The apple's core: Only space and time

(Side effect: Gravitation)

Contents

What is matter and what not?

The electric force

The mean space-density of a wave far, far from the CP (the space-density of the source at the receiver (has $1/r^2$ dependence))

Finally: the derivation of the wonderful $\Delta\lambda_R \approx \lambda_R \cdot \frac{SD_{S(r)}}{SD_R}$

Calculation of the space-amount ☹

Use of the mean space-density ☺

Inert mass

So

Magnetism

The velocity of the source V_S

The parallel component of the velocity of the source $V_{S\parallel}$

The perpendicular component of the velocity of the source ($V_{S\perp}$)

Next, the receiver moves too (with V_R)

We start with the parallel component of V_R, that is with $V_{R\parallel}$

We are now in the parallel direction to the $V_{R\parallel}$

And now in the direction perpendicular to the $V_{R\parallel}$ (finally the magnetic force)

The calculation of the vertical $\Delta\lambda_R$ of the $V_{R\parallel}$ (the calculation of the magnetic force)

Now it is the turn of the perpendicular component of the V_R that is the $V_{R\perp}$ (it too generates a magnetic force)

Now the $V_{R\perp}$ gets its big sketch too (as before the $V_{R\parallel}$)

So

The gravitation

The change of the space-density of the electric field attracts us all

Disaster: The $\Delta SD_{S(\lambda)}$ is proportional to $\frac{1}{r_S^3}$ and not to $\frac{1}{r_S^2}$

Like "The Egg of Columbus": The V_{dis} turns $\frac{1}{r_S^3}$ back to $\frac{1}{r_S^2}$

g as gravitation

The eternal dream: anti-gravitation

An earth of protons

So that's how it is:

What are electromagnetic waves?

Electromagnetic waves in gravity

Temporarily last words

Little introduction

Beware, who reads the following, could go blind - or was it the opposite?

Anyone who always wanted to know how gravitation comes into being, who wants to learn more about gravitation than he already knows, will certainly find some new ideas in this paper.

The general theory of relativity is really good, but there are still alternative approaches (which, of course, by no means contradict the general theory of relativity). Besides, I always liked special relativity much more than general relativity.

To understand something means to recognize connections: "Doctor! Whenever I drink tea in the morning, my right eye hurts." "Then take the spoon out of the cup first." The doctor has recognized the connection. Gravitation had caused similar complaints until I realized (without the help of a doctor) that the mass itself must be reduced to the most basic physical quantities: space and time.

During this work (and not before) it became apparent that gravitation is indeed an electrical phenomenon. No wonder that the development of the nature of electric forces consumes most of the pages. - Just as you need a haystack if you want to find a needle.

It was a huge mountain of work (larger than the "Olympus Moon" on Mars, as if all of Mars were a mountain on the Earth's surface), but after all, it was worth it. New fascinating connections have become apparent between the electric field and gravitation, and in addition - as a disproportionately large bonus - a better understanding of magnetism and the electromagnetic waves resulted.

It was exhausting, but never boring; how nice then that this work is only - as Marco Polo may had said - "a first step of a long journey"; maybe it's just a glimpse out the window, even before the actual journey, to see what the weather will be like...

What is matter and what not?

Knowledge in the head, or non-head in non-knowledge

In ancient Greece, Leucippus and Democritus postulated that everything, even the soul, consists of indivisible atoms. And the atoms would be made of matter. But what the matter consists of could not be said. The matter of ancient Greece had the enviable privilege of simply existing. At best, one could say that this matter was the opposite of vacuum, so that the vacuum could therefore be defined as non-matter. According to Democritus, the most important properties of matter were that it could move in non-matter, and that its atoms had different geometric shapes that could be combined to form complex materials.

Hardly 2500 years later, we looked more closely and realized that atoms are still divisible. We discovered that atoms consist of positive and negative elementary electric charges - assuming at first that neutrons consist of equal positive and negative electric charges. Since then, it has been shown that the interactions between elementary electric charges lead to extremely complex behaviors, which is what disciplines like electrodynamics and atomic physics are all about.

The elementary electric charges consist of an electric field and a mass. And we (humans) have already found out a great deal about the properties of the electric field and the mass. But what the electric field and the mass consist of, could not be said for a long time. The electric field and the mass could simply exist for decades.

Modern atomic physics took much less than 2500 years to find the quarks and many other particles. Currently, the Quarks and their colleagues enjoy the privilege of just existing at least partially.

We recognize a pattern here: the more accurately we can look through the technology, the smaller the structures become. Can this ever end? And no matter how many contexts we recognize, in the end there is always the question: what does matter consist of? In the end we always have something that can be described by its properties, but beyond that just exists. It is almost as if we had to be content with it, as if the question were wrong - if - yes, if we were not constantly able to look more closely and understand more.

It has never been my goal to deal with questions about the structure of matter. Ever since my early teens, I have always wanted to better understand gravitation. I could have known better, because the focus of gravitation always seems to be matter. In this context, we call the matter heavy mass and of course mass may not only be heavy but also inert.

Atomic physics has worked out a complicated picture in both elaborate and painstaking detail work: At the center of an elementary electric charge is a somehow spherical object whose radius is hardly determinable. There are three quarks in it, which exchange any particles with each other. Barely noticeable, there is a particle field around the quarks that creates gravitation, and the Higgs bosons provide inertia, so that the elementary electric charges behave like primitive billiard balls when they colide, always following momentum conservation. And I am convinced that particle physics correctly describes reality thanks to its tremendous experiments.

At the same time, I believe that the context of atomic physics can be represented much more fundamentally - and that, including gravitation and the electric and magnetic forces.

When dealing with gravitation, one will automatically deal with the theory of relativity. The *special* theory of relativity shows us that a moving object is getting shorter and its clocks are slower and out of sync. What a fascinating insight. I can only imagine an *object* if it has a volume. So the special theory of relativity tells us that a moving volume has different space-time values than the observer. The *general* theory of relativity tells us that space is curved around a mass. In other words, even a volume that does not move may have different space-time values than the observer (such an observer is usually called a global observer). And gravitational waves are space-time waves.

People often ask what time is at all. This can be answered relatively briefly: Time is defined by the changes taking place in space. Such changes can be the *motions* of objects and of electric and magnetic fields. The space-time values significantly influence our observations. And as space-time values change, so do our observations. Thus, e.g. in the special theory of relativity magnetic fields become electric fields.

Let's look again at Democritus's atoms: the atoms are made of matter and move in a vacuum - in non-matter. Conversely, one could say that matter is the non-vacuum. If there were more of the matter and less of the vacuum, then one would not say that matter moves in vacuum, but that the vacuum moves in matter. Probably, one would associate non-matter with the shapes of the atoms, and since matter would fill most of the space, it would not be able to bump into itself, making it look as if the non-matter atoms collided with each other.

It's a bit like water and air: if there's a lot of air and less water, then the water moves in the air (sometimes we call that rain), and if there's a lot of water and less air, then the air moves in water - these are air bubbles. It also works the other way round: who has a lot of money, moves the money, who has little money, is moved by the money - the few move the many and the many are moved by the few. It's all more than just semantics and wordplay. It shows us that Democritus knew neither what matter is nor what vacuum is. The only thing he really knew is that matter and vacuum are different! That was the basis for a thoroughly satisfactory description of the reality at the time. And basically we are still in the same situation today - with one major difference: Einstein has since discovered relativity. Thereby we know that a volume can differ from its environment by its space-time values!! And that's basically all we need: space that differs from other space by its space-time values. So it is sufficient if the space-time values of matter and vacuum differ. A real vacuum - in the sense of a completely empty space - does not exist in the known universe. All space is filled with force fields. So, due to the differences in space-time values, matter can differ from force fields, and besides, matter can differ from other matter, and force fields can differ from other force fields.

Space *superposes* with SPACE and creates space

Space that differs from other space is indeed the foundation, but it is not enough. There also has to be the possibility of interactions. Only in this way, our highly dynamic and complex world could emerge. The difference as well as the boundary between matter and vacuum is fluid - both consist of space and they only differ in their space-time-values. So that the boundary between matter and vacuum is linguistically a bit more fluid, volumes now become *space-areas*.

In our perception, matter moves in space, whereby matter consists of space-areas, which therefore move in space... Even force fields are space-areas, and they move too. The key statement here is: space-areas move. This does not only seem trivial, it is trivial.

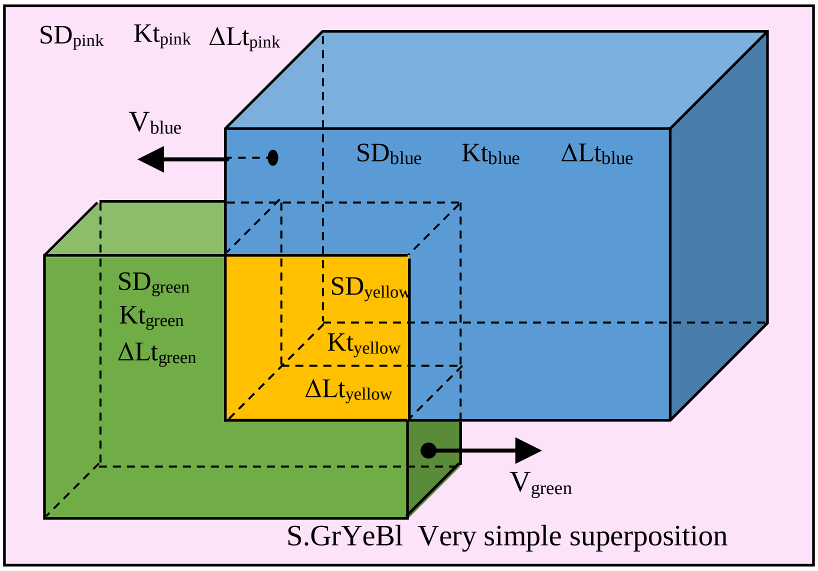
When space-areas move, and because there are many of them, they will inevitably come together. When space-areas meet, they will not collide classic-mechanically like billiard balls - after all, they're just space. Instead, they will interpenetrate each other. They will superpose each other. This creates a *superposition-area*.

Most of the space-areas that superpose will have different space-time values. What space-time values will the superposition-area have? It is clear that the superposition-area of two space-areas having different space-time values cannot possibly have the space-time values of both space-areas simultaneously. If you mix cold and hot water in equal proportions, the result is neither cold nor hot. It creates something new. As red and blue give green. However, the result of a superposition is not necessarily the arithmetic mean, or a proportionate mix. It is like cooking blindfolded - with a cook who does not have to taste his creations for himself. Everything is possible. The superposition-area can have all conceivable space-time values, as long as we do not know the laws superpositions follow.

Usually, we try to find out such laws through observations and experiments. But not all connections or contexts jump right in the eye. Then abstraction, model ideas and logical-mathematical thinking are required - and a dose of imagination. Of course, that is not enough. We will never be able to find out everything, or imagine everything. Human imagination is quite limited. Who e.g. could have imagined in Democritus time that an astronaut named Chris Austin Hadfield would sing the song "Space Oddity" by David Bowie on the ISS with his guitar? And that we would look at the video for example on YouTube? Who could have imagined YouTube at that time? Have efforts been worthwhile up to this point? I mean yes. And if it was just for this one video - though there are certainly taxpayers here who disagree. Let us hope that the gigantic facilities of modern science are more useful than... e.g. the pyramids. Anyway...

Setting some examples

Systematic procedure is often helpful. The best way to start with superpositions is to start with a situation that is as simple as possible: Two space-areas (I call them green and blue) with different space-time values and speeds (see sketch S.GrYeBl) generate a superposition-area (I call that yellow) with its own space-time values.



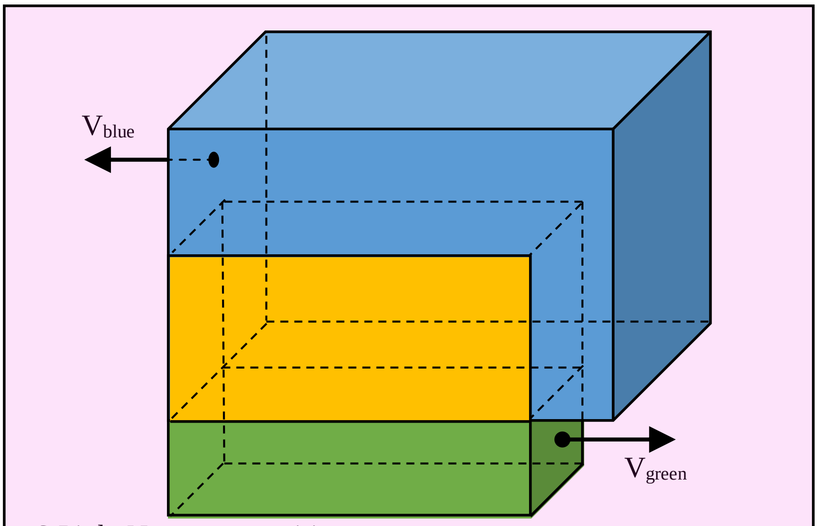
S.GrYeBl Very simple superposition

For the space-time values, I know only three quantities, as used by Einstein: the length alias the space-density (SD), the speed of the clocks/time (Kt), and the amount by which the clocks (time) are out of sync along a distance (or length (L)) in the direction of the motion (ΔLt). All three quantities can have different values in different directions and at different locations even in the same space-area.

In our very simple first example (from sketch S.GrYeBl) I do not specify the SD, Kt and ΔLt more exactly. Yellow simply results from the shape, size and speed of blue and green.

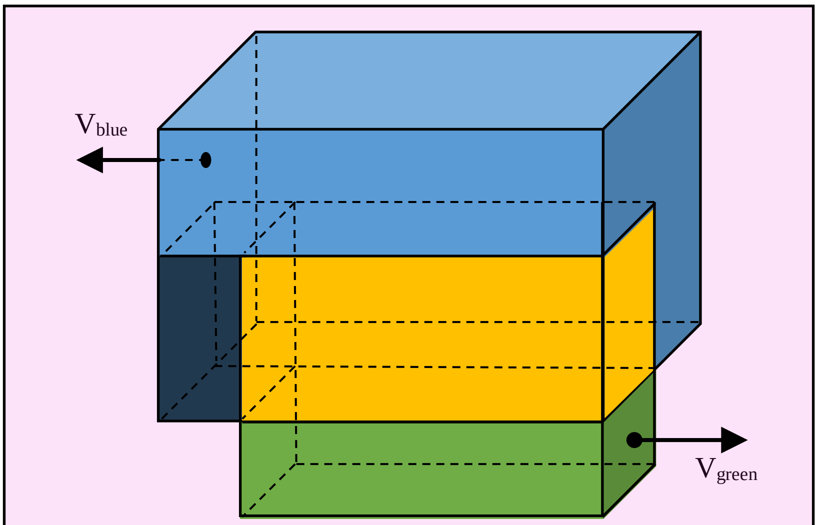
I chose the crazy colors not for confusion, but for clarification, that is, without knowledge of the laws the superpositions obey everything is possible. Instead of blue and green, e.g. also blue may superpose with blue. For the superposition-area, we could then add, subtract, multiply, divide, factorize, potentiate, extract, extrapolate, negate, ignore, catapult, or inhale blue and blue, or whatever else comes to mind. The result could even be yellow again.

Since blue and green are limited and since they move, they will separate again. Sketch S.Pink shows the moment when blue and green separate for the first time. Somebody might think now that yellow turns blue again. But that does not have to be that way, because in fact, in this wondrous moment, yellow enters in pink (because in the sketches of this example blue, green and yellow are surrounded by pink). And each *superposition*-area is a perfectly normal space-area with its own space-time values. It differs in no way from other space-areas, because in the end *all* space-areas are the result of some superpositions.



S.Pink New superposition

So instead of assuming that yellow turns blue again, we realize that something *new* can emerge from the superposition of yellow and pink - in sketch S.Black I chose (even crazier than before) black. In S.Black we can also see the moment in which green and blue separate again - this time on the other side (in S.Black that is the right side). The result of this second new superposition will not be revealed...

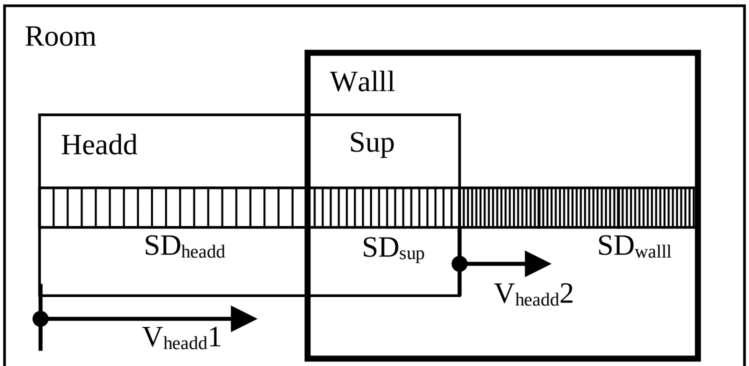


S.Black The superposition-area superposes

Next, let us take a closer look at some more specific connections/contexts with more specific examples.

Let us look at a somehow larger, dormant space-area (which I call walll) and a somehow smaller, moving space-area (which I call headd). Headd moves into walll and creates a superposition-area. We are interested in the space-densities of walll (SD_{wall}), and headd (SD_{headd}), and their superposition-area (SD_{sup}) in the direction of the *motion* of headd. It may be: $SD_{wall} > SD_{sup} > SD_{headd}$.

When space-areas are superposed, their space-time values change to the space-time values of the superposition-area. We can visualize this with scales (see sketch S.Scales).



S.Scales Change in length of a scale

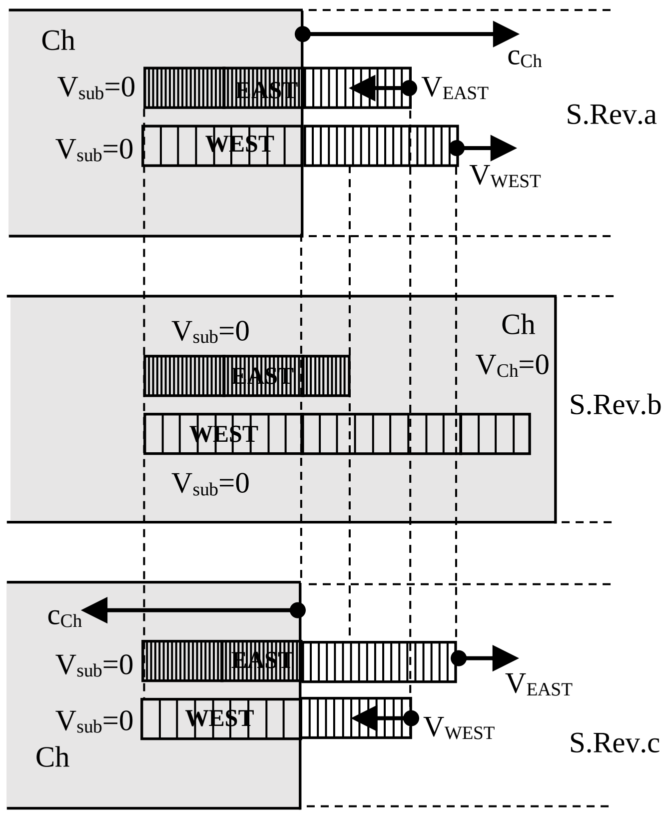
One particular, very special type of superposition is that the *length* of the scale of a space-area *changes* in that way that its space-density adapts to that of the superposition-area. In our example, the length of the scale of headd should change in that way that the space-density of headd in the superposition-area becomes SD_{sup}. (This somewhat awkward formulation is necessary because the space-area of headd actually moves into the space-area of walll only at the moment of touch, thereby creating the superposition-area, and in the further course headd moves into the superposition-area. While the scale of walll is, for its part, recessive in the superposition-area.) So when the scale of headd moves into the superposition-area, it becomes denser and thus shorter. This is only possible when the velocity of the scale after the superposition ($V_{headdf2}$) is smaller than before the superposition (V_{headd1}), i.e. $V_{headd2} < V_{headd1}$.

It looks a bit as if the scale and speed of headd are changed by the superposition. And we know by now that the changes of headd are not necessarily reversed when leaving walll (on the other side). The exit is a separate superposition, and thus a completely different story.

Of course, the scale and speed of walll could change due to the superposition. But that too is another story. The scales of headd and walll are not real scales (or yardsticks) that need to be stretched or compressed in order to adapt to the superposition-area. The adaptation of a scale by a change of the length is a special type of superposition. The imaginary scales of the space-areas are only aids. Real scales are made up of matter, that is, they consist of very complex structured space-areas, and their behavior in superpositions can be accordingly complex.

In the next example, I will gradually show how the direction of the velocity of moving space-areas reverses.

A relatively large space-area (I call it Ch) moves at the speed of light (c), its space-time values are unimportant. Two much smaller space-areas (I call them East and West) move at much lower velocities (V_{East}, V_{West} << c) in opposite directions. Their space-densities (SD_{East}, SD_{West}) are equal before they superpose with Ch. When superposing, the (imaginary) scales of East and West shall be adapted to the space-density of the superposition-area (as in the previous example). The speed of the superposition-area should be zero (V_{sup} = 0). All this and only this is shown in sketch S.Rev.a (top part of sketch S.Rev).



S.Rev Reversal of velocity directions

The boundary of Ch on the left is intentionally missing and remains hidden. Under the conditions mentioned above and the velocities shown in S.Rev.a, we recognize that the superpositions make the space-density of East greater and that of West smaller. After the superposition of East and West is complete (S.Rev.b), the direction of motion of Ch reverses. This time there is a certain symmetry in which East and West, when leaving Ch, regain their original space-densities. This is only possible if East and West have exactly opposite velocities after exiting as before entry (see S.Rev.c).

In short: East and West have reversed their velocities.

And what does that mean, that Ch just reverses its direction? That's simple: There are 2 Ch´s from the outset, with opposite velocities. And each of the two Ch´s shall cause alternatingly (i.e. periodically) very large (maximum) and very small (minimum) length changes in East and West. The superpositions of these two periodic Ch´s will have a spatially and temporally periodic result. Therefore, there may well be places where one or the other Ch alternately dominates.

Multiplying

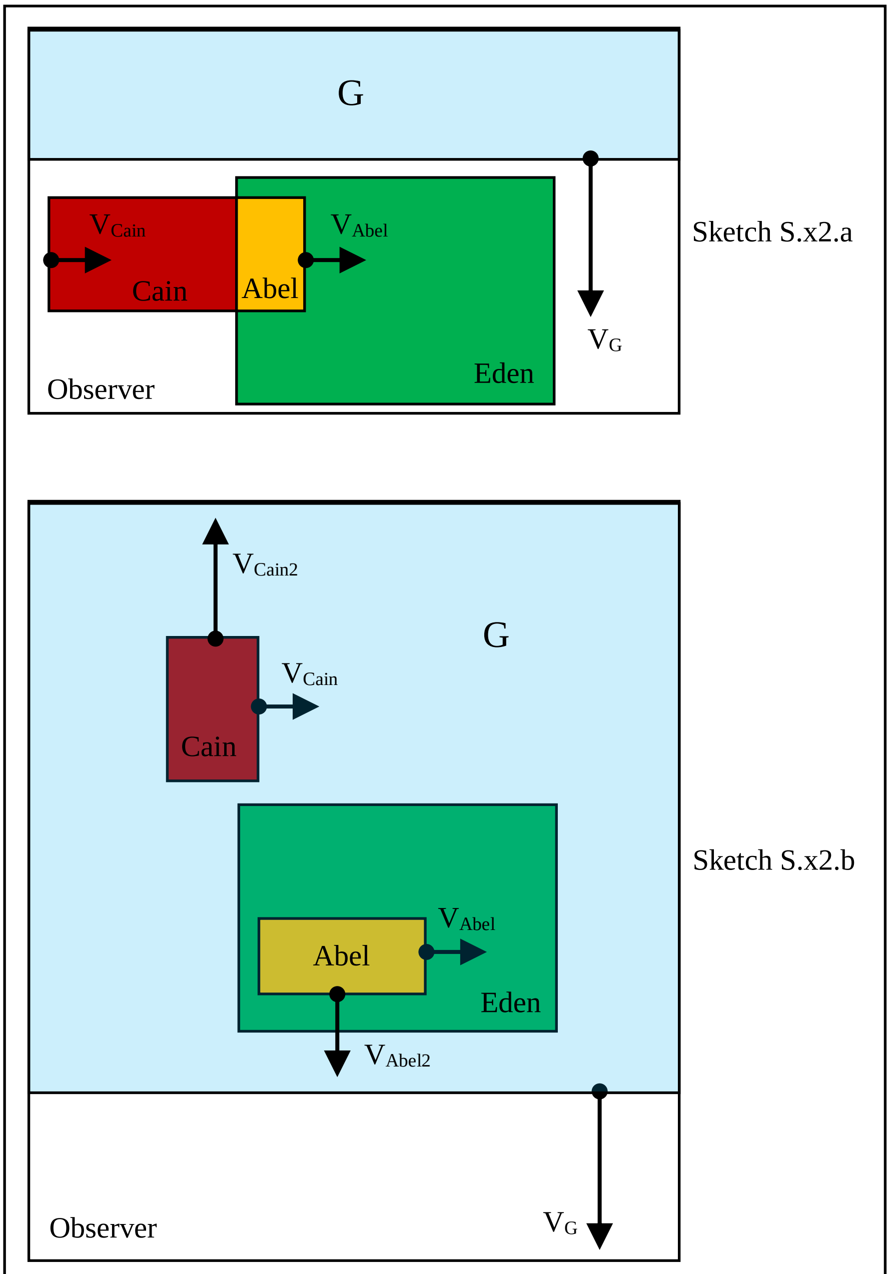
I belive, the examples clearly show that space differs from other space, so that space can change and move other space. That is almost enough to make our complex world possible out of space -

and only out of space. But where do all the space-areas that make up our confusing world come from?

I think that at this point an example could be a good idea.

It suffices to show how *one* space-area becomes *two* independent, separate space-areas, and that these two space-areas will become in the further course rather four space-areas than to become one space-area again.

So, let there be the relatively small, moving space-area Cain, which moves into the larger space-area Eden. I call the superposition-area from Cain and Eden Abel. The very large space area G moves towards them, perpendicular to the direction of motion of Cain and Abel (see sketch S.x2.a, that is the upper sketch of sketch S.x2).



Sketch S.x2 Emergence of the space-areas

Abel was originally like Cain, but has become a completely different space-area due to the superposition with Eden. Accordingly, G differently affects Cain and Abel. In S.x2.b we see that Cain and Abel get additional velocities in *opposite* directions (V_{Cain2} and V_{Abel2}). As a result, they are separated from each other and each goes towards its own destiny. Both Cain and Abel can be the source of many new space-areas.

And vice versa? Can Cain and Abel become a single space-area again? Their paths have split and they are moving into an unmanageable variety. Even if they met again by an incredible coincidence, they would be completely changed. It seems absurd that they could superpose to the original space-area. Especially since the overall situation would be completely different.

The only way to reverse the original separation would be to let the separation process run exactly in the opposite way. But that too would involve countless changes.

With once separate space-areas, it is as with parts of a broken vase: they will not reintegrate on their own. Just as little will an exploded bomb spontaneously reintegrate through implosion. And something once heard does not leave the thoughts through the ears again. There is probably a theoretical probability for such spontaneous restorations, but it is usually so small that the necessary time exceeds the age of the universe. It certainly does not pay to wait. Only divine intervention could help here. Divine intervention, that could be a physics we do not know yet. As far as vases and bombs are concerned, that is rather unrealistic.

Expansion with a difference

On the other hand, it is quite realistic that the number and complexity of the space-areas continues to increase as a result of superpositions.

In fact, the number and complexity of space-areas between two points increases over time - in other words: the space between the two points increases - in other words: the distance increases - in other words: they move away from each other. There may well be situations in which an observer can just discern that two points are not moving apart, but that the space between them is increasing, but in the end, *every* observer is affected by this phenomenon, in the entire (known) universe - of which we humans know less than a flea on the back of a dog knows from the rest of the world (even very smart fleas on especially smart dogs understand little of the extravagant interests and the burning needs in the human world, in which they too live, as shown for example in the creation of horoscopes).

So the universe is growing, it is expanding. It does not expand from a midpoint into nothingness. It expands into itself - and out of itself. It does not expand into itself from a center, but from within each individual, existing place in a moderately equal way.

And the further two points (or rather positions, because what really is really a point?) are away from each other, the more space is created between them. Eventually, so much space is created between the two positions that even the speed of light is too small to travel from one positions to the other. That is the outer limit of the known universe. And what is behind that limit? Someone could go to look. The one should, however, hurry with his way back, because the greater the distance to the home becomes, the faster it goes away. And at some point he disappears behind the speed of light and *never* returns - unless he's aboard the spaceship Duck Piss, or he finds a star gate, or he falls into a wormhole (you can sometimes see them in the garden), or he walks through a subspace, or he just takes a time machine, maybe he has a wand, or a spellbook, or he meets a magician, or a fairy, or Santa Claus... Anyway, to return, the speed of light would always has to be overcome. But all observations, that have been made so far, have confirmed that the constancy of the speed of light is valid - taking into account gravity of course. The constancy of the speed of light applies here and now with us. And *our* environment here in the Universe is just as good as any other environment (but it's nicer nowhere). So we can reasonably suspect that the speed of light is like ours in much of the universe. Although that is strange. Everything consists of space and time. And it's easy to define space-time conditions where any speed is possible. Does nature lack imagination in the end? No, that's not it, because we too are part of nature and, as part of nature, we are quite capable of imagining more than there is in nature. But the basis of all conceptions is observation - one could say that nature observes itself through us. And, above all, nature recognizes one thing: a high degree of order. This order is created, above all, through matter and its force fields. Almost like in cupboards and chests, the space-areas are arranged in matter. But, above all, it are the force fields that move at the speed of light. And it are, above all, the force fields that build atoms from elementary electric particles, and from the atoms they then build, for example, cars.

Now let us imagine for a short moment that the constancy of the speed of light would not apply. Then there could be an observer in whose system all the force fields of the atoms of a car move in the same direction. The car would not stand that. The expensive car. A disaster. The necessary symmetry for the preservation of matter would be lost. The owner of the car would have to change the observation system to save the car. What a crazy world that would be. That will not work, not with us, that's for sure. Every observer would have his own world, with its own physical rules, which can change at any time. At any rate, these are good reasons to keep the constancy of the speed of light (considering gravity) for the time being.

Big Bangs

Only at a *big bang*, we already know that, the constancy of the speed of light is not valid. Although such a big bang is not what we thought it was. There has always been space and time, because without space and time there is nothing. And since nothingness is nothing, nothingness can not exist. And since there is no nothingness, there can be no beginning that begins in nothingness. And yet a big bang is a beginning. It is not the beginning of space and time. Space and time are eternal and limitless. It is not possible to get to a place without space and time. Not for someone who exists. Because even one's own existence, consisting of space and time, forbids the absence of space and time. In a place without space and time there is nothing. In particular, there would be no structures of complex matter in the void.

We have seen that the complexity of the universe continues to increase as a result of the superpositions. And the greater the complexity becomes, the faster it increases. In an eternal and infinite universe, the complexity should now be infinite, which can only result in a total uniformity, which in turn corresponds to nothingness. Even an infinitely small volume would contain an infinite universe, and every infinitely small volume within that infinitely large universe would again contain an infinite universe, and so on... The density would be infinitely large everywhere and therefore uniform - we would have an infinite nothingness, which is no more than nothing.

But it does not even come to such an infinite nothingness. Because for this, the complexity of the space-time would have to increase *evenly*. But if we look around, we do not see uniformity. Not only would it be boring to observe complete uniformity, it would be impossible. Because just as the space-areas, the order, in which we live, can exist only due to the differences that exist in the structures that are built by the space-areas. And what we have is matter and force fields. We have enough order with that. And matter accumulates into big balls, which we call suns and planets, and these balls eventually fall into black holes. And an increasing amount of matter is created which accumulates into big balls, and all these big balls can do is to fall into black holes. And the black holes are getting bigger. The space-density in the interior of a black hole is unimaginably high, and the distances would accordingly seem unreachable, if there were still an order of orientation to detect the distances. Inside a black hole, the constancy of the speed of light has no meaning - after all, it is completely black, inside a black hole, and so no one sees anything, and everyone does what he wants. And as soon as the constancy of the speed of light is no longer valid, this destroys the matter known to us and also every other order known to us.

Our knowledge about black holes comes from a third-hand source, because what happens in a black hole remains in a black hole - until it explodes. For this, a black hole must be absurdly big, fantastical quantities of mater fall into it; countless galaxies are condensing into a deluge that disappears in the black hole. A wooden ark, like that of Noah, would not be enough for such a deluge. But in our universe, a black hole could not explode yet. The density of our universe is not high enough yet. The stars and black holes are too small. But they grow, as the superpositions create new matter, and eventually the gravitation triumphs completely and everything disappears in an all-powerful black hole - great triumph. And Noah's offspring have to come up with something more than a wooden boat.

In an old, dense universe a black hole could explode: so much matter falls into it at the same time, that the border between the black hole and its surroundings is no longer recognizable, the event horizon dissolves. No longer trapped behind the event horizon, the destructive conditions can spread out of the interior of the black hole. Particularly shocking is that the constancy of the speed of light no longer applies, because that creates a shockwave - better known as the Big Bang.

It has be shown that most of what we call our universe originated in only a few seconds in the first moments after the Big Bang.

Unlike to what was thought until now, a big bang does not create space and time, it renews it. The lack of the constancy of the speed of light in the shock wave of the Big Bang destroys the order of matter. And it creates a much simpler ground state.

Such a shock wave loses no energy on its way, it spreads infinitely, except that it encounters the legacy of another shockwave. It's like fighting fire with fire. A fire can not immediately burn a forest again that has just been burned - that would not be nice, would it? So there could be boundary layers in the infinity of the universe, where the shock waves of the big bangs encounter fresh, poorly structured, less developed space-time. However, we will hardly be able to observe the boundary layers of our big bang, because the universe we know ends much faster with the speed of light.

