Brief Story about the World Formula

Dear reader, the following is only a very brief extract from the book "The World Formula (from 1915) - A Late Recognition of David Hilbert's Stroke of Genius" by Norbert Schwarzer. To get an idea about the whole book's content, we left the headlines, a few text pieces and the final chapter. The excerpt shall only give proof to the fact that we indeed have a theoretical approach to Quantum Gravity. In case you are only interested in the proof please go directly to chapter 15! There you will find the simplest example for a world formula.

The author wants to point out explicitly that he is not the one who found it. He merely had to extract it from the work of mainly Einstein and Hilbert.

Norbert Schwarzer

DEDICATION

To the victims of ignorant politicians.

We will not forget. We will not forgive.

CONTENTS

ACKNOWLEDGMENTS

Thank you, reader, for your interest in my work.

ABOUT THE BOOK

No, David Hilbert's work "on the fundaments of physics" [α↔ω] is not unknown. This is – by no means – what we meant to say when stating in the title of this book that here we intend to give a fairly "late recognition" to his work. In fact, there was a lot recognition over the past decades already. But the true meaning of Hilbert's work and thus, his true stroke of genius, obviously was not discovered yet. It seems, namely, that - already over 100 years ago - Hilbert had written down the world formula.

Even though this author still considers the book a draft, we think that it is time to bring it out, simply because we want to have some basis for discussion.

After a brief motivation, thereby reprinting one of the stories which actually brought this author to start working on this book in the first place, we will derive a or rather write down the wordformula. If truth be told, that apparently huge task isn't much more than representing the Einstein-Hilbert-Action [α↔ω] which already contained it all. We only needed to dig a little bit deeper than Einstein and Hilbert had done.

Then, directly from the Einstein-Hilbert-Action we will extract the Theory of Relativity, Quantum Theory, Thermodynamics (here meaning the second law of thermodynamics), the principle forces of Evolution, interaction and more.

Surprisingly, in connection with Evolution it is thereby found that the second law of thermodynamics fundamentally hides the basic driving forces of evolution, which means evolution comes with the second law of Thermodynamics and the 2nd law comes with evolution. That is not an option for the two, but a must.

Or still shorter: "Life and death belong together and are coded in only one metric term".

Taking the old wisdom of many ancient natural religions this actually is not very new, though, but still it appears to be a nice finding if one sees it in an equation coming out from something as fundamental as the Einstein-Hilbert-Action.

Finally we will consider a variety of potential applications, show how to derive the classical quantum equations from Hilbert's formula and present a list of project ideas using a world formula approach.

[α↔ω] D. Hilbert, Die Grundlagen der Physik, Teil 1, Göttinger Nachrichten, 395-407 (1915)

PERSONAL MOTIVATION

Why the Classical Explanations do not Suffice

How to explain the world to my dying child?

