Correspondence

What Experiments on Diffraction of Photons Say

The foundation of quantum theory rests on the notion that a particle is a localized wave-packet formed from the superposition of plane waves of many different frequencies, all grouped around some central frequency. Several experiments conducted by Panarella [1-3] confirm that the wave nature of light appears with a collection of photons, but dispute it for single photons. Experiments show that photons cannot produce a diffraction pattern when they are detected one at a time or as isolated entities; photons need to be clumped together in order to create a diffraction pattern. In other words, it appears that, in diffraction and interference phenomena, light is not really a wave at all, but rather 'clumps' of particles. However, a model of this sort is not compatible with quantum theory, and might also require a complete reformulation of electrodynamics.

A separate laser diffraction experiment conducted by a Brazilian team [4] shows that the course of light rays changes with the motion of the Earth, and their results differ in amount of 21% from the prediction of special relativity theory. Two optical sensors (segmented photo-diodes) were used for measuring the position of diffracted light spots with a precision better than 0.1 μm. The goal was to look for signals of anisotropic light propagation as function of the laser beam alignment to the Earth's motion (solar barycenter motion) obtained by COBE. Two raster search techniques were used. First, a laser beam fixed in the laboratory frame scanned in space due to Earth's rotation. Second, a laser beam mounted on a turntable system scanned actively in space by turning the table. The results obtained with both methods show that the path of light rays changes with the motion of the Earth, and a predominant first order quantity with a $\Delta c / c = \pm\beta(1+2\alpha)\cos\theta$ with $\alpha = -0.393 \pm 0.032$ describes well the experimental results. This result differs in amount of 21% from the prediction of special relativity theory, and that supplies the value of $\alpha = -1/2$ (isotropy). And so in addition to the original findings of Panarella's experiments, this new finding is further evidence that something is wrong with contemporary physics.

Original Theories of Light—What Went Wrong

Isaac Newton, Walter Ritz, and others proposed 'emission theories', in which the speed of light in all reference frames is constant only relative to the source of emission. In his *Corpuscular theory,* Newton envisioned light 'corpuscles' being thrown off from hot bodies at a nominal speed of c with respect to the emitting object, and obeying the usual laws of Newtonian mechanics. But in 1913, Willem de Sitter found that the expected consequence of emission theory on the appearance of a binary star system—an extreme scrambling of its light signals—did not happen. This finding was widely accepted as definitive proof that emission theory is not viable. On the other hand, quantum electrodynamics put the propagation of light in an entirely different context that is completely incompatible with any theory that postulates a speed of light that is affected by the speed of the source. In agreement with special relativity, light in vacuum propagates with speed c in terms of any system of inertial coordinates, regardless of the state of motion of the light source.

Looking to Newton for Something New

If in fact something is wrong with contemporary physics, then where do we look for the root of its trouble? Questionable ideas go all the way back to Newton. His first law said that a body remains in its state of being at rest or of moving uniformly in a straight line, unless acted upon by an external force. In his second law, Newton said that if a body is acted upon by force, then there will be a change in its velocity proportional to the magnitude of the force and in the same direction in which the force is applied.

But there is more to consider. Newton's laws of motion describe relationships between external forces acting on a body and the motion of the body, but they do not consider effects of force from *within* a body. When a force pulls a body into a circular path of travel, the pulling force creates tension throughout the body. Because of this, the body's momentum is held at a right angle to the force [5]. Subsequently, the body pulls to break away from the force so as to move in a straight line, but the pull away has nothing to do with Newton's first law. The force causes it. Yet as formulated by Newton, the first law is more than a special case of the second law. The importance of the first law is to establish frames of reference for which the other laws are applicable, such frames being called 'inertial frames'. But to say the first law is verified by the second law is simply not true. Motion in a straight line could be a special case of the second law, while generally everything moves about inertial frames of natural and force-free *circular* motion [5].

The law of mass conservation says that matter cannot be created or destroyed. If that law holds true, then all physical substance of the Universe has existed forever. And so by the same logic, the primary motion of the Universe may exist with no beginning as well. Some sort of motion may exist simply because it has always existed—and with no cause by force involved. Certainly this pre-existing motion would be constant and uniform in the absence of force, but not necessarily in a straight line. Instead it could be circular, or a perfect spin with all matter as one. And because the spin is strictly an inertial effect, the spin would serve as a rotating inertial frame of reference. In such a case, Newton's second law still holds true, but any motion produced by force is carried by the original force-free spin of the Universe. Based on my previous reports [5,6], this idea leads to a reinterpretation of relativity theory, quantum mechanics, big bang theory, and cosmology. However, the only purpose of the present note is to bring conflicting observations of light into agreement with one common principle.

