IN LIGHT OF PHYSICS

Bob Ticer

Introduction

Rene Descartes philosophized, "I think, therefore I am . . . . If I am deceived of my existence, then I must at least be the Deceiver." He therefore confirmed his existence as an observational fact by way of his own awareness of himself.

Am I alone?

If something resists my thoughts and actions, as consequential to either pain or pleasure, then there is an objective world about me. I am not alone. We therefore exist.

I am witness to existence, but unless I am all knowing and in denial of it I know not how either existence or a state of consciousness is possible. I only assume we are parts of creation, as by way of a Supreme Being or otherwise from what already exist.

Can something exist without an awareness of it? Never mind. What does it matter? This book is about the physical world in which we live. The mind-matter duality is not here a concern.

I further perceive that material existence is comprised of some sort of substance that exists in space and time. This substance appears to vary in shape, size, quality and so forth, but philosophers throughout history have attempted to explain everything that exists in the physical world as part of a primary substance in space that became referred to as the ether.

Assume all physical existence in our world is indeed comprised of primary substance. What, then, can we further determine with regard to its fundamental properties? It would seem this primary substance only moves through space as nothing more than a flux colliding with itself, as to separate from and combine with other primary substance. To accomplish this feat it must be intrinsically elastic. If to the contrary it is intrinsically inelastic, then all interactions within it cancel out.

For primary substance to maintain continuous interaction by way of each parts linear, external motion it need not only be elastic, it needs to be infinite in extent as well. Otherwise, for it being primary, thus having no internal means to reverse course, it would tend to separate into infinite space where it would never have the means to turn around and come back to interact with itself.

Another condition of the ether to ponder is whether all of space is completely filled with it or only partly filled with it.

Descartes and other thinkers assumed space is a plenum, as to be completely filled with substance. How, then, are various densities possible of ordinary matter essentially comprised of the ether, which is everywhere identical in form and composition? If the medium fills up all of space, then there is no wiggle room for a wave-like action to occur from its distortion, as in the manner sound propagates through air by way of the compressed state of air molecules advancing forward. An all pervasive medium as that of the ether is thus contrary to one such as air for sound.

It is no wonder the early Greeks regarded our world as illusionary. As for the plenum, some of them, such as Aristotle, conceived of circular motion in it as only possible. By way of circular motion and elasticity (as to constitute conservation of energy) the ether maintains its motion through space.

Descartes also assumed the ether moves by way of circular motion to comprise a complex system of vortices with different sizes and rotational speeds. They vortices rotate separately, but they contain other vortices inside themselves that they exchange with other vortices, and so on, with endless possibilities. The number of either same size or different size vortices in one region of space can thus be denser than those in another region of space. Since the overall density of the primary substance is still the same everywhere in space, the objective world we experience somehow comes about from the interaction of vortices by way of their continuous motion.

We are thus inclined to explain all of creation as something already created out of what already exists ad infinitum.

Ways to Explain Nature

Some things we cannot explain; others we can, but whose existence we cannot prove. We cannot, for instance, explain the existence of the ether, if there is indeed a primary substance from which all things form, but we can use it to explain how constant light speed is possible. An explanation by it, in fact, was given by Hendrik Antoon Lorentz, a physicist born in the 19th century, but the equations of his theory revealed a unique cancellation of effects whereby the absolute state of rest in which the ether was assumed to reside becomes indeterminate. In effect, it is invisible to us. Because it is unobservable at most, it was declared non-scientific. As far as physics is concerned, the ethereal medium does not exist.

The concept of the ether is now rejected because physicists in general only accept what pertains to the observable world in which we live (as stated in the Copenhagen Doctrine of the 1930s that was agreed on by the top physicists of the time). Einstein was already in conformity with this doctrine, regarding the ether as superfluous to the mathematical formation of theory. In 1905 he thus postulated the constant speed of light as a fact of nature. He then, without reference to the ether, formulated his theory of special relativity to describe space, time and motion of physical events according to the constant speed of light. He further went on to explain the nature of gravity as space-time curvature due to the presence of mass.

