

EM-waves - additional aspects and hypotheses

The velocity of light:

Why is the velocity of light c limited and a constant in vacant space?

One answer could be that this constant is a quotient, as the number π in Euclidean geometry between the circumference and the radius in a circle. For EM-waves that "quotient" would be the relation between E- and M-factors of the fields, according to the views here. (Cf. the polarity radial - circular of d-degree 3 in this model. M-fields closed, "circular" field lines, electric fields open "radial" field lines.)

The velocity depends on the "medium" (not on the source) and the "medium" is "Vacant Space".

If the same aspect is applied to the "gravitation waves", so difficult to detect, or sooner GA-waves, what says that these waves should have the same velocity c ?

And why c^2 in the expression $E = mc^2$?

A transversal wave marks 2 orthogonal co-ordinate axes. We could see these as forming a co-ordinate system for the 2nd d-degree, for surfaces, indicating a multiplying operator.

With one of the axes representing inward direction, corresponding to negative sign, we should get something like

$$+ c \ x - c = - c^2 \text{ (in ordinary mathematics)}$$

—————→

←—————

The way back doesn't work, taking the root out of a negative number. Hence, the imaginary number $\sqrt{-1}$ ($x \ c^2$) is introduced in mathematics.

We can imagine that the c^2 -factor in Einstein's expression for the energy of Mass is inward directed, that is the imaginary direction, built in into the mass - as "inverted EM-fields" as written on page about Mass and matter,

(More about Velocity in another file.)

Some numbers (from 1973):

Distance scale, meter:

$$10^{-15} \xrightarrow{\hspace{1.5cm}} 10^{+26} \quad \text{Middle } 10^{+5,5}$$

∅ atomic nucleus ∅ Universe

Time scale, seconds:

$$10^{-23} \xrightarrow{\hspace{1.5cm}} 10^{+18} \quad \text{Middle } 10^{-2,5}$$

↓ ↓
Time for light Age of Universe
to pass a

proton

Quotient between middle of scales $10^{+5,5} / 10^{-2,5} = 10^8$, m/s, the 10-power of light.

Another operation:

$$[0,1 \times (5 \times 4 \times 3 \times 2 \times 1)]^2, \times (5 \times 4 \times 3 \times 2 \times 1) \rightarrow \text{squared again.}$$

$$= 2,985984 \times 10^8, \text{ ca the velocity of light, } 2,997925 \times 10^8 \text{ m/s}$$

A third note:

In a pentagon the inner angle is 72° . The root out of 72 is 8,48..., circa $\log c$ in meter/seconds. Gives $c = 3,0569 \times 10^8$. 2 % wrong.

What should the square root of an angle represent ? ! Madness?

45° , (the assumed angle in d-degree 2):

$\text{Arctan } 1/\sqrt{45^\circ} = 8,4787$., closer to \log light velocity 8,4768.

The length of a photon (?):

One quantification of EM-waves is the wavelength. But the quanta of EM-waves, the photons, are another question. What quantifies them? How much light, how many meters of light makes a quantum, a photon? Or how many wavelengths?

According to only oral information there has been experiments to measure the length of a photon: two parallel light beams were sent into a box with two slits. If they have the same starting time and velocity they allow interference, they give a common wave pattern on the screen in the box.

If one of the beams is delayed by passage through a staff of glass, in which the light velocity is about $2/3$ of that in vacuum, the interference between the beams ceases, if the delay corresponds to circa **1 meter** of light.

Presumably the length of the photon depends on the wavelength? In the experiment visible light was used (wavelengths between 4000 - 7000 Å). In the meter system the number of wavelengths per photon becomes the inversion of the wavelength if the photon is 1 meter.

Could this relation of inversion between number of wavelengths and photon length - if about 1 meter - reveal a principle from the world of mathematics underlying the physical world? Perhaps it is both obvious and natural? A certain amount of bound energy in the atom, released and translated to a certain number of crossings of the "E0"-line?

[If number of wavelengths in a photon of 1 meter is $10^{2\pi}$, the wavelength will be 5210 Å, near the value where the human eye has its best colour sensitivity (circa 5300 Å). 2π , the circumference of the unity circle, as a log number.]

Hypothesis about polarization between radiation of longer and shorter wavelengths:

Hypothesis:

A quantitative degree of difference between radiation of different wavelengths turns over to a qualitative structure difference under certain conditions turns over to a complementary polarity with features of the type

- centre /anti-centre, 0/00
- outward / inward direction
- radial /circular...

Condition for this: a coupling between the radiation waves - and energy or frequency relations corresponding to certain d-degree or level steps.

Could we imagine - most tentatively that for instance longer wavelengths can have a

"gravitational" or aggregating effect on shorter ones, shorter wavelengths an "electromagnetic effect" - or integrating and differentiating on longer ones?

