

Illobrand von Ludwiger

**THE NEW WORLDVIEW
OF THE PHYSICIST
BURKHARD HEIM**



The New Worldview of the Physicist Burkhard Heim

Burkhard Heim explains his Theory
in Speeches, Interviews and
private Conversations

by
Illobrand von Ludwiger

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The New Worldview of the Physicist Burkhard Heim

Burkhard Heim explains his Theory in Speeches, Interviews and private Conversations. With Comments by Illobrand von Ludwiger.

Burkhard Heim was born in Potsdam on February 9, 1925. In 1944, while he was department head of the *Chemisch-Technische Reichsanstalt* [Chemical-Technical Institute of the Reich] in Berlin, he lost his hands as well as most of his eyesight and hearing in an explosion. From 1945 till 1949 he studied chemistry, followed by studies of theoretical physics in Göttingen. In 1954 diploma degree (M.Sc.) in physics in Göttingen, thereafter work for the *Max-Planck-Institute* (MPI) for Astrophysics under Prof. von Weizsäcker. He left due to his physical incapacity for engaging in teamwork. From then on he pursued independent, private theoretical research in Göttingen and Northeim. In 1957 he came to international fame due to his discussing the theoretical possibility of a field propulsion system suitable for space vehicles. In the 1960s collaboration with Prof. Pascual Jordan on an experiment on gravity. Then he engaged in work on the extension of Einstein's theory by geometrization of all interaction fields. Further work on: description of the 6-dimensional world, quantum geometry, polymetry, development of an aspectual logic. In 1976 came the structure-theoretical derivation of a unified mass formula for elementary particles. Between 1978 and 1998, a part of his work was published by the publishing house Resch, Innsbruck. Since 1950 he was married to the former concert singer Gerda, maiden name Straube. After a serious illness, Burkhard Heim died in Northeim in 2001.

Summary

Until 2001 a mysterious physicist lived in Germany who in the 1950s had achieved fame for a short time, but then continued working in obscurity. Only rarely did he lecture at congresses, and it was not before the 1980s that he published his work in two comprehensive volumes. The message he wanted to communicate is so difficult to understand that his work has scarcely been read. And yet, the system developed by him seems to mean a greater revolution than Einstein's, as it directly affects human beings and their personal destinies.

If you ask physicists for their opinion about Burkhard Heim, you will hear judgments such as “*misfit, odd loner, dubious dreamer, weirdo*”, but also “*the new Einstein, Germany's Stephen Hawking, an ingenious thinker, someone who should be nominated for the Nobel Prize*”. So which is true?

The first thing you will note is that the positive opinions have been uttered by those physicists who have known Burkhard Heim personally or have studied his work. By

contrast, all critical judgments have come from physicists who have neither known Heim nor examined his work.

In the 1980s Burkhard Heim claimed to have found what Einstein and his successors have been looking for in vain to this day: a mass formula for all elementary particles and the explanation of their qualities by dynamic geometric structures.

That sounds incredible, as nobody thinks a physicist not integrated in the academic life capable of such an achievement. But Heim's mass formula was already programmed and analyzed by physicists at the Deutsche Elektronen-Synchrotron (DESY – German Electron-Synchrotron) in 1981 – with convincing results.

However, since nobody was able to understand the theoretical derivations of the formulas without prior familiarization, the DESY-physicists were stunned, but kept silent about this sensation and awaited the judgments of structural theorists and relativity theorists on the theory. As early as 2004 did the spokeswoman of DESY answer a journalist's question as follows:

“The few people who have known Heim and some leading scientists have unequivocally come to the opinion that the mass formula is in any case an enormous personal achievement, especially considering his handicap. However, all of them hold the view that it is much too complicated, so that even very good theorists would need to occupy themselves with this theory for at least one year in order to be able to evaluate it.”

This is not about analyzing or defending Heim's mass formula, but the present text shall give the readers the opportunity to form their own opinion about Burkhard Heim. For that purpose, Heim's own words will be cited as often as possible. Whenever certain technical terms are used which are only known to physicists, such terms will be commented on, so that the reader will be able to follow Burkhard Heim's explanations.

A theory that leads to the geometrical description of matter seems very reliable. - Other theories, such as String Theory, Loop-Quantum Gravity or the Standard Model of particle physics, on the other hand, cannot reveal anything about the geometric structure of elementary particles of matter that has been proven in experiments. Thus, Heim's system has proven correct – as measured by results. The philosophical consequences for us humans are enormous, as even qualitative aspects of matter, such as learning processes and consciousness, can be described by an aspectual logic newly developed by Heim. Heims occupation with the theory of elementary particles forced him, due to the 2 additional dimensions that had become mathematically necessary and which proved to be of organising kind, to integrate qualities into the total description of worldly events in a formal-logical way. Therefore, he had to develop a more general logic than the Aristotelic one. That is the subject of the present text...

Following the discovery of an additional 700 unpublished pages of manuscripts in Heim's legacy, this text, which had already been written at that time, was supplemented by a number of citations taken from those manuscripts.

Burkhard Heim's exceptional Talents

Burkhard Heim was born the son of a senior bank official in Potsdam on February 9, 1925. His interest in science already showed at the age of three. Instead of fairy tales he had read to him Bruno Buerger's book 'Aus fernen Welten' ['From Remote Worlds'], and therefore knew all larger stars and constellations in the sky when he started school. He taught himself reading. By the age of eight he could already read about 1,000 Chinese characters. Based on those characters he developed a kind of shorthand, so he could quickly note down everything he was interested in. This kind of shorthand he was able to write and read at the speed of stenography. He wanted to become a 'rocket scientist'.

As for the acceleration of rockets chemical fuels are needed, he read everything he could find on chemistry and the chemistry of explosives. At the age of ten he got a chemistry set from his father. The eager scientist started experimenting in the basement of his parents' house, and soon was able to create dynamite and nitroglycerin. Occasionally, something exploded in the basement, so that concerned friends of the family phoned his parents, asking if their house was still standing. By that time, however, the 11-year-old Burkhard had already become a specialist who worked with the precision of an experienced chemist.

In winter 1937, he launched a self-made rocket across the frozen Lake Templin together with two of his friends. For this purpose, he had filled a curtain rod with powder and had attached a highly explosive ignition head on one of its ends. When hitting the ice, the rocket tore a big hole into the ice covering.

At the age of 12 he wanted to take revenge on the, in his eyes, unfair teachers at his school. He prepared the doors, windows, cupboards and stairs in the school with self-made toy torpedos. When teachers and pupils opened doors and windows the next day, those toy torpedos caused loud explosions everywhere. Many months later – Burkhard Heim was 14 years old then – he was finally identified as the culprit and got kicked out of school (with a 4¹ in Chemistry, by the way).

After that, Burkhard Heim wanted nothing else but to become a Chemist, and he refused to remain at school. He read works about Physics and Chemistry, also Otto Hahn's report about the successful nuclear fission. Subsequently he drew up plans of a uranium-driven rocket.

For several weeks he wrote an essay about electron-pair production, then presented it to the head of a Berlin research institute. The professor concerned noticed the talent of the 17-year-old Burkhard and implored him to do his high-school diploma, so he would be able to study at university later. Burkhard's parents found a school that ac-

¹ 4 in the German grading system corresponds to a D in the Anglo-American grading system.

cepted their son. However, he felt underchallenged and additionally attended an evening school in Berlin where he was treated as an 'adult'. His parents were unaware of that additional school attendance.

During that time, Burkhard seemed sleepy and lazy at the regular school. In the evenings, however, he worked hard and even had the cheek to start an affair with his biology teacher. In 1943, when he showed his parents the high-school diploma from the evening school, their first thought was "*the boy is not only idle, but now he also fakes signatures*". The school-leaving examination for the students at the regular school would only have taken place some months later. But it shouldn't be performed anymore, as all students got drafted.

In Upper Italy the soldier Burkhard Heim worked on a theory for an explosive with very unusual properties during his freetime. In spring 1944, he sent his research results to the *Chemisch-Technische Reichsanstalt* (Chemical-Technical Institute of the Reich) in Berlin-Tegel. Hermann Goering immediately summoned him to the institute in order to put his idea to practice.

Some weeks later the 19-year-old Burkhard Heim got an appointment with Werner Heisenberg. He told him about his idea for a bomb in which by ignition of a hollow charge made from the explosive developed by him, tritium could be brought to fusion. Heisenberg, however, talked him out of that idea, as the temperatures needed allegedly could not be reached.

On May 19, 1944, Heim wants to conduct an experiment on the explosive and considers what amount of thermite should be applied in the experiment. He decides to use only one tenth of the intended amount first. This decision will save his life.

He's holding the mortar in his hand when the air-raid alarm goes off. With his right hand he grabs his throat when the blasting charge explodes in his other hand. The force of the explosion tears off both his hands, burns his face and chest, destroys his eardrums and blinds his eyes. Only because a doctor is in the institute on that Wednesday as a matter of routine, Burkhard Heim can be provisionally cared for and kept alive.

For months, Heim lies in the sickbay, first without any contact to the outside world. At last, he is able to understand a doctor. In 1981, Heim spoke about that situation to the psychologist Dr. Jürgen vom Scheidt in an interview for the *Bayerische Rundfunk* (Bavarian Broadcasting Company):

"I knew two things: First, I might never be able to live like a real human being again. I called a doctor and took an inventory with him: What was really still safe and sound?"

I knew that the eyeground was still working, that a weak hearing was still there and that my underarms were still existing to a length just right for creating split arms. That was what I knew. Well, I told myself, it is a question of skill whether I will ever become viable and also presentable again. So it would be down to myself for the most part.

However, I didn't know how I should proceed. For example, it was clear to me that regardless of whether my eyesight would ever return, I would probably lose my connection to the outside world if my hearing didn't. If I didn't manage the easiest tasks of everyday life, I would never actually come back to real life again.

So it was important to do something with the rest. The question was: how would I be able to grab a bar of soap with two split underarms? How can you actually take a comb in stride, a comb that you would need to clamp between the clefts? How flexible would I need to be in order to manage all that? Above all: How would I be able to manage on the toilet or in the bathroom? That were about the first pressing questions. But that was all manageable!

When those things improved in daily life, my confidence increased. Some things actually turned out very well in the end. A slight eyesight returned, so that I could orient myself without any help. In winter 1944/45, for the follow-up examination I was even able to make it from Potsdam to Berlin on my own. That I could do without any further ado, as the people were very friendly and always helped me.”

He can leave Berlin with the last hospital train. Via Czechoslovakia and Austria he finally gets to Bad Tölz in Upper Bavaria.

There, Prof. Lange operatively splits the ulna and the radius of his right arm into a gripper finger with which he learns to grab after a fashion. In 1946 he travels to Northheim to his aunt, where he also meets his mother again and his sister, who is two years younger than him. In Göttingen, his left arm, too, is operated on. In the winter term 1946 he enrolls with the Göttingen University in order to study Chemistry there. With the help of a hearing device he can hear a bit. However, he can hardly follow the lectures and is dependent on assistants who read everything out to him.

As he himself cannot make notes, he develops an extremely good memory. That memory soon accomplishes incredible things, as if Heim had developed an absolute memory. When he gets asked how the text reads on a certain page, he can cite that text from memory sentence for sentence, almost word-for-word, with all formulas. Later he baffles his acquaintances when he can state the date of each day of the week from 1946 on, and can also name the essential events that occurred on each day. For example, he can tell who wrote to him, what was aired on the radio, or which part in which book someone read out to him.

In 1948, his father Heinrich is released from Russian captivity in the Sachsenhausen camp. From now on he takes care of his son only. He accompanies Burkhard to university and writes down the lectures for him. In the afternoons from 2pm to 7pm he sits together with Burkhard in order to read to him and to write down all his son's thoughts in thick account books. This will eventually result in more than 8,000 pages.

In the course of time Burkhard Heim realizes that the subject Chemistry cannot give him any more mental adventures, which he – now as a complete theorist against his own will – is looking for. In 1949 he starts studying Theoretical Physics.

In 1950 Burkhard Heim gets married to the former opera singer Gerda Straube, and the couple moves to Göttingen.

In 1954 he takes his Diplom-degree² examination in Physics in Göttingen. His examiners are the two physicists Becker and von Weizsäcker and the mathematician Lyra. Subsequently, he becomes a member of the research group of Carl-Friedrich von Weizsäcker at the Max-Planck-Institute for Astrophysics in Göttingen, where he occupies himself with the stellar explosions of supernovae.

Soon, however, he has to realize bitterly that it is impossible for him to work in a team. He can't read the calculations on the blackboard, and he can hardly understand the conversations. He always needs someone to read out to him from scientific journals. Heavy-heartedly, Heim leaves the Max-Planck-Institute and enforcedly continues his work at home, where his father and his wife act as his eyes, ears and hands.

His right eye is completely blind, whereas Heim can still make out outlines with his left eye. If he wears glasses with strong lenses he can make out characters on the blackboard. Using his split arm, he can even write on the blackboard with a piece of chalk.

When Burkhard Heim is 40 years old, writers and students visit him in Göttingen and, among other things, ask him how he thinks about his fate. Surprisingly, Heim appears to be quite content with his situation:

“I have the impression that whatever happens is a priori right the way it is, and that I should not interfere with the plan that is behind everything. I take the view that whatever I am faced with is right and is the optimum in light of the given circumstances anyway. Some things might seem bad to me, whereas in reality they are not, because everything is right the way it is. I say to myself: I have a certain mission, no doubt. Because my existence as a human being must make sense. So it is my job to fulfill a certain purpose. That is the sense of my whole life in general. That purpose is to be fulfilled. That is essential. Whatever I need for fulfilling that purpose I will be pro-

² Diplom corresponds to a Master's degree in the Anglo-American education system.

vided with anyway. After all, if I didn't get what I need for fulfilling my purpose, it would be senseless to exist at all."

Mr. Klockmann from Hamburg says this sounded rather fatalistic. But Heim disagrees:

"No! I don't think so at all. You see, I absolutely affirm the awareness that I have a purpose. The important thing for me is to learn what that purpose is. And that is what I have to work towards.

Of course, absolutely nothing drops into one's lap. I always have to try to find out with excitement and energy how I can achieve the fulfilling of that purpose in a better way. That doesn't come to me by itself. I can't just put my feet up and say 'Ah, things will work out all right.' That's not possible, that's clear!

If I did that, and I was absolutely fatalistic, I would fundamentally thwart that fulfilling of my purpose. But I will do everything in my power to fulfill it.

I have already undergone 25 surgeries, and I will do it again. That is always very hard, especially if you don't feel any pain, but you know what is lying ahead of you. In those situations, you really have to kick your butt before you actually go into the hospital. But I am positive that all that is right. The result of all those endeavors will definitely be the way that I can fulfill my actual purpose. Whatever is needed will be provided anyway... When I look back on my life, I must say that everything has made sense. Everything came at the right time."

Wunder werden Wirklichkeit

Ein deutscher
Beitrag zur
Welttraumfahrt



Burkhard Heim, der 29jährige Physiker, mit dem Modell seines Raumschiffes. Bei einem wissenschaftlichen Experiment verlor er das Augenlicht und seine beiden Hände

Mit Höchstgeschwindigkeit zu jedem Punkt des Alls

Raketen gehören zum alten Eisen, wenn sich die Pläne des jungen Göttinger Wissenschaftlers Burkhard Heim verwirklichen sollten. Nach jahrelangen mathematischen Studien entdeckte er, daß es möglich sei, Raumschiffe auf eine völlig neue Art anzutreiben — ohne Raketen, ohne Propeller, allein durch ein Kraftfeld, welches den Körper des Raumschiffes umgibt. Heims Entdeckung erscheint uns heute noch wie die Phantasterei eines Autors utopischer Romane. Unseren Urgrößeltern hätte ein Düsenjäger nicht unbegreiflicher sein können. Aber Heims Berechnungen sind bereits in öffentlichen Vorträgen bei einem internationalen, wissenschaftlichen Kongreß vorgeführt worden. Der Flugkörper schafft sich ein eigenes, regulierbares, von der Erde unabhängiges Schwerfeld. Ein kleiner Uranblock spendet die Energie, die sich zwischen den Ringen und Rippen rund um den eiförmigen Flugkörper herumspannt. Heims Welttraumschiff, 22,5 Meter hoch und 22,5 Meter Ringdurchmesser, kann sowohl regungslos irgendwo im Weltraum stehen, als auch mit außerordentlich hohen, von Raketen nie erreichbaren Geschwindigkeiten, davonschießen. (Wie der kleine Flugkörper auf unserer Zeichnung, unterhalb der Erde.) Im Raumschiff selbst merkt man weder etwas von der gefürchteten Beschleunigung noch von den schärfsten Kurven. Bisher ist das sensationelle Projekt allerdings nur errechnet. Aber mit den Vorarbeiten könnte morgen schon begonnen werden, wenn die relativ geringen Geldmittel dafür bereitgestellt würden. Die vordringlichste Aufgabe besteht jetzt darin, daß die bereits bestehende Theorie verfeinert und experimentell ausgebaut wird.

Der Weltraum ist uns nahe gerückt. Seine Eroberung steht unmittelbar bevor. Jetzt geht es nur noch um die Frage:

Wer wird der erste sein?

Picture 1: In 1954, the German magazine *Stern* published an article about a space-craft proposed by Burkhard Heim that could translate electro-magnetic field energy into gravity.

If the accident hadn't happened, Heim concluded, he would have stayed a chemist, or, since he had been trained a pilot during the war, he would have gone into civil aviation. Thus, however, he became a successful physicist who succeeded in unifying the two predominant forces in the universe, namely electromagnetism and gravitation, and was able to derive technological consequences from it.

Heim talked about that at the Internationaler Astronautischer Kongress (*International Astronautical Congress*) in Stuttgart in 1952. However, he didn't publicize those works, since a new space propulsion system had proven feasible.

The practical consequences couldn't be estimated at that point of time.

The lecture he held in Frankfurt in early November 1957 caused a sensation. "*Is a new ,worldview of physics' imminent in Germany?*" the magazine *Neue Illustrierte* asked on its cover, followed by "*His colleagues call him a genius. The things he has talked about in Frankfurt come close to a sensation. Will he be proved right?*" (Sketch 1; see p. 123 et seq.)

The magazine *Stern* cited an internationally famous professor of physics with the following words about Burkhard Heim: "*His thoughts are of revolutionary boldness, of the kind of audacity of the mind that in the past centuries was able to overturn world-views.*"

A reputable British magazine on flight sciences regarded Heim's work as "*a theory that greatly outperforms Einstein.*"

Jean Cocteau placed a picture of "*the inner eye of Heim*" on the top of his painting of the great physicists (size 6x8 m²) for the Brussels Art Academy, next to the scientists Copernicus, Newton, Einstein, Lee and Yang. (Sketch 2)

Heim was made lucrative job offers by Americans. Officers of the intelligence service kept him under surveillance and protected him against spies from East Germany.

In other countries, too, it got around that in Frankfurt someone had lectured about a new propulsion concept for astronautics. The space scientists von Braun and Sedov, a Russian, inquired Heim about that new propulsion system. The whole world was waiting for the publication of Heim's Theory, which he had only presented at congresses on astronautics in 1952 and 1957.

The popular German magazine *Bild* called for donations for Heim in November 1957. Heim's objective was to gain publicity with his lectures in order to raise funds for his research. This worked out in part. The magazines *Bild* and *Stern* as well as the director of the aerospace company *Bölkow* supported Heim financially to such an extent that he could employ an assistant for some time.

However, Heim hadn't seen the attacks coming that he saw himself subjected to from the community of “*purely theoretical physicists*”. With a few exceptions, they resented him for his public appearances, as he had not presented his theory at a reputable physicists' congress and hadn't published his research in a professional journal first.

In the 1950s, space science wasn't taken seriously by German theoretical physicists. In their eyes, it was simply a pastime of technicians and dreamers – but no science. Born³, Heisenberg⁴ and von Weizsäcker⁵ regarded space science as a pure waste of money. Heim was called a “*space-travel dreamer*” and considered absolutely untrustworthy, and hence was shunned by the great physicists.

When Heim announced the publication of an essay on gravitation and magnetism in a physics journal, the concerned subject specialist Professor Lamla advised to refrain from doing so. Only the relativity theorist Pascual Jordan⁶ saw a great colleague in Heim and prepared an experiment on gravitation with him.

The difference between mainstream particle theory and Heim's physics can be explained as this: Heim first tries to fathom the geometrical inner structure of the particle, and only after that does he try to analyze the interactions. In the Standard Model and in String Theory, on the other hand, the question about the particle structure remains open (particles are considered as dots – or, not much better – as swinging strings), and the first thing to analyze is the possible interactions between the particles. According to Heim, that way the second step is taken before the first one, which leads to difficulties in determining the mass of elementary particles.

In the following chapters, Burkhard Heim is going to give a short overview of each of the three major scientific subject areas to which he contributed over the years in his own words. Only gradually are these works getting more attention from expert groups. The three subject areas are:

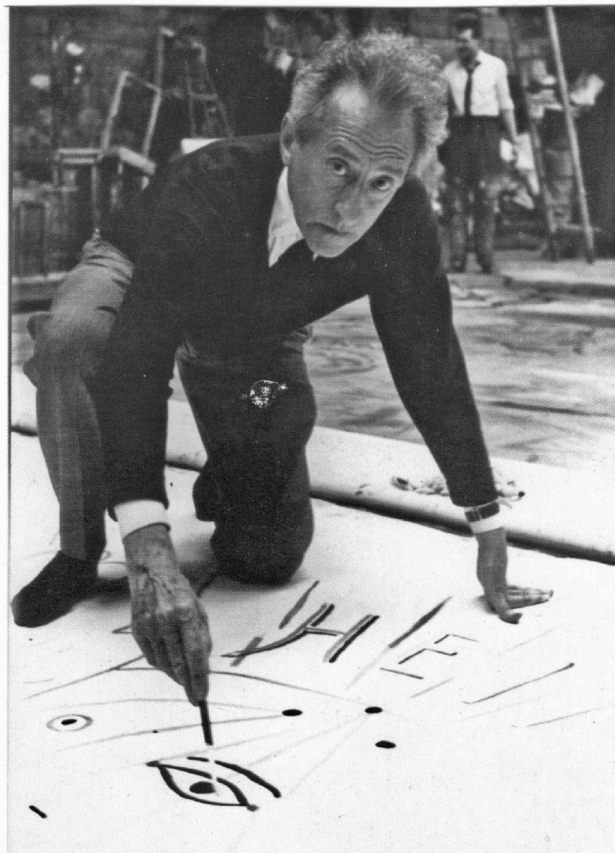
- a unified phenomenological field theory in which electro magnetism and gravity have been united by Heim,
- a unified quantum-geometric structure theory that has led to a formula for the calculation of the masses of elementary particles, and
- development of an aspectual logic by means of which both the quantitative-physical as well as the qualitative-organisational part of the world can be uniformly described.

³ Born, Max (1882-1970): Nobel Prize for Physics in 1954.

⁴ Heisenberg, W. K. (1901-1976): Nobel Prize for Physics in 1933.

⁵ Weizsäcker, C. F. von, (born 1912): Heisenberg's student and friend; 1946-1957 director of the Max-Planck-Institute Göttingen.

⁶ Jordan, P. (1902-1980), along with Born and Heisenberg the founder of quantum mechanics in matrix-form, member of the Nobel Prize Committee.



Picture 2: In 1957 Jean Cocteau drew a picture of the physicists Kopernikus, Newton, Einstein, Lee and Yang and B. Heim's 'the inner eye' in the center of the picture (dimensions approx. 6 times 8 m²) for the Art Academy of Brussels.

At the end there emerges a new world view with the following predications:

- we live in a 6-dimensional world,
- elementary particles are 6-dimensional, dynamic, metric structures,
- humans, too, are 6-dimensional creatures,
- there wasn't a big bang, but the universe developed from a simple space cell,
- the organization in matter is governed by qualitative structures from the 5th world coordinate,
- an approach for solving the body-mind-problem,
- autonomous structures of consciousness can exist free from a material carrier.

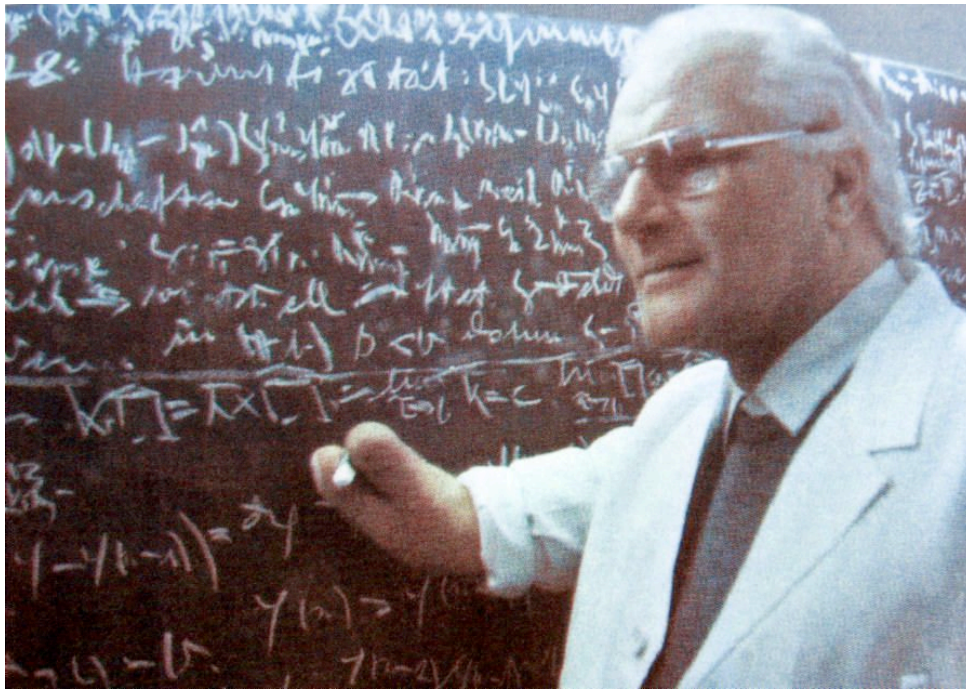
Even if the technical terminology will not always be comprehensible to the lay person, the readers will be able to convince themselves that all of Heim's conclusions are logical and reasonable and physically sound. This text will include information about the persons named in the text, as well as some new terms and the literature cited.

Especially for physicists, there will also be an appendix of two essential equations referred to in the text. By means of this short illustration the specialist will be given an idea of the respective approaches and interim results in Heim's theory.

Of course, for a more profound understanding of the book, it will be necessary to read Heim's original volumes.



Picture 3: Burkhard Heim held a lecture at an IMAGO-MUNDI congress, 1979, in Innsbruck, Austria.



Picture 4: Burkhard Heim had learned to write on a blackboard with his cloven arm and by help of a magnifying glass in front of his left eye (1995).

A The Unified Phenomenological Field Theory

1. Burkhard Heim's Modification of Newton's Law of Gravity

1.1 The Unified Field Strength Tensor of Gravity and Electromagnetism

The achievement for which Burkhard Heim achieved a degree of recognition was his discovery of a new propulsion concept for space flight. According to this concept, it should be possible to have a spaceship powered by specially generated gravitation fields and by conversion of electromagnetic waves – instead of by use of chemical fuels. Heim had discovered a phenomenological explanation of gravity as well as a connection to electromagnetic fields. By analogy with Maxwell's theory of electromagnetism, he had interpreted gravity as a physical field.

According to Heim, in the same way as a moved electric field induces a magnetic field, a moved gravitation field should be able to generate another field – termed a 'meso field'. In this way, Heim obtained similar relations as the ones given in Maxwell's formalism. He could describe the gravitation meso field and electromagnetism with a unified tensor.

By a tensor, physicists and mathematicians mean a physical quantity that retains its form irrespective of the observer's state of movement. Mathematically, for example,

with this quantity the field patterns of the sources of charges or matter in all three directions in space may be expressed as a single term. Here, the field components in the three directions of space are arranged in a 3x3 matrix scheme.

For the following elaborations it is important to explain some features of tensors, which Heim will frequently mention. A tensor is symmetric if by interchanging the line value and the column value in the matrix – in other words, the indexing of the components – the matrix retains its value. This is the case, for example, when only the diagonal elements differ from zero.

In a non-symmetric tensor, however, the diagonal elements of the matrix are zero and the extradiagonal elements differ from zero. The values in the columns have opposed algebraic signs to the ones in the lines.

If the coefficients are also set as complex, they are called hermitian instead of symmetric, and antihermitian in case of non-symmetric complex tensor components. (An example for a non-symmetric or anti-hermitian field tensor is the electromagnetic field strength tensor (A-1) that expresses a field rotation.)

In a lecture delivered to scientists and engineers of the aerospace company MBB in Germany in 1976, Heim talked about how he had developed his theory on gravity:

”It seemed sensible to me to first occupy myself with the phenomenon of gravity in more detail – without consideration of the micro-cosmos of the world. Although we know little about gravity, I can, for example, put Newton's law of gravitation into the Poisson version of a source field. It is widely known how that is done: you have a field vector, here acting as acceleration. In the static case it is the gradient of a scalar location function. The divergence of the field vector is then proportional to the density of the field-generating mass.

Now think about that: what would happen if you admitted a temporal variability? This means I assume a mass distribution that isn't homogenous, that has some inhomogeneities, some anisotropies that also change temporally, so that there exists a partial time derivative of the mass density of the field source. But I make sure that with these temporal changes no matter leaves a certain closed surface enclosing such matter, and now I'm looking at the gravitation field from the outside. What is actually happening here now? In this way, purely by logic, you can expand Newton's law of gravity for the case that such temporal changes exist.

And you can also try to factor in the field mass. If you're going into space, there would of course also be a gravitational field mass between us and the respective observation point and the field-generating mass. This gravitational field mass in turn creates gravity, so that the field can still be changed in an indeterminate way here.

That, of course, would be way below of what is technically measurable, but for once you can allow it.

Now it is possible to describe temporally changing gravitation fields, whereas at first you come to the conclusion that the disturbance of the gravitation field expands with a certain speed that is neither zero nor infinite, but any number other than zero, which might be identical with the speed of light.

Among other things I related the space-time events of a gravitational and electromagnetic nature taken together to a Minkowski world, i.e. to a space-time with an imaginary time coordinate.

In order to do the description, it seemed sensible to combine the obtained field tensors with a unified field tensor which contains both the electromagnetic and the gravitational field sizes.

Well, if I assume that in this way we have a unified field tensor, I can also formulate a unified energy density tensor from that, in the well-known way by an iteration of the field tensors.

You do it like this: you multiply that tensor tensorially with itself and create the matrix spectrum. You'll then get an energy density tensor which, however, represents the energy density of a unified field, namely a field source with its gravitation field. That seems like a unity. That is what matters for us now.

In the case of electromagnetism that energy density tensor may be expressed explicitly. Nevertheless, as the energy/matter equivalent applies, which allocates inertial mass to every kind of energy, of course you can also very well generalize the non-symmetrical, or rather non-hermitian energy density tensor.

That general energy density tensor seems to be non-hermitian – that's because of the interaction between gravity and its field source."

1.2 Magnetic Fields by rotating Masses

Heim's unified field equations postulate interactions between electromagnetism and gravity which are much stronger than the ones that can be derived from Einstein's geometrical theory on gravity.

As he factored in the field mass of the gravitation field (which Einstein had neglected due to its insignificance), Heim obtained his so-called *contrabaric equation*. According to that equation, the transformation of electric or magnetic fields into gravitational acceleration fields and vice versa should be possible.

Heim, who had always been a space travel enthusiast, was fascinated by such prospects. In 1955 he gave instructions to his family members regarding the construction of a certain device which could be used to prove that *contrabary* effect.

The contrabary equation states that the double rotation of the electromagnetic radiation vector and the source term cause the temporal change of a gravitative power density. Heim vaguely talked about that in Frankfurt in 1957, and in the magazine *Flugkörper* [*Flying Objects*] in 1959.⁷

Due to the possible technological consequences, however, he never completely published all of his theory on gravity and the contrabary equation, and always hoped one day he would be able to verify that effect himself in his laboratory.

His unified field theory also entails information about interactions between magnetic fields and gravitation fields. For example, uncharged rotating masses should be able to create a weak magnetic field. Indeed, this fact has been known among astrophysicists by the term ‘Blackett effect’ for a long time.⁸ It can be observed that stars that are heavy and rotate swiftly, also have an accordingly high magnetic field. Blackett only gave a heuristic formula for that. But Heim can derive that formula theoretically, too. The other way round, temporally variable magnetic fields should also be able to generate gravitation fields.

As early as in 1960 Heim already pointed out in his ‘Institute News’ that the reversion of the earth’s magnetic field every 1,000 years could be explained by the interaction of two magnetic fields, namely by a magnetic field that is created by magma streams in the interior of the earth and a magnetic field created by the earth’s rotation. The theoretical data correspond well with the empiric ones.

Only as of 1985 the aerospace company MBB seized on Heim's idea, and wanted to furnish the experimental proof that rotating masses can generate magnetic fields. In a laboratory experiment the weak magnetic field generated by means of a rotating crystal ball should have been proved with a Squid magnetometer, which is a highly sensitive detection device.⁹ However, the money necessary for that device couldn't be raised.

⁷ B. Heim, 1959: “Das Prinzip der dynamischen Kontrabarie” [“The Principle of the Dynamic Contrabary”], *Zeitschrift für Flugkörper* [magazine for flying objects], vol. I, 100-102, 164-166, 219-221, 244-247.

⁸ Blackett, P.M., 1947: *Nature*, 159.

