About the Dual Parametrization of *c*

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"To achieve .. a uniform description of nature, it appears to be essential to have recourse to the archetypal background of the scientific terms and concepts." - Wolfgang Pauli

The unification of relativity and quantum mechanics is the main problem of modern physics. It is still unsolved. The root of this problem could perhaps be the relativistic postulate of the invariance of the speed of light. In countless experiments it was found that the speed of light does not depend neither on the velocity of the light source (c_1) nor on the velocity of the observer (c_2), but in special relativity this dual constancy of light (c_1, c_2) is not understood well. In Einstein's theory these two parameters c_1 and c_2 are simply supposed as two fundamental principles of nature. In this paper it is shown how this dual constancy of light (c_1, c_2) could be considered as an expression of the quantum mechanical wave-particle-dualism. This quantum-mechanical interpretation implies not only a dual parametrization of c, but the existence of a sort of ether (probably the vacuum) as well. As the result of the dual parametrization of c an etherdrift is predicted, that is significantly smaller than all the values which were expected in previous times. Even if the velocity of Earth of approx. 390 km/s with respect to the cosmic microwave background is taken, the observable ether drift would only be of D = 0.0003 km/s.

1. Introduction

The new physics presented here is based on the assumption of an *invisible* medium, which is called in philosophy the ONE. The property of invisibility is only one property of the One. There is a more extended set of similar properties like Absoluteness, Oneness and Omnipresence. Since all these properties are related to the One, they naturally do define the most fundamental level of scientific inquiry that can be reached at all.

All past attempts to determine the precise physical meaning of these meta-physical properties failed, but it is in fact possible to succeed. It was found, that a universe with an invisible foundation had to be organized in a very special, unique way. The property of invisibility f.e. can be explained as the result of a radical non-dual conception of the universe. This explanation is called the "Principle of Radical Non-Duality", and can be defined precisely. It requires that not the speed of light c, but the speed $v = \infty$ must be the ultimate limiting speed of the universe.[1]

By applying the Principle of Radical Non-Duality to special relativity a specific spacetime arose. This spacetime looked very much like a MANDALA. A Mandala is a higly symmetrical and beautiful structure. It is geometrically composed of a circle and of a square, which are closely "entangled" with each other. Initial investigations showed that this archetypal structure surprisingly possessed a *Lorentz invariant structure*, just as special relativity did.

The spacetime of the Mandala appeared therefore as a physically meaningful matrix. It captured evidently fundamental features of the universe in a correct manner. In connection with the fact that it was based on an all-permeating medium, it opened the possibility, to look at the ether from a completely new point of view. This new look offered at the same time a way how special relativity relativity could be overcome, because it was just the unability to explain the invisibility of the ether that Einstein should lead to his theory: As the ether deprived of any observability, he concluded erroneously that there was no ether *at all*. Just this conclusion should lead him to his theory, which is still subject of intense debate since more than one hundred years.

Although this invisible medium, which shall physically be named **Meta-Ether**, could not be observed, its visible expression, that is, the archetypal space-time-structure of the Mandala, was found to be observable. It differed recognizably from the relativistic one. This difference could be isolated and defined: Like classical wave theory, which describes the propagation of waves *in a medium*, the structure of the Mandala allowed to differentiate clearly between the motion of the source and the motion of the observer. Although both patterns of motion were equally governed by a Lorentz transformation, *both transformations were slightly different*. Special relativity denying the existence of such a medium does not predict any difference between these two modes of motion.

The mathematical background of this subtle difference is the special design of a Mandala: As the result of its dual geometrical composition not only the fundamental constant of c was given *twice*, two different types of Lorentz transformations were also given.

2. Physics of Mandala: A Retrospective

In the paper "Do Space and Time have an archetypal Design?" some selected steps were described how the structure of the Mandala could be identified as a physically meaningful blueprint of the universe.[2] In the following diagram this archetypal blueprint is shown.

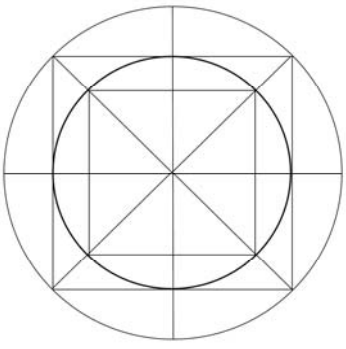

Fig. 1. The archetypal structure of space and time

In the above-mentioned paper I reported about a special geometrical language, which was highly important in order to be able to recognize the physical meaning of this archetypal structure. This language was developed by the physicist *Lewis Carroll Epstein* with the intention of explaining the special theory of relativity in such a way that it shall give the feeling of being back home on familiar and logical ground. This language bases on a special sort of diagram, which Epstein named "space-propertime diagram".

The physical idea behind this diagram is the assumption that there is only one speed: *Everything is always moving at the speed of light*. Nothing can ever be done to alter the speed of anything. Only its *direction* of motion through spacetime can be altered. This diagram thus has to be read in a specific way: "Why are the clocks moving through space perceived to run slower and slower as they travel faster and faster? Because a clock properly runs through time, not through space. If you compel a clock to run-through space, it is able to do so only by diverting some of the speed (of light) it should use for traveling through time. As it travels through space faster and faster, it diverts more and more speed. The most extreme case is given by the velocity of light: If a clock is going through space as fast as it possibly can, then there is nothing left for traveling through space. The clock stops ticking. It stops aging."[3]

The connection between space and time in Epstein's diagram is guided by the simple equation: $x^2 + y^2 = 1$, in which the fundamental constant of c is defined as c = 1. This equation satisfies the condition of the Lorentz Transformation. It shows how space and time are "mixed" in dependence of the (relative) velocity of the observer. The physical meaning of this relativistic feature is illustrated in the following two diagrams.

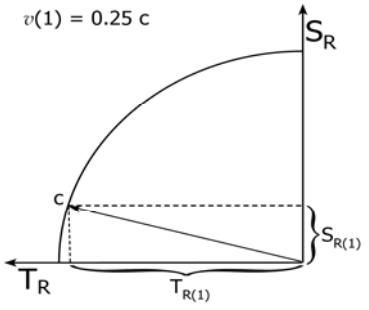

Fig. 2a. -v = 0.25 c

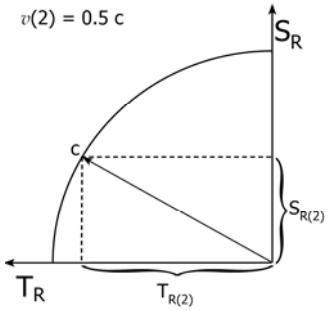

Fig. 2b. v = 0.5 c

Figure No. 2a shows an object, which is moving through space with the speed of 0.25 c ($S_R(1)$). As the result of this motion the speed of time is in accordance with the above-shown equation reduced: $1 - (0.25)^2 = 0.9375$ c ($T_R(1)$). Figure No. 2b shows the same object, now moving with the speed of 0.5 c ($S_R(2)$). Since its speed through space becomes faster, its speed through time becomes slower: $1 - (0.5)^2 = 0.75$ c ($T_R(2)$).

As Epstein uses these diagrams as a geometrical tool to describe special relativity, space (S) and time (T) have to be considered as *relative*: S_R, T_R. But to defend these diagrams as the visible expression of the Meta-Ether, space and time had to be defined in the opposite way, that is, as absolute terms: S_A & T_A. Otherwise they are physically and logically not compatible with the Meta-Ether (i.e. the One), which is unambigiously defined by the property of absoluteness. Later it shall be shown in which way the Lorentz transformation is satisfied by this preferred frame of reference.

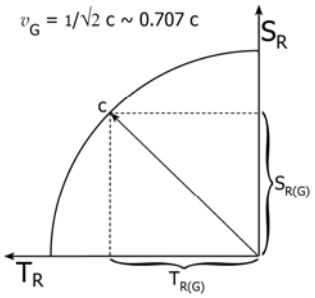

Fig. 3. Spacetime at the Gödel-Point

However, Epstein's geometrical language proved to be a very effective tool in deciphering the structure of the Mandala. In this structure the subluminal speed of $1/\sqrt{2}$ c (called the *Gödel-Point*) was already identified as a crucial point, long before Epstein's language was applied. It was directly connected with a hidden superluminal space-time-section. The *conscious* application of Epstein's geometrical language to this selected point of velocity unveiled a very specific spacetime-picture, shown in Figure 3.

This space-time-element could easily be recognized as an integral blueprint of the structure of the Mandala. It reflected the prominent character, that was distinguished by the Gödel-Point.