Einstein later suggested the ether could be used as a means for understanding theory, but most of his colleagues trumped that suggestion. This book agrees with Einstein inasmuch as the ether can be used to help us understand the historical development of modern theory. In effect, the metaphysics is used to explain the physics.

By special relativity observers in relative motion compare events according to constant light speed, but effects of light on our perception of the material world is more general according to the conditions of general relativity. Since the path of light is curved in a gravitational field, as due to the presence of mass warping the space-time continuum, as confirmed by observing the displacement of stars from light passing by the sun during a solar eclipse, then space is curved as well, such that special relativity is only valid as a special condition insofar as space-time curvature in negligible in effect.

In contrast to describing the world as we see it, the explanation of constant light speed by way of the ether refers to something that is not observable. Still, however, it played a historical role in the development of modern theory. It allowed, for instance, a wave theory of light to develop, as required of a medium in matter-free-space for light to propagate. Later, matter was also shown to possess wave-like properties, but both matter and light were detected as discreet units of particle-like energy. A theory of quantum waves developed. However, although wave equations are still an essential part of theory, physicists decided to interpret them as probability equations, thus giving no reference to the ether.

Actually a wave equation is more generally descriptive of a periodic occurrence of an event than just the manner that material waves appear to us. The event can cause wavelike action to occur, as from its own repetition, but it need not actually manifest as material waves.

It is also possible for waves to form from particle interaction and it is possible for particles to form by waves. Sound waves, for instance, arise from the disturbance of the equilibrium state of air molecules. Particle formation from wave action is more complex. Waves can carry momentum to reflect from a surface of a denser medium, as by exchanging momentum with it, pushing it one way to move in the opposite direction. However, waves and wavelets spread apart to have less energy per volume of space if particular properties of their medium are of three-dimensional space. Light intensity also spreads the farther it propagates, but light is also observed to have particle-like effects, as they are detected as discreet units of action called photons. Light also behaves according to wave action, as typical of diffraction, polarization and so forth.

It was discovered that matter also behaves according to both wave-like and particle-like properties. Louis de Broglie provided us with a theory that is consistent with both Einstein’s special theory of relativity and with the quantum nature of theory. De Broglie explained the particle-like action of the electron circling around the nucleus of the atom as occurring similar to the beats of musical notes. Edwin Schrodinger expanded on de Broglie's theory to form a theory of Quantum Mechanics, whereby he explained quantum effects in accordance with wave-packets. However, although it is theoretically possible for energetic cloud-like interactions of wave packets to result in particle effects, Schrodinger's wave equations were interpreted as probability equations by other physicists.

The results are not the same as that of the odds of flipping a coin. The odds for a coin to come up either heads or tails is the same either way for any amount of tosses, but it could turn up say only three times out of ten particular tosses. In contrast to the coin flip, if the quantum-wave equations indicate a particle effect should appear at a particular place and time seven out of ten times, then it occurs, as predicted, seven out of ten times. Nonetheless, as of yet anyway, we do not know for sure whether underlying sources of the predicted effects are particles or waves.

Modern Cosmology

Two years after finalizing general relativity Einstein proposed a cosmology. Because space is curved, it can curve in on itself. Einstein thus proposed a finite universe that is static. It neither contracts nor expands. He decided it was closed, as neither to absorb nor emit energy. (This condition of closure seems necessary because, in theory, any finite part of infinite space can curve in on itself. If it is able to absorb outside energy but unable to give up energy, then it could continually gobble up the rest of the infinite universe.) However, Einstein realized a finite universe could also contract by way of its own gravity. He therefore added a constant to his field equations. (This is a process of integration natural to the calculus. He had previously merely assumed the value of the constant is zero.) The cosmological constant, as it is now referred to, was interpreted as a mysterious repulsive force counter to gravity. Einstein assumed it maintains the stability of his finite universe.

