of *every* galaxy in the universe. But, of course, it is logically and physically impossible for the *present* gaps between galaxies to be ever-larger *outward* from us toward distant galaxies, while also being simultaneously ever-larger outward from distant galaxies toward *us*.

Figure 6-14 shows the resulting *present-moment* spacing of the galaxies shown in the Hubble Law diagram of Figure 6-13 as they would now be spaced out from us in the direction of distant Galaxy G, and then out from Galaxy G in our direction. It can be clearly seen that these are two completely physically incompatible versions of the spacing of the *same* galaxies at the present moment, resulting from "Hubble's Law."

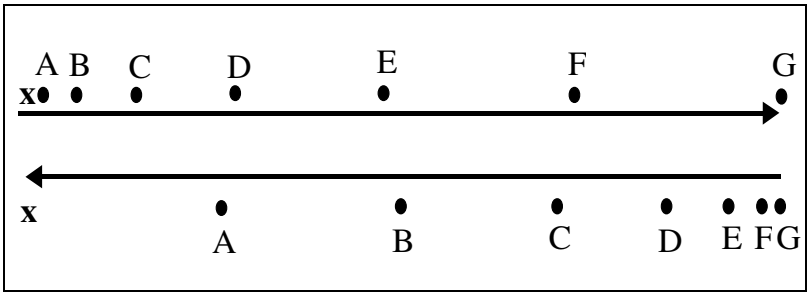


Fig. 6-14 Galaxy Spacing Out from Us and from a Distant Galaxy

This definitively shows that Hubble's "redshift = velocity" assumption is fatally flawed, and that there is no "Hubble Law" of motion-induced redshifted starlight and no reason to conclude that the universe is expanding apart. This important point deserves special note:

NOTE

Therefore, Hubble's "redshift = velocity" assumption is fatally flawed; there is no "Hubble Law" of motion-induced redshifted starlight and no reason to conclude that the universe is expanding apart.

But the geometric problems stemming from Hubble's Law continue to deepen. The Hubble-Law diagram of Figure 6-13 is said to characterize galaxies as they were in the past – the redshift and distance (and corresponding brightness) for Galaxy A one billion years ago, for Galaxy B two billion years ago, etc. But, as shown in the top of Figure 6-14, the present reality in Hubble's expanding universe would actually be *disproportionately greater* distances, therefore causing both disproportionately decreasing brightness and disproportionately increasing redshifts. Cosmologists now widely claim that redshifts are the result of "stretching space-time" rather than actual velocity *through* space, so the *disproportionate* "stretching" shown in Figure 6-14 should be imprinted on the detected redshifts, rather than the fairly *regular* redshift increases outward from us in Hubble's diagram.

But even more to the point, starlight dims very rapidly even when distance increases at a regular pace, so the *disproportionately* increasing distances shown in Figure 6-14 would produce an even *more* pronounced and disproportionate dimming with each further galaxy. Yet, neither these disproportionately stretched redshifts nor the even *more* disproportionately dimmed brightness are represented in the Hubble-Law diagram. Ironically, if the universe *were* actually expanding as Hubble claimed, it would produce nothing like the straight-line, regular spacing of the Hubble-Law diagram. Conversely, none of these problems or complexities would exist if the universe were relatively static and the detected brightness and redshifts merely arose from the nature and distance of these enormous spans of intervening space.

Additionally, this shows that Einstein initially correctly concluded that the solution to his *General Relativity* equations producing a universe that was expanding apart was an invalid mathematical artifact, and not a proper description of nature. It also shows that Lemaitre's efforts to follow this mathematical artifact to the conclusion that the entire universe exploded outward from a tiny "primordial atom" was equally erroneous. And it further shows that Slipher's redshift measurements indicated that something subtly but increasingly shifts starlight as it travels immense distances across the universe, and that these redshifts definitely *do not* and *cannot* indicate velocities, as Hubble assumed.

The only remaining possibility – that gravity should draw all the stars toward each other – was now also not the problem both Newton and Einstein had thought it was, due to the newly discovered existence of galaxies. The stars could now be drawn together into billions of local galactic structures, as observed today, without the entire universe simply collapsing in on itself. This further accentuates Einstein's

erroneous and improper addition of the *cosmological constant*, which he did later renounce, though this renouncement was to allow the *opposite* scenario of a universe mysteriously *expanding apart*, as Hubble and Lemaitre convinced him to be the case.

The Official Story – *Re-examined* (the Later Years)

But even *this* is only half of the story. Although this discussion exposes many problems, and even clear fatal flaws, in today's picture of the universe, none of these crucial points were factored into this developing picture throughout the 20th century – a fact that remains the case even today. As a result, the *"Big Bang"* theory of the universe was born, apparently supported by Hubble's redshift observations and his new "redshift = velocity" law of nature, and also by the "expanding universe" solution to Einstein's *General Relativity* equations, and even, reluctantly, by Einstein himself.

Despite its origins in this combination of *false cause*, *confirmation bias*, and *appeal to authority* fallacies, by the middle of the 20th century the *Big Bang* theory had become a powerful contender for the definitive explanation of the universe. The main opposing theory was Hoyle's *Steady State* theory, mentioned earlier, which attempted to explain how the galaxies could all be moving apart while the universe remained generally uniform and eternal. The Steady State theory was essentially a modification of the Static Universe theory, since a universe expanding apart was now largely unquestioned, and suggested that new matter was constantly being created, making new stars and galaxies to fill in the gaps as the galaxies moved apart.