First, we (humans) had to learn that the earth is not the center of the universe - instead, the earth spins around the sun, how humiliating. Then we realized that the sun is just a tiny star among innumerable other stars. And now even our big bang is not the center of the universe. What will we have to learn next? (That was a rhetorical question.)

There is always energy

New space-areas can be created due to superpositions, and they can transform into matter and force fields. Matter and force fields contain energy. This energy is stored in the structure of the space-time. The conservation of energy shall of course apply. Unstructured space, one could also say empty space, contains as much energy as later can be maximally transformed into a structure. Accordingly, the unstructured universe contains as much energy as is contained in matter and force fields just before the big bang.

It is a thought that needs getting used to: empty space-time that contains energy. But that's exactly what energy is all about: the potential to change a lot. And an empty space can fill up and this requires work, so energy is transformed. Some say: unresolved problems are work that has yet to be done. So, as well as empty space-time, unresolved problems contain energy too.

And even a big bang, no matter how powerful it might be, does not generate the energy of the universe. A black hole could barely contain all the energy of a universe. The shock wave of the Big Bang only triggers the transformation of energy. It's like throwing a piano out of a skyscraper. This requires very little energy. But by the fall, the entire potential energy transforms into kinetic energy. Once at the bottom, the kinetic energy transforms into deformation energy and the piano loses its order. But unlike the universe, which gradually regains its order, the piano will not easily get back its deformation energy and order. Artisans must also live.

Our universe is a bit like a forest whose wood energy is converted by combustion into heat that is used to generate electricity, for lamps whose light makes a new forest grow. Not only because of the many energy losses, it is not clear why anyone should do that. Not only God's ways are unfathomable.

1%, probably much less

When we look around, we recognize a certain order. Everything is reasonably manageable. There is matter and its force fields, there are electromagnetic waves – and there are laws, which we understand better and better and which show us how everything works. How nice.

The foundation of our order is structured space-time. These structures are formed by space-time-areas through superpositions. The special thing about the space-time-areas is that their possibilities to influence each other seem unlimited. On the other hand, these possibilities are severely restricted by the order in which we live - after all, that is the prerequisite for order. If, for example, an item in a department store had the opportunity to go to any location, that would not seem very orderly - on the other hand, sellers seem to be at any location, which means that they are only sporadically part of our orderly world.

There are so many possibilities for space-time-areas and only a few of them are part of our world. What about the possibilities that are not part of our world? Are they still there? The answer is yes. They exist - in part. There are space-time structures that we do not perceive directly. They escape our everyday experience. Among other things, they form the dark matter and the dark energy. And there are probably a lot more space-time structures that have so little contact with our physical reality that we may even never measure them - although nobody should ever say never.

There could be many space-time-areas outside of our perception. What we see is just the tip of the iceberg, it's what we see at night of a forest in the glow of a firefly, it's a letter in a book, an eyelash of Mona Lisa, a low tone in a symphony, one stone in a wall, a moth in glaring sunshine, a match in the hand of a pyromaniac...

We live in a tremendous noise that we do not hear and do not see. Imagine that there are hyper-billions of people. Dense crowded, they fill our universe. But each of these hypothetical people speaks at its own frequency and can only hear its own frequency. Of the hyper-billion people, everyone would only hear those who speak exactly in frequency. All others would be soundless. So it could be relatively quiet. In addition, each person has his own color (there are more than just three colors), and can only see his own color. Everyone would only see the few who have exactly their color. And finally, every person has his own density and can only get in touch with people of the same density. And so, even a universe that is filled with people would seem very manageable.

Of course, the interesting question is whether in all the space-time structures that we do not perceive, there is also intelligent life in our sense (which does not mean much), and whether there may be opportunities for contacts. But that is more of a philosophical or religious question. And yet physics is not a religion, because no one will be burned if he disagrees (at least not literally).

So

Everything that is described in this introductory and tipsy first chapter is essentially about differences.

Space-areas are created by the differences in space-time.

Structures arise from the differences in the superpositions of the space-areas.

Order arises from the differences in the structures.

Life arises due to the differences in behavior (animate matter behaves differently than inanimate matter).

And intelligent life manifests itself in behavior - which differs from the behavior of non-intelligent life - although it may not always be easy to decide who is what, and what not. And who is allowed to decide? One stone would probably not be that arrogant.

Everything is based on the differences in space-time. We humans too consist of space-time. We are thinking space-time.

The electric force

Now let's take a closer look at the elementary electric charges (abbreviated: EECs), and what's more.

The two opposite mass-waves of the EECs

We know from our everyday experience that the acceleration of different objects is not all the same. A person who can push a bicycle may already fail on a truck. Such experiences were processed by physics in terms of force and mass. The everyday experiences of physicists sometimes differ from those of normal people, instead of trucks they observe EECs, and lo and behold, EECs accelerate differently under the same conditions: Thus EECs have different inertial masses. And EECs are *always* inert. On the other hand, the electric *field* of an elementary electric charge (EEC) *always* moves at the speed of light (light speed: LS). In the case of a static EEC, its field spreads uniformly from a *center point* (CP) in all directions. The CP is inert, it does *not* move with LS. If the CP would also move with LS, then there would be no CP. - A singer (a big star) is the CP, because he sings and everyone else listens, if the singer too would just want to listen, down at the audience...

With such a CP in mind, it is not surprising that the inertial mass of an EEC is postulated to be in the *same* CP.

If the center points (CPs) of EECs are shot through a slit, because it is possible, it turns out that they have wavelengths that are inversely proportional to their velocity. The greater their kinetic energy, the smaller the wavelength (and the greater the frequency). Thanks to Max Planck, it was known that also the energy of the photons is proportional to their frequency - although Planck was probably too shy to speak of photons. He had analyzed some experiments on electromagnetic radiation.

Physicists like Einstein prefer thought experiments. This has advantages: no lab coat, very flexible working hours, prompt delivery of the required equipment... It is astonishing that even thought experiments always take longer than planned. Finally, Einstein and some interested physicists had found that photons can change the mass of an object - which then became $E = m \cdot c^2$ (by the way: “E” means “Energy” and not “Einstein”).

DeBroglie could hardly had dodged the brainstorm that made him see the connection between the inert mass and the frequency of moving EECs.

He set: $m \cdot c^2 = f_m \cdot h$ (Eq.mf1)

where m is the relativistic mass of the EEC, c is the LS, f_m is the frequency of the mass and h is Planck's constant. And already a particle became a wave.

A wave is much more blurry than a point, especially since there is nothing sharper than a point. Werner Heisenberg recognized this, and he took DeBroglie's equation (Eq.mf1) and converted it during his summer stay on the island of Heligoland in his famous uncertainty principle. Maybe he was just inspired from the North Sea waves.

Both, DeBroglie and Heisenberg, and many others obviously could not imagine that a wave can also have a CP. That would not had changed much in their conclusions, because the CP of a wave behaves differently than a CP without a wave. It is the thought that counts. At least DeBroglie would had found it easier to apply his equation to a static EEC. Of course, an EEC will not move statically through a slit, making experimental verification difficult. On the other hand, the slit and the measuring surface could move instead of the static EEC. If the prophet does not go to the mountain, the mountain will come to the prophet. In view of the difficulties of such an experiment, it almost seems easy for a mountain to move.

For a static EEC with the rest mass m_0 we have:

$$m_0 \cdot c^2 = f_{m0} \cdot h \qquad \text{(Eq.m0f)}$$

This equation can be confirmed even without experiments if it yields DeBroglie's velocity-dependent wavelength. But it will take a while (some pages) until it turns out.

The equation Eq.m0f tells us (it does not really speak, this only seems to us), that the mass of a static EEC oscillates with the frequency f_{m0}. Considering the slit-experiments, it seems daring to imagine the mass as a small sphere in the CP of an EEC whose surface vibrates a little. It would be like comparing a football to a huge surfing wave (e.g. off Hawaii). It would look weird when half a dozen surfers tried to surf together on a small football. Conversely, in connection with goalkeeping mistakes, it is often said that the wave function of the football has only successfully collapsed in the goal (this is the famous "fluttering" of the ball).

It is much more useful to think that the mass (which means at first only the inert mass) is an oscillation that spreads uniformly from the CP of an EEC. It is therefore a spherical oscillation, and thus a longitudinal wave.

From the same CP also spreads the electric field of an EEC. And this is as well the case with neutrons and other completely uncharged elementary particles: they also have electric fields, but in them the positive and negative properties of the EECs cancel each other out.

It would be possible, indeed even allowed, to give the mass-wave, that is the wave of inertia, its own field. On the other hand, the electric field and the mass-wave always appear together. They cannot be separated. As a result, they form one and the same field anyway. Therefore, it is easier to talk straight away about the electric field oscillating at the frequency of the mass-wave. To separate them would be like drinking first the coffee and then the milk of a latte, or like separating water into hydrogen and oxygen and then swimming in it, or like growing cacti and their spines separately, or as if in a tennis game first only one player would hit all the balls and then the other...

It also fits that according to Eq.m0f all the energy of the mass is in the oscillation. If the mass had its own field, it would have to contain energy without oscillating - which appears nowhere.

A this point, we shall remember (somehow unnecessarily) that everything consists of space-time. And two space-time-fields, which always superpose in the same way, form a single, common superposition-field.

There is no way around it: The energy of the inertial mass is in the oscillation of the electric field.

The electric field is space-time which propagates with LS from the CP evenly in all directions, it is space-time that moves away from the CP - much like the light of a light bulb, or that of the sun, whereby the light bulb can also shine at night. The mass-wave, for its part, is the change in the values of the space-time of the electric field. Accordingly, the mass-wave also moves with LS, together with the electric field.

Now it seems strange that something always moves away from a CP without anything coming up (added). Even if it is only space-time that is moving away from the CP all the time, and of which there can be as much as wanted, it seems strange. When we think of the mass-wave and its oscillation energy, we have to ask ourselves, where the energy comes from. Even for the light bulb, we know that the energy comes from the light switch.

You do not get it right away, but the solution is remarkably simple: in addition to the field moving away from the CP of the EEC, there is a second field that moves towards the CP of the EEC. This second field also moves with LS, it has the same energy as the first, and, for a resting CP, it has the same mass-frequency (f_{m0}) as the first field. In this way, the EEC is completely balanced. (Also, the light bulb would not need a switch if it would not only radiate light, but would also attract and absorb light.)

The mass-waves of the two fields are superposed to a standing wave, in whose oscillation the total energy of the mass is. Because for standing waves, only the nodal points do not move: it is as if two identical joggers meet head-on and still continue the running movement - they would do something like joint squats.

If the CP could jump

If the CP does not move, it is easy. So we move the CP. But before we deal with the continuous motion (that is the velocity) of an CP, we first consider a theoretical special case: We allow the CP as a thought experiment the impossible, namely to jump timelessly from one place to another. For example, from the living room to the kitchen, or from Hanover to Hawaii. After the jump, the field that moves away from the location of the missing CP will just keep moving - there's no reason to give up. Since without a CP no new field is emitted, a sphere grows around the now abandoned CP, in which no field moves away. The field that moves *towards* the location of the missing CP is created *together* with the field that is moving *away*. If one of the two does no longer exist, than the other cannot exist too. Both fields can only exist together. Both are created together in the CP. Both dissolve together. This is almost romantic - but not tragic, that would be silly, after all, they are just fields.

So, around the abandoned CP a field-free sphere is formed, which grows with LS.

The fatal, mutual dependence of the two fields is mandatory. After all, the conservation of energy should be valid, even if the CP has long been on Hawaii. This is especially true for the energy of the standing wave of the inertial mass.

With the CP on Hawaii (or in the kitchen), it is similar: With the field, which moves away with LS from the CP (the CP could be on a beach, for example), automatically the field that moves with LS towards the CP is created (in the evening, the CP could be in a restaurant, near the beach). A sphere is formed with LS around the CP, in which both fields are. This sphere fits perfectly into the field-free sphere that is formed around the abandoned CP in Hannover. But, of course, such an energy distribution can only be in a thought experiment (just as you can be on Hawaii only in your thoughts, while you pretend to be working in Hanover – that is called a daydream).

Joint compression and stretching of the fields of moving CPs

In order to make the two fields of an EEC with their opposite motions recognizable, we can imagine that they consist of many, very many, fantastically many points. As if we would put colorful smoke in the air or food coloring in water - on which our world would get a little more colorful, and peace and joy were everywhere. Of course, the points are not really there; they are only visualization points.

The points allow us to see what happens when the CP moves. Because in reality, which works without any thoughts, the CP will move with a finite velocity, e.g. with V_{CP}.

Let's first look at the electric field that leaves the CP, and that does not cause so many headaches: In the CP's motion direction (that's forwards), the distance between two points of the field that move one after the other away from the CP, shortened, because the CP rushes past the first point with V_{CP} before the second point moves away from the CP. The distance between the two points is smaller than it would be without the V_{CP}. Contrary to the CP's motion direction (that´s backwards), the distance becomes larger.

We can assign a density to the hopefully colored points of a field, treating the field as if it were substantial (as if there would be, besides bio-earth, mineral water, compressed air and lighter, still a 5th Element: Field).

The field-density is three-dimensional as the electric field (that would be the number of points per volume). Often we are also interested in the linear density in one direction (that would be the distance between the points in one direction) - we call this density the directional density.

Forwards, the directional density increases due to the V_{CP} (the distance between the points decreases) and backwards the directional density decreases (the distance between the points increases).

We know by now that everything, really everything (except the things we do not understand), consists of space-time. In this sense, we can also consider the field-density as space-density. And, of course, there is also a directional density for the space-density. The directional density tells us that lengths can change in one direction, which is something that we already know, for example, from the special theory of relativity. And if there is a density, then there is an amount that underlies that density (here illustrated by... points). We want to call this amount the space-amount, and allow it to have special space-time values, which, among others, embody the qualities of an amount.

Accordingly, with the field moving away from the CP, a space-amount moves away from the CP too. And that amount does *not* change due to the V_{CP}. In the world of points, one would say that the same number of points always move away from the CP, regardless of the V_{CP}. The CP cannot be influenced in this regard, it does not change its behavior by the V_{CP}. And that is normal, because a uniform motion (for example with V_{CP}) has no absolute meaning. Even people who travel on a train (moving with V_{CP}, for example) do not change their behavior. Motorists do. For them, it is not only Dr. Jekyll who becomes Mr. Hyde - but that may be due to the exhaust fumes?

It is precisely this uniformity, with which the space-amount moves away from the CP, which, in combination with the constancy of the LS, gives rise to the characteristic density-changes before and after the CP with respect to the direction of motion of the CP. At least as far as the field that moves *away* from the CP is concerned.

But that was only half the fun, because we know: everything that moves away from the CP must have moved towards the CP beforehand. It's like a vending machine. It only comes out, what was previously filled in. At vending machines, this can be green tea, hot chips, evening gowns, spare tires, spare horses, world literature, or just washing machines. At the CP of an EEC, this are electric fields or their space-amounts, recognizable by their points. The space-amount moving away from the CP moves towards the CP beforehand, being, in fact, the *field* that moves towards the CP.

As much comes, as much goes. It always has to be like this. Even if the CP has a V_{CP}. Then there is a front and a back or a front-side and a back-side. On the front-side, the CP moves towards the field that is moving towards it (and on the back-side it’s oppositely). Thus, on the front-side, more space-amount moves towards the CP due to the V_{CP} than without the V_{CP}. On the other hand, the space-amount, which leaves the CP, shall always be the same. This is done by making the *directional density* of the field, which moves towards the CP, *smaller* (in the line of the V_{CP}), so that the directional density appears *unchanged* to the CP, so that always the same space-amount (per time) reaches the CP from this direction.

On the back-side, of course, the directional density of the field moving towards the CP must increase (as the CP moves with V_{CP}). It is desired that the space-amount that reaches the CP front and back remains the same.

(Even those vending machines that have (through a mystical remote effect) a V_{CP} need, of course, to be filled as usual with the same amount, provided that the customers are not irritated by the V_{CP} in their buying behavior - but who urgently needs a replacement horse, is not easy to stop anyway (some even offer a kingdom for that).)

Since a forward-looking mind finds the changes in the space-density interesting, let's look at it a bit more. Without wanting to insult the rest of the space, we are initially only interested in the directional densities (in the direction of the V_{CP}).

The directional density (DiDe) is inversely proportional to the *mean* distance between the points of the point-amount that fills a direction. On the recommendation of a benevolent spirit, already known to us, we call this mean distance for $V_{CP} = 0$ confidently λ_0.

So: $DiDe_0 = \frac{1}{\lambda_0}$ (Eq.DiDeλ0)

At this very moment, we are really only interested in the space-density-changes in the direction of the V_{CP} (the rest of the universe does not matter for now at all).

To save words, we say that the CP *emits* and *absorbs* the space-amount. These formulations are not very nice, when filling vending machines or buying their goods we neither call that their goods “absorption” or “emission”, but we will get used to them.

The variables of the vectors have up arrows, without arrows are always the amounts of the vectors meant (not to be confused with the amounts of money, where a sign decides the direction of motion).

The space-amount which a sleeping - forgive me - motionless CP ($V_{CP} = 0$) emits (short: emission-amount (even shorter: EA)), results from the mean time that elapses between the emission of two of its points. This corresponds to the frequency with which the points are emitted on average. Wisdom calls this time T_0, and the corresponding frequency f_0.

So: $EA_0 = \frac{1}{T_0} = f_0$

(Here, actually, some constant would be needed between the EA_0 and the f_0, but since its value is not known anyway and since it would not help us here, it is left out.)

And since the fields always move with LS (c): $\lambda_0 = c \cdot T_0 = \frac{c}{f_0}$

Let's take a look at the front of a awake - sorry - of a CP which moves with V_{CP} .

The mean distance for the *emission* (λ_{em}) is: $\lambda_{em} = (c - V_{CP}) \cdot T_0$

and with $DiDe_{em} = \frac{1}{\lambda_{em}}$

follows: $DiDe_{em} = \frac{1}{(c-V_{CP}) \cdot T_0} = \frac{f_0}{(c-V_{CP})} = f_{em}$

Of course, the emission-amount of the CP always remains the same, namely EA_0. But the emitted space is compacted in the direction of the motion (meaning forward), it is compressed ($DiDe_{em} > DiDe_0$ or $f_{em} > f_0$) - when a news station moves quickly, then it sends the news compressed in motion direction.

The mean time that elapses between the *absorption* of two points must be equal to that of the emission, that is T_0. From this it can be calculated how large the average distance between two points (λ_{ab}) must be before absorption: $\lambda_{ab} = (c + V_{CP}) \cdot T_0$

and with $DiDe_{ab} = \frac{1}{\lambda_{ab}}$

follows: $DiDe_{ab} = \frac{1}{(c+V_{CP})\cdot T_0} = \frac{f_0}{(c+V_{CP})} = f_{ab}$

The field moving towards the CP on the front-side must be stretched already before it reaches the CP. This is not magic, it is done by the superposition with the field which moves away from the CP at the front-side. This field is already compressed in comparison to its normal state, and the oncoming field is adjusted. The two fields must be tuned so that the space-amount absorbed by the CP is equal to that emitted by the CP. In order to balance the effects of the V_{CP}, one field transports more space and the other less. A dormant observer (e.g. someone like Buddha), who in his serenity sees the space of both fields flowing past him, realizes that everything balances itself exactly: just as much space as flows in one direction more than normal flows in the other direction less. Of course, that is also (without Buddha's help) recognizable through the mean distances:

$$\lambda_{em} + \lambda_{ab} = (c - V_{CP}) \cdot T_0 + (c + V_{CP}) \cdot T_0 = 2 \cdot c \cdot T_0$$

and with $c = \frac{\lambda_0}{T_0}$

is $\lambda_{em} + \lambda_{ab} = 2 \cdot \lambda_0$

On the back-side of the moving CP, it is as at the front-side, only the fields are reversed: the emitted field becomes thinner and the absorbed field thickens (through the V_{CP}).

The world famous angle φ_{or} of the fields of EECs

In addition to the direction of motion, there are infinitely many other directions, e.g. the direction exactly *perpendicular* to the direction of motion (in a telegram or on Twitter everything needs to be expressed shortly: perpendicular emitted - and as SMS: PerEm).

A PerEm point (of the field) has LS and the CP has V_{CP}. The PerEm field-point thus moves away from the CP with $\left(\vec{c} - \overrightarrow{V_{CP}}\right)$.

Between $\vec{c}$ and $\left(\vec{c} - \overrightarrow{V_{CP}}\right)$ there is the angle $\varphi_{or} = \tan^{-1}\left(\frac{V_{CP}}{c}\right)$ (the "or" in the index of φ stands for "orientation"; by the way, Greece seems to be the Number 1 exporting nation for abstract angles such as φ, δ, γ, etc....). Two successive field-points are no longer in line with the LS they are moving with, they are offset from one another. The connecting line of two such field-points has the angle φ_{or} to the LS of their field. It is as if the field were tilted, like the Leaning Tower of Pisa. It is similar to parachutists jumping out of a flying (!) plane one after the other. If they were connected to a bar, we could see that the bar has the angle φ_{or} to speed they fall with. However, we know that $V_{CP} \leq c$, and usually in everyday life that is even $V_{CP} \ll c$, and thus φ_{or} is usually very small. The parachutists would therefore need to fall faster than the plane flies.

The PerEm field is thus angled, its space is angled. The same must apply to the *absorbed* field. It has to be the same angle, so that the emitted amount will be equal to the absorbed amount, because this must apply to all directions, not only for the direction of motion of the CP, while it is only for the direction of motion of the CP where $\varphi_{or} = 0$.

The field to be absorbed is created by the superposition with the emitted field. As for the direction of motion of the CP, for *any* other direction as well, the oppositely moved space-amounts of the fields must be balanced. Due to the angle φ_{or} ($\varphi_{or} \neq 0$) between the spatial orientation of the field and its direction of motion, however, the conditions become significantly more complicated. The orientation is important. As in real life: it makes a difference whether a leftist or a rightist mass demonstrates for their values - or whether the center demonstrates against left and right.

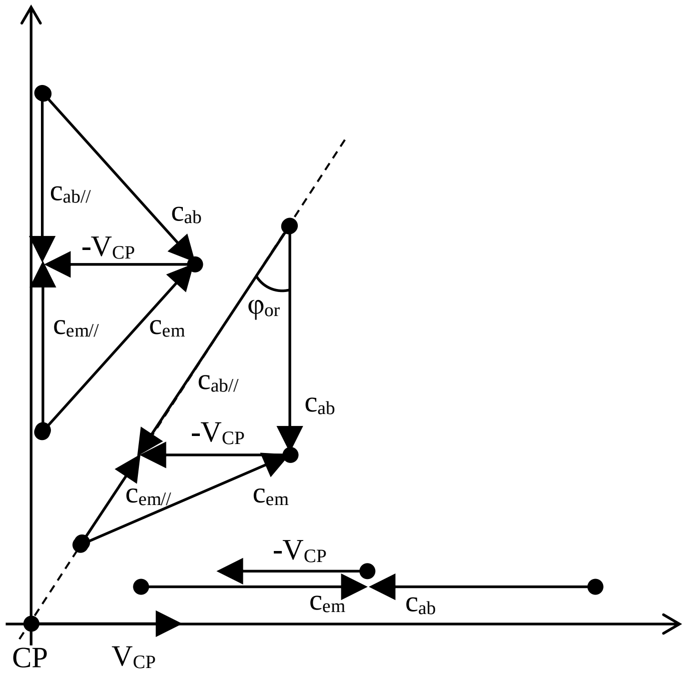
If the CP emits a field-point perpendicular, it must also absorb a field-point coming from a perpendicular direction. By perpendicular is of course meant perpendicular to the V_{CP}, as seen by an observer for whom the CP has the V_{CP}. The observations of the CP, which it would do if it had eyes, do not interest us, especially since it has no mouth to tell us about its observations.

A field-point that moves (for us, who see the V_{CP}) perpendicular to the V_{CP} with LS, shall reach the CP (to be absorbed there). This happens when there is an angle $\varphi_{or} = \tan^{-1}\left(\frac{V_{CP}}{c}\right)$ between the perpendicular direction and the connecting line from the field-point to the CP. The connecting line between the CP and a field-point, that moves so that it is absorbed by the CP, shall be called Bell Line, after John Bell, who had, in 1791, the idea to shoot a lifeline (something like a rope, not a line on a piece of paper) with a mortar to the target. Bell Lines save field-points!

Every Bell Line has its origin in the CP and moves together with the CP with V_{CP}. Thus, between the LS ($\vec{c}$) of a field-point to be absorbed and its Bell Line there is an angle - as in example the φ_{or} of the perpendicular direction - while the Bell Line has the direction $\left(\vec{c} - \overrightarrow{V_{CP}}\right)$. All field-points of a Bell Line must move in the same direction, with an angle $\leq 45°$ to the Bell Line (as geese that fly offset in a line).

The direction of the LS ($\vec{c}$) of the field-points of a Bell Line to be absorbed results from the superposition with the emitted field (emitted by the CP); and the emitted field has to move along the Bell Line, exactly as the field to be absorbed (and the Bell Line moves with V_{CP} , of course).

Not just a picture, even a sketch can save more than 1000 words - unfortunately, there is no guarantee that everyone (every viewer) thinks the same words when seeing a picture or a sketch.



Sketch S.Bell Bell lines and their LSs

Sketch S.Bell is hopefully clear and does not allow too much creativity. It shows us three characteristic Bell Lines, with the associated light speeds (LSs) of the emitted field ($\vec{c}_{em}$) and of the field to be absorbed ($\vec{c}_{ab}$).

The sum of the wavelengths of the two fields is only in V_{CP} direction $2 \cdot \lambda_0$. In all other directions, the sum is less than $2 \cdot \lambda_0$, corresponding to the components of the LSs in the direction of the associated Bell Line (these are $\vec{c}_{em\parallel}$ and $\vec{c}_{ab\parallel}$).

The statement of ~~the year~~ ~~the day~~ the minute is: at superpositions, not only the space-density (or directional density) of the fields counts but also their spatial orientation (the angle φ_{or} is meant).

Protons and electrons are in existence

The (electrical) value of an EEC corresponds to the space-amount that its CP emits and absorbs. Since there is only one value for EECs, all EECs emit and absorb the same space-amount.

The frequency, on the other hand, with which the fields of an EEC oscillate, are not all the same at all. This frequency corresponds to the inertial mass of an EEC, and there are many different values known.

Most EECs are protons and electrons that have well-defined mass-frequencies and they do not deviate from their frequency. It is strange. They could have any mass-frequency, and yet there are only two. It almost seems as if the mass-frequency determines the role of each charge. As with husband and wife. The protons would be men - big, low frequency. The electrons would be women - small, high frequency. Everyone with his role: Only women can have children and only men can become pope. And the neutrons would be something like gigantic children holding everything together. Family structures evolved through evolution. Only what works, remains. Some sort of balance develops, and deviations from this balance (for example, men with high heels or women who smoke cigars) can not last long. In their own evolution, the mass-frequencies of the protons and electrons have obviously proven to be good, so that they can form stable atoms.

A hydrogen atom is therefore a small family, a uranium atom is a large family or a small mountain village. Monaco would be a big, ostentatious molecule, France would be a tiny tartrate crystal, the US a crumb of green color, and China a small drop of sweat.

DeBroglie would like the beat

Just as the space-density (and especially the directional density), the mass-frequency also changes through a V_{CP}.

Let us look at this, whereby at first only the direction of motion interests us.

For $V_{CP} = 0$, the wavelength is λ_0, the frequency is f_0, and the period is T_0. The LS is as usual denoted by c (from "constant", since the LS in Maxwell's equations was just any constant).

The wavelength of the emitted field (λ_{em}) is in the forward direction (λ_{em1}):

$$\lambda_{em1} = (c - V_{CP}) \cdot T_0$$

and with $\lambda_0 = c \cdot T_0$

we have: $\lambda_{em1} = \frac{(c - V_{CP}) \cdot \lambda_0}{c}$ (Eq.λ1)

And in the backward direction (λ_{em2}):

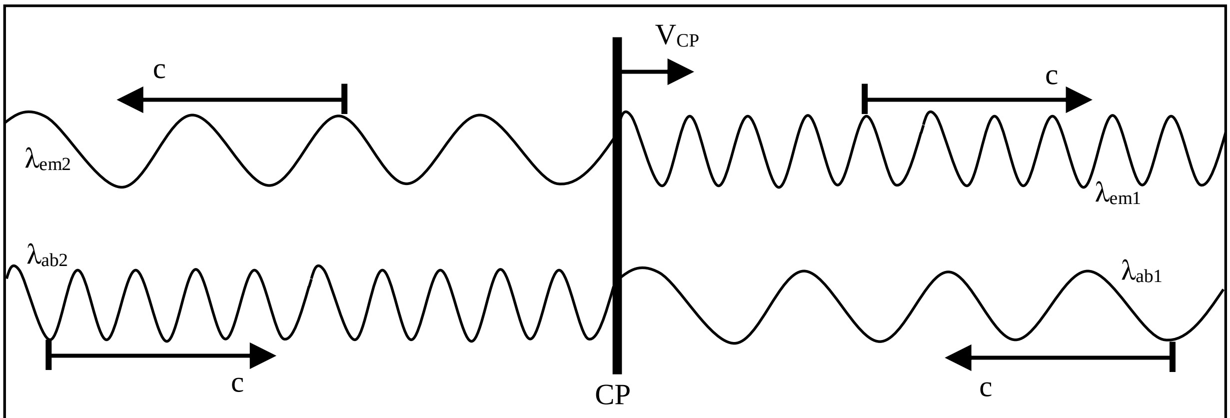
$$\lambda_{em2} = \frac{(c+V_{CP})\cdot\lambda_0}{c} \qquad \text{(Eq.λ2)}$$

And so the frequencies are in the forward (f_{em1}) and in the backward (f_{em2}) direction:

$$f_{em1} = \frac{c\cdot f_0}{c-V_{CP}} \qquad \text{(Eq.f1)} \qquad f_{em2} = \frac{c\cdot f_0}{c+V_{CP}} \qquad \text{(Eq.f2)}$$

The wavelength (λ_{ab}) and frequency (f_{ab}) of the field moving towards the CP change, as we now know, exactly opposite to the emitted field.

In sketch S.Waves we can see the waves of both fields (the center-*point* is shown as a thick, fat bar, that's called artistic freedom). The absorbed wave at the front-side and the emitted wave at the back-side are the same and could be drawn as a continuous wave by being displaced vertically, as well as the emitted wave at the front-side and the absorbed wave at the back-side.



Sketch S.Waves Mass-Waves at V_{CP}

The two fields of an EEC superpose. Thus, their mass-waves superpose too.

When two waves with different frequencies superpose (in the front-side that are f_{em1} and f_{ab1}, and in the back-side that are f_{em2} and f_{ab2}), then beating occurs.

Beating occurs because one wave is slightly shorter than the other. Whenever the difference to a complete wave has added up, the waves meet at the same level. - Like a stadium runner, who surpasses his limping competitor again and again and looks down on him from the same eye level.

The wavelength of a beat wave (λ_b) of an EEC moving with V_{CP} is:

$$\lambda_b = 2\cdot\frac{\lambda_{em1}\cdot\lambda_{em2}}{|\lambda_{em1}-\lambda_{em2}|} \qquad \text{(Eq.λs)}$$

And the beat frequency (f_b) is:

$$f_b = \frac{|f_{em1}-f_{em2}|}{2} \qquad \text{(Eq.fs)}$$

Inserting Eq.λ1 and Eq.λ2 into Eq.λs yields:

$$\lambda_b = \frac{\lambda_0\cdot c}{V_{CP}}\cdot\left(1-\frac{V_{CP}^2}{c^2}\right)$$

And for $V_{CP} \ll c$ we get: $\lambda_b = \frac{\lambda_0\cdot c}{V_{CP}}$

And with $\lambda_0 = \frac{c}{f_0}$: $\lambda_b = \frac{c^2}{f_0\cdot V_{CP}}$

And with Eq.m0f (the older of us still remember this equation) we finally get:

$$\lambda_b = \frac{h}{m_0 \cdot V_{CP}} \qquad \text{(Eq.λs)}$$

This is exactly the wavelength that DeBroglie has calculated for his matter waves. It's exhilarating: *Matter waves are just beating waves*. This finally confirms equation Eq.m0f - as if by itself, one could say.

The beating wave of an EEC also moves with LS, although it arises from the superposition of two waves that move in opposite directions. And the beating wave moves in the direction of the shorter wave, which is also the direction of the V_{CP}.

Beating phenomena are often difficult to understand. They are mostly known from the acoustics, but they even occur in interpersonal relationships. The small differences characterize us. Like two pendulums of different lengths, couples sometimes swing together - and sometimes not. And that alternates regularly. Perhaps the origin of relationship problems goes back much further into the early history of humankind, because the lunar phase (29.5 days) and the (female) menstrual cycle (28 days) are in beating. And when "the days" are at full moon, the Hellmouth opens and burning demons erase humanity from the face of the earth. On the other hand, when "the days" are at new moon, even the sun goes out (temporarily).

And Einstein oscillates with the average frequency

As fascinating as the beating may be, we do not have to fall in love with it right away. It is just a shadow of a wave. It is like the howl of a distant spirit that alternately turns louder and quieter. It's like a (forest) pattern that's so big that it can only be seen on a map while the reality is made up of trees. The beating is just the average wave getting alternately louder and quieter, where the average frequency is simply the average of the frequencies of the two waves that superpose.

The average frequency (f_a) is thus:

$$f_a = \frac{(f_{em1} + f_{em2})}{2} \qquad \text{(Eq.faf)}$$

Inserting Eq.f1 and Eq.f2 into Eq.faf yields:

$$f_a = \frac{f_0}{\left(1 - \frac{V_{CP}^2}{c^2}\right)} \qquad \text{(Eq.fa)}$$

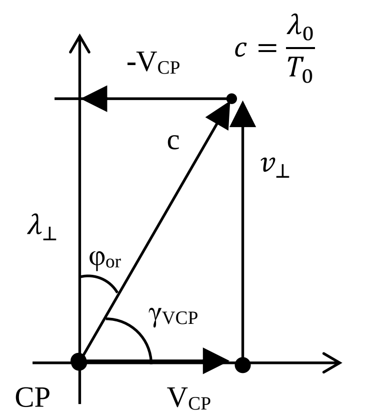
The two frequencies of the two fields of an EEC contain the energy of the mass of this EEC. This energy corresponds to the sum of the two frequencies. So in the average frequency (f_a) is exactly half the energy of the mass.

