

Modern Physics Unknown to Albert Einstein

The Hall Theory of Photon structure

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This paper introduces a radically new theory of multi-field photon structure.
This theory is named:

HALL PHOTON THEORY.

Hall Photon Theory (HPT) is a radically new theory concerning the physical structure of photons and electromagnetic waves. This theory is solidly based on a careful review and analysis of several well-known and famous experiments in the field of physics. HPT successfully explains all known physical interactions involving photons, and also predicts the existence of additional physical interactions involving photons.

HPT hypothesizes the existence of physically real photons that contain at least three physically real fields. The theory also suggests that the photon may contain additional physically real excited states, and may also contain additional physically real fields not yet quantified. Two of these fields are the well-known electric and magnetic fields described by Maxwell's four equations. The new physically real fields, hypothesized by Hall Photon Theory (HPT Theory) are named the Star Shine fields, and are identified in

the equations in this document as the S_n fields. The lowest order Star Shine field is the S_0 field.

Hall Photon Theory also expands Maxwell's four equations to at least six in order to fully describe the interaction of these fields with matter. Additional expansion of the equations may possibly be necessary in the future.

In 1864, Maxwell developed four famous equations that describe light as an electromagnetic disturbance. Maxwell described the electromagnetic disturbance using two physically real fields. These fields are the well-known electric field and the magnetic field. According to existing physical theories, when a photon of light is traveling in free space these two fields oscillate together in phase in the form of a plane wave. However, a careful review of the experimental evidence that relates to electromagnetic waves shows that the photon must contain of at least three physically real fields and that Maxwell's four equations need to be expanded to at least six or perhaps more.

Several famous and well-known scientific experiments provide solid evidence for the existence of these additional physically real fields within the photon.

Consider the following famous experiments:

Electromagnetic induction by a toroidal coil:

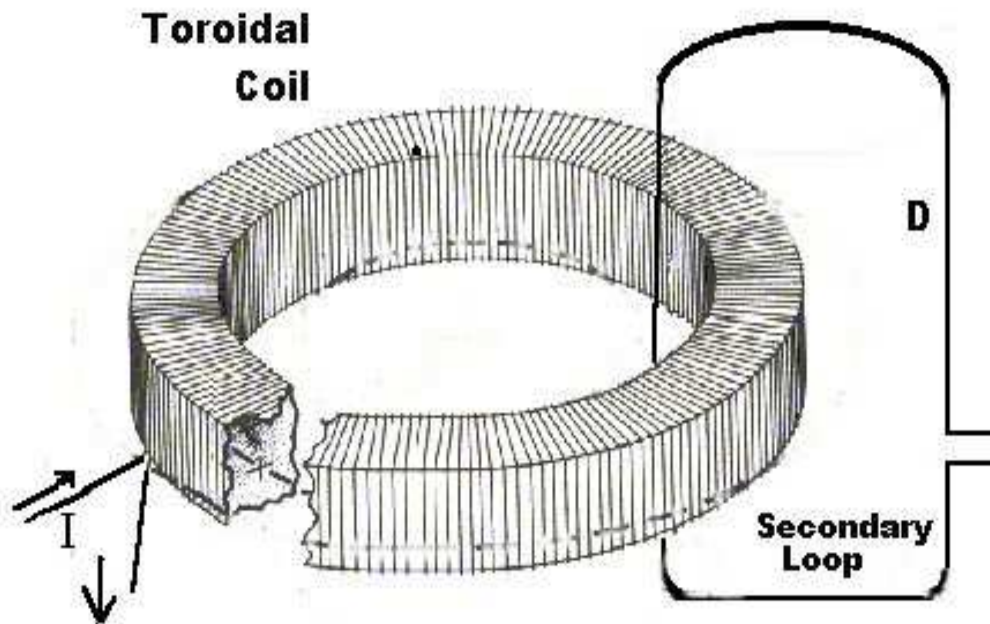


Figure 1.

An elementary experiment commonly performed in college physics classes shows that an electric current is induced in a secondary loop of conducting wire, D , by a change in a current, I , in a toroidal coil. Assuming that the toroidal coil is uniformly wound and properly constructed, it is easily demonstrated that no electric fields and no magnetic fields physically exist in the space outside the coil. Therefore, there are no magnetic lines of force and no electric lines of force physically connecting the secondary loop of wire, D , with the primary toroidal coil. Therefore, according to Maxwell's theory, no physically real fields exist that could be connecting the current in the primary toroidal coil with the secondary loop of wire, D . Yet, since a physically real electric current is generated in the secondary coil D by a change in the physically real current in the primary coil, ordinary logic dictates that some physically real field must be connecting the two coils. Otherwise, the concept of everyday physical reality and causality would be violated. Therefore, to correctly describe these physically real electromagnetic phenomena, at least one more field, a third physically real field, is required.

