Excerpt from

The Final Theory
Rethinking Our Scientific Legacy

(Second Edition)

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Debunking Albert Einstein's Relativity and Quantum Mechanics:

General Relativity – Is It Just An Oversight?
Quantum Mechanics – Just a Misunderstanding?
Special Relativity – Is it All Just a Mistake?

These are edited excerpts presenting only the debunk of our science, all attempts were made to present a clear flow of main ideas.

Download the first chapter of *The Final Theory* for the:
Debunk of Sir Isaac Newton's Gravity and more about General Relativity
And the excerpt Cosmology in Crisis for the:
Debunk of Dark Matter, Dark Energy and the Big Bang

General Relativity – Is It Just An Oversight?

- *Appeal to Authority fallacy*
- *Appeal to Consensus fallacy*
- *Confirmation Bias fallacy*
- *Misplaced Concreteness fallacy*
- *False Cause fallacy*
- *Exclusion fallacy*
- *False Analogy fallacy*
- *Straw Man fallacy*
- *Inductive fallacy*
- *Hedging/Ad Hoc Rescue fallacy*
- *Unrepresentative Sample fallacy*

Both Einstein's *Special Relativity Theory*, discussed later in Chapter 5, and his *General Relativity Theory*, published a decade afterward in 1916, are specialized versions of the broader *Relativity Theory* put forth centuries earlier by Galileo. *Relativity Theory* is essentially a formal mathematical description of the fact that objects do not possess *absolute* motion individually, but have only *relative* motion with each other. This purely relative motion of all objects was also discussed earlier in Chapter 2, showing that *Newton's First Law of Motion* mistakenly overlooks and misrepresents this important fact of nature.

Einstein developed *General Relativity Theory* to provide a version of relativity theory that dealt with *acceleration*, which his *Special Relativity Theory* did not encompass. A key focus of this effort was to arrive at a relativity-based description of *gravity,* as gravity is an accelerating phenomenon. The final form of Einstein's *General Relativity Theory* has the following core features:

***1) Acceleration Equals Gravity*:** The gravitational effect (the acceleration due to gravity) at the surface of planets is entirely identical to, and indistinguishable from, being continually pushed upward through space at an equivalent acceleration. This is known as the *Principle of Equivalence*.

***2) Time is a New Physical Dimension*:** Time is completely redefined, from a measure of passing events to a *literal physical dimension itself*, transforming our three-dimensional universe into a four-dimensional "space-time" realm of length, width, height and *time*. This proposed four-dimensional nature of the universe is key to Einstein's "warped space-time" explanation of gravity.

***3) Objects Cause and Follow "Space-Time Warps"*:** Objects warp Einstein's proposed "four-dimensional space-time" in proportion to their mass, then follow these "space-time warps," moving toward each other and creating the observed gravitational attraction of all objects.

***4) Gravity Slows Time*:** The gravity of bodies, such as moons, planets and stars, is proposed to slow the very passage of *time* itself. This is claimed to be the reason light from stars is generally shifted to lower frequencies – an effect known as the *gravitational redshift*.

***5) Agreement with Newton's Theory of Gravity*:** All calculations are designed for general agreement with Newton's theory of gravity except in very extreme or subtle situations.

The core features of Einstein's *General Relativity Theory* outlined above show the origin of the many claims in our science that branch off from it. However, this is not how *General Relativity* is often encountered. Many have heard of this theory, know it originated from one of our most revered scientific minds, and have heard or read claims of its mathematical beauty, its experimental confirmation and its scientific importance. This gives many the impression that it is well understood, scientifically sound, yet for some reason only accessible to the handful of experts found speaking authoritatively about it in the science media. Often wild notions closer to science fiction than science are presented along with assurances that they are validated by *General Relativity Theory*, further increasing the air of mystery and exclusivity surrounding it.

But rather than this situation being the hallmark of advanced science, it is actually an extremely dangerous one where the vast majority is largely in the dark while a handful of experts lay claim to all the knowledge and understanding. This leaves a key area of our science wide open to any number of fallacies, wrong turns and vested interests, which history has shown can often sidetrack science for centuries. As shown throughout this book,

logical fallacies are quite common and can be very powerful and misleading. This discussion already establishes widespread *appeal to authority* and *appeal to consensus* fallacies as the vast majority relies entirely on expert assurances, Einstein's reputation and the false assumption that most others must have deeply and objectively investigated and validated this theory. However, it is actually fairly easy to evaluate the viability of *General Relativity Theory* when presented with the core elements of its features and claims, detailed below:

Feature #1 – Acceleration Equals Gravity

This feature is very straightforward and is also the *only* fact necessary to understand gravity. This *principle of equivalence*, stating that acceleration and gravity are physically equivalent, is essentially a recognition that an object, either falling or resting on the ground, is identical in all respects to an object either floating above or resting on the floor of an upwardly accelerating platform in space. This has long been empirically established by experiment as the equivalence of "gravitational mass" (an object's weight on the ground due to gravity) and "inertial mass" (an object's resistance to being accelerated through space due to its inertia). Einstein famously illustrated this fact in his elevator-in-space thought experiment, discussed in Chapter 2, though Newton established this principle centuries earlier with pendulum experiments.

The earlier discussion of Einstein's space-elevator concept showed that, rather than being a mere *analogy* somehow suggesting "warped space-time," it was instead a *literal* description of gravity according to *Expansion Theory*.

Features #2 and 3 – Time and Space-time as Physical Entities

These two features depart from well-established scientific fact and instead introduce radically new proposals about the very nature and operation of our universe. The introduction of *time* as a new physical dimension originates, simply enough, in the fact that a position in three-dimensional space, involving length, width and height (x, y, z), also exists at a point in *time*. As such, a *time* parameter could also be included, giving *four* coordinates (x, y, z, t). Including this fourth *time* parameter is not itself a radical step, of course, but merely an indication of *when* something was at a particular location in three-dimensional space. In fact, a decade before *General Relativity Theory*, Einstein's former math professor, Hermann Minkowski, modified Einstein's *Special Relativity Theory* to use *time* in an abstract "Minkowski space-time" version of the theory. However, when Einstein later borrowed this idea for his *General Relativity Theory* he chose to treat *all four* coordinates as physical, promoting *time* from its more abstract role as a mere "*when*" indicator to a *literal physical dimension* on par with length, width and height. But, without solid scientific justification for doing so, this constitutes a *misplaced concreteness* fallacy.

Einstein further considered *time* to be an exotic new entity that somehow orchestrates the progression of all events, while also paradoxically being altered by events *itself*. This follows from such Einstein-inspired concepts as events proceeding at different rates due to local variations in the passage of *time* – a presumed side effect of either relative speeds (*Special Relativity*) or gravity and acceleration (*General Relativity*). Einstein's exotic new notion of *time* even provides an apparent infinite physical storage mechanism, where the infinity of all past and future events physically exists somewhere "in time," awaiting development of time-travel technology to be accessed at will. The further notions of parallel universes and multiverses arise from such thinking.

Such notions as a physical *time* dimension, warped space-time, *time* driving events, events altering *time*, parallel universes, and travel to a past or future stored somewhere "in *time*" are so pervasive in science and science fiction that it is easy to forget they are all just troubled offshoots of Einstein's relativity theories. It is particularly crucial to note that while

the above discussion of these mysteries and complexities is very brief, it is also *all the science that exists to explain or support them*.

There is no more scientific justification for the promotion of *time* to a physical entity or dimension than Einstein's arbitrary decision to do so from an abstract (x, y, z, t) coordinate system. Likewise, there is no more scientific justification behind a "four-dimensional space-time universe" than Einstein's arbitrary decision to interpret Minkowski's space-time abstraction literally. It is also Einstein's pure assumption that matter somehow warps his proposed space-time realm. And, although accelerating forces from particle accelerators, jet planes or planetary gravity do noticeably affect some physical processes, it is an enormously unexplained and unnecessary leap to represent this fairly unsurprising fact as evidence of relativistic alteration of time itself. To do so without overwhelming justification is to introduce a classic *false cause fallacy*.

But further, this "warped space-time" explanation for gravity, while central to Einstein's desire to build on his earlier *Special Relativity* theory, actually creates a serious conceptual problem. Feature #1 above recognized that gravity is equal to being accelerated through space, and *Expansion Theory* shows how even standing on the surface of a planet is consistent with this accelerating explanation for gravity. But *General Relativity* abandons this core feature at the surface of planets, instead claiming the planet's mass somehow warps the space-time around it to create the gravitational effect felt while standing on the ground. This essentially creates two completely different and physically incompatible explanations for gravity within the same theory. Where convenient, the "acceleration equals gravity" concept is employed, but elsewhere the "warped space-time equals gravity" concept is used instead, demonstrating an irreconcilable logical fallacy within the theory.

Feature #4 – Gravity Slows Time

This feature is another sizable departure from well-established scientific principles, relying instead on Einstein's highly speculative new definitions of *time* as a literal entity or physical dimension, "space-time" as the fabric of our universe and "warped space-time" as the explanation for gravity. This feature further claims that the existence of matter not only locally warps space-time, but also locally slows the *time* dimension of space-time, as well.

It must be emphasized that, although it is widely assumed Einstein and the overall scientific community must have a solid scientific understanding of these claims and concepts, there has actually never been any more scientific understanding, explanation or validation than presented here. This discussion presents a full overview of the origin, nature and claims of *General Relativity Theory*, in the process showing how much pure conjecture and how little hard science actually underlies it. Today's main sources of claims of *General Relativity's* scientific validation come from a combination of thought experiments and distant cosmological observations that are interpreted as support. Yet, as previous discussions have shown, many widespread thought-experiments, explanatory analogies and even Nobel prize-winning claims of support are actually marred by unchecked logical fallacies.

Likewise, the claim that warped space-time somehow slows *time* itself proves to also have an erroneous and fallacious origin. This notion arises from another thought experiment, where Einstein abandons his "warped space-time" explanation for gravity and returns to the "acceleration equals gravity" explanation in his space-elevator thought experiment. This time a clock is sitting on the floor of the elevator, and each tick of the clock is transformed into a wave of electromagnetic radiation that is transmitted to a receiver fixed to the ceiling. Since the elevator is constantly accelerating upward, the receiver continually accelerates slightly away from the signal, which travels upward from transmitter to ceiling, effectively elongating each signal wave to produce a slightly lower frequency at the receiver – a *Doppler Shift*. Therefore, the receiver detects a slower clock frequency coming from the clock on the floor, suggesting *time* itself runs slower at the floor than at the ceiling.

Alternatively, a clock on the ceiling could transmit to a receiver on the floor, with the signal being effectively squashed due to the receiver accelerating toward it, resulting in *time* being noted as running faster at the ceiling, which is the same effective result.

This is the reasoning used by Einstein to claim that, according to *General Relativity*, gravity slows time since the "acceleration equals gravity" feature would mean time would vary at different heights above a planet just as it does from top to bottom of his accelerating space elevator. However, there are enormous logical and physical flaws in this reasoning. To begin, there is no clear explanation in *General Relativity* for the arbitrary switch between "warped space-time" and "acceleration through space" from one discussion of gravity to another. Even assuming no further flaws in this thought experiment, this physical transference from an elevator accelerating through space to standing stationary within the warped space-time surrounding a planet is highly problematic.

However, the problems in this thought experiment do not end here. One might wonder, for example, why such a cumbersome and arbitrary experimental setup is presented when it would be far simpler to merely place one clock on the floor of the elevator and fix another clock to the ceiling. Surely, since the floor and the ceiling are rigidly connected by the solid structure of the elevator, both would accelerate identically. There is little doubt that both clocks would be equally affected by any stresses created by the elevator's acceleration, with no particular reason to expect one clock to run slower than the other, and certainly no logical or scientific reason for *time* itself to mysteriously alter. This scenario merely demonstrates the well-known fact that a Doppler Shift in a signal is a very common occurrence indicating variations in speed or acceleration, and has nothing whatsoever to do with the pace of *time* itself being altered. Motion-induced frequency shifts in electromagnetic radiation arise in many similar situations daily, such as police radar scenarios, yet there is no mention of mysterious, scientifically unexplained "time dilation" effects.

But further, another logical error exists at the heart if this thought experiment. If the clock on the floor emitted a cycle every second, then after 60 cycles it would have advanced by one minute, by definition. Likewise, these same 60 cycles would have passed the receiver on the ceiling, and since each cycle represents one second on the original clock this would indicate the passing of one minute at the ceiling, just as at the floor, and both clocks would be in sync. Each cycle might be slightly *distorted* in shape due to the effect of the ongoing acceleration, but the same *number* would be received as were transmitted. Another way to see this is to picture a rectangular frame with a pencil continually moving up and down on one end. If the frame is dragged along a sheet of paper the pencil will draw repeating waveforms, and of course the trailing end of the rectangular frame would pass over the same number of waves as were drawn at the leading end in any period of time. Even if the frame were continually *accelerated* across the paper it would be impossible for the trailing end to register more or less cycles than the leading end drew. Each cycle would be drawn stretched and distorted as the frame continually accelerated, representing a frequency shift, but the same *number* of cycles would have to pass at the trailing end as were drawn at the leading end over time. The seconds would pass the same at both ends, and this is the same principle as in Einstein's accelerating elevator thought experiment.