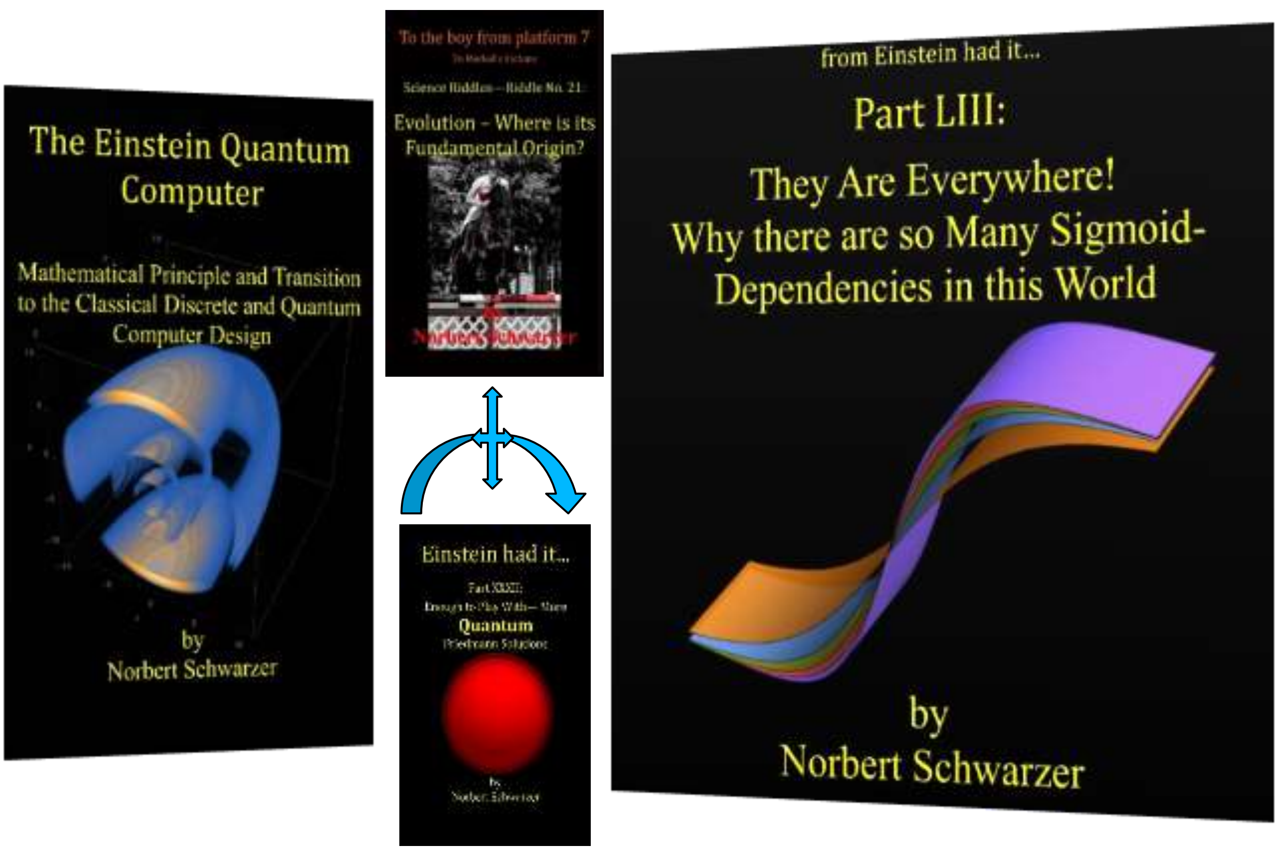
The most natural motivation to try for a better understanding of EVERYTHING can be personal **loss [1, 2]**!

Perhaps we want to be ready when our child needs us and we want to explain him / her the world before she / he has to leave it.

Along the way then we may find some unexpected results:

And then we learned:

Instead of making up your mind,
you could calculate an opinion, but you also have to accept that there is a principle limit to all models



SOME FUNDAMENTAL MOTIVATION

Why - apart from the philosophical question - would we need a Quantum Gravity or – as one also calls it – a Theory of Everything Approach for Everything?

THE EIGHTH DAY (FROM T. BODAN, WITH THANKS)

Preface to „The Eighth Day“

Yes my child has died. I mean, his body has died. Nevertheless, I cannot get rid of the feeling that still I have to keep my promise. Whatever and wherever my child is now, I feel that it measures me on this. No matter the dead body. I have given that promise and so I have a responsibility. After all, I cannot know whether my child still listens to my every word and perhaps longingly waits for me to fulfil that task. It might wait for me to finish the work we started together a bit more than seven days ago, trying to explain the world. For all that I know, information cannot die or disappear in this universe and so, I think, also the set of information which once had defined my child still exists. It is there, somewhere, it has dignity and deserves attention. Thus, I will finish the job now. Interestingly, it isn’t much I have to do myself here. The task was solved by a boy called Samuel and his father about 70 years ago. Both were killed by the Nazis in one of the gas chambers in Auschwitz. They died together in that chamber on Christmas Eve in 1944 and they were the greatest scientists of all time.

It was very difficult for me to collect all their astounding work, because often it wasn’t more than some scribbled notes on the rim of an old newspaper. Something written with shaking hands in the middle of publications of other scientists of their time. More was scratched into the walls of the miserable places they were forced to live. The most important pieces of their work however, was photographed from the interior of that *Reichsbahn* wagon which transported them to the KZ and finally there was this unobtrusive sketch in that dismal room where they both died together, a gas chamber in Auschwitz.