In Eq.fa of course we see immediately (and everybody who does not see this immediately has no right to live in this world) that the bigger the V_{CP} is the bigger the f_a becomes. In other words: the greater the speed of the CP becomes, the greater its inertial mass becomes too. That seems familiar; we know that from somewhere. We think of one stone, which, according to Einstein, becomes all the more inert the faster it gets.

So it's time to take a closer look at the special relativity with respect to the V_{CP} of the CP.

Although the CP moves for us with a V_{CP} ($\neq 0$), the LS remains the same from the view of the CP. The LS is only able to do this magic trick because it manipulates the clocks and scales of the CP. But what if the CP hides its clocks and scales? Do we still believe the LS when it claims to be constant?

For this, we look at the field emitted by the CP. In the angle $\gamma_{VCP} = 90° - \varphi_{or} = 90° - \tan^{-1}\left(\frac{V_{CP}}{c}\right)$ to the V_{CP} (which the CP has in our view), the field moves together with the CP (see Sketch S.$\perp$). It is as if this part of the field is in the rest system of the CP (in the CP´s view, this is the direction perpendicular to the $-V_{CP}$ oft he enviroment). In the rest system of the CP (which believes itself to be the only true system), the wavelength of the emitted field is naturally λ_0. Someone, for whom the CP moves with V_{CP} (and whose system is the only true one), can rightly assume that the part of the field emitted by the CP that moves as if it were in the rest system of the CP, must have the wavelength λ_0 relative to the CP. And yet that wavelength in the direction perpendicular to the CP (that is $\lambda_\perp$) is smaller, namely: $\lambda_\perp = \lambda_0 \cdot \sqrt{1 - \frac{V_{CP}^2}{c^2}}$ (see Sketch S.$\perp$) - this, of course, is only true as long as the period remains the same as the period of the rest system (T_0) despite the V_{CP}.



Sketch S.$\perp$ Perpendicular

Not three, not two, one wavelength arises during a period. How long should a period be, so that $\lambda_\perp = \lambda_0$ Just for the fun of it we call the period we are looking for T_{rel}. The velocity of the emitted field perpendicular to the CP ($v_\perp$) is (if the CP moves with V_{CP}):

$$v_\perp = c \cdot \sqrt{1 - \frac{V_{CP}^2}{c^2}}$$

With this $v_\perp$ the field should manage a wave of the length λ_0, otherwise the rest system would have to shrink (in the vertical direction) - with catastrophic consequences for world peace. The field gets for this wave exceptionally the time T_{rel}. And so:

$$v_\perp = \frac{\lambda_0}{T_{rel}} = c \cdot \sqrt{1 - \frac{V_{CP}^2}{c^2}} \Longrightarrow T_{rel} = \frac{\lambda_0}{c} \cdot \frac{1}{\sqrt{1 - \frac{V_{CP}^2}{c^2}}}$$

And with $T_0 = \frac{\lambda_0}{c}$ follows:

$$T_{rel} = \frac{T_0}{\sqrt{1 - \frac{V_{CP}^2}{c^2}}} \qquad \text{or} \qquad f_{rel} = f_0 \cdot \sqrt{1 - \frac{V_{CP}^2}{c^2}} \qquad \text{(Eq.frel)}$$

This result is not exactly a world-shaking revelation: When the velocity gets smaller ($v_\perp < c$), the time required for the same distance (λ_0) gets greater ($T_{rel} > T_0$). The period of a CP is as greater, the greater its speed is - and that is exactly what we can observe and understand, regardless of any clocks and scales that the CP claims to have or not to have.

Of course, this relativistic change of the rest frequency (f_0) definitely wants to be seen at the average frequency (f_a) of the mass-wave. We do it the favor and replace in Eq.fa the f_0 by the frequency with which the CP actually oscillates, namely f_{rel}. So:

$$f_{a\_rel} = \frac{f_0 \cdot \sqrt{1-\frac{V_{CP}^2}{c^2}}}{\left(1-\frac{V_{CP}^2}{c^2}\right)} \Rightarrow f_{a\_rel} = \frac{f_0}{\sqrt{1-\frac{V_{CP}^2}{c^2}}} \qquad \text{(Eq.fa\_rel)}$$

Somewhat surprisingly, Einstein's relativity actually reduces the *non*-relativistic velocity-dependent mass increase, because $f_{a\_rel} < f_G$. On the other hand, the highest possible speed is reduced from infinite to LS. Everyone must suffer from this, especially those who like to travel far.

And again, we see that it was good to apply DeBroglie's equation as well to a static EEC:

$$f_a \cdot h = m \cdot c^2 \Rightarrow \frac{f_0}{\sqrt{1-\frac{V_{CP}^2}{c^2}}} \cdot h = \frac{m_0}{\sqrt{1-\frac{V_{CP}^2}{c^2}}} \cdot c^2 \Rightarrow f_0 \cdot h = m_0 \cdot c^2$$

In retrospect, it seems almost natural.

At home inside an atom (homey mass-waves)

The mass is often represented as a small sphere located in the CP of the electric field of an EEC - and we spontaneously wonder what it is doing there or how it got there. In addition, such a small sphere cannot consist of any known material, such as marble, stone or iron, because they also consist of EECs. The mass is as unobtainable as a thought. A thought too cannot be formed into a (more or less big) sphere with which somebody could then play pool.

The mass is not a small sphere, it is an oscillation of the electric field of an EEC, so much has become clear. This becomes even clearer when we look at the proportions: The diameter of a proton is determined indirectly via its interactions (mainly collisions) with other small particles. It's like finding out the length of a person indirectly, by seeing how high he can jump; or finding out his age based on his taste of music.

The diameter of the proton is thus $\approx 1{,}6 \cdot 10^{-15} m$. The wavelength of the mass of a proton is, calculated with Eq.m0f, $\approx 1{,}32 \cdot 10^{-15} m$. The similarity of these two values encourages us to believe that the behavior of the proton in interactions with small particles is adequately influenced by its wavelength.

Inside the atom, the electrons move somewhere around the atomic nucleus. For the hydrogen atom, the covalent radius is given as $\approx 3{,}2 \cdot 10^{-11} m$. Actually, the electron in the hydrogen atom could have any distance from the nucleus - the closer it would be to the nucleus, the faster it would have to be to keep the distance. And yet all electrons of all hydrogen atoms have always the same distance from the nucleus (they bounce around in the same atomic orbital). Of course, we could suppose the greatest possible coincidence of all times of the entire universe - but even that would not be a sufficient explanation. Maybe the electron has something like a feel-good zone? Or has it learned to maintain a safe distance? If we look at the wavelength of the (rest) mass of the electron, it is $\approx 2{,}42 \cdot 10^{-12} m$. The velocity of the electron in the hydrogen atom is quite small with ≈ 1/15 of the LS and beats according to DeBroglie with the wavelength $\approx 3{,}64 \cdot 10^{-11} m$ (note the similarity to the covalent radius). Imagining an atom as a small solar system is becoming increasingly difficult. The EECs consist of simple oscillating fields that move with LS. And they are bottomless, because they have an CP but no core. One can probably speak of difficult conditions, if under these circumstances complex civilizations, like those on earth, are to arise inside a nuclear system (as in a solar system). For a genesis like this, a god would have to come up with something. Perhaps there are already such atomic civilizations in a distant part of the universe, and we can only hope that if they reach us with LS someday, they will be as surprised by our existence as we will be by theirs. Maybe they are interested in trade relations...

The proportions in an atomic system are characterized by the waves of the masses of EECs. The more EECs an atom has, the more complex the wave patterns become, that arise from the superpositions of the individual waves. These superposition patterns of the waves determine the intensity and direction of the electric and magnetic forces.

Atoms are created by atomic nuclei attracting electrons. These electrons oscillate around and with the nucleus, losing energy. At some point, the common oscillations have so little energy that it can no longer be undercut. There are then no more common oscillation patterns that could have less energy. Less energy would then be possible for the atom only if an electron-proton pair merged into a common CP. But they refuse to enter into such a close bond. Forcing them would cost a lot of energy that the atom no longer has. It is also impossible to leave the atom, because for that too energy is lacking. So the electrons and protons decide to stay together voluntarily, because there's nothing better than stable conditions anyway.

Neutrons are probably bi-electric, and have a balancing effect. A little bit like bipolar capacitors at AC voltage. This only works, of course, as long as there are no emotions in the game.

Even in their collisions, the EECs try to achieve stable conditions. Of course, with the giga(eV)-energies we give to the EECs for their collisions, we can expect more than from some steadily boring atoms. Whole bouquets of exotic particles appear. The collision energy is very creative. Especially popular are quarks. It is very likely that the quarks, as probably most particles, oscillate in some way too. Perhaps quarks are stable fragments of the wave patterns that form in the collisions. Split-experiments to detect quark waves are not yet available. Split-experiments with light can be done today with any laser pointer. Particle accelerators as keyrings that generate quarks do not yet exist - that would be quark pointers.

The addition of space-densities on superpositions changes the V_{CP}

The most *famous* feature of EECs is to make electricity, which often comes from sockets and batteries - but then only for a fee.

Let us now find out how the current manages to move in order to accomplish all the useful little wonders that make our everyday life so wonderful.

The most *important* feature of EECs is that they set each other in motion - which means that the *CPs* move, because without CPs there would be no particles, and thus no EECs. Whereby the CP of a grain of sand (that is a particle of a mountain) is the CP of the CPs of the EECs of which it consists.

The CP of an EEC gets its meaning by the emission and absorption of space-time. When the CP moves, the space is compressed *in* the direction of motion (at the front-side) and stretched *counter* to the direction of motion (at the back-side). This can be turned around: If the space-density, and especially the directional density, *changes* by becoming bigger on one side of the CP of an EEC and smaller on the other side, then the CP will move.

It is not always easy to distinguish cause and effect.

Have nocturnal animals developed big eyes so that they can be out at night, or are they out at night because they have big eyes? Do parents buy clothes that are too big for their children because they are still growing, or are children growing so that the clothes fit better?

For the EECs, the situation is a bit clearer, because the only and most plausible way to change the velocity of the CP is to change the space-densities and especially the directional densities. Conversely, the space-densities can change *without* changing the velocity of the CP - e.g. by changing the space-density in all directions evenly with respect to the CP. This would clarify the hierarchy between the space-density and the velocity.

Next, we are interested in the cause of the cause: Why should an EEC want to change its space-density? - Since it will neither talk nor sing to tell us what we want to know, we need to think for ourselves.

For a homogeneous space-area, the same applies as for a uniform motion: they change only by external influence. It's hard to interact with space-time. This can only be achieved by other space-time. If someone offers space-time for sale, you should inform yourself about the prices before making a purchase - at a reputable dealer, that will cheer him up the day.

And that means: the space-time of an EEC changes by the superpositions with the space-time of *other* EECs. And, of course, EECs superpose each other in an equal way, because no EEC is more elementary than any other EECs.

The superpositions of space-time could be completely chaotic. However, it is not possible to imagine a chaotic universe, because even the most primitive description requires a minimum of order. Not even honest dicing is a real coincidence, because then, while the dice are doing their diabolical work, there should be at least one moment that is beyond our physical reality. God, who is not part of our physical reality, could probably really roll the dice, but he does not tell us if he does - and maybe that's better.

A chaos can dissolve very easily. In a chaos, there is every imaginable superposition process. And every process that results in more processes of the same kind creates order. It creates an elemental order that is insurmountable, not even the thoughts are then still free - although that is also dependent on whose prayers God answers.

Order often appears to us as mathematics. The easiest way is to count, which corresponds to the addition. Building on this, capitalists have developed the multiplication and, much worse, the division, to confuse creditors.

The very simple behavior of the EECs in interactions indicates that for their superpositions the addition applies. It's amazing that the physical fundamentals are always so simple. As if we were deprived of a more complex reality. Actually, the superpositions of EECs could also be multiplicative, or based on even more complicated mathematical equations - but not in our world, not for us. But let us leave these depressing thoughts.

Volumes can be added. If we stack several space-areas (for example, in the form of boxes or houses, or square eggs) we can add them to the total volume. But what if the space-areas superpose? Then the inner volume gets bigger. You could say: inside bigger than outside. Of course, the inner volume can also get smaller. Then it is inside smaller than outside, but you only will notice that when you move in and not enough space is available for all furniture - unless you do not breathe.

We already know something like that from relativity, where lengths can vary for different observers - much as sellers and buyers often have different scales. An observer can equip his space-area with very many distance points. If we would agree on an international or better on a universal standard for the distances between the distance points, we can assign a space-density to space-areas that is comparable to a gas density.

And in the superposition of space-areas, the *space-densities* add up.

We have seen that a change of the V_{CP} always coincides with changes in wavelengths (λ). For EECs, these changes in the wavelengths in *one* direction are always caused by superpositions, and these superpositions actually only cause changes in one direction, in the direction of the V_{CP}.

As a result of the additions of the space-densities in the superpositions of the EECs the space thus changes in only *one* direction. Ultimately, the space-densities in the superpositions of EECs behave *like* directional densities. The wavelengths change in the additions of the space-densities as if the space-densities were one-dimensional.

However, the directional density is initially uninteresting because we are primarily interested in the changes of the wavelengths resulting from the additions of the space-densities and not from the additions of the directional densities. On the other hand, the directional densities *change* in the same proportion as the space-densities, which is why they are occasionally named (as if the international oil price for a barrel were converted to a local currency). Of course, when it's not about very special changes, the space-density and the directional density are significantly different - after all, by 2 powers (r^1 and r^3). We notice that inescapably, if we want to calculate both over the space-amount.

The fact that space-densities add up seems perfectly natural, as we can see from this example: If we slide two drawers that are almost equally sized and filled the same, so that one disappears into the other, then the resulting drawer has twice the density of contents. Drawers can contain everything: socks, diamonds, bonsai trees or mice. Einstein allegedly - when working at the Patent Office in Bern (Switzerland) - had a drawer for his ideas. If he had lived twice, and he had pushed the drawers of both lives together, the density of the ideas would probably had exploded... This cannot happen to the space-areas of the EECs. With them, the space-densities always add up in superpositions, and they maintain their additive behavior even if their superpositions only cause linear length-changes. After all, the superimposition of the space-areas of the EECs, despite the one-dimensional result, is a three-dimensional superimposition. The one-dimensional character arises because the fields of EECs move with LS, giving the superpositions a direction that is completely one-dimensional by nature.

But also the three-dimensional behavior of the space-density is very important for superpositions, which is why it is irreplaceable. Why, which, wherefore? Those who do not continue to read will not learn.

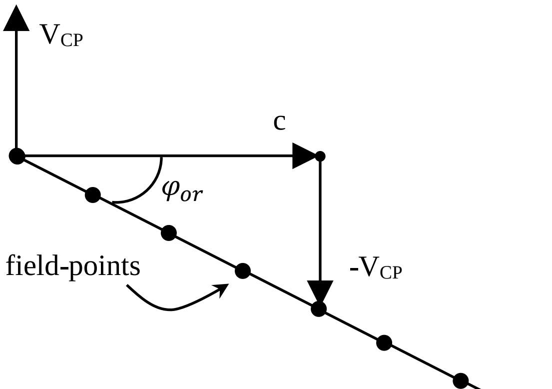
Freedom for the spatial direction (orientation) of the fields

Since EECs influence each other equally, it suffices to see what the *field* of one EEC makes with the *CP* of the other EEC. If one hand is clean when washing your hands, then the other will be clean too (assuming they were equally dirty).

The EEC whose *field* we look at gets the proud designation “source” - and the other is the “receiver”.

The CP of an EEC may have any speed it wants, as long as it does not want to be faster than the light. Its fields, however, must always have LS. This must inevitably lead to tensions between the CP and its fields. Let's take a look at this.

The CP has once again a V_{CP}. We already know that the wavelengths of the mass-waves of the fields change due to the V_{CP}. Just not in the perpendicular direction to the V_{CP}, because in the direction perpendicular to the V_{CP}, the V_{CP} has no component (I apologize for this "evening sunset" or “frozen ice” or “dry desert”). As compensation, the fields instead get a little magic in the perpendicular direction. So, let's look at some (arbitrary) field-points emitted by the CP in the perpendicular direction. The connecting line between these field-points has the angle $\varphi_{or} = \tan^{-1}\left(\frac{V_{CP}}{c}\right)$ to the direction of motion of the field (in sketch S.φor, c is the LS of the field).



Sketch S.φor Perpendicular direction

A little more succinctly formulated: The emitted field is angled in a perpendicular direction. For most creatures, it would probably be rather uncomfortable to be angled and it would change their behavior. For a field, the angle changes the results of its superpositions.

From $V_{CP} < c$ follows $\varphi_{or} \leq 45°$. So, the V_{CP} can not generate arbitrary angles. But why should such angles only be created by a V_{CP}? As if a field were relying on a V_{CP} to allow an angle. Space is free from the dictation of the V_{CP}. A field can have any angle it wants - as long as all the other fields agree, because, of course, a field does not decide its own angle. That is given, and it changes only by superpositions.

The field-points visualize the space of a field, they represent the spatial direction. The angle φ_{or}, which from now on and forever can be called field-angle, is therefore the angle between the spatial direction of the field and the direction of motion of the field.

For the results of superpositions, the spatial direction is decisive. Here too, as we have already agreed for the EECs, the *space-densities* are just added. It's like on the beach. The sand is just there (as well as some tourists on it). It has no direction, no orientation. It's just sand (just like some vacationers use the time to just be). Most of the beach is sloping towards the water - and already the sand of the beach has an orientation. If more sand is added (e.g., with a truck), the incline can be increased or decreased. We can assign a vector to the sand of the beach, e.g. from the land towards the water (that does not affect the bathing fun).

Even to the sand dunes in a desert, vectors can be assigned - or it may not be done. Some grains of sand are too free for vectors, others are so heavily integrated that nothing will change anyway. Whether space-points have vectors or not depends on the behavior of their space in superpositions. If the space behaves vectorially, its space -density becomes a vector (if it behaves criminally, its space-density gets a thriller, if it behaves masochistically, its space-density becomes a sadist - there are many possibilities, because: Space is not all the same).

Large distances between source and receiver simplify life

However, the space-density and the space-orientation are not sufficient to describe the superpositions of the space of the EECs. It is not enough to consider only the space-densities and the spatial directions. Space is not enough. Because the fields of EECs always move with LS. Never and nowhere and by no one will ever a field of ab EEC be observed that does not have LS. To look at the superpositions and to see only the space-densities and space-directions, and to pretend that the fields stand still, is as if it makes no difference whether somebody jumps from a moving train or from a standing train.

Only the motion of the fields of the source relative to the fields of the receiver produces those superimpositions that interested us first.

For most of the considerations still to come, regarding the superpositions, the distance between the source and the receiver will be much larger than their wavelengths. If the fields of the source were represented as rays, then these rays would be nearly parallel at the place of the receiver, much like the sun's rays on Earth. - Although it's never really obvious in everyday life that our sunbeams are parallel: Sunbeams that break through the cloud cover in a religiously glorious glory seem to radiate in any possible direction - though no one will ever see sunbeams crossing each other, and if somebody does, then he is no longer on earth... Even the shadows of trees in a forest rarely appear parallel. Conspiracy theorists, having proved that the moon landing was a fraud, could use this obvious flaw to prove that our life on earth is nothing but a big media scam.

Having only one direction in which the fields of the source move makes it easy to look at the superpositions, which seems quite pleasant. Of course, the basic superposition principles are the same even for small distances (of the order of one wavelength) as they are for large distances - but the calculations are much more cumbersome. Since not only our brains but also our thoughts are inert, we start slowly and leave it in this paper in the context of the large distances. It's like looking at a ballet, when we see a performance for the first time, only the prima ballerina seems to dance, and everything else disappears in the canthus.

Decisive for the results of the superpositions of the EECs is the relative motion between the fields of the source and the fields of the receiver. Of course, the fields of the receiver move in any direction with respect to their CP. Luckily, there are ways to simplify the thinking. If e.g. both the source and the receiver have no velocity, then only the direction of the connecting line between the two is actually interesting, since the results of the superpositions perpendicular to this connecting line cancel each other out. But we do not have to know that much at this point. That's too much information. To understand how the velocity of the receiver changes through the fields of the source, it is sufficient to consider those directions of the fields of the receiver, which are anyway fully parallel to the line connecting the two. Just as an astronomer is required to make a point mass out of the earth to calculate its orbit around the sun, while humankind's fates are not of interest to him.

The very special orientations of the EECs

We already know that the fields have won the right to have any spatial direction. Now we want to know on which spatial directions the *EECs* have agreed for their respective fields.

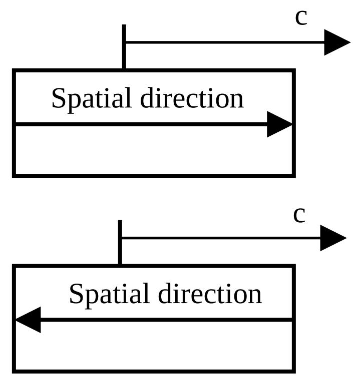
Let's look at some interesting facts (infakts) on the EECs: There are *2* sexes in the EECs, positive and negative. Each EEC consists of *2* fields, the emitted and the absorbed field. On a line there are *2* directions (orientations). And *2* EECs are connected by a line. – Anyone, who believes that all this is coincidence, also believes in coincidence when all the cars in road traffic always stop at red and go at green.

In addition, the EECs show an extremely delightful behavior: equal charges repel each other, and unequal charges attract each other.

The very pronounced duality of EECs almost forces us to believe that there are two distinct fields. The simplest difference that fields can have is their spatial direction. And indeed, it suffices to give the two distinct fields of the EELs opposite spatial directions to produce their (exciting) behavior.

In the fields of a (rarely) stationary EEC, the spatial direction and the direction of motion of the fields are always parallel. This results in the 2 field-types (both equally cool or not): in one field, the spatial direction and the direction of motion of the field are unidirectional, and in the other field the spatial direction and the direction of motion of the field are opposite (the angle φ_{or} is at the first 0° and at the second 180°).

Sketch S.Or shows a small *section* of each field as a rectangle.



S.Or. Spatial directions of EECs

The arrow inside a rectangle indicates the spatial direction (SDi) and the arrow outside the rectangle indicates the direction of motion (at the speed of light). The sketch does not want to show us more.

It is similar with a moving train: you can sit either with the face or with the back of the head in the direction of motion. The 2 field-types of EECs are therefore called front-field and back-field (which is which is a secret). The two types could also be called back and belly, or head and foot, hetero and homo, bow and stern, equal and counter, blade and handle, east and west, or forward and reverse. But most of these names seem silly.

In order for the magical behavior of the EECs to really appear, each EEC must consist of both types of field. It is defined: If the emitted field of an EEC is a front-field and the absorbed field is a back-field, then the EEC is positive. And with the negative EEC, it is exactly the opposite. And thinking for about 1 hour shows that it is obvious that the orientations of both fields of the positive EEC point away from the CP - and at the negative EEC it is exactly the opposite. It has to be like this so that the two fields achieve the same results, despite their opposing directions of motion, when they superpose other EECs. If the two fields of an EEC were equal (both front-fields or both back-fields), their superposing results would cancel each other out, and there would be no electrical forces. Then there would be no electricity from the socket and no atoms - only true love and pious sayings could hold the world together. Even worse is that the two fields of an EEC superpose each other. If the two fields were the same (both front-fields or both back-fields), they would subtract each other away because of their opposite directions of motion - and that too would be rather impractical.

The space-orientation is a property of space that allows us to compute superpositions (after all, by adding (and subtracting)). It's the behavior of the EECs that created the space-orientation - or vice versa (it's like with the egg and the half full glass of water or the chicken and the half empty glass of water - or vice versa). The universe knew it from the beginning and meanwhile we too know that space is not equal to space. Space differs from other space by its space-time values. For the results of superpositions, there must be laws. And one of these laws is reflected in the space-orientation. For the time being, the space-orientation appears in the fields of EECs, which always move with LS; whether the space-orientation will appear elsewhere (for example without LS at all) will be seen.

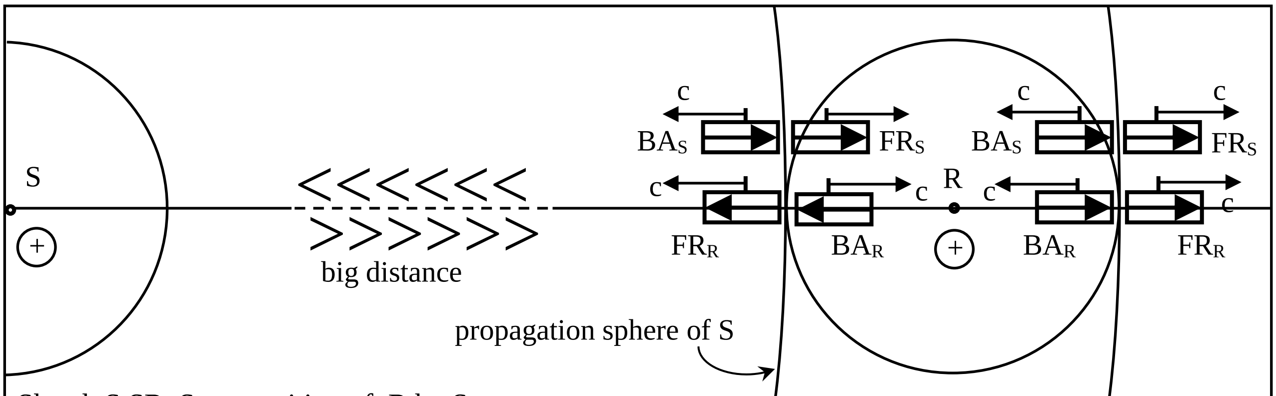
With the front- and back-fields it's like pulling and pushing: pulling and pushing in the same direction give very different results than pulling and pushing in opposite directions (you have to know what you're doing – one stone, for example, is *pulled* and not pushed *from* the top to the top).

An electrostatic superposition with everything included

Now that we've got all the ingredients together, we want to bake the cake, with 360° hot logic and powerful sketches (which, however, are not understood by the ignoramuses of the art world). The result will be the most beautiful forces of space and time that you can bake with EECs.

A rhetorical reminder: The fields of the source must change those of the receiver so that attraction and repulsion arise.

In the example of the sketch S.SR we see the superimposition of the receiver (R) through the fields of the source (S). Both charges are positive.



Sketch S.SR Superposition of R by S

Far left: the sources S. It is very far away (indicated by the <<< and >>>) in the somewhere, so that the small section of the spherical surface, with which the space-time of S spreads (we may call this the propagation sphere), appears plane to the receiver.

As promised, we consider only the superpositions in the direction of the connecting line ($\overline{SR}$).

As in the previous sketch (S.Or, to see it, you can either travel to the past or go back in the text), the rectangles represent sections of the fields, the inner arrows show the space-orientation and the outer arrows show the direction of motion (with LS = c). Brand new are the abbreviations FR and BA for the front- and back-fields.

As long as the velocities of the CPs of the source and the receiver are zero ($V_{CPS} = 0$ and $V_{CPR} = 0$), the orientation and direction of motion of the fields are parallel. We can say that the fields are in their simplest (ground) state. We look at the basic model, so to speak. And the basic model has only one direction, namely the line connecting the source and the receiver.

For two EECs this is the simplest situation that can be encountered. But of course such an idyllic initial situation with two stopped EECs can exist only in the waking dream of theoretical considerations. And even there, the results of the superpositions immediately cause a change of the velocity of the receiver corresponding to the electrical forces.

So let's look at these results of the superpositions. Since the order in which these superpositions take place is without any meaning, we throw a coin and thus start at the left of the receiver (in sketch S.SR), that is the backyard of the receiver, or more laborious formulated: we start with the source side of the receiver.

To save writing material and thereby save the world climate, I use the abbreviations from sketch S.SR to describe this example.

A neutral observer who is not influenced by S nor by R, and who is about as real as the man in the moon, could describe the results of the superposition in the backyard of R unsurpassable well (see sketch S.SR!):

FR_S superposes with FR_R. The space-orientations are opposite. So we subtract. As a result, the directional density of FR_R becomes smaller.

Ditto for BA_S and FR_R.

FR_S superposes with BA_R. The space-orientations are opposite. But we do *not* subtract. Because the FR_R and BA_R of R are coupled, they complement each other. And that means that FR_R and BA_R always have to change oppositely. And they have to react to external influences in the opposite way. If one becomes fatter, the other needs to become thinner, and vice versa (yet both are always happy, as if they share one and the same brain, which is always well cared for). The back-field of a receiver always behaves opposite to the front-field in superimpositions, whereby we regard the behavior of the front-field as normal (the back-field should not complain, after all, it is as if it were constantly going backwards). Since we subtract from FR_R, we have to add to BA_R. As a result, the directional density of BA_R becomes grater.

Ditto for BA_S and BA_R.

Simplified: the one field of R that moves away from R and onto S becomes thinner, and the other field of R that moves toward R and away from S becomes denser. Any ill-paid, dilettante, shortsighted and drunk tracker could immediately interpret this unique and characteristic density-distribution and recognize that the CP_R is moving away from S. This is repulsion in purest form, it can not possibly get better.

Despite all the euphoria, we do not want to forget to look at the side of R that is open to the world. This is the side of R that faces away from S:

FR_S superposes with FR_R. The orientations are unidirectional. So we add. As a result, the directional density of FR_R becomes grater.

Ditto for BA_S and FR_R.

FR_S superposes with BA_R. The orientations are unidirectional. But we do not add - and this time we already know why that is, because "experience gives us flowers" as Joachim Witt writes so beautifully (in German language, of course). We subtract.

Ditto for BA_S and BA_R.

And on this side of R too our by now fully drunken tracker would immediately recognize the repulsion between S and R.

We have seen in this simple example how the space-densities are to be added for EECs, according to their space-orientations, so that the EECs behave electrically.

The same space-density for all EECs allows acceleration per wave

Anyone who still thinks, he has not understood how the electric acceleration develops, is right. Because for an acceleration, the space-densities must change over *time*.

Each EEC charge has it: the mass-wave, which corresponds to its inert mass (m_i). This gives us a measure of time: the period (T) of the mass-wave.

First, however, we must remember that the electrical *force* of all EECs is always the same regardless of the accelerations that this force may cause in any EECs.

One of the most appalling features that contribute most to the still admirable character of EECs is their reliability: their electrostatic forces are always almost the *same* (at equal distances), so that these forces are independent of the mass of the EECs, which leads to a desirable equality between electrons and protons (some could take that as an example - even if the always annoying electrons are much more agile than the calmly, contented protons).

It is as with equal sized horses that always kick equally, regardless of their color, which corresponds to a wavelength (it seems anyway marginal what color a horse has after being kicked).

This means that the space-density of all EECs must always be the same, as long as they do not move. If that were not the case, then the mutual superimpositions of the EECs could produce quite different changes in the space-densities or directional densities, and thus the electrostatic forces would as much always be the same as the weather. The fields must always have the same space-density, at the same distance from the CP of their source, of course, because they superpose the receivers additively (at the same wave phase, of course).

Being superimposed by a raindrop has a very different meaning for an ant than for an elephant (the rain corresponds here to the field of the source) - and a raindrop does not make a waterfall, which would be somehow challenging for the ant. Anyhow, we understand why the space-densities of the EECs need to be the same (or, to put it a little differently, the space-amount that comes from the CP or is absorbed by the CP per time-unit is the same for all EECs).

We (humanity in general) already know that the wavelength of the mass-wave is inversely proportional to the inert mass. Moreover, if the space-densities of all EECs (especially those of the receivers) are always the same, then this can only mean one thing: the inertia of the mass is solely due to the wavelength of the mass-wave (...if no one else is left over, and somebody has to do it...).

So we know with unshakable certainty: all stationary EECs always have the same space-density and their wavelength corresponds to their inert mass. However, if somehow in a very mysterious way their space-density (and the associated directional density) changes, then the logic (this imperious despot), dictates that the wavelength changes too. The "mysterious way" is of course a rhetorical secret. Because the space-densities and the directional densities of the fields of the receiver are famously known to change due to the superpositions with the fields of the source. Not only does the velocity of the CP of the receiver change, but the wavelengths of the fields of the receiver also change accordingly - as the space-density (and accordingly the directional density) increases, the wavelength becomes smaller, and vice versa (the compression of the space pushes the waves together, and the opposite is true too).

The acceleration (a) is the temporal (Δt) change of the velocity (Δv), $a = \frac{\Delta v}{\Delta t}$. The change in speed corresponds to a change in the wavelengths (of the fields of the receiver). And the wavelength, as we know by now, realizes the inertia, which is the symbiotic multiplier of acceleration. It therefore makes sense to relate the acceleration to the wavelength by looking at the velocity-change (of the receiver) per period (T_R). If the LS is c then $T_R = \frac{\lambda_R}{c}$. And so it is by no means daring (so it is trivial) to write: $a_R \propto \frac{\Delta\lambda_R}{\lambda_R}$.

It is written in this relation that we want to know how much the wavelength of a wave changes per wave.

Wave by wave

An EEC changes its state of motion without external influences (these are superpositions) by no means. It does not do anything by itself. Like any government, it expects a suitable motivation, so as not to spend endless time with itself in remote spheres. Like a stubborn donkey, it needs a carrot at the front and a pat on the back. It certainly will not leave its feel-good zone by itself.

As long as nothing changes, each of the waves of an EEC is always exactly identical to the previous wave. And that's always the case. This results in an important consequence: as soon as a wave changes (for example, due to superpositions), the following wave will be again identical to its previous one, regardless of the origin of the previous wave. The change is thus maintained, because a once achieved state is maintained and changes only by external influences...