As the debate continued back and forth for many years, there was a strong will in the cosmological community to definitively resolve this issue, and the opportunity finally arrived with the accidental detection of the Cosmic Microwave Background Radiation (CMBR) in 1965. This CMBR detection was widely considered to be powerful direct evidence of the *Big Bang* creation event itself, bringing the debate to an end. This remains the position of the cosmological community even today, although it can be demonstrated that this is another example of a *false cause* logical fallacy that both fueled and was driven by a rapidly increasing *confirmation bias* toward the *Big Bang* theory.

The *Big Bang* Afterglow?

The CMBR is an extremely faint hiss of microwave noise that was accidentally discovered to be arriving uniformly from all directions in

the sky, in 1965. Due, in part, to the extremely uniform intensity of this radiation from all directions, it was assumed to be emanating from deep space, beyond even our galaxy, since any closer source would presumably reflect the sizable non-uniformity in structure of our galaxy or solar system. It was therefore considered to be background microwave radiation emanating from the deep cosmos, hence the term Cosmic Microwave Background Radiation. It was further claimed to be the afterglow of the *Big Bang* itself – the first visible radiation emitted throughout the young universe about 400 million years after the *Big Bang* creation event.

Although the CMBR is widely represented as a key piece of evidence for the increasingly solid *Big Bang* theory, the previous discussions show that, if this were truly verified as more than speculation, it would actually qualify as the *only* apparent evidence for an otherwise quite *troubled Big Bang* theory. Further, a closer look at this issue shows that this now nearly unquestioned evidence for the *Big Bang* is far less sound than commonly represented.

The first point to consider is that claims that the existence and nature of this radiation was predicted by *Big Bang* theory are highly inaccurate and misleading. In actuality, there were many published theories and predictions about background radiation at the time, covering a broad range of possible values, some based on *Big Bang* theory and some based on completely unrelated classical physics. In order to put all of this in perspective it is important to take note of a key natural process – the phenomenon of *Black Body Radiation.*

Since all objects in the universe have a temperature greater than absolute zero, everything emits electromagnetic radiation. Further, it has been long established in classical physics that the frequency of this emitted radiation is directly related to the temperature of the object. This is especially true for objects that absorb and emit radiation extremely well at all frequencies. Such objects have been given the name *Black Bodies* in recognition of the fact that if they perfectly absorbed all radiation there would be none reflected back to be seen or detected. However, despite this naming convention, Black Bodies also readily *emit* radiation, whose frequency accurately indicates their core temperature. Common practical examples of Black Bodies are stovetop heating elements, or the inside cavity of the oven itself. Even the overall universe is often thought of as an enormous Black Body cavity that re-radiates the energy from all the stars at a core temperature that can be deduced from the frequency content of this ubiqui-

tous microwave background radiation – which works out to about 3 degrees above absolute zero.

In point of fact, perhaps the single most accurate published prediction of this background radiation was made by the physicist Arthur Eddington, known also for his solar eclipse experiment in 1919 to test Einstein's *General Relativity Theory*. Eddington's prediction, based solely on the idea of classical Black Body re-radiation of the output of the stars, matched the detected CMBR almost exactly. Yet, oddly, despite the high profile given to his solar eclipse experiment in our science, there is often no mention of his CMBR prediction in *Big Bang* discussions today. This is suggestive of a *suppressed evidence* fallacy, with such viable alternatives dismissed or not presented for consideration. This could then result in such an alternate explanation even being *unknowingly* omitted for consideration as its very existence becomes increasingly obscure. Indeed, many published predictions of background radiation existed prior to its detection, creating a range of potential options from which any reasonable prediction might be purposely selected and presented as the lone, correct CMBR prediction, with the significance and even the *existence* of the others soon forgotten.

In fact, this is precisely what *did* occur, but it was not the accurate prediction by Eddington, based on classical Black Body Radiation, that was selected, but a far less accurate prediction by George Gamow (1904–1968), based on the *Big Bang* theory. Gamow claimed that Einstein's space-time fabric stretched as everything expanded apart from the presumed *Big Bang*, stretching the radiation from the *Big Bang* event along with it, now down to a frequency range corresponding to temperatures somewhere between 5 and 50 degrees above absolute zero. Despite the highly speculative and unproven foundation for Gamow's claim, its fairly wide prediction range, and the existence of more accurate predictions based on well established classical physics, only *Gamow's* prediction is typically mentioned in *Big Bang* discussions, and usually only the lowest 5-degree value. This potentially misleading, highly selective presentation of Gamow's much broader prediction suggests a strong *confirmation bias* to agree with the detected 3-degree CMBR, while the dismissal of all other predictions creates a powerful *exclusion fallacy*, including exclusion of classic Black Body Radiation as the sole explanation for the CMBR.