If a series of experiments are performed, using successively larger toroidal coils, this third field is seen to decrease in strength as the distances between the coil and the secondary loop increase. This third field appears to be governed by force laws that are similar in form to the force laws of electric fields. Of course, nothing within Maxwell's existing equations predicts this type of physical behavior.

This new physically real field must be capable of generating an electric current in the secondary loop of wire, D , whenever the current, I , changes in the primary. This field must have a mathematical curl of zero and a non-zero gradient, so that Maxwell's existing equations may be satisfied. The important point is that this field must be physically real and must have physical properties of its own. Hall Photon Theory names this field the lowest order Star Shine field (the S_0 field). This field must be governed by its own independent force law. The toroidal coil must, therefore, be one type of experimental apparatus that is capable of generating a physically real Star Shine field in a manner that permits additional study and research.

Further logic also shows that this Star Shine field must be capable of both creating and destroying the electric and the magnetic fields within photons so that Maxwell's equations may be satisfied.

A changing electric current in the toroidal coil is a physically real event. The Star Shine field transmits this event across space to cause an electric current to form in the secondary coil, which is also a physically real event. Therefore, the Star Shine field(s) must be capable of storing and transferring physically real energy, and also be capable of carrying momentum. Therefore, the Star Shine field(s) themselves must be physically real, and not just mere mathematical constructions or virtual mathematical constructions. Therefore the study of Star Shine fields must represent a new branch of physics and mathematics.

The Michelson-Morley experiment

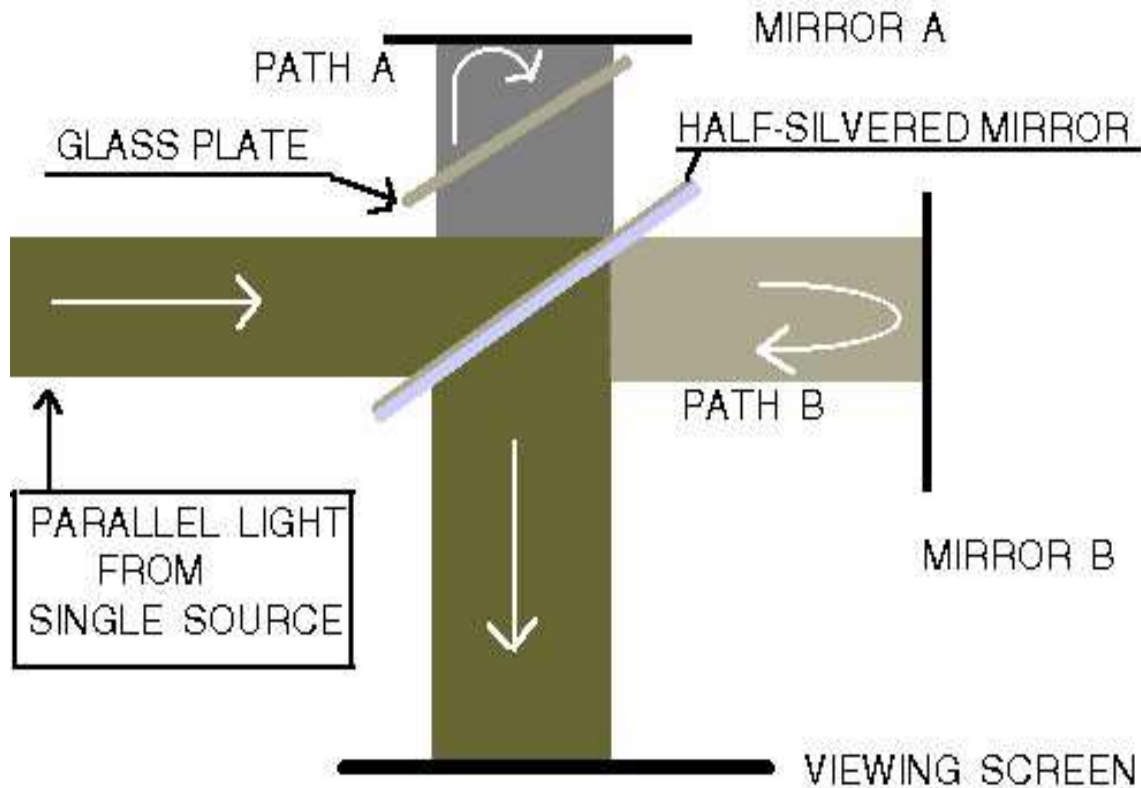


Figure 2.

In 1887, the American physicists Michelson and Morley performed a famous experiment. The basic apparatus is shown schematically in figure 2. This experiment is described in detail in many college level physics texts. The experiment was designed to detect the motion of the earth relative to a preferred reference frame (an aether at rest). A single laboratory light source is focused on a half silvered glass mirror. This half silvered glass mirror divides the light into two beams of light at right angles to each other. One of these beams traverses Path A which goes to Mirror A. The other beam traverses Path B that goes to Mirror B. Both beams are reflected back through the half silvered mirror to the viewing screen. The two light beams are then recombined at the viewing screen. If the conditions are such that the

two beams, A and B, have traveled nearly equal path lengths with nearly equal travel times, then interference patterns can be observed on the viewing screen. The failure of this experiment in 1887 to detect the motion of the earth around the sun was one of the important events that led to the development of the Special Theory of Relativity by Albert Einstein. Einstein used this experimental failure to conclude that it would never be possible to build a spacecraft that could start from sitting on the surface of the earth and accelerate to speeds many times faster than the speed of light, decelerate and land on another planet, and return to earth by reversing the process.