Each new wave is exactly the same as the previous wave, but at the same time every new wave is an absolute new beginning. Accordingly, each newly emerging wave can be superposed, and thus be changed by adding (or subtracting) the corresponding space-densities. As a result, the wave is no longer exactly equal to its previous wave, fulfilling its right of independence. - It is as if a clone's genes were changing during its growth. Could he change his genes to his liking, and could all do so, then the evolution of these clones and their machines (that they would develop) would create an unimaginably complex universe, in which we (humans and our earth) were just a gimmick on the edge.

Of course, for EECs, both the waves of the front- as well as the waves of the back-field will change simultaneously, since the two fields must share a stool (a seat).

When continuously each new wave is superposed, then the EEC changes from wave to wave. In this way, an EEC can change its velocity from wave to wave. - Like a trampoline jumper who jumps higher and higher - until he overcomes the earth's gravity and never returns. Then he would set up his trampoline on the sun - until he overcomes the sun's gravity and never returns. Next, he would have to set up his trampoline on the black hole in the center of our galaxy - and from there he would never return. But where else could he have gone? It would not have gone any “higher”, anyway.

If the fields of the source and those of the receiver superpose, then this is a continuous superposition, even if the amplitude of this superposition oscillates with the frequency of the source. For the electric force, the oscillation of the fields of the *source* is insignificant. In most cases, only the *mean* change of the receiver is interesting in this respect, which corresponds to the mean space-density of the fields of the source. After all, the source could consist of more than one (1) charge, e.g. of 2, or of 1000, or call a number (131313). Their fields can superpose completely crazy. It is as if many radios, all tuned to different stations, are on at the same time. The more radios it gets, the louder it gets and the less one understands. Fortunately, the receiver does not care about content but only about power: he uses microphones to convert the sound energy into electricity for his electric car (not suitable for the moon).

So we see that the electrical forces of the sources act additively on the receiver, which means that only the mean space-densities of the fields of the sources are relevant, not their swinging.

In a continuous superposition, the space-densities and the directional densities of the fields of the *receiver* change wave by wave, due to the superpositions with the fields of the source. And that means that the velocity of the receiver changes wave by wave. If the change of the velocity of the receiver per wave is Δv_R (and T_R is the period), then the acceleration of the receiver (a_R) is: $a_R = \frac{\Delta v_R}{T_R}$ - which does not say much to us as long as we do not know *how big* Δv_R is.

The mean space-density of a wave at the CP (the space-density of the receiver)

Like a preschooler who has realized that the school bus can not drive through the gas pedal alone and who is now looking for the hamster wheel and the giant hamster that drives the bus, we want to get to the bottom of the magnitude of the velocity-change by taking a closer look at the space-densities of the EECs.

To determine the space-densities of the EECs, we are eagerly interested in the mean space-densities of *individual* waves (especially at the receiver).

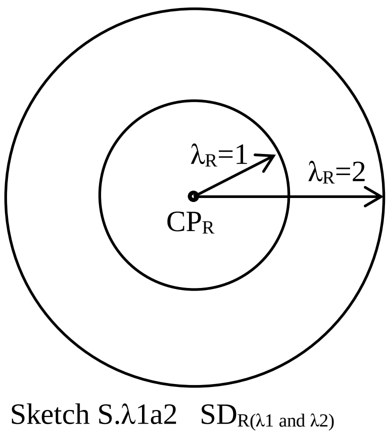
The mean value of the space-amount (SA) which leaves or which is absorbed by a velocity-free CP per time-unit is always the same. This means that the space-amount that a wave of the receiver ($SA_{R(\lambda)}$) contains directly after its formation around the CP_R is proportional to its period (T_R). Proportional means that the quotient is constant, which is represented symbolically and free of other values by the constant K_{SA}:

$$\frac{SA_{R(\lambda)}}{T_R} = K_{SA}$$

The mean space-*density* of this wave ($SD_{R(\lambda)}$) is the $SA_{R(\lambda)}$ per volume, where the wavelength λ_R corresponds to the radius around the CP_R:

$$SD_{R(\lambda)} = \frac{SA_{R(\lambda)}}{\lambda_R^3} \qquad \text{and with} \qquad T_R = \frac{\lambda_R}{c} \qquad (c = \text{LS})$$

$$SD_{R(\lambda)} = \frac{T_R \cdot K_{SA}}{\lambda_R^3} = \frac{\lambda_R \cdot K_{SA}}{c \cdot \lambda_R^3} = \frac{K_{SA}}{c \cdot \lambda_R^2}$$



Sketch S.λ1a2 $SD_{R(\lambda 1 \text{ and } \lambda 2)}$

Here is a tiny numerical example (see sketch S.λ1a2) to show that $SA_{R(\lambda)}$ and $SD_{R(\lambda)}$ do not differ in just one letter:

With $c = 1$ and $K_{SA} = 1000$

and with $\lambda_R = 1$ we have $SA_{R(\lambda)} = 1000$ and $SD_{R(\lambda)} = 1000$

And with $\lambda_R = 2$ we have $SA_{R(\lambda)} = 2000$ and $SD_{R(\lambda)} = 250$

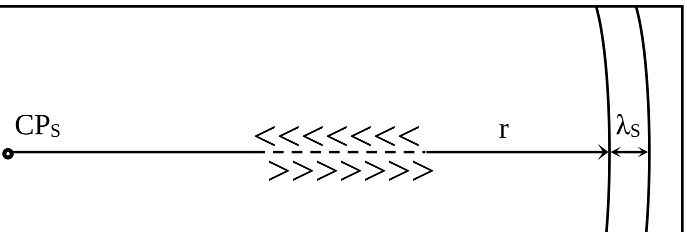
And also an example from real life (as it might be in business textbooks, for example): A cube maker would like to offer staggered discounts by charging a fixed price per meter of edge length. A standard cube of 1m edge length costs 1 €. 2 m edge length cost 2 € and make 8 standard cubes with 1/4 € unit price. With only 5 m edge length, the unit price has already fallen to 5/125 € = 0.004 €. Is this an acceptable business model?

The mean space-density of a wave far, far from the CP (the space-density of the source at the receiver (has $1/r^2$ dependence))

We have just determined the mean space-density of a wave of an EEC just after its formation around the CP_R. This space-density of the emerging wave is particularly interesting in terms of the velocity-change of the receiver. The velocity of the receiver changes in compulsive cooperation with the fields of the source. The source on its part knows nothing, because it is usually very, very far away (many, many times the wavelength far away).

So what could interest us more right now than to know which space-densities the fields of the source, which is far, far away from the receiver, have right near by the receiver (at the place of the receiver)?

A wave far away from its CP_S is like a spherical shell around its CP_S, with the thickness of the wavelength λ_S (since they are longitudinal waves) - see sketch S.rλ (r = radius).



Sketch S.rλ A spherical shell of S

The space-amount ($SA_{S(\lambda)}$) within this sphere has not changed since the wave originated in its CP_S (that was its very personal big bang).

On the other hand, the further the wave moves away from the CP_S, the bigger the *volume* of the wave´s spherical shell gets (it is proportional to the radius). - As well as the volume of a 1cm thick layer around the earth is bigger than the volume of a 1cm thick layer around an (normal-sized) orange.

We could calculate the volume of the spherical shell by subtracting from the entire universe the volume that is between the inner edge of the sphere and the CP_S (that is r^3) and the volume that is outside the outer edge of the sphere - or we subtract r^3 from $(r + \lambda_S)^3$:

$$(r + \lambda_S)^3 - r^3 = 3 \cdot r^2 \cdot \lambda_S + 3 \cdot r \cdot \lambda_S^2 + \lambda_S^3$$

The space-density ($SD_{S(r)}$) of a wave at the distance r from the CP_S (see S.rλ) is thus:

$$SD_{S(r)} = \frac{SA_{S(\lambda)}}{3 \cdot r^2 \cdot \lambda_S + 3 \cdot r \cdot \lambda_S^2 + \lambda_S^3}$$

The $SA_{S(\lambda)}$ corresponds to the $SA_{R(\lambda)}$ (which was already kindly introduced to us on the occasion of the wave's origin):

$$SA_{S(\lambda)} = K_{SA} \cdot T_S = \frac{K_{SA} \cdot \lambda_S}{c}$$

This event allows us intimate knowledge:

$$SD_{S(r)} = \frac{K_{SA}}{c} \cdot \frac{\lambda_S}{(3 \cdot r^2 \cdot \lambda_S + 3 \cdot r \cdot \lambda_S^2 + \lambda_S^3)} = \frac{K_{SA}}{c} \cdot \frac{1}{(3 \cdot r^2 + 3 \cdot r \cdot \lambda_S + \lambda_S^2)} = \frac{K_{SA}}{c} \cdot \frac{1}{r^2 \cdot \left(3 + \frac{\lambda_S}{r} + \frac{\lambda_S^2}{r^2}\right)}$$

The function of the parenthetical expression $\left(3 + \frac{\lambda_S}{r} + \frac{\lambda_S^2}{r^2}\right)$ is to compare the general expression $\frac{\lambda_S}{r}$ or $\frac{\lambda_S^2}{r^2}$ with a concrete number (this time the 3) . For $\lambda_S \ll r$ the $\frac{\lambda_S}{r} \ll 3$ or $\frac{\lambda_S^2}{r^2} \lll\ll 3$; it is like a single wave that is negligible in an ocean (as long as nobody drowns in that single wave).

And so for $r \gg \lambda_S$: $SD_{S(r)} = \frac{K_{SA}}{3 \cdot c} \cdot \frac{1}{r^2}$

This equation states that the $SD_{S(r)}$ of a wave changes with $\frac{1}{r^2}$, when being sufficiently far away from the CP_S of an EEC. This corresponds to the distance behavior of electrical forces.

For $\lambda_S \ll r$ the calculation of the volume of the spherical shell of the wave can be simplified, because the spherical surfaces of r^2 and $(r + \lambda_S)^2$ differ only very, very little. Transmitted to e.g. a large, thin sheet of paper that is as if the edges were cut slightly obliquely so that the areas of the top and of the bottom of the sheet are not exactly the same size. The difference of the surfaces is negligibly small, so that the volume can be calculated to a good approximation simply with $r^2 \cdot \lambda$.

Here is an example: The height of the habitat is for most people... say within 20 m of the ground. The few who live above or below (!) are negligible. The residence sphere is therefore 20 m thick (20m << 6300000m), and that would remain so even if the earth would grow larger (e.g. by as natural as mysterious growth processes - similar to the comic figure "The Hulk ", who can multiply his mass by rage within seconds, probably with anger and mass entangled in him). So if the earth had a growth spurt overnight, and would double its radius (quadruple the surface area), then humanity's population *density* would have decreased to ¼ within its 20m residence sphere.

Eventually: the derivation of the wonderful $\boldsymbol{\Delta\lambda_R \approx \lambda_R \cdot \frac{SD_{S(r)}}{SD_R}}$

Eventually *the* big moment is here - or at least *a* big moment is here, even though "big" is relative, and actually it is not a moment, but there are some sentences that tell us something more about the development of the electrical acceleration (a_R) . (That's all very exciting.)

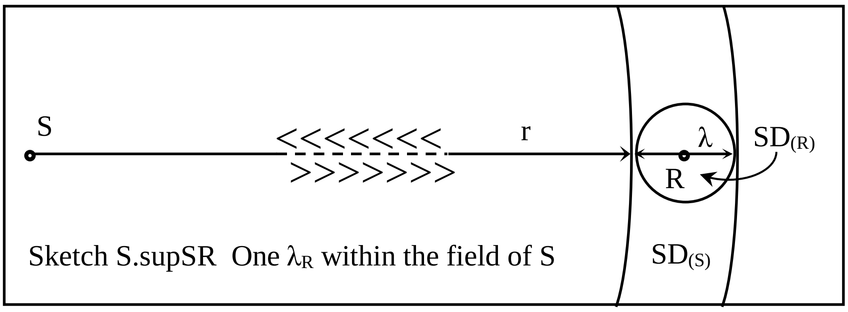
The electrical acceleration occurs when the fields of the source superpose with each newly emerging wave of the receiver (see sketch S.supSR), because the space-densities of the fields of the source are added to the space-densities of each wave of the receiver (or subtracted, whichever seems more pleasant), so that with each new wave of the receiver, the space-density of the field belonging to the wave changes *by* the value of the space-density of the source. And the change in a space-density at the receiver corresponds to a change of its directional density and thus also in a change of its wavelength, which in turn corresponds to a velocity-change of the receiver (this is the famous Δv_R).

The persistent presence of the fields of the source in the formation of the waves of the receiver is very helpful for the electrical acceleration (much like the sun for the growth of the plants). However, the $\frac{1}{r^2}$-distance dependence applies only to large distances ($r \gg \lambda$) between the EECs. But that's fine, because this relationship can actually be measured only for large distances - actually, it's even gigantic (Giga = 10^9) large distances. An electron has the wavelength $\lambda_e \approx 2{,}5 \cdot$

$10^{-12} m$. Already at a distance of a thousandfold, the deviation from the ideal $\frac{1}{r^2}$-dependence is negligible and practically barely measurable.

In addition, there are many difficult to determine electromagnetic influences in the measurement of electrical forces. This is all very dynamic and accordingly inaccurate. It is as if one would like to predict precisely the amount of the rainfall of a thunderstorm for each square centimeter by just looking at the clouds - and comparative experiments with watering cans are inconclusive.

As long as we only consider large distances between the EECs ($r \gg \lambda$), we can enjoy a pleasant advantage: we can consider the fields of the source for a wave of the receiver to be practically homogeneous. This facilitates the addition of the space-densities in the superpositions. As much as the gravitational field of the earth in our everyday life can usually be regarded as homogeneous - you will hardly find a housing ad in which the lower gravity on the 5th floor of an elevatorless house is praised.



Sketch S.supSR One λ_R within the field of S

The calculation of the *changes* in the wavelengths of the receiver (due to the superpositions with the fields of the source) is also kindly simplified at large distances ($r \gg \lambda$) and achieves by its simplicity almost timeless-aesthetic elegance (quite similar to antique statues, elegant fashion, expensive ham, or bells and whistles).

It has already been mentioned, and because it has meaning for the changes in the wavelengths of the emerging waves of the receiver, it should now be clarified here: superpositions between EECs can be represented as vector additions; where the direction of the vector corresponds to the direction of motion of the field and the magnitude of the vector corresponds to the space-density of the field (or the wave). In addition, the orientations of the fields, which respectively result from the velocities of the source or of the receiver, must be taken into account. And, of course, the space-densities of the fields change if their CPs have velocities - but for velocities it's still too early (they reach us at the latest in magnetism).

Everything is easiest if the EECs do not move (as in the case of harvesting tree fruits, imagine the trees could run away with their fruit). In unmoved (but in no case impassive) EECs the effects of the superpositions perpendicular to the connecting direction of the source and the receiver cancel each other out. This explains why we can confine ourselves to the changes of the space-densities in the connecting direction, which in this case, of course, coincides with the direction of motion of the fields of the source, which gives the directional density.

It's like an elongated boat tethered in the middle of a river. The water presses from both sides equally strong, so the boat is oriented lengthwise in the flow direction. This shows that water has no orientation. Somebody could create a fantastically large electrical voltage between the banks, in the hope that the water molecules will orientate a little bit perpendicular to the flow direction. Then the boat would stand diagonally in the river. This, in turn, would prove that the flow has no counterflow corresponding to the front- and back-fields of the EECs. That would require something like "anti-water", which flows interatomically uphill in the opposite direction. Enough about that - we do not want to further confuse the poor angler in his boat.

Let's look at the change in the space-density in the connecting direction. We get a somewhat weird quantity: a *space*-density along a stretch. But we will not let that irritate us. Because that is exactly what we want to know: how does the space-density change in a certain direction, in short: how does the directional density changes.

We want to know how much the wavelength of a newly emerging wave of the receiver changes compared to the *previous* wave by the superimposition with the fields of the source in the direction of motion of the fields of the source. The wavelength of an emerging wave of the receiver is inversely proportional to the space-density, and this also applies to the resulting space-density which results from changes in the space-density due to superpositions. The corresponding proportionality constant is cut out in the calculations, so we call it K_K (constant that is cut out).

The previous wave of the receiver may have had the wavelength λ_{R0} and the space-density SD_{R0}. The newly emerging wave has then the wavelength λ_R and the space density SD_R. The SD_R results from the addition of the space-density of the previous wave (SD_{R0}) plus the space-density, which has the field of the source, with which the wave just superposes, at a distance r from the source ($SD_{S(r)}$).

So:

$$SD_{R0} = \frac{K_K}{\lambda_{R0}} \qquad \text{and}$$

$$SD_R = SD_{R0} + SD_{S(r)} = \frac{K_K}{\lambda_R} \quad \Longrightarrow \quad \lambda_{R0} \cdot SD_{R0} = \lambda_R \cdot \left(SD_{R0} + SD_{S(r)}\right)$$

We insert this equation in the equation for the change of the wavelength ($\Delta\lambda_R$):

$$\Delta\lambda_R = \lambda_{R0} - \lambda_R = \lambda_{R0} - \frac{\lambda_{R0} \cdot SD_{R0}}{\left(SD_{R0} + SD_{S(r)}\right)} \quad \Longrightarrow \quad \Delta\lambda_R = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot \frac{1}{\left(1 + \frac{SD_{S(r)}}{SD_{R0}}\right)}$$

At large distances between the source and the receiver (r$\gg \lambda$), it is $\frac{SD_{S(r)}}{SD_{R0}} \ll 1$, and thus we obtain our long-awaited, classic beauty:

$$\Delta\lambda_R \approx \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}}$$

However, in this equation we can omit the 0 at λ_{R0} and SD_{R0} , it is only important that *both* belong to the same wave, so:

$$\Delta\lambda_R \approx \lambda_R \cdot \frac{SD_{S(r)}}{SD_R} \qquad \text{(Eq.}\Delta\lambda\text{R)}$$

(If an equation gets a label, it's special, just as houses in England may or may not have names, while people almost always have a name.)

The change of the wavelength corresponds to a velocity-change (Δv_R):

$$\Delta v_R = \frac{\Delta\lambda_R}{T_R} \qquad (T_R = \text{period})$$

The acceleration of the receiver (a_R) is thus: $\quad a_R = \frac{\Delta v_R}{T_R} = \frac{\Delta\lambda_R}{T_R^2}$

Calculation of the space-amount ☹

The space-amount that leaves the CP of an EEC, or which is absorbed by it, is always the same for all EECs, this is especially true for the source and the receiver (insofar as these are EECs and no money-, wine- or drug-sources and their receivers, or what confusions seem possible at this point). Of course it would be nice to be able to calculate this space-amount. However, anyone who hopes that the electric acceleration will allow such a calculation will be disappointed at this point - and he is not the only one. No matter what value is specified for the space-amount of the source, the receiver has the same space-amount, so that the quotient $\frac{SD_S}{SD_R}$ and thus the a_R do not change, because mathematically $\frac{1/4\ of\ a\ cake}{1\ cake}$ is as much as $\frac{2*1/4\ of\ a\ cake}{2*1\ cake}$. We just do not have enough information yet to determine the space-amount. Gravitation feels deep kinship solidarity and will later provide more information.

Use of the mean space-density ☺

In calculating the change in the wavelength of the receiver, we have used the *mean* space-density of the emerging wave of the receiver (SD_R), which is the quotient of the space-amount that is emitted or absorbed by the CP_R in a period ($SA_{R(T)}$) and the volume of a sphere of the radius of one wavelength (λ_R^3):

$$SD_R = \frac{SA_{R(T)}}{\lambda_R^3}$$

Consequently, the change of the wavelength is:

$$\Delta\lambda_R \approx \lambda_R \cdot \frac{SD_S}{SD_R} = \lambda_R \cdot \frac{SD_S}{SA_{R(T)}} \cdot \lambda_R^3$$

Unfortunately, we know that the space-density of a field decreases very fast when moving away from the CP_R (in the radial direction), and this knowledge stands in the way of our bliss, because we wonder if it is responsible, under these circumstances, to use the mean space-density?

To be sure, we can divide the sphere of the emerging wave of the receiver into N equal spherical shells. The thickness of each spherical shell is therefore $\frac{\lambda_R}{N}$. The time that a wave needs to pass through a spherical shell is the same for all shells, namely $\frac{T_R}{N}$, and thus the space-amount in each spherical shell is the same, namely $\frac{SA_{R(T)}}{N}$. And the volume of each spherical shell is always the volume of the outer radius of the spherical shell minus the volume of the inner radius:

$$\left((n+1) \cdot \frac{\lambda_R}{N}\right)^3 - \left(n \cdot \frac{\lambda_R}{N}\right)^3 \qquad \text{where} \quad 0 \le n \le N-1$$

And, of course, each spherical shell superposes with the same space-density of the source ((SD_S).

And now we just add the wavelength changes of all spheres:

$$\sum_{n=0}^{n=N-1} \Delta\lambda_{Rn} = SD_S \cdot \frac{\frac{\lambda_R}{N}}{\frac{SA_{R(T)}}{N}} \cdot \left(\left(\frac{(n+1)\cdot\lambda_R}{N}\right)^3 - \left(\frac{n\cdot\lambda_R}{N}\right)^3\right) = \frac{SD_S\cdot\lambda_R}{SA_{R(T)}} \cdot \left(\frac{\lambda_R}{N}\right)^3 \cdot ((n+1)^3 - n^3) =$$

$$\frac{SD_S\cdot\lambda_R}{SA_{R(T)}} \cdot \left(\frac{\lambda_R}{N}\right)^3 \cdot N^3 = \lambda_R \cdot \frac{SD_S}{SA_{R(T)}} \cdot \lambda_R^3 = \Delta\lambda_R!$$

If we look closely, we realize that just the volumes of the individual spherical shells are added up to the total volume.

In fact, our irrational concerns were completely unfounded: we can continue to use the mean space-density of an emerging wave to compute their length-change.

This result makes us happy, no doubt. And that may justify the somewhat cumbersome calculation. However, even if the result were different, we would have continued to use the mean density of an emerging wave as it provides the correct results for superimpositions. But we would then have had to consider in what strange and unnatural way the superposition of the fields of the source with the emerging waves of the receiver takes place. Luckily, we were spared that.

We are just beginning to understand superposition processes. Luckily, we are used to the fact that our ideas describe the reality only superficially and incompletely.

For example, it is unlikely that the space-density is infinitely high in the CP of an EEC. Rather, the space-density will approach a maximum at the CP.

Also, the wave with its space-amount will not flow out of the CP_R (or flow into it). Rather, the wave will arise around the CP_R.

We will still have to adapt many of our ideas. That's development. This can be exhausting, but on the other hand, change also brings variety.

Inert mass

Let us now dedicate ourselves to the phantom pain of physics, which is also called inert mass - because we feel it, and yet it is not there.

An EEC consists solely of the fields that it emits or absorbs. The inertia of an EEC arises solely by the time required for the change of a wavelength. And this time is solely the time that one wave needs to emerge, which is its period. An EEC contains no additional substantial embodiment of the inert mass. There is no inert mass as a separate object. There is the inertia of the EECs, and the mass is just the multiplication factor of this inertia.

It is as at a butterfly, whose colors are not caused by pigments but by interference in the grooves of its scales; just as a dirty oil film on a puddle can create beautiful interference colors.

For EECs, the magnitude of the frequency corresponds to the magnitude of the inert mass - as we have already seen. The frequency is therefore the multiplication factor of the inertia of the EECs. This can be shown very easily by calculation. We already know the necessary equations.

The acceleration of the receiver is: $a_R = \frac{\Delta\lambda_R}{T_R^2}$

Where $\Delta\lambda_R \approx \lambda_R \cdot \frac{SD_{S(r)}}{SD_R}$

For the space-density of the receiver (SD_R), we can confine ourselves to the simplest starting situation when its velocity is zero. Then it is sufficient to write:

$$SD_R = \frac{SA_{R(T)}}{\lambda_R^3} \qquad \text{with} \qquad SA_{R(T)} = T_R \cdot K_{SA}$$

How it is, if the source and the receiver do not move at zero speed, that we will consider after next.

And the simplest of all equations is always useful: $c = \frac{\lambda_R}{T_R}$

At this stage, everybody inserts at its own discretion. And after a short fight we achieve the aim:

$$a_R = \frac{\lambda_R \cdot SD_{S(r)}}{\frac{\lambda_R^2}{c^2} \cdot \frac{K_{SA}}{\lambda_R^2 \cdot c}} = \lambda_R \cdot \frac{c^3 \cdot SD_{S(r)}}{K_{SA}} \qquad \text{(Eq.aR}\lambda\text{)}$$

Since force is equal to mass multiplied by acceleration (if the mass is constant), mass and acceleration are inversely proportional to each other. – Somebody with a bike can sing even 2 songs about it: if, in addition to the driver, somebody sits on the luggage carrier, then the possible acceleration is halved; and when pumping air, the pressure in the air pump doubles as the volume in the air pump is halved. So, if the inert mass is proportional to the frequency, then the corresponding acceleration (a_R) must be proportional to the wavelength (since $c = \lambda_R \cdot f_R$), but that´s all self-evident, of course, so let us do quickly a little example to Eq.aRλ:

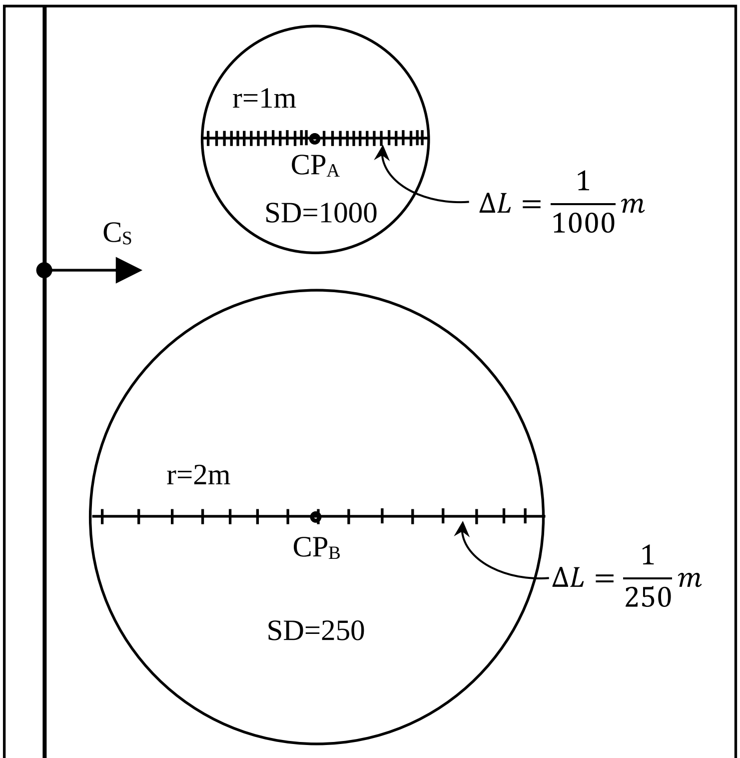
Let the receiver **A** have the wavelength $\lambda_{A(0)} = 1m$. Its CP (CP_A) emits (and absorbs) in a period (T_A) the space-amount $SA_A = 1000P$ (the P could represent, for example, points), and thus the mean space-density is:

$$SD_A = \frac{SA_A}{V_A} = \frac{1000P}{1^3 m^3} = 1000 \frac{P}{m^3}$$

It may also be that the field of the source (the one which currently superposes the receiver) has the space-density (SD_S) at the receiver:

$$SD_S = 1 \frac{P}{m^3}$$

Since $SD_S = \frac{1}{1000} \cdot SD_A$, it makes sense to subdivide $\lambda_{A(0)}$ into 1000 units of length (which are only indicated in sketch S.R1λ2λ, and the long vertical line on the left side represents the field of the source moving with LS (c_S)).



Sketch S.R1λ2 λ a_R proportional to λ_R

It may be that the space-densities of the source and of the receiver are *added* on the *right* side of the CP_A, and so the $\lambda_{A(0)}$ is reduced there to a good approximation by:

$$\Delta\lambda_A = \frac{SD_S}{SD_A} \cdot \lambda_{A(0)} = \frac{1}{1000} \cdot \lambda_{A(0)} = 1mm$$

Therefore, it becomes $\lambda_{A(right)} = 999mm.$

And on the *left* side of the CP_A it is then $\lambda_{A(left)} = 1001mm.$

And so the CP_A moves (to a good approximation) in the right direction with $\frac{1}{1000}$ LS.

The receiver **B** may have $\lambda_{B(0)} = 2m$, from which we conclude: $T_B = 2 \cdot T_A$. The space-amount emitted (and absorbed) by a CP is always the same, hence:

$$SD_B = \frac{2 \cdot 1000P}{2^3 m^3} = 250 \frac{P}{m^3} \qquad \text{(and on the fly: } SD_B = \frac{1}{4} \cdot SD_A \text{)}$$

Let **A** and **B** be equidistant from the source, so that for both: $SD_S = 1 \frac{P}{m^3}$

Thus the change of the wavelength of **B** is:

$$\Delta\lambda_B = \lambda_{B(0)} \cdot \frac{1}{250} = 2 \cdot \lambda_{A(0)} \cdot \frac{1}{250} = 8mm$$

With reference to $\lambda_{A(0)}$, this is: $\frac{\lambda_{A(0)} \cdot \Delta\lambda_B}{\lambda_{B(0)}} = \frac{1000 \cdot 8}{2000} mm = 4mm$

At **A**, the change of the wavelength is 1mm per meter and at **B** it is 4mm per meter. The smaller the space-density of the receiver is, the more the receiver is affected by the superpositions with the fields of the source. - This is often like this: If e.g. of 10000 ants 2 die, that's tragic, but the colony could survive. If 2 of 2 ants die...

The length-change per unit is for **B** 4 times as big as for **A**, but the acceleration is for **B** *not* 4 times as big as for **A**, because the formation of the wave takes for **B** twice as long as for **A**, and thus, the acceleration of **B** is only 2 times that of **A** - but we have known that for a long time, since we learned that the mass of **B** is only half the mass of **A** ($\lambda_B = 2 \cdot \lambda_A \Longrightarrow f_B = \frac{1}{2} \cdot f_A$).

Here is a little illustration out of the real life: We imagine two long rowing boats, which compete against each other. In boat A, the "Herring", sit 1000 rowers. One of the rowers is intimate with the competitors and only pretends to row - which reduces the speed of the "Herring" by 1/1000. In Boat B, the "Walrus", sit 250 rowers, but all of them are 4 times as big and strong as the "herrings" of boat A. Therefore, both boats could have about the same speed. In the "Walrus" sits a saboteur too, who may be intimate with a "herring", and tries only to pretend that he is rowing. But because of his enormous power, he does not notice that he is still half-rowing. This reduces the speed of the “Walrus” only by 1/2 * 1/250 = 1/500. Nothing is more important in sports betting than having the right information and knowing how to calculate with it. And, as we have seen, that's not just the case with sports betting.

This little arithmetical example draws our attention to an interesting connection: If the wavelength of the receiver doubles, then the change of the wavelength increases eightfold, just as the volume does.

That's reason enough for us to look again at the equation of the change of the wavelength (Eq.ΔλR) (it's nice to have it):

$$\Delta\lambda_R \approx \lambda_R \cdot \frac{SD_{S(r)}}{SD_R}$$

We already know all the components:

$$SD_R = \frac{SA_R}{\lambda_R^3} \quad \text{and with} \quad SA_R = T_R \cdot K_{SA} = \frac{\lambda_R}{c} \cdot K_{SA} \quad \text{follows} \quad SD_R = \frac{K_{SA}}{c \cdot \lambda_R^2}$$

And so: $\Delta\lambda_R \approx \lambda_R^3 \cdot SD_S \cdot \frac{K_{SA}}{c}$

Indeed: the change of the wavelength at superpositions is proportional to the volume of the wave.

Here again we recognize the three-dimensional nature of superpositions. - Although even Nostradamus could have come to such a realization, especially since he was good at recognizing and interpreting signs.

Seriously, such a context is just a small piece of a puzzle, in a puzzle whose parts have to be put together by superpositions, to finally make a treasure map - as if normal puzzles were not exhausting enough.

Since so much has already been written about inertia in this text, Higgs must also be mentioned - meaning, of course, his famous Higgs boson and not Mr. Higgs personally (the little joke had to be). If particles are in principle oscillating space-time, then also the particles, which arise with the particle collisions, will be oscillating space-time. And it seems only natural that the frequencies of the masses of the colliding particles have a great influence on the particles formed during the collision. The Higgs particle could be a short-lived particle - maybe even just an oscillating fragment - that always results from particle collisions and whose frequency is tied to the mass-frequency.

We also know this from everyday life: If e.g. a stone collides with a pane of glass, then the pieces of glass will not transmute into flowers - they still will consist of glass. And the stone does not become a butterfly. Even if the stone is shattered by the collision, the pieces of debris do not turn into little ladybirds.

So

The electric field of an EEC oscillates with its mass-frequency, it has a space-amount and an associated space-density, and it has an orientation.

EECs set one another in motion through superimpositions that add up their space-densities, they accelerate wave by wave, and the frequency of their waves is meaningless to the electric forces.

Their inertia (their inert mass) arises automatically from the way in which their space-densities are added up in their superpositions for acceleration.

EECs are nothing but oscillating space-time, yet they fulfill all expectations. I am almost surprised that they can not sing and dance as well.

Magnetism

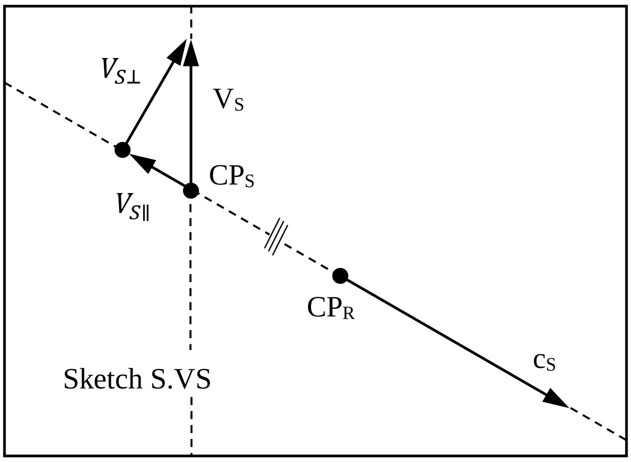
The velocity of the source (V_S)

For the elaboration of the basics until here, which are wonderful, it was usually sufficient to look at still-standing EECs. When EECs move - and especially the small electrons love to move - then completely new phenomena, in particular magnetism arise. As long as we (and the rest of the world) still regarded EECs as simple point charges, we simply had to accept the formation of magnetic forces (much like our ancestors had to accept darkness at night, uncooked food, clothes without Zippers and cars without wheels). Now that we have realized that EECs consist of oscillating space-time fields that superpose each other, we get magnetism as a matter of course by the velocities of the EECs. - However, it is still surprising that new forces suddenly appear. As if Superman gets his super powers only when he uses them...