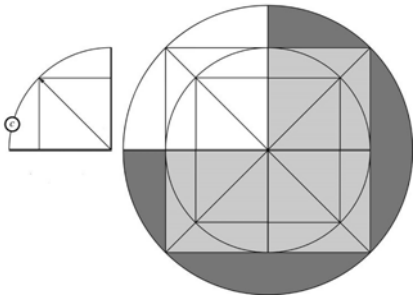

Fig. 4. The World at the Gödel-Point

Such discoveries recommended Epstein's language as a highly useful tool in order to explore the physical meaning of this universal archetype. And in fact by using this tool in a more systematic way a surprising insight came up: Like special relativity the space-time of the Mandala seemed to have a Lorentz invariant structure, which is highlighted in the following diagram.

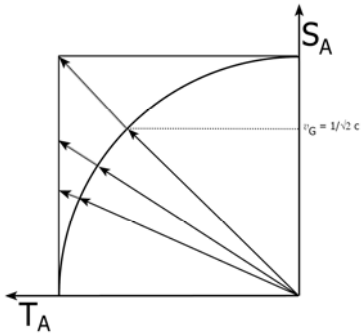

Fig. 5. The Lorentz invariance of the structure of the Mandala

If we use the familiar Lorentz transformation and calculate the corresponding γ-factor of the Gödel-Point, that is, of the speed of $c/\sqrt{2}$, then we will get the value of $\gamma = \sqrt{2}$. Now let us consider the structure of the Mandala. In this structure the speed of $c/\sqrt{2}$ (or ~ 0.707 c) is placed *at the angle of 45°* if Epstein's geometrical language is applied. If we look at the ratio between the corresponding *vector of the square* and the *vector of the quarter cir-*

cle at this specific angle (resp. velocity) we can immediately see: We get exactly the same value like in SRT:

$$\gamma M = 1.414\ldots \;:\; 1 = \sqrt{2}$$

This surprising insight signalled that the structure of the Mandala could be understood as a new kind of a Lorentz-invariant spacetime. The paper "Do space and time have an archetypal design?" finished with this insight.

In the subsequent chapters I like to show why a theory which follows the lines of the Mandala-spacetime could be a more fundamental and a more accurate theory about the universe than the special theory of relativity, especially with respect to its most weird postulate: The principle of invariance of the speed of light. We shall see that this principle (i.e. the fundamental constant c) has probably to be parametrized *in two different ways*.

3. Special Relativity – In a Nutshell

Special relativity (SR) - also known as the special theory of relativity or STR **-** is a physical theory about measurements in inertial frames of reference. It was proposed in 1905 by Albert Einstein in the paper *On the Electrodynamics of Moving Bodies*. It has generalized Galileo's principle of relativity – that all uniform motion is relative, and that there is no absolute and well-defined state of rest (no privileged reference frame) – from Newtonian mechanics to all the laws of physics, including the laws of electrodynamics. This generalized principle of relativity makes sure that the measured velocity of light does not depend (a) on the motion of the source ($c = c_1$) and (b) on the motion of the observer ($c = c_2$).

At the end of the 19th century only one of these two constancies of light, that is, c_1, was clearly recognized. It became unequivocally visible after the Michelson-Morley experiment (1887) had performed. The physicists still believing in the existence of the ether expected that the speed of light c measured by a moving observer would lead to a change of its speed in different directions. But the speed of light was always the same in all directions, that is, $c = 1$. There was no detectable motion with respect to ether.

This experiment became known as the most famous failed experiment to date. Instead of providing a confirmation of the existence of the ether, the measured velocity was only approximately one-sixth of the expected velocity of the Earth's motion in orbit and "certainly less than one-fourth". Although this small "velocity" was measured, it was considered far too small to be used as experimental evidence of ether. Later it was said to be within the range of an experimental error that would allow the speed to actually be zero.

Despite of this null result the most physicists of that time tried to derive the constancy of light as a specific consequence of a specific ether theory.

The physicist George Francis FitzGerald f.e. proposed in 1889 that a body moving through the ether changed its size due to its motion. This length contraction hypothesis combined with the formula of the Lorentz factor could actually explain Michelson and Morley's null result.

A few years later the Dutch physicist Hendrik A. Lorentz recognized that he had to introduce besides the hypothesis of length contraction the hypothesis of time dilatation, too. To describe these two effects consistently he used a specific mathematical tool which became known the Lorentz transformation. But Lorentz' theory was an ether theory: It described these two effects of length contraction and time dilation on the basis of an undetectable ether. Although Lorentz' ether theory was highly effective in explaining all facts, finally it was rejected in favour of Einstein's theory, because it was very complex and tended to use arbitrary-looking coefficients and physical assumptions. In brief, it did not satisfy Occam's Razor.

Einstein's theory satisfied this methodological principle. He was able to derive the Lorentz transformation as well as the two effects of Length contraction and Time dilatation on the ground of two basic principles only: the principle of the constancy of light and the principle of relativity – without invoking a mysterious ether that could not be observed in any way.

Whereas the most physicists tried to explain the constancy of light on the basis of a very complicated and sophisticated ether theory Einstein cutted through all these artificial complexities and took the absoluteness of the speed of light simply as a fact, which had to be taken into account. Then he supposed that Galileo's principle of Relativity was always true (not only in the context of Newtonian mechanics) and asked himself what changes needed in order to make space and time compatible with the absoluteness of the speed of light. He discovered that the ideas of an absolute space and of an absolute time had to be replaced by a relativity of space coupled with a relativity of time.

By the relativity of space and time Einstein could regard all inertial frames of references (i.e. observers) as equivalent. Just this equivalence, which is the central content of his principle of relativity, gave him the opportunity, to explain the first constancy of light c_1 without assuming any ether. The ether became quite superfluous.

But this explanation implied the assumption that the speed of light had not only to be the same in all directions, it had to be same at all velocities (of the observer) as well. In 1905 when Einstein published his SR this assumption has not yet been confirmed by experiment. This experiment known as the Kennedy-Thorndike experiment was first conducted in 1932 – at a time, when special relativity was already accepted as a true theory about space, time and light. This was as I like to show later a tragic circumstance, because the null result of this later experiment was explained on the theoretical basis of Einstein's theory in a completely wrong way.

As SR had denied the existence of a light transmitting medium it did not differentiate between the motion of the source and the motion of the observer. Hence, it describes the two constancies of light geometrically in the same way. This intrinsic conclusion of SR, which is seldom expressed explicitly, takes in Epstein's geometrical language following form:

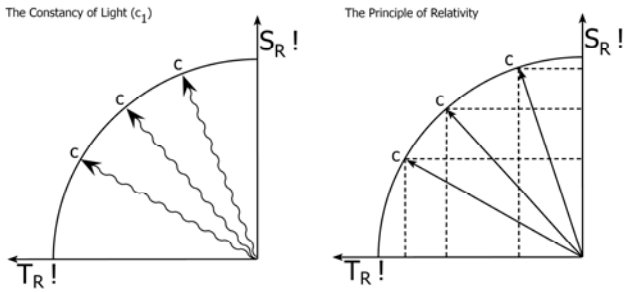

Fig. 6. Two Principles = One Speed = One geometrical Face

According to the Physics of Mandala, this description is fundamentally wrong. The second constancy of light c_2, concerning the motion of the observer, is geometrically codified in a different

way than the first constancy of light c_1: *It actually bases on a square*. The Mandala-view takes the following geometrical form:

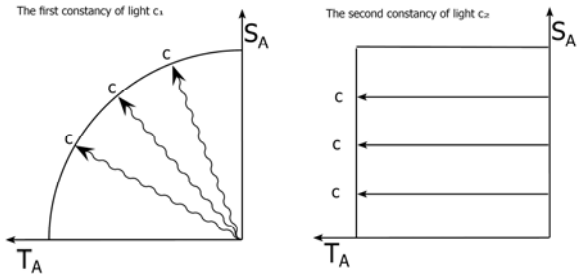

Fig. 7. One Principle = One Speed = Two geometrical Faces

If c_2 would really be codified in the proposed way, then SR has actually erased essential lines of a fundamental blueprint of the universe (i.e. the square). But since this fundamental blueprint, i.e. the square, is parametrized in the same way like the first one, that is, $c = 1$, the physicists did not recognize, what message was truly given by the Kennedy-Thornedike experiment. As the physicists applied the special relativity to this experiment they erroneously came to the believe, that the null result of this experiment has merely confirmed the null result of the first constancy of light c_1 (on the left side) **a second time**. But this is one of the most fatal mistakes that was ever made in physics. Later I like to show how it is possible to explain the Lorentz Transformation as well as the two key effects of SR (i.e. the length contraction and the time dilation) on the ground of this **dual** space-time-picture of the Mandala.

At first I like to show why SR led to this mistake. We shall see, that this mistake, that is, the formal reduction of the square to the quarter circle, was essentially caused by Einstein's rejection of an absolute time: T_A and the introduction of a relative time: T_R. And just this relativity of time is the most critized aspect of special relativity. Many physicists felt that something was wrong with Einstein's theory and they are possibly right.