Despite the enormous conceptual, logical and scientific flaws in this "time dilation" belief, *General Relativity* is such a highly favored theory that a strong confirmation bias drives efforts to find scientific proof nevertheless. This often results in a self-perpetuating cycle where an observation is loosely accepted as solid proof of this favored theory, boosting the theory's credibility such that even more questionable evidence is accepted as proof, further boosting its credibility, etc. One effort that has been frequently cited for decades is an experiment performed at Harvard University to try to implement Einstein's elevator time-dilation thought experiment, known as the Pound-Rebka experiment. This involved measuring frequency shifts in vertical signal transmissions between several stories of a campus building. Assuming that claims of a tiny frequency shift from this experiment could

be reliably reproduced and verified independently, the preceding discussion shows that effects on signals due to speed or acceleration variations is a common physical occurrence having nothing to do with a mysterious alteration of *time* itself.

Feature #5 – Agreement with Newton's Theory of Gravity

This final feature has been alluded to in a number of earlier discussions. Since Newton's gravitational theory is deeply entrenched in our thinking and science, Einstein ensured that his *General Relativity* theory of gravity retained the core features of Newton's theory, giving equivalent results in all but the most extreme or subtle circumstances.

Recognizing this feature of *General Relativity* greatly assists in clarifying and demystifying the theory. It clearly shows, for example, that all earlier discussions of today's problematic explanations for falling objects, orbiting objects, satellite and spacecraft behavior, gravitational potential energy, tides, etc., all apply to both Newton and Einstein's theories of gravity. This understanding facilitates a further evaluation of the scientific validity of *General Relativity Theory* based on these earlier discussions.

Although the mathematical details of *General Relativity Theory* are complex, the above discussions of its core features demonstrate that it is still quite straightforward to evaluate the claims made by and about this theory. A further example is an often-stated appeal to its mathematical beauty and precision as an indication of the validity of the theory. However, as mentioned in the previous section, when truly put to the test the claimed precision of *General Relativity's* calculations actually vanishes completely, miscalculating galactic dynamics by more than a factor of *ten*, and requiring the *ad hoc rescue* invention of scientifically unexplained "Dark Matter" to try to salvage the theory.

And although mathematical beauty is highly subjective, the equations of *General Relativity* represent years of effort to tie together the equations of *Special Relativity* with those of Newtonian gravitational theory along with the concept of four-dimensionally warped space-time. In the process Einstein drew sizably upon a variety of novel mathematical constructs by mathematicians such as Minkowski, Riemann, Grossmann and Schwarzschild, producing some of the most highly complex and actively modified equations known to science.

Einstein himself made perhaps the most widely known modification, adding a "cosmological constant" as an effective anti-gravity repelling force to counterbalance the attracting gravity between galaxies in his model to match the prevailing belief that the universe was static and unchanging. Yet this was merely a mathematical artifact arbitrarily written in after the fact to force the math to fit observations, rather than following from solid physical or scientific principles, making this a *misplaced concreteness* fallacy since there is no known phenomenon in nature as an anti-gravity force. Einstein may even have been demonstrating his recognition of this serious scientific faux pas when belief in a static universe later fell out of favor, prompting Einstein to remove his cosmological constant and state that it was his "greatest blunder."

Despite this, today there are efforts to return Einstein's constant on the basis that it may actually be the repulsive "Dark Energy" scientists are now proposing to exist between galaxies to explain observations (discussed further in Chapter 6). However, Einstein's cosmological constant is *not* a physical force or energy, of course, but merely the same mathematical artifact it originally was, being just as arbitrarily re-added now, and "Dark Energy" is just as unscientific and unexplained as Einstein's "anti-gravity" force, merely with a name change. Therefore, arbitrarily re-adding this constant to fit the beliefs of the day with no more solid scientific understanding of what it represents than a century ago is a repetition of exactly the same act that Einstein called his greatest blunder.

Numerous further modifications have been made to Einstein's equations by many others – so many modifications, in fact, that entire classes of *General Relativity* equations now exist, such as *Scalar Field*, *Tensor*, *Scalar-Tensor*, *Vector-Tensor*, *Quasilinear*, *Bimetric* and *Stratified*

classes. Most of these equations are so complex that they have never actually been solved for either usability or testability in any practical situations. Such a high degree of complexity, manipulation and tolerance of complete calculation failures strongly suggests a *hedging* or *ad hoc rescue* fallacy artificially supporting a theory that is claimed to be the singular, correct explanation of gravity in our science.

So, it is crucial for the health of our science that we are aware of the true state of this highly favored theory. The concept of *time* as an entity or physical dimension that orchestrates events, while also being manipulated *by* events, still remains an imaginative, scientifically unverified proposal supported by highly questionable evidence a century after its inception. Likewise, the concept of "space-time" composing the structure of our universe and somehow being warped by the presence of matter to produce gravity is a borrowed, troubled abstraction that is still awaiting scientific validation. The often-stated mathematical beauty and precision of *General Relativity's* equations have also just been shown to be a complete myth. And the widespread "rubber sheet" analogy presented in support of this theory (discussed in Chapter 2) is actually a *false* analogy that *misrepresents* the theory, paradoxically having orbiting bodies moving oddly through time while appealing to a pre-existing gravity phenomenon to explain gravity. Fatal errors and logical fallacies can also be identified in much of the claimed experimental support of this theory. One further example is the issue of the precession of Mercury's orbit:

ERROR

Mercury's Precession Does *Not* Prove *General Relativity*

A major claimed proof of Einstein's *General Relativity* theory is that Einstein's theory was used to calculate an otherwise unexplained behavior in the orbit of Mercury – a precession of its orbit that even Newtonian gravitational theory reportedly failed to explain. This is the often-repeated account of Einstein's achievement usually presented to the public via passing references in science books, documentaries and magazines, creating a widespread and compelling belief in the apparently proven correctness of Einstein's theory.

However, the picture changes significantly when we examine the details typically omitted from reports of this achievement. The first point to note is that the central issue of the precession of Mercury – a very slow rotation of its overall elliptical orbit over centuries – was already accurately modeled using Newtonian theory prior to Einstein, with a discrepancy between calculation and observation of *well under one percent*. This result considered multiple factors, such as any known significant irregularities in the shape of the Sun, the gravitational influence the other planets were believed to have on Mercury, and Earth's own precession of its rotational axis (since all observations were made from Earth).

Cumulative errors from limitations in calculation accuracy, equipment accuracy, and procedural methods are always present in any observation or experiment, as in each of the factors taken into account here. It must also be considered, especially in such a large-scale ambitious operation, that other significant factors might be unknowingly overlooked, or that there may be errors in how well the known factors were understood or handled a century ago, or even today. For example, Mercury was recently found to have a magnetic field, which may well introduce a significant interaction with the Sun's solar wind and solar flares on the orbit of this closest planet to the Sun. This is especially true in a context where even the subtlest theoretical gravitational influence of distant planets is considered significant.

Yet, again, despite all possible sources of error, observations of Mercury's orbital precession were explained down to a *fraction of one percent*. Many might consider this pre-Einstein result to be a sizable success if presented with such information, in stark contrast to the often-repeated mischaracterization of Mercury's precession as an unexplained mystery prior to Einstein. Indeed, such a mischaracterization constitutes a ***Straw Man***

Fallacy, where an issue is artificially fabricated to serve as a platform to showcase a favored solution, when in actuality no true issue existed in the first place, leaving the apparent "solution" often irrelevant or meaningless.

There are also many other factors to consider in a serious investigation into Mercury's orbit. Mercury is a rather special-case planet in our solar system since it is the closest planet to the Sun, and thus the only planet directly exposed to the raw geometry and dynamics of the Sun as it orbits. Recall that, according to *Expansion Theory*, the other much more distant planets orbit the large orbital rings of their neighboring inner planet rather than orbiting the Sun directly. This greatly elevates the importance of any irregularities in the shape or dynamics of the Sun when considering Mercury's orbit – irregularities that were only partially known and understood a century ago, and perhaps even today. Mercury is also heavily cratered, being in the path of many objects that were drawn toward the Sun, and, given its small size and mass (roughly the size of our moon and 20 times less massive than Earth), any theoretical orbit could be significantly altered by such past events. Mercury's orbit is also far more elliptical than the other planets, whose orbits are nearly circular in comparison, questioning the relevancy of transferring assumptions, comparisons and analytical techniques from the other planets.

Given these additional real-world considerations, it may be even less surprising if purely theoretical calculations may not perfectly characterize Mercury's orbit, especially over the relatively tiny slice of time modern astronomers have been closely observing its precession. Indeed, all manner of anomalous orbital dynamics may well exist in any solar system for any number of physical or historical reasons that may never be known. Such practical deviations from theory would no doubt abound in our universe without necessarily having any bearing on the validity of one gravitational theory or another. Therefore, great caution should be exercised before allowing one tiny and highly debatable discrepancy between theory and observation in our particular solar system to influence our very understanding of gravity.

Finally, despite the many issues and challenges in precisely matching Mercury's real-world orbital dynamics with idealized theoretical models, a number of mathematicians and physicists developed alternate theories of gravity a century ago that did match Mercury's then-known precession *exactly*. Some of these efforts included those of Maurice Levy and Paul Gerber around 1890–1900, and, of course, Albert Einstein several decades later. One issue that this highlights is the fact that, given enough information, ingenuity and variables to work with, it is possible to arrive at any number of models that can be fitted arbitrarily close to any known desired result. This fact alone, then, cannot constitute proof of the literal physical correctness of any given model; and indeed none of these exact solutions to Mercury's known precession prior to Einstein received wide recognition and acceptance. However, Einstein's notoriety from his earlier *Special Relativity* theory created far greater publicity and credibility for his solution using his *General Relativity* theory. Yet, given the significant accuracy of already-existing calculations and the practical reality that it may be unreasonable to expect *any* theory to model every orbital observation exactly, it is debatable whether there was truly any problem for Einstein to solve. It might even give us pause when a theory arrives that turns already-accurate results for an imperfect real-world observation into a perfect match to a known expected outcome amidst all the inherent uncertainties, inaccuracies and unknowns – and especially when *several* different theories manage to do so.

ERROR

Eddington Did *Not* Prove *General Relativity*

No discussion of *General Relativity Theory* would be complete without addressing Arthur Eddington's famous solar eclipse experiment in 1919 that produced headlines around the world and rocketed Einstein and his latest theory to worldwide fame and largely unquestioned scientific acceptance. Although the popular account of this event states that

Eddington carried out a rigorous scientific experiment that showed exactly what Einstein's theory predicted, the reality of the situation has been increasingly acknowledged to be quite different.

The experiment itself was a simple observation of the bending of starlight as it passed the Sun – the largest nearby body that might produce a noticeable effect. This is the well-known "gravitational lens" effect discussed earlier. The idea was to note any slight change in the position of the stars from where they were supposed to appear in the sky as the Sun passed very close. Any bending of the starlight would cause the stars to appear in a slightly different location in the sky than normally expected. This experiment could only be done during the few minutes that the Moon completely covered the Sun during a full solar eclipse so the Sun's glare did not outshine the stars.

Eddington was a great supporter of Einstein's theory, and traveled to Africa to view the full eclipse in the hope of confirming it. Based on Eddington's report of his own experiment, this singular claim was considered solid scientific verification of Einstein's *General Relativity Theory*. Yet there are many problems and fallacies surrounding this claim. Firstly, proper scientific method requires that any experiment be repeated and objectively and unanimously confirmed by separate teams. Yet the scientific community of the day enthusiastically accepted this singular report from the lead scientist behind the venture as proof of this highly favored theory.

Also, as mentioned in the earlier discussion on gravitational lensing, the fact that gravity effectively draws objects and light beams toward large bodies is not in dispute. Newton's gravitational theory, Einstein's *General Relativity Theory* and *Expansion Theory* all agree on this point, as would any viable theory of gravity. Indeed, independent published analysis of Eddington's experiment in 1930 suggests Einstein's calculations for bending light merely represent well known optics equations modified to slow light passing near the Sun, explicitly involving none of the warped space-time physics claimed by Einstein. So, it is a *false cause* and an *exclusion* fallacy to presume a successful prediction of bending starlight *necessarily* validates Einstein's theory in particular – and *only* that theory, especially if it contains as many conceptual flaws, scientific mysteries and logical fallacies as already discussed for *General Relativity*.

Further, it has been increasingly acknowledged that independent published reports also show Eddington overlooked significant sources of error and obtained very few usable photos during the experiment, reducing the sample space from which to make accurate measurements and comparisons. Such reports suggest that Eddington may have discarded up to 85% of his photos as unhelpful in validating Einstein's predictions. This combination of reduced sample size along with selective exclusion of potentially sizable contradictory evidence raises questions of both *unrepresentative sample* and *confirmation bias* fallacies at the heart of the famous reports of success that rocketed *General Relativity*, Einstein, and also Eddington to fame.