Alexander Friedmann examined Einstein's result and found that the equations indicated Einstein's finite universe was still unstable. It was now able to expand as well as contract. Einstein had no remedy to Friedmann's find. Alternatives were that either the universe is infinite in extend or it is finite and unstable.

Along with Friedmann's find were new discoveries by astronomers. They discovered Doppler shifts in the light spectrum of starlight. Indications were that starlight from more distant stars tended to be, on the average, shifted more towards the red end of the spectrum. Calculations by Edward Hubble, in particular, indicated this red shift is linear with distance. Since one cause of a red shift could be a recession between the light source and the observer, indications are the universe could be finite and expanding.

A number of models of the universe are still possible. One that has become most popular among physicists is the big bang theory whereby the finite universe is expanding by way of a cosmic explosion. Other models in consideration are plasma cosmology, tired light theory, and a standing wave theory. Typical of these other theories is that the observable universe is only the visible part of an infinite one.

Nowadays big bang cosmology is most popular among physicists. It assumes the universe is not only finite in space and time; it also has a beginning, as about ten billion years ago when it was created from a cosmic explosion of some origin unknown to us. After all, explosions occur. There are atomic bombs, volcanic eruptions, the supernovae of exploding stars and so forth. Why not can the universe itself be a finite, erupting event?

For the most part big bang theory is consistent with observation. It is not only consistent with the Hubble Constant, which is the constant of proportionality by which Hubble determined the amount of red shift that occurs with distance, it further resolves Olber's paradox. According to the paradox there should be no night sky from an infinite universe of countless stars lighting up the sky from every direction. Big bang cosmology avoids the paradox since a finite universe only contains a finite number of stars.

Big bang cosmology also explains the existence of a background radiation in the microwave range of the light spectrum moving every which way. This microwave background radiation appeared on early televisions sets when they were left on after the broadcast station went off the air. The temperature and density of the radiation have been measured. The results appear to be in agreement with big bang theory. According to theory, the existence and temperature of this background radiation, as it moves evenly every which way in space, occurred from the big bang before its energy cooled enough for the formation of matter. Furthermore, as the universe continues to expand, the cosmic background radiation continues to cool, as predicted by theory and as indicated by observation. The theory is thus further verifiable in the course of time.

Big bang cosmology is also formulated in a way that it is consistent with Einstein's general theory of relativity. This consistency exists insofar as it includes solutions to Einstein's general field equations. One solution is a metric derived by Alexander Friedmann in showing that space-time within a finite universe is unstable instead of static, whereby it either contracts or expands, such as caused by a cosmic explosion.

Another solution to Einstein's field equations is a metric derived by Karl Schwartzschild. It contains a singularity, which is the basis of black hole theory. However, both Schwartzschild and Einstein regarded the singularity as only an abstract condition of the equations. They were of the opinion it does not actually exist in the real world. Einstein was firm in this belief, as he defended his position for years in a debate with Oppenheimer, who was one of the founders of black hole theory. Nonetheless the metric is still used to describe a finite universe full of black holes evolving, itself, from a singularity, as the origin of creation.

How the big bang derives from general relativity is with regard to how metrics allow the dynamics of the universe to evolve. Relativity theory is essentially a description of space, time and motion, and a metric is what compares distances and times of one set of coordinates to those of another. Einstein's general field equations provide conditions of pressure and density for a cosmological equation of state in analogy to that of an ideal gas. Friedmann assumed such conditions apply on a large scale. On a small scale, as experienced locally within Earth's immediate surroundings, they differ, but the differences even out within volumes of space billions of miles in diameter.

Lemaitre, Robertson and Walker reformulated Friedmann's metric into the FLRW metric. It incorporates a Cosmological Principle whereby the universe is assumed to be on the large scale homogeneous, and also isotropic, as to appear relatively the same in all directions. This metric is also assumed to be time dependent, and since light takes time to reach us from afar, the theory therefore provides us with a means to discover how the universe evolved from the beginning of time. It takes the universe back to a singularity where the laws of physics no longer apply.