⁹ Harasim, A., I.v. Ludwiger, W. Kroy and T. Auerbach, 1985: “Laboratory Experiment for Testing the Gravi-Magnetic Hypothesis with Squid-Magnetometers”, *SQUID '85-Superconducting Quantum Interference Devices and their Applications*. H.D. Dahlbohm and H. Lübig editors; Berlin: Walter de Gruyter & Co.

According to Heim, factoring in the gravitational field mass as an additional source of gravity leads to a slight change of Newton's law of gravity.

1.3 The Limits of the Attractive Gravitation Field

In his lecture delivered to MBB employees in 1976, Heim explained in more detail:

“Now, the first question was: how does Newton's law of gravity really look like? How far can that be changed?”

If you assume the gravitation field to be observed is totally undisturbed, the field function which in this phenomenological picture appears as scalar function ϕ , depends only on the spatial distance r from the field source.

In this version the dependence of the respective mass on its location in space of course also appears in the gravitation field. Here, the distortion of the pattern of a gravitation field by the field mass of the field itself needs to appear. The whole thing would then be described by a non-linear differential equation.

And this non-linear differential equation for the function ϕ can be solved elementally.

There is a distance ρ in finitude which curiously is determined by the mean-weight masses m of the atoms that constitute the field source M , and at this distance ρ , ϕ equals 0. ρ can be calculated explicitly.

If we now approximately – that's of course not exact, but that doesn't matter – set the mean weight masses of these atoms which constitute the field source, roughly as the mean atomic weight A_1 multiplied by the nucleon mass m_N , we'll get a very nice rule of thumb for estimating this boundary ρ . Consequently, the cube of the mean atomic weight multiplied by ρ is a ratio of two natural constants: $\rho = h^2/\gamma M^3 m_N$. And that is, when calculated, roughly 50 Mpc.

If you take the Russell mixture of a galaxy (approx. 70 per cent hydrogen, approx. 29 per cent helium and approx. 1 per cent heavy elements), create a mean atom weight from it and then calculate ρ , it means the boundary ρ of the galaxies lies at about 10 and 20 million light years.”

According to Heim, Newton's law of gravity must be altered by one factor $(1 - r/\rho)^2$ for very large distances. Thus, Heim can describe the existence of galaxy clusters. He commented on this as follows:

“In this area, the gravitation field is attractive. It limits the maximum volume or the mass density by this radius r_0 , which in principle represents the reality barrier and

corresponds to the Schwarzschild radius of the ART. Because with $r = \rho$, the gravitational acceleration of the field equals zero.

Then there's another barrier, another reality barrier R_0 . Between ρ and this R_0 , the gravitational acceleration is positive, i.e. here the algebraic sign of the gravitative effect is reversed. A very weak repulsion field is created, which, however, steeply descends towards zero. R_0 is the second reality barrier that results from the reality requirement. If you calculate it, you'll realize that R_0 can be compared to the Hubble radius, which, however, cannot be regarded as the diameter of the universe nor its radius."

Apart from the new insights about the physical nature of gravity, Heim very closely followed experiments on the expansion of Einstein's theory of gravitation conducted by Jordan¹⁰, Dirac¹¹ and Brans & Dicke¹² which postulated a variable gravitational constant as well as the confirmation of cosmological models by astronomy.

Together with Pascual Jordan, Heim developed a gravimeter in order to furnish prove of the effect. In 1981, he talked to a colleague about it:

"I worked in field physics first and then turned to cosmology. I've always enjoyed cosmology. At that time, I also believed in Jordan's and Dirac's theories. That was also the reason why I constructed a gravimeter to experimentally prove those ideas of a variable gravitational constant. At that time I had already chosen an area in North-heim where I wanted to place the device. The shepherd dog club, the owner of that area, was just lucky that the Americans had put those laser reflectors up. My proposal, however, had already been submitted to the Federal Science Ministry. Minister Lenz had already written to me saying that he was inclined to regard the issue as most deserving of funding. He actually wanted to approve of the funding if we, Jordan and I, would give him the green light.

But then an American came along and realized that you could virtually use the whole lunar orbit as a gravimeter. And then that was done.

But a variability of the gravitational constant could not be proven. However, back then I believed in it."

¹⁰ Jordan, P., 1955: *Schwerkraft und Weltall* [Gravitation and Space], Braunschweig: Vieweg & Sohn.

¹¹ Dirac, P.A.M., 1938: *Proc. Roy.Soc. (A)* **165**, p 199.

¹² Brans, C. and R.H. Dicke, 1961: *Phys. Rev.* **124**, p 925.

1.4 The Redshift in the Quasi-Static Universe

“I held the opinion that redshift should be studied more thoroughly. That was in 1960/1961. At that time I had derived that redshift formula via the integrals, and it turned out:

I don't need a flight movement in order to understand redshift at all. There's another way!

From this effect of the positive gravitational acceleration you can make a study on the dispersion-free redshift of the spiral nebula spectra, and in this way it is possible to understand the Hubble constant.

You could say that R_0 is then the optical radius of the observable universe, in such a way that optical signals that stem from distances smaller than R_0 experience a more or less intense redshift resulting from that anti-gravity effect, i.e. the energy disperses.

If, however, R_0 is exceeded, the redshift becomes virtually infinite and the signals are not perceptible anymore. If we reached R_0 , there wouldn't be the ‘wooden fence with which the world is boarded up’, but we would see a new universe. But our own home would be invisible then, because the redshift would be infinitely large. Thus, the gravitation field is limited.

Beyond ρ a physical connection of star systems in the sense of an attractive connection isn't given anymore. That means beyond ρ matter would scatter in a completely chaotic way. But within the area of ρ galaxies for example provide the typical picture of the kind of order that can be seen with spiral nebula nests.

According to my understanding, the existence of ρ – attributable to this correction of the law of gravity – is responsible for the fact that there are spiral nebula nests, but no systems of higher order, because outside those nests matter behaves in a chaotic way.

Back then I talked about that issue – which I had known about for quite a long time then – with Professor Walter Baade. And he, too, said that one would be able to see a qualitative proof for galaxy clusters here. Because it made it possible to comprehend the in principle incomprehensible behavior in the macro-region very well. I find it interesting that this can be traced to the mean atomic weight of the field-generating masses.”

The astronomers W. Baade (1893-1960) and Fritz Zwicky (1898-1974) in particular did research on structures and distances of spiral nebulae.

“Thereupon I wrote to Zwicky. In his reply he moaned and said that he was in fact aware of this. He could even prove it with photos. But - he wasn't allowed to publish those pictures. He said the same about photos of star bridges. He couldn't publish those either and said: ‘There are certain anomalies in the redshift that indicate that it can't be an expansion. But that contradicts some famous people's theories. And that would mean trouble.’ He said the pictures were lying in his desk drawer.

I was shocked. That was the first time I realized astronomers behaved in such an uncouth manner towards their colleagues. I thought to myself, Zwicky did realize how important my calculations were – I had sent him the formulas – but even he couldn't publish his sky photographs. That strengthened my assumption that for explaining redshift I didn't need expansion. I also see that there are anomalies that are a slap in the face to the notion of expansion.”

This correspondence took place in the early 1960s. The astronomers Halton Arp¹³ and Van Flandern experienced the same kind of discrimination when they tried to publish astro-photos that seemed to contradict a cosmological redshift Heim's theory, according to which there can't exist galaxy clusters with a diameter larger than approx. 150 million lightyears, was falsified in 2013 due to the discovery of the galaxy cluster U1.27.¹⁴ After all, in the galaxy cluster U1.27 there are about 40,000 galaxies in a space with a diameter of approx. 4 billion lightyears. Moreover, Heim's derivations of the potential curves and limits of gravity have been found to be erroneous by A. Mueller and K. Gruener and had to be revised¹⁵.

Meanwhile, particle physicists have adopted the Big Bang model and vindicate it against all possible objections astronomers may have. They claim that quarks and electrons are points that can be squeezed infinitely densely without the space they occupy becoming any larger. Therefore they can manage perfectly with the singularity of the Big Bang. Halton Arp remarks on that¹⁶:

“The Big Bang Theory is so firmly entrenched in the minds that any thought deviating from it seems either ridiculous or dangerous... The attitude of the conventional cosmologists in the important research centers such as Stanford, Princeton and Cambridge, very much resembles religious fundamentalism.”

Einstein's field equations of gravity can still be regarded unfinished, as they are not completely geometrized. The only exception is the gravitation field.

¹³ Arp, H. 1987: *Quasars, Redshifts and Cosmology*. Berkley: Interstellar Media.

¹⁴ La Science & Vie: U1.27 Groupe de quasars qui ne devrait pas exister; April 2013, pp 36,27).

¹⁵ 2009: MUFON-CES report 12 pp.365-385.

¹⁶ Arp, H. in H.-D. Radecke: *“Arps schwarze Schafe”* [“Arp's Black Sheep”], *Star Observer 2 Special: Big Bang*. pp 80-87.

After his research on gravity, Burkhard Heim, following Einstein's example, also started to geometrize all physical fields, but – unlike Einstein – he additionally started to quantize the geometric space-time structure.

Neither Einstein nor his disciple Wheeler managed to find a geometric formulation for the phenomenological part¹⁷. Due to that fact there are contradictions in the cosmological Big Bang model – an infinitely extreme curvature of space with infinitely high matter density consisting of point particles.

2. Comments on Classical Field Theories

2.1 Comments on the Special Theory of Relativity

Since Einstein and Minkowski it has been known that the time aspect needs to be included in the description of a world geometry. The world is a four-dimensional space-time continuum. Therefore, all physical fields have not only three, but four field components – three spatial/real ones and one temporal/imaginary one – wherein the non-exchangeability of spatial dimensions with the temporal coordinate becomes apparent.

For example, the electric and the magnetic field can be indicated as one single field with spatial and temporal components in one unified field strength tensor that is non-symmetrical, in a R_4 , i.e. in space-time. A special characteristic of tensors is that they remain constant with all transformations into new reference systems and that they are invariant. Hence, in a field theory all physical conserved quantities are written as four-dimensional tensors.

Burkhard Heim recapitulates the basic concepts of the general theory of relativity before an audience of MBB scientists:

“When we deal with equal inertial systems that are in constant movement, we use the group of transformations, the so-called Lorentz group. The laws of nature can now be brought into a form invariant to this Lorentz group, the matrix of which, as is well known, is the four-line transformator matrix in the Lorentz group – a unitary matrix by means of which the laws of nature can be made Lorentz-invariant in the known way.

One consequence of this Lorentz-invariant description of the laws of nature are the very important equivalence principles, i.e. the principle of equivalence between energy and inertia and the one between inertia and gravity.

¹⁷ Wheeler, J.A., 1962: *Geometrodynamics*, New York, London: Academic Press.

According to my understanding, these two equivalence principles are of fundamental relevance. However, with these principles alone you cannot make a description of matter or space-time. Indeed, it has been tried. This way the special and the general theory of relativity were developed. Eventually, it was tried to design a unified field theory, and for this there are a lot of different approaches. But I think you just can't do something like that and still believe you could ignore the essential realm of experience, namely the quantum principle."

2.2 Einstein's General Theory of Relativity and his Unified Field Theory

The difference between the special and the general theory of relativity is that in the general one not only relative movements between reference systems with a constant speed, i.e. inertial systems, can be dealt with, but now also those between accelerated reference systems, i.e. non-inertial systems.

In such a non-inertial system the movement takes place in the same manner as in an inertial system when a gravitational field is present.

This led Einstein to the conclusion that an accelerated reference system or non-inertial system must be equivalent to a certain gravitation field. In free fall, for example inside an elevator, there is no acceleration and therefore also no gravity inside the elevator. Consequently, gravity is only a pseudo force that can be transformed away if the appropriate reference system is chosen. Therefore, gravitational force cannot be expressed by a tensor which defines a conserved quantity. Gravity needs to be described by a pseudotensor. So gravity must be very closely connected to space-time geometry. That was Einstein's big discovery!

In the general theory of relativity vectors or tensors are referred to arbitrary coordinates. If you refer to vertical Cartesian coordinates, the components of the tensor field are called covariant (with indices placed at the lower end in case of x_1, x_2, x_3 and x_4). If, however, the field vectors or tensor components are referred to a curvilinear coordinate system of the Riemannian geometry, they are called contravariant quantities (x^1, x^2, x^3 and x^4).

According to Einstein each gravitation field represents nothing but an alteration of the spatiotemporal metric which is a gravitational potential. Hence, geometrical characteristics are determined by physical ones.

By means of the geodetic equation the orbit of particles and photons in a certain gravitation field may be determined. The geometric shape of the gravitation field itself is given by the distribution of energy and matter in the space volume determined by Einstein's field equations. In these field equations, geometrical quantities of the

space-time G_{ik} are considered to be proportional to a phenomenological physical expression T_{ik} ($i, k = 1$ to 4).

The gravitation field is expressed by the geometrical part G_{ik} , the source of the gravitation field by the physical part T_{ik} on the right side of Einstein's equations. Thus, Einstein's field equations are neither purely geometric nor purely physical – a fact which animated him all his life to geometrize the phenomenological expression, too. However, without success.

In the final years of his life, Einstein tried to combine the electromagnetic and the gravitational field in a unified field theory. For this purpose he identified the asymmetric part of the metric – which in his theory on gravity is zero – with the electromagnetic and the symmetric part, as before, with the gravitational potential. However, Einstein didn't achieve useful results. Nowadays, nobody would risk such an attempt anymore, as a unification would also have to incorporate the strong and the weak nuclear forces.

At that time, Burkhard Heim was one of only a few physicists in Germany who occupied themselves with Einstein's unified field theory, because he, too, had developed a unified theory on gravity - however, a purely physical or phenomenological theory in contrast to Einstein's geometric version. Heim had combined a gravitational field-strength tensor with the electromagnetic field-strength tensor. For Heim, Einstein's approach regarding the unified field theory was not satisfactory at all.

That is what Heim told the journalist Peter Ripota in an interview in 1987:

“In 1952 I wanted to take an exam on the unified field theory for my scholarship. Our professors didn't want to conduct the examination, as nobody was able to do it. So in my distress – as the pension office was pushing me – I went to von Weizsäcker and he said to me: ‘I can't do that either, but I've always wanted to learn it. So, please teach me about it! Then I will assess it!’ (The money I earned from that was a real bonanza for me).

I said that I doubted it was possible to do it the way suggested by Einstein, and I already told him at that point that I would like to work on a unified theory myself.

You see, if you apply the metric tensor in an asymmetric way, as Einstein did, that's no use at all, as all anti-hermitian parts are being canceled. And later on, the only thing you're left with is a Riemannian metric again. Von Weizsäcker's response was: ‘Yes, that's been known. Wolfgang Pauli¹⁸ has already told me that.’ But, I added, I hadn't copied it from Pauli! And von Weizsäcker answered: ‘No. You can't know about it, as Pauli has told me that in a conversation only some days ago!’

¹⁸ Wolfgang Pauli (1900-1958): Nobel Prize in Physics 1945.

I said that according to my understanding that must be done differently, but he replied: 'I don't think there's any point in doing so.' Mr. Pauli had told him that kind of theory would be useless, 'as what God has put asunder no man let join together.' Of course, that immediately provoked my somewhat cheeky back answer: 'How do we know so exactly what God has put as under? We only know that Mr. Einstein has put asunder field and source.'"

Since by that time Heim had already developed a phenomenological unified field-strength tensor in which he managed to unify field and source of the gravitation field by unification of electromagnetism and gravity, he – unlike Einstein – didn't need to look for the field part in a geometric structural part. In 1954, Heim sent Einstein his results. But Einstein couldn't read the letter anymore and had it answered by Vaclav Hlavatý, who collaborated with him¹⁹.

In his MBB lecture Heim explained:

“Now the gravitation field generated by the unified energy density tensor needs to be described in a different way. In the general theory of relativity you look at all one-to-one constant transformations of coordinates and create this homogenous quadratic differential form of the metric from them – in such a way that later on you transform the coefficients of any arbitrary coordinates into any, for example, Cartesian coordinates. Then these coefficients, which themselves are functions of the space-time coordinates, are placed in front of the quadratic terms. And these are the components of the so-called fundamental tensor which in a hermitian case provides a Riemannian geometry.

Here you can observe parallel shifts within such a non-Euclidean space, in which the fundamental tensor differs from the unity tensor. This leads to the so-called Christoffel symbols which are defined in the known way by partial derivatives of the fundamental tensor that constitutes a tensor field.

You can then interpret this metric fundamental tensor as a tensorial gravitational potential, as the geodetic equation applies which now can be expressed by these Christoffel symbols. Einstein's thinking was the following: we know the conservation principle of energy must apply. That means that the vector divergence must go. The tensor must be divergence-free. The vector divergence is equal to the zero vector.”

As the divergence of the structural Einsteinian tensor – the application of a scalar differential operator on the structural part – must be retained, too, and consequently the divergence of this tensor must also be zero, Einstein considered the structural tensor and the energy density tensor proportional to each other and thus got to his field equations for gravity, the base equations of the general theory of relativity.

¹⁹ Hlavatý, V. (no date): *Geometry of Einstein's Unified Field Theory*, Groningen.

Heim: *“If we now cancel the gravitational quantity in our unified energy density tensor, it becomes hermitian. We must then interpret gravity as this metric structure field, but only if our matter field tensor doesn't already contain the gravitation field quantities.*

Here, we only get an energy density tensor which is of non-hermitian nature, and which already uniformly describes the field mass, i.e. the field-generating mass, and the gravitation field generated by it. So, we already have gravity incorporated in this non-hermitian energy density tensor.

This led me to an ansatz by means of which all the interactions, and not only gravity, can be geometrized. And this, in turn, leads to an ansatz for a spatiotemporal Cartan geometry²⁰.”

3. Heim's Unified Field Theory

3.1 Not Proportionality, but Equivalence between Geometry and Matter

Heim continued: *“On the other hand, further investigation should also contain Einstein's established approach, so that, if you cancel the gravity in the energy density tensor, you get an interpretation by means of a metric structure field.*

Of course you can't use a metric with such a non-hermitian fundamental tensor, as in the homogenous quadratic differential form the anti-hermitian parts immediately cancel out due to the process of summation, so in the end you will just have a Riemannian metric again. But you can nevertheless see parallel shifts, so you will realize that the Christoffel symbols – which actually indicate the parallel shifts – are non-hermitian in their covariants and can be split into a hermitian and an anti-hermitian part. Similarly, the fundamental tensor is non-hermitian, so it is different to its transpose. You could also construct such a metric part, which, however, doesn't need to be divergence-free by all means, as the non-hermitian energy density tensor, also, doesn't exactly fulfill the conservation laws of energy and momentum.

For the time being, we're going to accept that. Later on you will see that this cancels out.

At this point the following came to my mind: again, I constructed such a tensor – analogous to the general theory of relativity – but this time in a non-hermitian version and made it proportional to the non-hermitian energy density tensor. Now the question is: What does that mean?

²⁰ Cartan, E., 1951: “Lecons sur la géométrie des espaces de Riemann”, Paris.

First of all: if you cancel the gravitational part in the phenomenological tensor, it becomes a simple canonical energy density tensor, and that results in you converting the anti-hermitian part of the fundamental tensor on the other side to a null tensor as well. Then the whole thing becomes Einstein's equation. Now the metric structure field has to be interpreted as the gravitational field structure generated by the right side. However, if we don't do that, we already have the gravitation field contained in the non-hermitian energy density tensor. After all, we're writing the gravitation field and its field-generating source as a unity.

Now we have to interpret this non-hermitian equation differently. We need to interpret it as a kind of equivalence principle, and we must say: due to this proportionality a metric structure part – which is constructed by the Ricci tensor in the described way, so that the equations of the general theory of relativity result as exceptions or approximations – is equivalent to the phenomenological tensor that describes the field and its field source. It is an equivalence principle.”

3.2 Operator Equations instead of Field Equations

“On the other hand, you can say that the components of our phenomenological energy density tensors are proportional to spatial energy densities. An energy, however, can be regarded as the temporal change of an action, i.e. Ω is a volume of space-time, therefore $d\Omega$ is a volume element. Then you could say that the components of our energy density tensor are proportional to the spatiotemporal density of an action tensor. Nevertheless, in principle, actions are integer multiples of a quantum of action. In the general case, these numbers can construct complex numbers the real and imaginary parts of which are positive integers, namely the multiples of the quantum.

Now it is possible to create a spatiotemporal area integral and while doing this you have to introduce the quantum concept, i.e. you don't just clandestinely sweep the quantum concept into the whole thing, but it is introduced absolutely consciously. Consequently, for the spatiotemporal area integral we then get an arithmetic expression that is proportional to integer quantum numbers.

Now it's of course important to consider what there is to be learned from this fact. First of all, we know that the structural part is equivalent to the actual energy density tensor. Now the integer sequence of quantum numbers to which the whole thing is equivalent unfolds in front of us. That means that the metric structure – as hard as that may be to imagine, and as inconvenient that is in the mathematical calculations – i.e. our non-hermitian structure field of space-time, which actually is a radical geometrization of phenomenology, appears in quantum-like structure levels.

However, if this is the case, space-time R_4 can be understood as a sub-space of a Hilbert functional space, that means there must exist a convergent state function of the

metric state of the space-time, φ_{ik}^p and there must exist a hermitian state operator, C_p , in such a way that when this operator acts on the state function, an equivalent to our metric structure formulation is created. On the other hand, this operator – due to the necessary convergence of the state function and its hermiticity – also defines an eigenvalue spectrum λ_p . I.e. in this way, you can in fact get a state equation, namely at a quantum-theoretical state equation in a Hilbert functional space²¹.

The eigenvalues that form a discrete point spectrum, will then describe possible states of a micro-cosmic field source. After all, the whole thing then of course also applies to the microcosmic area.”

$$C_{(p)}\varphi_{km}^{(p)} = \lambda_{(p)}(k, m)\varphi_{km}^{(p)}$$

4. Expansion of the World Dimensions

4.1 The 6-dimensional World as Result of Invariance Requirements

“These quantities are of non-hermitian kind. You can now state the number of the possible descriptive equations of such an eigenvalue spectrum, as in each of these equations three index numbers independently of each other run through the numbers 1 to 4, i.e. we're dealing with $4^3 = 64$ of such non-hermitian equations. However, at the same time all theorems and identities, above all those of the hermitian symmetry, apply in this non-hermitian geometry of space-time. Thus, there is a set of further equations here: 28 pure structure relationships which don't contain the quantum concept and that constitute the construction of space-time.

Incidentally, you can find these relations in Einstein's book in which he made a try at a unified field theory. That can also be seen in the Weylsch geometry. These are statements about the metric field for which there is absolutely no analogue in the Riemannian geometry.

So these 28 additional relations also exist. Since our eigenvalues, however, are elementary states of space-time, it seemed reasonable to me to insert these 28 additional null relations into the 64 equations. Consequently, you get to the result that 28 of our 64 eigenvalue spectra, in principle remain empty, so these don't need to be considered in the first place. $64 - 28$ – that results in 36 remaining eigenvalue spectra that actually must be examined and which define 36 different sequences of energy levels altogether. These energy levels might describe some sort of fundamental particles of matter, as we have now entered the microcosmic region, and in this radical geometrization they appear as geometric conditions.

²¹ Hilbert space: infinite-dimensional version of the Euclidian space developed by David Hilbert. The Hilbert space is a complete, linearized, normed vector space with a scalar product.

On the other hand, these structural levels themselves are proportional to energies. Those in turn are proportional to masses, so that you could say: in principle those eigenvalues must be proportional to energetic quantum levels. Energies, however, need to be invariant. This non-hermicity, this non-symmetry was troublesome.

So I did the following: these 36 quantities should be invariant against the allowed coordinate transformations, namely against the allowed one-to-one transformations that are free of infinity places. If I demand this invariance, the energetic values, too, should be invariants. These 36 energetic, conceptually different quantities can be understood as components of 2nd degree by analogy to an energy density tensor. These 36 quantities can be placed in a 6-line tensor matrix. On the other hand, the lines and columns of a tensor are, as is well known, vectors, so in order to represent such a tensor we need a 6-dimensional space. For this reason I have tried to understand the whole description of the eigenvalue relations of these metric states of space in such a way that we actually have a 6-dimensional structure in a 6-dimensional world, so that the degenerate mappings of this structure lead into space-time to such spatio-temporal state equations.”

Let's briefly sum up Heim's statements: first, Heim developed a unified energy density tensor of gravity and electromagnetism. In contrast to Einstein he did not set it proportional to a geometric structural object from Riemannian geometry, as in Heim's theory both source and field are already contained in his energy density tensor. There only applies an equivalence principle between geometrical and physical description.

Einstein's theory applies only in macroscopic ranges. Heim, in contrast, examines gravity in the micro range of elementary particles. As in the physics of the micro range energies only appear quantized, this needs to be considered in the geometric structures as well. In this case, however, operator equations or state equations of structure levels must be used instead of field equations. The state equations here need to be something similar to Christoffel symbols, as from Heim's equations in the macro range the result must in turn be Einstein's field equations.

Thus, Heim obtains 64 eigenvalue equations of which 28 are zero, so that only 36 equations remain. If he puts them in the form of a 6-line tensor matrix, the energetic eigenvalues become invariant, and the tensor itself becomes symmetrical or hermitian. The world in which such a tensor exists would, corresponding to the number of columns, have to be 6-dimensional.

Now the nature of the two additional world coordinates needs to be examined. Or maybe they are only mathematical auxiliary constructions.

Other authors, too, included additional dimensions in their theories, for example Kaluza²² and Klein²³, who tried to unify the general theory of relativity with electromagnetism by means of a 5th dimension. This additional dimension, however, is just a mathematical trick, as this dimension is curled up - or compactified - into a volume of space so small that it does not appear in space-time.

In string theory, even 7 additional space-dimensions are introduced as auxiliary quantities which, according to the Kaluza/Klein scheme, are 'hidden'. In Burkhard Heim's theory the two additional dimensions are, in contrast, actually expanded world dimensions!

When trying to interpret quantum theory, James Jeans already suggested to add another actual world dimension to space-time, but that was rejected by the Kopenhagen Group of Quantum Physicists.

4.2 The physical Meaning of the two additional World Dimensions

In his MBB lecture, Heim pointed out:

“I mean, in quantum physics hidden coordinates had been considered before, as it actually doesn't matter at all if you admit certain degrees of freedom to a microstate or you talk of hidden coordinates.

The question is: of what algebraic nature are those additionally conceptualized world dimensions?

If you now demand that the functional determinant keeps its algebraic nature in this extension of the dimension number, so it doesn't suddenly become imaginary, you can technically render the whole problem of the possible results ambiguous.

Originally I had been confronted with a three-fold ambiguity. For example, one dimension can be imaginary, the other ones real. In that case, however, the functional determinant wouldn't keep its real nature. If I demand this reality, either both additional dimensions are real or both are imaginary. That means, I only have two possible signatures of the R_6 – of the 6-dimensional space – and have rendered the problem two-fold ambiguous.

²² Kaluza, Th., 1921: “Zum Unitätsproblem der Physik“ [“On the unity problem of physics“], Sitzungsberichte der Preuss. Akad. D. Wiss. Phys.-Math. Klasse [Minutes of the physics/mathematics class of the Prussian Academy of Sciences], Berlin; p966.

²³ Klein, O., 1928: “Nicht-euklidische Geometrie“ [“Non-Euclidian Geometry“], p261; Berlin: Julius Springer.

However, you can directly deduce from nature itself which way is possible and conforms with nature. The physicist Cole once examined if the world could have more than 3 real dimensions p at all²⁴. He tried to answer the question as to what the trajectories of a body in the gravitation field or of an electron in an atom must look like in case of more than 3 spatial dimensions. Could any stable Kepler orbits and stable basic states exist in the atomic shell at all?

He came to the conclusion that if p is greater than 4, there are no stable Kepler orbits, but all gravitational movements are logarithmic spirals. However, in our world that is undoubtedly not the case. Only in the case of $p = 4$ there is one single stable orbit. That is the circular orbit. The circular orbit, however, is also irrational and would immediately turn into a logarithmic spiral, as well.

The observed stable Kepler orbits which also remain stable in the case of energetic disturbances only exist in the case of $p = 3$. In the microcosmic range you can see that there are no stable basic states for all $p > 3$. In fact, however, we see stable atom shells, for example stable electron trajectories that exist only for $p = 3$. That's the reason why I assume that the two additional dimensions of the world which I'm introducing here, of which at first it's not known at all whether they are real world dimensions or only mathematical fictions, that these two additional dimensions may be regarded as imaginary, just as time is imaginary."

Therefore, the signature of the coordinates must be (+++ - - -).

Incidentally, the mathematician Roger Penrose²⁵, Stephen Hawking's teacher, has come across 3 real and 3 imaginary dimensions of the world as well. He discarded his complex C3-world, as he could not interpret the two additional imaginary dimensions physically. Should there be 3 time dimensions? How should they be discriminated from one another? However, if they are not time directions, what are they? And why can't they be temporal dimensions? Xiaodong Chen, a student of Penrose, found that in a R_6 at least the wave-particle-dualism, the entanglement of spatially distant particles can be explained and Bohm's quantum potentials and the Landé factor (g) can be derived²⁶. The Landé factor in Heim's theory can be found in appendix A.

In 1987, in the interview with Peter Ripota, Heim answered this question as follows:

²⁴ Cole, E.A.B., 1979: *Il Nuovo Cimento*, Vol. 44B, 1, 157-166; *Il Nuovo Cimento*, Vol. 55B, 2, 269-275.

²⁵ Penrose, R. 1975: "Twistor Theory, its Aims and Achievements", in *Quantum Gravity*, Calderon Press.

²⁶ Chen, X., 2008: "Three Dimensional Time Theory: to Unify the Principles of Basic Quantum Physics and Relativity", ar Xiv:quant-ph/0510010v1, October 3, 2005.

“Since regarding semantics it is something completely different. What matters is to see what happens if, for example, you examine a differential equation that describes a natural process, for example the principle of energy conservation...

If the energy density tensor in R_6 is divergence-free, it means that the unified force-field tensor must be divergence-free as well. If you explicitly write that down in the form of components, you get six differential equations of linear kind. The divergence equations for the space-time section of the tensor are contained in that.

If you assume that the 4-dimensional vector divergence of the unified field tensor is equal to a current flow, it becomes evident that any change in the material state is connected to such neutral currents. Something is being shifted a bit. If you insert such a change in the material state in the equation, you can see that these currents are determined by the changes in x_5 and x_6 . Therefore, x_5 is an evaluation of the structural state before the change, that can subsequently decrease or increase. The structure changes until a new, stable, static state has been attained.

In this way you can get to semantics.

If space-time was absolutely empty and only a structure in the form of quantum levels existed in the coordinates x_5 and x_6 apart from space and time, you would not be able to interpret this structure physically...

However, if such terms intersect space and time, and if the world lines are zero lines, they appear as gravitons, as gravity-field quanta. And in this case they appear as information probabilities and can change macro states. And such an information probability is always negative...

The x_5 -coordinate can be quantified. In the quantitative region that corresponds to an inverse entropy. And that is an organization. The smaller the possibility, the greater the x_5 -value.

In analogy to that, each car driver, for example, tries to attain a high x_5 -value when driving. As without a high x_5 -value the greatest possibility actually is that the car would drive into the ditch. However, the actual job of a truck driver is to maximize the organization probability and to minimize the entropic probability to the greatest extent possible...”

The former Husserl student, professor Hedwig Conrad-Martius²⁷ suggested to Heim to name this 5th world coordinate ‘entelechial’, as organizations are evaluated by it, and to call the 6th coordinate ‘aeonic’, as it describes the actualization of the 5th coordinate in time.

²⁷ Conrad-Martius, Hedwig (1888-1966): phenomenologist and natural philosopher.

“The additional dimensions and their properties are by no means a step into transcendence. Because these additional coordinates are stocks of numbers, just as other coordinates are. And the mere insertion of additional stocks of numbers is nowhere near a transcendence!

As the semantics of this x_5 -coordinate as evaluation of an organization corresponds to information, later on this semantics entails finding a description aspect for qualities. As, for example, several organizations, which are still of quantitative nature, can act together, and these in turn can cause or induce a superordinate organization. In that case, such complex structures can't be conceived quantitatively anymore.

The actual act of transcending would consist in thought structures by means of which the limits of competence between quantitative and qualitative aspects of a phenomenon can be transcended. Because then the R_6 is only the quantitative space of manifestation of an event that is taking place somewhere else.”

One of the most important questions for Heim was whether time really needs to have geometric meaning, or if this is pure fiction. I'd like to illustrate it with the following metaphor: imagine the world without humans as perceptive beings who are the ones that differentiate between past and future. Then you could imagine and overlook the world with its events as a space-time unity, something like a block consisting of film strips with pictures of space on each 2-dimensional slide, and the sequence of those pictures as time. In this picture, time would also have a geometric character. However, if time may be interpreted as a geometric coordinate, this also applies for the additional imaginary trans-coordinates.

4.3 Can the World have more than 6 Dimensions?

The question remains if the world could not have more than only 6 dimensions. (We're not talking about the curled up or compactified dimensions of mathematicians.) In 1991 Heim explained this in Heidelberg:

“I then found a law of dimensions that says that if a mathematical connection of this kind of approach, which was kept very universal, exists, then there are algebraic symmetries of this connection that are absolutely independent of the symmetries of geometric quantities. It also means that if in any empirically known space that is, let's say created of p dimensions, this connection applies, you can derive a law of dimensions from the law of conservation that states whether this space is a subspace of a hyperspace or not. And if so, how many dimensions this hyperspace has.