Before leaving this discussion, it is important to note several final points for consideration. The issue of verification attempts to support *General Relativity* provides a powerful demonstration of yet further fallacies that can creep into our science almost unnoticed if we are not careful. As demonstrated in the above example that shows the lengths to which Eddington was willing to go in his goal to prove Einstein right, it has long been a great prize in science to find verification of Einstein's highly favored theories in one's work. And, since *General Relativity* suggests that significant variation from Newtonian gravitational theory would only be seen in extremely subtle experiments or in scenarios of extreme gravity, cosmologists typically search far beyond our galaxy for supporting evidence. Interpretation of observations from millions or even billions of light years away is, by its very nature, subject to a fair degree of assumption and judgement -- by experts who are steeped in Einstein's theories and intent on proving them. Therefore, it might seem quite reasonable to make as many adjustments to the various parameters and assumptions

as justifiable to agree with Einstein if at all possible, even if other arguably more reasonable values and assumptions might mean sizable *disagreement*.

Yet, despite the sizable incentive and effort to find evidence to support Einstein's theories, no other convincing claims to verify *General Relativity Theory* appeared for another forty years after Eddintgon's experiment. And, to date, nearly a century later, there are still only a handful of recognized claims, based on inference and assumption from extremely distant, selected cosmological snapshots filtered through the lens of current theories and beliefs. It is unlikely that these few recognized claims arose from the *only* attempts to achieve this prize in the past century. It is far more likely that they represent the tip of the iceberg, with a great many failed attempts whose results either did not confirm Einstein's theory or even strongly refuted it, and so were never submitted for publication, or were rejected. Therefore, it would not be unreasonable to consider that the handful of verification claims to Einstein's *General Relativity Theory* might further constitute an *unrepresentative sample fallacy* rather than verification of the theory.

The many mysteries and violations of the laws of physics pointed out so far in even our most basic science show that we produce and use many everyday devices whose fundamental operating principles we do not truly understand – either as individuals or as a society. There is a sense of this lack of understanding in many of our scientists today as the search for deeper answers continues in earnest; however, current efforts to arrive at the final Theory Of Everything remain largely confined to our existing flawed paradigms. This can be seen even in the development of our most radical theories today, such as *Quantum Mechanics* and *Special Relativity*, which will now be explored.

Quantum Mechanics – Just a Misunderstanding?

- ***Appeal to Authority fallacy***
- ***Appeal to Consensus fallacy***
- ***Confirmation Bias fallacy***
- ***Persuasive Definition fallacy***
- ***Exclusion fallacy***
- ***False Cause fallacy***
- ***Non Sequitur fallacy***

Near the turn of the twentieth century there was a concerted effort to shake off existing paradigms in an attempt to truly understand the underlying physics of our universe and the phenomena in the world around us. Both our scientific ideas and our technology had advanced to investigate the atom, the subatomic realm and even the very nature of energy itself. There was a great deal of discussion, disagreement and debate amongst the researchers of the day since their discoveries about these issues were often surprising and confusing, leading to controversial and counterintuitive interpretations. Many scientists initially refused to accept these odd new interpretations, only being brought into reluctant agreement when experiment appeared to validate them. *Quantum Mechanics* is one of the most prominent examples of such radical new views on our world.

Even the creators and practitioners of many of these new theories have often admitted to not fully understanding them, but believed they nevertheless captured the apparently bizarre and mysterious nature of our universe. Niels Bohr, one of the founders of *Quantum*

Theory, summed up this sentiment in his famous quote*:* "*If Quantum Mechanics hasn't profoundly shocked you, then you haven't understood it yet*." Many proponents and practitioners of such theories echo similar sentiments even today. The implication here is that anyone truly understanding a theory that makes such bizarre claims would be shocked to think it may correctly describe nature as being filled with unexplainable, irresolvable physical and logical paradoxes. Such theories should give us great pause before being considered solid science, yet the particulars of the history and evolution of our science a century ago have resulted in precisely such theories becoming firmly installed as the cornerstones of modern physics. *General Relativity*, discussed earlier, is one such theory; *Special Relativity* is another, to be addressed shortly, as is *Quantum Mechanics*, discussed here.

Once such a theory becomes installed there is an enormous vested interest in defending and maintaining it – universities teach it, textbooks include it, researchers specialize in it, science journals publish it, government grants fund it, and the popular science media promotes it. And so public opinion follows, approving and supporting a furthering of all of these efforts. This can be a powerful self-reinforcing cycle, which also excludes dissent and the possibility of other more viable viewpoints, locking a problematic and potentially incorrect understanding of nature into our science and our society *indefinitely*. As pointed out in earlier discussions, when such a favored theory actually contains serious logical and scientific flaws upon examination, the above-mentioned cycle supporting it then becomes the *false* support of *confirmation bias, authority appeal*, *consensus appeal* and *exclusion* fallacies.

The now firm installment and acceptance of such troubled theories into our science has resulted in the elevation of some almost to the level of oracles that seem to know more about our universe than the human mind is capable of comprehending. This state of affairs has left us with little choice but to simply accept what these "oracles" seem to be telling us and to marvel at the apparent strangeness and mystery of nature. However, the understanding provided by *Expansion Theory* allows us to finally break free of some of the most mysterious and widespread theories in science today.

The theory of *Quantum Mechanics* refers to a body of knowledge that deals with the microscopic scale of the physical world, namely, subatomic particles and energy. It sits opposite *Classical Mechanics*, which deals with regular objects and is largely embodied in Newton's three laws of motion. Since it was discovered by experimentation that the laws of *Classical Mechanics* do not seem to apply to the subatomic realm and to energy, *Quantum Mechanics* was eventually developed in an attempt to complete the picture. Together, classical and quantum mechanics are used to describe our universe on both macroscopic and microscopic scales.

Despite the widely acknowledged bizarre and mysterious conclusions about our world that follow from *Quantum Theory*, many of its proponents also claim that it is one of the most important, elegant and accurate theories known to science. Such radically opposing aspects of the same theory can at least be partially attributed to unexamined assumptions and logical oversights. For example, while both the subatomic realm and energy are indeed extremely important elements of our universe and the world around us, it is a logical oversight to claim they are important manifestations of *Quantum Mechanics*, as is often stated. In actuality, they are manifestations of whatever fundamental truth may underlie our universe, and *Quantum Mechanics* is simply a troubled abstraction that attempts to describe and model the resulting behavior. Indeed, since *Quantum Mechanics* is widely acknowledged to be synonymous with "bizarre and paradoxical," an experiment or result described as being quantum-mechanical in nature is really just a purely empirical observation that is not yet understood.

Also, as mentioned in the previous chapter, the accurate experimental agreement claimed for such theories is often the result of sizable revision and refinement between theory and experiment to ensure this is the case. Experiments that cannot be brought into agreement with the favored theory tend to be dismissed as poorly conceived or designed,

while those that can are held high and widely referenced. Eventually, specific "classic" experiments emerge from this process to closely match refined versions of the theory, becoming the standard by which the theory is then claimed to agree beautifully with nature. Such claims often repeatedly reference these same few "classic" experimental setups – and often even the same *specific* historic experiments – creating the appearance of widespread verification.

The classic *scientific method* requires the healthy skepticism of independent teams critically analyzing such claims and experiments, yet too often this merely becomes a concerted effort to uncritically reproduce a specific popular experiment, in cookbook fashion, to be in line with the favored theory. If left unchecked, this becomes little more than a meaningless *confirmation bias* exercise, creating a further *exclusion fallacy* by ignoring the implications of contradictory results that may arise from a broader, critical experimental inquiry. This can lend unwarranted significance and credibility to a handful of experiments, or often even a singular experiment, highly contrived to agree with the favored theory, constituting a *non-sequitur fallacy* where a wider conclusion, such as broad experimental agreement, does not truly follow from the evidence.

Therefore, while the oft-stated accuracy of *Quantum Mechanics* is a tribute to the effort that has gone into ensuring agreement between calculation and certain "classic" experiments, this is often misconstrued as broad evidence that this theory must then be the literal description of the physical world. This dynamic can be seen in more depth in the continuing discussions below.

The Misunderstanding of the Nature of Light

Today's quantum-mechanical characterization of light as tiny packets of quantized energy also lies behind the well-known paradox referred to as the *wave-particle duality* of light. For centuries there has been an ongoing debate as to whether light is a wave or a particle. Today, it now appears we have experimental evidence for light behaving as *both* a wave *and* a particle. *Quantum Theory* states that a traveling beam of light exists in a bizarre state where nature has not yet "decided" whether it will be a wave or a particle until it is detected. It is thought that the method of detection *itself* breaks nature's uncertainty and forces the reality of either a wave or a particle to manifest itself.

This concept does not state that the detection of light simply exposes whether it was *originally* transmitted as a wave or particle, since the same beam of transmitted light can be detected as either a wave or a particle simply based on the method chosen for its *later* detection. Instead, *Quantum Theory* states that it is only once the light is detected as either a particle or a wave that its originally transmitted nature is "decided" by the universe. That is, according to *Quantum Theory*, there is a bizarre effect in nature that reaches back in space and time instantaneously – even across billions of light years to distant stars – to define whether a wave or a particle was *originally* transmitted, based purely on the outcome of its *later* detection.

This mysterious and completely unexplainable claim of instantaneous backward time travel is the currently accepted scientific interpretation of experimental results today – a claim that is commonly held up as a key example of the bizarre and purely probabilistic nature of not only *Quantum Theory* but, presumably, of the universe itself. However, as will be shown shortly, *Expansion Theory* does not require such fanciful explanations of our experimental results; but first, it is important to clarify what we mean when we speak of light waves, and, indeed, waves in general.

Waves and the "Wave Nature of Light"

The world around us has many examples of wave*like* behavior, and basic wave theory often represents such phenomena as purely conceptual, disembodied oscillations in space. Such wave theory states that when two waves line up in phase so their peaks coincide, as well as their troughs, these peaks and troughs add together to form a single larger wave in what is known as *constructive interference*. Likewise, when two waves are out of phase so the peaks of one wave coincide with the troughs of the other, the peaks and troughs cancel in *destructive interference* (Fig. 5-7).

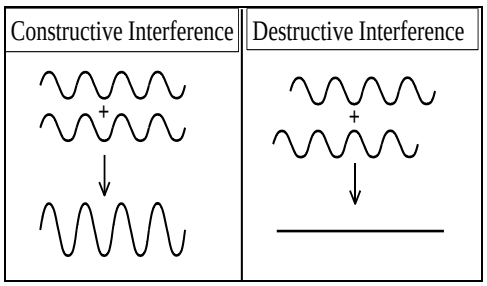

Fig. 5-7 Idealized Constructive and Destructive Interference

Although this is a common conceptualization of wave interaction, a closer look shows that it is an idealized abstraction that does not strictly apply to the real world. In actuality, such a model describes idealized, disembodied waves frozen in space and time, then mathematically added together. While this may be a convenient *model* for discussing wave behavior, such idealized frozen waves are not representative of true waves in nature. The real waves around us are actually all dynamic manifestations of the wave-*like* behavior of *physical matter*, not idealized waves of frozen "energy" that neatly add together. Both our diagrams and our mathematical descriptions of waves tend to represent them in this somewhat misleading manner. Even in situations where idealized standing waves *appear* to exist in the real world, such as a rapidly vibrating guitar string, they still result from ongoing dynamic wave-*like* vibrations of *physical matter*.

Sound waves, for example, are not waves of pure "sound energy," but rather, bands of alternating compressed and decompressed air molecules conducted along through the atmosphere in a kind of "domino effect" – a wave-*like* behavior of *matter*. Water waves are also a wavelike behavior of matter as their molecules fall due to gravity, compress, then rebound to rise again in an ongoing succession – again, a *matter wave* composed of water molecules.

In fact, *every* waveform in nature – without exception – is actually the dynamic wavelike behavior of a large number of matter particles oscillating in unison between clear physical forces of constraint. Although such wavelike behavior of matter may lend itself to representations in static diagrams of idealized waves that add mathematically, it is a conceptual oversight to assume such pure "energy waves" literally exist in the real world and interact in this manner. The idealized frozen waves in Figure 5-7 – presumably waves of pure energy – do not actually exist anywhere in nature.

It may be tempting to dispute this conclusion by referring to the example of light, which today's science tells us is composed of waves of pure energy – at least some of the time. However, the true nature of light has been in dispute for centuries, and the concept of light as pure "energy waves" is merely an idealization that has been borrowed from wavelike behavior of *matter* in the world around us. Indeed, the description of electromagnetic radiation as pure "energy waves" is an unsubstantiated human invention devoid of the usual

physical matter and forces that create and constrain wave motion, and which *does not exist anywhere else in nature*, even violating the laws of physics:

Classical Wave Theory Violates the Laws of Physics

This is an important realization since it shows that not only do pure "energy waves" have no proven existence in nature, but neither does their idealized wave *behavior* shown earlier in Figure 5-7. We can artificially draw waves on paper and add them together mathematically such that they neatly reinforce or cancel each other, but this is merely a human conceptual artifact that does not strictly occur in this manner in the real world. Indeed, if it *did* occur it would constitute a violation of the laws of physics.

To see this, consider the destructive interference shown in Figure 5-8. Instead of two idealized parallel waves, we have two parallel laser beams of identical frequencies that are also out of phase in the same manner as shown earlier in the right-hand frame of Figure 5-7.