4. The Wrong Step

From his original work of 1905 we know, that Einstein's approach to his theory was driven by the wish to solve the contradiction between Galileo's Principle of Relativity and the first constancy of light c_1, namely the fact, that light is always propagated in empty space with a definite velocity c which is independent of the state of motion of the emitting body. This contradiction can be given a geometrical form which makes clear, why Einstein's step of introducing a relative time led to a "destruction" of this hidden blueprint of the universe, i.e. of the square.

To explain the apparently inexplicable null result of the Michelson-Morley experiment the physicists tried different theoretical approaches.

It is no accident, that at the beginning of this research process the *Emission Theory* was "felt" as one of the most promising approaches, because this theory is, indeed, in very close touch with this hidden blueprint of the universe. Even Einstein himself tried this theory seriously.

The Emission theory is physically consistent with the negative result of the Michelson-Morley experiment: If light is seen as a stream of particles emitted by the source then the observer which is at rest with respect to the source of light would measure always the same speed of light *independently of the velocity of his (inertial) frame of reference*. If the velocity of light with respect to its source is c, and the velocity of the source with respect to a laboratory frame of reference (i.e. to the observer) is v, then the velocity of light with respect to the laboratory frame of reference is $c + v$.

This description is completely similar with the description of the motion of a bullet fired from a moving gun. It follows the classical law of addition of velocities, which is one of the consequences of *Galileo's principle of relativity*. Epstein expressed this "old" principle of relativity already in a way, that its close relationship to the hidden blueprint of the square can be recognized.[4] In the next figure it is geometrically captured.

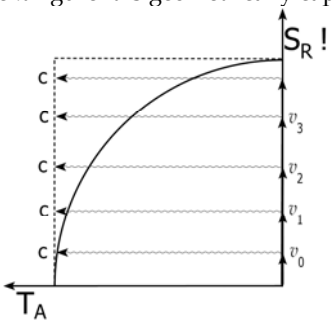

Fig. 8. Post-relativistic View of Galileo's Principle of Relativity

We can see, that in this diagram space is relative, whereas time is absolute. It thus satisfies the basic spatio-temporal demands of Galileo's principle of relativity. If the motion of a *light clock* is described in the context of this spacetime, it leads us directly to the square: If the relativity of space is given, then the motion along the space-axis (i.e. S_R) would not affect the photon's motion inside the clock. Given an absolute time, every observer travelling with this clock would, of course, always measure the same speed of light *independently of the velocity of his own (inertial) frame of reference*. If we extrapolate just this result in a systematic way to all velocities from $v = 0$ until $v = c$ a *square* as a geometrical blueprint naturally appears.

At the beginning of the 20th century physicists couldn't see that clearly, because they were still attached to the Newtonian time. And Newton's absolute time was framed by the speed: $v = \infty$. That a finite speed like the speed of light c (i.e. $c = 1$) could also be a fundamental *frame-limiting* constant of time this insight had not yet been recognized. It was just Einstein's merit to have realized this clearly. Epstein's description of Galileo's principle of relativity makes already use of this advanced insight.

His description allows us, to recognize in a very transparent way why Einstein has introduced the idea of a relative time (T_R) and why this introduction lead to a "destruction" of the square.

If we look at the contradiction between Galileo's principle of relativity and the first constancy of light c_1 through the eyes of special relativity, we will find, that the two geometrical blueprints, i.e. the square and the quarter circle, are physically incompatible with each other.

To unveil this contradiction we only have to apply the two basic postulates of Einstein's theory. If Einstein's second postulate of special relativity (i.e. the principle of relativity) is assumed then the photon has to go up and down without being able to move aside, because the photon does not know the clock is moving. In other words, the photon has to be *somewhere* in the clock, that is, somewhere on the line between the points A and B. Now, if the motion of the photon shall also satisfy the principle of invariance of the speed of light, we have additionally to draw a circle with the radius $c = 1$ centered on the point O, *because the photon always travelled at the same speed of light*. That is Einstein's first postulate of special relativity (i.e. c_1). Hence, there is only

one point which satisfies the first and the second postulate of special relativity at the same time: It is the point, at which that circle intersects the line between A and B. It is point R.

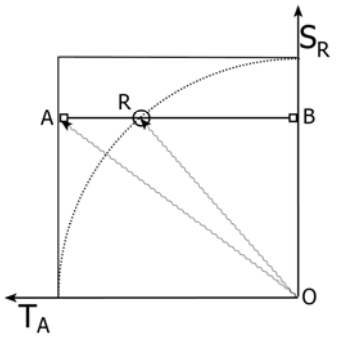

Fig. 9. The "wrong" contradiction

If we look at Galileo's principle of relativity from this postrelativistic point of view, we can recognize, that it contradicts the first postulate of special relativity, i.e. the first constancy of light c_1: Since the distance between A and O is *longer* than the distance between A and B, there is no way the photon, travelling at the speed of light, can be perceived to make it from A to O *in the same time* like from A to B. If we take special relativity as a true description of physical reality, then it is impossible to explain the first constancy of light c_1 consistently on the ground of the Galilean version of the principle of relativity.

Just this physical insight smoothed Einstein the way to his special theory of relativity. If we consider this specific constradicition on the background of Epstein's geometrical presentation we can directly read from the diagram that the replacement of an absolute time (T_A) by a relative time (T_R) is indeed the final step that has to be done to get special relativity.

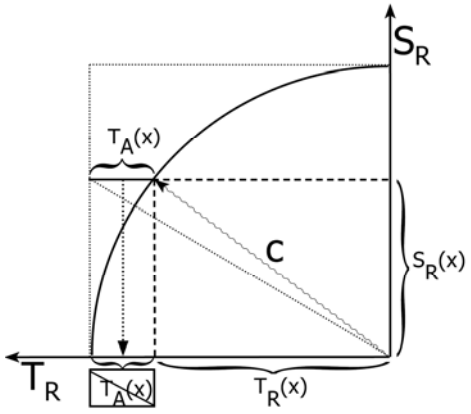

Fig. 10. Einstein's Step

From the view developed here this step may appear as trivial, but it was the most difficult one. In a talk in Kyoto 1921 Einstein reported that he wasted almost a year in fruitless considerations, before he perceived the absoluteness of time as the essential problem that had to be solved. He later referred to this moment of illumination as "the step". [5]

But just this step (i.e. the relativity of time) leads unavoidably to the physical "neutralization" of the square. If we want to reject the notion of an absolute time we have to erase all (horizontal) lines (see: time-line A – R of figure No. 9 or T_A (x) in figure No. 10).

According to the Physics of Mandala just this neutralization of the square was a fatal mistake, because this square is as mentioned previously a fundamental blueprint of the physical universe, which shows, how the motion of the observer along the space-axis S_A is geometrically codified. But why did this fatal mistake happen? It is asserted that it happened because Einstein had solved the wrong contradiction. The true contradiction that had to be solve was just another.

5. The True Contradiction

Special relativity was so successful, that nowadays the most physicists are thinking, that the contradiction between Galileo's principle of Relativity and the first constancy of light c_1 was the true contradiction that had to be solved in order to get an elegant and simple explanation of the absolute constancy of light.

But the true contradiction that had to be solved, is, perhaps, the contradiction between the two classical theories of light: The particle theory of Light (Emission Theory) and the wave theory of light (Maxwell's theory of Electromagnetism). It can be shown that the "Einsteinian contradiction" can equally be understood as a contradiction between these two classical theories of light.

We have already seen that the physical core of Galileo's principle of relativity was actually the classical particle theory of light, whereas the first constancy of light c_1 was related to the classical wave theory, i.e. Maxwell's theory of electro-magnetism. If we like to explain the constancy of light by these two classical light theories we are immediately faced with a physical contradiction. To explain the constancy of light by the classical particle theory we have to assume that the speed of light *depends* on the motion of the source. But this dependence contradicts the assumed *independence* of the velocity of light from the velocity of its source, which is physically given by the first constancy of light c_1.

But in 1900, when the physicists were faced with the inexplicable fact of the constancy of light c the contradiction between the two classical theories of light could not be solved in any way. Although the insight of their incompatibility had become acute, because there was strong evidence that light exhibits two seemingly mutually exclusive aspects, but there was no convincing explanation at hand. The fact, that light could simultaneously consist of particles and of waves, was indeed very puzzling. It became the main challenge of physics for more than twenty years.

In the early stages of the quest for such an explanation this puzzle was even experienced as paradoxical and absurd by the leading physicists like Werner Heisenberg but all experiments do confirm the existence of wave-like and particle-like aspects of light.

Only after more than twenty years in 1925 this paradoxical puzzle could be solved by the mathematical formalism of *quantum mechanics*. Quantum mechanics has meanwhile passed countless successful experiments, that we are sure, it is an accurate description of the universe. Thus we know, that light has a particle-like and a wave-like aspect at the same time. This knowlegde is also known as *wave-particle-dualism.* It is a central statement of quantum mechanics: According to the wave-particle-dualism the particle-like and the wave-like aspect of light do physically not contradict each other, they are instead of that of *complementary* character.