"Lissajou's figures" are created by bodies oscillating in two directions. Wave motions with wavelengths in integer relations to each other give closed Lissajou figures.

We could eventually turn this geometry the other way around and presume that waves which interfere in this way can give rise to bodies as closed figures? A 4-dimensional "meta-wave" field through step 4 → 3 give closed material bodies. (Cf. MEGA-fields, chapter [Forces](#).)

In astronomy one has observed strong sources of radiation in the radio frequency range beside a star: Can eventually a polarization between frequency ranges (radio versus visible light) be a part of the explanation? (Cf. human ears on the side of the head, eyes in front!)

Within plasma physics, with its innumerable wave phenomena, perhaps some wave types, geometries and discontinuities more generally could be explained with the hypothesis here?

Biology

Different frequencies of radiation emanate from different (quantified) shells, levels, angles etc. in the atom. It seems very natural if these different frequencies take part in angle polarizations of molecule structures to complementary chemical roles and other such polarizations:

revealing and reshaping the geometrical and "quantum number" differentiations of its origin in atomic shells.

The organisation of the retina would be one example - and its interpretation of complementary colours.

As a parallel on superposed levels: energy differences of certain degrees in nerve signals would lead to a complementary "casting" between nerve cells...?

Concerning vibration frequencies we have the fact that certain frequencies give resonance in different organs of the human body.

There are the so called "window effects" too: that biological organisms seem to be sensible to radiation in certain spread regions of the wavelength scale. This should eventually be possible to explain with the hypothesis on changed angles at certain quotients between wavelengths?

Meteorology and the like

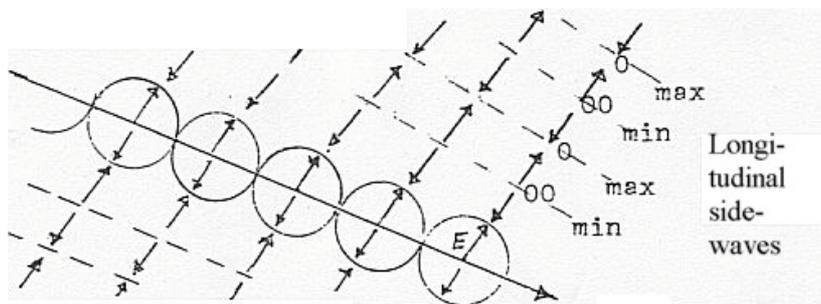
In meteorology as a superposed level there are some phenomena, which have been considered difficult to explain, and which perhaps could be interpreted in terms of this hypothesis (even if explanations in other physical terms simultaneously would be possible):

Currents in water and air (wind) are not primarily "waves" but their relative velocities could be a real analogy to frequency relations of EM-waves and other oscillations.

- Smaller circular sea currents have been discovered which has been difficult to explain (evidently then not a result of the Coriolis force). Quantitative differences in velocities but also in temperature and density could possibly lead to a polarization between a tangential and a circular current during certain conditions.
- The same seems to be valid for tornados - with air as structure carrier, where there seems to be an angle change from horizontal currents to vertical.
- The "polar front" over the North Pole shoots down from the pole 4-5 tongues of cold air, (cf. 5 steps in a dimension chain !) This wave front pendulates to and fro with a period of 4-6 weeks, the so-called Rossby waves.
From the wave-front "cells" of air are tied off, isolated air masses as centres of low pressure and high pressure. Perhaps the hypothesis above is illustrated in this geometrical development - as well as in the angle relation between warm and cold fronts within a low-pressure cell?

Hypothesis about "side waves" in EM-fields:

A transversally swinging string generates longitudinal "side waves" in the air. In the same way an electromagnetic wave, where half of the wavelength gives the picture of a swinging string, could be thought of as generating longitudinal waves in the surrounding "empty" space, laterally around the propagation way of the electromagnetic wave ?

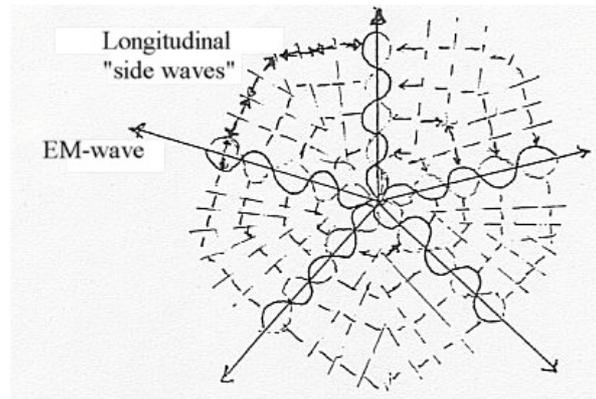


The condition would be that each motion gives rise to an opposite motion, in the same way as each force has a counter-force, which we can assume.