One very important fact associated with this experiment is frequently not mentioned in undergraduate level physics texts. This fact is that if the two path lengths (A and B) are different by a value much greater than the coherence length of the light source, no interference patterns are observed on the viewing screen. For a thermal light source, a value of 30 cm would not be uncommon. Thus, if the experiment is performed using a thermal light source with a coherence length of 30 cm, and if Path length A is longer than Path Length B by more than 30 cm, then no interference pattern will be observed on the viewing screen.

This concept of the coherence length causes us to logically conclude that separate photons do not interfere with each other. Instead, it must be true that each photon can interfere only with itself. This is an astounding paradox because the wavelength of the electric fields and the magnetic fields within visible light is of the same order of magnitude as the dimensions of single atoms. Neither the electric fields nor the magnetic fields within photons of visible light could possibly communicate with themselves over physical distances as large as 30 centimeters. Obviously the observed interference pattern must result from the workings of a third physically real field within individual photons. For photons generated by thermal sources, this third field must have macroscopic dimensions of the order of 30 cm. Therefore, each single photon must contain this third field, which HPT hypothesizes is the Star Shine S_0 field.

Since photons generated by different types of sources have different coherence lengths, HPT hypothesizes that this third physically real field may be formed into different physical shapes and sizes.

When the conditions within the interferometer are such that interference patterns may be observed on the viewing screen, within the interferometer

each single photon must be simultaneously traveling down both Path A and Path B. Yet, consider, according to Maxwell's 1864 equations, the photon structure consists only of an electric field and a magnetic field, and these two fields must always be locked together, inseparably in phase, in the form of a plane wave. According to Maxwell's equations, this wave must vary in a smooth and continuous manner. Therefore, according to Maxwell's 1864 equations, the photon must be in one path or the other. HPT resolves this paradox. According to Hall Photon Theory, the interferometer molds the Star Shine field(s) S_0 , for each photon into a physical shape consistent with the conditions within the interferometer. These interferometer conditions are such that interference patterns can be observed on the viewing screen only if the path lengths (A and B) are such that the Star Shine field for each individual photon can interact with both mirrors A and B as the photon is interacting with the interferometer as a whole.

It is noted that beams of photons obey the law of conservation of energy as they pass through the interferometer. This means that none of the energy carried by the individual photons, is created or destroyed within the interferometer. In addition, the color and wavelength of each individual photon remains the same. Therefore, the interference pattern can only result because selected individual photons are caused to move sideways within the beam as they pass through the interferometer. In terms of physical reality, this sideways movement is a vastly different process than the constructive / destructive wave interference process that is usually said to be the cause of interference patterns. This sideways movement of selected photons appears to be a repeatable, predictable process, without any random components. Yet, Maxwell's equations do not allow for a physical mechanism that could cause an individual photon to suddenly jog sideways in its flight, as it continues on in its motion in the forward direction. It therefore, follows, that each individual photon must contain at least a third field as part of its inner structure, that is controlling this interference process and also controlling its direction of flight. According to Hall Photon Theory, this third field is of macroscopic dimensions. For each individual photon, this third field fills the entire interferometer, and is capable of interacting with all of the interferometer's objects and parts as it passes through the interferometer.

Therefore, according to Hall Photon Theory, Einstein's fundamental assumptions underlying the Michelson-Morley experiment are seriously

flawed. According to Hall Photon Theory, the Michelson-Morley experiment does not demonstrate that the speed of light is constant in all directions. Hall Photon Theory hypothesizes that the Michelson-Morley experiment is instead, demonstrating that the underlying Star Shine field is of macroscopic dimensions, and capable of causing the photon to alter its direction of flight without destroying the photon, by interacting with the interferometer's macroscopic surroundings. These surroundings may possibly include the walls of the room in which the interferometer is located.

The Star Shine field provides a physical mechanism for creating the light and dark fringes in interference patterns observed in the Michelson interferometer. Because the Star Shine fields for some of the photons have changed their shape, and their direction of flight within the interferometer, these photons have been moved laterally within the light beam, creating bright fringes in their new location and leaving dark fringes behind in their old location.