In 1900 the physicists didn't know that, but today we do. *This knowledge gave rise to the idea, that the contradiction between two different geometrical matrices (i.e. the quarter circle = c_1 and the square = c_2), which was solved by Einstein on the basis of a generalization of Galileo's principle of relativity, only arises if they are connected with the classical light theories. If this connection is replaced by the quantummechanical view of light, which considers the particle-aspect and*

the wave-aspect of light as being of ***complementary*** *nature, this contradiction does, perhaps, not occur. This case given, the speed of light c has to be considered as a fundamental constant with two geometrical faces instead of one as we still believe.*

If the dual constancy of light is seen in this way – as an expression of the quantummechanical wave-particle-dualism – then already the Michelson-Morley experiment of 1887 had faced the physicists with a purely quantum mechanical problem at a time when quantum mechanics was still not in sight. It is clear, that they tried to explain this quantum mechanical problem in terms of classical physics. Albert Einstein was one of these physicists.

Although Einstein possibly solved the wrong contradiction, it is quite remarkable that he already has felt the truth behind. Only four years after the publication of his special theory of relativity he declared that a future theory of light would bring a kind of fusion of both classical theories. Einstein reported about this "feeling" in his Salzburg lecture in 1909. In spite of the general belief that the wave theory had completely triumphed over the emission theory, he maintained that "the next phase in the development of theoretical physics will bring us a theory of light that may be conceived of as a sort of fusion of the wave and of the emission theory." [6] At that time Einstein's thesis was so revolutionary that it did not find ready acceptance.

In the following chapter I like to show why the spacetime of the Mandala if considered as a sort of quantummechanical formalism could explain the constancy of light as well as the special theory of relativity did.

6. Mandala: A quantummechanical formalism?

To justify the archetypal space-time of the Mandala as the possible solution of the dual constancy of light the presented paper concentrates only on a specific part of the Mandala. I am calling this selected blueprint "MA_0-blueprint."

The space-axis (S_A) and the time-axis (T_A) of this blueprint are explicitly defined as *absolute* - at least with respect to the visible physical universe. [7]. By introducing an absolute space and an absolute time this blueprint represents a new kind of a preferred frame of reference. It has to be understood as the physical expression of the Meta-Ether. This understanding is nothing new. Already the Newtonian notions of absolute space and absolute time were understood in this way. New are only the framing parameter (i.e. v = c instead of $v = \infty$) and the relationship between space and time (i.e. a very close entanglement or unification instead of being separated):

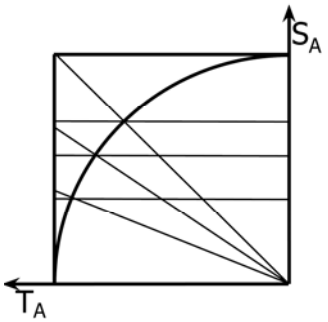

Fig. 11. The MA0-blueprint

If we compare this view of the dual constancy of light c_1 and c_2 with the relativistic view we can easily state, that there is obviously a very great geometrical and physical difference. As far as the physical difference is concerned the Mandala-view is generally defined by absolute terms of space and time whereas SR deals exclusively with relative terms of space and time.

The difference between these two views is indeed so great, that one may ask how the Mandala view can successfully compete with SR, which is one of the best tested theory of modern physics.

Although the spacetime of the Mandala distinguishes clearly between the motion of the source and the motion of the observer, the relationship between space and time leads in both cases to a mathematical formalism, which is equally of lorentzinvariant nature.

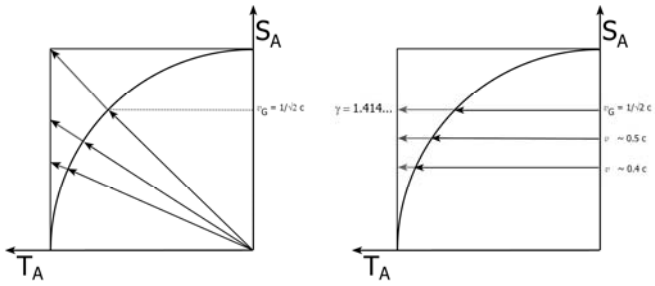

Fig. 12. The Two Types of Lorentzinvariance L_1 & L_2

This surprising feature of the MA_0-blueprint of being identical and different at the same time becomes obvious, if we consider the specific vectors connected with it. One numerical example of this dual Lorentzinvariance is shown below. It refers to the speed of the Gödel-Point:

Transformation	S-Vector	T-Vector	γ
L_1	1.414…	1	1.414…
L_2	1	0.707…	1.414…

Table 1. The Two Types of Lorentz Transformation

We can see, that the two types of Lorentzinvariance (L_1, L_2) lead with respect to the Lorentzfactor γ *to the same results*, *but the mathematical machinery behind is different*.

It is just this difference, by which the Physics of Mandala and Special Relativity can be distinguished experimentally. How this difference can be measured shall be explained in the chapter: "How can the existence of the Meta-Ether be tested?"

To sum up these thoughts it can be said, that the Lorentztransformation can be explained consistently in a preferred or privileged frame of reference if it follows the specific spacetime of the MA_0-blueprint. There is no need to explain this transformation by the relativity of space and the relativity of time (i.e. the equivalence of all inertial frames of reference) as Einstein did. Although the relationship between space and time variies in dependence of the velocity, the spacetime as a whole does not: It is always the same. Space and time are, contrary to SR, absolute.

Einstein rejected the absoluteness of space and time because the Newtonian frame did not have such a lorentzinvariant design. The space-time-foundation established by Sir Isaac Newton followed actually the Galilean transformation. By the MA_0-blueprint an absolute space-time-foundation is given, that satisfies naturally the required Lorentzian symmetry.

Before I like to discuss the physical and philosophical consequences of this specific spacetime, I like to look at those experiments by which the dual constancy of light was *experimentally* discovered. We shall see that in some sense it was a tragic circumstance that Einstein's Special Theory of Relativity was so remarkably successful.

This tragedy can be understood in the best way if the MA_0-blueprint is assumed of being true. On its background all steps of this development become very transparent. We can trace step by step how the story of SR took a bad turn. To deliver a coherent picture of this story I will describe what the physicists of that time expected by conducting this or that experiment, what they believed to have found, what they actually have found and how they finally should explain these findings.

7. The Rewritten History of SR

If the MA_0-blueprint is assumed as the true picture of space and time, the difference towards the relativistic picture of space and time can easily be shown.

In the spacetime of the MA_0-blueprint there are two fundamental "lines" of the universe, which are not covered by SR. According to the Mandala-view these two lines (S_L, T_L) have necessarily to be there if we like to consider space and time as absolute. S_L & T_L are thus geometrical representations of an absolute space and and an absolute time. In SR these two lines are wiped out radically, because in SR space and time are relative. In the following diagram these lines are shown. To make them visible, the Gödel-Point is taken again.

In the realm of very low speeds, like the speed of earth around the sun, these lines are vanishingly small. They cannot be shown in any way by the diagrams used here.

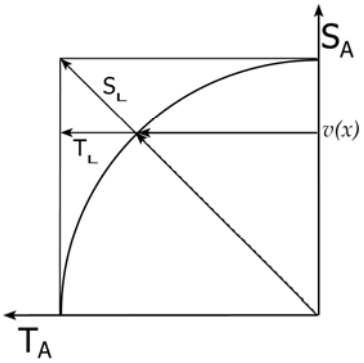

Fig. 13. The Lines of the Old One

The story that should lead to SR started in the year 1887, when Michelson and Morley conducted their experiment. They expected to measure different velocities of light in different directions. This expectation can geometrically be described like this:

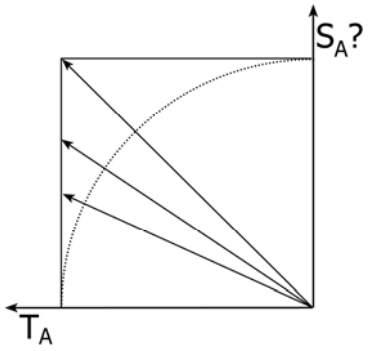

Fig. 14. Michelson's and Morley's expectation

Michelson and Morley believed that nature would answer *positively*. They expected that nature would confirm the existence of the absolute space, i.e. the square. Already at that time space and time were used to describe the physical presence of the ether within our visible universe. In this historical case it was Newton's absolute space. This identification was natural, because the ether was like Newton's absolute space defined of being in a state of rest.

But instead of satisfying this expectation nature answered *negatively*: The two physicists measured only a velocity of the light, which was much smaller than the expected values. This measured velocity was really so small, that the most physicists believed to have found a null result. This common belief can be described like this.