Since big bang theory proposes a creative beginning to the universe we are left to ponder whether time is finite or infinite. What caused the big bang? What happened first, what occurred before it, and so on? Are such questions beyond the physics, as is the singularity, or are they pertinent to a challenge of theory.

Challenging Theory

Physical science has evolved from the testing of speculative ideas. Some of these ideas had even been decreed unchallengeable. Einstein, for instance, challenged the concepts of absolute space and absolute time that were assumed by Newton as true by intuitive reason. Hence, Einstein's theory of relativity, being able to explain the results of experiment whereby space and time are described as relative instead of absolute, modified Newtonian Mechanics, which had reigned supreme for centuries.

Theories are based on one assumption or another that is either true or false. In some cases false assumptions lead to correct outcomes. Newtonian Mechanics, for instance, is still used for space exploration even though the math involved in the predictions is formulated according to the concepts of absolute space an absolute time. Einstein's more accurate theory of relativity replaces the concepts of absolute time and absolute space with the concept of relative space-time, as determined by how light is observed, but Newton's theory proves to be accurate enough and simpler to use to guide spacecraft through our solar system.

Crucial to the truthfulness of theories are still the assumptions on which they are based. Laws of nature, for instance, are integral parts of modern physics, but they are still assumptions. What distinguishes them from other assumptions is that they are firmly founded on observation.

Some laws become more firmly established than others. Since the constant nature of light speed has been confirmed by experiment, relativity theory is firmly established, yet it too is superseded by another theory. Its validity was challenged by Einstein himself advocating instead that space-time is curved, such that it is more accurately described in accordance with the equivalence of inertial and gravitational mass (the principle condition on which Einstein's general theory of relativity is based). This principle of equivalence has also been firmly established by experiment.

More controversial is big bang cosmology. It is accepted by most physicists because it provides a frame of reference for relating observation along with other theory, but it has hardly been shown to be conclusive. To the contrary, it has been modified with one assumption after another in order to remain consistent with observation. New calculations of the red shift, for instance, now indicate that the rate of expansion of the universe increases with time. To explain this increase it is assumed there is some kind of dark energy filling the otherwise void of space left by the vacation of matter.

The assumption there is dark energy is not unreasonable, as in view of Einstein's cosmological constant as a countering force to gravity, but the applications of the laws of physics are now more in question. The Hubble Constant, for instance, might not be a constant after all. Its value seems to increase in time, indicating it is still in the process of exploding, if indeed it is finite and expanding as such.

There are more questions to consider. Is the increase in the rate of the Hubble Constant itself constant, or does it change in time and location? With Einstein's cosmological constant and the possibility of the existence of dark energy, Newton's gravitational constant could even be in doubt.

If we had a billion years to wait and see how the universe changes in time, or had ample time and effort to send a probe out into deep space to see how the universe appears to change perception at different location, we might see the universe in a new light. As for now we are more or less inclined to speculate on the possibilities.

Big bang cosmology might be ultimately correct, but until it proves itself as such there are other theories still worthy of consideration. Hannes Alfven, for instance, developed the theory of plasma cosmology whereby computer models from the results of studies of plasma in the laboratory are projected to successfully describe the behavior of the heavens more in general. Alfven's ideas have been advanced by Eric J. Lerner, as defended by his book The Big Bang Never Happened. Another theory closely related is tired light theory. It was originally proposed by Fritz Zwicky to explain the cosmic red shift not as a recession of the stars but as the partial absorption of the light. It has more recently been advanced by Lyndon Ashmore, who expounded it in his book Big Bang Blasted. According to him it is the cosmic plasma that partially absorbs the light. Big bang cosmology is also opposed by Milo Wolff, as he offers a wave theory to describe the nature of a finite cosmos within an infinite one, as given in his book Schrodinger's Universe.