For the purpose of discussion, let space and time be considered absolute entities, while celestial bodies move about with force-free circular motion. In this setting, the Earth's daily spin is natural and force-free. Such spin is strictly an inertial effect, and so the spin represents an inertial frame of reference. The

Earth's orbit around the Sun is force-free as well. Of course planetary orbits are not truly circular, but this and other planetary motions are explained in [5].

A reasonable extension of this idea is that all radiation transmits with a natural curve in its path. The curve is due to the circular motion of its source. For this reason, the faster a star rotates, the more curved its light becomes. The same kind of effect results from the orbit of a star. To see what happens with this sort of motion, suppose a star maintains a fixed straight-line distance from Earth. Any curve in the path of light will increase its length of travel from emitter to receiver, and the greater the curve becomes, the longer the distance will be. But because any increase in length of travel is proportional to an increase in angular speed, the motion of a star has no effect on the *apparent* speed of its light. In the context of this report, the apparent speed of light refers to the magnitude of its average velocity, and it should not to be confused with *average* speed. Apparent speed equals total *displacement* divided by elapsed time, while average speed is total *distance* divided by elapsed time. The average velocity for any number of 360° rotations within a given period of time is zero, and so a logical assumption is that no degree of a star's rotation, or its orbit, will affect the apparent speed of its light.

Without any consideration for its waveform, we can assume that light from a source on Earth is emitted in a straight line due to force, and yet its momentum is carried by a force-free spin acquired from the Earth itself. In other words, the emission of light from a source on Earth is no different from the emission of light from a star, except we see it from a different point of view. Unlike a star and its light, the emission of light from a source on Earth is in the same rotating inertial frame as the observer. Because of this, the emission speed of light remains c with reference to the source of emission, while its path of travel turns and becomes longer with the addition of free circular motion from Earth. Furthermore, any curve in light due to the Earth's rotation is affected by the light's direction of travel. The path of an eastward moving light signal is longer and more curved than a westward moving light signal. Still, the emission speed of light is constant c relative to Earth. Thus, the apparent speed of an eastward moving light signal is slower with reference to Earth than a westward moving light signal. The apparent speed of light from a source on Earth is constant c only with reference to the fixed non-rotating Earth Centered Inertial (ECI) frame. The Global Positioning System (GPS) confirms this to be true. When the apparent speed of light is measured with the Global Positioning System, we find that it is $c-v$ or $c+v$, in which v is the rotation speed of the Earth where cities are located.

Principles of force-free circular motion can be applied to the workings of an atom [5,6]. In an updated model of the atom, the spin of an electron is strictly an inertial effect. What is more, the spin is actually a dual spin, with one spin perpendicular to the other. The orbit of an electron is of a similar nature. The orbit is in reality composed of *two* orbits, with one orbit perpendicular to the other. Orbital motion creates an imbalance of momentum because one side of a body moves faster than the other. Consequently, electrons wobble as they spin, and waveforms in their emissions are produced by their wobbles.

Electrons absorb photons, and the process of absorption creates force. But when the spin of an electron reaches speed c, photons break away from the force so as to emit in a straight line. Still, photons emitted from a source on Earth maintain the free circular motion of the Earth itself. And there is yet more to this story because the same kind of inertial effects take place due to the wobble of an electron. An electron's wobble is a separate motion from its dual spin, and the wobble is strictly an inertial effect. Individual paths of photons are therefore curved by the wobble of an emitter. The emission speed of a photon is affected by the wobble as well, and so these inertial effects work together so as to maintain apparent speed c.