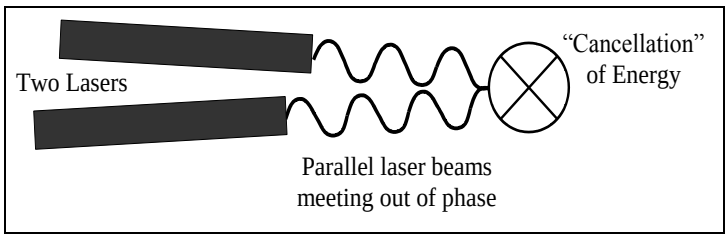

Fig. 5-8 Destructive Interference Violates the Laws of Physics

If the laser beams were brought together so they overlapped, then, according to the pure wave theory of destructive interference, they would simply "cancel" each other out. That is, both lasers produce light energy that immediately vanishes into thin air – no heat, no other forms of radiation, but simply complete annihilation. This would be the expectation according to current wave theory regardless of the amount of energy involved, even many thousands of watts of power. This is not a transformation of energy from one form to another according to our laws of physics, but an absolute *destruction* of energy, and, once again, a clear violation of the *Law of Conservation Of Energy*.

Of course, this complete vanishing of any arbitrary amount of energy simply due to a phase difference does not actually occur in reality, showing that the purely mathematical abstraction of "energy waves" and their idealized interference patterns creates a *false cause fallacy* that is not a true description of light. This shows that light does *not* actually behave like a wave of pure energy even in the simplest possible experiment – that of two identical waves of a single pure frequency meeting, as shown earlier in Fig. 5-7. If light *did* behave as an idealized wave its energy would have to vanish into thin air in our laser beam example, which it clearly does not do.

Yet, the idealized concept of constructive and destructive interference of light has long been held as proof of the more classical, wavelike behavior of pure "light energy." This flawed belief has persisted because selective evidence has been used to support the pure wave concept of light in our science in the face of clear logical, theoretical and physical evidence to the contrary. Despite this simple laser experiment that seriously challenges the concept of pure waves of light energy, such evidence is overlooked in favor of other experiments that superficially appear to fit the pure energy wave hypothesis – yet another example of an *exclusion fallacy* supporting a core scientific belief. One well-known experiment superficially supporting the "light wave" belief is the classic *Double-Slit Experiment*, which will be examined shortly.

This flawed characterization of light as waves of pure energy is, in large part, responsible for the apparent "wave-particle duality" paradox of light in *Quantum Mechanics*, yet the preceding example seriously calls this very notion into question. How can we have a wave-particle paradox when we have yet to confirm that light ever behaves as a true energy wave?

All evidence so far points to the fact that idealized waves, and waves of pure "energy," do not actually exist anywhere in nature, but are exclusively a human invention. Therefore, the wave-particle duality issue seems to be more of a conceptual oversight than a true paradox in nature. This possibility is examined further in the following discussions of some of the classic light experiments supporting our current quantum-mechanical beliefs about light and energy.

Rethinking the Classic Double-Slit Experiment

The double-slit experiment, first performed by Thomas Young in 1801, has become a classic experiment in our science because it is thought to show both the wave nature of light as well as the paradox of its dual wave-particle nature. This experiment simply involves a barrier with two vertical slits through which light is able to pass. The idea is that light passing through these slits will emerge on the other side and radiate outward as two separate cones of light that will interfere with each other in patterns of constructive and destructive interference. And indeed, with the proper selection of slit width and separation distance between the slits, the emerging light does interfere and cause dark and light bands on a far screen (Fig. 5-9). This experiment is thought to be analogous to the interference pattern that can be observed between water waves radiating from two nearby disturbances in a pond.

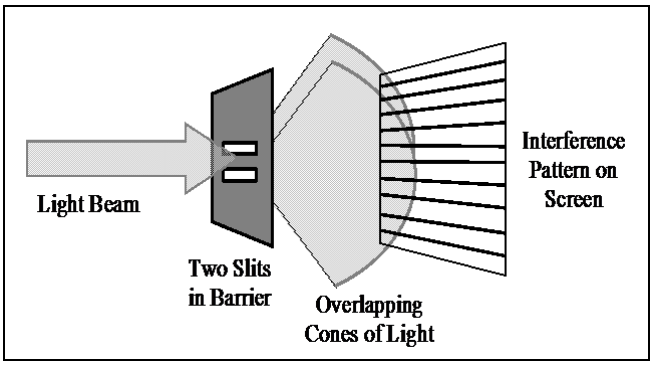

Fig. 5-9 Interference Pattern in Double-Slit Experiment

Since light is thought to be a wave of pure energy – and, in theory, idealized waves that meet out of phase cancel each other out – the dark and light bands have traditionally been interpreted as destructive/constructive interference bands, apparently validating the wave theory of light. Yet, a simple experiment with overlapping lasers, as discussed earlier, shows that light cannot be made to cancel itself out of existence in the manner idealized in abstract wave theory. It is not only a *false cause fallacy*, but also a violation of the laws of physics to even *expect* energy to vanish in the physical world in this manner.

So, although dark and light interference bands do occur within the two overlapping cones of light, the dark bands cannot be regions where waves of disembodied "light energy" cancel each other out of existence any more than waves of disembodied "water energy" cancel each other out in a pond. The analogous interference pattern with water waves results from the interaction of wavelike oscillations of *matter particles* (water molecules), and so, the

logical conclusion is that the interference pattern in light is similarly a manifestation of *matter particle* interaction.

> NOTE
>
> **The double-slit experiment has been misinterpreted as evidence for the *wave* theory of light, but is actually evidence of an interaction between groups of *particles*.**

A further reason the double-slit experiment is a classic is that it is also thought to demonstrate a deeply mysterious wave-particle paradox. The paradox supposedly arises when the intensity of the light beam is reduced to the point where only single photons are transmitted one-at-a-time from the light source. This means there should no longer be two cones of light interfering with each other, but rather, separate light photons traveling one at a time through one slit or the other. If these photons then proceed on and strike a photographic plate, the cumulative effect over time should develop into two bright spots on the plate – one for each slit that a photon might pass through.

However, the actual result is an interference pattern much like the original experiment with the full light beam. This is thought to show that even when light is sent toward the slits as individual particles one-at-a-time it can still produce a wavelike interference pattern. It is completely unexplained how these individual particles seem to "know" how to land in a wavelike interference pattern on the photographic plate, doing so even though the scenario is no longer one of interference between two waves. This is the famous wave-particle duality paradox of the double-slit experiment, showing that even single particles of light mysteriously act as if they were waves passing through both slits simultaneously.

Taking a fresh look at this apparent paradox, we can now see that it is not actually a "wave-particle paradox" at all. It was just shown that even the *original* interference pattern in Figure 5-9 is not a proven "energy wave" phenomenon, but merely resembles known interference patterns between groups of *particles*. So, the actual mystery of the double-slit experiment is not that these particles of light somehow individually produce the interference pattern of "pure waves," but only that individual particles seem to still produce the original group *particle* interference pattern.

With this clarification, the experiment simply leaves us with the question of whether this is truly a situation of separate particles fired one-at-a-time through the slits. As shown in the earlier discussion of light passing through a glass block, the current quantum-mechanical theory of "energy photons" behaving like projectiles shot individually through space is *unsupported by experiment*. Yet, despite the evidence against such an idea, this is precisely the claim made in the double-slit experiment; therefore, there is good reason to question even this facet of the experiment. Evidence is mounting for the possibility that the entire classic double-slit experiment may simply be a series of logical and experimental oversights regarding the nature and behavior of light.

Implications of the Double-Slit Reinterpretation

This reinterpretation of the double-slit experiment carries with it some very deep implications, not only for the nature of light and energy, but also for *Quantum Theory* itself. First, it explains a long-standing experimental mystery in our science, showing that light need not be considered to have a mysterious inherent wave-particle dual nature that is fundamentally unresolved until detection.

Secondly, this reinterpretation shakes the very core of *Quantum Mechanics* since the wave-particle duality paradox of light is thought to exemplify and validate the concepts of quantum uncertainty and probability in nature that are deeply woven into *Quantum Theory*.

In fact, this wave-particle-duality concept has become so widespread in our science today that it has even been extended from a description of *energy* to a description of *matter* as well. In 1924, Louis de Broglie postulated that electrons, atoms, and even regular objects possess a mysterious wavelike nature as well. Via a simple mathematical equation one can calculate the theoretical wavelength of any such object, as if it truly had a wavelike nature. Even the wavelength of a truck can be calculated, and although the result is of no practical use, science today does consider such calculations as valid applications of the wave-particle duality principle of *Quantum Theory* – a principle whose core experimental support was just shown to be erroneous.

Yet, as apparent proof of this seemingly mysterious wavelike behavior of matter, beams of electrons have been made to interfere with each other in a similar manner to the double-slit experiment, resulting in a similar "wavelike" interference pattern. Although this has been taken as proof of de Broglie's concept of matter having a paradoxical dual nature as a quantum "probability wave," it was just shown that such an interference pattern does not actually indicate a dual wave-particle nature at all, but merely interference between *particles*. Therefore, there is no particular reason to conclude that individual electrons have mysterious "quantum wave" natures, but merely that groups of electrons interfere in a manner much like many other known examples of interference between large groups of particles – just as we might expect.

Further, this supposed wave-particle dual nature of both energy and matter is embodied in one of the most central equations in *Quantum Mechanics* – the *Schroedinger Wave Equation*, named after Erwin Schroedinger (1887–1961), one of the founders of *Quantum Theory*. The *Schroedinger Wave Equation* is considered one of the cornerstone equations of *Quantum Theory*, and claims to capture the mysterious probabilistic "quantum wave" nature that supposedly underlies all energy and matter. Therefore, it is a sizable problem for *Quantum Theory* that the apparent experimental support for the "quantum wave" nature described by this central equation now appears to simply be a misinterpretation of straightforward particle interaction.

So, it now appears that none of either the *double-slit experiment*, de Broglie's *"matter-wave"* concept, Planck's *"quantum energy jump"* concept, nor even the central *Schroedinger Wave Equation* stand any longer as the literal description of our universe. And it was further shown in Chapter 4 that today's purely probabilistic mathematical model of atomic structure based on the *Heisenberg Uncertainty Principle* is also just a misunderstanding of subatomic expansion as electrons actually bounce off the nucleus.

Yet, *these are the core concepts representing the key support pillars for the theory of Quantum Mechanics*, which now increasingly appears merely to be an abstract model built partly on unchecked logical oversights in experimental interpretation and partly on misunderstandings of expanding matter. *This* is the likely reason for repeated descriptions of *Quantum Theory* as being mysterious, bizarre and paradoxical, rather than it being our *universe* that is truly a bizarre and incomprehensible place. Once the principle of expanding matter is recognized, all of today's quantum mysteries vanish. This can be further seen in yet another classic experiment that has been taken as support for *Quantum Mechanics* – the *Photoelectric Effect*.

Rethinking Einstein's Photoelectric Effect

The *Photoelectric Effect* refers to another experiment whose results surprised scientists in the early 1900s, and which was given an interpretation by Albert Einstein that is thought to show yet another odd quantum-mechanical manifestation that supports *Quantum Theory*.

For simplicity, the experimental setup can be represented as two parallel metal plates connected to a battery, creating an electric field between the plates. The experiment involves shining a beam of light on one of the plates to knock electrons off it so they are free to be pulled across the gap by the electric field and on through the circuit (Fig. 5-10). This creates a flow of electrons across the plates and around the circuit as long as the light shines on the plate.

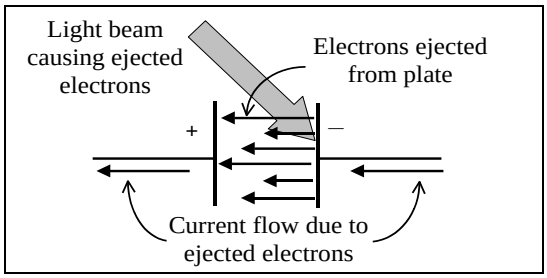

Fig. 5-10 The Photoelectric Effect

What surprised scientists about this experiment is that when they altered the light intensity they were unable to satisfactorily explain the resulting effect on the current flow using the classical wave theory of light. The three main surprises are presented below, each followed by the current quantum-mechanical explanation as well as the explanation from the perspective of *Expansion Theory*:

- ***Stopping-Potential Mystery:*** If the battery voltage supplying the electric field between the plates is continually reduced and eventually reversed, the number of ejected electrons crossing the gap is also reduced and eventually stopped. The minimum reverse voltage required to stop all current flow is called the *stopping potential*. So far, these results were not surprising since a reduced electric field should be less effective at promoting ejected electrons across the gap, and the far plate should repel them when the field is reversed. However, scientists *were* surprised to find that once the stopping potential was reached it didn't matter how much the light intensity was increased – *the same reverse voltage stopped all electron flow at any light intensity*. Classical wave theory states that more light energy (greater wave amplitude) should impart more energy to the ejected electrons, causing some to overcome the stopping potential and resume current flow.

  Quantum Explanation: An explanation for this mystery was presented in the idea that perhaps light didn't behave like a wave in this experiment, but rather, like a particle. If the energy were contained in little particle-like energy packets (i.e. photons) then increasing light intensity would mean increasing the *number of photons* rather than increasing the *amplitude of the light waves*. Therefore, if the stopping potential were strong enough to stop electron ejection by each photon individually, it shouldn't matter how many photons arrived per second. Each photon would be unable to eject an electron individually, and no current would flow at *any* intensity. This apparent validation of the "energy photon" quantization of light is considered a key support pillar of *Quantum Theory*.