It is possible to show that the point and the line can be mapped on areas. For the physical space, the 3-dimensional space (long, wide and high) that doesn't work, as a fractional number would result as dimensional number. Dimensional numbers, how-

ever, must be positive integers. For space-time the law of dimensions results in a 6-dimensional hyperspace. For 5 dimensions there is no hyperspace. If, however, I use the R_6 , it turns out that there also is a 12-dimensional hyperspace. There are no further hyperspaces in the world besides that. The equation is

$$(n-1)^2 - 1 = p (p-1) (p-2).$$

This, of course, is nice and simple. Now space-time geometry could be extended to a 12-dimensional geometry, where the result is that a 6-dimensional space is defined in its coordinates energetically.

This R_6 I call the 'world'.

The other dimensions of hyperspace, namely x_7 to x_{12} , define spaces in which the concept of energy doesn't exist anymore, but in which volumes can be created. Now from this standpoint you can use a half-classic form of description in a R_6 ."

As Heim is going to explain further, in 6 dimensions you can describe the dynamic structure of elementary particles. With 8 dimensions also interactions between the particles may be understood. And in 12 dimensions quantum theory appears as hyperspace dynamics.



Picture 5a: On November 17, 1969, Heim gives a lecture about his works before the management board of the aerospace company Messerschmitt-Boelkow-Blohm (MBB). From left to right, 2nd row: Professors Paqual Jordan (University of Hamburg), Gerhard Lyra (University of Göttingen), Harald Ruppe (University of Munich), Dr. Busch (MBB), Professor Heinrich Hora (MPI Garching), D. Kabiersch (MBB).



Picture 5b: MBB-Colloquium in 1969 participants from left to right: I. von Ludwiger, Gerda and Burkhard Heim, Pasquual Jordan, Gerhard Lyra.

B The Unified Quantized Structure-Theory

5. Geometric Fundamental Particles of the World

5.1 The World consists only of Area Elements and their Dynamics

Heim assumes an equivalence between physical quantities and geometric structures. Field equations become geometric state equations. In the MBB lecture he said:

“Now you can transfer the originally non-hermitian state equations into this 6-dimensional world with its 3 real and 3 imaginary dimensions, and you get to 6-dimensional state equations which, however, are fully hermitian. If you now operate in these dimensions, the passage to the macro state would lead to an analogy to this non-hermitian tensor equation and to a macroscopic analogy, which would be completely hermitian. And here, of course, the absence of divergence and the laws of conservation would apply exactly, too. However, only in the macroscopic range.

These field equations, these state equations of such structural levels, can be transferred into this R_6 , in hermitian form. The appearance of all these quantum numbers shows that there must be discontinuities here.

Back then, Professor Lyra²⁸ – whom I frequently met – drew my attention to this fact: we need to keep in mind that certain spacetime volumes can't become too small. Strictly speaking, we need to apply difference equations. The question arose if geometric elementary quantities could possibly exist? There seems to be some evidence for that.”

Independently of Heim, other physicists, too, for example Jürgen Treder²⁹, discovered that a smallest geometric unit exists in the real world: the product of two characteristic lengths which can be defined according to an elementary mass, are its very small so-called Schwarzschild radius and its very large Compton wave length. The product of the two yields a natural constant – a smallest area – which is the square of the Planck length with about 10^{-35} meters.

This quantity cannot become smaller, i.e. it's impossible to gain information about anything smaller than this quantity.

The String theorists, however, disregard this fact. In their opinion, oscillating strings still exist in these areas. The proponents of the modern loop-quantum gravity – the alternative to string theory³⁰ – around the physicists Ashtekar³¹, Smolin³² and Rovelli³³, also use the same area quantum. Heim calculated the same value for the area quantum which he calls τ – the ‘metron’, and made it the basis of a difference equation or metron calculation in which singularities can't exist – neither in particle dimensions nor at high energies or zero points at the origin of time of the universe.

5.2 Differences Calculation instead of Differential Calculus

“Of course, I had to try to adapt this whole infinitesimal calculus for the case $\tau > 0$. That was considerably hard work. During that process a method developed that is quite hard in its application. Above all, theorems such as the mean value theorem don't apply in that case anymore. You also deal with increasing sets there, as the ar-

²⁸ Lyra, G. developed the geometry named after him: whereas in the Weyl geometry a gauge is introduced into the metric $(x_0^{-1}g_{ik})$, Lyra introduced a gauge function into the affine connection $\Gamma^i_{kl}: (x_0^{-1}\Gamma^i_{kl})$.

²⁹ Treder, J., 1974: *Physikalische Probleme des physikalischen Raumes*, [physical problems of the physical space] p319; Berlin: Akademie Verlag.

³⁰ Green, B., 2000: *Das elegante Universum* [The elegant universe], Berlin: Siedler.

³¹ Ashtekar, A., 2002: “Quantum Geometry and Gravity: Recent Advances”, *General Relativity and Gravitation*, Singapore: World Scientific; Abhay Ashtekar's homepage: <http://cgpg.gravity.psu.edu/people/Ashtekar/>.

³² Smolin, Lee 2001: *Three Roads to Quantum Gravity*, London: Phoenix.

³³ Rovelli, C. 1998: “Loop Quantum Gravity”, *Liv. Rev. Rel.*, **1**, p. 1 et seq.

guments, too, become integer multiples, which in the case of an empty space are proportional to τ . It was quite difficult. I wrote a lot about it.”³⁴

There had also already been papers on the differences calculation^{35 36 37}.

However, due to the difficulty of having others search the literature for appropriate papers, Heim was not able to find the corresponding articles and thus had to establish the whole calculus himself. Moreover, Heim uses area differences instead of length differences.

In the 1970s Burkhard Heim was one of the first physicists who developed a quantum geometry or quantum gravity free of any background that can do without any perturbation calculation. This is a contrast to the particle physicists' method, who assume matter quanta in front of a background geometry, in order to integrate quantum effects in gravity. In the applied perturbation calculations spacetime is considered a continuum, as, by the way, in string theory is as well.

“The bottom line is: you can apply the τ -method to these eigenvalue equations in the R_6 , i.e. the infinitesimal representations which describe such world structures – if we simply regard the R_6 as world. You'll then get a system of relations of the R_6 which can generally display such structures in the R_6 , and that in a system that leads to integer solutions.

But the terms that decline hyperbolically, are tremendously densely arranged. You can't really use this spectrum for anything. This very dense arrangement comes about due to the fact that all possible field masses are included here, and that also includes the field masses of photons. And everything that can be called a 'photon' would need to be present in this as a term...”

However, only by means of this 6-dimensional version and differences calculation it is impossible to calculate particle structures. Therefore, Heim had to find a way to introduce a more comprehensive geometry by means of which a separation of the mass terms from the pseudo continuum of all possible forms of energy would be feasible.

³⁴ Heim, B., 1989: *Elementarstrukturen der Materie* [Elementary structures of matter], vol. 1, 2nd ed., (1st ed.: 1980); Innsbruck: Resch.

³⁵ Nörlund, N.E., 1923: *Differenzenrechnung* [Differences calculation], Berlin.

³⁶ Gelfond, A.O., 1952: *Differenzenrechnung* [Differences calculation] (Russian); Moscow-Leningrad.

³⁷ Meschkowski, H., 1959: *Differenzgleichungen* [Differences equations] Göttingen: Vandenhoeck & Ruprecht.

For this reason, he investigated the geometric structures at the time origin of the universe.

6. The Cosmological Model

In 1976, in Ottobrunn, Heim explained before of MBB-employees:

“If we know that the ponderable masses of the elementary particles overlay this spectrum as discrete point spectrae, we can ask where the lower bound of ponderable masses that are able to bear the charge field of an elementary charge e_{\pm} actually lies?”

You can investigate that by means of different theorems which result from this R_6 structure. Now you can calculate such a mass, so that you very exactly obtain the charge and mass of the electron as lower bound of the charged masses.

If we assume the universe does not contain any mass, except for a single lower mass barrier, the minimum mass, we would get to an absolute largest extension R , which, as the reality barrier of a gravitation field, would be determined by the minimum mass.

The double value $D = 2 R$ would then have to be understood as the diameter of the physical space per se, i.e. as the absolute largest distance that can actually exist in this space. If you calculate that exactly and take the natural constant τ into consideration, you will obtain a quite peculiar equation: you will realize that the largest diameter that can actually exist in the universe is, by means of pure numbers π , e , $E = 1 \text{ m}$ – by means of a purely algebraic relation – connected to the absolute smallest thing that exists in the world, namely the geometric elementary unit τ . That is a connection about which you can philosophize.

Now you can show the following: if you know that τ changes over time, that it shrinks, as in this algebraic equation of higher order τ is connected with D only by pure numbers, the diameter of the universe must be a time function as well. That means, the universe, in fact, must expand.

However, this cosmologic expansion of the universe is so small and D – since the optic radius is not the limit of the universe (it is only the optic limit of what is perceivable to us) – is tremendously vast and expands very very slowly. Here, of course, a red shift can come about, too, which, however, is so slight that it can't be measured. This redshift takes place in this area that is to be understood larger than ρ , but never as a dynamic expansion process.

I would say the universe is neither Hoyle's Steady-State-Universe³⁸, nor the expanding dynamic one of Jordan and Dicke. The truth lies somewhere in between. We are dealing with a very large universe that is quasi-infinite – but not infinite. We are dealing with a dynamic universe which, however, is only regarded as quasi-dynamic, as it expands only slightly.

Now you could imagine, if τ shrinks with increasing diameter, with increasing time, D must have been smaller and τ bigger in previous areas. Now you can go back into areas that lie further and further back in time. Then τ becomes bigger and bigger, D smaller and smaller. Ultimately, you must get a value D that is designed in such a way that such an area τ encompasses the whole protouniverse. The reason is that in this case the contraction process cannot continue, as, after all, nothing can be smaller than τ .

If you substitute that, you get an equation of the 7th degree in this origin of the world: $\beta \tau^7 - \beta = \text{const.}$ And the constant β in turn is only expressed by π .

If there is a solution of this equation of the 7th degree, there was also such a beginning in finite time.

And now you can calculate that there must be three of such real zeros. The curve has three zeros in the real range, three real solutions. We cannot use the imaginary solutions at all, as that would lead to contradictions later.

You can only understand the three solutions in such a way that there must be a protouniverse that is encompassed by such an elementary area, and that there are now two additional solutions that in turn create concentric spheres within this protouniverse. That means we're dealing with three of such original protospheres. Now, what does that mean?

I think that exceeds our imaginative power. That's simply not comprehensible for us. All we can say is that there might have been some structure at the origin of the world, where these two additional spheres, which, after all, fall below τ , are probably understandable due to the fact that other areas of these spheres are to be found in other areas of the actual R_6 , and these actually just 'dip' into the R_3 -area.

But it doesn't matter how you interpret this. Here, we have reached the limits of physics. We can't tell any more about it.

There is only one thing that's certain: if this universe actualizes, the expansion process starts. These spheres enter time and their surfaces split. More and more τ are created, which at the same time become smaller and smaller. But there remains this

³⁸ Hoyle, Fred 1952: *Die Natur des Universums* [The nature of the Universe], Köln-Berlin.

sequence of three structures which are arranged in a temporal sequence and are only separated from each other by a very small elementary time – which you can define here as well. Now this is getting smaller and smaller and smaller, and at the same time the number is becoming larger and larger.

You see, and here you have an ansatz. As the important thing for us must be to treat this pseudo continuum and to separate the point spectrum of ponderable terms from this pseudo continuum. With this detour back to the origin of the world you attain three structures. As at the present moment these three structures which follow each other within a very short time – and which actually define the present – would determine three structural units. “

Instead of the big bang, Heim talks about the ‘big leap’. After all, the expansion of the metron with concurrent surface splits happens in quantum leaps in an initially absolutely empty universe, and that by means of the enlargement of the space diameter by one length quantum per time quantum.

In Einstein's general theory of relativity, in contrast, the big bang, as proved by Stephen Hawking, is a necessity. Because in the field equations – as we have already seen – the geometry of space is only defined when a density of energy or matter is present. Thus, at the beginning of the world all matter of space would have had to exist compressed in a volume smaller than a pinhead. What matter geometrically means and how it was created, however, cannot be stated.

In Heim's theory, however, there is only the dynamics of a pure geometry. Its state equations don't contain any phenomenological quantities anymore. The thing we call matter appears in the universe only much later (approximately 10^{10} to the power 100 years later), and then not in one single explosion, but, put figuratively, almost concurrently “*as a kind of firework*” all over the universe as soon as the number of area quanta is big enough and their areas small enough (as soon as it has about double the value of today's area element), so that the broken symmetry of the Poincaré group³⁹ and the creation of matter can come about. That happened only about 14 to 20 billion years ago.

Matter entered space in the form of quanta of the Planck masses, i.e. about 10^{-5} grams, and accumulated in quasars. The cosmologic background radiation is explained in the same way as in the modern Quasi Steady State Theory⁴⁰, and not as the residual radiation of a big bang.

³⁹ Transformations with the matrix A^i_k , which let the line element ds^2 (see B-11) be invariant, are called Poincaré transformations. The transformations $x^{i'} = A^i_k x^i + a^i$ form the Poincaré group. Transformations $x^{i'} = A^i_k x^i$ form a subgroup of this, the (homogenous) Lorentz group.

⁴⁰ Hoyle, F., G. Burbidge and J.V. Narlikar, 2000: *A Different Approach to Cosmology*, Cambridge: University Press.

Nevertheless, particle physicists prefer the big bang model. That is because they need the concept of an extremely high mass density in order to be able to understand the development of matter. Indeed, you can undertake further theoretical research on plasma consisting of quarks and gluons, and you can investigate the state in which all interaction forces had the same value. These original components are presumed as already existing. And the big unification of all forces is seen as the perfection of physical knowledge.

However, loop-quantum theorists, such as Ashtekar & Lewandowski⁴¹, point out that one big unification by no means presents a criterium for a suitable theory. Some loop-quantum theorists, too, put – just as Heim did – an elementary space volume at the beginning of the world, a space volume that was surrounded by areas of the quantity τ .⁴² In contrast to Heim, in their theories τ (except for factors consisting of quantum numbers) is constant in time and still has the same quantity nowadays as at the origin of time. There is only one volume element as proto universe – not 3, as in Heim's theory. And the areas do not split either. In the course of time, volume elements are attached to the nodes by means of new graphs, and thus extend the universe. Space time is imagined as a construction of spin-nets.

In Heim's theory, the empty space is characterized by the fact that the geodetic grid consisting of the squares τ is equidistant and straight. Since for the areas also a direction of rotation can be defined – Heim calls this the metron spin – the smallest areas additionally need to be arranged in such a way that there is perfect isotropy. This characterizes the empty space.

Due to the fact that there are metrons with spin, a preformation of space exists, making it possible that something can actually happen later. For example, the isotropy can be disturbed by the circumstance that the metron spin turns down and oriented states are created. Heim calls that a 'field activation' which is a result of non-hermitian structure parts.

Whenever something like that happens, the consequence is a deformation of this geodetic grid. With regard to the empty grid it would, as a consequence of the projection, seem as if the geodetic elements become smaller and denser or as if they condensate. And this change is described by the tensorial state function. Therefore, Heim calls this state function a 'condensor'. (Sketch 1; see p. 123 et seq.)

⁴¹ Ashtekar, A. & J. Lewandowski, 2004: "Background and independent quantum gravity: a status report", *Class. Quantum Grav.*, **21**, p57.

⁴² Bojowald, M., 2001: "Absence of singularity in loop quantum cosmology", *Phys. Rev. Lett.*, **86**, 5227-30; Bojowald, M. & G. Date, 2004: "Quantum suppression of the generic chaotic behavior close to cosmological Singularities", *Phys. Rev. Lett.*, **92**, 017 302.

The promising concept in Heim's ansatz, however, was not so much the use of operator equations as a result of structure quantization or the 6-dimensionality, but the discovery of the 3 different geometric structures as partial structures of the world.

A quick recap: in Einstein's gravity theory there is only one metric which is identified with the gravity potential. In his unified field theory, Einstein tried to include the electromagnetic field in this matrix scheme of the metric as well. Later, other authors used further metrics for the description of additional interactions.

In Heim's theory 3 metrics – 3 partial structures – interact with each other and only as products create new fundamental tensors. From a mathematical point of view this is attributable to a non-Euclidian geometry with double coordinate transformation: Euclidian coordinates x are a function of the non-Euclidian coordinates y , which in turn depend on non-Euclidian coordinates z .

The metric partial structures, i.e. the 3 metrics κ – the 3 different geometries of the world interacting with each other – Heim indicates with λ .

7. The Polymetric Geometry

7.1 The interacting Partial Structures

“If you examine the three structures of the world, you'll get to the analogs of the integral operators, the cores of which I indicate with κ . The non-hermitian tensors I indicated with λ . As tensors, these structure units would now be interacting as follows: for $\lambda = 1$ the structure unit would only depend on the coordinates x_5 and x_6 , for $\lambda = 2$ only on x_4 , and for $\lambda = 3$ only on the coordinates of the compact R_3 . Now these structure units start interacting with each other. Whenever anything happens in our world, i.e. whenever anything in the material realm, there is an interaction and that is of multiplicative kind.

And this always creates 2 of such structure units – of a non-hermitian tensor: a fundamental tensor of the R_6 indicated with γ .

In this way we can define maximally 9 of such tensors, which are all in interaction with each other. That means that we're actually dealing with a polymetry – a polymetric geometry – which are all defined in the R_6 and interact with each other.

Here, we can differentiate 4 classes of polymetries. First, you can determine that the structure unit $\lambda = 1$ can never become the unity tensor; that means the components don't become the Kronecker element.

If there is anything physical, this unit $\lambda = 1:_{\kappa ik}^{(1)}$ will always exist. But the two other units can, depending on the nature of the geometry, become the Kronecker element. This, of course, has implications and consequences for the interaction of these geometries. There are correlations as well, but not this back and forth of the co- and contravariant indices anymore. That is pretty difficult to do. You can now differentiate 4 forms.”

The three partial structures, the spacial, the temporal and the structure consisting of the imaginary coordinates x_5 and x_6 can be combined in such a way that a) only the imaginary or trans-structure deviates from the even grid and condenses, b) the imaginary and the temporal structures condensate, c) the imaginary and the special structure condensate and d) all structures condensate, i.e. the imaginary, the temporal and the spacial structures.

The fundamental tensor of the a-geometry consists of only 2 partial structures (x_5 and x_6), so it forms a bimetry. The two fundamental tensors of the geometries b (from x_4, x_5, x_6) and c (from $x_1, x_2, x_3, x_4, x_5, x_6$) each consist of 6 partial structures, and therefore they are indicated by a hexametry. And the fundamental tensor according to geometry d (from $x_1, x_2, x_3, x_4, x_5, x_6$) consists of 9 partial structures and presents an eneametry. Heim examined the physical meaning of these polymetries:

“It turns out that the geometries depending on the imaginary dimensions of the R_6 describe imponderable states, for example, the bimetry, when projected in the R_6 , describes gravitation processes; the time-like hexametry electromagnetic processes and photons. Whereas the space-like hexametry describes smallest units of ponderable kind that are electrically neutral. However, the polymetry – the eneametry d – comprises the electrically charged elementary particles, as here the charge field, too, appears as a metric structure state. Due to the different physical meanings of the structures we already have the possibility to separate our pseudocontinuum from the point spectrum of ponderable quantities by disregarding the polymetries a and b, and just focussing on the polymetries c and d.”

The actual fundamental tensor that describes the R_6 geometry is itself, according to a law of composition, created from the tensors of the partial structures. Such a law of composition can be ascertained from the examination of parallel shifts in these partial structures. The entirety of the fundamental structures creates a composition field.

It is possible to create analogies to the symbols of parallel shifts or Christoffel symbols of the Riemannian geometry. However, these are now not only indicated by 3, but by 6 signatures, as now the single structure units, which can be deformed, must be stated.

If you allow τ to tend towards zero and you limitate the partial structures to a single one, the composition field turns into Christoffel symbols, the pseudotensors of the

general theory of relativity. It would then be possible to transform away this single partial structure as well. In general, however, the composition field is an invariant, a genuine tensor, as there will always be some structures left for which a geodesy condition cannot be found at the same time in order to transform away the overall structure.

Therefore, the composition field has the characteristic of a tensor field, and due to this invariance you can use the composition field as a state function. This state actually is the state of an empty space which now undergoes a compression or condensation of area elements, which will later appear as field or matter.

You can imagine a grid that is being concertinaed. During this process, the grid meshes retain their size. But projected to a flat surface they would throw a shadow which would let the meshes or the areas created by them appear smaller and denser.

“Whenever any event is created, whenever anything happens, this geodetic grid is being deformed. Regarding the empty grid, as, after all, the area contents remain constant, it would now seem as if these geodetic elements were becoming smaller as a consequence of the projection. This is now described as ‘condensor’ by the state function, which is of tensorial mixed-variant nature. The grade of condensation is a measure of the deformation and a measure of the structure.

The condensation of the area elements can happen in 9 different ways. This ‘can’ distinguishes fundamental forms from elementary structures. That actually is a consequence of the origin of the world, of the point in time $T = 0$. I think that's beautiful, as everything becomes so marvelously homogenous.

Now you can interpret the state function, which after all is invariant, directly as a condensation operator or ‘condensor’. I directly call it the condensor and have defined it as an operational quantity of functional kind. I call it the ‘space condensor’ and this state function the ‘fundamental condensor’.

Now you can split up the overall equation, which doesn't contain any phenomenological quantities anymore, with the help of the law of composition that describes to me how my state function is formed by the partial structures.

I call this the ‘symmetronic equation’ (‘syn’: the interaction). I'm talking about a ‘symmetronic version’, and for each partial structure I have a state equation. Now the entirety of the symmetronic state equations has been pooled in 4 groups.

The dissolution, the integration – that, of course, is no normal infinitesimal integration – later leads to this mass formula. At the end of the day, the integers that appear in it are a consequence of this geometric quantization. And as the factor square root of τ , that always precedes it, is canceled on both sides, the tiny factor $10^{-35}m$ drops

out. However, now the number theoretical functions of integer indices remain, and that creates the thing which later appears as a unified mass formula. That's how these things are connected. But the whole thing's not easy!"

7.2 The World Selector Equation

In Heim's Theory, the curvature tensor of the general theory of relativity is substituted by a 'space condensor', as the curvature is here described by a condensation of the number of metrons. (Sketch 1; see p. 123 et seq.) And the field equation for the macro range is substituted by a selector equation in the micro range. In Innsbruck, Heim said about this 'World Selector Equation' in 1992:

"In principle, that's a law of choice – a selection principle (after all, selection means choice). You can imagine any number of 6-fold geometric structures that could actually be world structures. However, they are anything but that. Not everything you can imagine also has to exist. And here we can see the following: if the effect of this 'world selector' – as we call this thing – becomes the null selector in any geometric 6-dimensional structure you can express mathematically, so if it becomes zero, there's a real structure of the world that is mapped from the R_6 in space and time and that represents physical processes we can observe. However, if it is different from zero, we have a real structure of this world.

That means, if I set this selector law – this world selector = 0 from the start, I get all possible material structures of energetic spacetime.

Now you can solve this world selector equation. That's what I've done in volume 2⁴³."

This work proved to be very difficult and it is not easy to briefly communicate the derivation to other physicists. In 1980 Heim told the author:

"For example, if you separate the selectors, this is just 20 to 30 pages of mathematic formulas – without text. Who wants to read that?"

Back then – I did these things in 1961 – I covered the large blackboard in writing 20 times in one afternoon. And I still remember, I was working and had forgotten everything around me, was writing my formulas, worked and underlined, as I always did, whatever I needed for continuing and underlined and wiped away on the top and continued writing. Wiped the blackboard clean and then went on...

It was a crazy kind of work."

⁴³ Heim, B., 1984: "Elementarstrukturen der Materie" [Elementary Structures of Matter], vol. 2; Innsbruck: Resch.

As Heim did not use any physical quantities in his calculations, until the end of them he was unsure about whether there was a reasonable equivalent in physics for the tangled geometric oscillation or exchange processes between maxima and minima of structure compressions at all. In 1981, Heim talked about this to a colleague:

“As I didn't know anymore whether I was coming or going, I said to my father: ,Fine. With the glasses I can now work at the blackboard. Alright. But if nothing fundamentally different comes to our minds regarding the formal description, we will have to stop. In that case I simply won't be able to handle it anymore’...”

When studying Heim's work, the reader can comprehend the difficult and complex approach finally found by Heim.

Einstein was right in assuming that the structure of matter must result from the geometry of space-time. However, many physicists think only quantum theory could lead the way towards it. They don't believe that Einstein's classic approach or a semi-classic one, i.e. one that includes the concept of the quantum, but nevertheless doesn't contain any probabilistic interpretation, could be successful.

“Of course, it's nonsense if someone says: ‘Mr. Heim doesn't seem to understand much of quantum theory’, as it was, after all, written in a semi-classical way. But it's not possible in any other way, as the relations themselves are of non-linear kind. But exactly this is what you need to describe weighable masses – in other words energy masses! However, the only thing that is actually available in a number of measurements, which so far nobody has understood, is this large number of particle masses that are brought to light by the high-energy institutes, as well as their quantum-theoretical laws of conservation. But those particles partially seem to exclude and also to contradict each other. However, the half-classical solution shows that this scheme is now actually given as analogon to the reality of these elementary particles.

Thereupon, some of my colleagues called it a ‘world equation’. That's not what it is! In this respect, the term ‘world equation’ is too large by some sizes. It is a world selector, as it only applies in the physical area. And this physis is ultimately just an excerpt that is accessible to us thanks to our physique and brain structure. However, it is the excerpt of a superordinate world wholeness. But that needs to be understood first. Then you will understand that there cannot exist anything like a ‘world equation’ at all! It's also superfluous!

The starting point for further considerations is the law of dimensions and the world selector. I was strongly encouraged for taking this starting point, as the high-energy institutes, for example the German Electron Synchrotron (DESY), had confirmed the correctness of the relations. That's because here you can find a plethora of prognoses if you have the single features of the particles calculated by a computer. Following that, the DESY-people implemented the formulas in the large data center; and the

program is running. Now there are hundreds of data coming out. And it has been shown that there actually doesn't exist an elementary quantity that has not been recorded here, that is not correctly reproduced here. There had never been anything like this before, and everyone congratulated me for it."

Of course, Burkhard Heim only got praise and encouragement from colleagues who had at least a basic knowledge of his works, such as the particle physicists at DESY. In 1981, most of the physicists could not believe that Heim had found the mass formula as a lone fighter, and they still can't believe it. Instead of getting acquainted with this theory, they categorically reject it due to formal reasons. The reason for this is that Heim did not – as customary – publish his comprehensive work in specialist journals in English, but in books. Again and again, Heim was criticized for that.

"And then there were the critics again", Heim explained, "I wouldn't say anything if these critics had been physicists of distinction, but these people... They said that all this was actual nonsense, as the mass values determined by Heim were too accurate. According to a Gaussian distribution they had to be somewhere above or below the values actually measured. But those guys forgot one thing: maybe the accuracy of the results is not down to a wrong theory. Quite the reverse: this theory could be exactly in accordance with reality!"

People doubted I had actually achieved these results by means of a structure theory, and not by simply tinkering with numbers. But when a friend of mine asked the skeptic: 'Have you actually read Heim's book?' he answered 'No'. I must say, such kind of criticism seems rather ridiculous."

The misconception of the physicists who criticized Heim is based on the assumption that quantum theory is needed in order to describe elementary particles, as this theory governs the micro range. Quantum-theory contains linear equation systems. The determining objects are state operators of a function space and can be presented by probability functions.

However, in case of the unified mass relation according to Heim, these operators are linked in a superordinated non-linear context. You can't just add the results of non-linear equation systems in order to attain new results. That means that for the masses the common form of quantum theory does not apply anymore at all.



Picture 6: During a visit at his colleague Illobrand von Ludwiger on Rabeneck Castle in Franconian Switzerland, Germany, in August 1969, Heim writes down the values he has calculated for the electron: **INCLUDE translations for the words in the following picture!**

electron

Elektron:

$$\eta^4 \sqrt{1 + \pi^4} = \pi^4, \text{ Ladung: } 4\pi^2 e_{\pm} = \pm 3(3 + \sqrt{\eta})$$

charge

$$\text{Feinstruktur: } (2\pi)^5 \alpha = \eta(5\eta - 2\sqrt{\eta} - 1)$$

fine-structure constant

$$\text{Masse: } c\eta m = 4^4 \sqrt{\pi^3} \sqrt{3\hbar s \gamma \pi} \sqrt{\frac{c\hbar}{3\gamma}}, \quad m = s m_e, \quad s = 1[\text{m}]$$

electron mass

$$\left(\frac{d\phi}{dr}\right)^2 + \frac{32}{3} c^2 F \left(\frac{d\phi}{dr} + Fy\right) = 0, \quad E = 1 [\text{m}^2]$$

gravitation potential

$$rF = \frac{\rho + r}{\rho - r}$$

range of gravitation

$$R = \rho \left(1 + \frac{b\rho}{\gamma m}\right) \left(1 - \sqrt{1 - \left(1 + \frac{b\rho}{\gamma m}\right)^2}\right)$$

8. The geometric Structure of the Elementary Particles

8.1 On the Derivation of the Particle States

Now let's turn to the new concept of matter. Whereas particle physicists know exactly which modules the particles consist of according to the standard model and can organize them according to group theory – similarly to what Mendeleev did with his periodic system of elements regarding atoms, without knowing what atoms really are – particle physicists don't know anything about the geometric structure of electrons or quarks and how these differ from the geometry of the vacuum.

The concept of these elementary structures must be provided by structure theorists, as Gell-Mann⁴⁴ – the discoverer of the quarks – already declared before physicists at a conference in Munich.

According to Heim, masses are created by a dynamic process in interaction with an expanding universe. In string theory, mass is yielded by a mechanism that is created by Higgs particles evenly distributed all over space. Such high-energy particles were actually measured in 2012. However, according to Heim's particle theory these are very ephemeral excitation states of elementary particles (resonances), such as W and Z-bosons as well, but no new particles.

Let's follow Heim's explanations in his MBB-presentation further:

“You can look at those results and you'll notice a very peculiar fact: The results are as follows: in a solution we always have a metric maximum, i.e. a maximum metric deviation that always corresponds to a minimum that is pseudo-Euclidian. Well, such a solution alone is nothing. In fact, that wouldn't mean anything, although it actually is a primal unity, which, however, has absolutely nothing to do with von Weizsäcker's 'Ure' (primals)⁴⁵ .

Only when at least 2 of such periodic processes are referred to the time coordinate x_4 of R_6 , maximum and minimum would constantly interchange. If at least two of such solutions of different geometries are in interaction, it would result in a conjugation, and only something like that defines material properties. Thus, these structures c and d , but also a and b , appear as interaction systems of internal structural states that interchange and constantly conjugate.

Here you can – metaphorically speaking – as these are now temporal fluxes that referred to the time axis periodically interchange – watch such a geometric compac-

⁴⁴ Gell-Mann, M. (born in 1929): Nobel price for physics in 1969 for the classification of elementary particles.

⁴⁵ Weizsäcker, C.-F. von, 1985: *Aufbau der Physik (Structure of Physics)*, Munich: Carl Hanser.

tion state as it runs through a whole network of structures until the initial state is recreated again. Here we have developed a veritable flux algebra in 6 dimensions – which, by the way, was very difficult, in order to follow these processes in detail. Now we come to the peculiar result that the elementary particles are actually to be understood as highly complex cyclic systems of such cyclic courses of basic fluxes in 6 dimensions.” (Sketch 2; see p. 123 et seq.)

To some physicists who wanted to know in more detail which dynamic processes were taking place there, Heim explained:

“The maximum of the compaction of one structure corresponds to the minimum of another structure. With regard to time, minima and maxima interchange. That’s like a metric conclusion. That’s not merely metric stages of static nature, but there’s a constant periodic interchange, in such a way that due to the super position during the interchange the maximum of the correlation always remains a very small pseudo-Euclidian area. I have to differentiate between correlation and correspondence. The correspondence is an interrelation that reaches outside. The correlation is an internal interrelational process that determines the inside of the cyclic solution. The maxima of the interrelations that act towards the outside – which I call the correspondences – are the strongest non-Euclidian deviation. Whereas the correlations maxima as correspondence minima are at the same time the inner correlation. The correspondence maxima are also the maxima of guiding fields at the same time.

Now the correspondence maxima can, in turn, convert to internal correlation maxima. A good deal of them can be connected, and some complex is created in which the structure states constantly interchange among each other.

There are these elementary structures that either interchange, respectively ‘flow’, and there are static metric field variables, so that a structure, such an elementary flux of this kind, is also surrounded by a metric structure field that determines a static ponderability which you use, for example, in relativity theory, however, one that appears in quantum stages. I generally call these elements of such a structure flux prototropes, which means primal structure. Here I was inspired by v. Weizsäcker’s ‘primals’. But I don’t find the term ‘primal’ appropriate, since if I used it, I would have to talk of primal particles.

Now I call a prototrope that performs such a periodic process, a flucton, and a field state surrounding such a flucton a shielding field. This whole aggregate always appearing together – flucton plus surrounding field – I call a primal most simple structure, the protosimplex. That’s a terminology that should be used later on, because if you don’t do that, there’ll be a terrible confusion of terms. That’s irrelevant now, but it will be important at some point later.

And now you can nicely create a flux algebra. The protosimplexes are construction units for me. None of them can exist for itself, as it always needs the counterpart in order to create the flucton process. It wouldn't be possible otherwise."

Thereby we realized that our real world must consist of 6 dimensions, since the cyclic basic fluxes for particles can only come about if in the solutions of the equations there is an imaginary quantity in a certain exponent – mathematicians know that e^{ix} yields a periodic function.