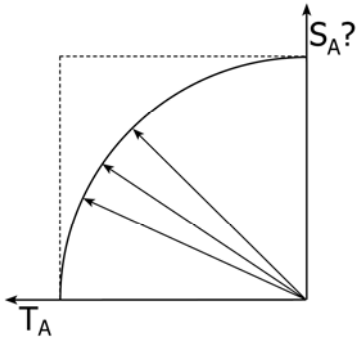

Fig. 15. The first null result

Although this assumed null restult made the ether to an ungraspable physical ghost the most physicists did still believe in its existence. This belief included – at least implicitly -, the belief in the existence of the absolute space, i.e. the square. But to defend this belief, the physicists were faced with the problem to explain why a motion through the absolute space could not be detected. In other words, they had to explain why the anisotropical lines of light (S_L is one of these lines) have not been measured. This explanation was found in the hypothesis of *length contraction*.

According to this hypothesis all objects physically contract along the line of motion relative to the ether, so while the light may indeed transit slower on that arm, it also ends up travelling a shorter distance that exactly cancels out any ether drift. This can geometrically described like this:

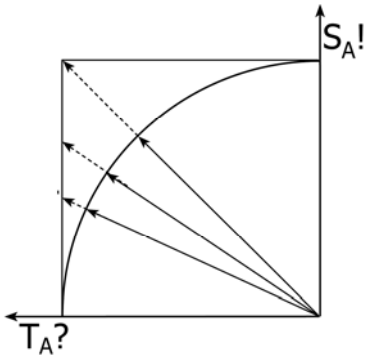

Fig. 16. The Length Contraction Hypothesis

We can see this explanation is physically very close to the explanation yielded by the Mandala-view. But we can also see, that this explanation is not sufficient in order to defend the absoluteness of the time. It was the Dutch physicist Hendrik A. Lorentz who should recognize that one had to introduce besides the hypothesis of length contraction the hypothesis of time dilatation, too, to keep time absolute. To explain this time dilatation Lorentz introduced a local time, which was, contrary to the true or absolute time, only a fictious time, which was measured by an observer moving in the ether. By this hypothesis he was able to explain why the time-line T_L could not be measured.

To describe these two effects consistently Lorentz invented a specific mathematical tool which became known the Lorentz

transformation. In the following diagram this achievement is shown.

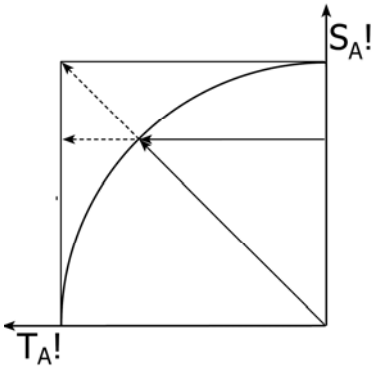

Fig. 17. Lorentz' ether theory

At the first sight Lorentz' ether theory may appear the same like the Meta-Ether theory presented here. But there is a subtle difference between the Meta-Ether and Lorentz' ether. According to the view here these two lines, that is, S_L& T_L, are ***measurable***. This is not the case in the ether theory of Lorentz. In Lorentz' ether theory these two lines were in principle unmeasurable, because his theory referred explicitly to the null result of the Michelson-Morley experiment (~ c_1 = quarter circle).

However, at the time, when Lorentz developed his ether theory, it was a highly effective theory. It could explain most of the known facts including the first constancy of light c_1. But nevertheless it was rejected in favour of Einstein's theory, especially of its ad hoc-character. The local time was certainly of this character. While Lorentz could explain length contraction as a real physical effect, his local time was only a heuristic working hypothesis. It appeared as a mathematical trick to simplify the calculation from the resting to a "fictitious" moving system.

Einstein was able to derive the Lorentz transformation as well as these two effects (Length contraction and time dilatation) elegantly on the basis of two principles only. But this elegant explanation was only achieved by the introducing the first constancy of light c_1 as an absolute parameter, whereas space and time had to be considered of being relative.

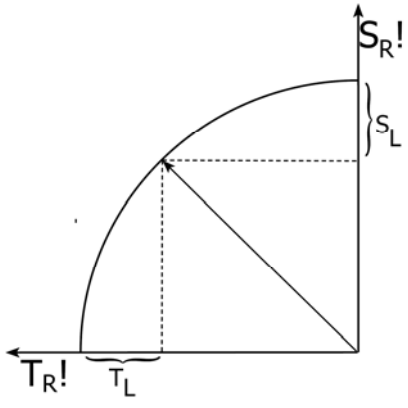

Fig. 18. SR in a nutshell

By this explanation it was no longer necessary to explain the existence of the seemingly unmeasurable two lines. According to SR they didn't exist at all. There was neither an absolute space nor an absolute time.

Although SR was a quite radical solution it became a foundational theory of modern physics, especially of its principal character. When the physicists R.J. Kennedy and E.M. Thorndike conducted in 1932 their experiment, SR was already a commonly accepted theory. And just this historical fact did have tragic consequences for the further development of physics, because the physicists should explain the null result of this experiment on the basis of SR. This means, they explained the measured constancy of light on the ground of the first constancy of light c_1. In terms of geometry, they believed that nature had confirmed the already known geometrical blueprint of the quarter circle.

But this was as I like to make clear a wrong conclusion. *Actually a new version of the constancy of light was measured, that is, the quadratic-designed second constancy of light c_2, but no one has seen that - until today.*

The Kennedy-Thorndike experiment was devised to test *directly* whether time satisfies the requirements of SR or not. The original Michelson–Morley experiment (1887) was useful for testing the length contracition only. In other words, when Einstein proposed his special theory of relativity, only the neutralization of the space-line S_L was experimentally justified, but not the neutralization of the time-line T_L.

In some sense it is really curious, that just the most important step, that should lead Einstein to his theory, was first tested after more than twenty years of its publication.

This fact was never seen clearly, because the Kennedy-Thorndike experiment was only a modified form of the Michelson–Morley experimental procedure. In the original version of the experiment both arms of the interferometer were equally long, in the Kennedy-Thorndike experiment one arm of the experiment was made much shorter than the other. As the result of this technical similarity the Kennedy-Thorndike experiment was historically put in the same line like the original Michelson-Morley Experiment.

This is in fact a widespread view, especially if physics is presented in a popular manner. In his book *The character of physical law* the well known physicist Richard Feynman commented the Michelson-Morley experiment like this: „The facts of nature are not so easy to understand, and the fact of the experiment was so obviously counter to commonsense, that there are some people who still do not believe the result! But time after time experiments indicated that the speed [of light] is 186.000 miles a second no matter how fast you are moving." [8]

In this quote Feynman is talking about the motion of the observer (or in more technical terms: about the velocity of the laboratory), but the original Michelson-Morley experiment has only examined the outcome of an interference experiment during a change of the orientation of the apparatus. It was the Kennedy-Thorndike experiment that did examine the dependence on the velocity of the observer.

Today the most theoretical physicists working on this field are aware of this. They know, that both experiments are different and that they have nothing to do with another.[9] But in 1932 the Kennedy-Thorndike experiment was seen as just another experiment of the same kind like the Michelson-Morley experiment. Hence, the most physicists meanwhile thinking in a relativistic way expected, that nature would answer in a negative way again. They expected to measure a null result. But this time their theoretical expectation was essentially determined by the spacetime of SR and not by the Newtonian spacetime. This relativistic expectation can be formulated like this. The physicists of that time thought: If we measure c = 1 (the speed is always the same at all velocities), then the relativity of time is experimentally confirmed, but if we do not (i.e. $c \neq 1$) then an effect corresponding to an absolute time was surprisingly measured. This expectation can geometrically be described like this:

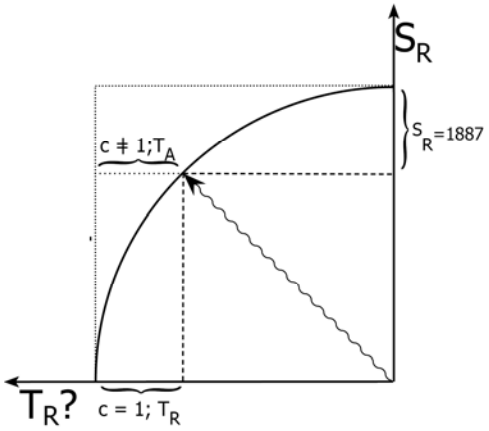

Fig. 19. Is Einstein's step justified?

But this time nature answered *positively,* but no one should recognize it. As the physicists measured the expected null result, that is, c = 1, they wrongly concluded that no effect corresponding to absolute time was found. They believed that nature had confirmed the first constancy of light c_1 **a second time.** But if we believe in the truth of the Mandala-Solution, the two physicists had actually discovered a completely new geometrical blueprint of the universe, i.e. a second face of c including the existence of an absolute time.