As a result, a Nobel Prize was awarded for this discovery of the "*Big Bang* afterglow," despite it being pure speculation and assumption, creating a powerful *appeal to authority* fallacy. This can be clearly demonstrated by the much later launch of the COBE satellite, intended to take far more sensitive readings from space to try to find some type of pattern beyond this pure random noise signal produced from ground-based detectors. The COBE results showed that nothing but random noise existed until a sensitivity of *one part in a hundred-thousand* was reached, which is far more sensitive than the capability of the original ground-based CMBR detection.

It was further determined that the *entire signal* above this extreme sensitivity was composed of elements that had *nothing* to do with a presumed "*Big Bang* afterglow," and had to be subtracted out to try to isolate any possible evidence of an identifiable faint *Big Bang* signal. This included microwave noise from our Sun and solar system, from the billions of stars in our own galaxy, and from the vast volume of space through billions of light years across the universe.

But it is well known that the sensitivity of the original CMBR detection was far too limited to detect anything *but* this "extraneous" radiation. In fact, so poor is the capability of any ground-based detector that even the non-uniformity of our own galaxy, or even our local solar system, is undetectable and washed out, leaving only completely featureless random microwave noise. So, the original reason the CMBR signal was assumed to be *cosmic* in origin – the complete lack of any local non-uniformity from our galaxy or solar system – was totally invalid. In actuality, the signal was so smooth and featureless because the detection method was far too poor to even detect such *local* variations.

This means the Nobel Prize-winning CMBR detection cannot actually be considered to have shown anything other than a crude representation of only the closest, strongest local sources, perhaps no further out than our own solar system, much less outside our galaxy. So, not only was it completely erroneous to call it the *Cosmic* Microwave Background Radiation, but also, naming it in this highly suggestive manner is now verifiably a *persuasive definition* fallacy. Yet this crucial fact never arises in *Big Bang* discussions, and, in fact, the COBE project *itself* was awarded a further Nobel Prize for apparent confir-

mation of the *CMBR* assumption, adding yet another powerful *appeal to authority* fallacy to the support for the highly favored *Big Bang* theory.

This leaves only the well established, classical Black Body Radiation explanation since it is fully acknowledged that the "extraneous" radiation is from various sources throughout the universe, and not a *Big Bang* event, raising another key point. The extremely faint "*Big Bang*" signal from COBE, left over after removing all the radiation judged "extraneous," had *precisely* the same characteristics as this extraneous Black Body radiation from the rest of the universe. It followed the same classic Black Body Radiation curve, with the same frequency content and distribution. This made it necessary for the "*Big Bang* afterglow" identification to be a pure process of elimination, requiring identification of *all* conceivable microwave sources in the solar system, galaxy and overall universe, all perfectly characterized and removed with complete certainty and absolute surgical precision. This process is claimed to have left an extremely faint but unquestionable "*Big Bang*" fingerprint, identifiable only at parts-per-million magnification, which accurately matches the large-scale structure of our universe.

In evaluating this enormous claim it must first be noted that it would be a false assumption to presume this is a distant cosmic signal merely because these variations are seen under high magnification. The lack of such tiny variations in the original ground-based detection is, first and foremost, due to the poor sensitivity of the detector. One cannot reasonably search for patterns in a signal at magnifications beyond the known capability of the equipment to detect them in the first place. Conversely, the very same signal can be legitimately deconstructed and characterized right down to the faintest part-per-million with an appropriately sensitive detector, even if its origin is nearby. So, the fact that one can presume to analyze the extremely faint leftover signal down to parts per million is largely a statement about the *detector*, and lends no particular support to the claim of a distant cosmic signal.

Moreover, the CMBR has no inherent property that suggests from how far away it may have originated. Unlike starlight, which contains inherent barcode-like spectral features that can be readily tracked as they are redshifted along the frequency spectrum, the background

microwave radiation has no such traceable features. It cannot be definitively determined whether background microwave radiation originated *one* light year away or a *million* or even a *billion*. So, although cosmologists solely represent the CMBR as highly redshifted, extremely ancient and distant high-frequency radiation, in actuality the evidence suggests this is a highly unlikely and unproven assumption for radiation that is probably more nearby, re-radiated original low-frequency microwaves. It is also well known that at such extreme sensitivity it can be very difficult to ensure the patterns that emerge are not created or corrupted by other effects – even the tiniest imperfections, variations or thermal vibrations in the detector itself. These issues are even more accentuated by a further generation of CMBR projects – the WMAP satellite, which has an even greater sensitivity than COBE and enabled the most detailed part-per-million patterns yet to be produced.

ERROR

Conceptual Flaws in "*Big Bang* Fingerprint" Claim

But there are still other, deep conceptual flaws in the very *concept* of detecting a *Big Bang* afterglow supposedly containing the early fingerprint of our universe. This CMBR radiation is said to have appeared everywhere all at once in the early universe, after which it would have dispersed at the speed of light. We certainly would not expect, today, to detect the first radiation that burst from our region of space nearly 14 billion years ago. Such radiation would have cleared out and across the universe by now, as would all early radiation in an enormous radius nearly 14 billion light years out from us in all directions. The only early radiation we could even *expect* to detect today is radiation that has been traveling for nearly 14 billion years, originating solely from a *completely separate*, *foreign* region of space at the outer edge of our observable universe.