One word about the translation from the German original into English:
The translation was done by a colleague and good friend of the author. Unfortunately, this colleague isn’t a professional at translating from German into English. He isn’t even good at writing. True, he has written quite a few publications and had successfully submitted them to scientific journals, but this probably doesn’t count if it comes to literature, does it? Well, the author thinks, that it is the knowledge which does count more here rather than smooth formulations and nice high flying text passages. The author thinks his book, after all, is more a scientific work, rather than a story, even so it tells one. In short, the author was happy with the translation and as it is his opinion that it serves its purpose, namely, to describe the inner structure and workings of the world.

Preface for the first 7 days

(s. „Seven Days or how to explain the world to my dying child?“, only available in German: „Sieben Tage oder wie erkläre ich meinem sterbenden Kind die Welt“)

This book is difficult to read and probably also difficult to understand. This shouldn’t come as a surprise, because - after all - the world is not explained easily. Learning and true understanding are never easy. Learning and understanding are tasks so complex, multiple and demanding as life itself. This is because life is learning – a whole life long… and also dying belongs to that. This too one has to learn and it does belong to life.

This is the story of a child, an astounding and courageous child, which had mastered all these tasks. And thus, its life, no matter how brief, never was in vain, never was without meaning. And thus, its life was important and of great value.

With every piece of knowledge I‘m allowed to give forward to others I do something to not forget this little hero and all the other courageous children who had gone much too early, because we had been too stupid to help them. But none of these children was unimportant. Why is elaborated in this book.

There is no logic in our existence if there wouldn’t be a task for us. Probably we haven’t been very good in seeing that very task, not to talk about performing it. Surely, we are going to leave this world without any great and real contribution – every one of us. A contribution to both the world and the task, which, in essence, is the same.
But shouldn’t we try and help our children to do it better than we have done?

Why

A good friend of mine owns a small summer cottage at the seaside. One day, she had the idea to make this holiday home available free of charge for families with children who are suffering from cancer.

Little children, who are not lucky enough to live for long.

Eighth Day

My dear child, this will now be the last and probably also the most difficult part of our “course” in trying to understand the world. This time we will not leave the math aside. On the contrary, this time, we are going to use it. Like the true big scientists we are going to write down the equations and let them do their magic. We will try our best to let them evolve, one might say. Because, after all, we want to know how the world is and not how we would like it to be, right?

Thereby, I do not want to adorn myself with borrowed plumes. The keys to understand the world were given to me many years ago. First there was this box. It was full with extremely old reprints of publications, scientific publications. Some of which looked so yellowed that it was almost impossible to read the original texts. But I didn’t need to anyway. I knew most of these papers already. I had them in my collection. The interesting part about these papers was the handwriting along the margins and between the lines. This was still pretty readable. The topmost paper was one of those predecessor papers of Einstein’s General Theory of Relativity. An old woman, not knowing herself how she had come by that box, had given it to me. She had found the carton in her attic. When opening the box and seeing the first paper she suspected the whole content to be of that – scientific - character. And so she considered it a nice gift for me, as I was just about to become a physicist those days – a very lazy physicist by the way and – above all – extremely slow on the uptake.

As this whole Einstein theory was by far too complicated for me I only took the box out of sheer politeness and intended to get rid of it as soon as possible. A nice fire seemed to be just the right thing. I think that Einstein respectively his theory of Relativity would still be far beyond my grasp if there wouldn’t have been the help of Samuel and his father. The two had left so many hints and additional elaborations on these papers that at some point it was almost easy to get the gist. This however, I was not to learn for a very long time. However, for some funny reason, something I’m absolutely unable to explain, I did not burn the box. I kept it with me wherever I moved. It learned to know almost all of my various girlfriends and I might even add that it learned to know some of them better than I knew them myself. It crisscrossed all over Germany, stood in many cellars and lofts and spend a lot of time in various car trunks. Why, in the end, this unobtrusive box did managed to survive in my possession, I cannot tell. I’m neither a believer not a fatalist and so, I think, it just was my laziness or the same kind of accident which one day brought me to open the very box a second time, but this time to look a bit more closely, to show a little bit more respect and to open my heart, or whatever was necessary, a tiny bit more.