Note also the presence of one or more additional pieces of glass within the interferometer. These additional pieces of glass are intended to adjust the travel time of the photons as they traverse the two different paths within the interferometer. The usual explanation given in many college texts is that since light travels slower in glass than it does in air, these pieces of glass allow the photons to spend the same amount of time traveling Path A as they do traveling Path B. However, consider the paradox of the Water-Filled telescope and the Aberration of Starlight experiments that are described in this same paper. It is entirely possible that these additional pieces of glass are also dragging the photons to the side as they traverse the various paths within the interferometer. Additional interactions of this type between the photons and the interferometer's physical apparatus would also have caused the Michelson - Morley experiment to fail without invoking Einstein's Theory of Relativity.

Hall Photon Theory logically explains the failure of the Michelson - Morley experiment without invoking Einstein's theory of relativity or any related theory involving Lorentz contractions. For this reason, Hall Photon Theory is expected to cause a total revolution in the study of physics. Historically, the failure of the Michelson - Morley experiment was one of major reasons for Einstein's development of the theory of relativity and his

hypothesis that spacecraft could never accelerate to velocities greater than the speed of light in free space, regardless of their design. Hall Photon Theory removes one of the major supports for relativity. HPT hypothesizes that physically real velocities in excess of the speed of light are possible, provided that the spacecraft has been properly designed for high-speed travel in space. HPT hypothesizes that physically real spacecraft may be constructed that are capable of accelerating faster than the speed of light in free space. Within HPT, velocities in excess of the speed of light in free space are measured in terms of their HALL NUMBER (HN). The speed of light in free space is assigned the HALL NUMBER equal to one.

Aberration of Starlight

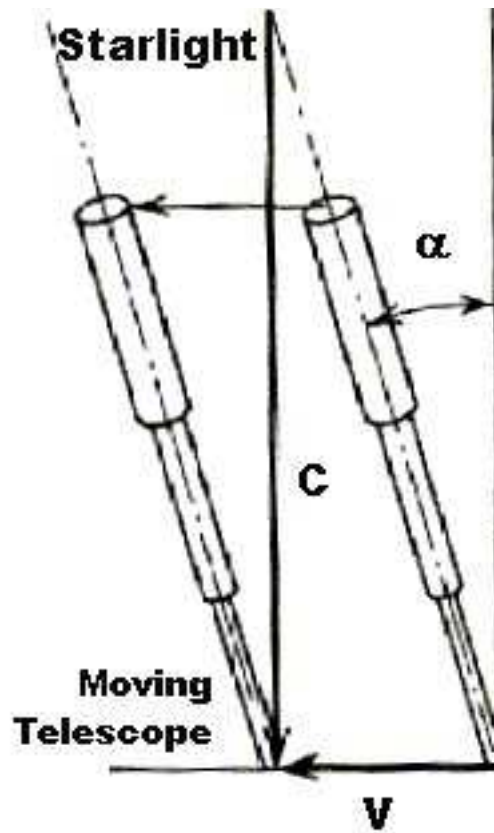


Figure 3

The aberration of starlight is the small shift in the apparent position of distant stars that takes place during the year. The ancients knew of this phenomenon. It is simply explained as resulting from the motion of the earth as it travels in its orbit around the sun. Referring to figure 3, C is the velocity of light in air. Consider, the earth travels in its orbit at a velocity V , that is of the order of 3×10^6 cm/sec. Suppose that the starlight is incident normal to the surface, while the velocity of the earth in its orbit is parallel to the surface. If the telescope is filled with air, Figure 3 shows that the telescope must be inclined at an angle in order to capture the starlight.

This angle is estimated by the simple equation:

$$\alpha \cong \frac{v}{c} \approx 10^{-4} \text{ radian .}$$

This angle of inclination allows the light beam to pass down the telescope to the observer as the telescope moves to the side. This simple explanation is based on the assumption that each individual photon of light is so small that it does not interact with the sides of the telescope as it travels down the tube. This assumption is made because the wavelength of the electromagnetic fields within visible light is of the order of atomic dimensions, while the telescope typically has large macroscopic dimensions. Note that the explanation and the resulting simple computation commonly found in many science textbooks, does not include any consideration of the dimensions of the telescope, the type of construction of the telescope, the actual path that the photon follows while in the telescope, or of the amount of time that the photon of light actually spends within the telescope. Inside of the telescope, for example, the photon of light could also traverse through an interferometer without affecting the value for the aberration of starlight.

In addition, consider the case that results when we perform the same experiment with clear water in the telescope. Because the speed of light in water is significantly slower than the speed of light in air, we might expect that the angle of inclination of the telescope would have to be increased in order to allow the photons of light more time to pass down the telescope to the observer while the telescope moves to the side. However, elementary physical experiments demonstrate that this is not the case. It is easily shown that the angle of inclination of the telescope is not affected by the medium within the telescope. For example, the telescope, like the interferometer, could contain additional pieces of transparent glass that would also slow the forward velocity of light as it travels within the telescope. That is to say, the angle of aberration does not depend on the forward velocity of light within the telescope. Therefore, each individual photon of light must be interacting with the telescope on a macroscopic scale. This interaction must cause each individual photon of light to move sideways while also traveling forward in

its flight through the telescope. This interaction must move the photon sideways in its flight, without changing the photon's basic properties such as its electromagnetic wavelength, its total energy, or its color.