At the source, regarding magnetism, we are interested only in the angle $\varphi_{or(S)}$ in the orientation of its fields, with which we are already familiar, and which arises in particular perpendicular to the velocity of the CP of an EEC (as e.g. the source).

The source did not create its velocity from its own rib. The velocity of the source was effected by distant forces beyond the source and given to the source. Only the unique Munchausen could pull himself out of the swamp by his own hair. Elementary particles that accelerate by themselves are not yet known - that would then be Munchausen particles; and in machines that generate energy out of nothing, it would be Munchausen-energy.

The velocity (of the CP_S) of the source is an *additional* velocity that exists in addition to the LS with which the fields of the source move. And so, by this additional velocity, the fields of the source also produce *additional* changes of the wavelengths of the receiver, in addition to those of a quiescent source. It's a bit like Christmas.



We have already seen that in the case of residential (static) EECs, the wavelengths of the receiver change through the fields of the source only in the direction of the line connecting the source and the receiver ($\overline{SR}$). Therefore it makes sense to devide the velocity of the source (V_S) into two components: one component parallel to the $\overline{SR}$ (which is $V_{S\parallel}$) and one perpendicular to the $\overline{SR}$ (which is $V_{S\perp}$), see sketch S.VS.

The parallel component of the velocity of the source $V_{S\|}$

First, we will consider the $V_{S\|}$. The effects of the $V_{S\|}$ are shocking; unfortunately, this is not exaggerated, and those who tend to overreact perhaps should better skip this part of the paper.

The space-density of a field changes by a velocity (V_S) in the same way as its frequency. With the inert mass (m_i) we have seen that the mean frequency of the sum of the front- and back-field in the direction of a velocity (which could be... e.g... a V_S) becomes relativistically larger, for the V_S that is by the Factor $\frac{1}{\sqrt{1-\frac{V_S^2}{c^2}}}$. It is completely unavoidable that the space-density will change by the same factor. And if the space-density of the source becomes larger, the change of the wavelength of the receiver also becomes larger ($\Delta\lambda_R = \lambda_R \cdot \frac{SD_{S(r)}}{SD_R}$, note $SD_{S(r)}$ (!); by the way, this is Eq.ΔλR from the chapter on the electric force). This shocking correlation seems like a laughing jack-in-the-box out of a box: as an EEC moves, its electrical force becomes relativistically larger in the direction of its velocity.

Relativistically larger means: relatively small in everyday life. As long as the speed of the source is significantly smaller than the LS, the changes of the space-densities of its two fields in the direction of its speed are practically the same (they balance each other out). When the directional density of one field of the source increases by the same amount as the other field decreases, then the electrical force remains the same, which is easy to understand: the changes of the wavelengths caused by the *two* fields of the source at *one* field of the receiver on the same side of the receiver are *added*. It's like in real life: gains and losses balance each other out. You lose your family, home, money and health, and you gain experience. Anyone who manages to stay the same under such circumstances is a proton or an electron.

To the electrons in atoms are attributed quite significant velocities ($\approx 2 \cdot 10^4 \ \frac{m}{s}$). At that velocities, the relativistic amplification of the electric force in the direction of motion is already noticeable and somebody could assume that atoms, all in all, are always slightly negatively charged - and with them all the matter that exists. We probably would have noticed that already.

In fact, if we look not only at the relativistic change of the mean space-density *in* the direction of motion of the EEC, but also at the direction *perpendicular* to the direction of motion, this disturbing effect is evened out.

Let's take a closer look: Due to the velocity of an EEC (which can be a source) its period (T_{rel}) increases by the relativistic factor, as we know for good by now ($T_{rel} = T_0 \cdot \frac{1}{\sqrt{1-\frac{V_S^2}{c^2}}}$ where T_0 is if $V_Q = 0$). If the period becomes relativistically larger, then this has a serious and thus fundamental meaning: the constant space-amount of a wave is emitted or absorbed in a longer time. Conclusion: the space-density is getting smaller. - It is as if a bottle of water needs to be not only enough for one hour but for one week (which usually happens when being in a desert). That sounds very negative now. But it also has advantages: you sweat less and you rarely have to powder your nose, or whatever you call it.

And indeed, we are pleased with this relativistic increase of the period. Because in the direction of motion of an EEC, this relativistic increase of the period *reduces* the non-relativistic increase of the mean space-density, so that finally the relativistic increase of the mean space-density results (we already have seen this in the chapter about the electric force in the subchapter on the average frequency, which is equal to the relativistic mass). And *perpendicular* to the direction of motion (where we have the angle φ_{or}), the space-density simply decreases by the factor $\sqrt{1-\frac{V_S^2}{c^2}}$. In short: the increase of the space-density *in* the direction of motion is inversely proportional to the decrease *perpendicular* to the direction of motion.

In an atom, the different changes of the space-densities balance each other out, *more or less*. After all, atoms only bond with other atoms because they are *not* always exactly balanced at every point in time and in every direction. We already know that atoms are much more complicated as it could be described with point charges.

More generally, we are seeing more and more that EECs are much more complicated in their behavior as recognizable at first glance. Like a picture-book family that only exists in picture books.

The perpendicular component of the velocity of the source ($V_{S\perp}$)

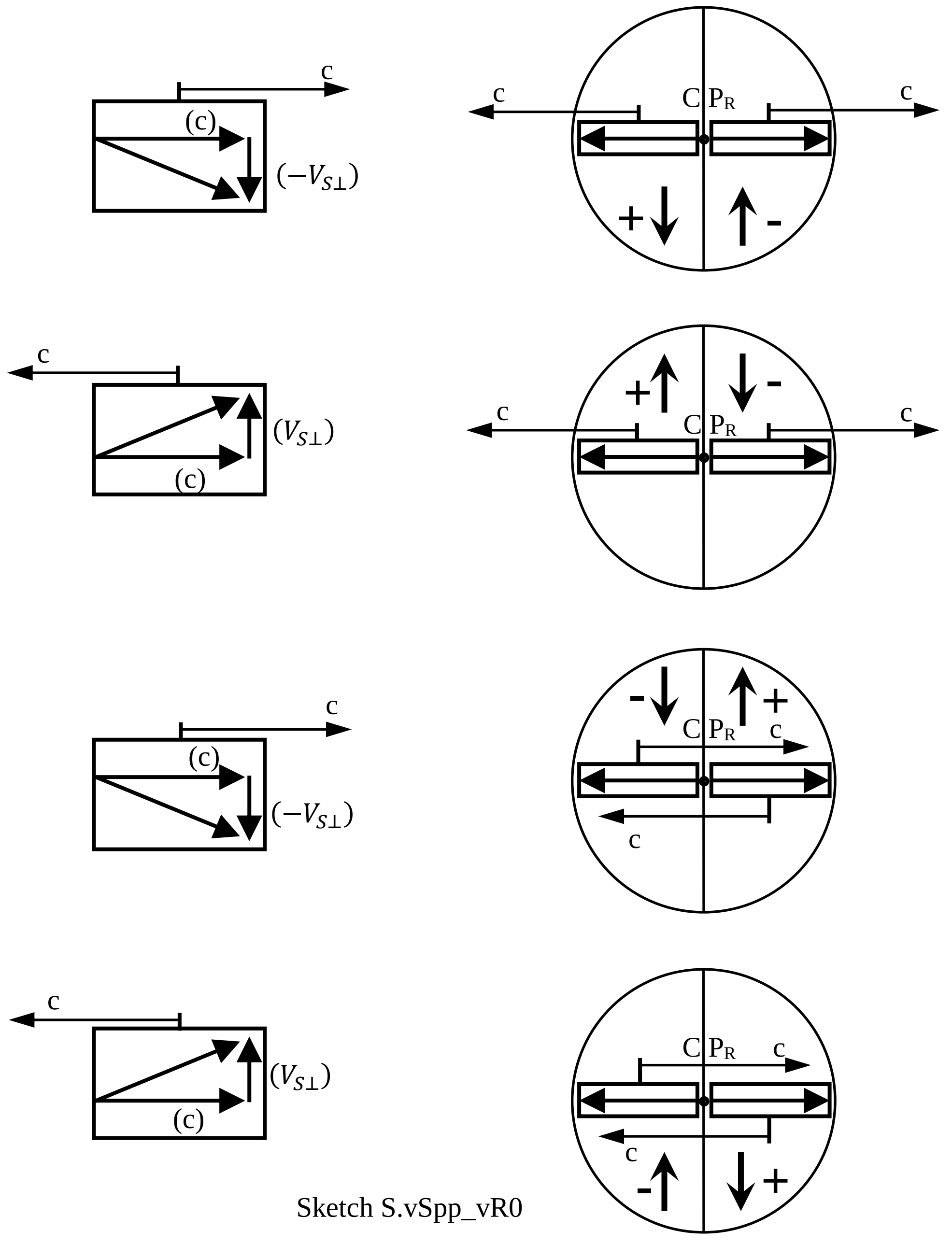
Next we eventually look at the $V_{S\perp}$, which generates the angle $\varphi_{or(Q)}$, which is so much in demand for magnetism, with $\varphi_{or(Q)} = \tan^{-1}\frac{V_{S\perp}}{c}$ (c = LS).

The $V_{S\perp}$ causes additional changes of the wavelengths at the receiver ($\Delta\lambda_R$) that exist in addition to the electrostatic wavelength-changes (electrostatics is like the still life in painting, and electrodynamics is like the 3-D Film, and taking relativity into account, is like in artistically demanding movies, with distorted looks and daring leaps in time, and this paper here is like a comic, maybe like "Asterix and Obelix" or like "Lucky Luck").

The extra changes of the wavelengths are - just as the $V_{S\perp}$ by which they arise - perpendicular to the direction of the line connecting the source to the receiver ($\overline{QE}$), in which the fields of the source move with LS.

The additional changes of the wavelengths become apparent at the orientations of the fields of the source, because those (the orientations), and nobody else, ultimately contain the angle $\varphi_{or(S)}$.

These additional, perpendicular changes of the wavelengths are intended to produce the magnetic forces. Consequently, as long as the receiver is not moving, it should be as if there were not the angle $\varphi_{or(S)}$ in the fields of the source. - As if the bullet fired from a firearm can not hurt you, as long as you do not move - that's downright scary. In any case, the perpendicular changes of the wavelengths of the front- and back-fields of the source must cancel each other out at a standpoint-faithful receiver. We check this (that about the perpendicular changes of the wavelengths, not that about the bullet), by looking at the 4 possible partial superpositions of a standard situation, which are shown in sketch S.vSpp_vR0. (Without wanting to insult anyone, just from personal experience, here's a little reminder, so that there is no irritation when looking at the sketch: The orientations show us first of all the changes of the space-densities in superimpositions. However, the sketch shows the changes of the wavelengths ($\Delta\lambda_E$) (as thick, bold, signed arrows that will be discussed later), and the $\Delta\lambda_E$ are inversely proportional to the space-densities. If anyone is yet offended, then he should imagine a friendly winking smiley – then, hopefully, everything will be nice again.)



Sketch S.vSpp_vR0

In the first presentation (this is the top image in S.vSpp_vR0), the source captivates with a simple front-field styled as a rectangle, bravely fitted with a directional arrow for the LS (c). The intentionally angulated orientation-arrow in the interior is composed of two idiosyncratic arrows which are in harmonizing *proportionality* to the LS (c) and the $V_{S\perp}$ (this almost classical proportionality is indicated by the (c) and ($V_{S\perp}$) in simple brackets). We immediately recognize that the source is positive, very, very positive, and that it is far away nearby left.

The receiver is positive too. The immobility of its center sets an aesthetic counterpoint. Its field is strictly stylized in archaic order always represented as a circle.

The miracle of superposition happens both to the left and to the right of the CP$_R$ of the receiver.

The changes of the wavelengths in the direction parallel to the LS of the fields of the source are like the electrostatic changes of the wavelengths, they are well known, they are boring, and we ignore them.

And so, all that remains is to decide the perpendicular direction. The changes of the wavelengths of the perpendicular direction follow the sign of the associated electrostatic changes of the wavelengths. The perpendicular direction does not have its own sign. It is just an additional feature (like a design element) that is quite desirable but without its own LS. The perpendicular direction of the orientation moves with the LS of its field. And only the component of the orientation, which is parallel to the LS of the field, decides the sign, no one else. The perpendicular direction is actually not even a superposition of its own. And yet, at every superposition between two fields, it causes an additional change of the wavelength too. The direction of this additional change in wavelength is unoriginal and just coincides with the direction of the perpendicular component of the orientation of the field of the source - at least at the front-field of the receiver. Of course, at the back-field of the receiver, it is exactly the opposite - as always with the back-field, this anti-capitalistic capitalist. At the back-field of the receiver, the direction of the additional perpendicular change of the wavelength is exactly opposite to the direction of the perpendicular component of the orientation of the field of the source. In the example of a positive EEC (as here our source is), the direction of the perpendicular component of the orientation of the *front*-field is equal to the direction of the evil clone of $V_{S\perp}$, that is the $-V_{S\perp}$.

An interesting detail for this situation here, which should not be overlooked, is that the perpendicular orientation of a field of the source changes a wave of the receiver in the same direction (i.e. perpendicular), both on the left and on the right side.

It is time to distribute small, fat (and in this example) vertical arrows with signs for the result. These little, fat arrows shall not be real vectors - they just look nice.

The *position* of these small, fat arrows within the receiver's wave (drawn as a circle) shows the direction in which the wave of the receiver changes. And the sign shows whether the wavelength of the receiver becomes larger or smaller in this direction. Just as the position and the sign also the *direction* of the small, fat arrows shows the direction in which the wavelength of the receiver changes, and whether the wave of the receiver becomes larger or smaller. The length of the small, fat arrows corresponds to the amount of the change of the wavelength of the receiver. - There is a great temptation to associate the small arrows pointing up and down with moral qualities as well, but indeed, the sketch can easily be rotated by 180°….

Since the receiver (still) has no velocity, it is (still) perfectly symmetrical, or, seen the other way round, since the receiver is (still) perfectly symmetrical, it does not (yet) have any velocity. In any case, its waves are spherical. - It is a bit like the arrow of an archer transforming from a round ball into an arrow (whose tip has the angle φ_{or}) only after it was fired.

The symmetry implies that the *amounts* of the perpendicular changes of the wavelengths of the receiver are equal - and we already know that the signs are opposite. Both together is unspeakable (but still possible to be written) boring, it leads to the fact that the perpendicular changes of the wavelengths cancel each other out.

And, actually, it is even much more unspeakable. In the case of a receiver without a velocity, the perpendicular changes of the wavelengths also cancel each other out in the three further partial superpositions (see S.vSppvR0). The $V_{S\perp}$ has exactly the opposite effect on the orientation of the back-field of the source then on the front-field. However, even due to the source's back-field, the receiver's perpendicular changes of the wavelengths result in zero, not only at the front of the receiver but even at the back of the receiver. No matter how we look at it, the perpendicular result is always zero, always zero.

This can only lead to one conclusion: we want the receiver to move - we want to see what happens if the receiver has a $V_R \neq 0$.

Next, the receiver moves too (with V_R)

At the urgent request (and without any tip) we now see a receiver, who is moving.

The straight line connecting the receiver and the source is not a throwaway straight line. After using it for the source, we can now reuse it for the receiver. And so we divide the velocity of the receiver (V_R) into two components: one parallel to the connecting line (that is $V_{R\|}$) and one perpendicular to it (this is $V_{R\perp}$).

We start with the parallel component of V_R, that is with $V_{R\|}$

We start with the parallel component, because in its direction the superposition which leads to the electric force takes place, and we are already familiar with this - the best and most desired results are usually achieved, if one already knows the mode of use of the tool to be used.

The $V_{R\|}$ changes the wavelength of the receiver in its direction (as we now know several times, if it is possible to know something several times). It is:

$$\lambda_R = \lambda_{R0} \cdot \frac{(c \pm V_{R\|})}{c}$$

where λ_{R0} is the wavelength at $V_R = 0$ (and c does not stand for coconut but for LS).

The $V_{R\|}$ also changes the space-density (SD_R) in its direction (in other words: the directional density of the receiver changes, which is always the case with this type of superpositions between EECs, which has been explained, and which will probably never become a catchy tune). The SD_R is inversely proportional to λ_R . It is:

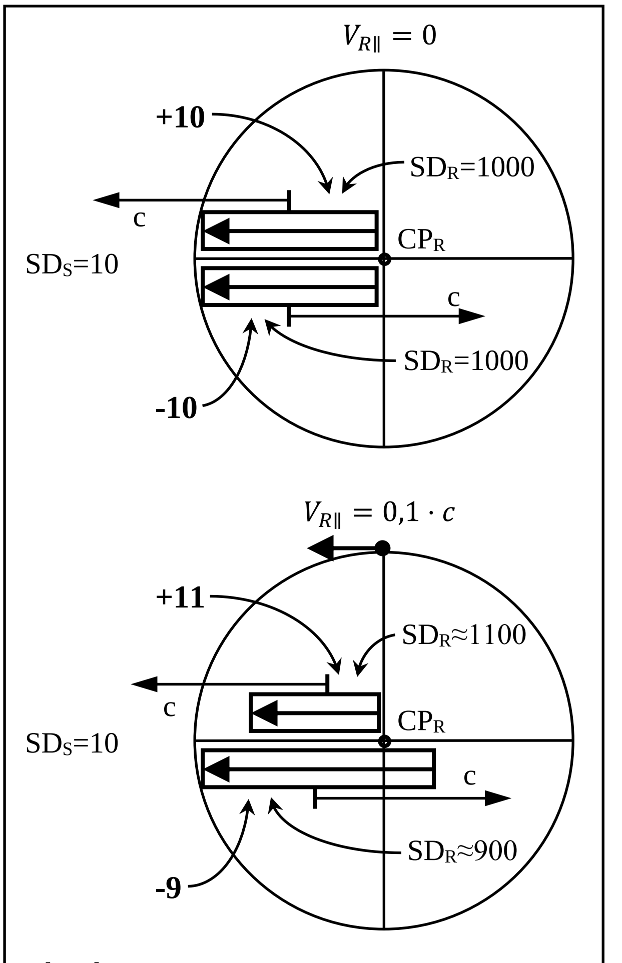
$$SD_R = SD_{R0} \cdot \frac{c}{(c \pm V_{R\|})}$$

where SD_{R0} is the space density at $V_R = 0$ (and c does not stand for chewing gum but for coconut).

We see, and anyway know that the amount of the $V_{R\|}$ is added to or subtracted from the LS, corresponding to the space-densities of the front- and back-field of the receiver changing in opposite directions. As much as one field gets bigger, the other field gets smaller. And the superposition of the receiver with one field of the source adapts to the changes of the space-densities (arising through the $V_{R\|}$) of the receiver's fields; the superposition changes in the same way as the space-densities of the receiver. The larger the space-density of a wave of the receiver becomes by the $V_{R\|}$ in the direction of the superposition, the larger the amount of the space-density becomes, which is added to or subtracted from the space-density of the wave of the receiver in the superposition with a field of the source. And the smaller... you replace in the previous "larger" by "smaller".

The space-densities of the front- and back-fields of the receiver change oppositely so that the *sum* of both space-densities remains approximately the same (at least at $V_{R\|} \ll c$). The same applies to the amounts of the space-densities of a field of the source, which are either added to the front-field of the receiver and subtracted from the back-field or subtracted from the front-field and added to the back-field: the sum of the amounts remains (approximately) alike. That is so, because the amount of the space-density of the source added to one field of the receiver has changed by the $V_{R\|}$ exactly oppositely to the amount subtracted from the other field. And this actually has to be so, since the receiver's space-densities have to change on average (approximately) by the actual value of the space-density of a field of the source. - What is right for the one, is cheap for the other, in sum, that compensates. The larger the bike path of the one becomes, the smaller becomes the walkway of the other. The larger the garbage area of the one, the smaller the park of the other becomes. The bigger the right of way of the one is, the smaller is the car of the other. If the one is unjustly sentenced to death, the another will be unfairly freed - in total...

In the small auxiliary sketch S.HELP+SDS is shown symbolically and for the better understanding how the amount changes, which is added to or subtracted from the space-densities of the receiver by the superposition with one field of the source. There is only one field of the source and only the left side of the receiver to see.



Sketch S.HELP+SDS

It was no coincidence that we considered λ_R , SD_R and $SD_{S(r)}$ in the light of $V_{R\parallel}$. All three quantities appear in the equation for the change of the wavelength ($\Delta\lambda_R$) written as:

$$\Delta\lambda_R = \lambda_R \cdot \frac{SD_{SVR(r)}}{SD_R}$$

where $SD_{SVR(r)}$ is the amount of the actual space-density of a field of the source as changed by the $V_{R\parallel}$.

For $V_{R\parallel} = 0$ it is: $\Delta\lambda_{R0} = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}}$

We immediately recognize the almost cosmic wisdom in the order of the representations, because the quotient $\frac{SD_{SVR(r)}}{SD_R}$ does not change through the $V_{R\parallel}$ and remains $\frac{SD_{S(r)}}{SD_{R0}}$, since the effects of $V_{R\parallel}$ on $SD_{SVR(r)}$ and SD_R are the same and they cancel each other out.

So it is sufficient to use λ_{R0} in $\Delta\lambda_R$:

$$\Delta\lambda_R = \lambda_{R0} \cdot \frac{(c \pm V_{R\parallel})}{c} \cdot \frac{SD_{S(r)}}{SD_{R0}} \qquad \text{(Eq.}\Delta\lambda\text{RVR//)}$$

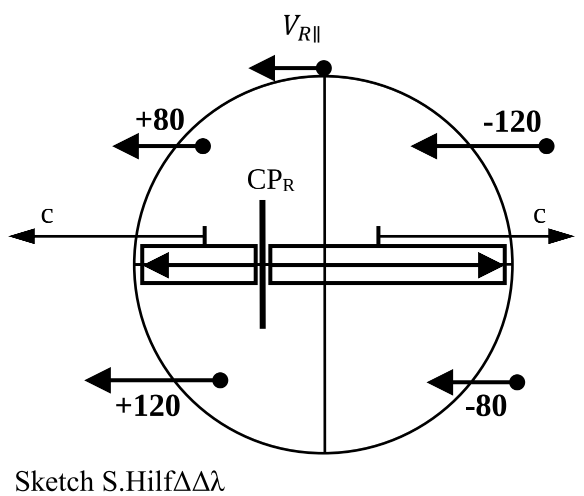
Here we see the velocity-dependence of the $\Delta\lambda_R$ of a wave (of a field) of the receiver in one direction. Our (already paid) hope is that the velocity-dependence of $\Delta\lambda_R$ produces magnetism.

We are now in the parallel direction to the $V_{R\parallel}$

Because it is clearer, perhaps even more honest, because it seems normal, maybe even constructive, we start with the front-field of the source superposing the receiver. We want to understand the world before we despair of it.

In the direction *parallel* to $V_{R\parallel}$,the $\Delta\lambda_R$ decreases at the front-side and increases at the back-side by the same amount (due to the $V_{R\parallel}$).

This is shown in simplified form in the small auxiliary sketch S.HILFΔΔλ. We imagine, if $V_{R\parallel} = 0$, then the $\Delta\lambda_R$ is, due to the superposition, +100 on the right side and -100 on the left side (of a non-significant unit). Due to a $V_{R\parallel}$ $(\neq 0)$ towards the left, the $\Delta\lambda_R$ becomes on the left side, e.g. +80, so that the right side needs to become -120 (these are the top arrows).



Sketch S.HilfΔΔλ

And immediately an outcry tears open the fibers of the universe, which threatens to collapse or to explode: the amounts of $\Delta\lambda_R$ are different left and right, which is impossible. It threatens the destruction of the universe, maybe even before the weekend.

By way of exception, the source's *back-field* saves the situation. Because the back-field of the source reverses the meaning of the $V_{R\parallel}$. It is, as so often with the back-field, opposite.

The $\Delta\lambda_R$ increases to the front (that is in the sketch on the left), and it decreases to the back (these are the two lower arrows). And so, the sum of the $\Delta\lambda_R$ which is effected at the receiver from the front- and back-field of the source, is the same with and without $V_{R\parallel}$.

In short: in the direction parallel to the $V_{R\parallel}$, the magnitude of the electric force does not change due to the $V_{R\parallel}$. It retains the magnitude of the electrostatic force. - It's as if it were summer and winter at the same time: it would be temperate all year, that would be the normal, static state. Or as if it were both yesterday and tomorrow: it would always be today. This also works with day and night: twilight. Inside and outside: doorframe. Beautiful (for example rose) and ugly (for example slime worm): ??

And now in the direction perpendicular to the $V_{R\parallel}$ (finally the magnetic force)

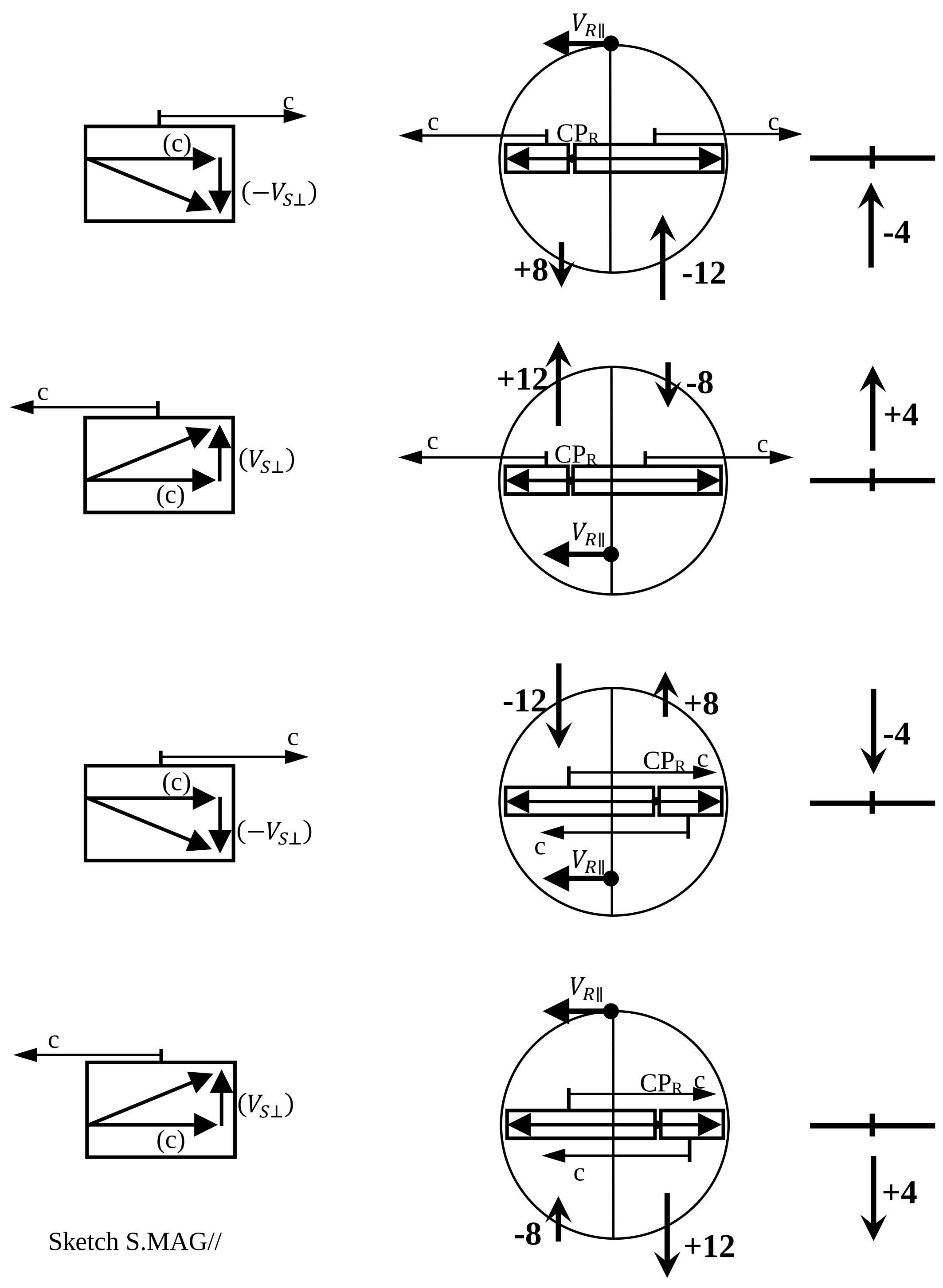
In the direction perpendicular to the $V_{R\parallel}$ it looks completely different, in this direction, the effects will not cancel each other again. In this direction, the perpendicular component of the orientation of the fields of the source meets officially the $V_{R\parallel}$. The $\Delta\lambda_R$ in the perpendicular direction increases or decreases in size through the $V_{R\parallel}$ in the same ratio as the $\Delta\lambda_R$ in the parallel direction. But there is an important difference between the perpendicular and the parallel direction: the two $\Delta\lambda_R$, which causes *one* field of the source at the receiver in the parallel direction, arise on *opposite* sides of the CP_R, while, on the other hand, the two $\Delta\lambda_R$, which causes *one* field of the source at the receiver in the perpendicular direction, arise on the *same* side of the CP_R. And because they have different amounts and signs, there is *always* something left over in the sum. And that is the magnetic force. - It's like a particularly cold winter and a not particularly warm summer. As if the "yesterday" was a little bit longer than the "tomorrow". As if the nights were always a bit longer than the days. As if to be half an inch more inside than outside. As if the rose was not always beautiful and as if the slime worm had a little beauty in itself.

Maybe it’s best to take an example. And maybe it´s the very best to take an example that we already know, because that saves us many explanations here and now: we take the example we took for $V_{S\perp} \neq 0$ and $V_R = 0$ (this can be seen in sketch S.vSpp_vR0), in which the magnetic force is zero, and we change $V_R = 0$ to $V_{R\parallel} \neq 0$ - the new sketch then necessarily receives the consistent name S.MAG// (the MAG does not just stand for magnetic but also for magical, because that's magnetism: magical).

If we compare the amounts of the changes of the wavelengths in the new sketch with those of the small auxiliary sketch S.HILFΔΔλ, we see that $V_{S\perp} = \frac{1}{10} \cdot c$ (if $V_{R\parallel}$ is in both sketches the same).

Although the numerical values of these two examples are fictitious, they have by no means been chosen arbitrarily: they are fully in line with the superposition logic. The examples are intended to illustrate and clarify; the basis for the calculations follows the example - round numbers and clearly visible arrows make life easier. Imagine road signs would indicate the distances to the centimeter, and instead of arrows, complete, grammatically correct sentences would describe the possibilities. To the names of the villages or towns there would be all-encompassing information about the places, and the traffic signs would not represent the rules symbolically but in the wording. You would feel like driving through a book - if driving would still be possible. On the other hand, with the automatic driving of the future we would have more time to read again - if reading would still be interesting enough. One could e.g. also do sports, e.g. run on a treadmill - if the car had a skylight.

Anyway, we keep the simplified numerical values. Therefore, for $V_{R\parallel} = 0$, the amount of the perpendicular $\Delta\lambda_R$ is always 10. And the enlargement or reduction of the $\Delta\lambda_R$ by the $V_{R\parallel}$ $(\neq 0)$ is always ± 2.



Sketch S.MAG//

To the right of the receiver, the sum of the perpendicular $\Delta\lambda_R$ for the respective partial superposition is shown as an arrow (not as a vector). The arrow is on that side of the CP$_R$ (above or below) where the wave of the receiver changes. The direction of the arrow only shows us if the wave gets bigger or smaller at this place. The amount is next to it as a number. Really, the small $\Delta\lambda$-arrows are not true vectors, they are only for the eye.

And what our eye sees instantly (thanks to the symbolic arrows) is that the front-field of the receiver becomes smaller downwards and, by the *same* amount, larger upwards. Conclusion: The receiver is moving downwards. And even better: in the back-field of the receiver, the signs of the amounts of the $\Delta\lambda_R$ are exactly opposite to those of the front-field, just as it must be for a velocity downwards.

The calculation of the vertical $\Delta\lambda_R$ of the $V_{R\parallel}$ (the calculation of the magnetic force)

For the calculation of the vertical $\Delta\lambda_R$ (that is the $\Delta\lambda_{R\perp}$) we pay attention to the $V_{S\perp}$.

The $V_{S\perp}$ produces a shift, one could say a shear of the space, or, more simply, the angle φ_{or} , in the fields of the source, exactly perpendicular to the LS (c). This results in an additional $\Delta\lambda_R$, which is $\Delta\lambda_{R\perp}$. And this perpendicular $\Delta\lambda_{R\perp}$ is in the same ratio to the parallel $\Delta\lambda_R$ (that is the $\Delta\lambda_{R\parallel}$) as the $V_{S\perp}$ to the c . So:

$$\Delta\lambda_{R\perp} = \Delta\lambda_{R\parallel} \cdot \frac{V_{S\perp}}{c}$$

(- It's like flavor enhancers in the restaurant: the more of it the food contains, the bigger the tip (which is in addition to the bill) .Much more flavor enhancer than the food weighs, however, can not be added, as the flavor enhancer does not enhances its own taste, the tip then reaches its maximum and is as high as the bill itself.)

The $\Delta\lambda_R$, that the front- and back-fields of the source cause at the receiver, add up, as we know. However, the orientations of the front- and the back-fields of the source are opposite to each other in the perpendicular direction (!), and so the addition becomes a subtraction.