There was this one day where an official guy from the local tax office had announced himself to check on our “working rooms”. I had no idea what he wanted to “check on”, but I thought that all rooms we had declared as working rooms should also better look like some. I saw absolutely no problems anywhere except for our so called server-and-archive-room. Not that I suspected anything wrong there but, well, as the name says, it is a room where we keep the servers nobody looks at except there’s something wrong. And there is the stuff being stored there for safe keeping which usually just means for good. With all things you rarely see you don’t exactly know how they look like and so I wasn’t sure what an impression this room would make to an overcritical taxman, especially one who was keen on justifying his job by “finding something”. Thus, I decided to check on the room myself before the taxman and see whether it needed a bit of “structural optimization”. Most of my anxiety by the way come from the fact that you and your siblings have played there, even when it was forbidden. And in fact, I found rather impressively huge and fairly intact ecosystems of dinosaurs, knights and Native Americans there. It must have been wonderful adventures which took place in that, on first side so unimpressive, if not to say dull room. And it is a pity that you can’t tell us these stories anymore. When forcing all those knights, Natives and dinosaurs into a bag I suddenly saw the box. You had used it as small platform on which the Native Americans had built their home. I immediately recognized it and it almost made me feel guilty… somewhere back in my brain. And so, this time I did not just put it to another place, but opened it.

I didn't expect anything. After all, science meanwhile was years ahead and what on earth was there to learn when reading old papers others had smeared on. If I had known that there also were old newspaper rims scribbled full with funny equations in a style so very strange to me, I probably had chucked the whole package straight into the fire. Instead I stared on the first sheet of paper in amazement and wasn't sure whether to trust my eyes. There in a funny, old fashioned German handwriting where the two words "dimension" and "Hilbert" by a question mark. Each of the two words on its own would have meant nothing to me, but together on this Einstein paper they did not only made sense but…

Something wasn't right here. This was an old box, nobody had opened it for decades and still there was a hint about fractal multi-dimensional spaces directly on that Einstein paper. This couldn't be just an accident. Now my attention was caught.

As you well know, my little child, I have the technical possibilities to check on the age of things, especially when they are made from or contain organic substances. So, extremely careful in order not to put in impurities, I took some samples. As any material from outside the box was of young origin such an impurity would have led to a younger dating, not to an overestimation of the age.

By the way: I had meanwhile completely forgotten about the taxman and so was completely perplexed when suddenly the bell rang and a young, well-dressed man stood in the door, showing me his ID. When slowly my brain locked into gear again, I made the guy a Latte Macchiato and rather boldly told him to "feel like home", because "I had no time" and was "working on something important", while I hurried back to that box checking its content and sorting it. I didn't even realize the guy following me. I remember him asking me something about "permission to look over my shoulder", but I can't even remember whether or whether not I ever gave that permission respectively answered at all. In fact, he was a bit like a second and very quiet shadow… probably even quieter than my first one, because I did not become aware of him before he announced himself satisfied and thanked me "for such an excellent demonstration of my typical work". Meanwhile I was so deeply immersed in the content of that box that I probably didn't even say Goodbye, which, apparently the taxman did not mind at all. A few days later we received an official looking letter from the tax office telling us that – surprisingly – there are absolutely no complaints and everything is in best order. Your mother gave me a huge hug that day for the "good job I had done about this tax thing" and I never revealed to her that – if truth be told – I had not done anything to deserve that hug. So, one should note: A room declared as a working room for the tax office is most convincing if you can absentmindedly demonstrate how to work in it.

One day before the official letter the results from the age determination measurement arrived:

„Older than 80 years – for both, paper and handwriting!"

I had expected anything, but definitively not such a number. It meant that the scribbling was mad at a time where nobody even thought about things like strings and fractal spaces not to talk about discussing it or making notes and evaluations about such ideas. Now I definitively was intrigued. I wanted to know more about those people who had left these unbelievable messages.