In reality, the coordinates x_5 and x_6 are given in the exponent. The two additional world dimensions actually need to be imaginary, since without them the periodic basic fluxes couldn't be created. That means that the geometric structure of ponderable particles can only exist in a 6-dimensional space or in short: because there is matter, the world must consist of 6 dimensions!

Following explanations by Heim show why the elementary particles are so numerous and have such a variety of properties:

"There's a maximum of six different protosimplexes, which has to do with the dependency on the world coordinates. These are in an internal correlation and now form courses of basic fluxes.

Two protosimplexes correlate and create a simple basic flux. But others can join them and create whole chains and lock again. That's what I call flux algebra. Now connection operations take place which I call – depending on with which of them the protosimplex interacts – conjunctives, the connectors. There you can find a variety of highly different forms of possible conjunctives, which in turn depends on the dimensions of the subspace in which they are active. I talk of a 'conjunctive' as an exchange operation. That's an operation law – an operation rule – that determines via which conjunctives as generic term these exchange processes of cyclic nature run. The whole thing is a conjunctive law.

And now you can present an overall conjunctive structure for the most different isomers for a whole closed structure of such protosimplexes, which all have more or less strong conjunctive structures towards the outside. There is a plethora of isomers which, by the way, can also be calculated. There are enantiostereoisomerism of the structure itself, however, referred to the R_6 – not in the R_3 !

There also appear such strange symmetries of the contra- and co-signature and the impact signature of the separate flux quantities which, after all, then appear in contra- and covariant position. In that case, there's a conjunctive isomerism. Each of the spin vectors can be positioned parallelly or antiparallelly. There's a variety of possibilities to combine them with others here, etc." (Sketch 3; see p. 123 et seq.)

8.2 The Cause of Inertia

A particle, whether electrically charged or neutral, is defined by its mass inertia. The general theory of relativity cannot explicitly explain what inertia is. According to a suggestion by Ernst Mach⁴⁶ it is considered that the inertia of material objects here on earth is induced by the total of all stars in the universe. According to this, the stars were the reason why, for example, someone is falling forward on a breaking bus. Today, this idea is still shared by only a handful of physicists. This theory is based on the fact that Einstein only examined the gravitative effects in large areas of space, and did not look for the sources of inertia in matter itself.

According to Burkhard Heim, the geometric reason for inertia can be found in structure fluxes in the micro areas:

“The following happens there: You will now recognize an analogy to a rotation vector, as it is a cyclic process. The exciting thing is: in this structural system you can show that the vectors, the metric eigenvectors, run parrallelly, and that they are parallel to those spin vectors. In R_6 too, you can define the term of the world velocity, the progression in the direction of time. Now you can also show that in case of such cyclic solutions that are in interrelation, these eigenvectors as a matter of principle proceed normally to the world velocity vector. That’s a natural principle, you could say a kind of principle of conservation. That can be neatly derived.

The consequence of this is the following: If you move such a system in the R_3 at accelerated speed, it means that with regard to the R_4 subspace you perform an imaginary rotation – here the Lorentz group comes to my mind. However, this imaginative rotation means that you are trying to get these vectors out of normality. And that is not allowed! This system puts up resistance against such a twisting reason – and that’s what we humans call inertial load resistance.

It is true, each of these structures principally has such a cyclic aggregate as a gravitation field, since this first trans-structure, that here appears as gravitational field, always condensates in the polymetries too. Concurrently with these cyclic aggregates inertia is created. In the deepest depth the equivalence of gravitation and inertia actually doesn’t apply anymore. However, it does apply because the two of them go hand in hand and are conform.”

Thus, according to Heim, without the expansion of the universe there can’t be any inertia. Since the axial vector of a periodically revolving structure always has to be positioned vertically to the direction of expansion – thus to the world velocity vector – each object, when accelerated, creates an inertia effect as resistance in order to re-create this normality – the vertical position.

⁴⁶ Mach, E. (1838-1916) examined movements of supersonic speed and red-shifts of stars.

Metaphorically you could illustrate this with the image of a rotating top: the faster the top rotates, the more difficult it is to divert its rotation axis from the orthogonality, as the inertia is getting stronger and stronger with increasing rotation speed.

Now we know how the empty space differentiates from material structures. If in such a flux aggregate the initial state is not recreated again if the correlations become aperiodic, this structure disintegrates into separate flux aggregates, which represents the radioactive decay. If the structural fluxes do not recreate the initial state, but interchange aperiodically, there's the vacuum state, respectively vacuum fluctuations from structural correlations. The closed flux systems, however, create complicated connections with each other and also present an inner structure.

Vacuum fluctuations for themselves don't have any energy yet. Therefore, it is futile to obtain energy from virtual vacuum fluctuations or virtual structures. In reality, the vacuum energy measured is less by the factor 10^{120} than it should be according to the assumptions of string theory!

The higher the rotational frequency of a flux aggregate, the higher its particle mass. The mass determination therefore consists of the examination of the partial fluxes involved that contribute to the total rotation.

Hypothetical Higgs particles which are thought to give mass to the elementary particles in the standard model, are not necessary in Heim's theory, and quarks don't represent particles at all.

8.3. The Cause of Quarks

Heim: *"You can now see that the networks of such dynamic fluxes display a contouring regarding x_4 . That's not just tied together. No, it is a veritable contouring of metric structural fluxes in an inner dynamic stability, namely a quadruple contouring.*

For the beginning you can say that there are only two cases in which the initial state, regarding the x_4 , continuously recreates itself. For metric reasons you can outline this with a number, which I call k .

There are only two possibilities. In these two possibilities of stable basic structuring of this quadruple contour I set $k = 1$ for the one and $k = 2$ for the next higher one (there is no $k = 3$. That would never be stable). But these four zones can be occupied by additional quantum-like basic fluxes of this kind. I have labeled those with n , m , p and σ .

Firstly, this quadruple contouring differs in density. In elementary particles we have a very compact inside core, the central zone, surrounded by three further zones – I call them the configuration zones – with decreasing density and permeability.

That means, an elementary particle is structured in such a way that there's an impervious central core and the permeability decreases towards the outside. This, by the way, is a fact that you can prove.

And finally the external area – the outer zone – consists of flux aggregates that enable the strong as well as the weak interactions that only act within close distances. Here I see an ansatz for the description of interactions.”

According to Heim the configuration zones are the reason why particle physicists came to the conclusion that elementary particles were constructed of sub-constituents of matter, the so-called quarks. Answering a question regarding quarks in 1991, Heim illustrated in detail why quarks are inseparable:

“There is the quarks model. If you look at the particle theory developed by Dröscher and me, you will see that we can prove that each elementary particle is constructed of 2 sub-constituents in the mesonic and of 3 sub-constituents in the baryonic area. However, these are quasi-particulate sub-constituents. That's got nothing to do with particles yet. Of course, we cannot separate them, as these are only the spatial components of a dynamic flux system that is closed in itself and forms elementary particles. That means they must exceed space-time in order to separate these sub-constituents.

In other words: We can use the quarks model and can prove that these sub-constituents really exist as reflection points for neutrinos. However, we can do without gluons, i.e. glue particles, and confinement.

Nowadays, that whole work of the particle physicists only comes down to finding an excuse why despite of 620 giga volt it's still not possible to create any isolated quarks. They need an explanation for that. But we can say: ,You cannot separate them at all.'

In principle, it's like this: imagine you were a flat book worm that can only think in the dimensions 'long' and 'wide'. The 3rd dimension is incomprehensible. But now the book worm finds small dot-shaped discs in its world that are absolutely inseparable. And if you insert high energy, the discs widen a bit, and then the energy comes out in form of 2, 3 or even 4 particles, namely in the most probable form as γ -radiation or pairs of particles. If, however, it came to the mind of the book worm to look at this world from the outside, it would realize: hey, these things cannot be separated, as these 3 disks in the plane are the areas where the tips of the three legs of a kitchen stool meet the ground. Here, it's similarly.”

As the quarks discovered in deeply inelastic scattering experiments are considered as inseparable particles, ‘gluons’ had to be introduced that are thought to facilitate the strong interaction between the quarks charged with ‘color’. There are 6 different quarks that can change their colors by interacting with gluons. From experiments with particle collisions in 1979, in the course of which three conical particle eruptions (jets) occurred, the existence of gluons was concluded, assuming that one of the produced quarks had emitted them. If Heim’s particle theory is correct, all internal interactions that had been discovered in collision experiments will have to be explainable from the particle structure of the hadrons alone.

It is still unclear how the hadrons (neutrons, protons) created from quarks attain their masses, as quarks only possess 2 percent of the mass of hadrons, and gluons are without mass. Another mystery is how the spin of the hadrons is made up of the spins of quarks and gluons, how gluons bond quarks together, and how the color-charged gluons and quarks always create color-neutral hadrons. If quarks were components of a six-dimensional hyper structure, such problems would be irrelevant.

However, if the existence of gluons was confirmed further, for example by the discovery of color-neutral hadrons that consist of 4 or 5 quarks or only of gluons (‘gluon balls’), Heim’s theory would have to be extended to 8 dimensions, as W. Droescher and J. Haeuser proposed in 2015⁴⁷.

For particle physicists, the interactions are the most important thing. But Heim’s opinion was that the description of the structure of one single particle should logically be the first step, followed by the 2nd step – the analysis of the interactions. Heim only determined the one interaction, namely the electric bond of the electron to the nucleus, which is described by the Sommerfeld finestructure constant (gluons as exchange particles for the strong interaction aren’t needed).

According to the opinion of the great physicist Paul Dirac⁴⁸, the true unified field theory should be able to present this constant as a pure number – one divided by 137. All major theorists have tried to derive that number⁴⁹. When Heisenberg in his non-linear spinor theory⁵⁰ found the value 120 for it, he was already excited. In Heim’s theory, however, the value theoretically determined actually is in the tolerance range of the measurements! (see appendix for formula for the finestructure-constant).
(Equation I)

⁴⁷ Droescher, W. and Haeuser, J., 2015: “Introduction to Physics, Astrophysics and Cosmology of Gravity-Like Fields“, Hamburg: HPCC – Space GmbH.

⁴⁸ Dirac, P., 1964: “Die Entwicklung des physikalischen Naturbildes“ (“The development of the physical image of nature“, Umschau in Nat-Wiss. U. Technik, 1, p 7.

⁴⁹ Miller, A. I., 2009: “137 – C.G. Jung, Wolfgang Pauli und die Suche nach der kosmischen Zahl“, (“137 - C.G. Jung, Wolfgang Pauli and the quest for the cosmic number“, Munich: DVA.

⁵⁰ Heisenberg, W., 1967: “Einführung in die einheitliche Feldtheorie der Elementarteilchen“ (“Introduction to the unified field theory of the elementary particles“, p 120: Stuttgart: Hirzel.

“This way, we can also derive interactions”, Heim explains. “But, unlike in the hadronic interaction we don’t need any virtual particles for that. That’s not necessary, as what interacts are basically metric structures that act in a way Einstein hoped gravitation would. And that’s exactly what they do!

Similarly, I think the gravitation field can also be understood as a projection of that structural unit $\lambda = 1$. But since it’s a projection, we don’t need any exchange particles here. Structure fluxes is what’s getting exchanged. But since it’s projected into space, that isn’t necessarily the case, although in the trans area in which bimetry exists, fluxes are exchanged – and that even in a huge variety of forms. There’s a plethora of possibilities. And that’s exactly what makes gravitation theory so difficult, as these are projections.

And now there’s an equivalent, as one thing is certain: wherever structural fluxes exist – and because there are only 4 solution manifolds – they are accompanied by a trans-condensation, namely κ_1 .

Here, a direct equivalence between the fluxes on the one hand and the many interactions that originate from the interaction centers – which we describe as particles – on the other hand is faked by the phenomenon of gravitation.”

It would take us too far afield to state the single physical features particles can have due to the various possibilities that can geometrically be created by structural fluxes and to state how to derive the geometric meaning of the empirically found quantum numbers.

However, it is important to note that the particles Heim describes with the configuration number k prove to be mesons in the case of $k = 1$ and baryons in the case of $k = 2$, and that there is only one zone in electrons of extremely high density, however, in mesons there are 2 zones of high density and in baryons 3 of such zones at which particles can be scattered. These zones of extremely high density Heim identifies with the particles called quarks by particle physicists.

However, in Heim’s theory these aren’t particles that need to be held together by gluons, but simply internal structures that cannot be released.

There is another fact that should be noted: no particle physicist can explain why for example photons – the light particles – are something completely different from usual particles, although they can transform by means of pair production and annihilation. For this you need to know their different geometries.

The angular momentum of particles is called a spin. The isospin is a quantum number that allocates a different state to particles that have nearly the same mass, for example protons and neutrons.

According to Burkhard Heim the structural fluxes create an integral spin in 6 dimensions. Translated into formulae this consists of 2 parts, one spin quantum number s in the transdimensions and one spin quantum number J that relates to spatial dimensions. Both of them can be whole or partial numbers. If those two numbers are multiplied with the imaginary number i and J and also -1^J , the sum is the total spin.

8.4 The Causes of Spin, Isospin and Anti-Particles

“You can derive an integral spin from the conjuncture structure. However, it’s possible that the integral spin of all these fluctons of the total flux aggregates equals zero and all the spins eliminate each other. But if it differs from zero, it has to be an integer or half-integer multiple of the quantum of action. However, that means that we basically have different classes of structures – of elementary particles. If J was a real number, $(-1)^J$ would be real. That means the non-spatial part s always remains imaginary, so it doesn’t have anything to do with the spatial dimension. It can, by the way, be interpreted as something that for empiric reasons has been introduced as isospin. Because that’s the intersections of this R_6 -structure in the R_3 .

There’s a whole family of R_3 -structures that we call isospin multiplet. The number of members of such an isospin family is $2s + 1$. In this case that always remains imaginary and is not connected to space, whereas the part J as a spatial spin refers to space.

If J remains an integer, this spatial part remains imaginary as well. In that case we speak of a boson – an integer term. (Those bosons I also call tensor terms, as they can be presented by tensors, depending on the spin quantum number. These bosons can be superimposed in an additive way – similarly as for example the bosons of the photon in a laser – you can also think of the photon as a boson. In the same area of space the amplitude becomes higher and higher.

If, however, J is half-integer, we have so-called spinor terms. So in this case minus one would be the potence of a half-integer number, i.e. the root of minus one to the power of one odd number. Minus one to the power of an odd number, however, is always -1 . The root of -1 is imaginary. Now we would have imaginary multiplied with imaginary, i.e. the spatial part becomes real in the spin.

Now there’s this peculiar entanglement of the spinor term with physical space. Spinor terms cannot simply be added like bosons. They’re also called fermions. Those fermions practically bump into each other in space.

That’s something you could philosophize about. Bosons and fermions not only drastically differ in this respect. No, I also have the impression that due to these fermions, these spinor terms, the concept of objects actually came into the world.

So much for spin.

However, as these flux aggregates run cyclically, there's a stereoisomeric structure – to use a term from chemistry here – for each aggregate state, whereby the stereoisomery represents the reflection. I assign the number ε to this, with the decision $+1$ or -1 , whereby -1 stands for the mirror-symmetric structure. That would be an anti-structure to each term if you like.”

Since further derivations will only be of interest for specialists of particle research, we will not go into any more detail here. You can read all about the development of the mass formula in volume 2 of Heim's book 'Elementarstrukturen der Materie' ['Elementary Structures of Matter']. We will only include some more comments on quantum numbers from the MBB lecture.

8.5 Heim's Mass Formula and its experimental Confirmation

“You can now show that the unified mass spectrum depends on 12 integer numbers, namely on 4 parameters, the allocations n , m , p and σ , and on 7 quantum numbers and on the decision ε - whether referred to time it is structure or anti-structure. It is the mass for any term x of any isospin multiplet.

Added to this is the dependency on N , the sequence of positive integer numbers. $N = 0$ characterizes these in total 11 multiplets that I call basic states, according to which, by the way, there would also have to exist a neutral electron. That would be $N = 0$.

For $N > 0$ there's a whole spectrum of excited states for each member of the isospin family. If you calculate that, you can describe these short-living resonances in this way. N would imply the resonance spectrum.

However, for these allocations n , m , p and σ , not all quadruplets are allowed. So there's a law I also stated implicitly for the form x . It's a functional connection between these 4 parameters n , m , p and σ and these allocations, described by a function that depends on the quantum numbers and the activator number N .

Now you can state these quadruplets for any possible term and apply this. On the other hand, this strangeness quantum number or the quantum number of charge q_x for the term x can be presented by the main quantum numbers spin, isospin, doublet number and k , and also depends on the strangeness and the decision ε . This is how you can trace back this part to it. But you can also trace back the strangeness to the quantum number quadruplets.

We have described the whole spectrum with the features spin, isospin, quantum number of charge and strangeness in a unified context and can also describe the masses of the elementary particles and resonances as well as the decay times of the states for $N = 0$. I've also written all that down. (Table II)

However, it hasn't been possible so far to describe the existence times or ranges of the short-lived resonances. Although there is an ansatz that also very nicely throws light on the long-lasting heavy ψ parts, it hasn't been possible to describe the angular momentum number, i.e. the spin number Q of the short-lived resonances, so far. It has to depend on the number N somehow, but frankly speaking, I don't know yet exactly how that works.

That's how far it's been developed. I think that you can already describe quite a lot, so I actually don't see any reason to depart from this kind of description of elementary particles.“

Every pragmatically thinking physicist could agree with this. It is always he whose theory can describe the phenomena in reality who is right!

In 2003, very elaborate calculations in the course of the so-called grid-quantum chromodynamics provided mass values for elementary particles that differed from the values measured by 1 to 10%⁵¹. Heim's calculations are faster and are in closer concordance with empiricism.

In a lecture in Heidelberg in 1991, Heim said:

“Only by using these non-linear relations do I get a description of the particle masses that provides a decent mass spectrum and a decent spectrum of sets of quantum numbers that describe the single terms.

But it has also been tried otherwise - think of Supergravity Theory or String Theory. There, you also get a mass spectrum, but the masses are too big by the factor 100,000. That simply means that these approaches are wrong. Moreover, you can't just make things that lack certain invariants to be invariant. I'm especially thinking of that Supergravity Theory, that renders gravitation invariant by forcing it to be so. That's all nothing but tricks. But that doesn't lead anywhere.

This description is nice. In short: high-energy physicists have always confirmed that to me. It also contains a lot of prognoses. Programing these unified solution fomulas was very nice.”

⁵¹ Gattringer, Ch., 2004: „Quantenchromodynamik auf dem Gitter – Quarks & Gluonen im Superrechner“ (Quantum chromo dynamics on the grid – quarks and gluons in the super calculator), Phys. Unserer Zeit (Physics of our time), 5, volume 35, p 230.

In 1981 the mass formula, consisting of about 10 pages, was programmed by staff of the German Electron-Synchrotron near Hamburg. In this first ansatz Heim had adjusted one mass value from empirical data in order to see how a certain activation function would look, as he describes in his book. In 1989 no parameters needing to be adjusted in this way were included in the new mass formula!

The masses and lifespans of the 11 basic states of the elementary particles only deviated by a few per mil from the values measured, and hundreds of short-living resonance masses were printed. However, there were still too many resonances, as a selection rule was still missing.

In Heim's Theory there's the possibility of – not the explicit demand for – the existence of a neutral electron e_0 with a mass a little bit smaller than the one of the charged electron. It's extremely difficult to prove it, but not impossible, and this proof might help to find an explanation for dark matter in galaxies. According to Heim, the three neutrino masses, also, are much smaller than the ones experimentally determined.

20 years later – after Burkhard Heim's death – some physicists re-programmed this mass formula. In this formula the three natural constants speed of light, quantum of action and gravitational constant were entered. With the value for the gravitational constant known more precisely today more precise mass values for some elementary particles were attained.⁵² That means that Heim's Theory has stood the test, and that Heim was right when he said in 1976:

“I think that here it has partially been managed to at least fragmentally describe this initially requested mathematical scheme as analogue to the entirety of this huge number of elementary particles, even if the way towards it is quite complicated and difficult.” (Tab. 1)

Part 1 of Burkhard Heim's books on 'Elementarstrukturen der Materie' ['Elementary structures of matter'] contains some mistakes that have been noticed by several physicists. Surprisingly, wrong derivations still led to correct results. Only in 2010 did physicists discover manuscripts comprising 700 pages in Heim's legacy in Innsbruck – manuscripts that Heim had originally planned to publish, but hadn't found a publisher for. It was only then that it became clear that Heim had shortened the content of his first book so drastically that some of the derivations had become incomprehensible. He had also tried simpler, shorter derivations that were wrong.

Furthermore, some calculations were discovered that Heim had never published, but which are nevertheless significant, as for example group theoretical analyses, formu-

⁵² www.heim-theory.com

las for the magnetic moments of elementary particles and the derivation of a simple formula for the g-factor.

This factor which was introduced by Landé considers the fact that the magnetic moment of an atomic system is not just its angular momentum multiplied by $e/(2m_e)$ (e = elementary charge, m_e = mass of electron), as should be the case if an electron-spin did not exist. Therefore, the ratio of the magnetic moment to the angular momentum (gyromagnetic ratio) is $g e/(2m_e)$, whereby the Landé factor g equals 1 if the spin angular momentum is null and has the value 2 if the orbital angular momentum is null. In general, the value lies between 1 and 2. However, there are deviations of the value due to radiation corrections in the course of interactions of the electron with virtual photons. As a result of these interactions radiation corrections need to be added to the g factor.

In quantum electrodynamics (QED) there is a factor associated with any vertex in the Feynman diagrams the value of which is very small: the electric charge.

In Feynman diagrams particles are represented by lines, and interactions between particles by points where these lines join. Such an interaction point is called a vertex. In calculations with particles one has to draw as many diagrams as applicable and to write down the corresponding mathematical expressions. Then one has to sum them up.

The emission or absorption of a photon by an electron (or positron) is proportional to the electric charge of the electron. An additional photon exchanged between electron and positron gives a contribution that is down by a factor e^2 , where $-e$ is the electric charge of the electron. The relevant dimensionless quantity α is the fine-structure constant $\alpha = e^2 / 2hc$ (c = speed of light, h = Planck constant).

A diagram with an extra photon exchange indicates a contribution of the order of 1% as compared to that of the diagram without that photon exchange. By including diagrams with two or more vertices the results get much more accurate. This procedure is perturbation theory.

This theory leads to an infinite series of perturbations in potencies of the fine structure constant α that must experimentally be determined. For the calculation of the corrections more and more complex integrals need to be analyzed that capture the influence of more and more complex interaction processes in a physical way.

“The calculation of the coefficient of α^3 has taken some 20 years, involving some 72 diagrams, while the calculation of α^4 term (891 diagrams) has been done mainly by numerical approximation methods, using up years of super-computer time” (M. Veltman 2003; see footnote p. 79).

The agreement between theoretical and experimental values is excellent and it proves the validity of perturbation theory and the correctness of QED.

“Many theorists would have liked a formulation of the theory not involving approximations, but so far perturbation theory is all we have“ the Nobel laureate Martinus Veltman wrote, ignorant of Heim's theory. *“In certain instances one has been able to sum up the contributions of some classes of diagrams to all orders, but we do not have any general non-perturbative version of the theory.“* (Veltman 2003)

Heim's formula for the g-factor does not include any values determined by measurements, such as the fine structure constant, but only numbers, π , and the Euler number e . A perturbation calculation is not necessary. In Heim's formula the theoretical value comes close by seven points to the value that could be measured exactly to 11 digits behind the point already in the first approximation. (Equation II) For theorists, the fact that Heim's simple calculation already yields such a consistent value proves that at least at its core, Heim is on the right way with his theory. Concerning physics, Heim's approximation for the g-factor is at least much more interesting than the serial description of the QED, since this also needs α as input parameter.

9. Structures of the physical World and its non-material Side

9.1 The Model of the Creation of the World

In 1996 Burkhard Heim wrote his third book together with the theorist Walter Dröscher from Vienna. Its title is ‘Strukturen der physikalischen Welt und ihrer nichtmateriellen Seite’ [‘Structures of the physical world and its non-material side’]⁵³. In a version of Heim's theory extended to 8 dimensions, Dröscher has lately been able to show that the propositions of quantum theory and the general theory of relativity as well as the standard model of particle physics can be derived from Heim's eigenvalue equation⁵⁴. Therefore, Heim's theory cannot be wrong, but at best incomplete in some respects – as is the case with every theory. After Heim had found the stationary structural states that can exist as elementary particles, he began to examine the interactions between these structures as well. First, he dealt with the question where the constants of the interactions come from. If they were real constants, their values shouldn't have changed since the beginning of the world.

That means: when the world was created, all interaction constants must have been created concurrently. Therefore, it first needs to be examined what logically could have happened during and before the process of the creation of the world. As there

⁵³ Dröscher, W. and B. Heim, 1996: “Strukturen der physikalischen Welt und ihrer nichtmateriellen Seite“ [“Structures of the physical world and its non-material site“], Innsbruck: Resch.

⁵⁴ Personal communication of W. Dröscher to I. v. Ludwiger, November 2005, with calculations.

was no matter yet, no time and no space, according to human thinking there could only have been a mathematical quantity of possible dimensions. And these primeval elements can be examined by means of set-theoretical methods. Walter Dröscher pointed that out to Heim. In 1992 Heim talked about this topic in Innsbruck:

“The set of the coordinates is structured, i.e. the 3 coordinates of the real physical space form a semantic unity. The one-dimensional manifold of the time structure forms a 2nd semantic unity, and the two organizational coordinates for which we have used the terms entelechy and aeon, form a 3rd group. That means that the complex of cardinal numbers of this set of coordinates would look as follows: 3, 1, 2, so it would be a K6-symmetry. By the way, this symmetry appears time and again.

Now you can try to interpret the coordinates of the hyper space. Mr. Dröscher has shown that you have to interpret the coordinates 7 and 8 as information coordinates which then in turn form a unity, which now adds to the coordinate set, whereas the coordinates 9 to 12 appear together. You also cannot interpret them. That’s completely unknown territory. But they appear as a unity, far beyond the material world, so that the coordinate set is structured as a complex of cardinal numbers: 3, 1, 2, 2, 4. That means it forms a K12-symmetry.

We can’t interpret these coordinates of the now imaginary 4-dimensional space 9 to 12 – we don’t know what’s going on there. Of course, we’ve tried to do something about it. Apparently, the space is closed to us. Nevertheless, we’ve ‘started drilling holes’, as the door won’t open. But that was simply frustrating. What you actually see is highly symmetric but non-temporal structures that interfere with every random period of the spatial cosmos via information coordinates and can change something that’s present, past or future, irrespective of whether it’s referred to us humans. That’s why I called this space G_4 – referring to an insider’s joke the DESY physicists had made. Maybe it’s the loom of time, where the threads of destiny are woven, as every cut in time is accessible.”

With the passing of time, the diameter of the universe becomes larger and larger and the size of an area quantum becomes smaller and smaller in Heim’s model of the cosmos. As a result, they become more and more numerous. So, if you want to know how the world has started to exist, you have to look for the state in the past when the surface of a quantum of area was of a size just big enough to enclose the whole proto-universe. The area quantum, the metron, is made up of the natural constants speed of light, gravitational constant and the quantum of action. Therefore, the relation that describes the dependency of the metron on the diameter of the universe is of tremendous significance, which at first glance is hardly recognized. It’s Heim’s equation 37 in the 2nd volume of ‘Elementarstrukturen der Materie’ [‘Elementary structures of matter’].

“Each solution stands for 2 real diameters. So I have 6 diameters. That’s combined 3 dualities of inseparable spheres. Therefore the term ‘trinity’. So at the beginning of the world there’s a cosmogonic trinity of spheres consisting of 3 primal spheres, whereas the 2nd trinity of spheres is so small it comprises the final sphere of the cosmological trinity. And in the end of the existence of the world, where this results in a trinity again, that whole process is reversed.

The 6 spheres that are placed concentrically in each other are projections from such a 12-dimensional space, i.e. at the time zero this large trinity of spheres from cosmogony appears which enters temporality. And when after the expiry of the world era, the aeon, it, exits temporality again, it merges into an eschatological trinity, whereby ‘eschatological’ refers to the exit out of temporality. That’s this small trinity of spheres. Thus, due to the mirror symmetrical projections of the trinity of spheres an asymmetry is created. That’s the explanation for the so-called ‘time arrow’. The direction is always from the relative past into the relative future.

It’s possible that the end of time is the initialization of a new cosmogonic trinity of spheres in a parallel, but with time anti-parallel space-time in another x_5 -distance, and that this space-time then runs backwards in an eschatological trinity of spheres, which now in our space-time appears as origin.

That’s how a gigantic aeonic, temporal circle of our world concludes. These 6 diameters, however, you can determine as real numbers. These are dimensions we humans can imagine quite well. At the beginning of time, the largest sphere has a diameter of 3.7 m, and the smallest one a diameter of 17 cm.”

9.2. The Emergence of the Interaction Fields’ Coupling Constants

“We can divide all diameters by the largest diameter of spheres, in order to define a new scale. Then we get 6 pure numbers which, however, are of a very primal type. Now you could say, if I have the most primal thing in front of me that exists in the world, namely numerical proportions that describe the origin and the end of the whole cosmos, then it’s justified to apply the most primal thing in mathematics to it – and that’s the abstract set theory. If you do that, you can start at the zero point and from there descend deeper and deeper into the world structure. You’ll then get to its temporal source and at the bottom of this source you see a very simple algebraic primal structure, i.e. the first 8 terms of the ordered set of prime numbers, whereas in the space-less and non-temporal area before the time zero (which Conrad-Martius called ‘apeiron’) the ‘2’ does not exist anymore in the primal set.

Only when the 2 appears, the preforming structure of the apeiron enters temporality. The same happens in the eschatological end region, which, by the way, suggests that for the initialization this constitutes a new but anti-parallel space-time, as the apei-

ron needs to be symmetrical. But this symmetry only comes about if the end of the world and its beginning coincide.

Now you can find numerous primal numbers. For example, you can apply certain algebraic methods of set theory to these primal scales and you'll get the complete reversal of the dimensions of descriptive spaces – eight in total: 12, 28, 24, 36, 4, 64, 1, 3. One and three don't appear reciprocal in the primal element. Of the others you have to create the reciprocal values. Then you'll get a primal set of non-temporal elements that you can explicitly describe.

These non-temporal original elements establish relationships between each other. You can apply a potential set to these primal elements and you'll get non-temporal numerical proportions and non-temporal descriptions as products of these primal elements that have remained unchangeable since the time zero of the cosmos, which, after all, dates back 10 to the power of 108 years – whereas 2-3% of the time available have been updated at the most.

If you now examine them, you'll notice that 23 such terms can be pooled in 2 sets of non-temporal constants. Now you recognize empirical values that have been known for a long time. But nobody knows how they come about. They are simply accepted as values. These are the so-called coupling constants of the interaction fields.

In the first set of the coupling constants you'll see the energetic couplings of physical space-time, i.e. the couplings of the electro-magnetic interactions. And the square then provides the Sommerfeld finestructure constant.

Thus we get a very weak coupling that you can combine with the gravitation field.

Then there's the strong and the weak coupling – all of them numbers that have been empirically known for a long time and which form a group of couplings.

And then there are two further coupling constants that might seem gravitational. These are actually degenerated structures that are still in there, i.e. in fact we're dealing with 6 different coupling constants – in contrast to today's assumption that's based on the proposition of 4 interactions.

Furthermore, there's another set that also contains such coupling constants which, however, do not energetically appear in space-time, but remain in the background and in the trans region – in the background of hyperspace – and which influence the energetic coupling of space-time and can change these. Here, among other things, it's controlled if a term that interacts with something exchanges ponderable, virtual or imponderable, i.e. zero rest mass quanta of interaction, etc. We call these the transformative coupling and interactions.”

Walter Dröscher could demonstrate that one of the new quanta of interaction are so-called gravito-photons that can transform photons into gravitons. This could make a field propulsion system for astronautics feasible.

For the article ‘Heim Quantum Theory for Space Propulsion Physics’⁵⁵ Häuser and Dröscher were awarded 1st price by the *American Institute of Aeronautics and Astronautics* (AIAA) in 2005.⁵⁶

9.3 The Derivation of Quantum Theory from Hyperspace Dynamics

Heim: “You can now examine the coordinate structures of this hyperspace, as here there seems to be an actual dynamics of hyper space. Something comes out of this unknown space of non-temporal, highly symmetrical structures that lies far beyond the material world – something that via an intermediate space that is similar to the Hilbert Functional Space, influences the unity of the coordinates 7 and 8. This means that due to this influence of the G_4 , the informative coordinates are warped in a non-Euclidian way. So now we have a hermetry.

I have introduced the term ‘hermetry’ for particle physics that refers to the structuring of the coordinate set. (It’s about the interpretation or hermeneutics of world geometries, since only a very small class of solutions is allowed that has resulted in the coordinate structuring. And from ‘hermeneutics of the world geometry’ I have designed the term ‘hermetry’.)

So here this peculiar G_4 seems to cause an information hermetry to which all events of dynamic nature can be traced back. And that’s all events. In the course of time a stationarity can be simulated. If you look closely, you’ll see that new absolute time zeros are continuously set, as in fact each event we are able to notice is dynamic.

Now, there’s a projection chain – this information hermetry interferes with the organizational unity and already influences the material world in the R_6 .

The organization is in turn projected on the time structure, and interferes with space-time. The time structure is projected onto the respective physical space.