The $V_{R\parallel}$ in turn causes opposite changes in the front- and in the back-field of the source, according to the fact, that the LS of a field of the source may be either unidirectional or opposite to the $V_{R\parallel}$. If the $V_{R\parallel}$ is unidirectional to the LS (c) of one of the two fields of the source, then the $\Delta\lambda_{R\perp}$ is:

$$\Delta\lambda_{R\perp 1} = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot \frac{(c - V_{R\parallel})}{c} \cdot \frac{V_{S\perp}}{c}$$

And the $\Delta\lambda_{R\perp}$, which results from the other of the two fields of the source, is therefore:

$$\Delta\lambda_{R\perp 2} = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot \frac{(c + V_{R\parallel})}{c} \cdot \frac{V_{S\perp}}{c}$$

The difference between $\Delta\lambda_{R\perp 1}$ and $\Delta\lambda_{R\perp 2}$ is the $\Delta\lambda_{R\perp}$ of the magnetic force:

$$\Delta\lambda_{R\perp} = \Delta\lambda_{R\perp 1} - \Delta\lambda_{R\perp 2} = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot \frac{V_{S\perp}}{c} \cdot \frac{(c - V_{R\parallel}) - (c + V_{R\parallel})}{c} \Longrightarrow$$

$$\Delta\lambda_{R\perp} = 2 \cdot \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot \frac{V_{S\perp} \cdot V_{R\parallel}}{c} \qquad \text{(Eq.MAG//)}$$

The factor 2 in this equation (Eq.MAG//) means that one half of the $\Delta\lambda_{R\perp}$ is formed by the front-field of the source and the other half by the back-field.

We determine the *direction* of the $\Delta\lambda_{R\perp}$ from the orientations of the fields and the type of the fields involved (there are 2 types: the front- and the back-field).

If we denote the electrostatic $\Delta\lambda_R$, which, of course, exists only in a parallel direction, by $\Delta\lambda_{R0}$, then we can write:

$$\Delta\lambda_{R\perp} = \Delta\lambda_{R0} \cdot \frac{V_{S\perp} \cdot V_{R\parallel}}{c^2}$$

It suffices to have only one eye half open, to realize that for

$V_{QS\perp} = V_{R\parallel} = c$ follows: $\Delta\lambda_{R\perp} = \Delta\lambda_{R0}$

And in words: If two EECs move together with LS, then there is no (electric) force between them, as the magnetic force exactly eliminates the electric force. - That sounds like the perfect couples therapy (for married couples): LS. In general, when two argue: first try LS. Soon there will be special flashlights in selected (?) stores - for couples therapy. Ophthalmologists are already looking forward to it. And if the relationship problems are too deep for a treatment with LS, the flashlights can still be used as batons.

Because just the word "force" appeared, the following memories should have been awakened (at least it would be nice if it were so): The electrical acceleration (a_e) is generated by the $\Delta\lambda_R$ per wave (with the period T_R) and is: $a_e = \frac{\Delta\lambda_R}{T_R}$. As long as we do not *forget* that, it is sufficient to deal with the $\Delta\lambda_R$. - It's like nicknames, they're simpler and shorter. "Sweetheart" for the partner, instead of First and Last Name. Or "junior" (son), "boss" (supervisor), "body" (friend), "honey" (lover), etc... But, of course, you must never forget who is who - otherwise you may call the "boss" "bunny".

Now it is the turn of the perpendicular component of the V_R that is the $V_{R\perp}$ (it too generates a magnetic force)

After everything went so well with the $V_{R\parallel}$, we now try our luck with the $V_{R\perp}$ - the risk is small, because luckily luck has nothing to do with it.

The $V_{R\perp}$ is perpendicular to the direction of the LS of the fields of the source, as is the $\Delta\lambda_{R\perp}$, ($V_{R\perp}$ and $\Delta\lambda_{R\perp}$ are parallel). We obtain a $\Delta\lambda_{R\perp}$, which is perpendicular to the $V_{R\perp}$, which corresponds to the magnetic force, which we call $\delta\lambda_{R\perp}$ (because "letter δ" <"letter Δ").

The $\delta\lambda_{R\perp}$ (the one with the small "δ") can be determined easiest and clearest geometrically. It's fun to see how well that works.

To achieve it (the $\delta\lambda_{R\perp}$ and the fun), the velocities of the fields and the CPs are displayed graphically.

This is allowed because the $\Delta\lambda_R$ are proportional to the velocities.

In an electrostatic situation (as can be found in museums, only with statues instead of EECs, whereby some visitors can also seem homostatic in their deepening), there is only the LS of the fields.

The electrostatic $\Delta\lambda_{R0} \approx \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}}$ should therefore correspond to the LS. The proportionality constant with which the LS, or any other velocity, is to be multiplied so that the velocity becomes again a $\Delta\lambda_R$, is therefore:

$$KR0 = \frac{\lambda_{R0}}{c} \cdot \frac{SD_{S(r)}}{SD_{R0}}$$

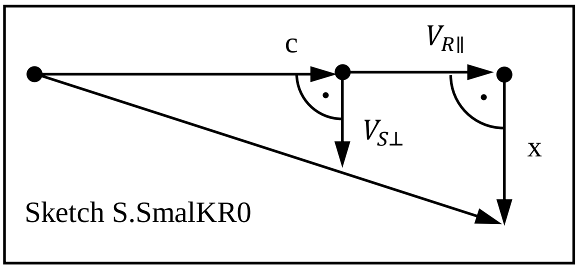
(because $\Delta\lambda_{R0} = KR0 \cdot c = \frac{\lambda_{R0}}{c} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot c = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}}$).

The best way to look at this is an example that we already know: In the small auxiliary sketch S.SmalKR0 we can see the LS (c), the $V_{R\parallel}$, and the $V_{S\perp}$. The $V_{S\perp}$ corresponds to the vertical $\Delta\lambda_{R\perp}$ for $V_{R\parallel} = 0$. The vector $\vec{x}$ corresponds to the $\Delta\lambda_{R\perp}$ for $V_{R\parallel} \neq 0$ - in this example, the $\Delta\lambda_{R\perp}$ shall become *larger* due to the $V_{R\parallel}$.

It is: $\frac{V_{S\perp}}{c} = \frac{x}{c+V_{R\parallel}} \Longrightarrow x = \frac{V_{S\perp} \cdot (c+V_{R\parallel})}{c}$

And further: $\Delta\lambda_{R\perp} = KR0 \cdot x = \lambda_{R0} \cdot \frac{SD_{S(r)}}{SD_{R0}} \cdot \frac{V_{S\perp}\cdot(c+V_{R\parallel})}{c^2}$

(in case somebody has not noticed yet: that is the $\Delta\lambda_{R\perp 2}$ from the calculation of the equation Gl.MAG//)



Sketch S.SmalKR0

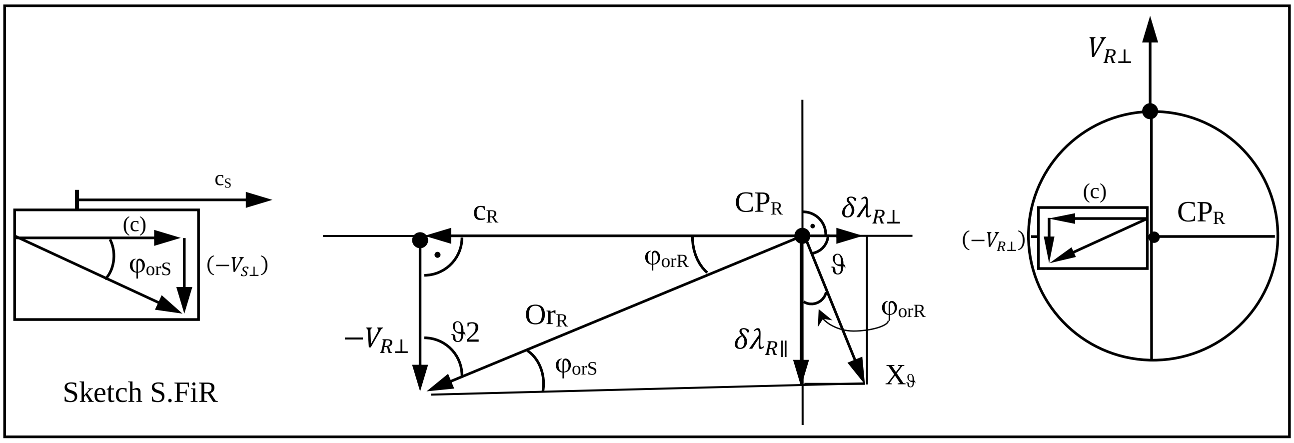
The $V_{R\perp}$ of the receiver creates a space shift with the angle $\varphi_{orR} = \tan^{-1}\frac{V_{R\perp}}{c}$

(For a given reason, the angle of the orientation of a field of the source is now called φ_{orS}.)

At the superposition of a wave of the receiver with a field of the source, the orientation of the receiver is to be used (which is rotated by the angle φ_{orR}). *In addition*, the length of the vector (in the direction) of the orientation of the receiver must be taken into account. If we did not do it that way, we could forget about the receiver's orientations anyway. It is as if the field of the source would be rotated by the angle φ_{orR} for the superposition with the receiver. This includes, in particular, the perpendicular component of the orientation of a field of the source (resulting from the $V_{S\perp}$).

We should take a closer look at this.

Sketch S.FiR shows the LS of the wave of the receiver (c_R), the $-V_{R\perp}$, and the orientation of this wave (Or_R, which results from both c_R and $-V_{R\perp}$). The LS of the field of the source (c_S) is rotated by the angle φ_{orR} and thus runs in the direction of the Or_R. The c_S is stretched to the length of the Or_R. The $V_{S\perp}$ is, of course, still perpendicular to the c_S (and hence to the Or_R), and it is stretched in the same ratio as the c_S . Finally, the $V_{S\perp}$ is decomposed into two components: one parallel to the $V_{R\perp}$, which is the $\delta\lambda_{R\parallel}$, and one perpendicular to the $V_{R\perp}$, which is the $\delta\lambda_{R\perp}$ (it has certainly been noticed that the names of the two components are not just coincidence). To the left and to the right of the central sketch are (some may have wondered) the field of the source and that of the receiver symbolically represented, to give an overview.



Sketch S.FiR

After this tiresome description of the obvious, now some refreshing calculations.

The length of the vector $\overrightarrow{Or_R}$ is: $Or_R = \sqrt{c_R^2 + V_{R\perp}^2}$

The $V_{S\perp}$ is stretched and given the length X_ϑ. We already know that:

$$\frac{V_{S\perp}}{c} = \frac{X_{\vartheta}.}{\sqrt{c^2+V_{R\perp}^2}} \Longrightarrow X_\vartheta = \frac{V_{S\perp}\cdot\sqrt{c^2+V_{R\perp}^2}}{c}$$

The angle ϑ is obvious: $\vartheta = 90° - \varphi_{orR}$

And $\vartheta 2$ in the right-angled triangle $(c_R\widehat{V_{R\perp}Or_R})$ is just as obvious: $\vartheta 2 = 90° - \varphi_{orR}$

The triangles $(c_R\widehat{V_{R\perp}Or_R})$ and $(\delta\lambda_{R\parallel}\widehat{\delta\lambda_{R\perp}}X_\vartheta)$ are therefore similar. - Similar means that they have the same proportions, not that they are the same size. Like an expensive car and its scale model. Even their respective owners can be similar. Maybe, for example, they live both in the countryside, one in a villa, the other in a tree house. They could have the same hairstyles, one pays a fortune to the hairdresser, the other has no hair dryer....

We get equal aspect ratios:

$$\frac{\delta\lambda_{R\perp}}{X_\vartheta} = \frac{V_{R\perp}}{Or_R} \Longrightarrow \frac{\delta\lambda_{R\perp}\cdot c}{V_{S\perp}\cdot\sqrt{c^2+V_{R\perp}^2}} = \frac{V_{R\perp}}{\sqrt{c^2+V_{R\perp}^2}} \Longrightarrow \delta\lambda_{R\perp} = \frac{V_{S\perp}\cdot V_{R\perp}}{c} \qquad (!!)$$

If we now use the proportionality constant KR0, we get:

$$\Delta\lambda_{R\perp} = KR0\cdot\delta\lambda_{R\perp} = \lambda_{R0}\cdot\frac{SD_{S(r)}}{SD_{R0}}\cdot\frac{V_{S\perp}\cdot V_{R\perp}}{c^2} \qquad \text{(Eq.MAG}\perp\text{)}$$

And this is like the equation Gl.MAG// only this time not for $V_{R\parallel}$ but for $V_{R\perp}$.

That was a refreshingly direct derivation.

It remains to note that every, really every true V_R can be decomposed into a $V_{R\parallel}$ and a $V_{R\perp}$.

Now the $V_{R\perp}$ gets its big sketch too (as before the $V_{R\parallel}$)

As an example, let's look at the same example we used for the magnetic force of the $V_{R\parallel}$ (in sketch S.MAG//), but instead of $V_{R\parallel}$ we have $V_{R\perp}$.

Since the $V_{R\parallel}$ has just been mentioned: the geometric method used to determine the magnetic force produced by the $V_{R\perp}$ can of course be applied to the $V_{R\parallel}$ as well – but, indeed, the result is already known. - Deriving the magnetic force of the $V_{R\parallel}$ geometrically would be like recounting a thriller in which victims and perpetrators have long been known, this time not from the point of view of the commissioner, but from the perspective of his assistant, or from the perspective of the goldfish of the commissioner who lives on his desk.

In the following example, whose sketch has the name S.MAG⊥, it will then be seen that the $\delta\lambda_{R\parallel}$ does not exist as a result.

The example is divided into 4 partial superpositions, each consisting of 2 superpositions (so there are 8 superpositions).

In this example, we do not want to see the $V_{R\parallel}$ at all, because the $V_{R\parallel}$ after all has its own example with its own sketch. As long as the $V_{R\parallel}$ can be considered as non-existent, it probably will not cause any changes to the $\Delta\lambda_R$ of the receiver, since the mere mentioning of the $V_{R\parallel}$ does not trigger anything (superpositions are not overly emotional). In addition, the amount of the angle, by which the fields of the source are rotated in their superpositions with the fields of the receiver, is always the same. And that means that the $V_{S\perp}$ of the example is stretched by the same factor in all 8 superpositions.

To be quite clear (as far as that is possible): In all 8 superpositions of the example, the amounts of the $\Delta\lambda_R$ of the receiver are the same, and all $\Delta\lambda_R$ are rotated by the same amount of the angle φ_{orR} relatively to $V_{R\perp}$. Not only geometry, but even the geo-tourism will lead to the same conclusion here: the amounts of all $\delta\lambda_{R\perp}$ are equal in this example and also the amounts of all $\delta\lambda_{R\parallel}$.

Remains to consider the signs of the changes of the wavelengths – that is, if the wavelength increases or decreases in a particular direction due to a superposition. It is clear that the signs can not all be the same. (Just as it is clear that you can not always go straight without ever encountering an obstacle - for example, a tree or an ocean. But maybe in 1000 years a fantastilionaire will build a perfectly straight, obstacle-free route around the globe on which our genetically engineered offspring will try to run the 40000 km in changing bodies in less than 2 months.)

Let's look at the signs in the first section (this is the top section) of sketch S.MAG$^\perp$. On the left side of the receiver, the wavelength of the receiver increases due to the superimposition with the field of the source (this results from the orientations of the LSs of the receiver and of the source). The perpendicular orientation of the source is rotated by the angle φ_{orR} relatively to $V_{R\perp}$, whereby the $\Delta\lambda_R$ which it causes at the receiver appears on the right side of the receiver - and the wavelength of the receiver increases in its direction too, so the $\Delta\lambda_R$ is positive. And again, as usually, this $\Delta\lambda_R$ can be seen as a small, revealing arrow, this time right down in the receiver's wave, along with a plus sign. Analogously, the superposition on the right side of the receiver results in a small, tantalizing arrow left down in the receiver's wave, this time along with a minus sign.

Adding (or subtracting) arrows is not difficult: someone who shoots an arrow with a bow in any direction, while another arrow comes from the same direction towards him, has nothing to fear, because the sum is zero.

In the first section of the example of the sketch S.MAG$^\perp$, each of the two $\Delta\lambda_R$-arrows has a component parallel to the $V_{R\perp}$. And the sum of these two components is zero (since the amounts of the two arrows and the amounts of their angles are the same, of course). And of course these are the two $\delta\lambda_{R\parallel}$, which eliminate themselves so early.

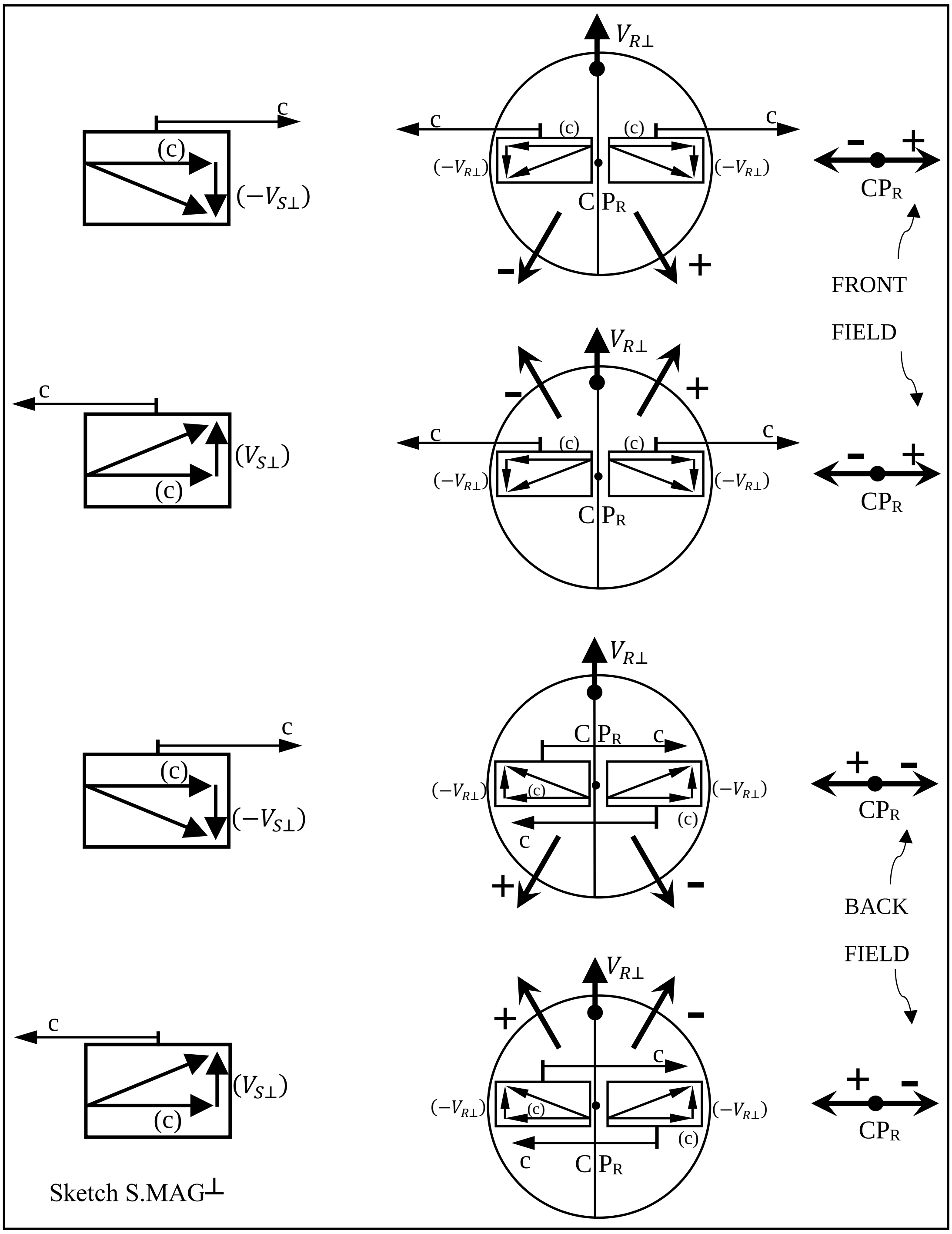
The corresponding two components in the direction perpendicular to the $V_{R\perp}$ are of course the $\delta\lambda_{R\perp}$. They too have equal amounts and opposite signs. Completely contrariwise as at the two $\delta\lambda_{R\parallel}$ the two $\delta\lambda_{R\perp}$ are on opposite sides of the CP_R, which leads to an opposite behavior, opposite to... well, in any case, the CP_R has a velocity towards the left, dedicated to $\delta\lambda_{R\perp}$.

We could almost work off the remaining 3 sections of the sketch S.MAG$^\perp$ in the same way, if... yes, if there were not the perpendicular orientation of the receiver.

In this example, not only the source has a perpendicular orientation but also the receiver. These perpendicular orientations of the source and the receiver are parallel, and they influence each other. In the first section, this is not noticeable, since their orientations are unidirectional there. For then everything is very simple, because then the $\Delta\lambda_R$ of the perpendicular orientations simply adopt the signs of the $\Delta\lambda_R$ of the orientations of the LSs of the source and the receiver.

And if the perpendicular orientations of the source and the receiver are opposite, then the signs just invert, compared to the unidirectional situation.

This is what happened in the 2nd and 3rd sections of the sketch S.MAG$^\perp$.



In the 1st and 2nd sections of the sketch S.MAG⊥ we see that the front-field of the receiver receives a velocity in the same direction from both the front- and the back-field of the source. This results in a factor of 2, as we have also found in the calculations for the magnetic force of the $V_{R\parallel}$. Ditto for the back-field of the receiver, seen in the 3rd and 4th sections of the sketch.

For the absolute clarification of the general situation (of this example, not of any world situation), all the resulting $\Delta\lambda_R$ of the receiver, which are caused by the perpendicular orientations of the fields of the source, are to be seen separately to the right of the receiver (they are like signposts in a city, you can confine yourself to them, but without the city they make no sense).

So

So far so good. I think that it has become recognizable how the magnetic force arises. This can certainly be expressed mathematically even more generally, but not in this paper. The challenge of this paper is to clarify the basic connections/contexts.

In this sense, it will be a work of its very own to apply the newly discovered connections of this paper to electrodynamics. Thus, for example, an important statement of electrodynamics is, somewhat flippantly formulated, that a changing electric field results in a magnetic field, and vice versa. The orientations (and their angles) of the fields of the EECs must be applied to such statements too, and they must be integrated into the corresponding mathematics. This is of course feasible, but, as already mentioned, to remove this mountain, that will be a work of its very own.

The most amazing thing at the end of this chapter is that, after all this, the fridge magnets still work.

The gravitation

(the real reason for this paper)

The change of the space-density of the electric field attracts us all

Since I was a child, I was fascinated by the vastness of the starry sky and the gravitation that encompassed everything, the distant stars, the sun, the moon, and the earth (I was told a lot and it was beautiful, especially on warm summer nights in Greece). When we eventually got physics at school, it got even more interesting, and so I wanted to understand how gravitation works. That is the reason for this paper. I wanted to understand gravitation. This means that I wanted to know to which (physical) quantities gravitation can be attributed, and how these quantities cause gravitation. So maybe I could have found out that gravitation is due to invisible dwarfs, who form rope teams in large numbers, and who retrieve anyone who tries to move away from the mass. That seems plausible, of course. On the other hand, one wonders what is going on with these boring, unimaginative dwarfs (the gravitons)? On the one hand, they are intelligent enough to cause gravitation, on the other hand, they have been doing the same thing for billions of years (that is gravitation). Well, maybe that's a rather archaic way of looking at things.

It will be better if we forget the dwarves (?) and stay with physics. There was an early suspicion that gravitation and electric force are related. Consequently, it was necessary to examine the electric forces more closely. The result is that magnetism and gravitation have no existence of their own. Magnetism and gravitation are only side effects of the electric force. Without electricity, there is neither magnetism nor gravitation. - It's like the side effects of drugs. Only, that our dear God did not make it very easy for us to read the chapter on electricity of the package leaflet - which in turn has a headache as a side effect. There are often side effects. A side effect of water are webs. A side effect of the sun is sunscreen. And a side effect of the moon are lugworms....

In everyday life, we do not notice how dominant the electric force actually is, as attractive and repulsive forces balance out.

Imagine 2 glass marbles each 30 grams (the molar mass of SiO_2 is ≈60 g/mol) and let us assume that all EECs (without neutrons) of one marble are positive and those of the other negative. Something like them can not exist, of course, but we can imagine them, somehow. The force between these two marbles at a distance of 2 cm would then be $\approx 1 * 10^{26}$N (N = Newton). That's equivalent to many, many billions of tons. Here it starts getting difficult still to imagine these two marbles.

It is all the easier to imagine that gravitation is for electricity like water vapor over the ocean.

There may be a variety of electrical or electromagnetic effects that have as a result a gravitational effect. For example, at some point I had derived a gravitational effect on the velocity-dependence of the electric force, in combination with quite specific and cumbersome assumptions about the vibrational behavior of EECs. It is always possible to reach some kind of gravitation through very special conditions - which sometimes might even be quite real. - Similar to diamonds that can only be created under very special conditions, so that they are very rare - they are not as omnipresent as gravitation. Equally special were the conditions in the Nasca caves in Chile, where huge, several meters long selenite crystals grew, as they could imagine until their discovery only sci-fi authors. At least as special must have been the development of those people who can communicate with deceased pets - on the other hand, maybe not everything is always completely true, what people can think of.

At any rate, gravitation should be able to do without special electrical effects that have to be cumbersomely created or deduced. Gravitation must be more fundamental. Even completely motionless EECs should already generate gravitation. The sign of the EECs must also have no meaning for gravitation. After all, for EECs, when they are in their normal state (?), it is not possible to distinguish between the front- and back-fields of a positive or negative EEC (whether there are any other states for the EECs, other than the normal state (which is the only state we know so far), we can not yet know, as we do not yet know too much overall).

So we are looking for a characteristic feature (one might also say quality or attribute) of the EECs that is independent of their sign and that is the same for the front- and back-field. And what we are looking for should not be the result of any motions of the EECs.

No, it is not the frequency. In the case of gravitation, it is as with the electric force: the forces of any number (except perhaps infinitely many) of EECs can add up, so the frequency can not play any role (not even a minor role).

There seems to be only one feature left. But that feature is not a storekeeper, certainly not! Because it actually produces gravitation. It is the spatial *change* of the space-density of the EECs (which has nothing to do with any superpositions). Because, of course, the space-density of a field of an EEC changes as a function of the distance (r) to the CP of the EEC. We have already calculated this in the chapter on the electric force:

$$SD_{(r)} = \frac{K_{SA}}{3 \cdot c} \cdot \frac{1}{r^2}$$

where c is the LS and K_{SA} is the constant of the space-amount emitted or absorbed by the CP of an EEC.

Disaster: The $\boldsymbol{\Delta SD_{S(\lambda)}}$ is proportional to $\boldsymbol{\frac{1}{r_S^3}}$ and not to $\boldsymbol{\frac{1}{r_S^2}}$

For a gravitation without extras, we consider a source and a receiver, both of which have no initial velocity.

The origin of gravitation is the distance-dependent change of the space-density ($SD_{S(r)}$) of the fields of the *source* along the wavelength of the receiver in the radial direction of the source - because obviously the $SD_{S(r)}$ of the fields of the source changes along the wavelength of the receiver (λ_R) (in the radial direction of the source). The emerging wave of the receiver thus superposes with a field of the source whose $SD_{S(r)}$ changes along the wavelength of the receiver (λ_R). More precisely: on the path of the emerging wave of the receiver from the CP_R towards the source the $SD_{S(r)}$ of the field of the source increases, and in the opposite direction the $SD_{S(r)}$ decreases. So, in the end, it is all about the difference of the $SD_{S(r)}$ between the endpoints of a λ_R in the radial direction of the source.

All these words can also be represented as an equation:

$$\Delta SD_{S(\lambda)} = \frac{K_{SA}}{3 \cdot c} \cdot \frac{1}{r_S^2} - \frac{K_{SA}}{3 \cdot c} \cdot \frac{1}{(r_S + \lambda_R)^2}$$

where r is the distance from one of the end points of the λ_R to the CP_S.

To make it short, we save ourselves the intermediate steps. For $r \gg \lambda_R$ we get:

$$\Delta SD_{S(\lambda)} = \frac{K_{SA}}{3 \cdot c} \cdot \frac{2 \cdot \lambda_R}{r_S^3} \qquad \text{(Eq.}\Delta\text{SDS)}$$

If $r \gg \lambda_R$, then the density-difference ($\Delta SD_{S(\lambda)}$) for the very small distance λ_R will be very small. - Just as we breath denser air while sitting than when standing. This seems silly, but it is precisely this small difference in air pressure that causes a birthday balloon filled with helium to ascend. If you do not believe that, you can try to ascend a helium balloon on (or better in) the ISS.

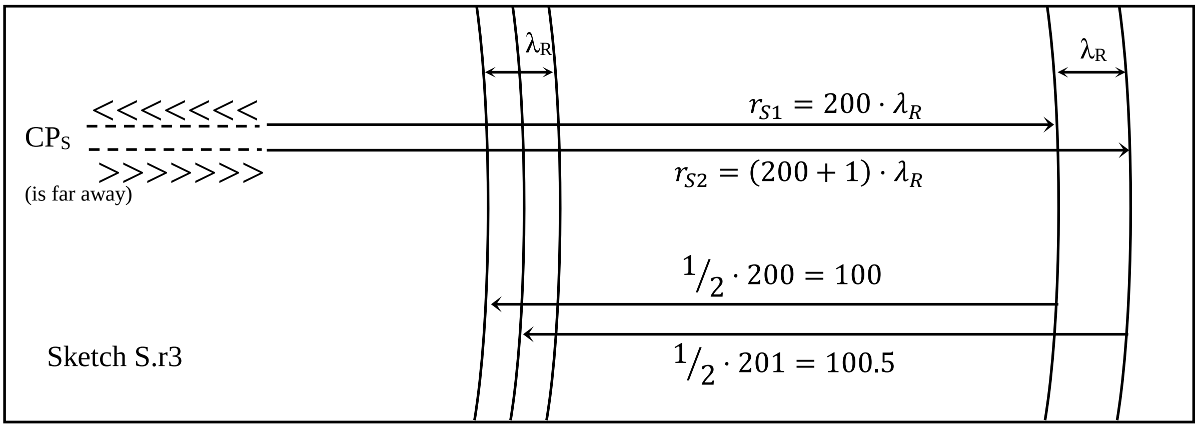
For the electric force we have assumed that the SD_S is approximately homogeneous at the receiver. The superposition of the receiver with this (let us call it) mean density has caused a $\Delta\lambda_R$. But not only the SD_S itself, but also the radial distance-dependent *change* of the SD_S influences the SD_R of the emerging wave of the receiver, and thus causes an additional $\Delta\lambda_R$. Finally, this additional $\Delta\lambda_R$ will be the $\Delta\lambda_R$ of gravitation, so we can already call it gravitational $\Delta\lambda_R$ ($G\Delta\lambda_R$).

The $G\Delta\lambda_R$ is proportional to the change of the SD_S along the λ_R , that is the $\Delta SD_{S(\lambda)}$. Here we will need a constant of proportionality, which of course we call GK (this sounds only like the Newtonian gravitational constant, but it is something completely different).

First of all, the GK is needed because the $\Delta SD_{S(\lambda)}$ and the $G\Delta\lambda_R$ have different units (multiplied by the correct constants, you can even add apples and pears:

$$5\ apples \cdot \frac{worm \cdot 0{,}4}{apple} + 4\ pears \cdot \frac{worm \cdot 1{,}25}{pear} = 7\ worms)$$

In addition, the GK is necessary because the $\Delta SD_{S(\lambda)}$ can not have exactly the same value as the ΔSD_R in the case of gravitation (the (gravitational) ΔSD_R is meant that belongs to the $G\Delta\lambda_R$). We recognize this very easily, because $\Delta SD_{S(\lambda)} \propto \frac{1}{r_S^3}$, and gravitation must of course be proportional to $\frac{1}{r_S^2}$.



The fact that the difference $\frac{1}{r_S^2} - \frac{1}{(r_S+\lambda_R)^2}$ is actually proportional to $\frac{1}{r_S^3}$ can be nicely explained: Let the CP_R be $r_{S1} = 200 \cdot \lambda_R$ away from the CP_S (as in sketch S.r3). The outer end of the wave of the receiver, which has $\lambda_R = 1$, is then $r_{S2} = 201 \cdot \lambda_R$ away from the CP_S. If the distance of the CP_R from the CP_S is halved ($= 100 \cdot \lambda_R$), the SD_S will quadruple at the CP_R. However, half of 201 is 100.5, not 101. There, at r = 100.5, the SD_S will quadruple compared to the previous position. And between these two positions (r = 100 and r = 100.5) the ΔSD_S only quadrupled. However, the λ_R reaches r = 101. The distance that the λ_R reaches from the CP_R is thus twice as large as that at the r = 100.5. As a result, the ΔSD_S doubles again, so that the $\Delta SD_{S(\lambda)}$ has increased 8 times ($8=2^3$) compared to the previous position (at r = 200). Actually, it is quite simple: if two distances are halved, then the distance between them is also halved. - Eggs are similar: their shells become all the thicker the bigger the eggs become. If elephants laid eggs, we could make bathtubs out of their egg shells - a pity, really, that they don´t lay eggs - and the elephant chick would need an electric saw to hatch.

In any case, it is quite challenging that the $\Delta SD_{S(\lambda)}$ is proportional to $\frac{1}{r_S^3}$ and not to $\frac{1}{r_S^2}$.

The wavelength of the EECs can not help to correct this discrepancy, because it is independent of its distance to the source (multiplying the distance to the source does not change its value). - It is like love's labor's *lost*: no matter how often the efforts are multiplied, the result does not multiply. It would be quite funny to get testimonies after the end of relationships (or unsuccessful overtures), similar to the work certificates. There probably would be encrypted phrases: "always tried to stay awake", "was outgoing", "had seen how the washing machine was used", "liked order when it appeared by itself". After a failed 1st meeting: "wore interesting clothes", "knows how to handle money", "is very well versed in his/her field", "is environmentally conscious (and saves water)". There may also be seemingly innocuous mistakes: if the signature is right instead of left, that means homosexuality. A deliberate spelling mistake in the word "zertifikate" indicates a reading disability....