But also, even *this* radiation would be greatly altered after traveling across our enormous universe through the many various epochs of chaotic, dynamically evolving stars and galaxies. And further, starlight is observed to be distorted and bending all across the universe, often said to be due to such effects as *gravitational lensing*. And, since Einstein's *General Relativity Theory* completely fails to explain such observations according to the known quantities and distribution of matter in the universe, it is assumed there must exist *ten times* more unseen Dark Matter densely filling the universe. So, the extremely

faint, part-per-million fingerprint, which already could only represent a completely foreign region at the edge of the visible universe, would even be more severely distorted by 14 billion light years of travel across our universe.

Given this discussion, the "*Big Bang* afterglow" claim qualifies more as a *wishful thinking* fallacy where one sees what one wishes to see, but also, a *falsifiability* fallacy where the main "proof" of a claim is simply that its nature makes it difficult to solidly *disprove*. Fortunately though, solid evidence *has* arisen that exposes this fallacious and highly misleading claim in our science.

ERROR

CMBR *Thrice* Falsely Claimed "*Big Bang* Fingerprint"

It can now be solidly shown that the CMBR has been falsely declared as the *Big Bang* afterglow fully *three* times now. The *first* time was the initial claim, since we now know the detector would have been completely blind to such a faint, distant afterglow, even if it *did* exist. The *second* time was the COBE claim that the pattern it produced accurately matched the overall distribution of matter in the universe, despite the current belief that *ten times* more matter existed than was accounted for at the time, in the form of "Dark Matter." And the *third* time was the WMAP claim that the more detailed pattern it produced matched the structure of the universe, somehow *simultaneously* agreeing with the *pre*-Dark Matter COBE results and the *later* Dark Matter claims. But further, even this WMAP claim was made before the newly introduced "Dark Energy" was taken into account, which cosmologists now believe is the most dominant component of our universe, said to have profoundly influenced its current size and structure.

Thus, both the validity and the meaning of the faint patterns produced from the COBE and WMAP projects appear to be far less sound than typically represented. Indeed, it appears the entire CMBR "*Big Bang* afterglow" issue may be a combination of *false cause*, *persuasive definition*, *confirmation bias*, *appeal to authority*, *wishful thinking* and *falsifiability* fallacies in order to support the highly favored "*Big Bang*" theory. But there is still more to the story.

A Universe Expanding Apart?

Although the previous discussions show that the support for the *Big Bang* theory is either highly questionable or verifiably false, this fact is generally unknown. Further, the idea of a *Big Bang* creation event

producing a universe that is expanding apart is now deeply entrenched in both cosmology and popular perception. Yet, serious problems can be seen even with the very *notion* of a universe expanding apart.

ERROR

Observations *Do Not* Show a Universe Expanding Apart

As mentioned previously, the earliest suggestions of an expanding universe, based on the implications of Einstein's *General Relativity Theory*, were noted by Friedman, de Sitter and Lemaitre, and described a universe of separate *stars* all expanding apart. However, although not generally realized, this idea actually became invalid once it was discovered that the stars in the universe are gathered into *galaxies*, where they are *not* expanding apart at all, but remain in stable structures, each containing many *billions* of stars.

Then Hubble suggested it is entire *galaxies* that are expanding apart from each other, based again on Einstein's *General Relativity Theory*, combined with the redshift data – once Hubble interpreted it as velocities. This remains the common belief even today, despite the fact that cosmologists have become increasingly aware that even the *galaxies* are generally *not* expanding apart, even according to Hubble's "redshift = velocity" assumption. In actuality, it is now well known in the cosmological community that even overall *galaxies* are grouped into fairly static *galaxy clusters*, each containing dozens, hundreds, or even *thousands* of galaxies. This certainly does not describe a universe that is expanding apart, either at the level of individual stars or even overall galaxies – not even according to today's beliefs in Einstein's *General Relativity Theory*, the *Big Bang*, and Hubble's "redshift = velocity" assumption. Moreover, cosmologists now acknowledge that, in proportion to their size, the spacing between the galaxies throughout the universe is actually *closer* together, relatively speaking, than the spacing between the *stars in a typical galaxy*.

So then, how do cosmologists rectify this stark conflict between the core legacy claim of a universe expanding apart, perpetuated since the early 20th century, with the growing realization that it does not appear to be doing so at all? This growing realization is increasingly justified by claims that the attracting effect of "Dark Matter" is counteracting the repelling effect of "Dark Energy," keeping the universe largely in balance. Of course, this is a completely arbitrary claim of near-perfect balance between two scientifically unexplained

phenomena, neither of which has even been verified to exist. Indeed, these two huge mysteries would vanish from science if the erroneous and unnecessary claims and beliefs supporting both "Dark Matter" and "Dark Energy" were acknowledged and corrected, showing that *neither* phenomenon exists at all.

Instead, this widespread misconception of a ubiquitous expanding universe has quietly shifted within the cosmological community to the claim now that it is actually only on the almost unimaginably large-scale level that overall *galaxy clusters*, or even larger *strings of galaxy clusters*, are all moving apart from one another. So, the very *concept* of a universe expanding apart – even giving the benefit of the doubt to its most supportive claims, beliefs and theories – has been quietly forced into continual retreat, now out to only the absolute farthest and largest-scale structures we can possibly observe and conceptualize.