Another condition is that "empty space" is not an undefined "nothing" but a that kind of "negative" energy which we have assumed in other chapters hear, and can be graded, even if it is the plus-energy that grades it.

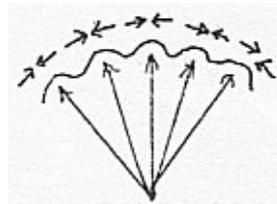
A third condition would probably be that "vacant space" as medium is totally non plastic ("elastic") in its negative property (!) , which it reasonably should be (in spite of Einstein's view)?

From a circular radiating source, for example a star, the longitudinal "side waves" should be more or less circular, separating radii of maxima and minima:



Cf. leaf nerves and leaf cell domains.

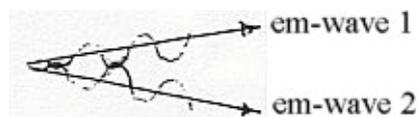
Such side waves could also be compared with the interference pattern, like longitudinal waves, which an EM-wave give rise to after the passage of slits in a screen:



What else could actually explain such interference patterns in radially spread light beams, interference seen as the typical character of the "wave" property ?

According to general principles too in this dimension model it should be possible to find more high dimensional waves as components in wave types of other d-degrees, such as L-waves in T-waves.) If we could presume such "side waves", they should in some way be connected with "gravitation waves", at a guess ? Or at least constitute a component in gravitation?

Nearest the light source or centre should the vectors in the "negative" energy of empty space not have room enough or should "overlap" each other. What happens there? Some type of bonds through overlapping? Definitions of new centres (as gravitons)? Extinction - in the nearest field ?



[If the linear propagation of an EM-wave demands room sidewise for at least 1 longitudinal wavelength in empty space, and the empty space field was restored through each step of propagation of the EM-wave, one could imagine that some type of "overlapping" or bond in the extreme near field hampered a restoration - and with that also the further linear propagation of the EM-wave. This could in that case possibly be a way to interpret celestial bodies, which are so dense, with gravitation so strong, that not even light can escape ("black holes") ?]

Phase waves:

Some sketched notes with question marks

Source of information from the 1970th forgotten.

Phase waves originate from a phase displacement between 2 other waves (as electromagnetic waves or waves as variations in current, charge or voltage...). They can be described as a result of polarizations in angles, when waves are viewed as projected from vector rotation in a unity circle.

One example: When a light wave is polarized, a phase displacement arises between the right and left polarized light wave, which gives a phase wave as an "illusory rotation", "Faradays rotation". This is still another polarization in a light wave, which gives the phase wave.

- In a single light wave we have the phase displacement of 90° between the electric and the magnetic vector fields. If this description is correct ([preceding page](#)), we could ask if not ordinary light waves could be seen as phase waves too, on a deeper level?
- The phase waves here, as expressions for relations between two other - but usually "similar" - waves, represent a relation and a connection between these.
- It seems as something like a parallel to the two polarizations between 1) opposite charges as proton-electron (cf. M-E) and 2) as pairings between electrons (and protons?) of opposite spins?

The "illusory rotation" in a polarized light wave is also called its spin.

We have also the fact that α -particles have the resulting spin 0, which should imply that the 2 protons - and neutrons - should have opposite spins - as a principle for pairing. (How about H_2 -molecules?)

Other bits of information:

- A phase wave has also been described as motion of a point, i.e. of a 0-dimensional entity.
- Phase waves can have velocities both less and higher than c , the velocity of light.
- They approach zero (0) at absorption, approach infinity (∞) at "cut off".

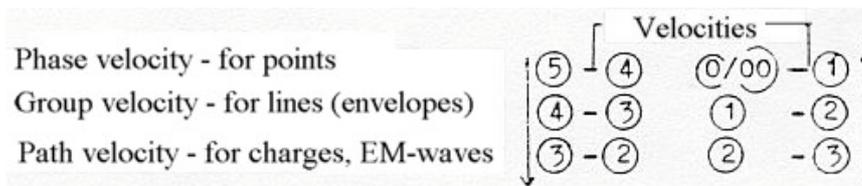
It sounds as if we could presume some kind of a connection of phase waves with the last step $1 \rightarrow 0/\infty$ in our model here, a step towards "motion as such" - **and** a relative history, that is: a history of relations - as all other potential lines in Universe...

Step 1 in this model, polarized into poles 1a-----1b, identified as

- 1a: converging "movements towards each other", defining a zero, a secondary 0-pole,
- 1b: diverging "movements from each other", defining an anticentre, a secondary ∞ -pole.

A 4-dimensional, radial vector field between first centre and anti-centre (0---- ∞) contains all thinkable phase displacement, as angle steps between vectors. All these angle steps could be thought of as potential phase waves - realised through rotation of the vector fields and following steps in the chain to the last d-degree of Motion.