Apart from the space-time of physical structures there must also be space-time of the projections within this hyperspace dynamics. Moreover, it now turns out that the projections of some functions in the G_4 take place via these hyperspace structures and in the space-time of the projections appear as probability fields. Those two space-times

⁵⁵ Dröscher, W. and J. Haeuser, 2005: American Institute of Physics, 0-7354-0230-2/05/.CP746, Space Technology and Application International Forum-STAIF 2005.

⁵⁶ Lietz, H., 2006: ”A leap into hyperspace“, New Scientist; Jan 1, 2006, pp 24-27.

are entangled in such a way that in the micro range all events are determined by the dynamics of probability fields.

And if you now calculate this, you can derive the whole quantum theory from this hyperspace dynamics, in all its premises, both the abstract as well as the concrete quantum theory. Contrary to the concept of the Copenhagen School, this means that this quantum theory that was empirically established during the 1920s is not fundamental!

If it really was fundamental, you couldn't derive it from a completely different context. It's also not complete, as the derived quantum theory contains all statements of the empirical quantum theory that is practised today, but it goes beyond the contents of those statements. A lot more information is added.

The projection chain that influences the physical structures in a controlling way is the reason why physicists of all positions still experience enormous difficulties with the interpretation of the understanding of quantum theory nowadays.

One thing that's certain is that the projection exceeds the time structure. Nobody can predict the true course of time. The futuristic statements determined by those probability fields of the time structure. In the relative present one of those fields factually becomes 'one'. Then it happens. Statements regarding the past clearly refer to the factuality of the past – that's how this process appears.

You can now link very many other things to this. However, the projection is ultimately controlled by transformative coupling constants that we can all provide together with numerical values – and that's verifiable!

For example you can then demonstrate that there probably are other possibilities still that are significant for the view of the world (therefore the title of our third book 'Strukturen der physikalischen Welt und ihrer nichtmateriellen Seite' ['Structures of the physical world and its non-material side']). Those are the dimensions of hyperspace where the concept of energy does not exist. But it's a dynamic control. Whatever it is controlling inside the G_4 – it is a projection chain G_4 descending via the intermediate space into the informative substructure. It runs over the organizational structure and then enters the material world. Via time consequently the probability fields of the physical space emerge. Thus, you have actually achieved a lot."

9.4 The Cosmogony of Matter

Heim continues: "You cannot only understand quantum theory. You can also understand something else. The time zero in the world was a breach of symmetry which, of course, was controlled in the same way as discontinuous change of a state – namely

as entry into temporality – and then, at a much later point of time results in the generation of matter – in a cosmogony of matter.

The universe accessible to us is only one element of an incredibly vast universe, a sub-universe where in turn large universes attain structure through this minimum diameter. An elementary universe may have originated 15 to 40 billion years ago, in the nick of time so to say – compared to the vast time span that goes back to the absolute zero.

If you know that it is a control process, it means: firstly, via this chain probability fields were controlled out of this G_4 in such a way that – seemingly contradicting the principle of energy, which, however, does not necessarily apply in hyperspace anyway – certain elementary lengths were caused, which, however, are to be interpreted as wave lengths. An upper barrier of the energy/mass spectrum was created, identical with the root of 2 times Planck's quantity. These particles emerge at the point of time of the genesis of matter. Next, they avalanche-like create other particles, and the whole thing drifts apart at high speed.

*Mr. Dröscher pointed out to me that this inflationary process that we can exactly describe results in matter being pressed apart. We can even state the lower and upper mass barriers of the emerging galaxies. This, by the way, corresponds to a statement Mayer makes in *Handbuch des Weltalls*⁵⁷.*

Now, if you know the law of formation of matter, and you know these transformative and energetic interactions and coupling constants, you can demonstrate how all the matter expands. So the galaxies probably developed out of something we nowadays call quasars.

So you can calculate the diameters of such space bubbles. Our result was a diameter of approx. 52mpc. That in turn corresponds to the wide angle photos you can take of cosmic objects nowadays. That means the whole structure of the current elementary universe accessible to us, this bubble structure as well as the generation of mass, the formation of galaxies – all that can be determined from these things. That's actually also what you would expect.

Apart from this examination of all possible interactions it's also the construction law of matter itself that's unveiled here. Compared to that, the 'Grand Unification' seems a bit incomplete. Most important: its proponents can't draw conclusions from it!"

⁵⁷ Hoerner, S. von & K. Schaifers, 1961: *Meyers Handbuch über das Weltall [Handbook of the Universe]*, Mannheim: Bibliographisches Inst.

9.5 Why Heim's Theory is unknown to most Physicists

Burkhard Heim geometrized all physical fields and consequently could derive the mass spectrum of the elementary particles. He can also provide the explanation for the natural constants. Heim even holds out the prospect of generating gravitation fields. You would think that all physicists would zealously jump on this new theory. But why do only a few physicists engage themselves in Heim's theory?

It's down to Heim's refusal to immediately publish all his new thoughts, as is common in science. As he wasn't sponsored by any heads of institutes and instructed by them to publish, he could afford the luxury of not writing anything for as long as he needed until he was sure that he had achieved presentable results. Of course, many colleagues urged him to publish something. Among others, Pascual Jordan, Germany's leading relativity theorist, who knew Heim quite well, wrote to him on December 22, 1969:

"Foremost it seems urgent to me that you make the results of your considerations, which you have accumulated for a long time in silence, accessible to broader circles of physicists by publishing them. In physics, growth takes place by means of a continuous exchange of thoughts, in which the different contributions brought forward in discussions are compared and brought into relation to each other. This is the only way to continuously ensure what proves as useful and prolific, and how the different contributions of single authors can gradually be mosaic-like arranged to a full picture. However, publishing of course is the prerequisite for enabling a discussion in the circle of all participants."

But only when Heim had calculated the masses of the elementary particles, he presented Pascual Jordan with the derivation for evaluation. On December 7, 1971, Jordan wrote to Heim:

"I vividly feel that the gaps in my knowledge concerning this matter are regrettable, as they deny me the possibility to address details of your results in an informed way. That's also the reason why I can't form an opinion on the question if your formulas allow making a connection to the Heisenberg world formula, which Heisenberg has continued to appraise very optimistically, although some other specialists in this area have uttered their skepticism about it."

Heisenberg's co-worker and successor Professor Hans-Peter Dürr, whom Heim had visited in Munich in 1976 and had asked how he should publish his now presentable results, suggested to firstly give a short overview of them in the 'Zeitschrift für Naturforschung' ['Magazine for Science']. The decision whether he would publish in a specialist journal or write a book should be based on the readers' letters and opinions. This article evoked an exceptional response. Burkhard Heim received about 100

letters and therefore decided to publish his theory in books. However, in science, books are not recognized as serious first publications.

Furthermore, Heim had his works published by a friend who was a publisher that had never before brought out any works on physics, and who could not hire any experts as reviewers. These are unforgivable formal mistakes in science, as in times of peace the adherence to form is more important in science than the contents of a piece of work!

But Heim wasn't bothered with the formalities. That's also what he declared to the psychologist Jürgen vom Scheidt in an interview in Munich in 1981:

"I have here – actually just out of joy with the issue – spent about 30 or 31 years of my time on earth to pursue these thoughts – quietly, under exclusion of any publicity. I have done so very deliberately. It was my express intention to hold back. But now the time has come to present these things to the public."

However, the physicists who had waited for specialist articles by Heim since the 1950s were no longer interested. Scientists want to take an active interest in the development of a theory and don't like being surprised by very extensive, uncommon and difficult presentations. On the other hand, Heim's special bodily conditions should have justified an exception in his case. Nevertheless, only a handful of physicists have read Heim's theory so far. All the others prefer to wait and see how other authorities will evaluate Heim's theory.

One of the few experts who have occupied themselves with Heim's theory is professor H.-T. Auerbach of the University of Zurich. In 1996, with the knowledge he had at that time, he wrote to a critic:

"You may think what you want about Heim's theory, but you can't deny that it's an exceptional achievement. I'm convinced that, at least in a rudimentary sense, it predicts the physics of the future."

In order to underline the importance of Heim's theory once more, we would like to cite one of the experts of particle physics, Professor Martinus Veltman⁵⁸. He states:

"There is no theory that says how large Newton's gravitational constant has to be... The electric charge, too, is a free parameter... Another parameter of such kind is the mass of the electron. It's not known by any basic principle, and its value needs to be ascertained by measurements."

⁵⁸ Veltmann, M. 2003: „Facts and Mysteries in Elementary Particle Physics“, New Jersey, London: World Scientific.

So far, nobody has been able to calculate the properties of the proton or the pion, although we think that we can understand these objects as bound states of quarks. We haven't even been able to understand gravity itself yet. Maybe all these problems are connected.

So far, the theorists have not been able to present any viable theory that could answer all or just some of these questions, including the questions as to masses, the Cabibbo angle, the existence of all quarks and their groupings into families, etc.“

The natural constants are just as inexplicable to physicists. John Barrow⁵⁹ says: “*The natural constants stand for two things: our deep knowledge of the world and our major cluelessness... Their size will still remain a deeply hidden secret.*”

You should check Heim's calculations in order to maybe have the chance to get certainty about the secrets of nature and especially matter!

After Heim's death in 2001, a small group of physicists and mathematicians (amongst them also four professors) started to collect the vast unpublished material left behind and to check Heim's calculations. All out of private interest. In the 1st volume of 'Elementarstrukturen' ['Elementary structures'] some inaccuracies and mistakes were found and were corrected (e.g. incorrect integration limits, wrong presentations of an operator, incorrect solution of the eigen-values equations) and unclear derivations were made more stringently again.

Mistakes of such kind happen to every scientist who does not have his works reviewed by experts before publishing. However, fortunately, they do not affect the final results of the theory. But before a new edition is made, volume 1 would have to be revised again, and, since Heim's theory is so comprehensive, several teams at universities should deal with that. The aim of the 'Working Group Heim's Theory'⁶⁰ (Arbeitskreis Heimsche Theorie) is to evoke interest for Heim's theory with other scientists.

Meanwhile, the working group has dissolved, as some physicists think that you already can explain all and any physical phenomena with a 6-dimensional theory only, whereas other physicists of the group prefer an 8-dimensional theory in order to describe also gluons, Higgs particles and quintessence. Both directions are further being followed (in private research) and will have to be judged by their results. In any case, these approaches seem to yield more interesting results for science than Super String Theory, and it has been possible to get young physicists interested in Heim's theory.

⁵⁹ Barrow, J.D., 2004: Das 1x1 des Universums – Neue Erkenntnisse über die Naturkonstanten (“The 1x1 of the universe – new knowledge about the natural constants“), New York – Frankfurt: Campus.

⁶⁰ Working Group Heim's Theory: www.heim-theory.com

Heim had felt that there was only little time left for him to bring his research program to an end. That's why he didn't place much value on the formal neatness and the presentation of his work. Heim didn't only want to know: where does the universe come from and where does it go? – questions that are of special interest to Stephen Hawking. No, Heim rather wanted to know: what are humans? Where do they come from and where do they go?

These are questions not so much aimed at physicists, but at philosophers. Heim was in the tradition of the Weizsäcker school, where the requirement of philosophizing always has to be physical knowledge. Burkhard Heim, who had studied Formal Logic with von Weizsäcker, always felt more like a philosopher than a physicist. Other physicists lack the solid basis in order to be able to describe a hierarchically structured constitution of matter, based on which they can ask questions about living things and the consciousness of matter.

C The aspect-related Logic for the unified Description of Body and Soul

10. The Superior World Entity

10.1 Is Consciousness a physical State?

Heim's actual concern was not so much physics and the understanding of its material fundamental particles, but rather trying to solve the body-mind problem, respectively the brain-mind problem, which Schopenhauer described as the 'world knot'. Before we look at what Heim said about that, we would like to shortly address the current state of the discussion of this problem.

Behaviourists and materialists among the scientists take the easy way out. They simply exclude the fact of conscious life from their concepts. In materialism, the actual existence of consciousness is simply denied. But also Descartes's dualism rids itself of the problem by claiming: Consciousness is not part of the natural world. Mind and matter are defined by him in such a way that they exclude each other.

The philosopher Thomas Metzinger is a materialist. He thinks that the concept of 'self' is created in a 'self-model' of the brain. Human beings falsely believe that they are the contents of this self-model: "*The Self doesn't think, it is thought – it is itself only a model that is used by the brain*" (cited in Damasio, 2002)⁶¹. The concept of

⁶¹ Damasio, A.R., 2002: "Wie das Gehirn Geist erzeugt" ("How the brain creates mind"), Spektrum der Wissenschaft, 3, p6-11.

subjectivity was based on signals from the inside of the body, and therefore on basic biologic processes, the neurologist Damasio also thinks.

The psychologist Roracher states that consciousness depended entirely on processes in the brain and was caused by those⁶².

The brain ‘calculated’ the signals coming in from the sensory organs and produced symbolic engrams that were saved as experiences.

And the neurobiologist Walter Freeman says you should not even try inquiring about consciousness itself. The only thing sensible was the question as to how it works and the quest for those brain processes that are accompanied by consciousness.

Many neurologists, among them J. Searle⁶³, think that consciousness is merely an epiphenomenon of physical conditions and processes – an insignificant attendant phenomenon of matter. They say thinking was identical with processes in the brain. Therefore, consciousness could be reduced to brain processes. Any phenomenological description of consciousness was nothing more than ‘rudimentary physiology’, Feigl⁶⁴ claims. And Mario Bunge⁶⁵ holds the view that mind, consciousness and soul are not immaterial: *“The soul of a living being is not an entity itself, but something that is combined by a series of processes in its brain.”*⁶⁶

A clarification of the problem with consciousness is expected to be provided by brain science. It has already made remarkable progress in the last few years, and it was discovered in which brain areas consciousness is created and how it works. But the properties of consciousness are still a mystery.

The properties of conscious being are intentionality and qualia. That is the mentally imagined pictures and processes that differ from the outside world on the one hand. Also there is the ‘how’ of experiencing by means of ‘emotional colorings’ of sensory impressions and neuronal activities, which are sent to the conscious processor in a filtered state. Both properties are experiences purely referring to the individual and therefore are private, hidden, internal and definitely subjective.

Many brain researchers hold the view that in order to understand these internal properties you do not need any special kind of physics or mathematics, and that these properties can be researched by classic neurological means. Parts of consciousness

⁶² Roracher, H., 1951: Einführung in die Psychologie (“Introduction to Psychology“), Wien.

⁶³ Searle, J., 1984: Minds, Brains and Science, Cambridge, Mass.

⁶⁴ Feigl, H., 1967: The “Mental“ and the „Physical“, Minneapolis, Minn.

⁶⁵ Bunge, M. 1984: Das Leib-Seele-Problem (“The Body-Mind Problem“), Tübingen.

⁶⁶ Bunge, M. & M. Mahner, 2004: Über die Natur der Dinge – Materialismus und Wissenschaft (“On the nature of things – materialism and science“), Stuttgart: Hirzel.

simply present themselves as special interactions between known and unknown ensembles of neurons that operate with manifold cellular and molecular mechanisms. (Jean Delacour⁶⁷, Andreas Herz and Christof Koch⁶⁸).

H. Jonas, on the other hand, criticises this epiphenomenalism in an impressive way⁶⁹. He proves that, quite the reverse, consciousness cannot be reduced to physical behaviors and processes in the brain. In the nature of living things it's something new, something that reaches out beyond physical and chemical processes. Roger Penrose tries to explain this non-identifiable new property of consciousness with quanta processes in micro-tuboli parts of the cell skeleton in neurons⁷⁰.

Henry Markram tries to get to the 'sources of consciousness' via the understanding of the neuronal network of the neocortical columns. He hopes to be able to explain how nerve cells can assign meaning to things⁷¹.

Francis Crick and Christian Koch thought that consciousness is created by certain oscillations in the cerebral cortex that come about because neurons fire about 40 times per second in sync⁷². That may explain how the brain generates information and retains the state of alertness. But explaining structure and function of processes in the brain is insufficient for solving the problem of consciousness. What you have to explain are, for example, the entanglement of conscious and unconscious processes within the same state of consciousness as well as the aspect of qualia.

Apparently, in conscious experiencing one aspect or mode of an entity expresses itself in another one and influences it. *"For example, how is it possible that the soul that is understood as a mere 'aspect' of a non-substantial kind can freely control the body as another 'aspect', can express itself in it, can influence it"*, the philosopher Josef Seifert asks⁷³. Epiphenomenologists answer this question by arguing that there

⁶⁷ Delacour, J., 2004: "Was kann die Neurobiologie erklären?" ("What can neurobiology explain?"), Spektrum der Wissenschaft, Spezial: Bewusstsein, 1, pp 12-19.

⁶⁸ Baukhabe, M., 2005: "Die 7 Rätsel des Bewusstseins" ("The 7 mysteries of consciousness"), PM Magazine, November 05, pp 10-17.

⁶⁹ Jonas, H., 1981: "Macht oder Ohnmacht der Subjektivität?" ("Power or powerlessness of subjectivity?"), Frankfurt a. M.: Suhrkamp.

⁷⁰ Penrose, R., 1995: "Schatten des Geistes – Wege zu einer neuen Physik des Bewusstseins" („Shadows of the mind – Ways to a new physics of consciousness“), Heidelberg: Spektrum Akademischer Verlag.

⁷¹ Markram, H., 2005: „Blue Brain Project“, in PM Magazine, November 05, p 14.

⁷² Crick, F. & C. Koch, 2002: „Warum die Neurowissenschaft das Bewusstsein vielleicht doch erklären kann“ („Why neuroscience might be able to explain consciousness after all“), Spektrum der Wissenschaft, 3, 1995, pp16-17.

⁷³ Seifert, J., 1989: „Das Leib-Seele-Problem und die gegenwärtige philosophische Discussion“ („The body-mind problem and the current philosophical debate“), WBG Darmstadt.

was no interaction between mind and matter in the first place, that was just an illusion, as freedom of will was nothing but a deception.

The neurophysiologist John Eccles states that none of the methods of brain science can be used in order to study the conscious self and conscious experiencing of a person. Together with the philosopher Karl Popper⁷⁴ he suggested a three-world model. World 1 is thought to contain the material world including the brain. World 2 is the area of the conscious self with all conscious acts, and world 3 is the area of culture and language.

The criticism on this Popper epistemology has been justified, as Popper allocates all meaningful results to a sphere of totally uncertain suggestions. However, the differentiation between the two first worlds and the statement that world 1 is fundamentally open to the influences of world 2 is significant.

Most scientists treat the problem of consciousness quite perfunctorily. However, for philosophers it remains to be a key issue, as can be seen from the philosopher Hans Goller's statement⁷⁵:

“Consciousness represents the biggest obstacle on the way to a scientific understanding of humans and the universe.”

Most physicists incline towards monism and they, too, believe that the phenomenon of consciousness can be neglected in a unified description of the world. If physicists wish to develop a ‘theory of everything’ without regard to this phenomenon⁷⁶, this, to phrase it politely sounds rather absurd.

With regard to this, the philosopher David Chalmers⁷⁷ says the following:

“If the existence of consciousness cannot be derived from physical laws, then a physical theory is no real theory of everything. It must contain two components: firstly, physical laws for the behavior of physical systems from evanescent to cosmologic dimensions and secondly: psycho-physical laws that explain how some of those systems are connected to conscious experience. Only those two components together can make a genuine theory of everything.”

⁷⁴ Popper, K. & J.C. Eccles, 1977: “Das Ich und sein Gehirn“ („The Self and its Brain“), Munich-Zurich: Piper.

⁷⁵ Goller, H., 2003: “Das Rätsel von Körper und Geist – Eine philosophische Deutung“ (“The mystery of body and mind – A philosophical explanation”), WBG Darmstadt.

⁷⁶ Barro, J.D., 1992: “Theorien für Alles“ (“Theories of Everything“), p 205; Heidelberg: Spektrum Akademischer Verlag.

⁷⁷ Chalmers, D.J., 1996: The conscious mind. In search of a fundamental theory, New York: University Press.

Chalmers thinks that the term ‘information’ will be playing a central part in the entire theory of reality, as conscious life has to do with the ability to process information. He suggests a two-aspect theory of information, one physical and one experienced information. He hopes that one day it will be possible to combine theoretical physics and a theory of consciousness in the framework of one superior theory of information. Thus, he exactly predicted Heim’s work.

The philosopher Colin McGinn⁷⁸ believes that the reference framework for conscious processes lies beyond spacetime. However, he says he couldn’t state which missing dimension it is, as he knew nothing about it, not even if ‘dimension’ was the right word for it. He, too, thinks along the right lines.

In fact, with the transdimensions x_5 and x_6 in Heim’s theory it is possible to describe information patterns that ‘lead’ to (or are associated with) states of consciousness in matter!

McGinn says: “...that we need a qualitative leap forward regarding our understanding of mind and brain. But I’m also saying that I think this is a leap that we can’t perform with our intellectual legs.”

He’s not right with his latter claim, as the following is going to show!

The philosopher Peter Bieri⁷⁹ is also right in seeing the difficulties in our cognitive limitation. He thinks we are not able to develop the right terms in order to deal with the topic of consciousness in an appropriate way. In fact, Heim introduces a new system of terms and a kind of logic based on random aspects. The clues of those philosophers and neuro-scientists all point in the same direction. They also imply the correctness of the path taken by Burkhard Heim for the solution of the body-mind-problem.

Consequently, it cannot be sufficient to explain consciousness by brain-physiological findings, as it has to be explained how, why and where the translation of sensory stimuli into qualities of experience is performed. According to Heim that can only result from a logical system of concepts separate from the physical region and that is the result of the effects of additional world dimensions.

The basis for this explanation is knowledge of higher dimensional spaces and the possibility of an information control of the interaction-processes in matter by activi-

⁷⁸ McGinn, C., 1999: “Wie kommt der Geist in die Materie? Das Rätsel des Bewusstseins“ (“How does mind get into matter? The mystery of consciousness”), Munich: Piper.

⁷⁹ Bieri, P., 1992: “Analytische Philosophie des Geistes“ (“Analytic Philosophy of the Mind“), (2nd edition), Bodenheim: Athenäum Hain Hanstein.

ties in hyperspace. That's the topic of Heim's and Dröscher's second book mentioned before. In reference to that book Heim explained in Innsbruck in 1992:

“These cosmologic consequences via the cosmogony of matter – actually via this control of information via the control chain – that's the actual message of the book. The consequence of this would be that you have to say goodbye to a world of materialism! In this respect I believe the dialectic materialism applies insofar as it says: ‘The world outside there really exists, and I as a human being am responsible for everything that happens out there’.

However, ‘How is this world constituted as a whole?’ is a current question. We have always only researched those physical things in the logic area of the physis. That's all down to Galilei's omission that means: ‘We won't get one step further with regard to the understanding of reality if we assume intentions and take mindful aspects into consideration, for example in alchemical processes.’

Now, let's put things in order and let's say: ‘We only notice the measure. Let's measure the natural processes and let's see if behind these results there might be a principle.’

Because back then, mathematics was already highly developed – so to say as Plato's ‘Eidia agaton’ in form of a mathematic formula. That really works. That's how today's picture of the physical world could be developed. But, as Galilei would also tell us today: ‘Think of it, something important is missing here: That's down to my missing out on everything that's not measurable back then.’ That means, due to Galilei's omission, I can now only state two sentences regarding the world:

A) This world is physical and nothing but physical and fully mathematizable. Anything not mathematizable is nonsense and doesn't exist!

B) This physical world is perceived and analyzed by me as a human being based on the receptors of my sensory organs and my brain structure and my alternative logic, but it's only a part of a superior entity!

It remains to be determined which of these sentences is true.”

10.2 Why there is Organization in living Matter

“Now I could assume and claim that this world was exclusively physical. If I'm presented with a unified description of matter and I would – purely empirically – induce the concept of life, I could, of course, research the living organisms with physical methods and would get a description of the desoxyribonucleic acid double helix that

is practically to be read like a punched tape – it's a triplet code to be read in a linear way.

Now you could ask the question: if this world is physical, it must be possible to trace back all life structures and life forms imaginable, including the ones past and the existing ones, to the quantum theory of valence shells of 6 sorts of atoms, namely C, O, N, H, P and S. Those are the sorts of atoms that create the nucleotides of the DNS.

However, you forget one thing here. After all, you would require to derive logical sentences of a superordinated system, namely the structures and the organizations from the logical sentences of a subordinated system, namely the system of the valence shells. That appears impossible to me.

Apart from the physical world we have to assume at least one further area of regularities, i.e. the regularities of the bios that can't fully be formulated in a physical way at all – partly because biologic events always have a quantitative component. But saying this, I'm stating something that is in total conflict to the claim of a purely physical world. That means the assumptions are completely wrong!

So you can further imply an area of psyche and one area of mentality. However, the question is: what is this based on?

I can never conclude from one known part of the world – namely the physical part, despite a unified theory of elementary particles – to a superordinated entity that undoubtedly exists, as the conclusion of a reductio ad absurdum applies if you assume the world to be pure physics and empirically induce the life process.”

According to Heim the existence of highly organized creatures in an evolutionary process only taking place in space and time is not comprehensible, as also the Nobel laureate Manfred Eigen⁸⁰ admits. Because based on chaos, the organization structures observed would not stand a chance to develop. In 1980, Heim discussed this topic with the author:

“That's the whole dilemma that's never talked about. According to the Eigen consideration it is, based on physics, fully comprehensible that under suitable boundary conditions in a primal sea consisting of fluid water and an atmosphere in which a lot of carbon dioxide in gaseous connections exists, under the influence of meteorologically conditioned electrical discharges after a long time and in the presence of all the other elements – as carbon dioxide has a special capacity for self-bonding – that under all those conditions a myriad of different organic molecules in fine dispersion is

⁸⁰ Eigen, M., W. Gariener, P. Schuster & R. Winkler-Oswatitsch, 1981: “Ursprung der genetischen Information“ (“Origin of genetic information“), Spektrum der Wissenschaft, 6, pp36-56.

created. A number of those also creates itself autonomously in a catalytic way. That's comprehensible.

Another thing we can understand is that here a catalyst, a learn-function group – that's a learn group that adjusts a function group in such a way that it adjusts to its surroundings – is created which is actually a prebiont, a pre-living form. That's all comprehensible. That can come into existence by chance products, actually even with a relatively high probability. But that's where it ends.

It would be comprehensible if on a eubiotic planet this state was set forever, i.e. that for example a special form of matter works in this way.

However, it remains incomprehensible – that's also what Eigen states – why this trend exists despite physical principles for reaching higher and higher grades of complexity. As the more complex a functional system is, the more unlikely it is at the same time.”

The author von Ludwiger puts another aspect up for discussion:

“If structures as matrix of information lie beyond matter, they stem from areas in which there is no such thing as distances and time. Therefore, isn't it obvious that some suitable information patterns are accumulated from random areas of the cosmos that are provided by material statistic events and that apply as rules for developments in similar biotops all over the universe?

Globally seen, everything is static. Referred to the biotope of a single planet the global coincidence seems targeted, teleological. In this respect, only things that have proved successful somewhere in the universe are repeated as pattern somewhere else, too. This way, the time for learning is getting shortened according to the selection principle, as selection can draw on 'experiences' that have been made in the whole cosmos.”

Heim shared this opinion:

“Yes. One thing that already points in that direction is that the whole living nature is morphologically based on only a few construction patterns. The animalic world of heterotrophic creatures – i.e. creatures taking in food from the outside and that have a colon, heart, blood circulation –you'll find everywhere. Outer skin, sensory organs – it's always the same structures. Especially when you look at creatures living on land. They all have central control centers, nervous systems somewhere. It's always the same principle that is repeated because it has proved well. Already the trilobites of the Cambrium were equipped with that. There wasn't much experimentation there neither. Actually, everything was already there.

However, if you say it clearly this way, you're already stepping into a transcendent area that is radically rejected by science. That's what I criticize, that there's always the try to construct everything from the bottom to the top, and in doing so, one thing is forgotten. Although otherwise logic is always strictly observed, now suddenly it is assumed that the Gödel theorem⁸¹ doesn't apply anymore.

Furthermore, the evolutionary principle of dissipation is expected to then get to the next higher level. Why the next higher level? It could well have been continued on the same level in other areas. It is not comprehensible why other structural levels are reached which then – that's what is assumed – simply develop out of the subordinated system. That would mean that in nature propositions of the superordinated system are continuously derived from the subordinated system. “

“In my opinion, there couldn't be any, or at best only an extremely slow evolution of living things on earth if this planet earth was the only planet in the whole universe that supported life”, the author says. Heim, too, was occupied with the question, which authority determines the selection of patterns of experience:

“But now the question is: What kind of ideas are active here? Here we are, I presume, on a borderline area that hasn't been noticed by today's physics and which we should transcend. You should think about the methods needed in order to transcend it. Because you have to overstep this border, as otherwise the whole thing is basically just messing about.

In mimicry you see in a very drastic way that something completely different must play a part in here. After all, you could ask: where does the small worm know from that it has to wrap several leaves in order to pupate and therewith bore the raptor to a point where it finally flies away?⁸² Or take this story about the moths in South America: it happened quite fast that the colorless, but well-tasting sorts of moths suddenly adopted the red pattern of the poisonous moths and then weren't eaten anymore.

If there's an imbalance anywhere in the world, it will be balanced out by such an invention. Otherwise the colorless moth might have become extinct. But apparently it is still needed for something else.

⁸¹ Gödel, Kurt (1908-1978), from Gödel's 1st incompleteness theorem the 2nd theorem results; that no formal system that contains significant parts of mathematics can prove its own consistency. In order to be able to do that, the boundaries of the system need to be transcended.

⁸² B. Heim refers to examples from Wickler, W., 1971: “Mimicry – Nachahmung und Täuschung in der Natur“ (“Mimicry – Imitation and Fake in Nature“), Munich: Kindler.

It appears to me as if everything's sensibly controlled with a view to a long-term result. But if you ask me from where all this is controlled, I assume I couldn't talk to all those gentlemen – also not to Mr. Eigen, to Mr. Dürr and all the others. In contrast, the right dialogue partner here might be Mr. Wojtyla (Pope John Paul II). Because from him I might get answers that would really get me thinking, as here the ideas would fall on good soil. For today's scientists it's just very bothersome.

That's also the reason why I like being in contact with Catholic priests – not because I have the intention to convert. There are things I don't like about this religion at all. That's something I'm telling you frankly. But well, it's formalized that way. Those gentlemen don't have the power to change that either.

But of course you can talk about this with people from all religions. You can just as well talk about this with smart Chief Rabbis or with smart Buddhist monks. The only difference is, these people are not always available. I also assume they basically speak another intellectual language.

To us, the closest thing is Christianity; Judaism is the mother religion: Islam ultimately also seceded from it (for example, in Islam Jesus of Nazareth is also considered a great prophet).

Basically, all those people representing the world religions have the same basic idea. Whether it's far away in the East, with the representatives of Zen, Taoism, Mahajana, Hinduism and whatever else there is. Doesn't matter. Wherever you look, all religious people are imbued with the same idea: we do see this part of the world, but we don't see the other one, as it isn't accessible to us. There's an entity that we might be able to experience in this or that way. But even if we experience something according to a practice, no matter which one exactly, there's always a higher superordinated entity again that can't be experienced. All those people carry that idea in themselves.”

Material events are controlled from a background. Heim asked which possible physical or logical causes there must be for it:

“There are organisms living in the cosmos. They consist of the DNS double helix as the carrier of information and of proteins of higher level which we don't know yet very well, and which are able to retrieve information and know ‘where the full-stop is in the sentence’. The nucleotides alone or the polipeptides that can definitely come about in the primal days of a eubiotic planet by themselves are no creatures yet. Prebionts don't live.

Only if a code is engraved, i.e. if the phosphodiester bounds of the nucleotides are closed in such a way that always 3 nucleotides of the codon form a catalyst or create some element of live, e.g. one of the 20 aminoacids or nucleotides or primal axyl is

added, it is important that these codes are connected in series in a useful way. Only if that is the case, proteins can develop that can appear as the first links of a synthesis chain. That means, the code needs to be engraved in an intelligent way. You can say this comes about due to random mutation and selection. But I have my doubts! I myself have engaged myself in paleontology. I know that living creatures develop the way stated by Darwin.

Darwin was a very very smart man. He should really be paid the respect he deserves. He found out that if you put fossils together, there are transitions up to the species that there are today. From that he had to conclude that the species have developed out of each other. But there's one thing he couldn't know: at Darwin's time there was no atom physics. He wasn't able to determine the age of the fossils. But today we can do that.

According to pure Darwinism, evolution of living creatures in its modification speed would lie on a horizontal curve, so it would take place in a constant way.

If that was true, however, the first horse would have existed before our earth and our sun. Bats would have been there in cambrian times 3 billion years ago. The time wouldn't be sufficient. That's something already stated by Schindewolf⁸³. But we know that's not the case, as we can determine the age of the fossils by means of radiocarbon dating.

The species appear typrostrophically, they start with a high value of modification speed that falls away sharply during the typtogenesis, and then becomes horizontal – I call it the Darwin hypostasis – and as soon as the typtosis starts there's a steep increase in the modification speed again. And after that the species is gone. In that short-term transition period new principles are introduced, the species develop typrostrophically. In relatively short time one item-code is being attached to the other, and something sensible comes out.

In order for something like that to develop, physical nature would have to roll the dice for a long time. For a time longer than the world is old. You get out of this dilemma if you try to integrate the principles of biology via molecular genetics in this big picture of the world's background. After all, if the construction plans of the organisms are constructed in an intelligent way – as according to a blueprint – the controlling cause in the G₄ must be an intelligent one.”