HPT hypothesizes that the Star Shine fields within the photon allow it to be dragged sideways without otherwise changing its properties or interrupting its flight in the forward direction. HPT hypothesizes that this is a general property of all photons including light, radio waves, and x-rays.

The water filled telescope experiment presents a paradox for Maxwell's 1864 theory because the 1864 theory does not contain any physical mechanism that could be responsible for dragging each photon to the side as the photon travels forward. According to HPT, the Star Shine field(s) can react to changes in the photon's environment by absorbing the photon's electric and magnetic fields at any point and recreate them at a new lateral point while still traveling forward. Therefore, the Star Shine fields within the photon provide a mechanism that allows photons to be dragged sideways within a moving telescope.

Since it is an observation of physics that the photons are being dragged sideways in the famous water filled telescope experiment, and interacting with the telescope on a macroscopic scale, HPT hypothesizes that photons are also being dragged sideways within many other pieces of hardware that are commonly used by experimental physicists, and also that photons are interacting with the experimental equipment in macroscopic ways. These pieces of common experimental equipment include the Michelson-Morley interferometer, and Young's famous double slit experiment. This HPT hypothesis has many profound ramifications. The water filled telescope, for example, could not be used to determine the speed of light within clear water, or within any transparent material such as glass. The original Michelson-Morley experiment was performed inside of a room that was similar in many respects to the inside of the tube of a large telescope, and the experimental apparatus itself contained many of the same elements that are typically found in a telescope, such as the viewing eye piece. Therefore, HPT hypothesizes that the experimental equipment used in Michelson-Morley experiment, like the telescope, was capable of dragging the photons to the side, and therefore was never able to measure the speed of light within the apparatus. Therefore, HPT hypothesizes that physical objects can be

designed and constructed here on this earth in a manner that allows them to be accelerated to speeds in excess of the speed of light, relative to the earth's frame of reference.

Snell's law of refraction of light at a boundary

Consider Snell's well-known laws of refraction of light at the boundary between any two media. Let us consider a simple case of a beam of light photons traveling from air into glass. Snell's law is based on the macroscopic properties of the air and the macroscopic properties of the glass. According to Snell's law, the glass has a macroscopic index of refraction, based on the macroscopic properties of the glass (temperature, pressure, composition, etc.). Similar statements apply to the air. Consider, however, that Snell's law is easily demonstrated to be valid for beams of light with both macroscopic and microscopic widths, no matter how wide or narrow, the beam of light is. So, for example, even if a beam of sunlight is used that is much wider than the transverse coherence value for sunlight, Snell's law is still easily demonstrated to apply. We are therefore, logically forced to conclude that Snell's law must be valid for each individual photon of light moving within the beam of light in question. However, Maxwell's 1864 theory considered an individual photon of light to be a microscopic entity. The wavelengths of the electromagnetic fields within individual photons of light are of the same order of magnitude as atomic and molecular dimensions. If light consisted only of an electric field and a magnetic field locked together in phase, moving as a plane wave, there would not exist within each individual photon of light a physical mechanism that allowed it to respond smoothly to the different values for the macroscopic index of refraction as it traveled from one physical medium to another. There would be no such thing as a transparent piece of glass.

Therefore, it logically follows that each individual photon of light must contain at least one field of macroscopic dimensions that allows each individual photon to interact with large pieces of glass, and with matter in general, at a macroscopic level. The Star Shine fields hypothesized by Hall Photon Theory provide the photon with these macroscopic capabilities. Under Hall Photon Theory the Star Shine fields have macroscopic and finite dimensions of the same order of magnitude as the transverse and longitudinal coherence lengths. The Star Shine field is therefore sufficiently large so that

it can respond to the macroscopic properties of the medium through which the photon is traveling. These properties include the shape of a glass lens, the temperature and density of various layers of air, the composition of a glass lens, etc.

The Red Shift from the field of Astronomy

Hall Photon Theory hypothesizes that the photon's Star Shine fields have finite physical lengths and well defined physical shapes and sizes. HPT theorizes that the photon's polarization state is determined by its Star Shine field properties. Under Hall Photon Theory (HPT), the shape and dimensions of the Star Shine field may be altered or affected by the environment through which the photon travels. Under HPT, the effective length of the photon's Star Shine field is hypothesized to be the longitudinal coherence length. The effective width of the photon's Star Shine field is hypothesized to be the transverse coherence length. These lengths are non-zero, finite and are initially determined by the process that creates the photon. As the photon travels and interacts with its surroundings, HPT hypothesizes that these lengths may change without altering the photon's other properties such as its color or wavelength. Under HPT the photon is actually carrying its energy and its momentum in its Star Shine field. Under HPT, the electric and magnetic fields associated with the photon result from vibrations within the Star Shine field. Under HPT, the energy and momentum contained within a single photon is logically consistent with Plank's law and with Lorentz' electron theory. Under HPT, when two or more photons are traveling together in close proximity for a sufficiently long time and under the proper conditions, their respective Star Shine fields can possibly interact with each other. Such interactions could possibly remove momentum and energy from each photon, thereby altering its color and wavelength. Therefore, such interactions would leave a beam of light with a "Red Shift." In the field of astronomy, in order for photons of light to be received here on earth from a distant galaxy, the photons must have traveled together in close physical proximity with other photons for a long duration. Therefore, according to HPT, light from distant galaxies is expected to show a pronounced "Red Shift" that is not due to the expansion of the universe. Instead, this "Red Shift" is due to interactions between the Star Shine fields of the

corresponding photons because they have traveled for so long in such close proximity with other photons.