- ***Light-Frequency Mystery:*** Another surprising finding arose when it was discovered that the flow of electrons could also be cut off by changing the frequency of the light striking the plate. It was found that, once the light frequency dropped below a certain value, electrons were no longer ejected from the plate *no matter how much the intensity of*

the light beam was increased. In standard wave theory, if light were composed of waves, whose energy was reduced as their frequency was lowered, then simply increasing the intensity (amplitude) of the light should increase the energy of the waves and cause electrons to be ejected again.

Quantum Explanation: This problem is solved if reducing light frequency means each photon has less energy *individually*. Then the argument is the same as in the stopping-potential solution: if each photon is individually incapable of ejecting an electron, then it shouldn't matter how many arrive. No current would flow at *any* intensity below a certain frequency of light.

- ***Time-Lag Mystery:*** Finally, standard wave theory states that it takes time for each wave of light energy to be fully absorbed by the atoms in the plate, resulting in an *eventual* ejection of an electron. Even though this time lag would be extremely small it is thought to be measurable. Despite this prediction by Standard Theory, no time lag has ever been detected.

  Quantum Explanation: If light were composed of individual photons that must each be capable of ejecting an electron in order for current to flow, then reducing the light intensity would not affect this individual ejection mechanism. A reduced light intensity would reduce the number of photons arriving per second, but it would not increase the time lag between arrival of a given photon and ejection of an electron. Any time lag that may exist could remain immeasurably small even at the weakest light intensity.

This discussion of the *Photoelectric Effect* shows that this cornerstone of experimental support for *Quantum Mechanics* is readily explained by *Expansion Theory* [in the book *The Final Theory*], making it further unnecessary to accept the bizarre and mysterious conclusions of a "quantum-mechanical" universe.

The Misunderstanding of "Quantum Entanglement"

Quantum Entanglement

One of the more recent quantum-mechanical mysteries to be added to our science is that of "quantum entanglement." This is an experimental observation where two photons produced from the same light source travel together through space then are split into two separate paths of travel, yet apparently maintain a mysterious link with each other. Thus, if one of the photons is somehow altered after they are separated (such as a change in polarization), the other photon also becomes *instantaneously* altered in the same fashion no matter how far apart the two photons may be at the time. This is considered to be a mysterious faster-than-light "communication" between two "entangled" photons, classified as yet another mysterious "quantum effect" between these two quantum-mechanically-defined energy particles. This is an effect that Einstein is famously quoted as calling "spooky," and which he took as a clear indication that such quantum-mechanical interpretations of observations must be fatally flawed.

Further doubt is cast on today's "quantum-mechanical" interpretation of this event by the preceding discussions showing that polarization is not likely a quality possessed by individual "energy photons," and that the very concept of photons traveling separately through space is quite problematic.

Once this interpretation is considered, the more likely explanation of the "entanglement" effect is that any influence that alters one beam could potentially be conducted along this continuous span of physically connected electron clusters (or through a sea of unseen clusters between them) to affect the other beam. Since vibrations within solid objects travel faster the more dense the material, the speed of conduction through the extremely dense span of subatomic particles (electron clusters) in light may well be extremely rapid – perhaps even far exceeding the speed of light. Although this explanation is yet to be confirmed, it is suggested that this is the most likely explanation for the otherwise mysterious and unexplained "quantum entanglement" phenomenon.

Faster-Than-Light Communication?

As this discussion suggests, there appears to be preliminary lab evidence of the possibility of conducting signals along beams of light at speeds that so far appear to be instantaneous, providing a practical possibility for faster-than-light communication. The possibility of faster-than-light communication would be unexplainable in science today since it violates the speed-of-light limit in Einstein's *Special Relativity Theory* – a theory that also must be rethought in light of *Expansion Theory*, which will be done shortly.

If such a faster-than-light communication method is possible, it is likely that advanced species would use this method of communication along existing beams of starlight rather than generating light or radio waves and waiting for them to physically move through space at the relatively slow speed of light.

An analogy for the difference between these two methods of signal transmission can be seen in the common desktop toy made from a line of hanging metal spheres all suspended next to one another, often called Newton's Cradle. When one sphere is pulled back and allowed to swing to strike the others, a sphere at the far end is immediately ejected. A long line of such spheres would allow transmission of such a signal to the far end in this manner far faster than it would take for a single sphere to swing that same distance on its own.

Somewhat similarly, today's method of communication waits for newly generated light or radio waves to physically move across a distance rather than attempting to conduct signals along existing light beams instead. Although this possibility is only a conjecture at this point, it is one that would seem to be suggested by experiment. It is also a conjecture that would not be possible in today's theories of light, which describe light as discontinuous packets of "quantum-mechanical energy photons" rather than a continuous span of expanding matter (electron clusters).

Another energy-based theory that is equally as mysterious and pervasive in our science as *Quantum Theory* is Albert Einstein's *Theory of Special Relativity*. This theory has its origins in thought experiments involving light energy, and extending to physically mysterious claims involving time, matter and space that are said to occur purely due to speed of travel once relative speeds reach a significant fraction of the speed of light. Once again, *Expansion Theory* shows that significant misunderstandings, as well as clear errors, have led to the creation and acceptance of this mysterious and paradox-filled theory in our science.

Special Relativity – Is it All Just a Mistake?

- ***Appeal to Authority fallacy***
- ***Appeal to Consensus fallacy***
- ***Confirmation Bias fallacy***
- ***Persuasive Definition fallacy***
- ***False Analogy fallacy***
- ***Straw Man fallacy***
- ***False Cause fallacy***

Special Relativity Theory, for which Albert Einstein is perhaps most well known, is a specialized version of Galileo's much earlier *Relativity Theory*. Henri Poincaré (1854–1912) and Hendrik Lorentz (1853–1928) modified Galileo's *Relativity Theory*, which Einstein then further altered to incorporate his proposal that the speed of light is the maximum speed possible in the universe and is a constant for all observers, forming his *Special Relativity Theory*, published in 1905. Let's examine how Einstein's *Special Relativity Theory* – which is also widely recognized as mysterious and paradoxical – came to be accepted as part of our scientific beliefs today, beginning with a famous key experiment:

Rethinking the Michelson-Morley Experiment

Light was largely believed to be a wave in Einstein's day, and since every known wave required a physical medium for transmission (water, air, etc.), it was believed light must travel through an invisible and, as yet, undetected medium known as the *ether*, which fills the universe. However, the existence of the ether had never been scientifically verified and was becoming an increasing point of debate among the scientists of the day. Finally, in 1887, A.A. Michelson and E.W. Morley devised an experiment to resolve this debate. The results of this experiment not only ended the ether debate, but were also given an interpretation by Einstein that radically changed our view of light, time, space and matter – embodied in his *Special Theory of Relativity*. Let's return to this crucial turning point in our scientific legacy and take another look at this issue from our perspective a century later – and now with the knowledge of *Expansion Theory*.

The Michelson-Morley Experiment

The Michelson-Morley experiment was an attempt to determine whether the proposed ether actually existed. The premise was that if the universe were filled with a stationary, invisible ether that light must use to move through space (much as sound uses air), then light would travel the same speed through this medium in all directions. So, then, a light beam should take the same amount of time to propagate through the proposed ether between any two points on Earth, whether it travels in a North-South direction or an East-West direction.

However, since Earth moves rapidly through space (and through the presumed ether) as it orbits the Sun, and also spins rapidly on its axis in the same plane, this motion through the ether should affect the measured speed of light. Any Earthbound experiment to measure the speed of light would itself be hurtling through space along with our orbiting, spinning

planet, giving the whole apparatus a sizable relative speed with respect to both the stationary ether and the light traveling within it. So then, if the ether exists, a different speed of light should be measured in the East-West direction of our planet's motion through it, compared to the North-South direction.

Michelson and Morley reasoned that this effect, if it existed, could be measured by timing a beam of light as it traveled first in the direction of the Earth's motion through space, then perpendicular to this motion. Since light would be confined to travel at a constant speed within the stationary ether, when it is shone in the direction of the Earth's motion, the light would have to travel slightly further to catch up as the Earth moved further away through the ether. Therefore, instead of merely traveling from ***A*** to ***B*** on Earth, the light would have to propagate through the ether from ***A***, past the original location of ***B***, then a bit further since ***B*** (and ***A***) would have moved ahead slightly as Earth moved through the ether (Fig. 5-12, left frame).

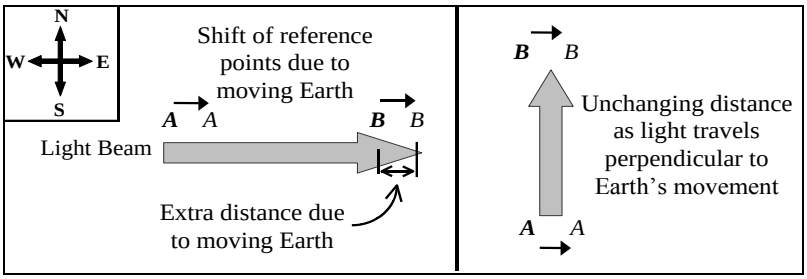

Fig. 5-12 Increased and Unchanged Distances as Earth Moves

However, if ***A*** and ***B*** were positioned perpendicular to the Earth's motion through the ether, then ***A*** and ***B*** would now move *sideways* through the ether, and the distance the light beam had to propagate would remain constant (Figure 5-12, right frame). Therefore, if a longer travel time were measured in the first case, it would confirm the hypothesis that light propagated at a constant speed through an unseen ether that permeated the universe, acting as an absolute, stationary reference through which light propagates.

Michelson and Morley found no measurable difference in the travel time of the light beam in either direction, which meant light did not travel through a medium that served as a stationary reference point throughout the universe, ending the debate over the ether and showing that it did not exist. Light did not travel through a medium, but moved independently through empty space.

However, with this issue resolved, another one came to the forefront. If water waves move at the characteristic speed of ripples in water, and sound waves travel at the characteristic speed of vibrations in air, then what is the speed of light relative to, if it does not have a medium such as the ether for reference? After all, since existing *Relativity Theory* in classical physics stated that all motion is relative, the speed of light was considered relative to the stationary ether that was thought to permeate the universe. But now that the ether did not exist, what did it mean when the speed of light was quoted? If it were always quoted as an *absolute* speed with no agreed-upon reference medium, then it would seem to violate existing *Relativity Theory* and its well-established equations of relative motion. All observers would then presumably measure the same speed for a given beam of light whether they were stationary or speeding through space, which violates common sense.

Einstein's Postulate – a Solution without a Problem

Einstein offered a solution to this apparent conundrum, although his solution was not to *eliminate* this violation of common sense, but to *accept* it as a mysterious new behavior in our universe. He postulated that light was somehow special and outside of all known laws

of physics and motion, suggesting that the speed of light in a vacuum (empty space) was indeed somehow a universal constant that was the same for all observers regardless of their relative motion through space. This meant that an observer speeding toward a light source would, paradoxically, measure the same speed of light as an observer speeding away from it.

When Einstein worked his new constant-speed-of-light postulate into the existing equations of *Relativity Theory*, the resulting equations of motion were largely unchanged, except for a term that only became significant at speeds approaching light-speed. The implications of these revised equations were very mysterious and bizarre, but at the speeds of regular daily experience the new term introduced by Einstein effectively vanished, leaving the original *Relativity Theory* equations. This suggested that the familiar world we experience in our daily activities is a special case in a universe that is actually far more bizarre, but that this bizarreness is only exhibited to a significant degree at near-light speeds.

This constant-speed-of-light modification to *Relativity Theory* offered a mathematical solution to the issues raised by the Michelson-Morley experiment, and eventually became known as *Special Relativity Theory*. However, this postulate seemed to introduce sizable mysteries that violated common sense. If one blindly followed the logic in Einstein's version of the *Relativity Theory* equations, it became obvious that science was being asked to accept that, at near-light speeds, time, space and matter behave in bizarre new ways that run counter to our everyday experience and understanding. And indeed, during the century that has passed since Einstein's original postulate, these ideas have become firmly integrated into our science as deeply mysterious truths of nature. But was this really necessary and correct – and if not, why has this happened?

The following examination of *Special Relativity Theory* shows that the odd conclusions following from Einstein's proposal were *not* necessary or correct, yet they have become accepted into our science, nonetheless, due to a combination of logical oversights, experimental coincidence and unchecked mathematical errors. As we will see, the original logic (above) that led to *Special Relativity Theory* follows one very narrow line of reasoning that overlooks a much simpler commonsense interpretation of the Michelson-Morley experiment.

This oversight has gone uncorrected for nearly a century due to apparent support from various thought experiments that have been invented over the decades; however, even these thought experiments have clear logical flaws that have either been repeatedly overlooked or ignored. And, a major reason why the flaws in these thought experiments continue to be overlooked is that some actual physical experiments appear to support *Special Relativity Theory*; however, once again, even these physical experiments have been misinterpreted.

Finally, even the core mathematics that transform the equations of *Relativity Theory* into Einstein's *Special Relativity Theory* have numerous mathematical errors that have been both overlooked and, for the more severe errors, even hidden from view by omitting the erroneous lines in published versions of the derivation. Each of these issues will now be clearly examined against the backdrop of *Expansion Theory*.