Like "The Egg of Columbus": The V_{dis} turns $\frac{1}{r_S^3}$ back to $\frac{1}{r_S^2}$

Fortunately, for all involved, here and everywhere, there is another variable associated with the $\Delta SD_{S(\lambda)}$, which has an influence on the formation of the $G\Delta\lambda_R$, so that the $1/r^3$-trauma is overcome. As so often with therapies, we have to take a closer look.

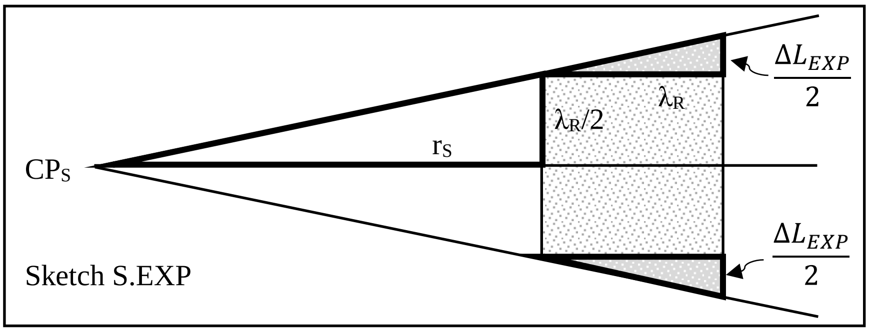
The $\Delta SD_{S(\lambda)}$ arises as the space of the fields of the source expands (spreads) or contracts (spreads backwards). Somewhat simplified, we can say that the distribution of space changes. The expansion or contraction of the space of the source happens perpendicular to the radial direction of the source - we just call it tangential. We can easily understand that by imagining that the space of the fields of the source (which of course move with LS) has points – the by now famous, imaginary points of space (so that. not. every.thing. is. ful.l of .poi.nts. on.ly .selec.ted. fie.lds .get. p.o.i.n.t.s.).

A change in the distribution of space means that distances change (e.g., those between imaginary points), and that happens - of course - over time, and thus we have a velocity called distribution-velocity (V_{dis}) (V_{dis} does not mean "Victoria´s dislikes", CP does not mean city police, SD does not mean smoker domicile, and the λs not graze on the pasture).

Velocities are very important for superpositions, we know that. So it is with the V_{dis} for gravitation. The V_{dis} and the $\Delta SD_{S(\lambda)}$ have the same cause, so their effects on the receiver are equal; this means that $G\Delta\lambda_R$ is proportional to V_{dis} (as well as to $\Delta SD_{S(\lambda)}$).

For the calculation of the V_{dis} a 2D representation is sufficient, which is quite pleasant. Of course, the space distribution is 3D, like almost everything material, but often a 2D representation is good enough, such as with the buoyancy of a balloon, although it is clear that the silhouette of a balloon can not fly.

On its way away from the CP_S a field expands. For $r_S \gg \lambda_R$, the length-change (ΔL_{EXP}) resulting from the expansion along the λ_R can be easily calculated, since λ_R can be represented as a square, as in sketch S.EXP - however, in sketch S.EXP the r_S is quite small ($r_S \approx 4 \cdot \lambda_R$), which is wrong, because a spherical surface is not nearly flat for a small r_S, but we can see the relevant triangles better.



Sketch S.EXP

We immediately recognize the similar triangles, and so:

$$\frac{\lambda_R/2}{r_S} = \frac{\Delta L_{EXP}/2}{\lambda_R} \Longrightarrow \Delta L_{EXP} = \frac{{\lambda_R}^2}{r_S}$$

We could now divide this length-change caused by the expansion by T_R and get a velocity. But this velocity would have little significance, as long as the SD_S is not taken into account. Because we want to know how *much* space is expanding. - A cook would not say that a spoonful of filtered forest soil should be added to the soup without saying how big the spoon should be.

Instead of the imaginary space-points, we can imagine that the space is divided into imaginary space-elements (perhaps small rectangles) - the more space-elements there are along a stretch, the larger the space-density and the smaller each space-element is (since *everything* consists of space, it seems that imagination is needed to recognize reality, as if we had to close our eyes to see the stars). At an expansion, the relative length-change of a space-element is completely independent of its length (one could also say that the percentage length-change is always the same). The relative length-change of a λ_R is $\frac{\lambda_R+\Delta L_{EXP}}{\lambda_R}$. If the λ_R is divided into Z (Z = any number) of space-elements, then the length per space-element is $\frac{\lambda_R}{Z}$, and the expansion-related length-change per space-element is $\frac{\Delta L_{EXP}}{Z}$, and thus the relative length-change per space-element is

$$\frac{\frac{\lambda_R}{Z}+\frac{\Delta L_{EXP}}{Z}}{\frac{\lambda_R}{Z}} = \frac{\lambda_R+\Delta L_{EXP}}{\lambda_R}$$

We see that the relative ΔL_{EXP} can have no meaning for the $G\Delta\lambda_R$ since it is always the same, while the $G\Delta\lambda_R$ is proportional to ΔSD_S. The $G\Delta\lambda_R$ is also proportional to the V_{dis}, so we can expect the V_{dis} to be proportional to the SD_S (and not to be always the same).

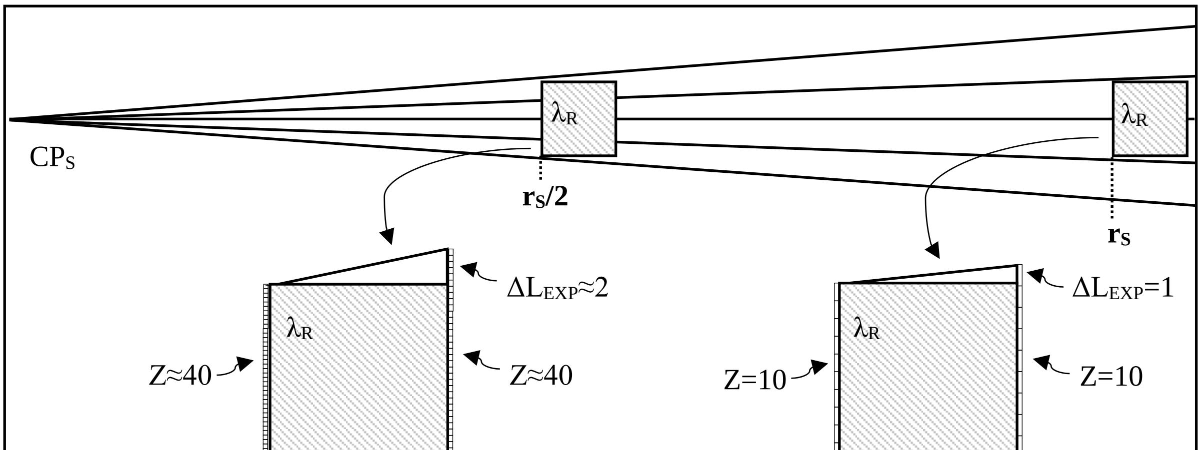
We therefore need the absolute length-change per space-element ($\frac{\Delta L_{EXP}}{Z}$), which we can also call deformation of the space (and which can be positive or negative).

The number (Z) of space-elements along a stretch is proportional to SD_S (with a constant of proportionality whose exact numerical value is just as interesting for further consideration as the favorite diet of the English Prime Minister's domestic cat for the outcome of the elections, we just call it $\frac{1}{K_L}$). So the absolute length-change per space-element is:

$$\frac{\Delta L_{EXP}}{SD_S} \cdot K_L = \frac{\lambda_R^2}{r_S} \cdot \frac{3 \cdot c \cdot r_S^2}{K_{SA}} = \lambda_R^2 \cdot r_S \cdot \frac{K_L}{K_c} \qquad \text{(with } K_c = \frac{K_{SA}}{3 \cdot c}\text{)}$$

We see that the absolute ΔL_{EXP} per space-element is proportional to r_S.

This can be beautifully illustrated in a symbolic sketch (S.51%) (symbolic means here that the example of the sketch is not 100% correct, just as the symbolic sketch of a brain does not always reflect 100% of all the thoughts that take place in it).



Sketch S.51%

Let be Z = 10 and $\lambda_R = 10$ at the distance r_S from the CP$_S$. The length of the space-elements (L_{SE}) is thus: $L_{SE} = \frac{10}{10} = 1$ Let the length-change along a λ_R be $\Delta L_{EXP} = 1$. So at $r_S + \lambda_R$ we have: $L_{SE} = \frac{12}{10} = 1{,}2$ And so the absolute ΔL_{EXP} per space-element at r_S is: 1.2-1 = 0.2

By simplifying the calculations, the results are good only for $r_S \gg \lambda_R$, while in this example λ_R is quite large relative to r_S - but that does not bother us, we round generously.

At the distance $\frac{r_S}{2}$ from the CP$_S$ the Z is therefore $Z \approx 40$ (remember: Z is proportional to SD_S), and thus $L_{SE} \approx \frac{10}{40} = 0{,}25$. And the length-change along a λ_R is thus $\Delta L_{EXP} = 2$. So at $\frac{r_S}{2} + \lambda_R$ we have $L_{SE} = \frac{14}{40} = 0{,}35$ And so the absolute ΔL_{EXP} per space-element at $\frac{r_S}{2}$ is: 0.35-0.25 = ***0.1*** (the 0.1 at $\frac{r_S}{2}$ is ½ from the 0.2 at r_S).

A similar example is food: When the proportion of healthy foods is doubled, the taste is quartered, making healthy foods appear 4 times larger and 4 times more uncomfortable. At the same time, there is a doubling of the willingness still to eat the food (because it is healthy). “4 times” divided by “doubling” = 2. The absolute unpleasant appearance of healthy foods is therefore proportional to their share. Conversely, the example fails: when the proportion of unhealthy food is doubled, the taste and its agreeable appearance are 4 times greater; and the willingness to eat the meal nonetheless doubles. “4 times” multiplied with “doubles” = 8. The pleasant appearance of unhealthy foods is therefore disproportionate to their share. That's why the famous yo-yo effect, despite the yo-yo going up and down the same way, leads to overweight.

Now that we have become familiar with the absolute ΔL_{EXP} of a space-element, we want to calculate the V_{dis} belonging to it, namely for the T_R of a λ_R :

$$V_{dis} = \frac{\lambda_R^2 \cdot r_S \cdot K_L}{T_R \cdot K_c} = \frac{c}{\lambda_R} \cdot \frac{\lambda_R^2 \cdot r_S \cdot K_L}{K_c} = \lambda_R \cdot r_S \cdot \frac{K_L \cdot c}{K_c}$$

g as gravitation

We need the V_{dis} as well as the $\Delta SD_{S(\lambda)}$ to calculate the $G\Delta\lambda_R$. Both are proportional to $G\Delta\lambda_R$. If we consider the proportionality constant K$_G$ to be a temporary fad or a temporary accessory of GK, then:

$$\mathrm{G}\Delta\lambda_R = K_G \cdot \Delta SD_{S(\lambda)} \cdot V_{dis} = K_G \cdot \frac{K_{SA}}{3 \cdot c} \cdot \frac{2 \cdot \lambda_R}{r_S^3} \cdot \frac{\lambda_R \cdot r_S \cdot c \cdot K_L}{K_c} =$$

$$K_G \cdot \frac{2\cdot\lambda_R}{r_S^2} \cdot \lambda_R \cdot c \cdot K_L = K_G \cdot \frac{{\lambda_R}^2}{r_S^2} \cdot 2 \cdot c \cdot K_L = \frac{{\lambda_R}^2}{r_S^2} \cdot GK$$

(with $GK = 2 \cdot c \cdot K_G \cdot K_L$)

With $G\Delta\lambda_R$ we can calculate the acceleration caused by the source at the receiver, which is not simply called by coincidence g:

$$g = \frac{\mathrm{G}\Delta\lambda_R}{T_R^2} = \frac{\frac{{\lambda_R}^2}{r_S^2}\cdot GK}{\frac{{\lambda_R}^2}{c^2}} = \frac{c^2\cdot GK}{r_S^2} = \frac{Gk_g}{r_S^2} \qquad \text{(with } Gk_g = c^2 \cdot GK \text{)}$$

The most important thing, the very most important thing that we can see immediately and that lets us jubilant with joy, is that λ_R cuts out. The g is independent of λ_R . Or more wonderfully formulated: The g is independent of the mass of the receiver. And that's the most exciting feature of gravitational acceleration.

Classically, this is the equivalence of inert and heavy mass.

The inert mass, however, is, as we have seen, a purely electrical phenomenon. The inert mass is the immaterial proportionality between the electrical acceleration of an EEC and its wavelength (or λ_R).

Our everyday life is dominated by mechanical and chemical-biological forces. We notice them when we walk, swim or fly, when we throw stones or fire bullets, when balloons burst, or when wind blows, when we play billiard, or when we hit our finger with a hammer and when we scream loudly or sing.... What we usually do not notice in everyday life, is, that all these forces are ultimately due to electrical forces that act between unimaginably many EECs, which influence each other with LS.

The gravitation is omnipresent in everyday life too. And the heavy mass is too a purely electrical phenomenon. But the λ_R is irrelevant for the g since the time that elapses for the $G\Delta\lambda_R$ of a λ_R is just proportional to the $\mathrm{G}\Delta\lambda_R$.

We recognize here that the equivalence of inert and heavy mass means that the electrical acceleration is proportional to λ_R and that g is not proportional to λ_R .

It is astonishing: the *equivalence* of two quantities, the inert and the heavy mass, both of which exist only indirectly, arises only because the inert mass has no significance whatsoever for the g.

The eternal dream: anti-gravitation

All EECs always fall in freefall with the same acceleration of gravity, so much has become clear. Of course, there can be countless, even unknown electrical phenomena that take the freefall part of its freedom, and, unfortunately, we can only hope to eventually find ways to counteract gravitation, because hoping for true anti-gravitation is in vain.

Gravitation arises solely from the distance-dependent change in the density of the fields of the EECs (which changes with $1/r^2$), and it does not matter which fields produce the space-density. And the space-densities of various fields simply add up. As, for example, at our earth, which - one can say this without exaggeration - consists of many EECs (compared to the 1 or 2 EECs with which we usually deal). The high space-density of the earth (or the high space-density around the earth) has a correspondingly high space-density gradient, which finally produces our gravitation (it's a little bit as if the higher space-density in the lower area (e.g. at the feet) would hold us back, and with each movement downwards we sink deeper).

For gravitation, only the distance-dependent change in the space-density is relevant, and that is the same for the front- and back-fields, regardless of their direction of motion. For gravitation, therefore, the *amounts* of the space-densities of the fields of the EECs *add up*. Never will a space-density be *subtracted*. This would only make sense if the radial, distance-dependent change in the space-density were opposite: if the space-density *increased* with increasing distance from the CP (perhaps even with r^2, if r is the distance to the CP). Such an EEC could have an infinitely great electrical force in infinity. But just a few feet away from its CP, its electric force would be huge, and the influence of its field would rip all atoms apart. Such an EEC would be a true anti-particle, a destroyer of whole worlds, the end of the cosmic balance, the fulfiller of all the gloomy prophecies. No comparison with the ordinary anti-particles we already know, where only the front- and back-fields are interchanged.

An earth of protons

For the origin of gravitation, in this chapter, it was all about EECs and never about electrons or protons. The reason is simple: it makes no difference; electrons and protons create the same gravitation. And the neutrons are anyway just some combination of the fields of positive and negative EECs.

Imagine a ball consisting of 10 mol ($10*8.8*10^{23}$) protons (which all repel each other - you might as well try stuffing 10000 orange-sized rubber balls into a common grocery bag) and another ball, which consists of 10 mol electrons. Both balls produce the same gravitation, but the proton ball is ≈2000 times more inert than the electron ball. And yet that does not violate the equivalency of heavy and inert mass, for both balls fall e.g. in the gravitational field of the earth with the same acceleration. So too, if, e.g., at the earth the electrons were replaced by protons: its gravitation would remain the same, and its orbit around the sun would not be affected either. However, the (linear) momentum and the angular momentum of such an earth would be significantly greater; a collision with Mars would be like the collision of an insect with the windshield of a truck.

So, that's how it is:

Gravity is an electrical phenomenon. The derivation is not even complicated and does not seem to produce any contradictions. The EECs do not need to do any tricks to create gravitation, they are simply in their ground state. And the $G\Delta\lambda_R$ of gravitation is simply added to the $\Delta\lambda_R$ of the electrical acceleration.

Of course, it is still (frighteningly) a lot to do. The general theory of relativity has its own chapter (the chapter after next, but it is very general). This paper is just a start anyway. We do not have to do everything now. We can save something for later, for long, boring winter evenings with power outage, or, if we strand on a deserted island without electricity, or, if we should get a job at a patent office and there would be a power outage....

An important reason for this paper was my hope to find anti-gravitation. The result of this paper is that there will be no easy way to create true anti-gravitation. It's a pity, but it also makes us sleep more peacefully: we will not suddenly fall off the earth.

What are electromagnetic waves?

Electromagnetic waves: almost like a knot of air

Electromagnetic waves (EMWs) occur when EECs move.

It takes little imagination to imagine that EMWs consist of the same space-time fields as the EECs. Fortunately, as we will see, it is quite easy to construct EMWs of fields similar to those that make up the EECs. - If you prefer to have a particularly complicated job, you can skip every second line while reading.

EMWs move with LS (when God said "Let there be light." he created not only light but also LS, and maybe even relativity). Unlike the EECs, the EMWs do not generate any electrical forces in their direction of motion. Instead, the electric forces of the EMWs are perpendicular to the LS, as are the 90° phase-shifted magnetic forces (whereby we now know that the magnetic forces are generated by the same space-time fields as the electrical forces, with the difference that the space-time fields of the magnetic forces also have perpendicular components in their orientations).

The task now is to explain the stubborn interplay of forces of the EMWs. To do this, we want to find out what fields an electromagnetic wave (EMW) consists of, which is the nature of these fields, and what orientations these fields have.

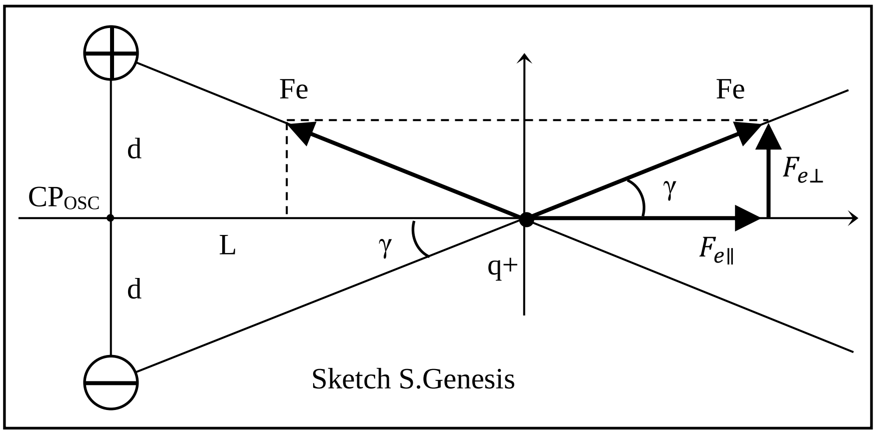
It will not be enough simply to take over the fields of those EECs whose motions produce the EMW. An EMW is not created simply by adding the fields of two opposite EECs, just because they oscillate. EMWs are more than just the direct addition of the fields of the involved EECs, they are something else, something new. - It is reminiscent of chemical reactions involving e.g. mixing two liquids does not just give the addition of the liquids, but maybe a solid or a gas. It's like a dialogue. A dialogue too should be more than the sum of two monologues (although it is not yet clear what happens more often: two EECs that generate an EMW, or two people who engage in real dialogue - interdisciplinary questions are often difficult to answer).

Their creation

It is time for us to look at the emergence of an EMW. The basic principle is simple: two opposite EECs oscillate about a common CP (this CP of the oscillation has as much to do with the CPs of the EECs as English food with French cuisine).

In the sketch S.Genesis, the EECs oscillate vertically and are at the maximum distance (d) from the CP of the oscillation (CP_{OSC}) at the moment shown. In this position, the maximum of the electric field of the EMW arises. We can easily see this from the forces exerted by the two oscillating EECs on a small sample charge ($q+$), which is placed at a distance L from the CP of the oscillation perpendicular to d, where the magnitudes of each of the two forces are F_e (that's all in S.Genesis). It is obvious that the components of F_e which are parallel to L ($F_{e\parallel}$) result in zero. And perpendicular to L ($F_{e\perp}$) we get:

$$F_{e\perp} = \frac{F_e \cdot d}{\sqrt{d^2 + L^2}}$$



We immediately recognize, in the equation as well as in the sketch S.Genesis, that the force (or electric field strength) perpendicular to L of the EMW decreases with an increasing distance from the CP_{OSC} of the oscillation. We know that EMWs transfer their energy by quanta. The smaller the force, the greater the time required to transmit a quantum. At a great distance from the origin of the EMW, the time required to transmit an energy quantum becomes ridiculously large compared to the time required to produce the EMW. Especially when we think of EMWs that originate inside atoms - these are the famous photons (named after "photos", the god of all photons). Only a few meters are already gigantic compared to the atomic diameter, the energy transfer of a photon would take ages, compared to the nanoseconds of the formation of a photon. In this way, photons would be unlikely to have a long range, while in fact, even photons from distant galaxies reach us. This is by no means a proof (!), but it supports the complacent assumption that the quanta of EMWs share some attributes of real particles.

The least that we can expect from an authentic particle is at least the hint of a CP. Of a quantum (of an EMW) no less can be expected. The special feature of a CP of an electromagnetic quantum is that it already has LS at its creation. Since it moves with LS, there is no field that can leave it with LS forward, or that can reach it with LS from behind. The CP of such a quantum is therefore not like the CP of an EEC. Rather, it is a stable densification of the space-density of a space-time field that moves with LS. Like a cloud in the wind, the CP of a quantum moves along with its field (although there is still uncertainty about the exact shape of the cloud, but it may not look like a bunny or Jesus or an UFO).

It are the densifications of the space-densities that quantize an EMW. The simple addition of the electric fields of the oscillating EECs would not produce any quantization (whoever wants to, can indeed try to create and quantize a transverse angular sound wave (TASW) by somehow oscillating two oppositely rotating fans - whoever manages that will either receive all future Nobel prizes in all categories or he becomes... well, let´s say problems).

So how do the densifications of the space-densities (that are the quanta) arise if they really exist? Nothing is not unknown precisely. Unfortunately. We see the result, and there are some indications of its formation but there are no clear connections, no processes that automatically quantize. - It's a bit like paleontology, where a fossilized jaw fragment and general information about related species and the environment, and with a little common sense, a new species can be reconstructed more or less well. For example, a 4 cm molar does not come from a mouse-sized animal, and only because the jaw fragment fossilized in volcanic ash, the animal must not have lived exclusively on volcanoes.

An important clue to the origin of the quantization is provided by the mass-waves of the EECs. While the EECs cause the EMWs, the mass-waves form interference patterns - areas (in the vicinity of the EECs) are formed in which the space-density (or the space-time) *oscillates*, and these areas change their size and shape, and they move. And we know, that the EECs too are only oscillating space-time areas. This similarity between the EECs and the oscillating areas of the interference patterns provides an exciting possibility: the oscillating areas of the interference patterns too may have the ability to influence each other, similar as the EECs do. The oscillation of an interference-area would therefore propagate *independently*, that is, *regardless* of the superpositions of the electric fields, into the surrounding space. The creation of an *oscillation* somewhere in the interference pattern of the mass-waves is tantamount to the emergence of an at least partially independent object - it does not equal a complete EEC or the finished quantum of an EMW, but it is more than nothing, it is a start. - Just as the protoplasm of the primordial seas of the earth will someday have given birth to the rulers of the universe. We also do not know how the EECs - the current rulers of the universe - originated. In any case, oscillating areas could well be the condensation germs of independent objects.

If some of the interference-areas can actually influence each other, then it gets very complicated - especially if we remember that the spin of the EECs also needs to be considered. We can refer to these interference patterns of the mass-waves, which can change themselves, as active interference patterns (this term will be needed in this paper only 3 more times). Compared to the active interference patterns, the simple, classical interference patterns look like children's toys. It is hard to imagine what the calculations for the active interference patterns might look like. This is really a job for another paper (you would not want to describe in the instructions for a scooter how the iron came from the big bang in the ball bearings). However complicated it may be, in the end everything seems to be organized according to the densifications of the quanta of the EMWs. And anything else that arises in the case of active interference, about which we just know nothing, is a completely different story.

The impossible electric field of an EMW

And for the *orientations* of the quanta of the EMWs, we can almost simply adopt the orientations of the EECs whose oscillations produce the EMWs. This seems surprisingly easy - and wrong. For we know, and we see it also in the sketch S.Genesis, that the electric force of the EMW perpendicular to L approaches zero for $L \gg d$ (because $\gamma = \tan^{-1}\frac{d}{L}$ approaches zero too). And, as we know, for a quantum that arises in the interior of an atom, $L \gg d$ is only a few meters away.

Even if the oscillating EECs are farthest from each other (d = maximum), their fields will be practically parallel at $L \gg d$ and therefore zero in their sum. And if the fields are practically parallel, then they can densificate into quanta as much as they want to, the electrical force perpendicular to L remains practically zero.

At the maximum distance from each other, the oscillating EECs hold still for a moment (by the way, a "moment" is not clearly defined, for humans it can be language- and mood-dependent, in mathematics, it is always zero, but still exists). At such a moment, the orientations of the EECs do not have any perpendicular components, so there is no chance of somehow getting any to L perpendicular electrical force through any indecent detours.

It does not seem to be possible to obtain an electric field for EMWs or its quanta (this gloomy mirage is of course deceptive).

The honest magnetic field of an EMW

Let's see how it behaves with the magnetic field of an EMW. It is caused by the *velocity* of the EECs whose oscillations produce the EMW. As we saw in the chapter on the magnetic force, the velocity of an EEC gives rise to an additional component in the orientations of the fields of the

EEC, which is perpendicular to the directions of the motions of the fields (it may be nicknamed "$\perp Or$"). Of course, the $\perp Or$ is largest for that part of a field that is perpendicular to the velocity of the EEC - no wonder, since the $\perp Or$ is directly proportional to the velocity of the EEC.

At the CP of the oscillation, the velocity of the EECs is biggest. We are therefore particularly interested in that part of an EMW or in those quanta that leave the system perpendicular to the oscillation at the level of the CP of the oscillation, because for atoms this is roughly the direction in which a quantum leaves the atom, and at antennas it is the direction of the greatest intensity of an EMW; and above all, it is the direction in which the $\perp Or$ is biggest (because it is exactly perpendicular to the highest velocity of the EECs, in the sketch of S.Genesis this is the direction of L).

The wonderful thing about the $\perp Or$ is that it stays forever - more precisely: the ratio of the $\perp Or$ to the $\parallel Or$ (that's the parallel orientation) stays the same forever (they even age alike, they become weaker together, the balance of power stays the same for ever and ever, in good and in bad times, even if they have long been forgotten).

But what good is an ***EM***W's magnetic field if it does not have an electric field?

Even without a field: the electrical force of an EMW

The problem resolves itself when we consider that an EM***W*** is a ***wave***. In the case of a wave, some values always change from place to place along its direction of motion, otherwise it is not really a wave (if a wave of hate hits you, then that is a partial wave, if the wave were longer, then probably contempt would follow, then hate again, contempt, hate...).

For an EMW, the magnitude of the $\perp Or$ changes along the wave.

The two oscillating EECs (whose fields design the EMW) always move in opposite directions. In addition, the two EECs are oppositely charged - the positive emits a front- and the negative a back-field. The consequence of opposite motions and being oppositely charged is that the $\perp$orientations of the two *emitted* fields are *uni*directional.

In the sketch S.Wave+CP, the two emitted fields of the two EECs are combined into one wave. The orientations in the direction parallel to the LS of the EMW are not to be seen, because they dissolve - as we well know - one each other (it is as if two oppositely moving trains would dissolve each other to nothing).

In addition, in the sketch S.Wave+CP an EEC is to be seen, which we call R out of pure habit. The important thing about this R is that this R can be *seen*. Because this R is *not* a point, it is not a point-charge (a point, that always has zero expansion, is never to be seen). Like any EEC, this R too emits a spatial field that oscillates at the frequency of its mass-wave (and, of course, the CP is invisible, the drawn point is actually a small circle of a thick line around the CP). The large circle around the CP_R has the radius of one wavelength of the mass-wave of R.

With respect to the CP_R, the EMW always superposes (according to its direction of motion) *first* one side of the R and *then* (secondly) the other side of the R (they shall be called the FIRST and the SECOND side, to avoid confusion with the front- and the back-field – both are discriminatory, of course(!)).

The special feature of the EMW is that its $\perp$orientations on the FIRST and SECOND sides of the R can be *different* (!), whereby it is especially important that the amplitude of the $\perp Or$ of the EMW changes in a wavelike manner!

In electrostatics, the fields of the source are homogeneous for the receiver. In the case of gravitation, we consider the distance-dependent change of the space-density of the fields, but the space-density does not change by time in one place. And finally, in the EMW, the $\perp Or$ changes for the receiver (this is the R in the sketch S.Wave+CP) both temporally and spatially (it is not always and everywhere the same).

And this wave-character of the $\perp Or$ of an EMW has quite amazing, almost exquisite effects, as we will see.

There are 3 relevant positions of an EMW relative to the CP_R. All 3 positions (***A***, ***B*** and ***C***) can be seen in the sketch S.Wave+CP (from top to bottom), where the EMW moves with the LS c_γ from left to right (if you read fast enough you can follow the wave).

We see: In position ***A***, the amounts and directions of the $\perp Or$ are exactly the same on the FIRST and on the SECOND side, in the positions ***B*** the amounts are on the FIRST side smaller than on the SECOND side, and in the position ***C*** the directions are on the FIRST and on the SECOND side exactly opposite while the amounts are the same.

We are, of course, interested in the electrical and magnetic forces in the 3 positions. However: ***B*** is just a mixture of ***A*** and ***C***, and would be interesting for the attachment at best, if there were one. We ignore ***B***.

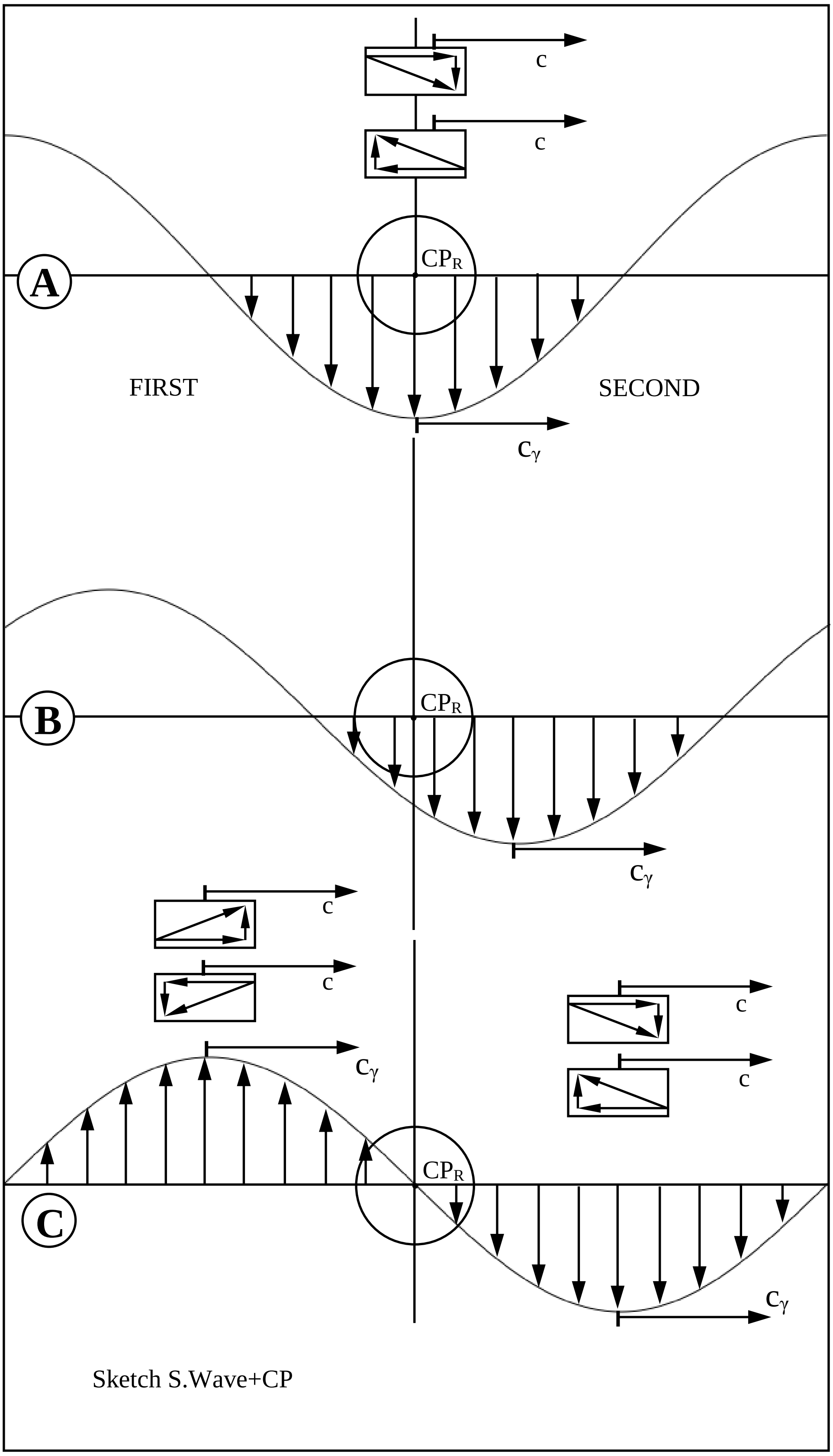
With our knowledge on the origin of the electrical and magnetic forces in the buffer (in the past we kept something in mind, but using a buffer is easier) we can now take a closer look at the positions ***A*** and ***C***. As a small help, the front-field and the back-field of the EECs that generate the EMW, that are emitted by the positive and the negative EEC respectively, were drawn at ***A*** and ***C*** (these are the traditional (from the chapter on the electric force), small rectangles with the arrows, that, as usual, come from the source).