The biologist Roberto Fondi⁸⁴, too, agrees that these discontinuities in the evolutionary speed are too drastic to provide enough room for the purely Darwinistic interpre-

⁸³ Schindewolf, O.H. (1896-1971): Geologist and paleontologist. He dealt with morphologic and morphogenetic research of fossils and of their phylogeny.

⁸⁴ Fondi, R., 1986: La Revolution Organiste, Paris.

tation. Apparently, living matter needs to absorb information from basic structures, similar to Jung's archetypes. The mathematician Hermann Weyl⁸⁵ already stated something similar when he assumed the existence of 'immaterial factors' of the kind of 'ideas, concepts and construction plans' in the living world. Furthermore, the unusual adaptation processes, for example between plants and insects, go far beyond the facts that can be explained with Darwin's theory, says the biologist Stephen Gould⁸⁶.

Evolution is regulated by mutation and selection. But Heim says, something else is added:

"The whole thing leads to a very strange form of theism. You can become a believer again if you only concern yourself with nature deeply enough. However, we can't create a concept of God here, as this is way too big for us human beings. We must draw a blank on that one. But that doesn't hurt. We can simply accept it and take pleasure in the connections we see.

In general, I have the impression the meaning of all conscious life is that in rational beings a kind of mirror of the whole universe is created in the light of which the primal thoughts from the bottom of the world soul become conscious of themselves.

If you realize that, you can, whenever life seems without meaning to you, tell yourself: 'Actually, it can't be so meaningless at all'".

10.3 The aspect-related Logic for the Description of the World's qualitative Sets of Values

In Heim's universal eigen value equation, the world selector clearly describes all physical structures you can think of. Heim also talked about that to colleagues:

"The unambiguity is actually unnecessary. Because that's a fact of experience. You could also construct other world structures that are just as logical. However, if from this plethora of possible worlds that are all just as logically possible – that can provide such a different nature – I really determine one, you could ask yourself: why is this unambiguity there? Maybe I, having all these limited physical and sensory possibilities after all, and due to all those limitations that simply are immanent in the human being, can't 'see' the entire world, but only a part of it that appears unambiguous to me now, although my deductions show that there are other possibilities too. However, they aren't existent!

⁸⁵ Weyl, H., 1949: "Philosophy of Mathematics and Natural Science", Princeton, N.J.

⁸⁶ Gould, S.J., 1983: "Irrelevance, submission and partnership: The changing role of paleontology in Darwin's three centennials, and a modest proposal for macroevolution", in D. Bendal (ed.) "Evolution from Molecules to Men", Cambridge, UK.

But saying that what I perceive as physical nature is only a part of a superordinated world entirety, you could just as well assume that this unambiguity I can clearly see in the world structures or that you can feel or describe somehow, is a consequence of superordinated areas that belong to this entirety that is just not accessible. Then you can ask the question if you can't try – as the direct conclusion according to Gödel principle isn't possible for this superordinated entirety – to find a way out of this ambiguity of a world equation. Of course, that would be a trick using the indirect method of conclusion.

Based on this knowledge about a world equation, couldn't I try to deduce additional areas that are just a bit beyond this unknown world entirety? Hoping that later this will be sufficient for deducing certain properties of the science of living things, of humans, so that such areas are still comprehensible to me?"

Although the additional coordinates that Heim introduced appear in all elementary particles, they are something different to geometric structures that are quantitative values. The organizations of matter as they present themselves in living creatures are effected by qualitative values that are neither measurable nor can be geometrized.

Heim explains: *"There are elements in each organization. But something completely different is above that, as the living animal is something more than a cluster of molecules. A structure consisting of those elements is more than the sum of its single parts. After all, that also applies to material structures.*



Picture 7: On July 19, 1974, the Heims meet Zen master Gerta Ital (2nd from right) at I. von Ludwiger's apartment in Feldkirchen-Westerham.



Picture 8: Some members of the workteam Heim-Theory, 2003, Innsbruck. From left to right: Dr. A. Mueller, Prof. Dr. J. Haeuser, Dipl-Ing. W. Droescher, Prof. Dr. Dr. A. Resch, Dr. K. Gruener, Prof. Dr. Dr. D. Gernert.

This ‘more than’ – that’s what eludes the quantitative idea. There’s a complementarity, though I can’t describe which kind of structures those are. It’s a bit like that: the components can be imagined as, for example, the parts of a pocketwatch. They are now combined to something that is more than the sum of its single parts, referred to a working clock. But that’s just a relative functionality referred to you as the user. That’s no value in itself.

If I call that ‘functionality of the automat’ that itself doesn’t mean anything, it’s something fundamentally different regarding living creatures. Those living creatures might not have a secondary, relative functionality. For example, a bug is something completely unpractical for you. But referred to the idea that’s behind it, the body of a bug has the optimal primary functionality. That is, referred to the idea that’s been manifested here, of an absolute kind.”

When we look at the animated world, we realize that these organizing effects exist in matter. According to Heim, the imaginary structures x_5 and x_6 , which were introduced for mathematical reasons, provide evaluations of such kind.

We remember: by interpreting the geometric structures, Heim yields four completely different physical objects. Heim calls those 4 geometric condensation structures ‘Hermetry Forms’, as they are created by a physical interpretation or hermeneutics of the geometry. Only curved spaces or condensations of area elements are ‘hermetri-

cal', whereas Euclidean spaces, respectively flat area grids are 'non-hermetrical' and therefore can't be interpreted physically.

Heim labels the 4 hermetry forms by giving them letters: a) gravitons, b) photons, c) uncharged particles and d) electrically charged particles. The hermetry form a, which consists of the coordinates x_5 and x_6 , physically appears as a graviton when it cuts the space.

"We haven't thought about what the elements of these trans-structures actually are. What is it in fact? I have this solution a, these condensation steps possible beyond space and time, which actually can't be physically interpreted. In my books I have kept silent about that.

Dr. Emde⁸⁷ gave me the idea. He said, if the entelechial world dimension was in fact the inverse to disorganization, i.e. if it was, for example, evaluable as logarithm by a negative entropy or non-logarithm by a reciprocal possibility, those would be quantitative evaluations of information or of organizations that I evaluate by a probability measure.

Now here we have the link. The structures that cannot be interpreted physically and that cannot be explained by electromagnetism or by particles, Emde said, actually were entelechial entities of possible organization potentials. They are of qualitative kind. Here's a possibility for transcendence.

Now it could be that the a-terms are the actual material that acts in an organizing way and that for example 'trails' the matter in the manifestation space, so that something appears that has maximum entelechy and minimum entropy, and something that eludes the 2nd main theorem for the term of existence.

I could imagine that these entelechial entities are able to organize themselves to higher complexity by means of integrating factors that I can hardly describe in more detail. This way, the DNS-code might be engraved.

You should think about what the principle of asymmetry means here. However, one thing I've realized: these 4 nucleotides are totally asymmetrical molecules."

The human being has four different characteristics: it consists of body, bios, mind and psyche. This differentiation even goes back to the ancient philosophers in Egypt and Greece. Heim thinks this subdivision is absolutely compatible with a scientific world view:

⁸⁷ Emde, G., mathematician and former senior head of department at the company MBB (today EADS).

“In fact, it’s like this: to us, life seems to be constructed in a 4-fold way.

We have shown that what the ancient thinkers philosophized in Thebes back then does have a good real background.

The only thing is, the human being should appear to us as a 4-fold creature now. But it doesn’t! In reality, it’s an entity that we just can’t comprehend, since our brain has a certain morphology, a certain functionality that has always been designed for making ‘yes/no’ decisions as to the question if something can be coped with by us or not.

However, you now have to consider how a logical structure that transcends these actually non-existent boundaries that are only given due to our brain structure, needs to be designed. You have to consider if there are declarative systems at all – here you should start at a declarative calculus – of possible declarations that are complementary, i.e. which complement each other. That does exist! For example, you can say that the purely anthropomorphic structure of logic is an alternative logic. We say ‘yes’ and ‘no’.

Now you could describe ‘yes’ with a 100%-probability, ‘no’ with the probability zero, and you can create a probability-logic with an indefinite value, since every real breach between 0 and 1 would be a description of probability after all. That’s something v. Weizsäcker has once demonstrated. You can even establish a quantum logic in quantifying a ‘maybe’.

Here you could say the bivalent anthropomorphic logic and such a probability logic are complementary. You might be able to translate a mathematically formulated fact that is described by probability statements. You could also use totally different things as a statement, for example an organization level or the level of a functional organization.

After all, organization is a cluster of signs. That’s some entity – a wholeness – that is functional. However, now you always have to say what you understand as a functional organization, as this never stands for itself. You must refer the organization to something different, consequently to another organization. The evaluation of the organization depends on the system it is referred to.”

In our common alternative logic we talk about quantities. In the abstract language of mathematics this alternation is expressed in the comparison of quantities that can either be the same or different, bigger or smaller. In each case transitivity applies: if a quantity a is smaller than b and that one is smaller than c, consequently a must also be smaller than c. That applies to quantities.

However, that doesn’t necessarily apply to qualities. You can’t just compare quantities here, but you have to evaluate the contents of quantities. When evaluating you

always have to state which contents of a quantity that can be a certain organization you're referring the evaluation to.

If you look at things on our earth, you realize that starting at a certain organizational level there's a transition from a purely quantitative composition to a qualitative structuring in living matter. In order to understand life processes, you therefore must find a logical system that enables the transition from quantitative to qualitative evaluations formally.

So, in order to describe physical facts you need to choose a different logical aspect than for the description of biological or mental processes. In a conversation with the author on June 6, 1982, Heim explained how such a unified description of different facts would be possible:

“If I want to describe the physical world, it's most sensible for me to choose the quantity aspect. And now I make the experience of aesthetic empirics, always considering a denumerable quantity. This means I reproduce an observed event, I abstract in such a way that I can measure everything, I build my measurement instruments that only show characteristics such as numbers or parts of numbers. And I set the yielded numbers in relation and thus get statements.

Then I apply an abstract method to these statements, namely this closed system of mathematical analysis as the most subtle expression of this quantity aspect. I then change over to a transcendental aesthetics – by the way, I call it anthropomorphic transcendental aesthetics, as the aspect is connected to the human way of thinking – and get the mathematical description of nature. However, only the nature that is adjusted to this aspect.

Thus, I can describe matter as it is. However, the thing already gets difficult in case of interactions. Well! Basically, that's nothing else than what we call theoretical physics.

But there are also some other sides to material nature. This nature of matter has, for example, characteristics of organization, of interaction. There's matter, namely macroscopic structures of matter that behave in an acausal way, that do whatever they want. This matter we call living beings.

The process of life is a process connected to living things and matter, however, it eludes the mathematical aspect.

Here the aspect stops. I see the limit. There is no sense in further mathematizing biological things, as my aspect stops. I actually need an aspect of the bios that is different to that of matter, but which touches the aspect of matter, too. That's one thing.

If I research living beings as you do in biology, and I botanize together, I'll observe that there exists yet something else that I cannot grasp with the purely physiological aspect anymore. Many higher living beings show psychological reactions. So here, there's a limit of the aspect of bios. There must be a descriptive aspect of the psyche.

I study and botanize psychological events. That's nothing else than what psychologists do. That's no science in the actual sense – just as biology is only botanizing and collecting.

I have extensively occupied myself with psychology. On the side, I have studied depth psychology. I have done dream analyses. I have done characterology. I have dealt with sexology and with sexual psychopathology. And I realized: what is done here is botanizing! There are models created that aren't valid, since the aspect of description is missing.

If I botanize and collect, phenomena take place that I cannot grasp psychologically at all. There's again another aspect missing. I think all these things are manifestations of one and the same reality. But I need to have a different descriptive aspect for each of them.

Without doubt there must be several logical possibilities that can be adjusted to the problem. So I have to take care of this: how does something need to look that must apply beyond random, logic systems? Then you have to clarify: how does a logic system actually look?

In every kind of logic I have to make statements. Terms are set in relation by statements. In every logic there must be terms and statements that put these terms in interrelations, as otherwise it's no logic. Human logic knows two kinds of statements: 'yes' and 'no'. Within the logic I have many different aspects. What is such an aspect actually?

Such an aspect is nothing else but the coordination of dialectically defining adjectives to my predicates. After all, it's a huge difference whether I for example coordinate the predicates to the affirmation of good and evil to the negation, or whether I do the inverse, that I coordinate evil to the affirmation and good to the negation. Because then I have the contradiction. That's the contrary aspect then. Because in the one case I refer to the good, so for example social coexistence is affirmed, in the other case the evil, i.e. the destruction of society. That's a huge difference.

You must differentiate between subjective aspect and logic system. The logic system results in predicative possibilities and the linguistically possible dialectical adjectives. This aspect is characterized by a system of predicates that have, however, been characterized by all the adjectives. That's the most obvious thing for a start...

Now, what must a connection of predicates between two terms look like, in such a way that this connection of predicates is valid in transformations beyond every random logic?

I need a simple connection of terms as a functor, since functionally, these terms are connected by the predicate. In classic logic you actually understand the functor to be a connection of predicates of the kind 'if – then', or something like that. That's actually a functor. But that's just a question of terminology. That doesn't really matter.

Now such a connection of predicates that I as a human being formulate, might not exist in my n-valid logic anymore. That's possible.

For example, I can absolutely use probability logic, I can coordinate the affirmation with the probability 1, the negation with the probability zero and can precise 'maybe' with the infinitely large number of real fractures between zero and one. However, it's not said that a fact I'm formulating quantitatively or qualitatively here applies in another logic.

Here, I'm thinking of an example in using an aspect of beauty and ugliness, making the statement: this sculpture is more beautiful than that one. In this case, I have connected two concepts by using the predicate 'more beautiful than'. If I use a totally different logic and this 'more beautiful than' is translated with a different adequate statement of the other logic, it can be that I can translate the statement, but the concepts don't exist anymore. The concept of 'sculpture' is absolutely unknown in that logic, whereas other concepts connected to it can very well appear.

In this form of simple connections of predicates they are bound to a specific logic system, or – which is the same – a specific aspect; this means I basically can't do anything with simple connections of predicates of concepts.

But let's think of a system not based on one concept but many. That should be constructed as follows: all these concepts should be connected, in mutual conditionalities. Then we have a system of concepts. I can choose a small sum of them and will see: the concepts are not derivable from each other and the others, but all the others from this system are. Similarly to the case when you have independent coordinates – in analogy to the analysis. These metaphors of analysis are always quite useful, as you have mastery of them.

So I have a system of independent concepts that carry the measure of the whole other system of concepts I can derive from it, similarly to, for example, the coordinates independent of each other that describe the whole reference space.

I have called these concepts apodictic concepts, i.e. concepts I can't derive from anywhere, but I also can't overturn. And these apodictic concepts I summarize to a

matrix-like scheme, namely to a carrier of measure, as I call the system of concepts, the metrophor.

And now you can extract concepts of a first conditionality from this metrophor. In conditionality grade 1 you always have connected two concepts and have made new concepts from them. Those arrange in a concentric scheme around the metrophor. That's a syndrome of concepts of first conditionality. I call the metrophor a zero-syndrome. (Syndrome means concourse. That's a term often used in neurology and medicine; syndrome = concourse).

Then you choose the next three concepts in the second grade of conditionality in your system, as a second syndrome, etc. Thus you arrange all your concepts in a sequence of syndromes.

Thus, a so-called syllogism has been created. You can say that your whole system is a category on the top of which – in a philosophical sense – the idea is positioned, namely this metrophor. Syllogistically oriented, the conditionalities now follow in form of syndromes. I call this whole system a syllogistic matrix = syntrix. (Sketch 4; see p. 123 et seq.)

Now you could imagine that you don't put the single concepts in relation, but by the use of whole syntrices the whole connection of predicates. You must introduce new concepts here, as in mathematics I don't find any analogy to it. It is not described in philosophy. This thing also has to be linguistically proved with a special term, otherwise you will get completely confused."

However, there is an analogy to a special area of pure mathematics that seems suitable, which was developed under different aspects, but which shows significant structural similarities. It is the Theory of Categories by Arbib-Manes⁸⁸. A *category* in the sense of this theory is defined as a quantity of objects, whereby there can exist relations between two objects that need to fulfill certain axioms. Another analogy is the *entity-relationship model* based on the basic theory of database systems⁸⁹. Here, too, inherently random objects or 'entities' are assumed between which relations can exist.

So far, we have only heard about Burkhard Heim's ansatz to his aspect-related logic. The full explanation was written down on 370 typewritten pages by Heim's wife Gerda. Heim already presented the manuscript on the occasion of a meeting with the

⁸⁸ Arbib, M.A. & E.G. Manes, 1975: "Arrows structures and functors", New York: Academic Press.

⁸⁹ Chen, P.P., 1976: "The entity-relationship model: Toward a unified view of data." *ACM Transactions on Database Systems*, 1, pp9-36.

professors Jordan, Hora and Lyra at the company Messerschmitt-Bölkow-Blohm in 1976⁹⁰.

The work on it was so difficult for Heim that sometimes he himself was not able to understand himself anymore. On July 19, 1974 Heim talked about his experiences with this work to Zen master Gerta Ital in Feldkirchen-Westerham⁹¹:

“I endeavored to find something that allowed me to transport facts from one logic, for example the mathematical-physical, into another, for example the logic of the psyche. It’s a very very ambitious work that demands extreme concentration, so difficult that compared to that, the work on my unified mass formula felt like pure relaxation:

As I cannot write, I dictated the derivations I did in my head to my father, walking up and down in the room. And during this, I sometimes got a very strange feeling: I couldn’t say ‘I’m dictating this’ and ‘I’m thinking this’, but ‘IT is dictating. IT’s thinking!’ It was something that apparently didn’t belong to me at all. It seemed to me as I was only repeating something that actually belonged to something completely elsewhere. That’s a weird feeling! I have never talked to anybody about this, as I said to myself, nobody would understand anyway. But I know that in some meditation exercises it’s said to be similar.”

That is the perfect doing, something that is practiced in Zen exercises, for example. Gerta Ital said: *“If you were, for example, a common tailor of a craftsman, you couldn’t have this experience. But your research is something that goes far beyond normal research.”*

“Yes, you could say that. Because nobody has done that in this way so far”, Heim replied.

“So – in my opinion – it’s rather normal IT collaborates with you.”

“I have only experienced that two or three times, but that’s enough. But the precondition is an extremely high tension and concentration.”

“But concentrated on your work you can also directly connect to the six-dimensional world. I don’t mean in a scientific way, but metaphysically. That’s the culmination I mean. That’s something wonderful, and human beings actually don’t need any more joy and happiness”, Gerta Ital said, who herself had had the Satori experience – the

⁹⁰ Heim, B. from 1976: ”Syntrometrische Maximentelezentrik“ (“Syntrometric Telecentrics of Maximes“ volumes I and II, 319 DIN-A4-pages (unpublished).

⁹¹ Ital, G., 1966/77: “Der Meister, die Mönche und ich“ (“The Master, the Monks and I“), Munich-Bern: Scherz.

enlightenment – the oneness with the ultimate source of being, and had this experience confirmed by Japanese Zen masters.

“Yes, that’s true life quality. In order to get such a life quality you don’t need huge palaces and cars. You don’t even need to pray!”

What Heim meant by this is every activity if it is only done in high concentration in absolute perfection can create the reconnection to the ultimate source itself.

The paper ‘Syntrometric Telecentrics of Maximes’, where Heim developed the aspect-related logic, has not been published yet. The small number of people who have read this text a bit, have been overwhelmed by the comprehension difficulties of the formal logic. So only some keywords necessary for the further understanding of our explanations will be mentioned here. Even these strongly shortened explanations are already difficult to understand. But it is also one of humanity’s most difficult questions that is to be answered here, namely the question of immortality of the human soul. If you don’t want to answer the question only ‘by believing’, but scientifically, high obstacles of thinking need to be overcome.

Heim already said that in a general dealing concepts cannot only be simple quantities you can compare and therefore quantitatively evaluate, but they can also be contents of information that need to be qualitatively evaluated. Whenever two syntrics of contents of information are connected, 2 further syntrics are connected at the same time that each refer the information to the corresponding aspects regarding which the syndromes are pieces of information.

Therefore there principally are, independent of the logical competence area, 4 elementary forms of syntrics from which all others can be created via connection laws. In the common alternative logic the quantity the statement is made of is identical with the content. There are only 2 syntrics connected to each other, instead of 4.

Heim calls the totality that is created from these 4 basic forms a *syntrix totality* of grade zero: $T(0)$, as the elements of the syntrics are simple concepts that can be reduced to the metaphoric complex, i.e. the measure-bearing inside area.

If now a whole complex of such syntrics of $T(0)$ is put up and a *pseudo metaphor* is created, functors that combine syntrics to hyper-syntrics and thus occupy syndromes can now be defined instead of the induction laws of the conditionalities. Heim calls this a metaphoric complex or *metroplex*. (Sketch 5; see p. 123 et seq.)

Metroplexes are conceptual patterns. Metaphorically, metroplexes stand on the 4 syntropodes (or basic syntropodes) in the syntrix-totality $T(0)$. These metroplexes of 1st grade in turn create a totality $T(0)$. Thus, metroplexes of higher grade can be created

in turn. This way ever more complex conceptual nets woven into higher levels of organization are created.

Also pseudo metroplexes that connect several metroplexes with each other like a linear fabric and that bridge the normal sequence of syndromes can be constructed from different syndromes. That is so-called *syntroclines*.

10.4 The transitional Criterion between Physics and Organizational World Structures

The interpretation of the two additional dimensions in Heim's theory as coordinates with qualitative character demanded the alternative logic being expanded to an aspect-related logic. With his logical method independent of a specific statement system Heim was then able to make quantitative and qualitative statements in a unified formal way. This method is called *syntrometry* by Heim. It is the combination of different metronic structures.

The consequence is, we no longer need to try deriving life processes or consciousness from physical quantum processes, but you start from a superior entity that manifests itself in this logic method, the syntrometry.

First, Heim had to deal with the problem of inserting the whole theory of matter developed by him into this logic hierarchy.

“Now it comes down to how the unified description of matter needs to be performed. In which mathematical form? How do I have to transfer this form into a syntrometry that's independent of the respective system of statements? How do I have to change and specialize the syntrometry, so that I can make qualitative statements, too?”

On the one hand I have my unified description of nature in mathematical notation. Well! That's there. That was the way from below to above, so from the gutter to the palace. Now we need to go the reverse way, we need to find a way leading from a still higher palace to another palace. This means you have to visualize how the structures of the so-called syntrometry are actually constituted and you have to say: from this superordinated observation level I assume that I have a scheme of predicates of 2 statements. So I'm making a two-value statement logic, the anthropomorphic logic with comparative alternative statements. Now I determine the following: with my statements I'll compare quantities. All my elements of the syntrometry are quantities. I call this version the anthropomorphic syntrometry. After all, the mathematical axioms must be applicable to the single elements.

Now I must take my world selector equation and need to consider how this actually needs to be written in order to make it possible for me to create such world syntrices?

At first, there wasn't any ansatz to be seen. I said to myself, the only syntrometric elements I got inside it are real and imaginary coordinates. I'll create a metrophor from two elements (or from just one element, namely the complex algebraic body), respectively from the real and imaginary numbers.

Now I let the iterator take effect. I call it the semantic iterator. This only requires: take 3 exchangeable supplies with the semantics from the real area, in order to get the basic structures of the physical space, since the SO3 is one of the fundamental structures in physical space and needs to be compact also in relation to the rotation group – after all these are physical fundamental requirements – and take 3 imaginary value supplies and combine them with it, so you get an R_6 . That's the only syntrix, or to be more precise, that's not even a syntrix, as this would only consist of a metrophor, the semantic iterator that creates the R_6 ."

The 2nd syntrices-syndrome Heim has is the three tensorial structure units. The 3rd syndrome is created by tensorial multiplications from these 9 emerging fundamental tensors. In the 4th syndrome these elements are contained in the 4 polymetric correlation tensors. Consequently, we have reached the syndrome closure T(0). (Sketch 7; see p. 123 et seq.)

There are 4 fundamental world syntrices. The dynamic exchange processes of maxima and minima of structure condensations of the single 4 geometric structures – which Heim calls *prototropes* – constitute the world metroplex of 1st grade, labeled with T(1). (Sketch 7)

The 2nd metroplex T(2) corresponds to these pre-material structures, the so-called *protosimplexes*, that are combined from these dynamic and static prototropes.

If two protosimplexes interrelate and create cyclical structure fluxes, inertia and therefore a material particle is created for the first time. Thus, geometric dynamics transforms into physically perceivable structures. Metroplexes of 3rd grade correspond to these particles and photons. (Sketch 8)

Thus, the transition criterion from the physical description into syntrometry is performed.

"There are certain elementary particles that can come into stable interactions. These are metroplexes of 4th grade that can emerge as nuclides of chemical elements. If these together with electron structures form a metroplex-combination of 4th grade, we call that a complete atom. And these metroplex-combinates can in turn get into an interrelation – the key to interrelation are these metroplex totalities – as metroplex totalities of 5th grade they can eventually form molecular structures, no matter if the structure being created is a water molecule or an organic molecule. In any case it remains a metroplex combinate of 5th grade."

Macromolecules would be metroplexes of 6th grade. In this respect, all technological objects of humans are to be understood as pseudo-metroplexes of 6th grade. These objects only have a relative purposefulness regarding us human beings, but no absolute purposefulness, as no immanent idea is implemented at all. Up to material structures of metroplex grade 6 physics is exclusively responsible.

“All metroplexes of grades higher than the 6th grade cannot readily be put into these categorized anymore. It’s here where the immanent organization level appears. Everything that lies above it, corresponds to living structures. (Sketch 6; see p. 123 et seq.)

Another parameter has to be added now, one that is, by the way, also looked for by Eigen, who, however, doesn’t know where to start. After all, from now on molecules need to result in purposeful function systems. Here, a novelty is added that doesn’t exist in the simple material world of molecular structures, namely the term of the organizing level. There are ever higher and higher organizations that manifest in increasing metroplex grades.

The metroplex grade is a direct measure for this dimension x_5 that evaluates these organizations. However, at this point I cannot compare these organizing principles by numerical values anymore. The statement logic suitable here is no probability logic, unless you say the inverse of probability evaluates an organization. Or let’s say some numbers of dimension x_5 in absolute values evaluate organizing levels.

Now you have to ask the question anyway: if matter organizes itself, then what actually is the organizing principle behind it?

Here, physical structures are active, structures however, that themselves do no longer exist in the physical space. It’s the first solution group in x_5 and x_6 condensations, the bimetry that can only appear as gravitons in R_3 , actually as negative probability matrixes, as information matrixes. After all, negative probabilities are information.

These transcondensations— I call them transcondensor terms related to spacetime — are already from semantics of transcoordinates entelechial entities of organizing potentials by definition. And these condensations are of quantum nature too.

These transcondensor terms I call activities. Activities that are evaluated in their organizing potential at level x_5 and x_6 . And new net-like connections of activities I call ideas, as it these are the ideas themselves. The content is there, and now this idea can complementarily organize matter, i.e. the metroplexes up to 5th grade.”

10.5 The structural Levels of Consciousness

Such processes in the trans region effect the manifestation of an idea in living creatures. As nets of activities, ideas can project themselves from high organizational levels in x_5 to lower areas of material structures and can re-structure the organizations of those. This corresponds to an information probability if the new state of organization is less probable.

And that is effected by the structural complexes from the organizational, respectively informational coordinates x_5 and x_6 that Heim calls activities. According to Heim, all material structures possess structural extensions reaching into these transdimensions. An additional 4 structural complexes from these transdimensions are attached to neutral particles and photons in the form of ‘condensor quartets’, as they are called by Heim.

“And now we’re getting to the other aspects of this logic adequate to this nature of ideas and activities. That’s not comparison anymore, but an evaluation, an evaluating statement.

I want to know what happens if these communicate with each other. Then I can’t continue on the mathematical basis. True, I can observe that these ideas can be in correspondence with material structures – for the simple reason that these transcondensations, as we call them, always accompany particles of matter, namely photons and neutral particles in form of a structural quartet.

The electrically charged particles don’t possess this quartet, although they, as well, have a component in x_5 . This means, here, too, activities can attach. In fact, however, they always attach at the condensor-quartet.”

Heim had also planned to have his syntrometry experimentally proved in order to satisfy Popper’s demand for falsification as a precondition for a valid theory. So he didn’t leave it at philosophizing. By means of an appropriate arrangement of material objects he wanted to prove activity streams.

“The only factor that can have an effect in the analysis-material cluster is the neutron-configurations of nuclides. Those of the electrically charged particles of the atom structure are completely unusable, as they miss this bridging-quartet. I need to know with which nuclide neutron-configuration there’s the optimum binding effect. How many of these configurations need to be there?

For answering this you need to know what neutrons and what nuclear forces are. So a purely theoretical study must precede. Therefore my consequent – almost obsessed – working at the elementary particle theory. Because without knowledge about the

elementary particles we can't get activity streams to become effects that can be registered."

Heim was very well aware of the fact that he couldn't bring this research and his sophisticated experiments to an end during his lifetime when he stated in 1983:

"I don't know if I will live long enough, as I have something completely different in mind with this research. The physical theory is just a means to an end. I simply need it for something completely else."

In order to draw attention to his comprehensive work at the aspect-related logic, Heim first wrote a small paper, in which he wanted to show a wide audience the practical application of the syntrometric method for biological and psychological areas⁹². The following explanations largely refer to that book.

In Heim's syntrometry ideas are shifted up and down in the transdimensions by activity streams via the conceptual complexes of the metroplex totalitates T(n).

Metroplex totalitates are qualities that define the organizational grade. Starting at the organizational grade T(7) they can change the probabilities for organizational states in matter. Living matter is defined by the hierarchically arranged metroplex totalities as the entlechiially layered causal networks of the ideas of living structures. By means of the metroplex totalities T(n) the organization levels increasing from n can be identified with the following biologic structures:

The living structures of T(7) would be elementary biophores, the structures of the T(8) = micelle structures, T(9) = organelles, T(10) = infracellular causal complexes, T(11) = livable cells, T(12) = multiple cell coherent tissue, T(13) = tissue connections (for example volvox proto zoos), T(14) = complete organs, T(15) = organ groups of a closed, somatic entity.

Here ends the aspect of the bios. The manifold merisms of the life process, i.e. the agglomeration of structures without higher organizations, are formed to a holistic entity by means of a *holomorphism*. This coherence is effected by a metroplex structure coming from T(16). That permeates the whole structure T(7) to T(15) and by means of falling activity streams projects the holomorphism onto spatial structures. (Sketch 9; see p. 123 et seq.)

Via these structures activity streams, too, rise to areas higher than T(16). Some quantitative influences from the material area that are receptorally ascertainable by the

⁹² Heim, B., 1980: "Postmorale Zustände? Die televariante Area integraler Weltstrukturen" ("Postmortal States? – The televariant areas of integral world structures"), Innsbruck: Resch.

soma are transformed into rising activity streams, so that the quantity of the physical influence is transformed into experience qualities.

In the metroplex totalities T(15) to T(24) the processing of a living structure's experiences take place. This area therefore corresponds to a psychological area. That means that the quantitative sensory processes in the physical area become qualities in an area lying outside space-time. Thinking, feeling, conscious acting are processes that take place outside the physical world.

“According to my understanding”, Heim cautiously explains regarding the definition of the concept of consciousness, “this whole structure of interrelations is more or less linked to far-away entelechial psychological instances. A pulse that at re-actualization binds or loosens these couplings in the time direction – I call it activities – and implements them, in other words the single information-carrying elements that are actually pure information, which for example implements into the metroplex combine of the soma world, these are processes of consciousness. This pulse that is running through it, that’s what I call consciousness.

As this is exactly what mediates the interchange of these information-carrying activities between psyche and soma. And there are contact canals that convey this psyche.

We call the information exchange psychosomatic. If one or two canals reach out and project out of the trans area into somewhere else, then we’re talking of animistic, paranormal phenomena. In reality there’s a very close connection between animism and psychosomatics.”

The process of experience in the psychological area is essentially based on four driving motivators that constitute the necessary and sufficient precondition of holistic life processes: 1. self-preservation, 2. self-unfolding, 3. conservation of the species and 4. hunting drives.

With increasing organization, with rising metroplex grades T(n), these channels multiply. The controlling of those activities takes place via these channels which Heim calls ‘intermittent guiding metroplexes of a correlating connection’, or in short *ilkor*-systems (from German ‘*intermittierende Leitmetroplexe einer korrelativen Verknüpfung*’). They connect the activity streams in a way that a guiding idea can be enforced and retained in the soma.

Each process of the split-up of an *ilkor*-channel that is described with factor λ creates 2^λ different channels via which activities can be transported into the soma. Living creatures of areas T(7) to T(10) only possess one such channel. λ is still zero. Creatures within T(11) to T(15) already possess one first split-up with $\lambda=1$, that is 2 control channels. That’s a characteristic of flora. Animals already possess $2^2 = 4$ control channels.

“The next step forward would be 2 to the power λ , which means 8. That’s the level of primates, the primates we nowadays still have remnants of. (But I have the impression a huge part of humanity is still at that level, these $\lambda 3$ -types: 2 to the power 3). If you take primates, the brain stem of which, as in animal creatures in general, is very active and the limbic zones of which are linked to the sensory organs, actually all their lives and activities are driven by a drive- and lust-automatism. (Sensory stimuli, satisfaction of lust, relaxation, renewed excitation as general motif of activities). That’s $\lambda 3$ -types. That’s the case with primates.

Then there’s another step forward that should lead to the homo sapiens, namely the repeated doubling of the 2^4 , i.e. $\lambda 4$ types with 16 channels. That seems to be the current human being to me.