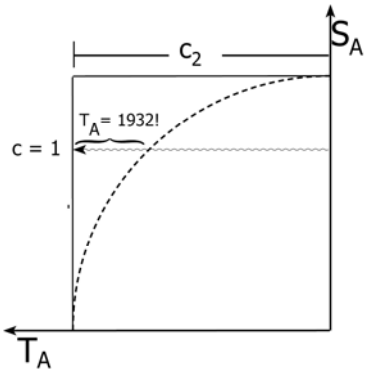

Fig. 20. The second null result

This explanation though the parameter of the second constancy of light is the same like the parameter of the first one deviates so much from SR, that it must wonder that no one has noticed that. Why did the positive answer of nature remain hidden?

Actually it is the strong lorentzinvariant character of Einstein's theory. It describes both the lenghth contraction (~ the original Michelson-Morley experiment 1887) and the time dilatation (~ the Kennedy-Thorndike experiment 1932) in a lorentzinvariant manner. As the result of this strong Lorentz invariance Einstein's theory describes the dual constancy of light *almost* perfectly – at least from a purely experimental point of view.

According to the Mandala-view there is only a very subtle difference, which is not picked up by SR: It is the subtle difference between the two different types of Lorentzinvariance, which is only predicted by the physics presented here, but not by SR. Later we shall see that just this subtle difference was probably measured by Michelson, Morley and others.

But the Mandala-view implies a far-reaching consequence, which seems to contradict all our experiences: If space and time are really absolute then all velocities have also to be regarded as *absolute*. But the assertion of such absolute velocities contradicts all experiences that the physicists have made during the last one hundred years. The principle of relativity, which states, that all velocities are *relative,* is still considered of being a fundamental truth about the universe. In the next chapter I like to explain why this truth is believed.

8. Is the Principle of Relativity Misleading?

Although Einstein did not mention the Michelson-Morley-Experiment in his original work *On the Electrodynamics of Moving Bodies* (1905), it should become one of the cornerstones of the experimental basis of his principle of relativity. If physicists are forced to defend the counterintuitive aspects of Einstein's theory they usually point to this experiment. It faciliates the acceptance of Einsteins theory and helps to have confidence in its irritating revelations about the nature of space and time. Even Einstein himself should recognize the great importance of the Michelson-Morley-experiment in the process of the *justification* of his theory, especially of his principle of relativity.

"The successes of the Lorentz theory were so significant that physicists would have unhesitatingly dropped the principle of relativity, if an important result had not existed, of which we must now speak, namely the Michelson experiment."[10]

This view was promoted by Einstein himself several times. He cited the Michelson-Morley experiment always – *without any exception* – as evidence for the relativity principle and never as evidence for the principle of the constancy of light. This contrasts remarkably with the treatment of this experiment in many places in the secondary literature. According to Lloyd Swenson the Michelson-Morley result had provided ready-made evidence for the credibility of the constancy of light. [11]

This 'policy' of Einstein to give the null result of the Michelson-Morley experiment just this turn became a main reason of critique.

Epstein f.e. characterized the constancy of light as a paradox that had to be attacked by saying: If there is something strange about the speed of light, there must be something strange about light itself. He mentioned as an example of this strangeness the dual nature of light. But Einstein had attacked this paradox in a completely different way. He said to himself: I don't know what light is, and I don't care what it is. The problem is not with light; the problem is with speed – and speed is a measure of space divided by a measure of time. So if the idea of speed is in trouble, it is because the underlying ideas of space and time need alteration.

Epstein calls this kind of attack on a problem foolish. He explains this in the following way.

"If a door in a house won't close, two things can be done. The door can be changed by planing or rehanging. Or the house can be changed by going down to the foundation with house jacks and jackin up the building until the door will close. Of cource, if the one door is ever made to close by jacking, every other door and window in the house will jam. Jacking around with the foundation is usually a stupid approach.

Space and time are the foundations of physics. Space and time underlie every aspect of physics: mechanics, thermo-dynamics, electricity, and magnetism, as well as optics. But there was only a problem in optics, and only in one part of optics – light's speed. Suppose space and time could jacked around to cure the speed-of-light problem. How could the new idea of space and time still square with all other aspects of physics that previously worked quite well? Jacking around with space and time meant opening a Pandora's box of unforeseen consequences." [12]

Epstein finished this explanation with the statement, that the odds were powerfully against a success of Einstein, but his solution carried the day. This may be a harsh critique, but even con-

servative physicists are asking: Will SR survive the Next 101 years? [13]

From the view developed here this criticism is warranted. To get the crucial point, it is necessary to remember that the MA_0-blueprint is only the visible expression of the invisible Meta-Ether. It expresses how the dual modes of motion of light are determined by an ether.

From classical physics we know that the speed of a wave is independent of the motion of the source because this speed is fully determined by the properties of the transmitting medium. Until 1900 physicists still believed that the speed of light was determined by such a transmitting medium, i.e. the ether. But this assumption was exclusively related to the *wave-like* aspect of light. Physicists have never taken into account that the *particle-like* aspect of light could also be determined by this medium.

The quantum mechanical wave-particle-dualism gives us, at least hypothetically, the freedom to make this assumption. *If this case is supposed, then the speed of light concerning the particle-like aspect of light (i.e. the second constancy of light c_2) would also to be independent of the motion of the emitting source like the wave-like aspect of light (i.e. the first constancy of light c_1).*

This assumption would change dramatically our view of the second constancy of light c_2: The relativistic statement, that the speed of light is always the same independently of the motion of the observer, must be substituted by the statement that the speed of light is always the same independently of the motion of the source. In other words, the second constancy of light c_2, though of different geometrical design, would have the same origin like the first constancy of light c_1: *It would be determined by the Meta-Ether, too.*

This determination is directly expressed by the MA_0-blueprint: The quarter circle guarantees that the speed of light is always the same *in all directions*: c = 1, whereas the square determines that the speed of light is always the same *at all velocities*: c = 1.

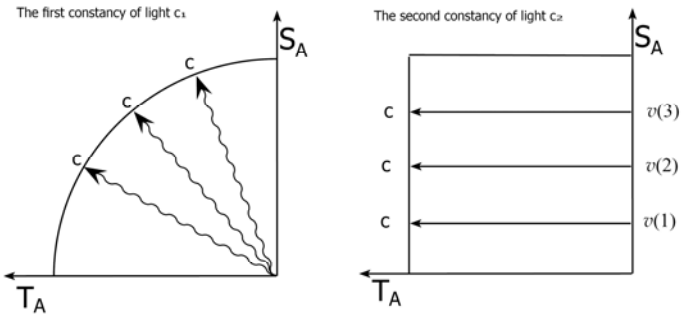

Fig. 21. The Two Faces of the Speed of Light

If this "Mandala-Solution" of the dual constancy of light (i.e. one speed but two faces) were true, then the null result of the Michelson Morley experiment (resp. its modified version of the Kennedy-Thorndike experiment) would get a completely different meaning. It were not a strong argument for the principle of relativity, but instead a strong argument against it. It were actually a proof of the existence of the ether!

This view is quite different to the view of special relativity. The difference between these two views can physically be formulated like this: According to the Mandala-view all velocities of the space-axis S_A are *absolute,* whereas to the relativistic view all velocities are *relative.*

The observation that the speed of light was always the same at all velocities has been misunderstood as an experimental fact that the velocity of the observer of being relative does not affect the speed of light. *But actually it has nothing to do with the velocity of the observer.* Why did this misunderstanding happen?

In some sense it is the result of the specific conditions of the Kennedy-Thorndike experiment. In this experiment (which is also given by the original Michelson-Morley experiment) the observer does have the same velocity (v_O) with respect to space like the light emitting source (v_L). Or, to use a phrase of Einstein: The observer is sitting at the source. [14]

As the result of this specific condition $v_O = v_L$ we can relate the null result of the Kennedy-Thorndike experiment (i.e. the speed of light is always the same) to the observer (= principle of relativity) or to the source (= ether). Both options are in principle possible, if we think in an open-minded way. But if we take into account the peculiarities of the physics of that time, only one way was open: When in 1932 the Kennedy-Thorndike experiment was performed, the special relativity already dominated the reasoning of the physicists.

It was therefore near at hand, to interprete the fact, that the speed of light did not depend on the motion of the observer, in the spirit of this theory, especially in the spirit of its principle of relativity. But according to the view developed here the null-result has *in realiter* to be referred to the source (= ether) instead to the observer. The application of the notion of the observer is even highly misleading: It masked completely the true physical meaning of the space-axis S_A, that is, all velocities of this axis are of *absolute* nature.

