

The Structure of Light

John-Erik Persson

john.erik.persson@gmail.com

Abstract

This article describes the structure and behavior of light, without using the particle model.

The most important problem

The question regarding the structure of light is the most important problem in physics. The introduction of the wave theory seems to be unfinished, and all particle-based thinking is not swept out. So, the transition from particles to waves is not completed, and this appears to be the most fundamental reason to the confusion in modern physics.

Potier's mistake

In 1882 Potier suggested that Michelson's prediction, regarding his experiments with Morley, should be reduced due to an effect in the transverse arm, assumed to be half the effect in the longitudinal arm. His motivation was, that transverse ether wind should force light to take a longer way, by changing the direction of light. This seems to be a particle-based reasoning.

A fundamental property of Michelson's interferometer is that light *does not have to take a longer way*. The equipment is sensitive in only one dimension. In the other two dimensions the instrument is blind to differences much smaller than the sizes of the fringes used. Instead of particle thinking we must use the wave model and we must apply Huygens's principle. We find that wave fronts in a resonator compete in such a way, that wave fronts consuming least amount of time are winning. This means, that standing waves in a resonator *always* have wave fronts parallel to the mirrors. The wave vector, \mathbf{c} – not $\mathbf{c}+\mathbf{v}$ – is orthogonal to mirrors and should therefore also be used in the laws of reflection and refraction.

Since the ether wind can be blowing inside a wave front, we find that light does not always move transverse to wave fronts as normally is assumed. The ether wind is very small (10^{-6} times c) this difference can therefore be ignored in most cases, but *not in the interpretation of Michelson-Morley's tests*. This means that we need two descriptions of light, namely

- real (beam) direction as a vector sum, $\mathbf{c}+\mathbf{v}$, and
- apparent (ray) direction without regarding ether wind component inside the wave fronts.

In most experiments the ray is relevant. The beam direction marks direction of max intensity and cannot be detected by the same high precision as the ray direction.

Michelson resisted Potier's idea for five years. Then he gave up, after a nervous breakdown, since most scientists were against him. This was bad for science and caused paradoxes like the twin paradox and the wave or particle paradox and also the Lorentz invariance.

Michelson -Morley's tests

Since stellar aberration reveals planetary *translation* it was assumed that Michelson-Morley's tests also would reveal that motion. However, later experiences from the global positioning system seems to indicate, that we only can expect an about hundred times smaller value, due to planetary *rotation*. This means that Michelson's test gave nothing of empirical value. However, unfortunately Potier's mistake contributed in negative direction to *theoretical* physics. As we have seen, a transverse ether wind changes only the beam direction of light – and it is the ray direction that is relevant in Michelson's tests. Therefore, no effect of ether wind in the transverse arm. Light has no reason to change behavior, since orientation of mirrors is not changed.

In the longitudinal arm changes in the ether are moving with the speed $c \pm v$, in two opposite directions between two mirrors. The positioning of the atoms in a crystal is based on changes in the ether moving with the speed $c \pm v$, in two opposite directions between atoms. The atoms have nothing, except the ether, to base their positioning on. The effects between mirrors are *sequential*, and the effects between atoms are *simultaneous*. However, these effects are additive in both cases. This indicates that the atomic separation is reduced to the same amount as the reduction of 2-way speed of light. The effect in the longitudinal arm is therefore *compensated*. This effect is two times the Lorentz contraction. So, we can conclude that a contraction of physical bodies *alone* can explain the same as space contraction and time dilation can do *together*. This means that we can use the Galilean transform and we do not need dilation of time. This interpretation means that Lorentz invariance can be an illusion produced in 1882. We do not even need to regard the contraction, since this contraction also exists in the definition of the unit of length. This means that the contraction exists in the old mechanical, as well as in the modern optical definition of the meter.

No effect in transverse arm and compensated effect in longitudinal arm explains the zero result.

Thermal radiation

A bound electron is assumed to produce thermal radiation. This radiation can produce a force on another electron. This force is defined by the product of the generating charge and the charge in the second electron. **This product proves that the force is not defined until the radiation has moved from the first to the second electron.** Before that time the force is only *potential* and will be realized when the radiation reaches the second electron. (The radiation cannot know in advance the existence and magnitude of the second charge.) This delayed realization of the force means that energy cannot be drawn from the emitting electron. Instead, this energy *must* be provided by the ether. The ether must exist.

The fact that the energy comes from the ether means that electrons can radiate *continuously* without losing energy. Thermal radiation can be explained without quantum jumping, and without photons.

Photoelectric effect

Photoelectric effect has been explained by assuming a light particle to collide with an electron and thereby adding kinetic energy to the electron. However, it seems odd that a particle moving towards a surface could cause an electron to move away from that surface.

The wave model for light provides a more reasonable explanation by means of an interference effect between a *tightly* bound electron and a wave of light. The electron can be assumed to orbit inside the plane of a wave front and light can produce a force transverse to electron motion thereby changing the *potential* energy in the electron. If kinetic energy is high enough the electron can escape from the atom and perhaps also from the crystal.

Compton effect

The wave model for light can also explain the Compton effect, as a result of *two* processes. In the first step an electron is escaping its kernel, in the same way as was described for the photoelectric effect. In the second step the process goes in opposite direction and the free electron is captured by another atom, whereby a second X-ray wave packet is generated. This X-ray may have a lower frequency.

Beam splitter and two detectors

A beam splitter can illuminate two photodetectors with equal and continuous light waves. The responses in the two detectors are not correlated, since the electrons in the two detectors are independent of each other.

Quantum jumping

We have seen that bound electrons can generate continuous light, without the need for jumping.

Planck's constant, h .

Planck's product, hf , does not have to be an evidence of light quanta. Instead, h can reflect a property of the electron. All our knowledge about light comes from observations on electron behavior. So, the fact that charge is quantized into electron charges can produce the illusion of light quanta. This illusion of photons can be a shadow of the electron acting as our detector.

The ether

Abolishing the ether by a young patent engineer was accepted. However, an experienced physics professor stating that 'physics without an ether is unthinkable' was completely ignored. This was fatal to science, and without the ether the law of energy conservation fooled us to believe in photons. It must be difficult for a scientist, knowing he was wrong, not to be allowed to correct himself.

Atomic clocks

Instead of using time dilation we can assume atomic clocks to depend on ether wind as $f=f_0(1-v^2/c^2)$, with v as ether wind component inside the plane of electron's orbit. The reason is that electrons are accelerated in proportion to $\pm v/c$, causing transverse speed component to be proportional to $c\pm v$. This assumption can, for clocks in the global positioning system, give the same prediction as the two theories of relativity give together.

Summary

We can have physics without

- quantum jumping,
- time dilation,
- wave particle paradox,
- twin paradox,
- photons,
- and confusion

if we only accept the energy contribution from the ether. It seems as the ether contains large amounts of energy. **So, the ether exists – but not the photons.**

Discussion

The fact that the forces in thermal radiation are just *potential* means that quantum jumping is not needed, and also that this jumping seems not very probable, due to the fact that energy consumption takes place at a later time. So, the fact that energy consumption must be delayed until radiation hits a charge is a very strong evidence for the *existence of the ether*.

See also:

<http://www.naturalphilosophy.org/site/member/?memberid=22>

http://www.naturalphilosophy.org/pdf/abstracts/abstracts_paperlink_7429.pdf