But having a cerebrum does not mean $\lambda 4$ yet. That starts at $\lambda 3$. With the many $\lambda 4$ -types we still have the same behavior as with the $\lambda 3$ -types, though the potential over 16 channels is now there. Because 16 channels have a significantly higher potential to their quality than only 8.

The repeated doubling that leads to 32, $\lambda 5$, would have to look completely different. Even the so-called enlightened ones don’t get there. I think a $\lambda 5$ -combination has not been exceeded yet on earth.” (Sketch 9; see p. 123 et seq.)

The number of these control channels is a measure for the different steps of consciousness. According to Heim, processes of consciousness can be described as descending and ascending activities in at least 8 control channels whereby activity streams can be more or less closely linked to the somatic structure. During sleep, for example, the activity streams retreat into areas beyond T(24).

These ilkor channels reach as far up as to the T(7) metroplexes of particles of the interbrain and the brain stem, as well as to the upper part of the ‘formation reticularis’ and the bridge area. If these parts are destroyed, activity streams cannot operate anymore. A human being’s consciousness will be changed.

This can be seen from split-brain patients. If the joist (corpus calosum) is severed, two independent spheres of consciousness are created in the patient. The activity streams connect to the soma via separate channels and convey separate experience qualities into higher metroplex totalities.

Neither does the brain create consciousness, nor does consciousness touch down to its somatic structure. Both organizations are partial structures of a 6-dimensional complex in different world dimensions that are mutually dependent in the sense of a monism.

Living creatures with up to 2^3 control channels, i.e. animals, are still closely tied to the background of existence. They cannot do wrong and follow a maxim given by that background. In the case of creatures with 16 control channels the link to the background of existence is more loose. Humans develop an autonomous maxim, unlike animals they aren't remotely controlled, and they can – detached from nature – become guilty.

The brain process is understood to be a temporally established structure in the metroplex totalities. In temporally changed partial areas of the established $T(n)$, coded chiffres are engraved according to the experienced reality. The units of chiffres are called *engrams* by Heim.

Theoretically, there must be an absolute memory the engram-like elements of which, however, would have to be reduced by access barriers in case of a fully conscious persona of a human being. As due to continuous reactualizations of experience contents and the temporally changeable restructurings of the engram pattern resulting from that, the possible activity stream must be limited.

Creatures with 16 control channels form an autonomous, independent x_6 -entity that develops an additional holism which holds not only the biological, but also the psychological structure together in a holistic way. With this holism such creatures possess an autonomous *persona* – which would correspond to the term 'soul'. The structure of the persona can also stay autonomous, independent of the physical structures of $T(1)$ to $T(6)$. In principle, this would open up the possibility that the persona without having contact to the soma could consciously exist in the world or in parallel worlds separated by x_5 , and that fully consciously and with memory contents in a state unknown to us. That could explain the out-of-body experiences and would make us understand why there can be a temporary or continuous absence of the persona in deep coma. (Sketch 10; see p. 123 et seq.)

The question whether a persona can also continue to exist after the decay of the soma, Heim answered in 1981:

“Basically, the question should be whether there is a temporal destiny of consciousness after death or not. A positive answer to this question stands and falls with this: is consciousness primarily a side product of metabolism, or does it constitute an independent entity that is independent of metabolism? The answer to this question determines whether there can be postmortal states or not. Anyway, it can only be discussed if it becomes clear that this consciousness is in no way a side product of an already very complex metabolism.

Based on my experience, I assume that this question about the independence of consciousness from the metabolic process can absolutely be answered positively.”

Heim thinks that evidence from brain surgery could confirm that there can be an autonomous persona even without any connection to the somatic structure. After all, according to research by Libet⁹³, irritants are immediately registered by the brain if they take effect somewhere in the body. This actually shouldn't be possible, as this would be a 'predating of irritants'.

"We know exactly how high the speed of nervous impulse is – it's only two meters per second. The speed of nervous impulses equals the one of a pedestrian in a hurry. If I set an irritant at the tiptoe of a human who's two meters tall, this irritant can only reach the brain after one second. Whatever I intermedate between it in the nervous system can only delay it. If I set the irritant directly on the brain with opened skull-cap, it'll only be registrated after half a second.

You cannot understand this process at all. It can't be explained by cybernetics, nor neurology, nor physiology or in any other way, as the irritant is perceived faster than it actually reaches the brain. The effect temporally runs ahead of the actual cause.

For a long time, it has been kept silent about this, and this fact was put aside, as it doesn't fit the other knowledge we have about the body. But that's a fact that appears at each brain surgery. All brain surgeons I've met have confirmed that to me. This peculiar process has only been discussed in more detail by Eccles⁹⁴ and Sperry⁹⁵."

The predating of irritants by the consciousness is evidence for the assumption that consciousness is not only a certain product of brain processes. In this – apart from anecdotal reports – Heim sees a first piece of evidence based on science for the autonomous structure of consciousness.

There is further evidence of such kind. If, for example, a test person intents to move one of their limbs, you can see from brain waves that completely 'new modular brain stimulation-movement patterns' appear within a very short time that develop out of a 'readiness potential'. The philosopher Seifert states⁹⁶: *"Even the most thorough research of a test person's brain couldn't discover any previous modular movement patterns of stimulations that could have explained the modular readiness potential and such stimulation patterns that preceded the body movement.*

⁹³ Libet, B., 1966: "Brain Stimulation and the Threshold of Conscious Experience", in J.C. Eccles (ed.), *Brain and Conscious Experience*, New York-Berlin: Springer.

⁹⁴ Eccles, J.C., (1903-1997), 1963 Nobel Prize for Medicine; 1994: "Wie das Selbst sein Gehirn steuert" ("How the self controls its brain"), p 206; Heidelberg: Springer.

⁹⁵ Sperry, R.W., (1913-1994), 1981 Nobel Prize for Medicine 1969: "A modified concept of consciousness", *Psychological Review*, 76, pp532-536.

⁹⁶ Seifert, J., 1989: "Das Leib-Seele-Problem" ("The Body-Mind-Problem"), pp161-162; Darmstadt: Wissenschaftliche Buchgesellschaft.

This means, with each intentional movement an objectively existing breach of the order of mind and will takes place to the world of the body that is even notable by experience, whereby the source of the physical changes does not lie in the brain itself, but in the person's will."

Maybe Heim's syntrometry is really suitable for solving the mind-body problem in a logical clear way. He himself is cautious and warns of jumping to conclusions based on his theory:

"Yes, take time thinking about it, but always under the provision: it's a try of one description of something actually indescribable for us human beings. Is it really like that? Don't believe it! Just think about whether on this basis you can get a bit forward or not?"

If we assume that all propositions of Heim's theory can be confirmed, something that can only be the case after a scrutinization, the question arises for everybody how a single person could develop all that?

Sometimes, Heim worked on the blackboard for up to 4 days in a row without a break. During such times he only lived on grape juice and trail mix. Due to his extremely high ability to concentrate, he sometimes got into an area where completely correct work became possible, as he already reported to the Zen master Gerda Ital:

"In some cases I had the same feeling as a Zen priest or Zen master if the exercise, for example archery, is suddenly taking place by itself. IT is acting. Not you have done it well, but 'IT has done it'.

Sometimes – and that's the most creative moments you can have as a human being – you have the feeling as if you're only the tool and you say, dictate or write something that actually doesn't originate in you. That has happened to me more than once while I was dictating these notebooks that I later further worked on in more detail. I always had the feeling that completely foreign thoughts were approaching me which only had to be recorded. But I was never able to tell where that came from. That only happened some times, strangely always in such moments where it seemed that I was at a loss. Then it happened."

10.6 On Postmortal States and the Job of scientific Research

When Burkhard Heim was asked by a journalist in 1981 whether he believed he had created a new physical episteme, his answer was:

“I don’t know if there’s really a new worldview. It might be a somewhat different view of the world. It remains to be seen if this new view will in fact lead to a new world picture.”

The introduction of a new world picture can be dangerous for a scientist. At a conference in Basel in 1982, Heim cautioned the scientists in the audience:

“Ladies and gentlemen, please always consider this: what we’re developing today can become the mass religion of tomorrow!”

At that time, Heim had just published his book ‘Postmortale Zustände?’ [‘Postmortal States?’], in which he pointed to the existence of the aspect-related logic developed by him and the consequences of the discovery of a superordinated world entity. In a sense, the syntrometry for the formal description of the body-mind problem culminates in the question of death and immortality and the problems of the individual human being’s origin connected therewith.

The current stance of philosophy is shaped by epiphenomenalism, as for example advocated by Thomas Metzinger, who claims it was hardly doubtable that consciousness decays together with our bodies⁹⁷: *“The more we learn about consciousness, the clearer we have to realize our ‘radical mortality’.”*

If our consciousness really was simply a function, an epiphenomenon of the body and its inner processes, and therefore was necessarily bound to those, the philosopher Seifert agrees, *“it could in no way, that seems inevitable to me, survive death.”*⁹⁸

But Seifert reminds us that Eccles had a completely different point of view, as this brain scientist *“approached the concept of the soul as a subject ..., in any case a concept of the self that is a center of real life, able to exist independently of the brain, at least in principle, and for which it is possible to act in a way that is not dictated by matter and mind anymore.”*

Epiphenomenalism corresponds to the modern, but not necessarily correct world view of the consumption-materialism that has spread everywhere.

“This denying of the substantial difference between body and soul inherent in the whole philosophic climate of this time”, Seifert writes, “has – if I as a philosopher am allowed to make such an interpretation here – also subsequently been interpreted into the bible. The logical and necessary thesis of complete death does not result from the bible, but definitely from the philosophical idea of the non-existence of human

⁹⁷ Metzinger, T., 1998: GEO Magazin, 2, p 80.

⁹⁸ Seifert, J., 1989: “Das Leib-Seele-Problem“ (“The body-mind problem“), pp 161,162; Darmstadt: Wissenschaftliche Buchgesellschaft.

beings' minds/souls, and if you as a Christian want to connect this philosophy with the belief of resurrection, the result is a theology of complete death."

The experience of the person's durable identity would contradict the belief that consciousness is just an illusion, Seifert says and shares Eccles's conviction *"that this our life possesses a transcendent dimension that aims at immortality. G. Marcel and many other contemporary thinkers have philosophically developed those conditions that bear witness to such a transcendence and justify Eccle's notion in a much more profound way than Popper's, who misses the sense for this transcendental dimension of consciousness."*

So from a scientific and philosophical standpoint, there is no imperative evidence against a continued existence of the conscious person. Unclear, at best, remains the question where the locality for the bodiless entity could be. That's a question that can now be answered by Heim's world model, and that from a scientific point of view. Due to the transdimensions x_5 and x_6 there's the possibility that apart from the four-dimensional world we experience there are other parallel spaces too.

Heim explained this in front of a group of distinguished guests at Pallotta Castle in Calderola at Pentecost 1973:

"There are spaces parallel to the real compact space of the physical universe in the hyper spaces with trans-dimensions, whereas the entelechial distances and the number of such parallel spaces is unknown.

You have to differentiate between vegetative life forms able and not able to transcend, depending on whether their respective organic structure is formed in such a way that their entelechial extension at least permeates the first parallel space. In such a case it can be shown that here and in the following parallel spaces, stable complements of the somatic physical structure can form that can continue to exist independently of time and the decay of the soma in physical space. We cannot rule out the possibility that even after physical death there are capacities for experience for organisms with certain entelechial minimum fields.

At the same time trans-complements to the material structure of the soma of a life form able to transcend must exist in the parallel spaces. Such transcomplements must exist longer than the temporal limit of the organism and must be able to occupy the pre-formed matter – in its embryonic state – as soon as the embryo has exceeded a critical organizational threshold. Consequently, such a trans-complement would have to be understood as an integrating factor that at sufficient preformation can create and retain the composition from matter that in the physical space appears as a living organism.

To me, this seems to be the necessary and sufficient precondition for the existence of conscious life able to transcend. But this sentence is not reversible. The non-reversibility results in the consequence that apart from paranormal phenomena of animism also spiritual paranormal phenomena can be expected.”

On the occasion of a radio interview, the psychologist Dr. Jürgen vom Scheidt asked Heim about his book ‘Postmortal States?’.

“We know that after an individually long life period death occurs, i.e. the living body is released from the area of psyche and bios and fully given over to the laws of physics, whereas the mental persona – defined in the laws of the area of pneuma – is non-definable anymore and cannot be perceived any longer.

The problematic question is: what’s the temporal destiny of this persona after the occurrence of physical death? The two possible answers are: it either vanishes or it has a temporal destiny. It either has the temporal destiny zero or one of a time greater than zero. In this case, a postmortal state would exist, in whatever form.

However, the question is: what kind of state is that? How long does it last? The problem was worked on here, i.e. the whole physical picture has been used as a basis.

If you use the indirect way of concluding, you have to consider carefully which logical methods are actually applicable, in such a way that the empiricism of living things fits into the evolving structures. For example also the paleontologic development of living creatures, so that further the connection to the facts known from physical theories is given as well. As said, in such a way that these life structures fit into the picture – without any gaps.

Then it’s also required that these gradations of evolutionary levels become clear. If you have this, you need to perform three acts of transcending of boundary areas. I have also shown how you can explicitly do that. Then, of course, you can treat the original problem. The only thing is, the whole issue is very difficult!”

Heim refuses to talk about an ‘afterlife’, because:

“The term life isn’t appropriate here, as it is a very peculiar state that we cannot imagine at all. It definitely doesn’t have anything to do with what we call life. But this persona exists in full integrity, after all. With persona I mean this mental self- and identity conscious instance with the ability for abstraction that basically constitutes the human being.

But you cannot derive a lot about that state. You can only say that it exists. And we have to get used to this idea, as it might be quite a long-term state.”

Heim solely derives his world view from the physical-mathematical description of matter and the logical conclusions from world dimensions operating in an organizing way. He does not refer to the beliefs of religions at all. Therefore, he was reproached for having questioned everything that religions or their prophets have told the world about this topic. Heim answered:

“Do I really question what the religions have shown? Aren’t the facts just communicated in another way by them?”

Quite the reverse, Heim points to the fact that the Catholic Church could even see its beliefs confirmed by his work:

“Isn’t it strange how theology and science are connected here, as I can apply the conclusion of the causa prima to the equation that had 3 real solutions at the absolute time zero. In the beginning, there must have been a volume.

If the beginning had a structure, then the question arises which causa prima had created this first structure? It must be beyond of what we call time!

Here, by the way, you can already see a contact to the superordinated world totality. The clergy should start from here, as now the Catholic theologians can reason their causa prima without any gaps. There was a beginning and a structure.”

In the Western world we have got accustomed to the idea that only those things exist that we can scientifically prove. But deep inside we know that human interests, such as conscience, free will, continued existence after death, paranormal happenings and the question of meaning are not adequately dealt with by science at all. Something is missing in the current world picture! At a congress in Basel in 1983, Heim talked to some colleagues:

“The picture of the world as it is presented by science might well be very certain in the area of natural science. Whatever we know in this field, we really know. But this building of natural science has an open end on the top. There’s no roof. As a matter of principle, the roof wasn’t built from the start. The thinking was simply: first, we want to do research with ponderable things.

People have never dared to claim that there wasn’t anything else apart from ponderable things. That claim was made in modern times. But that’s wrong! That means, as matter of principle, the building has an open end. But as the paradigm has always worked so well, people have simply invented a non-existing roof. Scientists have locked themselves in this building and have been feeling comfortable in there.

What we need is a different attitude towards things. Especially scientists need it. We should realize that – and that’s what I tell my colleagues again and again – that the world doesn’t finish with the things we can quantify.

We should have an open mind regarding transcendence, we should take things as they come. Then you have to consider to either expand the concept of natural science in some way, or develop something completely new.

I’m sure that vast new working areas will emerge here, where scientists, too, can become active as long as they have an open mind towards transcendence. After all, transcendence means nothing else but the crossing of a border.”

Asked if we need a paradigm change, Heim answered:

“Whether I change the paradigm of science or not – a stone will always drop to the ground and water will never stream upwards. There are natural laws of quantitative kind that cannot be eliminated.

However, one thing that’s possible is an openness towards what lies beyond the invented roof I mentioned earlier. I could imagine that you can take the foundation of the known as a starting point and via an indirect way try to make out still unknown areas of that superordinated world entity that in its core is completely unknown to us – areas that are still comparatively close to us – to put it humbly – and thus widen our horizon – which after all is open on the top anyway. Hoping that we will be able to access at least as much of the superordinated entity (by cognitive capacity) unknown to us as we need in order to cover certain areas of human existence with it, so that we can still our fellow humans’ fears – the fear of time, the fear of their temporal limitations, and thus we might be able to dry their tears. We should be able to show them which criteria the cosmos itself applies to human life, so that a necessary change of heart and awareness can take place.

That’s the sense I see in all this work. There cannot be any other sense in it!”

Addendum

Heim wouldn’t have been the great physicist we have known him as if he had turned a blind eye to newly discovered physical phenomena that could not be explained in a simple way – as it is common practice nowadays.

When in 1966 the well-known parapsychologist professor Hans Bender asked whether he would be willing to help him with his physical knowledge with interpreting the ‘tape-recorded voices’, Heim agreed. In Sweden, together with his assistant W.-D. Schott, he assessed the claims made by Mr. Jürgenson who heard unexplainable voices on tape and on the radio, voices that seemed to address him personally.

As these experiments weren't performed scientifically correct, Heim himself did experiments in his laboratory, which, however, he only rarely talked about. He despised people who carelessly went public with undistinguished results.

In 2010, the physicist Holger Klein found several hundred manuscript pages in Heim's legacy in Northeim which had been administered by Heim's foster daughter Ingrid Hartung until her death in the same year. Not only did these pages contain hundreds of Heim's experiments regarding the validation of transcommunication, but also approaches for a theory of transcommunication. No mainstream physicist would ever dare to start such a kind of work.

As in the 6-dimensional theory all physical field sizes are 6-dimensional, too, Heim derived a possible influx of the additional components x_5 and x_6 to the modulated phonetic sequence density from the 6-dimensional radiation vector that is transmitted by radio stations. He did this in such a way that in considering the required aerial properties for the trans-components of the radiation vector a modified spoken text can be received as a matter of principle.

In doing so, Heim created first approaches for theoretically comprehensible experiments of a paranormal kind.

Appendix of Formulas

The German original book contains an appendix to the text of 136 formulas on 24 pages. We have decided not to include these formulas in the English version, as they have not been clearly enough derived for physicists and are anyway incomprehensible even for educated lay persons.

Only two formulas are shown, as they are especially important for theoretical physicists: the formulas for the finestructure constant, the numerical value of which hasn't been comprehended so far, and the Landé factor g that in quantum electrodynamics needs to be calculated in quite a laborious way.

The formula for the masses of the elementary particles (basic states) can be found on the homepage

www.heim-theory.com

Two developments of the mass formula are given there.

The first formula from the year 1982 still contains adjusted parameters. We only show it, as its development can be traced by means of the book 'Elementary Structures of Matter'.

The second formula does not contain any free parameters, but only numbers and the natural constant speed of light c , Planck constant h and the gravitation constant G . Due to Burkhard Heim's illnesses, a publication regarding the derivation of the revised mass formula of 1989 was not realized anymore. In 2006 John Reed re-calculated the first formula and criticized the adaptation by parameters. In 2007 he also re-calculated the formula of 1989 and realized (Physics Forum, Sept. 4, 2007):

"I'm more convinced now that there is really something to this theory. I don't understand much of the maths yet. It's very complicated and different from anything I'm familiar with. I have a Ph.D. in physics so I know something about physics."

In Wikipedia an article called 'Rise and fall of the Heim theory' can be found: http://www.geoffreylandis.com/Heim_theory.html. In this article, the author wonders how a single physicist could achieve better results than the mainstream researchers:

"Is it just too good to be true? The unappreciated researcher, isolated from the field, coming up with a revolutionary breakthrough theory that is unnoticed in his time, but found after he's dead... This is very much the plot of a science fiction story, not the way physics works. At the moment, the jury seems to still be out. Is it physics? Or is it just numerological coincidence? It still needs further work to understand the theory, where it comes from, and how (or if) it corresponds to real physics."

Finestructure Constant

$$\alpha^{-1} = B \cdot (1 \pm \sqrt{1 - 2/B})$$

with
$$B = \frac{1}{2} \left[\frac{(2\pi^3)}{9\theta \cdot (1 - A_1 A_2)} \right]^2, \quad \theta = 5\eta + 2\sqrt{\mu} + 1$$

$$A_1 = \frac{(1 - \sqrt{\eta_{11}})}{(1 + \sqrt{\eta_{11}})} \eta_{11}^s, \quad A_2 = \frac{(1 - \sqrt{\eta_{12}})}{(1 + \sqrt{\eta_{12}})} \eta_{12}^s, \quad s = \frac{\eta}{2(1 + \sqrt{5})},$$

$$\eta_{11} = \frac{\pi}{\sqrt[4]{\pi^4 + 5}}, \quad \eta_{12} = \frac{\pi}{\sqrt[4]{\pi^4 + 6}}$$

Theoretical value: $\alpha_+^{-1} = 137,0359895$

Measured value (Particle Data Group CERN, 2002):

$$\alpha_+^{-1} = 137,03599976(50)$$

Spin Magnetic Moment μ_s of the Electron, derived from Heim's Theory

Definitions

Constants:

$$E = \lim_{n \rightarrow \infty} \left(1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{n} - \ln n \right)^n = 0.5772\dots = \text{Euler's constant}$$

e = elementary charge

m_e = electron mass

$\hbar = h/2\pi$ = Planck's constant

$$\pi = \lim_{n \rightarrow \infty} \left[\frac{2 \cdot 4 \cdot 6 \cdots (2n)}{1 \cdot 3 \cdot 5 \cdots (2n-1)} \right]^2 \cdot \frac{1}{n} = 3.14\dots$$

Bohr magneton:
$$\mu_B = \frac{e\hbar}{2m_e}$$

Spin magnetic moment of the electron:

$$\vec{\mu}_s = -g \cdot \mu_B \cdot (\vec{S}/\hbar), \quad S = \left| \vec{S} \right| = \hbar/2$$

g = Landé factor

$$\mu_S = \left| \vec{\mu}_S \right| = g \cdot \mu_B \cdot 1/2$$

$$a = \frac{g - 2}{g} = \frac{\mu_S}{\mu_B} - 1$$

Heim's Formula for the Factor a:

$$\eta = \frac{\pi}{(\pi^4 + 4)^{1/4}}$$

$$\theta = 5\eta + 2\sqrt{\mu} + 1$$

$$a = \sqrt{\frac{2}{\theta}} \cdot (1 + \sqrt{\mu}) \left(1 - \frac{4\pi E^2}{3} \frac{(1 - \sqrt{\mu})^2}{\theta \sqrt{\eta}} \right) - 1$$

Calculated value: $a = 1159.61961686 \dots \cdot 10^{-6}$

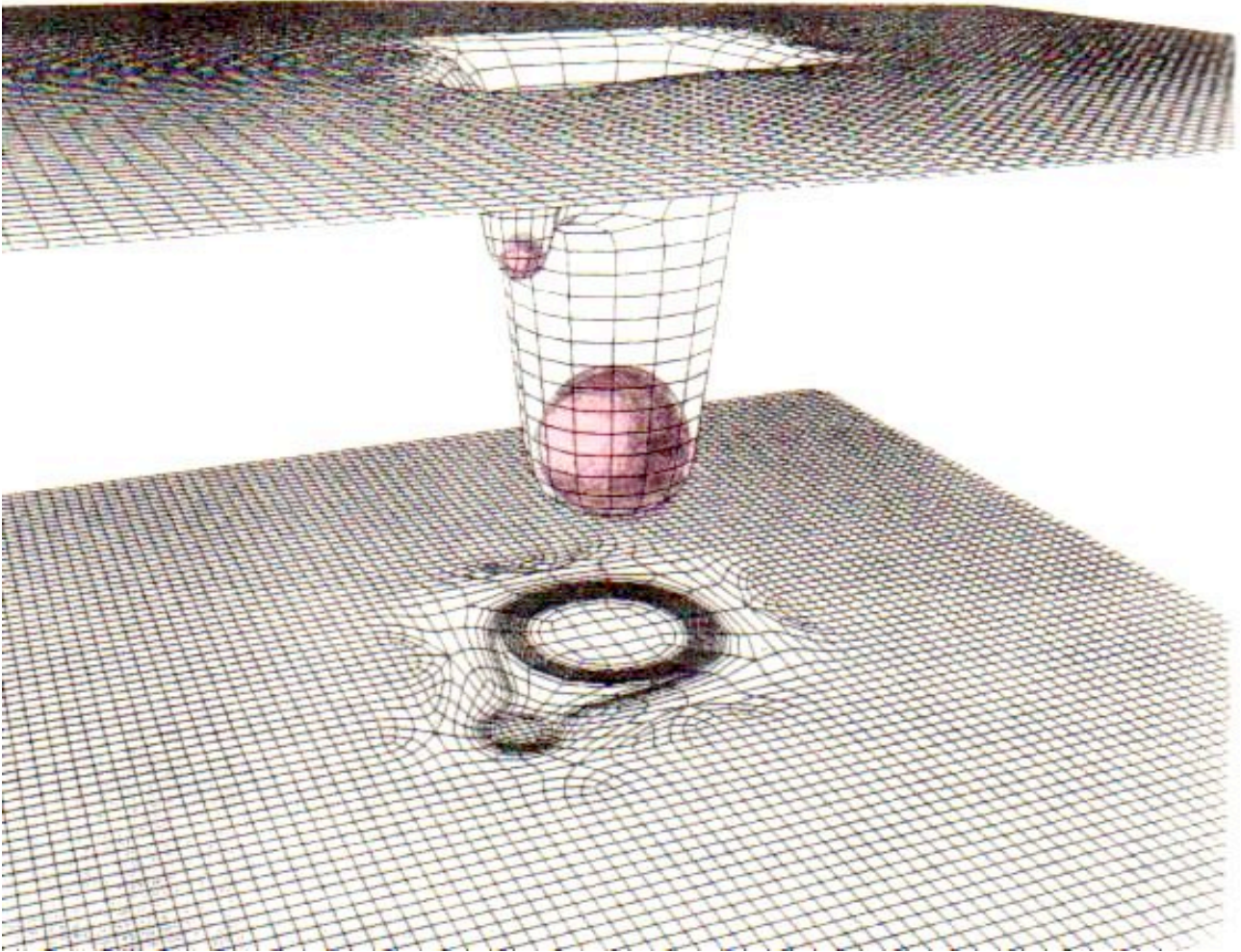
Current experimental value [K.Nakamura et al. (Particle Data Group), JP G 37, 075021 2010) and 2011 partial update for the 2012 edition] <https://pdg.lbl.gov>

$$a = 1159.65218073 \pm 0.00000028 \cdot 10^{-6}$$

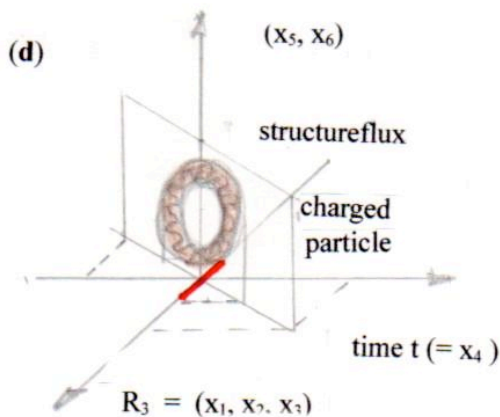
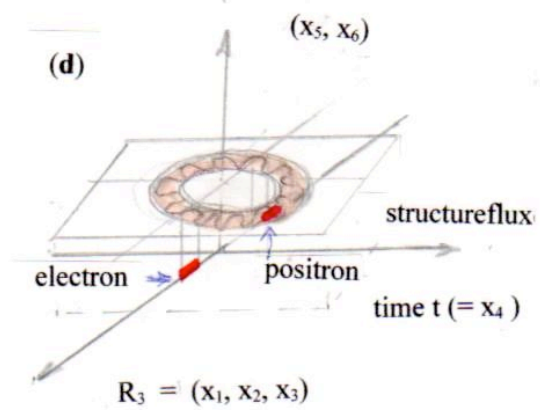
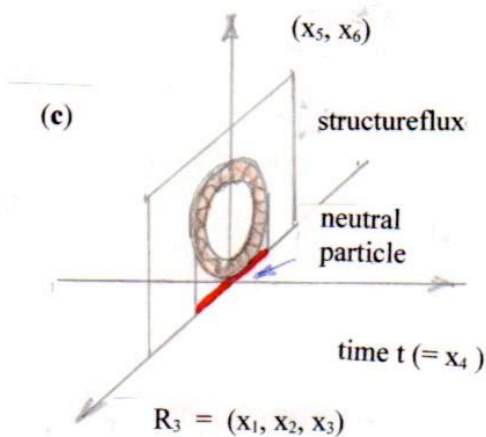
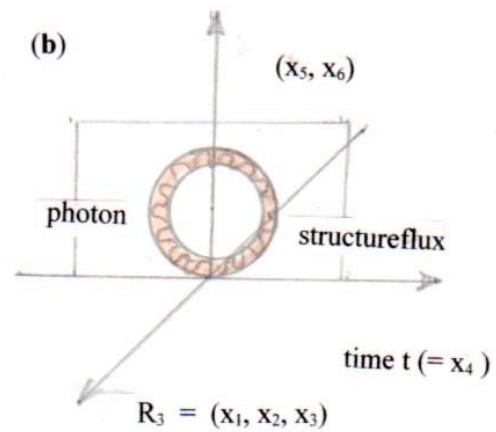
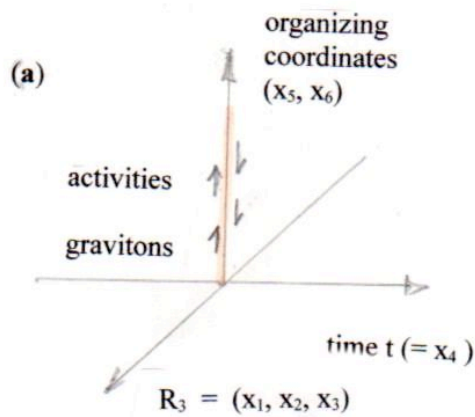
Theoretical Data of Elementary Particels
with Mean Lives > 10⁻¹⁶ sec Calculated by B. Heim 1989
(J = spin, P = parity, I = isospin, S = strangeness, B = baryon number)

Type	Symbol	Mass MeV	J	P	I	S	B	Mean Life 10 ⁻⁸ sec
Photons	γ	0	1	-1	-	-	0	∞
Leptons	ν_e	0.00381 x 10 ⁻⁶	1/2	-	-	-	0	∞
	ν_μ	0.00537	1/2	-	-	-	0	∞
	ν_τ	0.010752	1/2	-	-	-	0	∞
	ν_4	0.021059	1/2	-	-	-	0	∞
	ν_5	0.207001	1/2	-	-	-	0	∞
	e	0.51100343	1/2	± 1	-	-	0	∞
	e ⁰	0.51617049	1/2	1	-	-	0	∞
	μ	105.65948493	1/2	± 1	-	-	0	219.94237553
Mesons	π^\pm	139.56837088	0	-1	1	0	0	2.60282911
	π^0	134.96004114	0	-1	1	0	0	0.84016427 x 10 ⁻⁸
	η	548.80002432	0	-1	0	0	0	0.00233820 x 10 ⁻⁸
	K^\pm	493.71425074	0	-1	1/2	± 1	0	1.23709835
	K^0	497.72299959	0	-1	1/2	1	0	5.17900027
	K^0	497.72299959	0	-1	1/2	-1	0	0.00887666
Baryons	p	938.27959246	1/2	1	1/2	0	1	∞
	n	939.57336128	1/2	1	1/2	0	1	917.33526856 x 10 ⁸
	Λ	1115.59979064	1/2	1	0	0	1	0.02578198
	Σ^+	1189.37409717	1/2	1	1	1	1	0.00800714
	Σ^-	1197.30443002	1/2	1	1	1	1	0.01481729
	Σ^0	1192.47794854	1/2	1	1	1	1	0.42908026 x 10 ⁻¹⁰
	Ξ^-	1321.29326013	1/2	1	1/2	-2	1	0.01653050
	Ξ^0	1314.90206200	1/2	1	1/2	-2	1	0.02961947
	Ω^-	1672.17518902	3/2	1	0	-3	1	0.01317650
	-							
	σ^{++}, σ^{--}	1232.91663788	3/2	1	3/2	0	1	5.99071759 x 10 ⁻¹⁶
	σ^+, σ^-	1234.60981181	3/2	1	3/2	0	1	5.72954997 x 10 ⁻¹⁶
	σ^-, σ^+	1229.99529979	3/2	1	3/2	0	1	6.74230244 x 10 ⁻¹⁶
σ^0, σ^0	1237.06132359	3/2	1	3/2	0	1	5.08526841 x 10 ⁻¹⁶	

Table 1: Masses and mean lives of elementary particles due to Heim.



Sketch 1: 3-dimensional space curvature caused by the earth-moon system and its 2-dimensional projection (approximate representation).