ERROR

Oversight in Original Postulate

Einstein's original postulate of a constant speed of light for all observers – whether moving or stationary – is unlike anything we have ever experienced. If a stone were tossed toward an observer, the observer would not expect to measure the relative speed of the approaching stone to be the same whether running toward it or away from it. Running toward the stone would increase one's relative speed with it, and running away would decrease this relative speed. Yet, Einstein's postulate says an observer would measure the *same speed* for an approaching light beam whether that observer were stationary, moving

toward, or moving away from the light source. This idea runs completely counter to our common sense and to every experience we know of in the physical world. So then, why did Einstein introduce this concept to begin with?

As mentioned earlier, the results of the Michelson-Morley experiment removed the possibility of the ether existing, seemingly leaving light with no stationary reference point. We could measure its speed, but without the ether there was no medium to serve as a universal reference for this speed the way the stationary atmosphere is a reference for the speed of sound or a pond serves as reference for the speed of ripples upon it.

However, this does not necessarily introduce a serious problem requiring a whole new outlook on the universe. A bullet moves through empty space with no medium as reference without introducing any new mysteries, so why can't light also? For the scientists a century ago to have considered that light might move through empty space without a reference medium would not have violated existing *Relativity Theory* any more than would tossed stones or speeding bullets. The speed of a bullet is simply relative to the gun that fired it – an obvious fact that requires no special theory. Likewise, there is no fundamental reason why the speed of light cannot simply be relative to the source that produced it, also without introducing a special theory. This simply means that, just as a bullet would have different speeds for observers traveling at different rates relative to the gun, so light would have different speeds for observers traveling at various speeds relative to the light source. To accept the suggestion that the Michelson-Morley experiment presents a deep physical problem is to create a *straw man* fallacy, creating a problem where none exists.

But Einstein instead focused on the idea of light as a wave without a reference medium, returning to a thought experiment he had pondered as a young boy. In this thought experiment, the young Einstein had wondered what it would be like to travel next to a speeding light wave, and found it incomprehensible that a light wave could be essentially frozen in space beside him. Such frozen light waves had also never been observed. The combination of this thought experiment and the later results of the Michelson-Morley experiment caused Einstein to postulate that light waves must somehow always travel at the same speed for all observers.

Yet, in the years since Einstein's *Special Relativity Theory*, light has been increasingly considered to have a *particle* nature – the photon, casting doubt on Einstein's early "frozen light wave" thought experiment. But even more crucially, other simple experiments could be conceived that conclusively demonstrate fatal flaws in Einstein's constant-speed-of-light postulate for all observers.

One such simple experiment involves a light source shining a beam of light across a room to a detector. As fast as light is, it still takes time for all the photons in a beam of light spanning the room to cross the room and strike the detector. What happens if the detector is then fired across the room to meet the light source in a fraction of a second? The gap between the detector and the light source is almost immediately traversed, along with all the photons in the entire light beam, many of which would normally have taken more time to cross the room to the detector on the far wall. So there is no doubt that the detector passed more photons in the fraction of a second that it traversed the room (and the entire light beam) than would have arrived at the detector in that time had it remained fixed to the far wall. According to Einstein, it is impossible to pass a light beam faster by speeding toward it, yet this is precisely what it means to pass more photons in a given time period, as in this speeding detector example.

Einstein was initially deeply caught up in the wave theory of light, both in his boyhood light-wave thought experiment and in how it might relate to the Michelson-Morley result, leading to the bizarre characterizations of nature contained in his *Special Relativity Theory*. Yet, the photon theory of light, and the speeding detector example above, show that Einstein was operating under a *false cause* fallacy, thinking that light resulted from "light waves" that needed strange new physics to explain how they moved through space without a medium.

And, as the continuing discussion will demonstrate, a growing *confirmation bias* caused selective evidence to be misrepresented as proof of this increasingly favored theory, constituting additional *false cause* fallacies, and feeding a growing *authority appeal* fallacy as Einstein's reputation grew in turn. This cycle continued, until today a powerful *consensus appeal* fallacy exists where we now unquestioningly believe relative speed somehow increases the mass of objects, shortens lengths and distances, and even slows the very passage of time – all following from Einstein's "constant speed of light" claim.

In actuality though, the simple motion of projectiles through space, combined with the growing realization of the particle nature of light, would have provided all the necessary answers in a far more straightforward manner than inventing *Special Relativity Theory*. Indeed, no controlled Earthbound experiments have been done with moving observers (or light sources) to invalidate this straightforward conclusion – a conclusion that is also consistent with the results of the Michelson-Morley experiment. That is, a bullet would be expected to have the same speed on Earth regardless of the direction in which it was fired, since the momentum of the gun (and bullet) matches that of the planet – and light also gives this same result in the Michelson-Morley experiment. According to *Expansion Theory*, this would simply mean that all beams of expanding electron clusters (i.e. light) push themselves away from the light source at the same speed relative to the light source. So, just as we would expect a bullet to travel at the same speed in either East-West or North-South directions since its momentum while inside the gun already matched that of the Earth even before being fired, we should expect as much from light. The electrons within the subatomic realm of a battery move along with the Earth prior to being ejected into space as expanding electron clusters of light, which would travel at light speed away from this source.

It is only today's concept of pure "light energy" that allows us to treat light as if it were a mysterious, other-worldly phenomenon that somehow appears as if from nowhere and follows its own independent physical laws. The results of the Michelson-Morley experiment are not at all mysterious, and do not necessitate Einstein's postulate that light has the same relative speed for all observers – *a postulate that forms the foundation of Special Relativity Theory*. However, if *Special Relativity Theory* is not only an unnecessary mystery, but is indeed even incorrect, then why is it part of our science today? This question will be answered in the following discussions, which first detail the erroneous creation of this theory, then the many beliefs that have sprung up in apparent support of it since its inception a century ago.

ERROR

The Erroneous Creation of *Special Relativity Theory*

It can be readily demonstrated that the entire core of Einstein's *Special Relativity Theory*, both its physical claims and its mathematics, can be traced to one key logical error within one of Einstein's main thought experiments. This error is essentially a confusion and improper combination of separate reference frames.

Consider an enclosed cart slowly rolling across a room, with a bouncing ball within it, bouncing from floor to ceiling of the cart. Regardless of whether the cart is stationary in the room or slowly rolling past, the ball is still merely bouncing from floor to ceiling in the cart. To accentuate this point, the cart may even be rolling along the aisle of a speeding jet plane. None of this matters to the bouncing ball as long as there is smooth coasting motion and no acceleration – the jet maintains a constant speed and the cart also rolls smoothly along the aisle. This is known as *non-accelerated frames of reference*, and is the only scenario to which *Special Relativity Theory* is said to apply.

From inside the cart, the ball merely bounces in the same location from floor to ceiling of the cart; yet, for an observer watching the plane speed past from a high-rise building, this could be described as the ball bouncing past in tremendously elongated leaps at enormous speeds. But the ball cannot exhibit two different physical behaviors in the same reference

frame (as in Fig. 5-13 later). Only one of these descriptions can be correct, while the other contains a logical flaw, but which is the flawed description and what is its logic error?

Of course, the core of this situation is the original ball bouncing from floor to ceiling within the cart. There are countless additional frames of reference from which this event could be viewed, and as long as these are all force-free non-accelerating reference frames, they are completely arbitrary perspectives that have no impact or bearing on the core situation. So, the flawed description is that of the observer in the high-rise building, and the logic error is that the observer has *completely ignored the existence of the speeding jet plane*. The ball is not inexplicably bouncing along a hallway of the building at nearly the speed of sound, which would require an extraordinary explanation and would also severely damage both the ball and the building. Consequently, it would be pointless to contemplate the launching device that must have been used and the impressive material strength of the ball, floor and ceiling in this obvious physical misrepresentation. Instead, the ball is merely gently bouncing up and down, on the spot, inside the cart – an event that could, incidentally, be viewed from the relative perspective of countless other arbitrary non-accelerating reference frames, such as the high-rise building.

Yet this is precisely the type of thought-experiment-gone-wrong that the entire logic and mathematics of Einstein's *Special Relativity Theory* is based upon, typically involving a bouncing light beam aboard a speeding spaceship. The very same physical misrepresentations and logic errors are made, with the bouncing light beam initially apparently zipping past a stationary outside observer faster than the speed of light, in order to make its elongated bounces in the same amount of time as the bouncing light beam on the spaceship. But, unlike the bouncing ball scenario, Einstein did not only consider the light beam to have literally zipped past the observer in these elongated bounces. Einstein was intent on following his conclusion from the Michelson-Morley experiment, which he erroneously decided could only mean light somehow always travels at the same speed in all frames of reference. So, this thought experiment posed a serious problem for Einstein, since he could not allow light to ever exceed one set speed-of-light value in his developing new theory.

Einstein decided the only "logical" way the light beam could travel the greater elongated bouncing path past the observer, while paradoxically always maintaining the same speed, is if *time itself* slowed down on board the speeding spaceship. He could then arbitrarily use the same speed of light in both scenarios since a slowing of time on the spaceship means it would take longer for the beam on the ship to travel the shorter bouncing path from floor to ceiling. This way, the bouncing light beam could strike the floor and ceiling at the same moment in both scenarios, travel the same presumed universal speed of light in both scenarios, yet paradoxically travel different distances.

Of course, here, as in most physical "paradoxes," there *is* no true paradox, but only logical and physical flaws with the proposal or its interpretation. A clear indication of this can be identified straight away by noting that even in the bouncing ball scenario, an observer on the plane would see the ball following a very obvious elongated bouncing path down the aisle as the cart merely rolls slowly past. Yet, at this slow speed, there cannot be any relativistic effects, so it cannot be a deep relativistic mystery or paradox that the ball simultaneously bounces up and down on the cart while also following a very different elongated bouncing path as the cart rolls past. So, it should already be clear that any such notion merely demonstrates a logical flaw in how the situation is interpreted or represented, especially when the proposed "solution" is to consider time to be running slower on the rolling cart.

And indeed, in Einstein's thought experiment involving the speeding spaceship, there are a series of logical and physical errors right from the start. The first error is the same as in the bouncing ball scenario, where *the existence of the speeding spaceship is completely ignored*, and the traveling light beam is erroneously treated as if it was fired from a stationary light source

apparently faster than light-speed. In actuality, this is merely an elementary reference frame error, where the actual light beam bouncing up and down aboard a speeding spaceship is mistaken for a lone light beam speeding past in faster, elongated bounces in a completely different reference frame – *as if the speeding spaceship did not exist*.

Next, rather than correcting this initial error, Einstein proceeded to create the further error of *Special Relativity Theory itself,* by insisting on a universal speed of light, which further necessitated a mysterious "slowing of time" to keep the two conceptual beams in sync. Here the confusion can be clearly seen in this effort to synchronize the two separate reference frames, despite the initial error of effectively combining them into one by ignoring the existence of the speeding spaceship. Therefore, *Special Relativity Theory* itself is simply a mistake, based on three uncorrected, compounding errors:

- initial combined reference-frame error ignoring the spaceship
- "universal speed of light" error of Michelson-Morley experiment
- erroneous time slowing ("dilation") to keep the beams in sync

Not recognizing these compounded errors, Einstein then proceeded to complete his theory, eventually called *Special Relativity Theory*, working out the mathematics that would follow from this highly confused viewpoint. This was essentially a matter of drawing the right-angled triangle that follows from the initial combined reference frame error, labeling its sides using his erroneous "universal light speed" and "slowed time" parameters, and applying *Pythagoras' Theorem* for triangles. This led to the central mathematical term, ***1/(1-v²/c²)***, that appears at the core of all of Einstein's *Special Relativity* equations. This is shown in Figure 5-13, with the bouncing between floor and ceiling (A and B) shown on the left, and the apparent elongated bouncing path as the spaceship speeds by shown on the right. This diagram clearly shows Einstein's error of combining two separate motion reference frames into one.

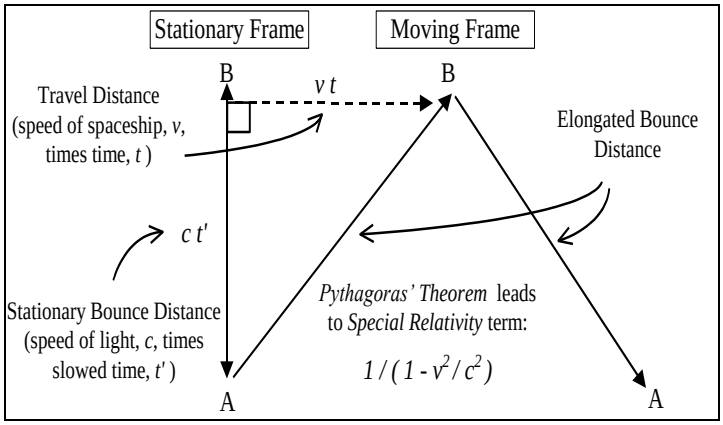

Fig. 5-13 Einstein's Erroneous *Special Relativity* Inception

This now completed Einstein's new theory, which was published in the German journal, *Annalen der Physik* in 1905, entitled "*On the Electrodynamics of Moving Bodies,*" now known as the *Special Theory of Relativity*. Yet this discussion shows the deep logical and conceptual flaws at the heart of Einstein's theory, as well as the resulting flawed mathematical term that forms its "time dilation" core, as well as the core of all the follow-on concepts and equations, such as relativistic "mass increase" and "length contraction." The erroneous apparent support for such concepts can also now be clearly demonstrated.