It is this absoluteness, which guarantees that the speed of light is really the same *at all velocities*. If the speed of light shall be conditioned by the Meta-Ether in an unambigious way, all velocities must have conditioning resp. absolute character (c_2 = square) as well. *Otherwise the speed of light would be undefined.*

Just this insight is massively veiled by the notion of the observer. But it is, of course, not the notion of the observer alone that masks this insight, there are also strong historical reasons, why the idea of a relative motion is physically convincing and not the idea of an absolute motion.

If we look at the historical root of the principle of relativity (i.e. Galileo's principle of relativity), we can see, that it was *originally* related to the motions connected with the space-axis S_A only. By this close relationship the space-axis was marked as relative right from the beginning when physics started its enterprise of the physical universe. The principle of relativity was already enunciated by Galileo Galilei in 1632 in his *Dialogue Concerning the Two Chief World Systems,* using the metaphor of a ship.

This close historical relationship between the space-axis (i.e. the square) and the principle of relativity might be the most important reason, why the radical rejection of an absolute space-axis was only a matter of time.

When Einstein had identified the contradiction between Galileo's principle of relativity and Maxwell's theory of electromagnetism (i.e. the first constancy of light c_1) as the central problem that had to be solved this time had come: When he investigated whether it was possible to interpret the complete space-axis in the spirit of the principle of relativity he had no strange thought. He only followed an old historical tradition of physical thinking.

If one has won the conviction that space is *fundamentally* relative, then the Michelson-Morley experiment of 1887 provides as Einstein correctly saw a very strong argument for the validity of the principle of relativity. But if space is clearly recognized as absolute, then this conclusion is really misleading, because the principle of relativity (i.e. Galileo's principle of relativity) was

originally restricted to a very tiny area of the physical universe that could be labelled as the area of extremely low speeds compared with the speed of light. Einstein's generalization of an observation that was made in this very restricted area was therefore a very huge extrapolation. With respect to the total speed scale (v = 0 until v = c) the original area, i.e. our everyday world, can even be neglected. Compared to the speed of light it is vanishingly small. In other words, the conviction, that all (uniform) motions along the space-axis are relative, depends only on few "crucial" experiments.

It was just Einstein himself who has taught us that our understanding of the universe grasped in our everyday world could be fundamentally wrong.

For over 200 years the Newtonian equations of motion were believed to describe nature correctly. Newton's second law, which we have expressed by the equation F = d (mv)/dt, was stated with the tacit assumption, that m is a constant. But we now know that this is not true. Special relativity has taught us that the mass of a body increases with velocity in a well-defined manner. This increase is even very large at velocities near the speed of light. But if we restrict to our everyday world, in which all bodies are moving with extremely small velocities, this mass increase is so small that it is nearly impossible to observe. In this area the mass of a body appears to be independent of its velocity. But actually there are very very subtle differences. According to special relativity it makes a difference whether a body is moving or not. But this very subtle difference (f.e. between v = 0.1 km/s and v = 0 km/s) cannot be observed. The mass of the moving body is simply indistinguishable from the mass of the resting body.

It could be possible that we have to think about Galileo's principle of relativity *in the same way*. The uniform states of motion observed in our everyday world may appear to be indistinguishable from the state of rest, but they are perhaps not. Possibly there are very subtle differences which have not yet been observed. In a previous paper I have claimed, that the existence of the absoluteness of the uniform motion becomes only "visible" if we extend the time scale of the inertial motion to a cosmological scale of very large times (including very large distances). The Pioneer Anomaly was cited as an experimental evidence for this thesis. But this historical core of the principle of relativity is not discussed here in detail. [15]

At the moment all these thoughts are nothing else than an attempt to re-construct the history of physics in such a way, that the triumphal march of the principle of relativity becomes understandable.

But even if this rough re-construction would be true the principle of relativity would have been of great importance for physics. Only by the support of this principle the Lorentz symmetry was recognized as a fundamental symmetry of nature. Motivated by the belief that the principle of relativity was of fundamental character physicists systematically incorporated the Lorentz symmetry into the body of physics. And this fundamental character of the Lorentz symmetry is not doubted in any way by the view sketched in this paper. Just the opposite is the case: The Lorentz symmetry would also be a central part of the Physics of Mandala.

But nevertheless the principle of relativity *itself* would be a highly misleading principle: it would essentially mask the perception of the ultimate foundation of the universe, which is here called the Meta-Ether and which most physicists would probably name *vacuum*.

In view of this far-reaching conclusion the question naturally arises: How can the existence of the Meta-Ether be proved experimentally? For the sake of simplicity this question is still discussed in the familiar relativistic term of the observer.

9. How Can the Hypothesis of the Meta-Ether be Tested?

According to special relativity light waves do not require a medium. Therefore only the *relative motion* of source and observer needs to be considered to determine the Doppler effect, i.e. the frequency shift. In non-relativistic physics all motions of the observer and the source are related to the medium. By this medium a difference between the motion of the observer and the motion of the source occur that special relativity does not predict. If a medium is supposed of being there we obtain in fact different quantitative results, depending on whether the source or the observer is moving. This difference occurs because there is a medium in which the wave is propagated. This difference *is therefore a signature of the existence of the medium.*

In brief, according to special relativity which denies the existence of such a medium, the two patterns of motions – the motion of the source and the motion of the observer - have to be symmetric, whereas in the case of any light carrying medium they have to be asymmetric.

If we look at the Meta-Ether resp. its visible expression, that is, the MA_0-blueprint, we can find such an asymmetry. The MA_0-blueprint differs very clearly between the motion of the source and the motion of the observer. But nature has made us very difficult to see this obvious asymmetry, because both patterns are not only parametrized in the same way: c = 1, they are also closely entangled to each other.

Consequently, as the result of this dual parametrization and the close entanglement both patterns are of *lorentzinvariant nature*, but there is, as already mentioned, a slight difference between the two types of Lorentz invariance.

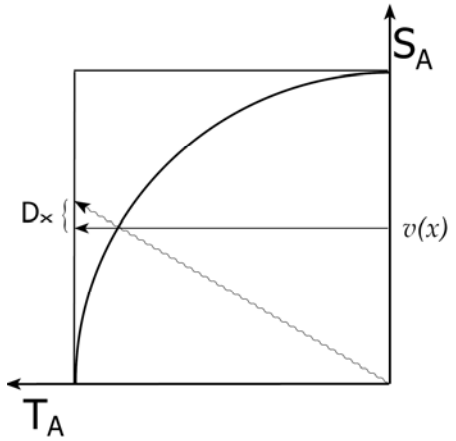

Fig. 22. The drift of the Meta-Ether

If we look at this diagram we can see that specific differences occur, if both pattern of motions are entangled to each other. One of these differences is shown: It is indicated by the letter D(x). Differences like D(x) are the *visible signatures of the existence of the Meta-Ether.*

Just these specific differences (i.e. spatio-temporal lines) are obviously not picked up by SR. In SR all these differences are erased by assuming space and time of being relative. These differences may be only of *indirect character*, as far as the velocity with respect to this preferred frame of reference (i.e. the Meta-

Ether) is concerned, but they are theoretically unambiguous because their magnitude depend on this absolute velocity. We can test them with respect to different velocites. However, in the realm of extremely small velocities these differences are vanishingly small – and the velocity of the Earth (orbiting around the sun) f.e. is quite small.

To determine all these differences quantitatively only simple trigonometric functions are necessary. But to apply the numerical result, given by the formalism of the MA_0-blueprint, to the real world, this is not easy, because to predict any difference $D_{(x)}$ we have to know the *absolute* velocity, because the speed scale introduced by this formalism is expclicitly of absolute nature.

For more than one hundred years such a knowledge was not available. It was the big problem with which most critics of special relativity have struggled. As long as it was impossible to detect an absolute motion, Einstein's theory, which rests on the impossibility to measure such an absolute velocity, could not be refuted convincingly. Nowadays physicists have found such a possibility.

In 1977 the physicists G.F. Smoot, M.V. Gorenstein and R.A. Muller reported about the detection of anisotropy in the cosmic blackbody radiation.[16] They named their experimental findings the "new ether drift". They measured an absolute motion of our solar system to be approximately equal to 390 km/s in the direction of constellation LEO.

If we calculate for this velocity the value of D we get the differential velocity equivalent of

$$D_{\mathrm{LEO}} = 0.0003 \text{ km/s}$$

This value is very small. It is almost indistinguishable from a null result. This ether drift is even smaller than all the values which were measured by classical interferometers. If several cases of these differences could be confirmed experimentally, then this would be a "proof" that the Meta-Ether really exists, thus refuting Einstein's principle of relativity.

Although the prediction of such a ether drift contradicts the relativistic null interpretation of the Michelson-Morley experiment, it is remarkable, that the outcomes of this experiment, and all subsequent repetitions, never were null. The physicists always measured a small velocity, but it was considered far too small to be used as evidence of ether. [17]

The physics presented here could perhaps explain this inexplicable experimental outcome of the Michelson-Morley experiment. But this explanation is of course not yet based on a coherent theory. There are still a lot of unanswered questions. One of these unanswered questions was already mentioned: Is the uniform motion relative or is it absolute? Another question concerns the nature of space and time *beyond the MA_0-blueprint*.