Consider, for example, a hypothetical spiral galaxy that is 2 billion light years from earth. Of course, large numbers of such galaxies do exist in reality. Consider the case that exists for two separate photons of light, each of them created by hot stars located on opposite sides of this hypothetical galaxy and heading in the direction of a single telescope located here on earth. When these two hypothetical photons of light were created, they were many thousands of light years apart. However, during the course of their journey towards earth, the two photons would find themselves traveling successively closer and closer together for very long durations of time. By the time the two photons finally arrived at the aperture of the telescope, they would have been traveling side by side and in physical contact with each other for many millions of years. There would have been adequate time and adequate conditions for the two photons of light to interact in any manner that is possible as determined by the laws of physics.

According to Einstein's physics, individual photons can not interact with each other. However, HPT hypothesizes that photon-to-photon interactions are possible. For this reason, HPT hypothesizes that the observed "Red Shift" of light from distant galaxies is not necessarily caused by a general expansion of the universe, but instead results from photon-to-photon interactions between the individual photons of light that are arriving on earth after having traveled such vast distances.

In-Phase radiation from an antenna

The operation of radio antennas and the behavior of radio waves is well studied. Consider, however, that an oscillating electron within a conducting radio antenna radiates a radio wave photon that has the electric field and the magnetic field locked together in phase. This is true, even though the electric field and the magnetic field in the conducting antenna may not be in phase. Logically then, the process of creating a particular photon within a radio wave must first create a third field. This third field must then create both the electric field and the magnetic field within the wave. Under Hall Photon Theory first the oscillating electron creates the Star Shine field of a particular shape and size. After this radio wave photon has been created, the Star Shine

field creates the corresponding electric field and magnetic field based on the properties of the Star Shine field. An important point is that the shape and properties of the Star Shine field would be determined by the nature of the electron's oscillations. These electron oscillations would be influenced by the shape, composition, and electrical conditions within the radiating antenna. Therefore, HPT hypothesizes that antennas of different shapes, compositions, and electrical conditions can be designed that will create photons with specialized physical properties that permit radio wave photons to travel in otherwise non transparent mediums, such as limestone or sea water, for example.

Under HPT the shape and properties of the photon's Star Shine field(s) are influenced by the interaction between the photon and the medium in which it is traveling. Under HPT, radio antennas with special shapes and electrical qualities may create photons that are able to travel only in certain materials or under certain physical conditions. So HPT, for example, recommends constructing radio transmitters and receivers with a wide variety of antenna shapes and compositions, and testing these transmitter / receiver pairs in a wide variety of materials and conditions. One such test, for example, might be to construct a transmitter / receiver pair that used an elliptically shaped radio antenna made from tin and test it to see if the transmitter is creating a specialized radio wave that travels only in materials such as sea water.

Thus, Hall Photon Theory hypothesizes the existence of physically real photons and radio waves with a far greater range of properties than Maxwell's 1864 theory allows.

Gravitational Considerations

Current scientific theory holds that the photon interacts with gravitational fields. Scientific evidence exists to support this theory. However, existing photon theory in this area contains a paradox. Consider the magnetic field in an electromagnet. Gravity affects the moving electrons that produce the magnetic field. However, gravity does not affect the magnetic field itself. For example, increasing the strength of the magnetic field produced by an electromagnet does not, all by itself, cause the electromagnet to significantly

increase or decrease in weight. Similarly, gravity affects the electrons stored in a capacitor. However, gravity does not affect the electric field itself. For example, increasing the strength of the electric field within the capacitor, does not, all by itself, cause the capacitor to significantly increase or decrease in weight. Thus, since the photon is affected by gravity, but its constituent electric and magnetic fields are not, by themselves, affected by gravity, it logically follows that at least one additional field must physically exist within the photon that interacts with gravity. Hall Photon Theory hypothesizes that the physically real Star Shine field(s) directly interact with gravity. An important point, however, is that Hall Photon Theory allows for the possible existence of a physically real anti-photon that exhibits anti-gravity. This is because the toroidal coil experiment demonstrates that the Star Shine field has a non-zero gradient and is associated with electric and magnetic phenomena. The Star Shine field must, therefore, be associated with a corresponding positive or negative physically real Star Shine charge. There exists a large number of physically real electrically charged subatomic particles that have physically real anti-particles. Therefore, Hall Photon Theory hypothesizes the existence of Star Shine anti-particles, and Star Shine fields that push against a star's gravity field, instead of being attracted by it. HPT hypothesizes that a spacecraft whose design allowed its occupants to create and manipulate Star Shine fields could propel itself by pushing directly against the Earth and the Sun's gravity fields, and quickly accelerate to velocities far greater than the speed of light in free space.