Errors and Misunderstandings in Supporting Evidence

There are a number of physical experiments and thought experiments that are commonly cited as proof of Einstein's *Special Relativity Theory*; however, on closer examination all of this apparent evidence can be readily shown to have fatal flaws of logic or interpretation.

Misinterpreted "Mass-Increase" Experiments

One of the mysteries following from the equations of *Special Relativity* is the concept that objects gain "relativistic mass" as they increase in speed relative to an observer. The faster an object moves relative to an observer, the more "relativistic mass" it is said to gain and, therefore, the more energy it takes to continue increasing its speed. Eventually, as the object approaches the speed of light, its mass approaches infinity, according to the equations of *Special Relativity Theory*, and even an infinite amount of energy would barely increase its speed any further. This is the reasoning behind the well-known speed-of-light limit in our universe, where nothing can travel faster than light-speed.

This claim would simply be a fanciful abstraction if it weren't for the fact that experiments appear to validate it. Usually cited as proof are the results from particle accelerators, where physicists can show that, as particles approach light-speed, it becomes more and more difficult to continue increasing their speed; and, regardless of the amount of energy used, the particles *never* exceed light-speed. Although this is widely believed to be proof of the dramatic increase in the "relativistic mass" of these tiny particles, a much more straightforward explanation can be found in *Expansion Theory*.

The "energy" used to accelerate these particles is supplied by electromagnets that are timed to pulse as the particles pass, giving them a boost. However, as shown in the previous chapter, a magnetic field is actually a cloud of expanding electrons. If each pulse sends a cloud of electrons expanding toward the passing particles at the speed of light to give them a push from behind, it is not surprising that the particles are accelerated less and less as they speed by faster and faster. As the particles approach light-speed they pass almost as rapidly as the electron clouds are expanding behind them. The expanding electron clouds would barely be able to catch up with the passing particles, and so, would only be able to give them a tiny additional boost that becomes smaller still as the particles get even closer to light-speed.

Increasing the energy input simply means producing denser electron clouds from the pulsing magnets, which improves the *efficiency* of each boost (makes each push more solid), but does not increase the *speed* of expansion of these electron clouds. Therefore, as ever more energy is put into the system, the passing particles receive ever more solid nudges toward light-speed, but still can never exceed the speed of light since *this is the limit of the speed boosts*. This need not be considered as validation of the mysterious "relativistic mass increase" concept of *Special Relativity Theory*, but merely as an expected result once the true nature of magnetic fields is understood.

Erroneous "Time Dilation" Evidence

A further mystery introduced by *Special Relativity Theory* is the claim that time slows down due to relative speed – known as "*time dilation.*" This literally means a speeding astronaut

ages slower than a stationary observer, and a clock on board the speeding spaceship runs slower than a stationary one. This line of thought lies behind a commonly cited example known as the *Twin Paradox*.

The Twin Paradox

The *Twin Paradox* thought experiment states that if one of a pair of identical twins embarks on an extended space mission at near light-speeds for many years according to our Earthbound timeframe, the mission would only seem to have lasted perhaps a few hours for the astronaut twin. This is because *Special Relativity Theory* states that time slows down dramatically for anyone traveling at near light-speed relative to a stationary observer, yet runs at the same unchanging rate for the observer; so, upon returning to Earth, the astronaut would be much younger than the twin who stayed home.

Logical Oversight in Twin "Paradox"

This thought experiment is considered to show a concrete example of the "time dilation" effect that follows from the equations of *Special Relativity*. However, on closer examination, the very scenario introduced by *Special Relativity Theory* is also undone by the same theory. Since "everything is relative" in *Special Relativity Theory*, it is just as valid to consider the *astronaut* to be stationary while the *Earth* speeds away at near light-speed. There would be an initial difference between these two views since the astronaut would feel an absolute initial acceleration as the spaceship fired its rockets to gain speed, but thereafter this completely relative view of who is traveling and who is stationary is not only supported, but also *demanded* by *Special Relativity Theory*.

Therefore, as the *Earth* now coasts away at near light-speed, it would be the *astronaut* who ages while sitting in a stationary spaceship, while only a few hours pass on the speeding Earth. But how can two completely different physical outcomes result from the same space mission simply due to how we think about it? Clearly this is not a true physical paradox, but merely a logical oversight in an attempt to lend validity to the fanciful claim of "time dilation."

Appeals to *General Relativity* Fail as Well

The Twin Paradox problem is often claimed to be resolved by recognizing that only the astronaut undergoes actual forceful acceleration, creating an *absolute* physical reference rather than a purely arbitrary *relative* one. As such, it is then said that *General Relativity* – ***not*** *Special Relativity* – applies here, since only *General Relativity* applies in scenarios of absolute acceleration. But this explanatory attempt only introduces more questions and problems.

First, the Twin Paradox is always traditionally introduced in the context of *Special Relativity* to demonstrate its mysterious implications, yet focus immediately switches to *General Relativity* once serious difficulties emerge. This approach creates the *illusion* of an example of a bizarre truth in nature, yet in actuality it clearly exposes and concedes the fatal flaws at the very core of *Special Relativity*. This is a clear *false analogy* fallacy, which is nevertheless widely presented, at least initially, as support for *Special Relativity Theory*.

Secondly, the switch to *General Relativity* only applies to a very tiny part of the thought experiment – the initial acceleration up to speed and any turnaround acceleration for the return. The vast majority of the journey, to any arbitrary length at near light-speed, would involve simple *non-accelerated* coasting, fully in line with *Special Relativity*. So, the unresolved

Special Relativity "twin paradox" mentioned earlier still remains, regardless of any additional *General Relativity* considerations at either end of the journey.

Thirdly, one of the core features of *General Relativity Theory* is that acceleration through space is indistinguishable in every respect from simply standing on a planet with equivalent gravitational strength. This is the *Principle of Equivalence* mentioned earlier in Chapter 2. So, even considering the absolute acceleration according to *General Relativity*, the astronaut could accelerate to near light-speed at the rate of one g-force, coast for any arbitrary length of time, then return, and there still would be no theoretical explanation for any age difference compared to the Earthbound twin. Neither *Special Relativity* nor *General Relativity* would explain such a mysterious effect, yet claims of "relativistic time dilation" still abound in today's science.

ERROR

Logical Oversights in "Time Dilation" Experiments

Claims that this "time dilation" paradox was conclusively demonstrated decades ago, by comparing a stationary atomic clock to one flown in a jet, must also be erroneous since any positive "time dilation" conclusions from such an experiment would verify a theory that states such results should *not* occur. That is, since "everything is relative," the observer on the ground should see the atomic clock on the jet run slower, while the clock on the jet could be considered stationary and should then see the effectively-moving ground-based clock run slower. There cannot be an *absolute* time difference afterward, as reported in this experiment, and as Einstein's special theory claims, if everything is *relative*.

Clearly there must be other explanations for such claims, such as experimental or reporting errors, influences such as turbulence and acceleration upon the delicate operation of atomic clocks (this experiment was performed across a number of regular, non-direct commercial airline trips), or even simple random coincidence. After all, in such a delicate, one-off experiment, the tiniest discrepancy could arise for any reason, with equal odds that it might occur in the expected direction of time loss. None of these sources of error can be reasonably dismissed without an appropriate number of repeated, carefully performed experiments by independent research teams, especially considering the extremely tiny time difference that is being measured in this experiment and the enormous, mysterious and scientifically unexplainable implications of a positive result.

Likewise, while it may be technically true that software exists to make relativistic corrections for speeding satellites, it is unlikely that this software is truly playing the role it is widely believed to play – based even on the doubts cast by *Special Relativity Theory* itself, as just discussed. How can we correct the clock of a satellite for time-dilation effects due to its motion relative to the ground, when ground-based clocks could be equally considered in need of correction due to their motion relative to the satellite? Both equally valid relative views, according to *Special Relativity Theory* itself, would mean there can be no singular absolute time dilation to correct, and indeed, the need for any correction should entirely cancel out, requiring no action whatsoever. Moreover, a serious flaw can be seen at the very heart of such claimed correction efforts:

ERROR

Fatal Flaw in GPS Satellite "Time Dilation" Claims

GPS satellites pass overhead at thousands of kilometers per hour, and although such speeds are actually quite slow compared to the speed of light (about 300,000 km/s), they would still be enough to cause noticeable clock inaccuracies if Einstein's claimed "time dilation" effect actually did exist in nature. Consequently, *Special Relativity* theorists ensure that time dilation corrections, based on the speed of these satellites, are included – along

with various other practical correction factors – in the software of such satellite systems. But a closer look shows that such theoretical relativistic corrections are quite misguided, even *producing* clock inaccuracies that must be counteracted by the other practical correction factors in the satellite software.

To see this, imagine standing on the ground with a tape measure extending up, connected to the passing satellite. As the satellite approached overhead, the tape measure would slowly reel inward, slowing to a stop as the satellite passed directly overhead, indicating its orbital altitude, then slowly reeling out again as the satellite proceeded past. So, although the satellite is speeding along in its orbit, this much slower reeling in and out speed of the tape measure – about *100 times slower* – shows the *actual relative speed* between the *satellite* and the *ground*, which is the source of concern over possible relativistic clock inaccuracies. One could imagine many other points of reference and relative speeds, but the only issue at hand is the *direct relative speed* between clocks on the satellite and on the ground below – the speed of the tape measure.

Therefore, even if speed-related time dilation effects did occur in nature, the *actual* relative speeds in question are 100 times less than *Special Relativity* theorists are using in their relativistic satellite "corrections." Further, since Einstein's *Special Relativity* equations are non-linear, any input velocity errors will produce greatly amplified time dilation calculation output errors, in this case producing a roughly *10,000-fold* over-estimation in the theoretical "time dilation" effect. So, even if Einstein's time dilation did exist, its effect on our GPS satellites would be 10,000 times smaller than the already tiny one currently claimed by *Special Relativity* theorists, and therefore negligible.

This means that the theoretical "relativistic corrections" in our satellite systems are indeed actually *producing* inaccuracies where none would have occurred, which must be counteracted by the various practical correction factors also included. This also shows that one of the often-cited proofs of *Special Relativity Theory* – the proper operation of our GPS systems – is actually nothing of the sort. If anything, the huge errors in even properly applying Einstein's theory have *worsened* the operation of our GPS systems, and certainly provide no evidence whatsoever for the existence of a "time dilation" effect in nature. It is even possible that the erroneous relativistic calculations coincidentally model aspects of a very different phenomenon, as in the earlier example of relativistic calculations for the apparent "relativistic mass increase" in particle accelerators.

And, perhaps most importantly, this logical, conceptual, and practical "time dilation" failure at the core of *Special Relativity Theory* not only invalidates the Twin Paradox thought experiment, as well as the claimed atomic clock and satellite evidence, but even *Special Relativity Theory itself*. This theory leads its practitioners to claim there is an absolute "time dilation" effect in nature to consider or correct, yet this same theory clearly demonstrates that such an absolute effect should *not* occur if "everything is relative." As will be shown shortly, one of the reasons this logical conundrum exists is because the equations of *Special Relativity* can only stand if we are willing to overlook a number of improper mathematical techniques, and even clear mathematical errors, in their derivation. As such, it should not be surprising if logical paradoxes follow, even to the point where they invalidate the very theory that produces them.

Misunderstanding of Half-Life Experiments

Despite these problems with the "time dilation" claim of *Special Relativity*, there are further claims of experimental proof for this phenomenon. Scientists have observed that unstable subatomic particles take far longer to decay when they are accelerated close to light-speed in particle accelerators than when they are stationary. This is taken as proof that time mysteriously slows down for the speeding particles, since such beliefs are now given

serious scientific credibility by the unquestioned acceptance of such theories as *Special Relativity*.

However, according to *Expansion Theory*, these unstable subatomic particles have a composition and nature that should remain stable for longer periods of time if they are compressed by external forces. The details of this particle composition will be explained in the next chapter.

So, it should not be surprising if these tremendous external pressures significantly extend the lifetimes of particles that might be held together longer by external forces. Such experiments need not be interpreted to impart a mysterious "time dilation" effect upon the particles, but merely to provide simple mechanical compression that holds these unstable particles together longer.

Re-evaluating Cosmic Ray Evidence

Another example of apparent "time dilation" effects is thought to exist in speeding cosmic rays. Particles are detected on Earth that should not live long enough to travel from the upper atmosphere, where they originate, to the ground. The current explanation for this unusually extended lifetime is that their tremendous relative speed compared to stationary detectors on the ground means time is drastically slowed down for the speeding particles, allowing them to live long enough to be detected on the ground.

However, the usual lifetimes of such unstable particles cannot be known *individually*, and are only expressed in terms of their *half-lives*. The quoted half-life of a particle is the time it takes for half of a given population of such particles to decay – not each particle individually. So, after one half-life period, half of the original population remains, after two half-life periods one quarter remains (half of a half), one eighth remains after three half-life periods, etc.