"Cut off" is possibly equivalent with a break of the coupling or relation between the two carrying waves. The waves following separate courses defines an anti-centre. The velocity of the phase wave goes towards ∞ (~ anti-centre)?



Concerning velocities, could we eventually (?) see a scheme like this:

[Group velocity seems to concern "wave packages", and particles with mass are sometimes viewed and analysed as such. In this model Mass is presumed to be identified in d-degree 3 and charge as a property of particles in d-degree 2.]

According to some information group velocity should be the derivative of phase velocity. If this is correct, it sounds a bit back to front, even if it fits in the scheme above. The light velocity should then be the last derivative, the constant c ?

More bits of information:

- Phase waves can have negative velocities. Perhaps equivalent to say that their direction is inwards, towards higher d-degrees or underlying levels, according to the views in this model.
- Their equations can give imaginary roots. These roots should then be possible to discover in other revelation forms?
- Phase waves can be absorbed. Or reflected towards a too high density.

"Negative" direction, interpreted as inward direction in this model (cf. other pages) and coupled with imaginary factors indicates that phase waves also are included in matter. Externally 3-dimensional bodies created out of 4-dimensional space-time fields. Compare how a 4th dimension in 3-dimensional bodies has been illustrated as built-in "holes" of different forms.

In matter, if analysed as sewed together by "inverted" fields, "curled lines, stratified shells" etc., with multidimensional motions, there ought to be a crawling with phase waves!

Matter itself could eventually be interpreted as "phase waves", a network of relations between polarized (and "inverted") 4-dimensional field lines, according to the postulate that level of analysis is optional.

Between the so called "field lines" in the **magnetic field of earth** for instance there could exist phase waves in their mutual relations? These waves could eventually be revealed in the incorporation of cosmic particles:

With the dimension model follows the aspect or postulate about a **gradually increasing substantiation**, from dimensions to fields to matter etc., through counterdirection from other dimension chains. Therewith also growing centres: from points to elementary particles to atom nuclei...

Between the so called "field lines" in the **magnetic field of earth** for instance and variations in these, there could exist phase waves in their mutual relations? These waves could eventually be revealed in the incorporation of cosmic particles.

Hence, **captured elementary particles and nucleons in the magnetic field, spiralling around the field lines**, should be possible to interpret as "the motion by points" in phase waves - on a superposed level.

Inside bodies, within biology and in the nervous system, there should exist a lot of phase waves and phase displacements, absorption or "cut offs", responsible for biochemical reactions, with molecules perhaps as the "points". Hunger for example could be such an expression for growing "phase

displacement".

According to new information this seems also to be a common view in biochemistry

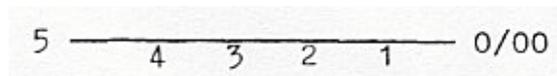
y.

Energy

Phase waves don't carry any energy, according to fundamental physics. That's why they can have velocities higher than the light velocity, without contradicting the law - or Einstein's postulate - that c is the maximal velocity in nature - implicit: for transition of energy or "information" .

This statement that phase waves don't carry energy could as a suggestion be connected with the interpretation of phase waves as motion in d-degree 0/00.

The main axis in a dimension chain, the axis of the quantum jumps has in this model been assumed to represent an "E0"-axis or E0-line. Energy 0 (Zero)



(The energy of EM-waves for example defined as proportional to number of passages of this E0-line. (per time interval = frequency. Or by distance to this E0-line (potential energy or amplitude.)

The motion of the point, characterising a phase wave, could in that case be thought of as occurring along this main axis.

(Another, contradictory, formulation of this lack of energy:

If the phase wave is described as motion by a point on the circumference of a unity circle, in opposition to waves generated by vector rotations in this circle, it implies that the point is moving along the anticentre of the circle, never has contact with the vector centre in the middle. The phase wave spiralling around the E0-line never crosses it.)

The aspect of information:

It is said, a bit vaguely, that phase waves don't mediate any information, as not conveying any energy.

Information is usually quantified (as in connection with data) in "bits" or number of polarizations, options at ramifications.

Hence, we could believe that a phase wave as expression for 1 polarization, that is phase displacement between 2 energy-carrying waves, should at least give 1 bit of information - about just this phase displacement ? *

Information out of polarisations as ramifications means information about couplings between different units or poles. A phase wave is such a coupling between 2 waves, isn't it? Especially should the relations between different phase waves be able to mediate much information?

Thoughts as phase waves or relations between these?

The thought reaches the furthest limit of Universe on less than a second, while the light needs billions of years. Only a phase wave should manage that, shouldn't it !?

* This view seems today (and perhaps since long?) accepted: phase wave modulation is used for transition of information besides frequency and amplitude modulation.