ERROR

***Olbers' "Paradox"* – False Expanding-Universe Support**

The expanding universe concept is often backed using a suggestion by Heinrich Olbers (1758–1840) that an observational paradox exists in the night sky, known as *Olbers' Paradox*. It suggests there is no reasonable explanation why the dark night sky is not bright with light from the countless stars in the universe – and is now presented as proof that the universe is expanding apart, rushing the stars and galaxies away while stretching and weakening their light. But we now know our galaxy is composed of over a *hundred billion* stars that are *not* speeding away from us at all, and yet we only see the faint light of a few thousand of these stars on a dark night. Further out, our closest neighboring galaxy, Andromeda, which we would see larger than the full moon in the sky if it were brighter, is invisible to the unaided eye despite having *billions* of stars – a fact that clearly has nothing to do with rushing away, enormous distances or "stretching space-time."

These examples show that there is nothing mysterious or paradoxical about the dark night sky, demonstrating the fact that the human visual system merely has constraints and limits. It cannot see fainter stars in contrast with brighter objects such as the Moon or scattered city lights, and even without these competing light sources there is an absolute limit on the sensitivity of the human eye to extremely faint light. Many nocturnal animals see faint light far better than humans do, with some even hunting by starlight. Such animals would no doubt be capable of seeing far more stars and a far brighter

night sky, which is clearly demonstrated by long-exposure photographs that show a glaringly bright night sky filled with starlight.

This perpetuating of the widespread misconception that the dark night sky is a paradox that can only be resolved by the *Big Bang / expanding universe* concept demonstrates multiple logical fallacies. Its very presentation is a *straw man* fallacy, suggesting a non-existent "problem" that the night sky should appear bright, followed immediately by an *exclusion* fallacy claiming there is no other reasonable explanation, then the *false cause* extreme "solution" of an expanding universe. And this entire issue is clearly driven by a strong *confirmation bias* for the highly favored *Big Bang / expanding universe* belief.

ERROR

Stretching *Time*?

Another huge problem with the very *concept* of a universe expanding apart is the fact that, according to Einstein's *General Relativity Theory*, it is actually the presumed *space-time* fabric of the universe that is stretching ever larger. Therefore, this means it is not only *space* that would be stretching, as usually presented or presumed, but *time* as well. Despite the many enormous implications of this inevitable conclusion, the fact that *time* would have to have continually and dramatically stretched throughout the age of the universe is completely overlooked in most of the research, analysis, discussions and conclusions about our universe. Einstein himself sidestepped the many bizarre implications of a universe of stretching *space* and *time*, even doing his best to eliminate this notion entirely by attempting to add de Sitter's *cosmological constant* to remove the option of an expanding universe.

ERROR

The *Central-Expansion* Problem

Even the mere *geometry* of the expanding universe concept presents an ongoing, chronic problem for cosmologists. The *Big Bang* has always been represented as a tiny singularity or "primordial atom" that expanded outward to produce our universe, and continues to be represented so even today. "Hubble's Law" of galaxies speeding away from us ever faster with distance also suggests travel rapidly outward from a central explosion. Yet cosmologists staunchly deny that the universe is expanding outward from *any* central location. This is clear from the fact that the universe appears essentially the same in all

directions, in terms of such attributes as brightness, redshifts, and type and distribution of galaxies. Since there is no reason to presume or believe we have a special place in the enormity of the cosmos, the universe must be essentially the same everywhere and hence there *cannot* be a central expansion point.

Cosmologists frequently face the dilemma of questions about the theories, laws and descriptions of an expanding universe all pointing to a central expansion geometry, while their observations and claims maintain that there is *no central expansion point*. Flawed or unrepresentative analogies of rising raisin bread or inflating balloons are often presented, and claimed to resolve this paradox; but *claiming* that an explanation resolves a paradox does not necessarily mean it *does* so. A geometric center can clearly be identified from which the raisins are all moving outward no matter how large the loaf of bread, and an inflating balloon is similarly a 3-dimensional volume growing outward from its center despite its uniformly stretching 2-dimensional skin.

Such *false analogy* fallacies attempting to justify or dismiss this irresolvable logical paradox in today's beliefs once again demonstrate the powerful *confirmation bias* that exists for this highly favored and now heavily vested theory of the universe. This can especially be seen when we consider that cosmologists' *observations* of no central expansion point, and *claims* of no central expansion point, are far more easily consistent with there simply *being no expansion at all*. But there exists an even more powerful observational example *against* the *Big Bang / expanding universe* concept in plain view, produced by the Hubble Space Telescope, yet which is nevertheless claimed to *support* it.