Reichskristallnacht

It happened in the night from November 9 to 10, 1938, the night hundreds of Jews were killed, tens of thousands maltreated, disseized of their property and procrastinated into concentration camps. All this happened under the watchful eyes and protection of the German police and a usually passive often jubilating mass of ordinary German citizens. Some of whom even actively supported the pogroms. In this night, Schmuel went to a meeting with old colleagues. They wanted to discuss the Einstein-Podolsky-Rosen paradox in quantum mechanics and…

A courageous Jewess

They only knocked once. Sarah, even though mother of two and in her mid-forties was still a very pretty woman and rather athletic, too. She barely had time to grab her dressing gown when the door burst open under the heavy strokes of a sledge hammer and an axe. Men in civil cloths stormed into the house...

The two brothers and the Einstein-Hilbert-Action

It was extremely difficult for Schmuel to get over the death of his wife. And as there was no other distraction, he threw himself into the only task left: The explanation of the world. Samuel fully understood his father's sorrow. He also understood and accepted the way his father went in order to overcome the grief. He himself would have liked to spend a bit more of his time with this task, but now it was on him to care for the family, to try and protect them, to feed them in these difficult times. This was an almost impossible task. Even though it was only him, his beloved sister Judith, who he always called his "Julchen", and his father, there was barely enough food for one of them alone. The Nazi-Regime had decided that Jews must not get more than 200 calories per day which was nothing else but a cruel sentence to slow and steady starvation. For comparison: Even a sick person who is put on a strict diet would still get about 1,000 calories…

Judith, the Little Sister

Father and son still sat over those papers and excitedly discussed the new world expending itself before their eyes, when suddenly a small hand was laid on Schmuel's arm and a timid little voice asked:

"Papa, I'm a bit hungry… only a little bit. Is there something today?"

Brief Hours of Scholarship

No matter how unbelievable it sounds, but Samuel succeeded for a surprisingly long time in keeping the family alive…

The Evacuation

Then one morning, their time was up. From all directions military trucks moved into the Ghetto and they were trapped. SS-men jumped from the trucks and stormed the houses. Yelling, lashing and shouting they beat out the occupants. This time Samuel had not received a warning and so just had time to hide Judith inside the small hole behind the stove and got it covered before the door flew open…

Before the End lays a way through fractal dimensions

"What a shame", Schmuel sighed many hours later, when he and his son were cowering next to each other penned with many others in an animal wagon, "I'd loved to let her know how much her suggestion with the 'tickled space' had brought us forward."

The Last Piece

Samuel and his father were deaf and blind regarding all those cruelties, the suffering and the death around them. Yes, they even almost completely ignored all those atrocities done to themselves. They were too busy to note and to care about them. Being pushed in a certain direction on the selection ramp they had discussed a certain problem and they had deepened that discussion when being forced to a wing where they had to undress. They ignored the sanctimonious elaborations about now being cleaned from lice and disinfection in the KZ-shower. They knew that they had only very little time left and the stupid trial to cover the cruel killing by gassing somebody with Zyklon B and call it “disinfection” only insulted their paramounting intellect. They simply read the signs, combined the information at hand, knew what was coming and still had much better things to worry about than their soon death. They did not worry more about this than they needed in order to estimate the time they might have left to finish their task. If only one of those self-proclaimed „Herrenmenschen“, the dimwitted watchmen would have known what a divine stroke of genius was being performed right in front of the eyes of those blind SS-men, he had immediately shot his comrades and then asked to be gassed himself simply out of shame. But none of these monsters even had a clue. Nobody sensed anything, not even the Kapos, who were inmates, forced to help the SS doing the killing. Nobody wanted or could see, hear or feel anything.

And the victims?

….

In the protocols of that day there was a very peculiar input of the camp doctor. It was about two male corpses, probably father and son, both with such a bright and honest smile on their faces that the liquidators did not dare touching them. When then the Kapos came to beat them for their disobedience they also stopped and just stood there, completely shocked. Nobody had ever seen anything like that after a gasification with Zyklon B. What was more, was the fact that even though the chamber was full to bursting point, the dying people, despite their own agony had managed to keep a lot of free space around that couple of father and son. When finally an SS-man came to check what was all the hold up about he almost froze when seeing them. After a while of expressionless gazing he almost panically called for the camp doctor.

In that moment a group of six detached themselves from the other awed liquidators and moved towards the two dead men. For a moment completely ignoring the SS and the Kapos, they lifted father and son with great dignity and in an almost perfect procession they marched them to the lift. Nobody moved. At the lift the six arranged the dead bodies such that father and son could face and smile at each other. Everybody took off his hat and stood still. Even the SS-man who had called for the camp doctor earlier stood in attention. It was said that he had shot himself the same evening.