Consistency of Theory

Physics has developed by means of physicists challenging one theory after another to replace them with better ones. This technique assumes we come up with better ones. Here, to the contrary, we have only big bang and contending theories. Some day new observation might better support one of these theories in particular. For now they are all candidates. Any of them, or even parts of them combined into a new unified theory, could be useful. The aim here is therefore not to discard any of them.

What we can do is articulate our speculation in a better light, as to reexamine the development of theory from the past to the present in order to determine its consistency with physics in general. Since new ideas can challenge laws of the past, as with the Hubble Constant and so forth, this book reviews and elaborates on theory as far back as with impetus theory. From it came the laws of motion. Wave theory emerged, and so forth.

In some ways early conceptions of the universe have been upheld. The notion that space is filled with substance, for instance, is supported by observation, as with light of various spectrum emitted from the stars, of the Cosmic Microwave Background radiation scattered about the cosmos, of a multitude of such subatomic particles as muons bombarding us from outer space. Rather than the vastness of space being mostly empty there is the belief by some physicists that it is filled with plasma, as mainly a freer state of electrons, and possibly positrons as the antimatter of electrons. All this proposes questions that had been similarly asked in the past. How is it that the planets appear to move so freely according to the laws of motion put forth by Newton, Einstein and other physicists?

This question is similar to the one of asking how the planets can move as freely as they appear to do if space is filled with ether. To answer it, consider the origin of matter is ethereal waves. Matter therefore simply propagates through the ethereal medium as wave energy.

To follow up on this answer we consider wave theory, such as the one proposed by Milo Wolff. He predicates his theory on the principle of simplicity. He assumes all phenomena are explainable by way of wave action. Gravity, for instance, simply results due to a decrease in amplitudes of standing waves compensating for an increase in density of wave centers, which we perceive as the accumulation of mass.

The use of the principle of simplicity to justify theory is not without precedence. Copernicus used the principle in arguing that the heliocentric system of Earth and the other planets revolving around the sun is a simpler description than was the more complicated system of epicycles used at the time to describe the sun and planets as revolving around Earth instead.

Einstein also provided a simple explanation of gravity. According to general relativity everything simply follows space-time curvature, which is due to the presence of mass warping space-time. However, if you want to know in more intricate detail how the presence of mass warps space-time, then the explanation is not as simple. Similarly, if you want to know in more intricate detail how standing waves between wave centers increase in density and decrease in amplitudes to result in gravity, then the theory is not as simple.

This is not to conclude that gravity cannot be explained by way of standing waves between wave centers. We are only inclined to seek a more detailed principle of action to explain the process. The explanation below, for instance, is an elaboration of the main idea.

The constant back and forth wave action along a rope held in place is the typical action of standing waves, which differ from waves emitted freely from their source of action. As with the three dimensional state of the cosmos, say standing waves centers are equilibrium states of matter, as maintaining states of separation by way of vibrant action of standing waves between them. Let the resistance of wave centers also convert part of the standing waves into another form of energy. We thus have two different forms of wave action: standing waves and waves freely emitted here and there. The wave centers become, in effect, the medium of propagation for this new form of energy they converted from the standing wave energy.

Gravity can occur from the conversion of standing waves into free waves if the conversion rate is proportional to the number of wave centers filling the particular volume of space in which they reside. It can simply be a decrease in repulsive energy of the standing waves as wave centers tend to condense in order to fill the otherwise vacuum state from the departure of the freely emitted waves they create. The magnitude at which they tend to condense occurs according to the rate of conversion, which depends on the relative distance, density and tension between wave centers.

This explanation of gravity is consistent with Einstein's inasmuch as it merely explains how the presence of mass can warp space-time, but the real success of Einstein's explanation was that it provided new information of observational consequence. It predicts as confirmed by observation, for instance, starlight passing closely by the sun on its way to Earth results in the observational position of the light source (a star) being displaced, as for light following its natural path of space-time curvature. To be scientifically useful, an explanation of gravity in more intricate detail must also provide confirmable information about the world in which we live.