ERROR

No *Big Bang* or *Expanding Universe* in Ultra Deep Field

In 2003, the Hubble Space Telescope was pointed to a tiny dark region of the sky – about the size of a grain of sand held at arms-length – for many weeks to create a long enough exposure for the earliest-ever picture of the faint, distant universe. The resulting, widely released picture, known as the Hubble *Ultra Deep Field*, shows *thousands of galaxies* as far out in space and back in time as we can possibly see, despite the fact that we are presumably looking at one of the most primitive eras of the infant universe. The universe is now said to be roughly 14 billion years old, with the first galaxies of modern stars forming within the first billion years, following an era of countless

short-lived early stars that exploded as supernovae, producing the modern stars and chemical elements. Yet this Ultra Deep Field picture does not show the claimed hot, dense infant universe filled with early stars and exploding supernovae, but a fairly typical universe of widely spaced, entire galaxies amidst the darkness of space. This is particularly odd since we detect the CMBR – supposedly from 400 million years after the *Big Bang* and redshifted to microwaves -- and we can see the presumed first galaxies, supposedly from shortly thereafter, in visible light, but nothing in between, even with our most powerful telescopes and longest exposures.

Telescopes do exist that view the universe in the lower-frequency infrared spectrum below visible light, and which detect stars that are not readily seen with optical telescopes. This is sometimes represented as detection of the early stars in the infant universe in frequencies that are now shifted below visible light. However, a closer look at this situation shows that these infrared-detected stars often have their visible light largely obscured by dense gas in more nearby nebulae, but their infrared radiation – also considered heat radiation – can be detected. This is similar to infrared night-vision goggles that detect objects amidst dust or darkness using their heat, and is very different from detecting a distant infant universe of densely packed early stars and exploding supernovae. Such misrepresentations of infrared observations of mere optically obscured stars dotted about the universe again indicate a strong *confirmation bias* fallacy.

Finally, the extremely poor resolution and color depth in this picture of thousands of galaxies, blown up from such a tiny patch of sky, understandably produced quite blurry, indistinct images of the individual galaxies. In many cases it is impossible to differentiate between a primitive galaxy, a mature but very blurry elliptic-shaped galaxy, and a blurred mature spiral-shaped galaxy seen from an odd angle. Further, not only are the galaxies in the photo spaced well apart, in proportion to their size and distance, but it is also widely acknowledged that many are from various distances all across the universe, leaving even fewer out at the farthest distance. It is also not particularly unusual to find galaxies that appear primitive, misshapen or malformed throughout the universe.

Therefore, the presumed earliest universe we can possibly see has an arguably typical population of galaxies, with spacing also arguably typical of galaxies in *any* region or time period. Yet cosmologists calculate that even when the universe was presumably just *half* its present size it would have been *eight times* denser than today, despite

observations showing a consistent density of galaxies throughout history. And, according to today's theories, the first forming galaxies should be *extremely* primitive and *much* closer together still – in a photo presumably stretching 95% of the way back to the singularity of creation. Yet, despite even this most distant Ultra Deep Field evidence to the contrary, cosmologists claim that this picture shows primitive early galaxies just emerging from the hot, dense early universe. So, although this is the official interpretation of the Ultra Deep Field picture, it actually appears typical of any region or era of the universe, and shows no clear indication of a *Big Bang* or expanding universe. This situation suggests cosmologists may simply be seeing what they wish to see, again demonstrating a powerful *confirmation bias* for today's highly favored, heavily vested *Big Bang / expanding universe* theory.

This view, out into the distance and back in time as far as we can see, provided by the Ultra Deep Field picture, highlights the issues of the size and age of the universe. The currently quoted age of about 14 billion years is largely based on how far we can see with our best telescopes. The universe cannot be younger than our most distant observations, since it would be impossible to see light from a given number of light years away unless the universe had existed for at least the corresponding number of years for the light to have had time to reach us. But it is further assumed that the universe also cannot be much older than these distant observations, since we would presumably see even further if it were.

Following this line of thought, the claimed age of the universe has changed dramatically with progresses in our observations and distance estimates, from 2 billion years in Hubble's day to as high as 20 billion years, with today's value now settling around 14 billion years. This age estimate is then used to determine how fast the universe must have been expanding apart since the presumed *Big Bang* in order to reach its current scale and inter-galactic spacing. Therefore, the values of *Hubble's Constant* in *Hubble's Law*, and the presumed expansion rate of the universe, have also been changed equally dramatically over the years in step with the changing age claims for the universe.

However, since this entire expanding universe belief appears highly questionable, we can only reasonably conclude that we have simply peered about 14 billion light years across the universe, based on

distance estimates from both supernova and redshift observations. But this in no way indicates any particular size, age or expansion dynamic for the universe itself. It may well be a fairly static universe overall, as observations arguably suggest, and it may even be infinite in size and eternal in age. It appears we may only be capable of seeing about 14 billion light years into the distance, even with our most powerful telescopes, but the true size and age of the universe remain open questions.

Given this, we might question the current belief that the 14 billion-year travel time for light to reach us from our farthest observations means this also corresponds to the size and age of the universe. After all, in a universe presumed to be expanding apart, and which could well be infinite in size, it would be quite reasonable if it had been expanding relatively slowly for even 100 billion years. Cosmologists frequently state that there was no center to the *Big Bang*, that the universe could even be infinite in size, and that it simply came into being and started expanding apart everywhere, all at once. Therefore, the fact that we are apparently technologically and physically limited to only seeing about 14 billion light years of a possibly infinite universe should have no particular bearing on how long it might have been expanding apart since the presumed *Big Bang*. Indeed, cosmologists calculate that this most distant observed universe should now be theoretically about 46 billion light years in size, assuming it has been continually expanding since these ancient observations, but that the light from that distance would still be in transit, and therefore unseen.