General Considerations Relating to Star Shine Fields.

Hall Photon Theory hypothesizes that Star Shine fields are capable of being formed into various physically real shapes that have a mathematical curl of zero and a non-zero mathematical gradient. HPT hypothesizes that the mathematical equations that pertain to pure Star Shine fields and Star Shine charges share a certain mathematical similarity in form with corresponding equations for electric fields and electric charges. Therefore, HPT hypothesizes that Star Shine fields exist in both positive and negative forms. HPT hypothesizes that the toroidal coil manufactured with copper wire and moving electrons creates one or more pure Star Shine fields with a positive sense. HPT hypothesizes the existence of Star Shine fields with a similar structure and a negative sense. This paper highly recommends that many

variations of toroidal coils be created using a variety of materials, and tested with a variety of moving sub-atomic particles, in addition to electrons. One such test apparatus, for example, might be a toroidal coil manufactured using fiber optics and tested using photons as the moving medium. Such an experimental apparatus should be constructed and tested for the existence of other types of Star Shine fields.

Since HPT hypothesizes that Star Shine fields have a non-zero gradient and have both positive and negative forms, the theory also hypothesizes the existence of physically real positive and negative poles for the various Star Shine fields. Therefore, HPT hypothesizes the existence of a new kind of physically real force in physics. HPT names this new kind of force the Star Shine force and it would exist between any two sub-atomic particles, each of which would be carrying quantized quantities of Star Shine charge. Therefore, HPT hypothesizes that Star Shine circuits can be constructed that are mathematically similar to electric circuits. These hypothesized Star Shine circuits would use moving subatomic particles that carried the Star Shine charge, to form moving Star Shine currents. Such hypothesized circuits could be designed to physically interact with ordinary electric circuits to accomplish various physically real tasks. As one simple example, in the toroidal coil any number of independent secondary loops could be added. The material that is physically in-between the toroidal coil windings and the secondary coils does not need to be air. The connecting material, for example might possibly be plastic or concrete. In this simple example, the entire apparatus could then be used as a high-speed, one-to-many relay switch. Turning on the current in the toroidal coil could then immediately activate all of the independent secondary circuits.

According to Hall Photon Theory, the Star Shine field(s) is physically real and has physically real dimensions. According to this theory, the Star Shine field can both create and destroy the associated electromagnetic wave without itself being destroyed in the process. The associated electromagnetic wave is a pattern of vibrations within the Star Shine field(s). Therefore, according to Hall Photon Theory, experimental arrangements are possible that would cause the photon to move laterally (i.e. to jog suddenly) while still traveling in the forward direction. This is because the presence of the Star Shine field allows the photon to apparently absorb its electromagnetic field and recreate it at a different physical location within the Star Shine

field. Under Hall Photon Theory, circularly polarized light results when the Star Shine field is made to revolve as the photon travels. Therefore, according to Hall Photon Theory, physically real experiments can be devised which cause single photons to change many of their physical properties, such as their polarization state, without destroying the photon.

Maxwell's 1864 equations may be expressed as follows:

$$\text{Equation \#1: } \tilde{\mathbf{N}} \cdot \mathbf{E} = \frac{\rho_t}{\epsilon_0}$$

$$\text{Equation \#2: } \tilde{\mathbf{N}} \cdot \mathbf{B} = 0$$

$$\text{Equation \#3: } \tilde{\mathbf{N}} \times \mathbf{E} + \frac{\mathcal{J}_B}{\mathcal{J}_t} = 0$$

$$\text{Equation \#4: } \tilde{\mathbf{N}} \times \mathbf{B} - \frac{1}{c^2} \frac{\mathcal{J}_E}{\mathcal{J}_t} = \mu_0 \mathbf{J}_m$$

Definitions:

\mathbf{E} is the electric field intensity in volts/meter

$\rho_t = \rho_f + \rho_b$ is the total electric charge density in coulombs/ meter

ρ_f is the free charge density

ρ_b is the bound charge density $-\nabla \cdot \mathbf{P}$

\mathbf{P} is the electric polarization in coulombs/meter

\mathbf{B} is the magnetic induction in teslas.

$\mathbf{J}_m = \mathbf{J}_f + \frac{\nabla P}{t} + \tilde{\mathbf{N}}' M$ is the current density due to the flow of charges in matter, in amperes/meter.

\mathbf{J}_f is the current density of free charges

$\frac{\nabla P}{t}$ is the polarization current density

$\tilde{\mathbf{N}}' M$ is the equivalent current density in magnetized matter.