Although... actually, it is quite simple.

In position ***A*** the EMW is exactly the same on the FIRST and on the SECOND side. This is almost as if the forces were created by homogeneous fields and not by a wave. Instead of the two oscillating EECs (from sketch S.Genesis), we can imagine two uniform electrical currents (as in two power cables), the stream of electrons moves in one direction and the stream of protons moves in the other direction. (Positive currents can hardly be realized in wires, of course. Maybe we could instead load a well insulated, long, looped wire positively and let it run over pulleys. The resulting magnetic field would have a strong positive aura that could be reliably used in purification ceremonies of all kinds.) For opposite electrical charges of the same magnitude, the resulting purely electrical forces are always zero, while the magnetic forces add up to twice the forces of the two individual currents, due to their opposite directions of motion. And so we realize that, in position ***A***, the EMW has its magnetic field at the receiver (that is at R).

In position ***C***, the $\perp$orientations of the EMW are exactly opposite at the FIRST and at the SECOND side. For the magnetic force, it is as if the two currents (which we have already imagined very successfully in ***A*** instead of the oscillating EECs) flow at the FIRST side in an exactly opposite direction than at the SECOND side. And so the magnetic forces are exactly opposite on the FIRST and on the SECOND side, and cancel each other out.

Somebody could now think prematurely that the electrical forces also result to zero - and as far as the $\parallel Or$ is concerned, that's true. But with the $\perp Or$, it is worth a second consideration.



In the chapter on the magnetic force we have seen that, for $V_R = 0$, the $\perp Or$ of every single field of the source does *not* cause a perpendicular $\Delta\lambda_R$ in the sum. The reason for this is simple: the *direction* of the perpendicular $\Delta\lambda_R$, which a field of the source causes in the fields of the receiver, and also the *magnitude* of the perpendicular $\Delta\lambda_R$ are the same on the FIRST and on the SECOND side;

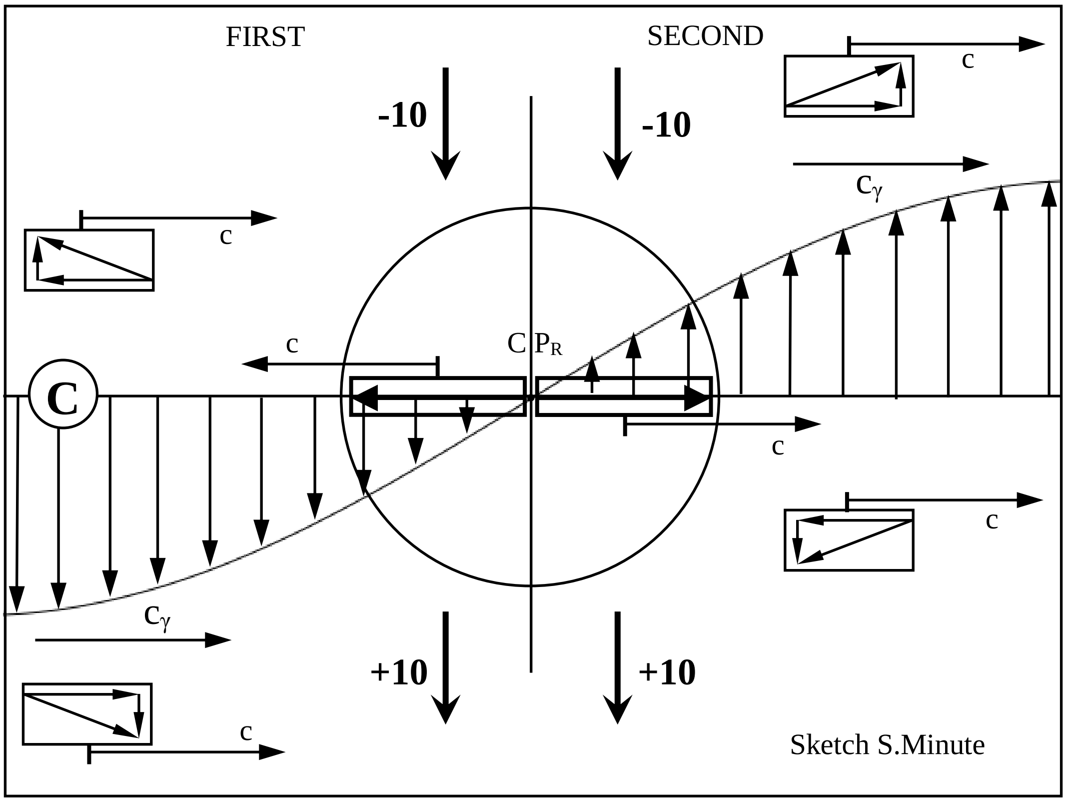
the *signs*, on the other hand, of these two $\Delta\lambda_R$ are exactly opposite - the sum is zero. The requirement is, of course, that the ⊥*orientations* are exactly the same on the FIRST and on the SECOND side. However, as we have noticed, the ⊥orientations of the EMW in position ***C*** are on the FIRST and on the SECOND side exactly the opposite of exactly the same - thus the sum is twice the single $\Delta\lambda_R$.

We also have not forgotten that the emitted EMW consists, for palaeontological reasons, of two fields, a front- and a back-field. And the $\Delta\lambda_R$ of these two fields do not cancel each other out, no, they complement each other: If one of the two fields generates 2 negative perpendicular $\Delta\lambda_R$ on *one* side of the CP_R, then the other field will generate 2 in magnitude equal positive perpendicular $\Delta\lambda_R$ on the *other* side of the CP_R. And, of course, it is completely superfluous to mention here that this corresponds to a perpendicular electric force ($F_{e\perp}$).

A quick auxiliary sketch of the electric force of the EMW (Situation C)

There has been a lot of "opposite to opposing to unidirectional and so on" lately - that's not complicated but sometimes a bit confusing. In magnetism, a small auxiliary sketch with small helpful arrows and with some simple numbers of a simple numerical example helped. A similar sketch (see S.Minute) shall accomplish the same task here.

The situation ***C*** is shown from sketch S.Wave+CP. The fields of the EMW and the receiver are shown in rectangles as always, and the small arrows on the rectangles with the small c symbolize the LS of the fields. We only see the emitted fields. Anyone who wants to see the fields to be absorbed can try it with a lot of imagination or by drawing. The results are anyway the same for the emitted and for the absorbed fields.



Sketch S.Minute

The 4 small, bold, numbered arrows indicate the $\Delta\lambda_R$. If the arrows are *above* the CP_R, then they show us how the wavelength of the receiver changes upwards, and if the arrows are *under* the CP_R... If the arrows are on the left, they are due to the superposition of the fields of the EMW with the left part of the field of the receiver, and if the arrows are on the right… In the same quadrant, in which each of the 4 small, bold arrows is, we see exactly the field of the EMW that caused the respective arrow.

The numbers of the simple numerical example next to the small, bold arrows are just jewelry that shall emphasize their beauty.

What we have just seen is very remarkable: although an EMW has no resultant electric field at any place, it does produce a perpendicular electrical force at the receiver. This happens because the magnetic field of the EMW alternates wave-like. The term electrodynamics suddenly appears much more dynamic: not only that the angle of the magnetic field only arises when the sources of the electric fields (the EECs, of course) move, also the electric force of an EMW arises only because its magnetic field oscillates.

The necessary calculations are, like all these calculations, quite cumbersome and do not give any new insights, and, no, they are not performed in this paper. - There is still much to do (this sentence begins to bother like an annoying mantra).

On distances and on quanta

Even without calculations, we want to look briefly at the difference between a (radio) antenna and an atom: An antenna consists of many atoms, an atom... not. With an atom, we could theoretically play basketball, with an antenna... usually not. For an atom, it's usually $d \ll L$ (relative to humans), for an antenna... not always. In fact, we can even be very close to an antenna (some even have one on their roof, or on their ear). At such a short distance from an antenna, there are actually real, resultant electric fields, without any tricks. We can see this also in the sketch S.Genesis. The good thing is that these real fields are created in exactly the same place as the crafty fields from position ***C***. So there is blissful accordance here.

Somewhat less blissful is the question of quantization. Do the quanta come into being already very close to the antenna, or farther away?

There are no answers to these questions here and now. The quanta are densifications in the fields of the EMW. How and where these densifications arise is as unknown as their dimensions and their density-gradient. However, the densifications should of course have some kind of CP, otherwise the EECs will deny their interaction.

There may still be an interesting connection regarding the quantization of the waves that we generate with antennas, such as the radio waves. The energy density of such waves can be very large compared to the energy of a single quantum of the corresponding wavelength. This could mean that even a small fraction of such a wave would contain several quanta, suggesting that the densifications of the quanta are reasonably evenly distributed over large, intense waves. In any case, a connection between the positions of the densifications and the magnetic amplitude of the EMW appears irrational. After all, a large wave may contain many quanta, and a large quantum (e.g., of gamma rays) may contain many waves. - A large bucket may contain many grains of sand; a large grain of sand may contain many small (very small) buckets.

Our world is the world of the EECs and the LS

EMWs are moving with LS. Why? Because they are densifications in the space-time fields of the EECs, and the space-time fields of the EECs always move with LS. And why do the space-time fields of the EECs move with LS? Well...

To begin with, I did not find a compelling answer to this question either. But there are hints, again...

The special theory of relativity tells us two things about the LS: only nothing is faster, and everyone sees it the same way.

Nothing is faster? What about EECs? It seems trivial that the CP of an EEC will not overtake the field that it emits itself. Besides, it would need an infinite amount of energy for that. But, what if? We can imagine with a great deal of imagination that not an infinite amount of energy would be needed, but only an infinite energy-density for a tiny moment in a small space-area around the CP of the EEC - and then the EEC skips the light wall. From then on, the CP could not emit any field forwards or absorb any field from behind, with respect to its direction of motion. It would not be a real CP anymore. Such a structure could certainly no longer be called EEC (a bicycle without wheels and with a rocket engine and a space capsule would no longer be called "bicycle" either, because what meaning would then have a sentence like: "I came by bike."?). It is also not to be expected that such an over-light structure still has the properties of an EEC, it is rather a super-light-space structure.

It is not clear what happens when crossing the light wall in the small area of infinite energy-density. The charge-, energy- and momentum-conservation must apply in any case. That, what would be left over after crossing the wall of light could probably no longer interact with EECs in common ways, because such overlight objects have not yet been measured, which means that they either do not exist, or that they are not part of our reality. Not being part of our reality may be nothing special when our reality is a straw hut on a godforsaken island, while there are huge metropolises and palaces everywhere else.

Our world is the world of the EECs and their fields. Everything that has nothing to do with our EECs, has nothing to do with us.

In short: the CPs of our EECs are never faster than LS.

The space-time fields of our EECs, on the other hand, *always* have LS. All observers always confirm that. And that seems very plausible. Because the velocity of a CP of an EEC is nothing more than a change in the wavelengths of the fields of the EEC in one direction. The velocity of the fields (i.e. their LS) is not affected in any way. Thus, if *one* observer makes the determination that the LS of the fields of the EECs is independent of the velocities of their CPs, then all other observers will have to make the same determination. Here is an example with a train: an EEC rests in a moving train. For the fellow travelers, the fields of the EEC of course have LS. But even a very attentive observer along the way (who is not inside the train) would find that the fields of the EEC have LS, only their wavelengths would be altered due to the velocity of the train (how this mysterious observer at the wayside does the necessary measurements, will probably remain his secret).

It all seems trivial. But for it to work, there has to be time dilation, length contraction, and desynchronization (by desynchronization, it is meant that the clocks in a moving inertial system indicate a later time at the rear than at the front; some divers of synchronized diving, who studied physics on the side, occasionally tried to assert relativistic effects, but they could not convince).

Imagine a solitary EEC. When it has a velocity, its time automatically goes slower (because of time dilation), which also decreases its mass-frequency. How does the lone EEC know how fast it has to tick? Well, it does not know. It does not really know anything. It does not even know that it is moving. It simply emits its field with LS evenly in all directions. Only those, for whom the CP of the EEC moves, see the strange space-time phenomena. And that happens only because the fields of the EEC keep their LS regardless of the velocity of the CP.

So the question that still wants to be answered is: why are there no EECs whose fields have any other velocities than the LS?

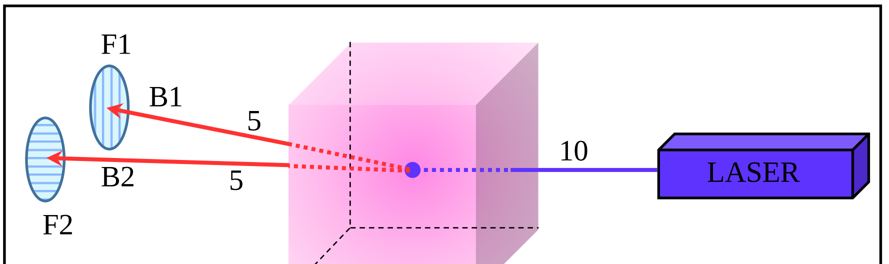
The answer is surprisingly simple: even if the fields of these new EECs do not move with LS, they should not differ in all their other properties from the old EECs (whose fields move with LS). And that means that even for these new EECs the velocity of their fields (which is not the LS) is not affected by any velocity of their CPs. And that's what really *all* observers need to observe. And immediately the observers have a problem. Because they can only set their time dilation, length contraction and desynchronization to one velocity (e.g., the LS). All other velocities are then no longer the same for all observers. There can only be one speed that is the same for all observers. If the observers choose the LS, then the new EECs will not behave like real EECs. Then they will not be EECs, but something unknown. And we, we live in the world of the EECs. And anything that is not an EEC does not belong to our world. And the mysterious, new pseudo EECs enjoy themselves in their very own universe.

The fragmentary "jump" (entanglement)

In a chapter on EMWs, those over-zealous EMWs should be mentioned, of course, which cause the entanglement in their search for the extraordinary.

The phenomenon of entanglement is always exotic and often dramatic: It can be two prince siblings. He fights for the evil, she for the good. The evil seems invincible. But there is a tragic and guaranteed touching way out. Every time he is injured, exactly the same injury occurs instantly with her as well. And vice versa. And he knows that; what he does not know is how far she will go to stop him... very dramatic. Suppose, if one of the two would explode, would the other also explode? If that were in principle possible, then somebody could build a bomb that could not be detected as a bomb: He would create two entangled metal balls, and leave one of the two balls empty and place it in the middle of the international gathering of all the babies and kindergartners, all of whom have brought their cuddly toys, and he would fill the other of the two balls with explosives at some distant place... We may think that someone, who is smart enough to build such a bomb, would be even smart enough not to build it, but, really, since when does the soul of a human being has to do anything with his intelligence...

Yes, o.k., there are still other forms of entanglement. We can radiate a photon of the energy of 10 (pretty) units into a special crystal. There, the photon decays into two photons of the energy of 5 units. These two little photons a la 5 units (each a little prince) move in slightly different directions and, if the experimenter is lucky, can be entangled - what is done to the one little prince happens to the other. In order not to be unlucky, the experimenter sends a continuous laser beam into the crystal (see Sketch S.Entanglement), and receives two beams of light (B1 and B2) that guarantee (by the laws of nature, after all) a certain percentage of entangled photons.



Sketch S.Entanglement

The entanglement is often measured by the polarization. The two small rays should not be polarized. As long as only *one* of the two beams is measured with a polarizing filter (e.g., F1), it is confirmed that it is not polarized. But as soon as the experimenter also wants to measure the second beam with a second polarization filter, while leaving - e.g. out of forgetfulness - the first polarization filter in the first beam, the accident happens: the second beam is partially polarized. Immediately the first beam is examined, and lo and behold, that also is now partially polarized. Immediately the second filter is removed and the polarization at the first beam is gone.

The obvious assumption, of course, would be that some feedback occurs through the filters. But the filters do not reflect, and after (that is behind) the filters the beams are absorbed.

And suddenly it seems easy to believe in a "spooky long-distance effect". It would be exciting to the extent, if the haunt would confirm. Finally, an insight into the infinite variety of space-time areas that goes beyond our small, limited perception.

On the other hand (even if I do not like it), some kind of feedback is much more likely, because unlike the "spooky long-distance effect", a feedback can be justified directly, as soon as we find something that can feed back.

Let us remember how a photon arises. Some EECs in an atom oscillate, creating a photon. But we have seen it before: this process is not trivial. Everything has to fit exactly. It is very unlikely that the oscillation is so perfect right from the beginning that nothing is ever lost, that all its energy is perfectly combined to form a photon. Already the excitation of the energy levels will be quite turbulent. And such an atom is a very dynamic entity. - It's as if a very small child on a very large swing wants to swing calmly and harmoniously with thundering gale-force gusts.

The point is: generating a photon will likely produce many wave *fragments* that contain no significant densifications. Many of these fragments may arise even before the photon. - In this picture, a photon would be like an aircraft carrier, surrounded by many smaller ships, and sending its planes far ahead. Or the photon would be like a conqueror whose lore conquers the thoughts of men long before him. And the fragments would be like an e-mail announcing that Uncle Photon wants to visit; desperately it is written back that polarizing filters block the streets, but too late, uncle Photon is already on the way.

Unlike the photons themselves, their wave fragments can be reflected on the polarizing filters. The photons, on the other hand, with their massive densifications, either shoot through the filters or they are absorbed or dissolved. When the absorbed photons dissolve, wave fragments are formed again. And all these reflected or newly formed wave fragments are highly polarized when they return to their crystal. The influence of the wave fragments is small, since they do not contain strong densifications, but it was enough to astonish the experimenters.

One problem still exists: if a filter reflects partially polarized wave fragments, then this one filter would have to feed back the generation of its own beam already, which would measurably increase the intensity behind the filter, but, of course, that does not happen.

There is a simple explanation: when one of the laser photons (with its 10 units of energy) decays into two photons, it does not simply burst like a small stone in whose path happens to be an anvil. Instead, two coupled oscillations of EECs arise that produce two small photons, whose polarizations are rotated by 90° to each other, and which move in slightly different directions. And it seems that the partially polarized wave fragments coming back from the filter of the *one* direction can only affect the oscillation of the *other* direction. The reason for this strange behavior could be related to the direction from which the reflected wave fragments come from. It seems as if, with these crystals, the feedback would not work if the direction of the *motion* of the (returning) wave fragments is rotated by 180° to the direction of the original emission in the crystal. Instead, the influence of the reflected (returning) wave fragments is transferred - over the coupling of the two oscillations of the paired photons in the crystal - to the other, complementary oscillation. So, the entanglement takes place - as we now recognize - by the "jump" or by the transmission of the feedback from one direction to the complementary direction. This "jump" is the actual entanglement. Obviously, it is a special property of the pairing of photons that appears under special circumstances (such as those found in special crystals). - It is as if a magician disappears through a trapdoor and suddenly appears elsewhere. And while the male spectators admire the professionalism of the lightly dressed female assistant, and the female spectators dream of the attractive magician, he has all the time in the world to polarize the complementary photon beam.

In any case, we now understand why two polarization filters are actually needed.

By the way, in experiments we should keep in mind that the wave fragments are not only reflected more easily than photons, but they are also likely to transmit more easily. Thus, even *before* one of the pair-photons is finally emitted, some of the fragments could have transmitted anywhere, and have long ago returned from their reflection and polarized the complementary photon - assuming, of course, that the corresponding filter is not too far away.

Nowadays, the entanglement has long been measured even with EECs, but that is not surprising, since photons and EECs are very similar, in particular, both have wave character.

On the one hand, it is true that the reflected wave fragments and their "jumps" might well explain the difficulties encountered by experimenters in creating entangled photons; on the other hand, all of this could just be nonsense - time will tell, and if need be, heal all wounds.

So

That EMWs have no electric fields is original.

That the quanta of the EMWs are stable space-time densifications seems a bit infantile. This has to be analyzed much more carefully. How, for example, does the energy of the oscillation of two oppositely charged EECs gets into a photon?

Photons have similarities to EECs. They can collide with EECs and they consist of similar fields as the EECs. But photons are more unstable than EECs, they act like imperfect EECs. It's almost as if EECs were producing fragments of themselves, if they are excited.

The special thing about photons for us is that they can overcome the electrical neutrality of normal matter. Without this ability of photons, we would know much less of the universe, because electrically neutral matter would not be very communicative without photons.

Electromagnetic waves in gravitation

Non-vacuum slows down the quanta of the electromagnetic waves

Electromagnetic waves (EMWs) are composed of the same very ordinary fields as the EECs. Within this fields, densifications are formed (whose density increases towards the center), which we also know as quanta. The quanta, for their part, can collide with the EECs, almost as if they were also EECs - and for the quanta, the momentum- and energy-conservation can be applied almost as if they were particles. On the other hand, if the fields of EECs have no densifications (that is, they have no quanta), they can not collide like particles - without densifications there are no exclusive particle collisions for the fields.

When quanta (e.g., light quanta) are transmitted through matter (e.g., glass), their velocity slows down (becoming slower than the LS of the vacuum). The reason for this is simple: the quanta are on their way through the matter in constant interaction with the quite frequent EECs. - Similarly, a falling refrigerator is slowed down by a tree. Or it's like being in a mall: it's usually not possible to transmit the children through the sweets- or toy-section without slowing down (from vacuum speed) (for (chic) women it is the shoe-section, for (real) men the tool-section).

The quanta-free, flawless fields of EECs, which have no densifications or other inclusions, move also in matter with the vacuum LS. A pure field can not be stopped by anything (although, of course, it can be superposed, but that's a completely different song). It would be rather strange if the pure fields were slowed down in matter much like the quanta of EMWs, especially since the velocities of the quanta are frequency- and material-dependent Then the fields would have a different speed in e.g. gold than in e.g. hexagonally arranged carbon. That is very unlikely.

Quanta in the scrum of the gravitational field

By the general theory of relativity and by observations, we know that the quanta of EMWs can be slowed down not only by matter, but also by gravitational fields, which is measurable especially for larger masses, such as the sun, the moon, and black holes.

A gravitational field, such as that of the earth, arises from unimaginable many multiplied with unimaginable many multiplied with unimaginable many EECs that move all. And all their fields are superposed to form the gravitational field, which, on closer examination, is anything but homogeneous. On closer examination, we will inevitably see countless densifications that are very small and - unlike the quanta of the EMWs - completely disordered and therefore also very short-lived.

For our everyday life, this dense bustle has no meaning. For the quanta of the EMWs, on the other hand, this scrum is an undeniable fact. Much like in matter, they are slowed down in the scrum of the gravitational field. The LS is thus height dependent. A direct consequence of this is that the wavelength of a quantum becomes smaller on its way down because it is compressed by the slowdown.

We can try to measure the LS, e.g., on the earth's surface. If we use light-clocks (that are photons that oscillate between two mirrors), it will not surprise us that the result is again the vacuum LS, because the light-clocks are slowed down to the same extent as the light. - When we slow down our internal clock (for example, on vacation), we do not even notice that we are moving more slowly. The environment does not move suddenly like in time-lapse. Anything that's too fast, we just do not realize: A passing car? Way too fast. A cyclist? Too fast. A pedestrian? Almost not too fast. And a crawling snail? But, that snail is in a hurry...

We could use quartz or atomic clocks to measure the LS. But, of course, the EECs will slow down as much as the light through the scrum of the gravitational field or, as one might call it, the "dynamic grain" of the gravitational field - and with EECs the atomic clocks slow down as well. This slowdown of the EECs is usually very, very small, except near black holes, and can barely disturb the immense forces that hold an atom together so that atoms will not be disturb or (even worse) destroyed.

So, with a clock on site the slowdown of the LS can not be measured. The on-site observer could observe the star constellations and use them as a clock - he might as well use the constant continental drift over long periods of time as a stopwatch for a men's 100m sprint (the ladies are of course a bit slower...).

Ultimately, only remote observers can observe the slowdown of the LS as it causes a gravitational field. And astronomers often observe sufficiently distant objects.

The best of all principles: the equivalence principle

Unlike the quanta of EMWs, the pure fields of EECs, even for a distant observer, retain their LS even as they move through a gravitational field. It almost seems as if the pure fields of EECs would *always* have LS - unless, of course, the observer himself is *accelerated*. What happens with the LS during acceleration, is so far completely unclear. The easiest acceleration is when a system accelerates evenly relatively to the environment without changing the distances between the accelerated observers (relatively to the environment). After the end of the acceleration, the observers of the formerly accelerated system will notice that (in the direction of the acceleration) the distances between them have increased, that their clocks are out of sync, and that their clocks are no longer in line with those of the environment (the latter is particularly true if their clocks prior to the acceleration coincided with those of the environment). Now we could make all sorts of assumptions about how to take into account the extension of the accelerated system and the changes of the clocks during the acceleration in the calculation of the LS in the accelerated system, but, really, that would be just guesswork. I do not know how much reliable information is available about the LS during acceleration. Einstein, anyway, solved the problem with the equivalence principle (in free fall, the LS is free too).

The equivalence principle is fabulous. It allows the *calculation* of the LS in the gravitational field. It would hardly have been possible to calculate the LS based on the "dynamic grain" of the fields of the EECs, since we know very little about the "dynamic grain" - and we could not know too much about it, because it does not form (even only slightly) stable particles or complete waves. Accordingly, we can not know how the "dynamic graining" slows down the quanta of the EMWs and the EECs.

The equivalence principle offers an almost classic solution: we do not ask how the gravitational field - which causes the gravitational acceleration - changes the LS. Instead, we assume that the LS does not change in free fall in the gravitational field, and calculate how space and time would have to change to make that possible. It's as if we "turn off" the change of the LS in the gravitational field and see what happens. - Take e.g. a herd of cows that is always and constantly accompanied by a chirping swarm of birds. If we want to know what effect the chirping has on the cows and since we can not just ask the cows, we turn off the chirping. Eventually, the cows suddenly start dancing the Lambada, which is exhausting, so they give less milk. The wise farmer will switch on the chirping again immediately. On the other hand, unhappy cows give less milk, and perhaps the chirping makes the cows unhappy. There is a fine line between dancing the Lambada and unhappiness, which provides the most milk - I digress…

In any case, the LS in a gravitational field is correctly calculated using the equivalence principle. Whether the freefall is really as free for the LS as it is demanded by the equivalence principle is difficult to verify experimentally, and it really is unimportant. It is essentially all about the calculation method.

Perhaps in the future it will be possible to measure the velocity of the pure fields of the EECs in the gravitational field and to compare it with the velocity of the quanta of the EMWs - then we will see where we are (however, such measurements are always peppered with many pitfalls, and so they are to be treated with caution).

Almost too trivial: denser downwards

The equivalence principle does not only mean that the LS gets smaller with an increasing gravitational force (i.e. downwards), and that the time passes more slowly (downwards), but also that the scales shrink downwards. This, of course, has to be this way: An observer on (e.g.) the earth's surface sends a beam of light vertically upwards for a certain distance where it is reflected back by a mirror. Since the light beam is at the top (near the mirror) slightly faster than at the bottom (near the observer), it returns faster than the vacuum LS allows. A distant observer (who, by the way, is an alien, because he observes the earth from far away) simply corrects the small mistake by moving the mirror a little bit further upwards, in such a way that the earthly observer will not notice any difference in distance - this is possible by stretching the scale or space between the earthly observer and his mirror. In this way, the beam of light will travel a little longer for both observers than before, and if the alien has done everything right, it will reach the earthly observer (who might be human, for example) with LS. If the possibly human observer ("human" does not mean that he has particularly deep emotions, but only that he is a human being - about his emotions we do not need to know anything here) sends a beam of light vertically downwards to a mirror, it is similar to the light beam sent upwards, only that the scales are not stretched this time, but compressed. In short: the scales are compressed from top to bottom.

With all this, we do not want to forget the horizontal direction, because in order to retain the LS constant also in the horizontal direction, the changes of time and space must be exactly coordinated, which is not trivial, which the general theory of relativity impressively shows.

That the LS becomes smaller in the gravitational field is due to the "dynamic graining" of the fields of the EECs. That time is slowed down in the gravitational field is due to the slowed LS. But why should space be compressed and become denser? But, we already know that: the space-density of the fields of the EECs increases towards the CP. It almost seems as if gravitation gives us - at the end of this paper - a little consolation by giving us a tiny hint of the meaning of the space-density of the fields of the EECs. Because still the space and time values of the fields of EECs are completely unclear. Only that the velocity of the pure fields of the EECs is *not* influenced by their space-density must be clear, since the fields of EECs otherwise would be constantly strongly deflected, so that the electrical and magnetic forces, as we know them, would not come about.

The free case of the magnets

It may be interesting that there is a magnetic equivalent to the free fall of gravitation. Imagine a very large magnet whose magnetic field is reasonably homogeneous over a large area, and which (very implausibly) represents the earth. From that field, a very small, very weak magnet is attracted and accelerated. If a second, identical magnet is added (it is important that the degree of magnetization is the same), then not only the magnetic force but also the mass doubles, and thus the acceleration remains the same. Here, the similarity to gravitation ends already, because magnets are much crazier than masses.

So

The fact that time may not go by in the same way always and everywhere is already more than just general knowledge, it is almost everyday knowledge. But really, what a fascinating reality. For example, on the Earth's surface, time passes more slowly than on the Martian surface (Mars is smaller than the Earth). Should any descendants of humans live in the Jupiter atmosphere, their time will pass even more slowly. And near a black hole, time almost stops. - This seems somehow practical: maybe in the distant future somebody will be able to isolate and extract the time-delaying properties of a black hole and integrate them into a refrigerator - the expiration date of the food could be extended by millions of years.

Temporarily last words

After writing everything important, I allow myself to conclude with some completely over-the-top, philosophical notes that scoff at any seriousness. Nevertheless, these thoughts are fascinating; and who knows, maybe it just happens that it's not all crazy sci-fi.

We have seen it throughout this paper over and over again and again that the entire space, even the entire universe known to us, is tightly packed with highly dynamic space-areas, which may even have any speed. Already the fields of the EECs, which seem very familiar to us, create a barely imaginable dynamic in the space-time.

And we are not aware of this unimaginable dynamic.

It is believed that the universe we know consists *mostly* of dark matter and energy, well, that is certainly not exaggerated.

Our world is the world of the EECs (including neutrons, of course). It's an orderly, quiet, almost idyllic world, compared to the other 98 (plus a few squashed) percent. Anything that can not communicate with our EECs in such a way that the consequences are perceptible to us, simply does not exist for us. The EECs, that are so important to us, could do "things" that we can not even guess that they are doing them. And what all the other objects can do, of whom we do not even know that they exist, we can not even try to guess.

“There are more things in heaven and earth, than are dreamed of in your philosophy.” Shakespeare wrote. Yes, you can say, there is more, much more. Such an immensity, even Shakespeare could not have meant.

It becomes exciting, but also mystical-religious, when we imagine that there can be *connections* between our EECs and the innumerable objects of the reality that is hidden from us. In our world, complex life has evolved that has - as we call it - intelligent behavior. And if the EECs of intelligent beings are connected to the space-time objects of hidden worlds, is it not logical that these objects could have something that is similar to our intelligent behavior? (That was a suggestive question, by the way.) And if there are connections, then there will be some form of exchange between the connected participants, even if we do not notice (as if we believed we were having a soliloquy while in fact we were actually talking to somebody). These hidden connections could be very extensive, and our intelligence and consciousness would be but a tiny fraction of a much broader intelligence and consciousness. It would truly be tragic if none of the intelligent realities ever gained knowledge of the other intelligences.

But maybe it's just us, not noticing anything. But we also continue to develop - or at least say that genetic engineering and artificial intelligence will change a lot in the future. Anyway. Anyone who really believes that religious ideas are physically nonsensical has not understood how little he knows.

Maybe we should not take ourselves too seriously. At the end of the day, we are only thinking space-time. And that's really perplexing, especially when we think of all our joys and fears, worries and hopes, love and hate: that´s all just thinking space-time.

We have learned in this paper that we live in a world of EECs.

The inert mass is an oscillation of the space-time fields of the EECs. Magnetism is an angle in the fields of EECs. And gravitation is the distance-dependent change of the space-density of the fields of the EECs. Why can EECs not have some more properties that produce some more forces?

Of course, the strong and weak nuclear forces will probably be due to the oscillating CPs of the EECs. But we know those forces. Is that really supposed to be all that exists? Well, there is the spin that certainly will have some effects, so what? Well, I'm afraid that there are no more forces for the time being. Everybody who is much too unhappy now, may imagine tables full of sweets, unlimited vouchers for pastry shops, romantic evenings for two, or whatever makes happy...

This is not the end, here. This is a small start, because there is still endlessly (that is meant literally) much to do. And it is us, who will work, and it is us, who will think, because we can not expect space-time to think on its own.

Vita

Birth and death: I was born in 1967, on 11.11. at 11[11] o'clock. Hoping that I'll be 111 years old is too optimistic. I'm lucky that I did not die in 2011.

My childhood and youth I spent alternately in Germany and Greece, alternating between German and Greek schools. That was varied and maybe sometimes difficult, but it was never boring - the best of all mothers (my mom) made it possible for me, and later also for my 11 years younger brother, with great strength and wit, to have a wonderful childhood and youth - even if we did not always thank her, of course.

I was just 12 years old when we spent a night on the beach (because the handful of guest rooms that existed in the bay were all occupied) with a German teacher in August in a secluded bay where there was still no electricity, on the island of Sifnos in Greece. As night fell, an indescribable starry sky unfolded, and with the knowledge that the teacher could mediate, the stars got 3 dimensions.

Earlier, when I was about 6 years old, two speaker magnets were my favorite toy. How could I not have been interested in physics later? - Fate sometimes goes cruel ways. There is a child that has all the possibilities that exist...

After many detours, I started to study physics, but after some more detours, I finally had to stop.

From then on, it was occasionally quite unpleasant, but the physics has always accompanied me - until today.