Even if the galaxies in our possibly infinite universe had existed and expanded slowly apart for 100 billion years, we might still only be able to see 14 billion years distant. It can be assumed we are approaching a practical resolution limit as we detect thousands of galaxies in a tiny sand grain-sized region of the sky, and we know "Olbers' Paradox" is a fallacy and there are practical limits to how distant and faint light can be detected. So there is no particular reason to conclude that the travel time of light from the arbitrary 14 billion light-year limit of our vision also indicates the creation point of all matter and light – and the very size and age of the universe itself. This type of human-centric thinking has plagued the history of astronomy, creating enormously distorted pictures of the universe and our place within it, and should serve as a firm reminder and caution to ensure that we do not repeat such mistakes.

A Universe *Accelerating* Apart?

Despite these many problems, the idea of a universe expanding apart from a distant *Big Bang* eventually became established fact in cosmology, with the only question being whether there was enough gravity to eventually stop it and pull the universe back in, or whether it would continue coasting outward forever. Cosmologists eventually arrived at a method for judging the distances to even the most remote galaxies, which aided this quest.

Originally, it was only possible to determine the distance to the closest stars in our galaxy with certainty – *directly* by the parallax method. This also made it possible to infer how bright these stars must *actually* be at their source, based on the rate that starlight diminishes with distance. It was also noticed that some of these nearby stars regularly *varied* in brightness, and at rates that *also* seemed to correspond to their average *actual* brightness. Once cosmologists were confident that they could rely on this "variation = brightness" assumption for these nearby *Cepheid Variable* stars, it was no longer a limitation that *direct* distance determination was impossible for more distant stars, and for all galaxies. As long as a Cepheid Variable star could be found in any galaxy, its *actual* brightness could presumably be assumed from its variation rate. This then allowed its *distance* to be deduced based on how much its *observed* light has dimmed compared to its presumed *actual* brightness at its source.

However, Cepheid Variable stars are only bright enough to be seen in relatively nearby galaxies, but it was further noticed that the brightness of a very specific type of exploding supernova star in these same nearby galaxies *also* seemed to correlate with their distance. This is because the *actual* brightness determined for these particular *Type 1a supernova* explosions at their source always seemed to be the same, suggesting distance might be inferred based solely on the diminished brightness of these *standard* light sources, now called "*Standard Candles*." Once cosmologists were confident that they could rely on this further "brightness = distance" assumption for these relatively nearby Type 1a supernovae, it was no longer a limitation that only the distance to fairly *nearby* galaxies could be inferred with the Cepheid Variable method. Supernova explosions are visible across the universe, so as long as this specific type of supernova could be found in mid-explosion – which can last several weeks – its distance, no matter how remote, could presumably be deduced by comparing its *observed* brightness with the *actual* brightness assumed for *all* such explosions.

Although this is an increasing chain of assumptions, extending direct local parallax distances to much further *indirect* Cepheid Variable distances, then extending these distances to even further *indirect* Type 1a Supernova distances, cosmologists are now generally fairly confident in the reliability of this process. Indeed, an accurate method of determining distances was crucial in refining and extending Hubble's original scattered plot of nearby galaxies in order to verify Hubble's Law. One could not make a Hubble plot of velocity vs. distance, or even of directly measured *redshift* vs. distance, without a reliable, independent way to determine distance in the first place.

However, it is critical to note that once this process led to the conclusion that Hubble had discovered an actual *law of nature*, where the frequency of starlight was intimately and directly linked to the motion of stars, independent distance measurement became secondary. Just as changes in the pitch of sound sources *must* match their motion, according to the Doppler Effect, the redshifts of galaxies *must* match their motion as well, according to Hubble's Law. This is an inescapable fact if *redshift* arises directly from *velocity*, while *velocity* is a change in *distance* over time. When Hubble based his claim on apparent similarities to the Doppler Effect in sound, he ensured that these three quantities are also inextricably and invariably linked together by a similar direct physicality, captured in the resulting "Hubble's Law."

To be clear, Hubble did not state, for example, that redshifts appear to *generally* reflect distances, presumably due to some indirect cause such as a fairly regular density of gas and dust throughout the universe. In this case, it would not be particularly surprising if some variation was noted, and there would be no particular reason to *always* expect or require strict adherence to a solid "redshift = distance" law of nature. But Hubble claimed that the *motion* of stars *directly shifts their light*, as in the Doppler Effect of sound, producing the observed redshifts. This is an extremely important distinction, since it means redshifts must *always* vary along with any variation in star motion.

Given this fact, the universe could not, for example, suddenly *accelerate* its expansion, propelling galaxies further than expected, without a corresponding increase in redshifts due to this rapid change in motion. This would still correspond to a point on the Hubble diagram, but just a bit further along Hubble's straight line than expected, since it must still follow Hubble's Law, which intimately links redshift, velocity and distance along this line. And it is *precisely* this fact that recently created quite a stir in the cosmological commu-

nity, prompting the invention of an entirely new, mysterious form of energy said to now dominate the universe, termed "*Dark Energy*."