The off-center rotation of an electron's wobble moves 'back and forth' longitudinally to the propagation direction of a light signal. Ongoing inertial effects of this motion may explain the expansion and contraction of light signals. Imagine two different photons in a single wavelength of light. Now suppose the leading photon travels faster than the other but with a greater curve in its path. At the very onset of their emissions, a faster photon will speed ahead of a slower photon so as to increase the space between them. Accordingly, wavelengths of light will expand longitudinally. Yet the traveled distance from a light source to a receiver is longer with a faster photon than with a slower photon. A slower photon has less distance to travel, and so by their travel's end, the slower photon will catch up to the faster photon. Wavelengths of light will therefore contract. Furthermore, the paths of these photons cannot run parallel to one another due to the difference in their curves. The individual paths of these photons will start out close together at the point of their emissions, and they will end up close together at their receiver. But during mid-flight these differently curved paths will naturally move further apart. This would explain expansion and contraction transverse to the propagation direction of a light signal. Force-free circular motion may therefore explain expansion and contraction of light signals--both longitudinally and transverse to the direction of propagation. [7]

Experiments on diffraction of photons point to a problem in theoretical physics, but the idea of force-free circular motion brings about a possible solution to the trouble. With a proper understanding of motion, emission theory becomes a viable concept. Thus, it is feasible that waveforms in the transmission of light are produced by the motion of the emitter. (See [6].) Accordingly, packets of photons could serve as a model to explain diffraction and interference phenomena of light.

All radiation from Earth maintains the circular motion of Earth itself; including Earth's daily spin, its orbit around the Sun, and so on. The geometry of force-free circular motion combined with motion in a straight-line is determined by the speed and the direction of each motion with reference to the other. For this reason, the direction in which a light source on Earth is pointed will affect the course of its light rays. This was confirmed by the Brazilian experiment, in which a laser beam mounted on a turntable system scanned actively in space by turning the table.

The Brazilian experiment also used a laser beam fixed in a laboratory frame that scanned in space due to Earth's rotation. The Earth's daily spin alternately agrees with and opposes the direction of its orbit. Consequently, the overall motion of the Earth is not uniform, but is in fact constantly changing. This irregular motion was detected by the Brazilian experiment. Indeed, the apparent speed of light is constant relative to the non-

rotating ECI frame, but its direction will change as the direction of the Earth's daily spin changes with reference to its orbit. And so in conclusion, these tests on diffraction of photons could be telling us that the entire foundation of theoretical physics is wrong.

Cern, the world's largest physics lab, recently announced that a neutrino beam fired from a particle accelerator near Geneva to a lab 454 miles away in Italy travelled 60 nanoseconds faster than the speed of light [8]. A speed as such goes against special relativity theory, but it may very well agree with principles of force-free circular motion. According to those principles, a neutrino beam fired from Earth travels in a naturally curved path due to Earth's axial rotation. Thus, those particles curve into the same general direction in which the Earth and its cities rotate. Yet any curve in the path of a neutrino becomes less curved relative to cities on Earth because those cities move in a similar path of their own. Moreover, a curved path which becomes less curved also becomes shorter to travel, while the speed of a neutrino remains unchanged relative to its source of emission. As a result, the apparent speed of a neutrino, or the magnitude of its average velocity, becomes faster than c relative to cities on Earth. And so is this to be interpreted as the effect of 'time dilation'? Or has Cern found a problem with special relativity?

Conclusion

The Global Positioning System was used by Cern for its time of flight measurement of a neutrino beam. The GPS involves a light signal traveling from Earth to a satellite system and then traveling back to Earth. The apparent speed of an outgoing light signal may indeed be faster than c relative to cities on Earth, but by the same margin an incoming light signal would be slower than c. This is because the curved path of an incoming light signal becomes longer and more curved relative to cities moving with Earth's rotation. Hence, the average round trip speed of a light signal agrees with the apparent speed of light c, and the GPS works accordingly. By this account a neutrino's apparent speed, in excess of c, is the result of relative motion. In no way does this contradict a previous observation in which neutrino speed was the same as that of light [8]. In 1987 there was a supernova called SN1987A, and scientists were able to see the light and detect the neutrinos from it. Because the neutrinos arrived almost at the same time as the light, we know they travel very close to the speed of light.

Physics professor Michael Longo and his research team at the University of Michigan recently determined that the early Universe may have not displayed mirror symmetry as generally believed [9]. The team analyzed thousands of spiral galaxies from datasets provided by the Sloan Digital Sky Survey, and found that they tend to exhibit a preferred direction of rotation. According to Longo the new data indicates that the Universe was born rotating. If this is true, then why not assume the Universe was born with a circular type of inertia so as to bring new possibilities to the world of theoretical physics?

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