To be fair, this wave explanation of gravity is not complete. When masses separate by means of relative motion, the gravity between them decreases, such that the rate of standing waves converting into free waves needs to decrease, or even reverse to convert free waves back into standing waves. What this reverse mechanism is and how it converts free waves back into standing ones has yet to be explained.

Other explanations of gravity are possible as well. Light energy, for instance, could clear the path for gravity to occur. In plasma cosmology, for instance, electrons tunnel their way out of the more dense regions of mass to create a vacuum state in their wake. Plasma is a freer state of electrons, and electrons interacting with matter comprise electromagnetic fields for the emission and absorption of light to occur.

The amount of a particular radiation occurring between mass could very well be cause for the amount of electrons present in a plasma state in equilibrium with the state of matter. It also suggests a connection between gravity and electromagnetism. In view of this it is interesting to note that a particular value of the Hubble Constant, as consistent with observation, times the diameter of the nucleus of the hydrogen atom divided by light speed equals the ratio of the gravitational and electric forces between the electron and the proton:

$$\frac{H_o(2r_n)}{c} = \frac{Gm_pm_e}{e^2}$$

In this equation the Hubble Constant H_o is 70 kilometers per second at a distance of one hundred million parsecs from us, the nucleus of the hydrogen atom had a diameter equal to $2r_n$ = 5.76 X 10^{-12} centimeters, the speed of light is c = 3.0 X 10^{10} centimeters per second, the gravitational constant is G = (6.67 X 10^{-8} cubic centimeters per one gram of mass times one second squared, the mass of the proton is m_p = 1.67 X 10^{-24} grams, the mass of the electron is m_e = 9.11 X 10^{-28} grams, and the electrostatic unit of charge squared is e^2 = 23.07 X 10^{-20} cubic centimeters times one gram of mass times one second squared. One million parsecs equal 3.09 X 10^{17} kilometers. Dividing H_o by 3.09 X 10^{17} kilometers and multiplying it by 5.76 X 10^{-12} centimeter obtains $H_o(2r_n)$ = 1.32 X 10^{-29} centimeters per second. Hence

$$\frac{(1.32 \times 10^{-29})}{3.0 \times 10^{10}} = \frac{(6.67 \times 1010^{-8})(1.67 \times 10^{-24})(9.11 \times 10^{-28})}{23.07 \times 10^{-20}} = 4.4 \times 10^{-40}$$

This mathematical result indicates gravity results from plasma in a state of electrostatic equilibrium absorbing energy of light that is emitted from matter. It provides an explanation of gravity similar to the one given of standing waves. It is also consistent with the tired-light theory proposed by Lyndon Ashmore. By his theory electrons in their plasma state absorb part of the light energy passing through interstellar space. Since light loses part of its energy along the way, the red shift in the light spectrum from more distant stars is explained.

This partial light energy absorbed by the plasma also becomes the Cosmic Microwave Background energy. We thus have electrons tunneling out from the vicinity of matter, producing the gravitational effect in their wake and an intergalactic medium of plasma, absorbing light energy and producing the Cosmic Microwave Background radiation. What is yet to be explained is what becomes of this radiant energy continually absorbed by the plasma.

Perhaps it is absorbed anew by matter interacting with plasma in the manner gravity was previously explained by the conversion of standing waves. If this possibility is worthy of consideration, then the next step is to test its consistency with the laws of physics in general.

One law to consider is entropy, which is the amount of energy an isolated system has that is unavailable for internal work on the system, as for self-change.

Let an isolated system consists of two rocks relatively at rest with each other. If they are of the same temperature, heat energy from one rock cannot perform work on the other. This useless energy is entropy.