If we look attentively to this blueprint, we will find that its speed scale is *with respect to the wave-like aspect of light* only limited to the Gödel-Point, that is, to the speed of 0.707 c (precisely: to $1/\sqrt{2}$ c). It does not explain what is physically happening beyond this point. In the following chapter I like to give some impressions about this section of the Mandala.

10. Beyond the Gödel-Point

If we go beyond the MA_0-blueprint diving more deeply into the archetypal structure of the Mandala we will find two extended sections of space and time, which are covered by the edges of the two-dimensional representation. In the following diagram these two unfolded sections are shown.

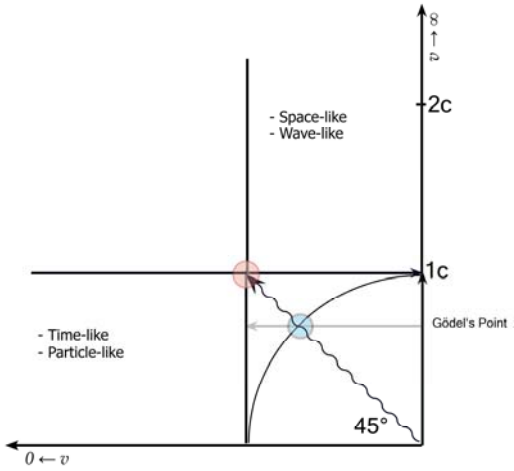

Fig. 23. The unfolded Mandala

In modern physics the left section is already known. It is the home of special relativity. According to the view developed here it is related to the *particle-like* aspect of light. Its speed scale contains all *subluminal* velocities from $v = 0$ until $v = c$, whereas the speed scale of the *wave-like* aspect of light is limited to the Gödel-Point – to the speed of $1/\sqrt{2}$ c. At this very specific speed light waves touch the speed of light c and enter a *superluminal* space-time-section that is still unknown to modern physics. The speed scale of this hidden space-time-section contains all speeds from $v = c$ until $v = \infty$, whereas the velocitiy of $v = \infty$ is the ultimate limiting speed of the universe. It cannot be reached by any physical object or process, because it is *exclusively* referred to the Meta-Ether (resp. to the ONE).

According to special relativity this section is physically excluded. It embraces a space-time-field that would relativistically be called *space-like*.

It is just the *space-like* nature of this section that makes the Physics of Mandala highly interesting. It offers us as conceived by me the possibility to understand the secret mechanism of the quantum mechanical phenomenon *Quantum entanglement*, i.e. the fact, that a quantum mechanical state of a system of two or more objects are linked even if the objects are spatially separated in a *space-like* manner.

Einstein critized these correlations as *a spooky action at a distance* because they seem to include superluminal velocities. But the existence of these space-like correlations are meanwhile confirmed. They are real. But nevertheless this superluminal underpinning of the Universe is almost completely concealed. The quantum entanglement would have been discovered long ago if it were more evident. It leaves its mark only indirectly through very subtle correlations. Hence, we don't know what is really happening behind this curtain. A precise knowledge about space-like features of the Mandala could help us to lift this curtain.

But does such a space-like section predicted by the Physics of Mandala (PoM) really exist? There is a striking point, which could be a hint of its existence. In astronomy, superluminal motion was already seen in some jets of radio galaxies and quasars. For the jet of the quasar 3C 273 a motion of up to ~9.6c was measured. The most astrophysicists still believe that these superluminal velocities do not involve physics incompatible with the theory of special relativity. They are considering them as an optical illusion caused by objects moving near the speed of light and approaching Earth at a small angle to the line of sight. Since the light which was emitted when the jet was farther away took

longer to reach the Earth, the time between two successive observations corresponds to a longer time between the instants at which the light rays were emitted.

But there is some condition involved which shows a close relationship to the Physics of Mandala. The *minimum speed* of the jet that is necessary to go beyond the velocity of light is just given by the value of $1/\sqrt{2}$ c. According to the Physics of Mandala the wave-like aspect of light transcends the speed of c if this specific speed of $1/\sqrt{2}$ c is reached.

This equality may be an accident, but perhaps it is a hint that a *space-like* section predicted by the Physics of Mandala is really existing. If this superluminal branch of realitiy would really exist, then the relativistic interpretation of light waves might be *incomplete*, because just this branch is excluded by Einstein's theory. Since this branch is the *wave-like* expression of the Meta-Ether, it is near at hand, to suppose that nature makes use of similar patterns of motion that we have already observed in the field of classical waves.

11. Double *c* Instead of Double Relativity: A Closing Remark

The most important problem of contemporary physics is the quantization of the gravitational field. A main difficulty is the lack of available experimental tests that discriminate among the theories proposed to quantize gravity. Recently, Lorentz invariance violation by quantum gravity has been subject of growing interest.

One of these approaches, known as loop quantum gravity, describes the gravitational interaction f.e. in terms of variables on a loop. It allows for the possibility that Lorentz invariance might not hold exactly. The search for Lorentz violations became the main focus of recent work in quantum-gravity.

Doubly special relativity (DSR) is part of this work. It is a theory, in which special relativity was extended by a purely quantum mechanical quantity. According to this theory there is not only an observer-independent maximum velocity (the speed of light), but an observer-independent maximum energy scale (the Planck energy). But until today there is yet no consistent formulation of DSR. May be a *double* parametrization of c as it is proposed by the Physics of Mandala is a further interesting alternative to re-formulate Einstein's theory in terms of quantum mechanics.

I am indeed convinced that only the Physics of Mandala can break the spell that the special theory of relativity still surrounds. I believe that we stand at the beginning of a development of the greatest importance that cannot yet be surveyed. The statements that I have presented here are still largely my personal opinion. All the results of my considerations have not yet been checked by others. If I present them here in spite of their uncertainty, the reason is the hope to induce one or another of you to deal with a structure that is of great beauty and symmetry. [18]

References

[1] Helmut Hansen, "About an Anomaly that challenges Relativity", Principle of Radical Non-Duality versus Mach's Principle, Proceedings of the Natural Philosophy Alliance, v5, n1, pp. 73–84 (2008).

[2] Helmut Hansen; "Do Space and Time have an Archetypal Design?", Newsletter of the NPA, v13, n2 (July 2007), p. 9.

[3] Lewis Carroll Epstein; **Relativity Visualized** (San Francisco 1981).

[4] Lewis Carroll Epstein; ib. pp. 60-67.

[5] Abraham Pais has mentioned this in describing his conversations with Einstein.

[6] Albert Einstein, 1909c (Doc. 60), pp. 482, 483.

[7] As the Meta-Ether (or in more philosophical terms: the ONE) is introduced as the only (physical) "thing", which is really absolute, all other physical things like space and time are only of relative nature.

[8] Richard Feynman; The Character of Physical Law, 1961, p. 91.

[9] Claus Lämmerzahl, "Test Theories for Lorentz Invariance", in: Jürgen Ehlers/Claus Lämmerzahl (Eds); "Special Relativity – Will it survive the Next 101 years?", Berlin – Heidelberg 2006, p. 351.

[10] Albert Einstein; "Relativitätstheorie" in: E. Lechner (ed.), **Die Physik**. Leipzig: Teubner Vol. I, 703 (1915) (Readex 70).

[11] J. Stachel, "Einstein und Michelson – The Context of Discovery and the Context of Justification", Astron. Nachr., 303 (1982) I, p. 48.

[12] Lewis Carroll Epstein; ib. pp. 24-26.

[13] Jürgen Ehlers/Claus Lämmerzahl (Eds), **Special Relativity – Will it survive the Next 101 years?** (Berlin, Heidelberg, 2006).

[14] Albert Einstein in a letter to Paul Ehrenfest written in 1912.

[15] Helmut Hansen, "The Pioneer Anomaly: Do We Have to Modify the First Law of Newtonian Dynamics?", 16th Natural Philosophy Alliance Conference, Storrs, CT, United States (2009).

[16] G.F. Smoot, M.V. Gorenstein and R.A. Muller, "Detection of anisotropy in the cosmic blackbody radition", Phys. Rev. Letters, vol. 39, no. 14, pp. 898-901 (1977).

[17] Héctor A. Mūnera, "Michelson-Morley Experiments Revisited: Systematic Errors, Consistency Among Different Experimentc, and Compatibility with Absolute Space", APEIRON Vol. 5 Nr. 1 – 2, January-April 1998, pp. 37

[18] Helmut Hansen; **Die Linien des Alten – Einsteins letzte Vision** (**The Lines of the Old One – Einstein's Last Vision**), eBook (Free University of Berlin, 2009), 232pp.