Hermetryforms:

- | | |
|--|--------------------------|
| a $\equiv (x_5, x_6)$ | = activities (gravitons) |
| b $\equiv (x_4, x_5, x_6)$ | = photons |
| c $\equiv (R_3, x_5, x_6)$ | = neutral particles |
| d $\equiv (R_3, x_4, x_5, x_6)$ | = charged particles |

Sketch 2: Symbolic representation of the structure fluxes in R_6 (orange) and their possible projections in the space R_3 as particles with rest mass (red). (Six-dimensional representation is given by the three coordinates $R_3 = (x_1, x_2, x_3)$, time $t = (x_4)$ and the organizational coordinate $a = (x_5, x_6)$). Structure fluxes are cyclical, dynamic exchange processes of maxima and minima of metron condensations in sub-spaces of the R_6 . Due to fluctuations of the structure flux of the hermetry form **b** (photon) around the time axis electron- and positron pairs can be projected into the space. If the plane in which the cyclical structure flux lies is turned in such a way that it intersects the paper plane in the coordinate system, you see that the structure flux **d** projects structures into the space (R_3 axis) as electrical charged particles.

$$\varphi_{km}^{i(\mu\nu)} = g_{(\kappa\lambda)}^{is} \varphi_{skm}^{(\mu\nu)} = \frac{1}{2} \sum_{\kappa,\lambda=1}^3 g_{(\kappa\lambda)}^{is} \left(\sum_{\mu,\nu=1}^3 \left(\frac{\partial g_{sk}^{(\mu\nu)}}{\partial z^m} + \frac{\partial g_{sm}^{(\mu\nu)}}{\partial z^k} - \frac{\partial g_{km}^{(\mu\nu)}}{\partial z^s} \right) \right) \equiv \sum_{\kappa\lambda\mu\nu}^3 [i]_{km}^{(\kappa\lambda)} \equiv [i]_{\mu\nu}^{(\kappa\lambda)}$$

$$g_{(\lambda\mu)}^{is} = \sum_{j=1}^4 K_j^i K_j^s$$

$$g_{is(\lambda\mu)} g_{(\nu\eta)}^{sj} = Q_i^j \begin{pmatrix} \lambda\mu \\ \nu\eta \end{pmatrix}$$

3 groups are heteronomous, i.e. Their basic- and contrasignature are different. The heteronomous groups are intern subdivided into the subgroups a and b.

$$Q_1 : \begin{bmatrix} 11 \\ 1 \end{bmatrix} \begin{bmatrix} 1 \\ 11 \end{bmatrix}, Q_2 : \begin{bmatrix} \alpha\alpha \\ \alpha \end{bmatrix} \begin{bmatrix} \alpha \\ \alpha\alpha \end{bmatrix}, Q_3 : \begin{bmatrix} 1\alpha \\ \alpha 1 \end{bmatrix} \begin{bmatrix} \alpha 1 \\ 1\alpha \end{bmatrix},$$

$$Q_{4a} : \begin{bmatrix} 1 \\ \alpha \end{bmatrix} \begin{bmatrix} 1 \\ \alpha\alpha \end{bmatrix} \begin{bmatrix} 11 \\ \alpha \end{bmatrix} \begin{bmatrix} 11 \\ \alpha\alpha \end{bmatrix}, Q_{4b} : \begin{bmatrix} \alpha \\ 1 \end{bmatrix} \begin{bmatrix} \alpha \\ 11 \end{bmatrix} \begin{bmatrix} \alpha\alpha \\ 1 \end{bmatrix} \begin{bmatrix} \alpha\alpha \\ 11 \end{bmatrix},$$

$$Q_{5a} : \begin{bmatrix} 1 \\ 1\alpha \end{bmatrix} \begin{bmatrix} 1 \\ \alpha 1 \end{bmatrix} \begin{bmatrix} 11 \\ 1\alpha \end{bmatrix} \begin{bmatrix} 11 \\ \alpha 1 \end{bmatrix}, Q_{5b} : \begin{bmatrix} 1\alpha \\ 1 \end{bmatrix} \begin{bmatrix} 1\alpha \\ 11 \end{bmatrix} \begin{bmatrix} \alpha 1 \\ 1 \end{bmatrix} \begin{bmatrix} \alpha 1 \\ 11 \end{bmatrix},$$

$$Q_{6a} : \begin{bmatrix} \alpha \\ 1\alpha \end{bmatrix} \begin{bmatrix} \alpha\alpha \\ 1\alpha \end{bmatrix} \begin{bmatrix} \alpha \\ \alpha 1 \end{bmatrix} \begin{bmatrix} \alpha\alpha \\ \alpha 1 \end{bmatrix}, Q_{6b} : \begin{bmatrix} 1\alpha \\ \alpha \end{bmatrix} \begin{bmatrix} 1\alpha \\ \alpha\alpha \end{bmatrix} \begin{bmatrix} \alpha 1 \\ \alpha \end{bmatrix} \begin{bmatrix} \alpha 1 \\ \alpha\alpha \end{bmatrix}.$$

abbreviations:

30 condensors

e.g.: $\begin{bmatrix} 1\alpha \\ \alpha 1 \end{bmatrix} \equiv \varphi_{kl(\alpha 1)}^{i(1\alpha)}$

hermetry forms:

1 \equiv (x₅, x₆)

$\alpha \equiv$ 2 or 3, i.e.

2 \equiv (x₄)

3 \equiv (x₁, x₂, x₃)

color code:

the deeper the color

of the rings

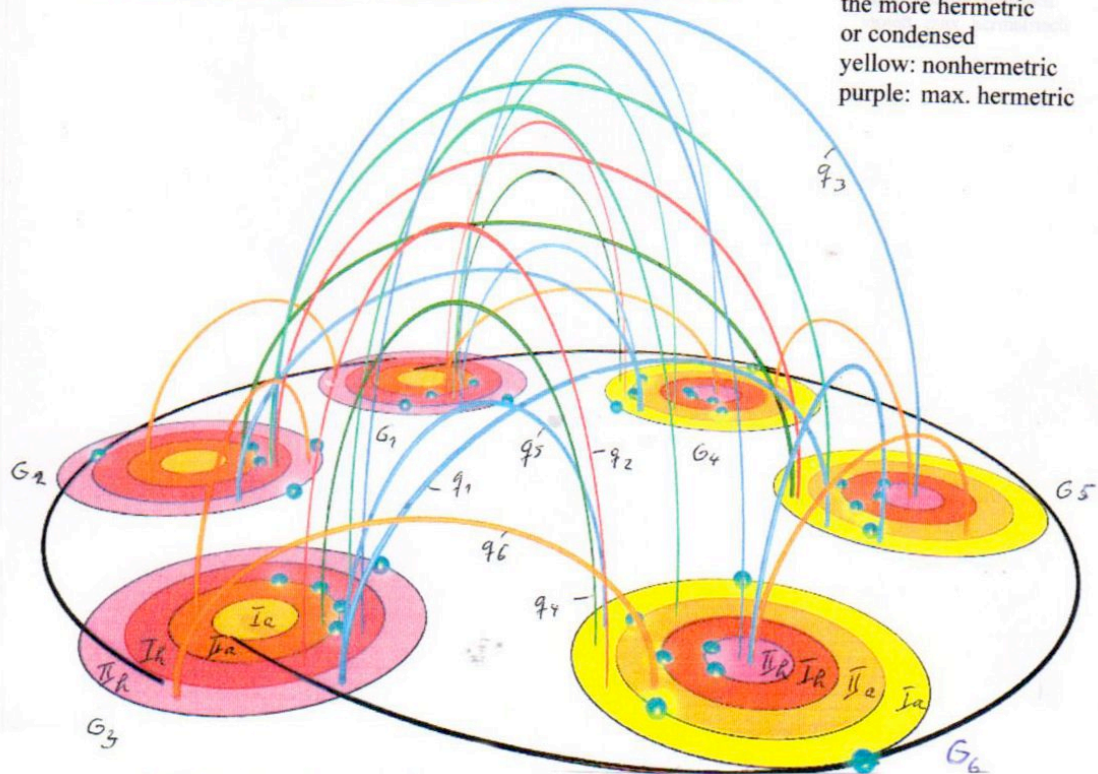
the more hermetric

or condensed

yellow: nonhermetric

purple: max. hermetric

	G ₁	G ₂	G ₃	G ₄	G ₅	G ₆
Ia	Q ₁	Q ₂	Q ₃	Q ₁ Q ₂ Q ₄	Q ₁ Q ₃ Q ₅	Q ₂ Q ₃ Q ₆
IIa	Q _{4b} Q _{5b}	Q _{4a} Q _{6b}	Q _{5a} Q _{6a}	Q _{5b} Q _{6b}	Q _{4b} Q _{6a}	Q _{4a} Q _{5a}
Ih	Q ₂ Q ₃ Q ₆	Q ₁ Q ₃ Q ₅	Q ₁ Q ₂ Q ₄	Q ₃	Q ₂	Q ₁
IIh	Q _{4a} Q _{5a}	Q _{4b} Q _{6a}	Q _{5b} Q _{6b}	Q _{5a} Q _{6a}	Q _{4a} Q _{6b}	Q _{4b} Q _{5b}



Number of condensors in the 3 homonomous groups G₁ and G₃

Ia = 2
IIa = 8
Ih = 12
IIh = 8

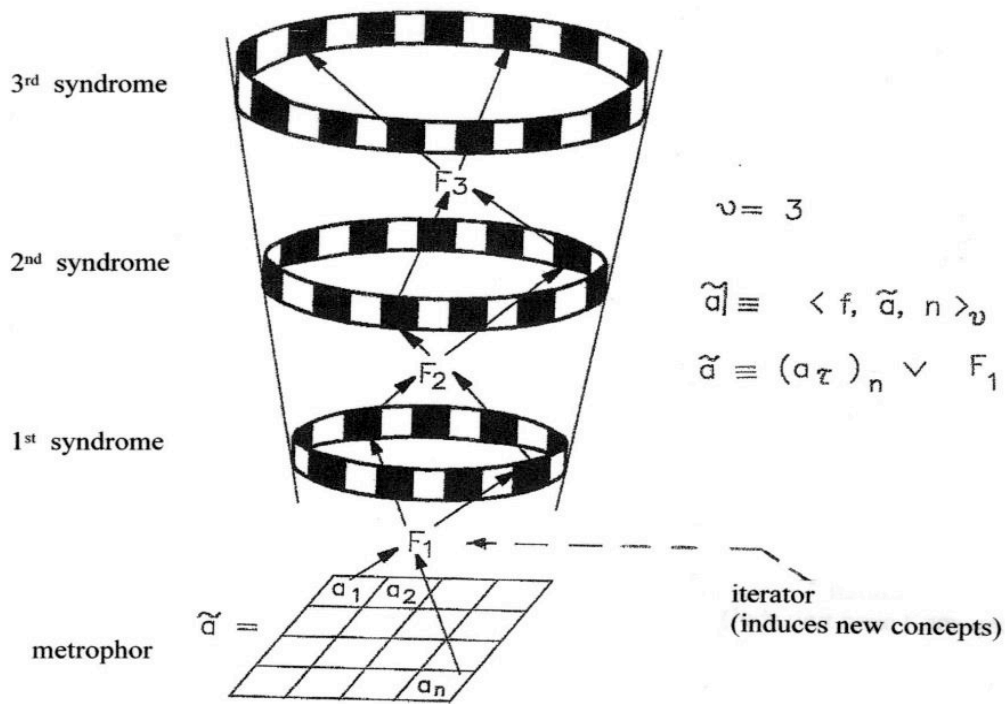
number of condensors in the 3 heteronomous groups G₄ and G₆

Ia = 12
IIa = 8
Ih = 2
IIh = 8

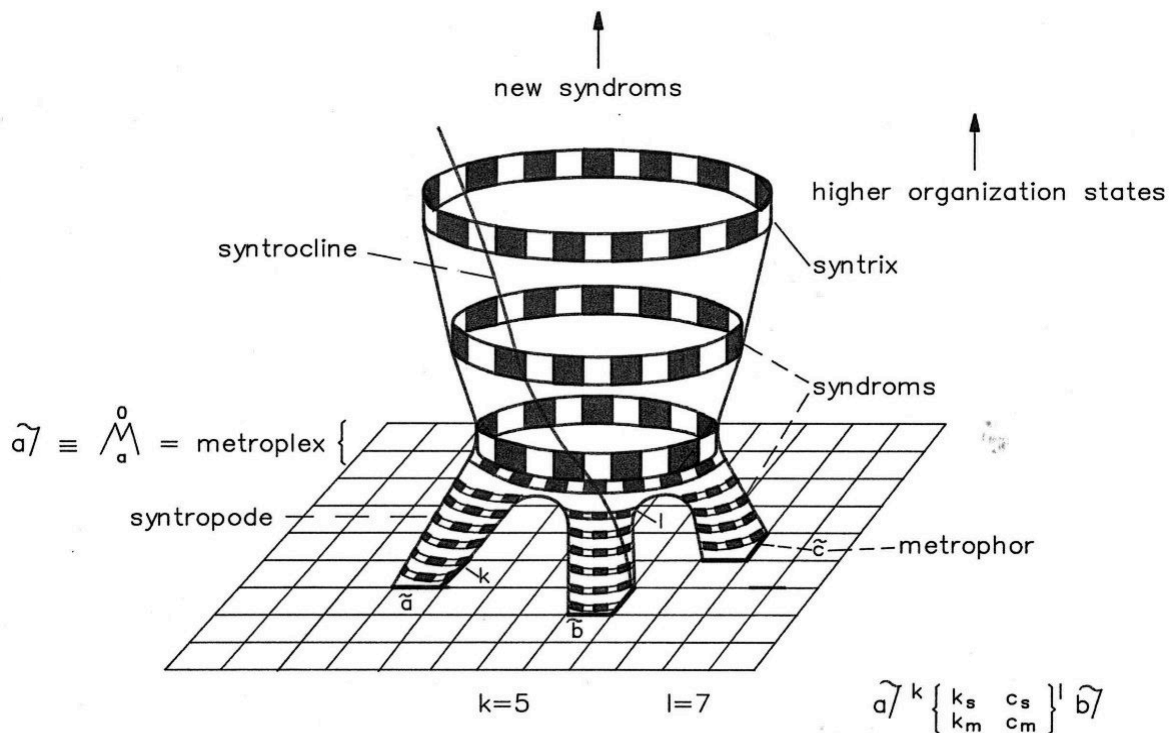
exchange of condensor extrema

q₁ (Ih → Ia)
q₂ (Ih → IIa)
q₃ (IIh → Ia)
q₄ (IIh → IIa)
q₅ (Ih → IIh)
q₆ (IIa → Ia)

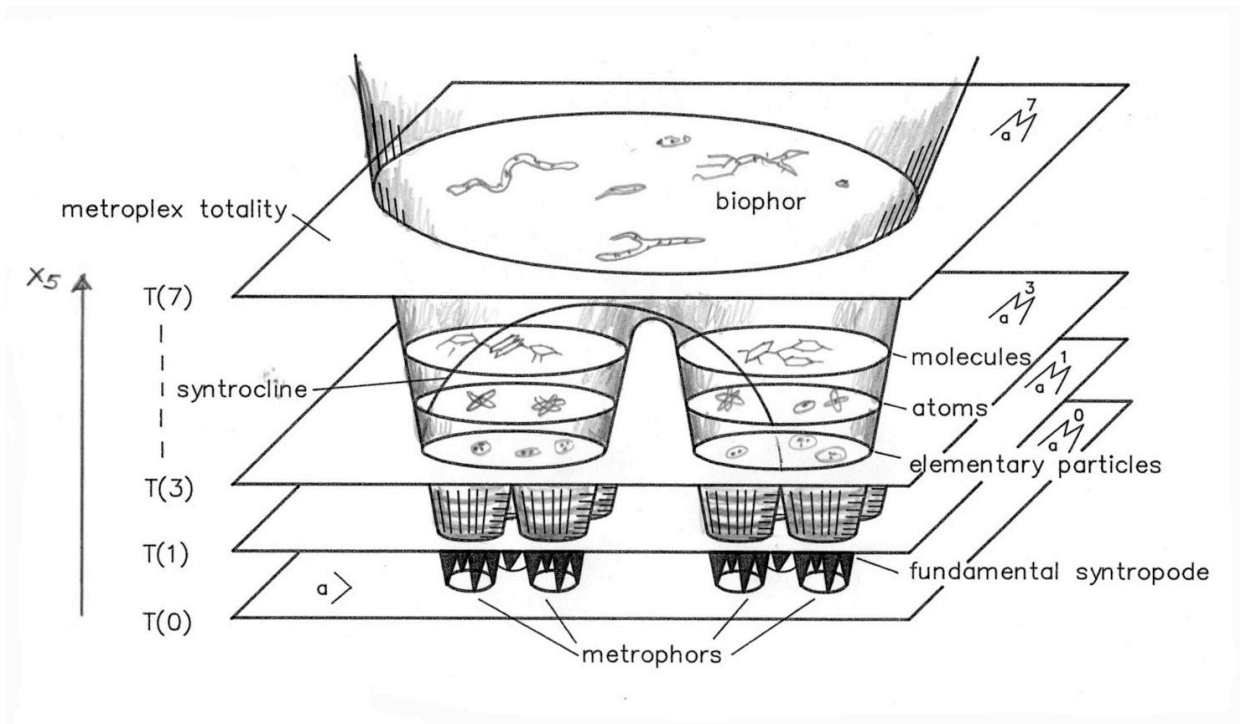
Sketch 3: Dynamic geometric exchange processes in elementary particles (here photons). 5 groups of structure maxima (Ih), structure side maxima (IIh), structure minima (Ia) and structure side minima (IIa) exchange (represented by the spans). The structure processes are stated in photons and neutral particles. (In electrically charged particles there would be 9 groups with 72 condensors).



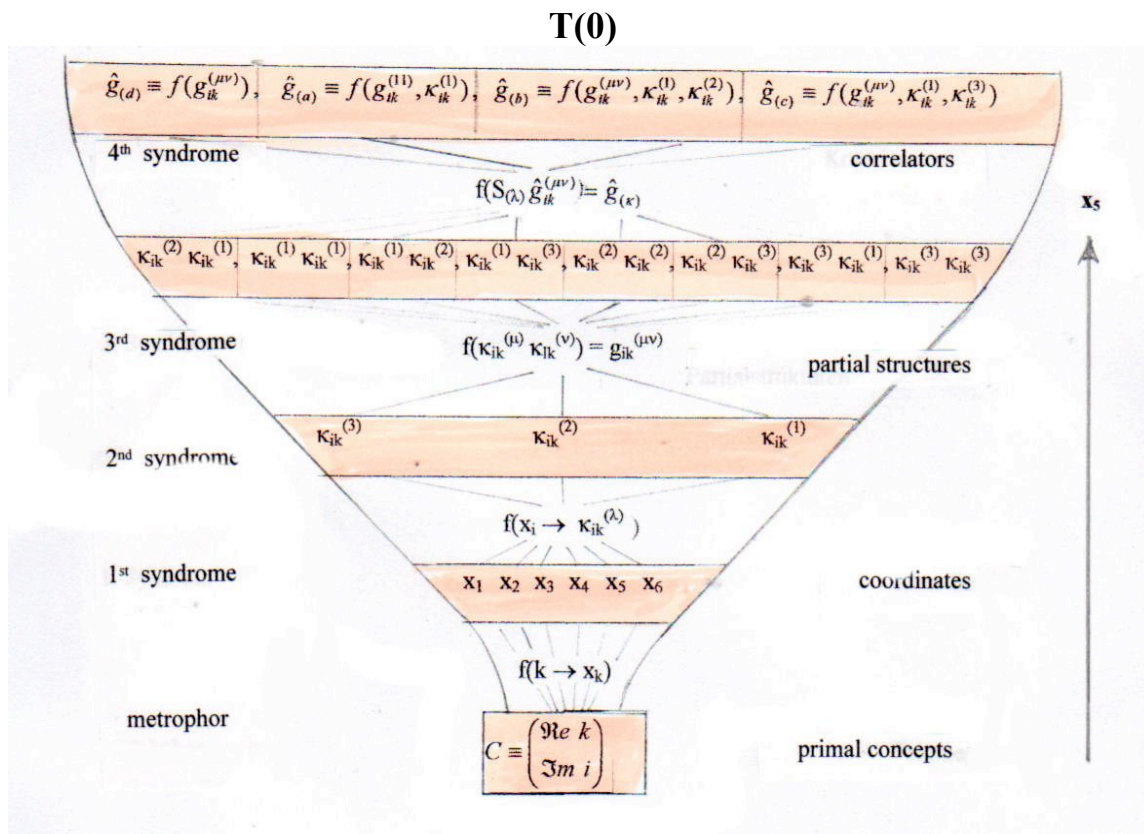
Sketch 4: Connections of predicates.



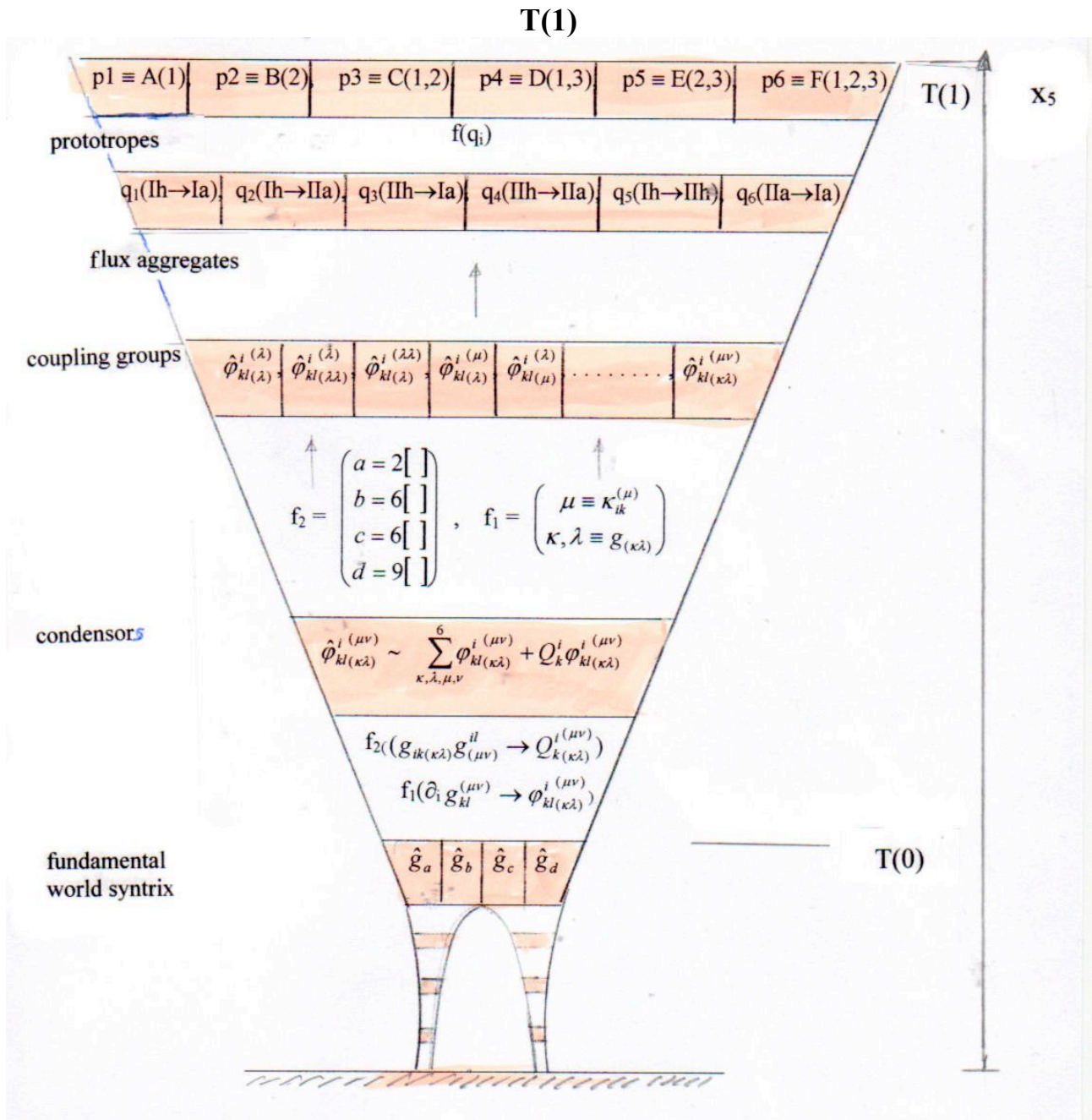
Sketch 5: The metroplex concept: levels of organization states in x_5 . All of the syndromes can be supposed as metaphors which can be connected by predicates. Four syntrices with syndrome k and l and contents of values k_s, k_m, c_s, c_m build up a 'totality' of syntrices of degree 0: $T(0)$. n totalities taken as metaphores, generate a metaphorical complex – called a 'metroplex' by Heim.



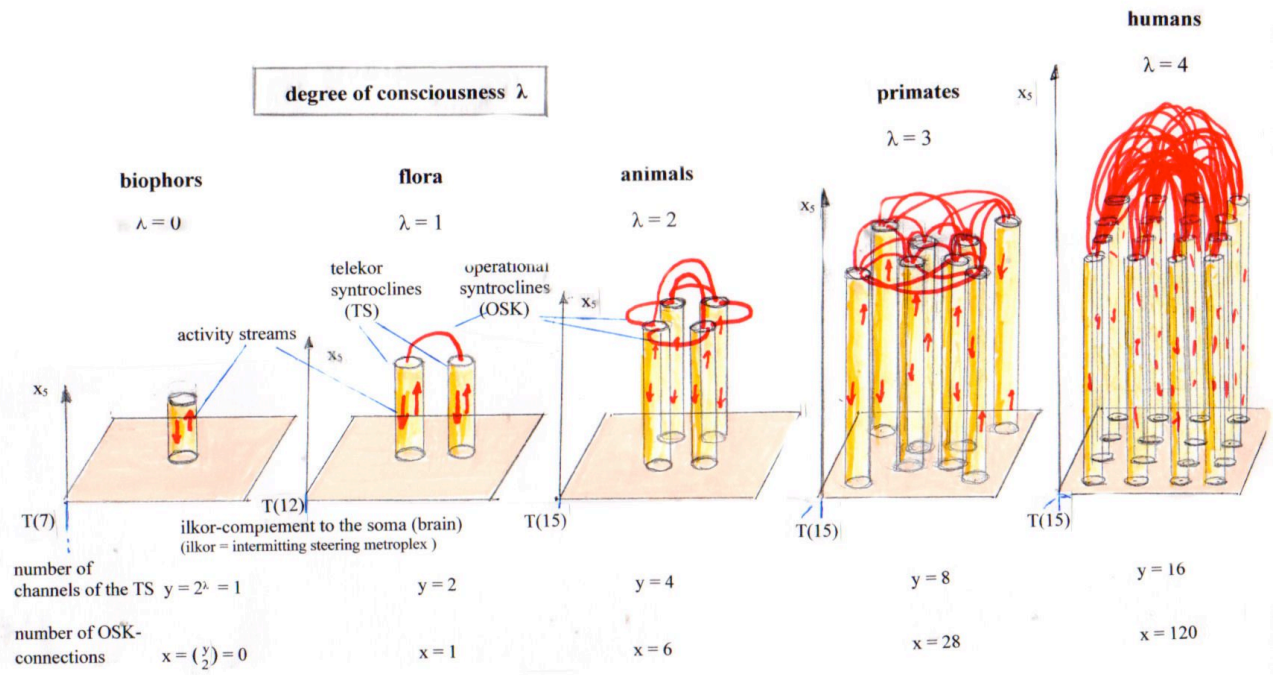
Sketch 6: Syntrix totalities and metroplex associations. The dynamics of metroplex structures consists of correspondences of metropexes which elements are given by condensor terms of hermetry form $a = (x_5, x_6)$. The transmission of activity streams requires the proximity ε of corresponding metropexes. The transmission of activity streams is also possible if $\varepsilon \leq 1$. These information streams go up and down the syntroclines.



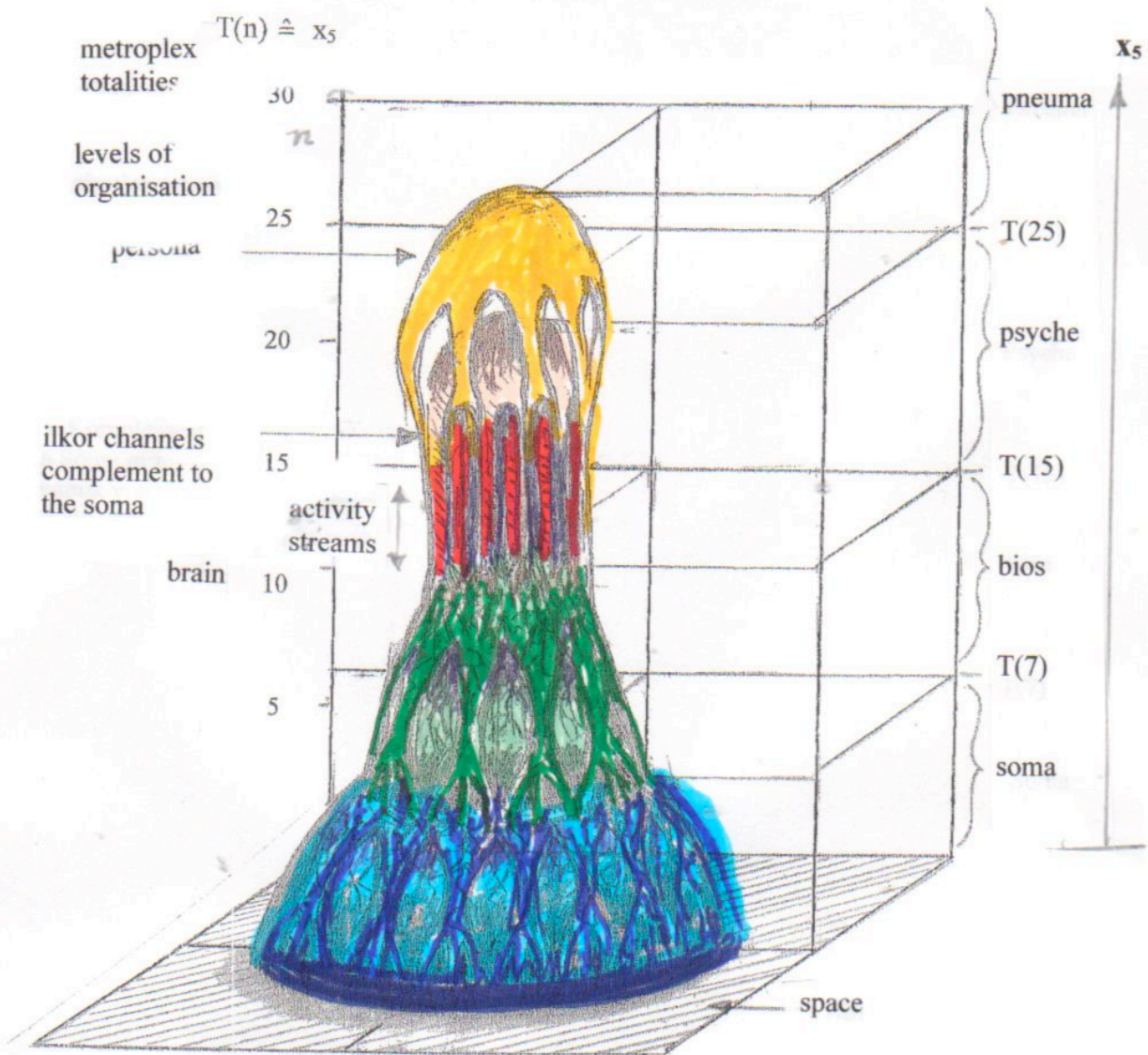
Sketch 7: Structural cascade of the world syntrix. World metroplex of degree 0 in the antropomorphic logic.



Sketch 8: World metroplex of degree 1 in the antropomorphic logic.



Sketch 9: Holomorphisms of living structures.



Sketch 10: Metaphoric representation of qualitative structure cascades in x_5 . Via ilkor channels (red), brain wave activities in the biologic region up to metroplex totalities $T(15)$ are transformed into higher organizational structures as qualities of experience, are filtered and stored as idea patterns in high metroplex totalities $T(n)$ with $n > 20$ ('pneuma'). If activity streams ascend and descend on all $k = 16$ 'channels' between them and brain, which is the case with humans ($\lambda = 4, k = 2^\lambda = 16$), humans are self-aware. In sleeping state, the activity streams retreat into higher metroplex totalities. From $T(n)$ with $n > 25$, a holomorphic structure (yellow) acts on the idea patterns of the persona down to lower organizational states. By means of ilkor complexes, it holds together the whole structure cascade (which corresponds to a 'life energy'). Starting at $T(15)$, activity streams can, decoupled from structures $< T(15)$, exchange with idea complexes in $T(25)$, which leads to conscious perceptions. Moreover, they can continue to exist autonomous as persona without material reconnection.

Burkhard Heim was born in Potsdam, Germany, in 1925. In 1944, while he was department head of the Chemisch-Technische Reichsanstalt [Chemical-Technical Institute of the Reich] in Berlin, he lost his hands as well as most of his eyesight and hearing in an explosion.

From 1945 till 1949 he studied chemistry, followed by studies of theoretical physics in Göttingen. In 1954 diploma degree (M.Sc.) in physics in Göttingen, thereafter work for the Max-Planck-Institute (MPI) for Astrophysics under Prof. von Weizsäcker. He left due to his physical incapacity for engaging in teamwork.

From then on he pursued independent, private theoretical research in Göttingen and Northeim, Germany. In 1957 he came to international fame due to his discussing the theoretical possibility of a field propulsion system suitable for space vehicles.

In the 1960s collaboration with Prof. Pascual Jordan on an experiment on gravity. Then he engaged in work on the extension of Einstein's theory by geometrization of all interaction fields. Further work on: description of the 6-dimensional world, quantum geometry, polymetry, development of an aspectual logic. In 1976 came the stucturetheoretical derivation of a unified mass formula for elementary particles.

After a serious illness, Burkhard Heim died in Northeim in 2001.

www.heim-theory.com