This means that, even after a time period *ten times* longer than the stated half-life of a given type of particle, one thousandth of the population should still remain. That is, one in a thousand particles would be expected to live *ten times longer* than the quoted half-life of such a particle even under normal conditions. Therefore, it might not be surprising that some cosmic ray particles from the upper atmosphere live far longer than their stated half-life period – long enough to be detected on Earth. Characterizations of these results as "time dilation" effects may be a case of seeing what one expects to see – a *wishful thinking* fallacy. If one is looking for evidence that the mysteries of *Special Relativity* are actually true, these cosmic-ray results might be misconstrued as such evidence in lieu of the possibility that a large enough initial population of particles may have existed to account for the number that survived.

In fact, once again, this belief is undone by the very theory that spawned it. Since "everything is relative" in *Special Relativity Theory*, it is just as valid to consider the *Earth* to be speeding toward *stationary* particles in the upper atmosphere. In that case, time slows down for Earthbound observers. The particles then decay at their usual half-life pace in their stationary reference frame while only a fraction of this half-life time passes for the speeding observers on Earth. Then, just as the speeding astronaut in the Twin Paradox returns to find a much older twin, the speeding Earthbound observers would encounter an extremely old population of cosmic ray particles, which means that they should all have long since decayed and should *not* be detected.

Even more circular logic can be brought into this situation, since the equations of *Special Relativity Theory* also state that lengths shorten for speeding observers (another mysterious result of the *Special Relativity* equations). Therefore, it could be claimed that the distance to the cosmic ray particles shortens, allowing the speeding observers to detect them before

they all decay. However, if such reasoning invalidates the conclusion that the particles should have long-since aged and decayed, then it also invalidates the aged twin in the Twin Paradox thought experiment.

Such endless, irresolvable circular logic permeates much of *Special Relativity Theory* today. The fact that this mysterious theory simultaneously predicts two completely opposite and irreconcilable physical outcomes is often overshadowed by the intrigue of claims that experiments validate its predictions. It is this type of logical oversight and selective evidence, combined with the now towering reputation of its creator, that has caused *Special Relativity Theory* to gain such unquestioned acceptance in our science today.

Despite the fact that both the thought experiments and the physical experiments commonly used to support *Special Relativity Theory* are either highly questionable or clearly flawed on closer examination, it might still seem that this theory must at least have solid mathematical support. After all, the equations of *Special Relativity Theory* were derived and presented in the logic of mathematics for all to see. Indeed, this mathematical support is open for inspection, as will be done now with Einstein's own derivation from the appendix of his book, *Relativity: The Special and General Theory,* published in 1961:

ERROR

Fatal Flaws in Einstein's *Special Relativity* Derivation

To support his *Special Relativity Theory*, it was imperative that Einstein presented viable mathematical backing of his ideas and claims. Yet, upon examination of Einstein's own account of this supporting logic, numerous fatal flaws can be readily identified. Of these flaws, perhaps the most critical of all is an improper mathematical manipulation that can be clearly seen in the following simplified example of the logic found in the derivation to follow shortly:

Line 1: $x = a + b$ – original expression, no speed of light
Line 2: $x = a + b * (c^2/c^2)$ – "harmless" multiplication by 1 (c^2/c^2)

Now, let the symbol y stand for the expression ($b * c^2$)

Line 3: $x = a + y / c^2$

We begin with a line that has nothing to do with the speed of light, either because the speed-of-light term was never present or because it dropped out of the derivation by this point – both reasons are functionally equivalent. Next, we arbitrarily choose to multiply one of the terms in Line 1 by the expression c^2/c^2. The justification for this manipulation is that it is merely a harmless multiplication by 1 since any expression divided by itself is 1. Then, to keep the expression, c^2, from immediately canceling itself out again – top and bottom – we group all of the top symbols together and hide them from view inside a new variable, y. This hides the upper c^2 expression and leaves the lower one alone in plain view, transforming the original expression in Line 1 into one that now appears to be intimately connected with the speed of light since it now has a term that is divided by c^2.

Of course, this is merely a contrived sleight of hand that can be easily exposed. For example, why was the multiplication by 1 done in the particular form of c^2/c^2? Since this rather odd way to represent the value 1 was completely arbitrary, why not e^3/e^3 or $\sqrt{f}/\sqrt{f}$? For that matter, why even perform such an odd, arbitrary manipulation at all, especially since it introduces the very real danger of confusing this arbitrary symbol, c, with the symbol c that *did* represent the speed of light earlier on, but which naturally *dropped out of the derivation*?

This raises the crucial point that an arbitrarily introduced symbol, c, is as meaningless as the symbols e or f would have been had they been chosen. The fact that c is often used to represent the speed of light (and that it *did* earlier in the derivation) does not mean it

always does so whenever and however it appears. For example, Pythagoras' theorem for the hypotenuse of a right-angled triangle, $a^2 + b^2 = c^2$, has nothing to do with the speed of light, but only with the sides of a triangle. The symbol, ***c***, only represents the speed of light if that representation follows seamlessly from the logical structure and flow of a derivation; otherwise, it is just an arbitrary symbol – a mere letter randomly chosen from the alphabet. Yet, this is precisely the logic used by Einstein to ensure that the "speed of light" was re-introduced into his derivation after the *true* speed-of-light term *dropped out entirely*.

One of the reasons this fatal flaw has gone unnoticed by the scientific community is because Einstein omitted the two key lines showing the speed-of-light term dropping out, and the subsequent improper operation to artificially add it back. As a result, on the surface it appears as if the same speed-of-light term continues seamlessly throughout the derivation, though this is far from the case. In actuality, the "speed-of-light" term in the final form of Einstein's widely accepted *Special Relativity* equations is merely a random, meaningless letter from the alphabet – and nothing more. For those interested in the mathematical details, the first key section of Einstein's derivation is presented below in simplified form, along with analysis exposing not only the above fatal error, but numerous other critical errors and improper operations leading up to it as well.

OPTIONAL MATH

(x, y) Detailed Analysis of Flaws in Einstein's Derivation

A simplified summary of the key points in Einstein's derivation is given below, with the full derivation available in his book. We begin with the classic equation of motion, *distance* equals *time* times *velocity*:

$$d = t\,v$$

This equation is presented twice, once for a stationary reference frame (subscripted ***s***) and once for a moving reference frame (subscripted ***m***); and, in both cases, the speed of light, ***c***, is substituted as the velocity parameter:

$$d_s = t_s\,c$$
$$d_m = t_m\,c$$

These two equations are meant to represent two different perspectives, one stationary and the other moving, much like the earlier thought experiment with the light beam and the speeding spaceship. Since Einstein's *Special Relativity Theory* allows distances to shorten and time to slow down, time and distance are also subscripted to show that they may vary from the *stationary* to the *moving* reference frame. However, since Einstein further postulated that the speed of light never varies in *any* reference frame, the constant, ***c***, has no subscript.

Although this is a reasonable enough beginning, the logic soon becomes derailed by a series of arbitrary values assigned to different variables, while not fully following through on the effect of these assignments. As a result, new expressions arise, mixed in with old expressions that should have been updated but were not, making them invalid and the end result meaningless.

The corrupted operations that now follow from such errors are further distorted by more arbitrary value *reassignments* to some of these same variables, again without properly following through on the results of doing so. Often entire expressions that must now be updated before being used further are instead left unchanged. Some examples that can be found in the full derivation are:

- Setting $t_s = 0$, but ignoring that, according to the earlier equation, $d_s = t_s c$, this also means $d_s = 0$.
- Setting $d_m = 0$, but ignoring that, according to the earlier equation, $d_m = t_m c$, this also means $t_m = 0$.
- Setting $d_m = 1$, but ignoring the earlier assignment of $d_m = 0$ and the fact that this earlier assignment led to other expressions that are no longer valid if d_m is now arbitrarily changed to 1.

These errors produce a mixture of variables that are only partially updated, with further distortion due to entire expressions that are also only partially updated.

Yet, despite these fatal problems in the derivation already, the most significant error is yet to come. This error is not readily seen in Einstein's published derivation since the two key lines that would clearly show the improper manipulation are omitted. Nevertheless, it is straightforward to recreate these two omitted lines. We begin with a key line that arises from an odd leap of logic that is difficult to follow from the preceding line. This key line (in simplified form) is:

Key Line: $d_m = \left(\frac{v^2}{c^2}\right) d_s$ **– line with unexplained leap of logic**

This is a sizable and largely unexplained leap of logic from the line that precedes it. This is also a crucial line since the expression, v^2/c^2, is the key term that ends up in the final equations as the only difference between the pre-existing *Relativity Theory* and Einstein's new ***Special*** *Relativity Theory*. Although Einstein states that he made this leap of logic by substituting an expression from earlier in the derivation, he does not actually show his work. Below is this same leap, *but with the two omitted lines now shown* (again, in simplified form):

Omitted Line: $d_m = x\, d_s$ **– speed of light, *c*, *dropped out entirely***

Omitted Line: $d_m = \left(\frac{xc^2}{c^2}\right) d_s$ **– next line with improper attempt to re-introduce speed of light using c^2/c^2**

And, since $xc^2 = v^2$ (from earlier in the derivation), this gives:

$d_m = \left(\frac{v^2}{c^2}\right) d_s$ **– Key line (shown earlier), but with the two previous omitted lines now shown above**

Why were the two above omitted lines not shown? It is very significant that these two lines show the speed-of-light term, ***c***, dropping out entirely, then a completely arbitrary multiplication by c^2/c^2. Although it could be argued that this is merely a harmless multiplication by the value 1, the important point is that this is an *arbitrary, contrived attempt to reintroduce the speed of light*. Prior to this, the speed-of-light constant, ***c***, which was substituted into the velocity term at the start of the derivation, had dropped out of the derivation *entirely*. This means the derivation had stopped being one involving the speed of light in any fashion. Yet, the steps taken in the omitted lines are a deliberate (and erroneous) attempt to arbitrarily add it back in. And, since the symbol, ***c***, was essentially merely drawn in, and did not follow from the original flow of the derivation, it cannot be considered anything other than an undefined symbol – merely the letter '**c**' in the alphabet – and

nothing more. Consequently, this is actually all that appears in Einstein's final *Special Relativity* equations, rendering them meaningless.

Light-Speed is Not a Limit – "Warp" Speed has arrived

As the preceding analysis shows, there are numerous improper mathematical operations, as well as fundamental fatal flaws, at the very heart of Einstein's own derivation of his *Special Relativity Theory*. We have grown so accustomed to hearing about the thought experiments, paradoxes and mysterious experimental evidence supporting *Special Relativity Theory*, that it has all become accepted and commonplace – almost passing as commonsense itself. As a result, it can be difficult to imagine how there might *not* be a universal speed-of-light limit on objects, forgetting that there is actually no clear reason *for* such a limit. There was no clear need to introduce this concept in the first place a century ago, and we have struggled to maintain support for it – and all the mysteries following from it – ever since.

In actuality, there is nothing stopping objects from traveling well beyond light speed – to any arbitrary speed at all in fact. We won't achieve this in our current generation of particle accelerators that push particles along using a method that has an inherent speed-of-light limit itself, and there are no other processes on the planet that would cause objects to attain such relative speeds. So far, our spaceships have carried a limited amount of chemical rocket fuel and have used the "accelerate-and-coast" approach to traveling great distances – not even attempting to reach such tremendous speeds. But then, if there is no such speed limit in the universe, why don't we see objects of such tremendous speed in space?

There is actually no particular reason why such speeding objects *cannot* exist, although there is also no particular reason to *expect* to encounter objects of such tremendous speed relative to us either. Since our solar system likely formed from a single swirling disk of gas and particles, all early matter in our solar system would have swirled about more or less in unison. As time progressed, this matter congealed into planets of different orbital periods, and random collisions sent chunks of matter off on collision courses with still other objects, but there is no reason to expect this process to result in relative speeds that exceed or even approach light-speed. Any object having such a rapid speed relative to us would likely have to originate outside our solar system, and perhaps even outside our galaxy since our galaxy also may have formed from an enormous disk of gas and particles rotating in unison.

So, while there is no physical law prohibiting an asteroid traveling at ten times the speed of light from hitting the Earth without warning, there is no reasonable expectation of such an event occurring either. Also, even if such an object *did* careen through our solar system, it would be extremely unlikely to hit a planet. This is because at such tremendous speeds an asteroid would essentially fly through our solar system in a straight line, perhaps slightly deflected but essentially unaffected by the gravity (i.e. expansion) of planets. And, the planets are so tiny and widely spaced relative to the overall solar system that our solar system is essentially empty space from the perspective of such an object speeding through in a straight line. It is only the familiar, slower-moving asteroids within our solar system that are effectively attracted to planets.

This also means the dream of "warp-speed" space travel – in the sense of multiples of light-speed – is not science fiction and does not require some exotic or futuristic new physics or technology. Faster-than-light travel has been within our grasp ever since the early days of the space program. We simply have not achieved it because we haven't *tried*, and we haven't tried because *Special Relativity Theory* said we couldn't – and we believed it. All that is required is continuous acceleration from an extended fuel burn; a spaceship would accelerate faster and faster as its fuel burns, just as common sense tells us it should. The spaceship will not undergo a mysterious "relativistic mass increase" as it gains speed, it will

not need to burn more and more fuel to compensate for such "mass increase," and it will not have any special difficulty approaching or exceeding the "light-speed barrier." The only question about our ability to achieve or exceed light-speed – relative to our solar system for example – is whether the spaceship can carry enough fuel to reach such speeds before exhausting its supply.

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