\mathbf{M} is the magnetization in amperes / meter.

c is the velocity of light, 3×10^8 meters/sec and

$$c^2 = \frac{1}{(e_0 m_0)}$$

e_0 is the permittivity of free space, 8.85×10^{-12} farad/meter.

m_0 is the permeability of free space, 4×10^{-7} Henry / meter.

Hall Photon Theory hypothesizes that Maxwell's equations need to be modified to include the Star Shine fields. After studying the toroidal coil experiment carefully, Hall Photon Theory hypothesizes the Maxwell's equations need to be increased to six in number and modified as follows:

Equation #1: $\tilde{\mathbf{N}} \cdot \mathbf{E} = \frac{t}{e_0}$

Equation #2: $\tilde{N} \cdot B = 0$

Equation #3: $\tilde{N} \cdot E + \frac{\mathcal{J}}{\mathcal{C}} \frac{B}{t} + \frac{\mathcal{J}}{\mathcal{C}} \frac{S}{t} = 0$

Equation #4 $\nabla \times B - \frac{1}{\mathcal{C}} \frac{\partial E}{\partial t} + \nabla \cdot S = \mu_0 \mathbf{J}_m$

Equation #5 $\nabla \times S = 0$

Equation #6 $\tilde{N} \cdot S = m_0 \mathbf{J}_m$

where S is the Hall Photon Theory Star Shine Field(s).

Hall Photon Theory hypothesizes that future modifications to Maxwell's equations may be necessary after additional physical experiments are performed and analyzed.

HPT hypothesizes that a physical force exists between any two Star Shine charges. HPT hypothesizes that this physical force obeys the following force law:

$$F = -K \frac{S_1 S_2}{R^2}$$

where F is the force between the two Star Shine charges.

K is the Star Shine force constant.

S_1 and S_2 are the Star Shine charge strengths.

R is the distance between centers of the two Star Shine charges.

The minus sign is present because HPT hypothesizes that like Star Shine charges will repel each other, and that different Star Shine charges will attract each other.

HPT hypothesizes that the Star Shine field strength due to a single Star Shine charge is defined by the corresponding field formula:

$$F = -K \frac{S_1}{R^2}$$

The same symbol definitions apply.

MODIFICATIONS TO RELATIVISTIC FORMULAS

Photon Theory hypothesizes that a properly designed spacecraft can accelerate in free space to velocities that are many times greater than the velocity of light in free space. Therefore Hall, HPT theorizes that the existing formulas that relate to relativity will need to be modified to include mathematical terms that contain the Hall Number and the High Velocity Design Coefficient.

Hn_{hpt} is the Hall Number. It is defined as follows:

$$Hn_{hpt} = \frac{v}{c}$$

The Hall Number may take any real positive value.

D_{hpt} is the High Velocity Design coefficient.

Its precise value depends on the specific details of the space vehicle's construction and design. Under HPT, all naturally formed objects, such as stars and galaxies, have a high velocity design coefficient of 0, and therefore, obey Einstein's laws of relativity. However, Hall Photon Theory hypothesizes that a properly designed spacecraft, such as an ellipsoidal craft surrounded by a Star shine field, would have a design coefficient that is much different from 0. HPT hypothesizes that such a craft could easily accelerate to velocities greatly in excess of the velocity of light in free space.

Under HPT, travelers on board such a craft would not experience a time dilation, or an increase in mass.

Summary:

Hall Photon Theory logically explains the failure of the Michelson-Morley experiment without invoking Einstein's theory of relativity. In addition, Hall Photon Theory hypothesizes equally far reaching changes to Maxwell's 1864 equations relating to electromagnetic disturbances. Hall Photon Theory is expected to lead to revolutionary advances in physics, astronomy, and science in general.

Hall Photon Theory strongly recommends that American Atomic scientists study carefully the behavior of toroidal coils and electromagnetic devices, especially those constructed using fiber optics instead of copper wire, and using photons or subatomic particles other than electrons. Possible subatomic particles include mesons, and baryons.

Spacecraft designed in accordance with an understanding of these physical laws and Hall Photon Theory would be capable of taking off from earth, quickly accelerating within a few hours to velocities greater than the speed of light without having any negative impact on the well being of the occupants. Such spacecraft out in the vastness of space would be capable of maintaining speeds greatly in excess of the speed of light for long durations. They would be able to quickly slow down to ordinary sub-light speeds, and then, land at their destination. During the entire process, time would not slow down nor would it flow backwards. The energy and fuel requirements would not march off to infinity. Neither would the mass of the spacecraft march off to infinity. Such spacecraft would have a double hull construction with several sets of optical fiber windings between the two hulls. One set of windings is used to create a uniform surrounding force field that streamlines the spacecraft. This streamlining allows the craft to move smoothly through space itself. The other sets of windings generate the force fields that are used to propel and guide the craft on its journey. Spacecraft of this type of construction could readily be built and placed into service using today's technology.