Stationary Points in Space

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***Abstract**: When we look at a distant galaxy through a telescope, we do not see that galaxy where it is today, we see it where it was when the light photons we receive were emitted. That tells us that while light photons are emitted by atoms within a star, the points of emission remain stationary in space while the star and its atoms move on. All light originates from stationary points in space. That appears to be what Einstein meant when he wrote that a "'luminiferous ether' will prove to be superfluous" since his theory of Special Relativity does "not require an 'absolutely stationary space' provided with special properties." Wherever a photon is created there is "a stationary point in space."*

Key words: Relativity; Time Dilation; Speed of Light; Photon.

It is an undeniable and proven fact that when light is emitted, the emitter may move on but the point of emission in space remains stationary. The nearest star to our sun is Alpha Centauri, which is 4.367 light years away from our sun. That means that when we look at Alpha Centauri through a telescope, we see it where it was located 4.367 years ago. Farther from Earth, when we look at the Andromeda Galaxy, we see it where it was located 2,537,000 years ago. Closer to Earth, when we look at the planet Saturn at its closest point to Earth, we see it where it was located 67 minutes ago.

It is often said that when we look through telescopes at the universe around us, we are looking into the past. And because light typically travels in a straight line from its point of origin to our telescope, what we see is no longer located where we see it.

Photons are created by atoms at stationary points in space. The atom moves on, but the stationary point in space remains. The problem, of course, is that there is nothing to mark that point in space except by tracing a photon back to its point of origin. Additionally, while the point in space is stationary, the atom was not stationary when it emitted the photon. The type of atom and the atom's speed through space relative to that stationary point determine the oscillation frequency of the electric and magnetic fields which comprise the photon that is emitted.

What is rarely, if ever, discussed is how this is possible. The mathematics involved in computing distances may relate to a point in space that is now totally empty, but we understand why the emitter is no longer where it was located when it did the emitting. What we ignore is the fact that the point of emission is stationary. And we usually do not ask <u>why</u> photons are emitted from stationary points in space. Or how you can even <u>have</u> a stationary point in space. Instead, photons are generally described as being emitted by either a stationary or a moving atom. Mathematics can be performed either way.

Einstein seems to have understood this when he described how motion causes an electron to gain mass.[1] Some energy force <u>caused</u> the electron to move through space, and that force adds to the mass of the electron. That means that the mass of the electron tells you how fast that electron is moving through space – even when that electron is part of a tungsten atom in a lightbulb fixed to the ceiling above you in your laboratory, which is fixed to the Earth. It appears "normal" because everything in your laboratory is moving at about the same speed through space, which means Time ticks at about the same rate for everything in your laboratory. But that rate is very different from what it would be at a stationary point in space.

I came across this issue when reading some college physics textbooks. One textbook[2] described how a photon emitted at a 90 degree angle across a compartment within a spaceship traveling at very high speeds would <u>not</u> appear to move laterally but would appear to move in a curve toward the floor. But then the textbook described the curved trajectory to be the result of <u>gravity</u>. Here's a passage from that textbook:

> A light ray traverses a laboratory accelerating upward in empty space. [...] The path of the light ray is straight. However, the laboratory moves upward in the time the light ray takes to cross. The exit point of the light ray is, therefore, lower in the laboratory than the entry point. Thus, for an observer in the accelerating laboratory the light ray falls with an acceleration g. The equivalence principle implies that the same observation is made in a laboratory at rest in a uniform gravitational field. A light ray in a gravitational field must fall with the same acceleration as other objects. Gravity attracts light.

As I saw it, the curve was <u>entirely</u> the result of the speed of the laboratory traveling through the path of the moving photons (not a ray) which were in turn traveling from a stationary point in space to some other point in space. Gravity had nothing to do with anything.

Searching through other physics textbooks and sources about physics, I found several which described how gravity causes photons to "fall" toward the earth and thereby gain energy, resulting in the oscillation frequencies of the photons starting out slower at the higher altitude and then becoming faster at a lower altitude. They'd cite the Pound-Rebka Experiment as confirmation of their claims.[3][4]

The clear fact that photons are emitted from a "stationary point in space" says that the properties of an atom when it is at a point in space determines the oscillation frequency of the photon that is emitted by the atom at that stationary point. Photons do not change their frequency while traveling from atom to atom. Pound-Rebka demonstrated that due to differences in gravity at different altitudes, photons created at a higher altitude have a higher oscillation frequency than photons created at a lower altitude.[5] "Falling" from a roof to the ground doesn't change the oscillation frequency of a photon. The photon was created with a higher frequency on the roof. A photon created on the ground will have a lower frequency.

Additionally, when a moving photon hits a moving atom and is absorbed by that atom, the receiving atom may be unable to hold the extra energy. In that case, the receiving atom gets rid of that excess energy by emitting a NEW photon – again from a "stationary point in space." If the receiving atom was moving toward the oncoming photon, kinetic energy is added to the new photon, giving the new photon's electric and magnetic fields a higher oscillation frequency than the photon that was absorbed. This is the basic principle that allows radar guns to measure target speeds by comparing the oscillation frequency of the photons the gun emits to the oscillation frequency of the photons that get returned from the target.

The apparently undeniable fact that every photon is emitted from a "stationary point in space," and the fact that the energy of that photon is determined by the creating atom's motion relative to that "stationary point in space," evidently allowed Einstein to realize that such a process eliminated the need for any "luminiferous ether." All photons are emitted at and travel away from "stationary points in space." The properties of the atom that created the photon, and the atom's motion relative to that "stationary point in space," determine the oscillation frequency of the photon's electromagnetic fields.

Everything in our visible universe is moving relative to "stationary points in space." Or perhaps more accurately, everything in our visible universe is moving relative to stationary space. If you believe "space" cannot be stationary, the facts indicate otherwise.

It's something to think about.

References

[1] Albert Einstein, *On the Electrodynamics of Moving Bodies,* June 30, 1905, page 20-21, Annalen der Physik 17 (1905) Translation by G. B. Jeffery and W. Perrett, *The Principle of Relativity*, London: Methuen and Company, Ltd. (1923)

[2] James B. Hartle, *Gravity: An Introduction to Einstein's General Relativity*, published by Addison-Wesley (2003), page 114.

[3] Kenneth Krane, *Modern Physics*, 3rd edition, published by John Wiley& Sons, Ltd., (2012), page 488.

[4] https://einstein.stanford.edu/content/relativity/q56.html

[5] Robert V. Pound & Glen A. Rebka, Jr., *Apparent Weight of Photons*, Physical Review Letters, Volume 4, Number 7, April 1, 1960.