ERROR

The Erroneous Invention of "Dark Energy"

Referring back to Figure 6-13, cosmologists have recently found that the more distant galaxies seem to deviate from Hubble's straight line. Specifically, the observed brightness of their Type 1a supernovae is significantly dimmer than expected from the distance suggested by their redshifts according to Hubble's Law. Their measured *redshifts* imply one distance, which can be read off from Hubble's straight-line diagram, yet the distance suggested by their observed *brightness* no longer agrees with this value, instead suggesting a significantly *greater* distance. This is an enormous problem for cosmologists, which suggests one of two radical conclusions:

a) the "brightness = distance" supernova assumption is unreliable

OR

b) Hubble's "redshift = velocity" assumption is wrong

But the "Standard Candle" supernova brightness assumption is the cornerstone of many conclusions about the universe, even being used to extend and validate Hubble's Law, while Hubble's "redshift = velocity" assumption is considered a *law of nature*, and is the cornerstone of the entire *Big Bang / expanding universe* belief. Faced with these two troubling options, cosmologists created a *third*, logically and physically impossible option, stating that a mysterious repelling "Dark Energy" must have inexplicably begun *accelerating* the expansion of the universe billions of years ago, reversing the expected slowing by gravity. Yet this can be readily seen as a scientifically flawed invention:

VIOLATION

"Dark Energy" Violates the Laws of Physics

This newly introduced "Dark Energy" presumably creates a force that has no other precedent in our experience or our science, and which clearly violates the *Law of Conservation Of Energy*. There is no known power source for this mysterious new repelling force, no physical mechanism for its operation, and not only does it *not* diminish with

use, as required, but it presumably *increases*, producing ever more acceleration with time.

Besides there being no physical or scientific explanation for such a phenomenon, and no evidence for its existence in nature apart from the aforementioned explanatory difficulties cosmologists have recently encountered, there is another clear reason why this claim is impossible:

ERROR

Erroneous Justification for Invention of "Dark Energy"

As mentioned previously, Hubble's Law demands that redshift, velocity and distance always remain intimately linked – distance cannot change without altering velocity, and velocity cannot change without altering redshifts. Such an occurrence would be tantamount to an object moving independent of its shadow. Yet the "Dark Energy" claim is that this mysterious phenomenon somehow suddenly started accelerating the galaxies apart *much faster* and to a *much farther distance* than usual, while their redshifts inexplicably increased as usual. A *regular* increase in redshift plotted against an *accelerating* increase in distance creates a curve away from Hubble's straight-line law, as shown in Figure 6-13, which is why cosmologists were so surprised and troubled by this finding.

In Hubble's universe, this is just as impossible as a sound source suddenly accelerating away faster without affecting its pitch. This does not occur in the Doppler Effect of sound, as it describes a direct physical law of nature, and it *cannot* occur according to Hubble's Law either, for the same reason – assuming Hubble's Law is correct. So, rather than dealing with the two troubling options mentioned above, cosmologists invented the logically and physically impossible *third* option of "Dark Energy," which, if true, not only presents an enormous unexplained physical mystery, but also *invalidates Hubble's Law* by invoking accelerating velocity without affecting redshifts.

ERROR

Flawed *General Relativity / Quantum Mechanics* Link

But the problems do not end here. There have long been efforts to unify *General Relativity* and *Quantum Mechanics* in the hope of taking a step closer to a Theory Of Everything, but without success. More recently, cosmologists and physicists have attempted to merge these separate worlds with the conjecture that both Einstein's *cosmological*

constant and the claimed "vacuum energy" of *Quantum Mechanics* may be describing the same phenomenon in nature – the so-called "Dark Energy" now said to be accelerating the universe apart. As mentioned earlier, this is often presented as a tantalizing possibility that could link and validate all of these concepts and theories. This conceptual "*possibility*" alone often erroneously serves as further support for these beliefs, despite the fact that the *reality* has already been solidly shown to be *impossible*. When cosmologists compare their value of the *cosmological constant* needed to support current accelerating universe beliefs with the corresponding value needed for the "vacuum energy" in quantum theory, the two values differ by 10 raised to the 120th power, or a trillion trillion trillion … multiplied a total of ten times. In other words, this proposal for the long-sought conceptual link between the incompatible worlds of *General Relativity* and *Quantum Mechanics*, via "Dark Energy," could not be more verifiably erroneous, yet strong *confirmation bias* still often leaves this concept presented as a validating possibility.

So, it can be seen that the list of factors plaguing today's cosmological picture is long: the *Big Bang*, the *expanding universe*, *Hubble's Law*, the *CMBR*, the *cosmological constant*, *Dark Matter*, *Dark Energy* and the *accelerating universe*, to name just the key players. And it must not be overlooked that Einstein's *General Relativity Theory* lies at the heart of this picture, introducing or perpetuating most of these factors, and even *requiring* some, such as Dark Matter, in order to salvage its very existence. There are also many other troubling facts, observations and implications following from this picture, some that chronically resurface to be debated without resolution, and others that are largely ignored or dismissed as they challenge this highly favored, heavily vested, and now largely unquestioned mainstream belief system. Yet there are far simpler explanations for many of these highly troubled theories and beliefs, as it is now possible for us to see.