Entropy is the amount of energy an isolated system has that is unable to do mechanical work. A statistical concept of entropy was also later proposed by Ludwig Boltzmann in 1877. It assumes all systems tend towards their most probable state of order, which is an irreversible state of equilibrium constitutive of maximum entropy. He also defined entropy as a system's amount of order, as in contrast to disorder, which is what is required to produce work, as occurs between systems with a difference of temperature.

The law of entropy is consistent with big bang cosmology inasmuch as the universe expands to create a heat death. It thus radiates its energy outward to be non-useful. However, did entropy decrease by way of the original explosion, as to perform work in its creation of the universe? If so, then it might be in contradiction with the second law of thermodynamics, which states that the entropy of an isolated system cannot decrease on its own accord, as is the case of an initial creation of the universe from the big bang.

Big bang cosmology has also been modified, as with the inclusion of dark energy to explain why the rate of expansion of the universe now appears to be increasing with time. As a consequence, the big bang did not just occur in the past; it explodes to this day. Is, then, entropy increasing or decreasing? The answer seems to depend on how dark energy, if it exists, determines the fate of the universe, whatever that truly is.

Perhaps Boltzmann erred in assuming the most probable state of the universe is maximum entropy, the heat death. Perhaps entropy is only a local condition. Friedmann, for instance, proposed a solution to Einstein's general field equations by assuming large scale conditions of an ideal gas differ in nature from what is perceived locally about us. Entropy, too, could have a limiting aspect, as to be more consistent with Friedmann's metric than with Boltzmann's cosmology. Therefore, a most probable state of the universe could be a recycling state instead of a heat death. The universe could very well be in such a state of equilibrium. The gravitational force inside a star can thus generates pressure and heat. It either emits light or explodes. However, gravity also attracts matter to bring it together to create more pressure. On a large scale, then, the universe could very well be recycling in a manner consistent with a steady state cosmology.

We thus borrow from wave theory, plasma cosmology and a tired light theory to arrive at a steady state cosmology. Steady state cosmology has been discarded by most physicists, but the one discarded assumes the universe is finite, as does big bang cosmology. Another possible universe to consider is one that is only finite as the observable part of an infinite one. However, to show how this universe is consistent with general physics is still a work in progress.

There are still many questions to answer. Einstein rejected the idea that the singularity applies to the real world. If it does not, then black holes are not real. However, astronomical observations indicate they do exist. In any case, if they do not exist, why does not light from the past that entered into dark, massive regions of space eventually come out of it?

A possible answer to this question is space-time of a gravitational field is relatively extended in comparison to that of gravitational free space. If light is partially absorbed by plasma at a constant rate in proportion to space-time, then more of it is relatively absorbed in a gravitational field than in gravitational free space. The singularity is therefore not a condition for the existence of an actual black hole; it is only a limiting aspect for finite universes to exist as observable parts of an infinite universe.

In relativity theory, mass in either relative motion or a gravitational field is relatively greater than if it is relatively at rest in gravitational free space. How does this relative increase in mass come about from a change in relative motion or a gravitational field?

Since our perception of the material world is conditional to how it is affected by light, a likely answer seems to be that the relatively greater mass absorbs light energy. However, photons of light quanta are particle-like effects, and it can be shown that the increase in relative mass, as from a collision with a particle, photon or otherwise, cannot occur from the total absorption of the particle. Rather, for matter to obtain relative motion and increase in relative mass by absorbing light energy, and also be consistent mathematically with the law of conservation of momentum and the law of conservation of energy, part of the light needs to be reflected. It is thus consistent with relativity theory, even though it is contrary to the nature of the quantum, that the plasma of intergalactic space absorbs partial light quanta.

This result is not really contrary to quantum theory. The spectrum of light from a source in relative motion is Doppler shifted, although matter absorbs and emits discreet levels of energy there is a continuous range at which these discreet levels vary along with relative motion.

These are only a small number of countless questions to ponder in order to show consistency of theory. The aim of this book is to review and elaborate on the development of physics from impetus theory to present day cosmology. The metaphysics is included for understanding it in a better light.