Trials

Trials are an essential part of new developments. We therefore present here a series of trials which helped to gradually understand more and more essentials of a theory of everything. For those who are not interested in this phase of evolution, we suggest to directly move to the book parts “Use” and “Teaching”.

1. THE HISTORY OF OUR DEVELOPMENTS

Partially motivated by some personal experiences and more or less popular publications [1 - 7], it was shown in a book and some serious papers by the author that quantum equations emerge from the Einstein-Hilbert-Action in various forms and at various positions within the Einstein-Hilbert-Action [8 - 136]. However, while theses equations appeared more or less as perturbations in cases where we either variated classical solutions to the Einstein-Field-Equations on the level of the line element [8 - 29], or used the degrees of freedom offered by the surface term within the Einstein-Hilbert-Action [30 - 65], we later also saw them as exact outcomes in connection with a further variated metric tensor [66 - 136]. Thereby we here want to especially point out the extension of the variation of the Einstein-Hilbert-Action [137, 138] towards the base vectors and their transformations [114, 117, 136]. The reason for the importance of the latter approach lies in the fact that here also classical quantum equations can be derived directly from the classical Einstein-Hilbert-Action and that their solution automatically fulfills the whole variation condition. In other words: With these quantum solutions being active, the Einstein-Field-Equations do not need to be solved anymore as the whole Einstein-Hilbert-Action is already satisfied. The fact that there are still realizations of solutions to the "classical" Einstein-Field-Equations results, as it will later be shown in this book, from a structure of various scales which the universe apparently has taken on. Thereby each scale can realize different forms of satisfying the action, either as Einstein-Field-Equations or as quantum equations (erupting from the metric variation) or even both. The section about the reason for the weakness of gravity in comoparison with the other fundamental interactions, which are electro-weak and strong, being section 13, will give an illustrative example.

But, with this result already coming out from the extension of the variation of the Einstein-Hilbert-Action towards the metric, why than bothering with the other options, like the surface term or the perturbation?

Well, while the perturbation methods truly were not more than a tentative working round to a metric understanding of quantum theory, the consideration of the surface term [30 – 65] can simply be seen as an alternative approach to the classical Hilbert one. Hilbert dismissed the surface term of the Einstein-Hilbert-Action Fehler! Verweisquelle konnte nicht gefunden werden. **with the argument that one could always use the intrinsic degree of freedom of the variation to demand the variation to vanish at a certain closed surface. As this assumption can be made, the resulting solution is simply forced into a certain direction, which is to say the solution is still correct but restricted in accordance with the Hilbert condition being demanded. By not using this boundary condition, we therefore do nothing wrong but simply extend the playground. The resulting solutions might become more complicated or more difficult to find. But also the opposite would be possible and that is why we had to have a look and still – even after finding a more suitable approach – are not willing to dismiss this path. Thus, we are going to present it here, too.**

With the quantum equations extracted from the Einstein-Hilbert-Action [137] just together with the Einstein-Field-Equations [137, 138], we might come to the conclusion that we have obtained a so-called Theory of Everything. With such a theory at hand, however, we should in principle be able to also tackle other problems in completely different fields. Here, just as an example, we intend to work out a general way how to consider a variety of problems in connection with material science. Thereby, we want to motivate our general approach by the observation [113] that electro-magnetic interaction, which also clearly dominates material behavior, can directly be derived from a suitable metric quantum approach [139]. This derivation shall be given within the next subsection and it shall give us some confidence that the generality of our path is not only leading into the right direction, but also that it might help to handle and understand up to date unsolved or insufficiently solved problems in material science… and subsequently – hopefully – elsewhere, too.

2. AN UNUSUAL INTRODUCTION

What we usually connect with the "General Theory of Relativity".

2.1. Derivation of Electro-Magnetic Interaction (and Matter) via a Set of Creative Transformations

2.2. Intelligent Zero Approaches – Just one Example

2.3. Introduction Summed Up

3. HOW MANY THEORIES OF EVERYTHING ARE THERE?

3.1. About the Theory of Everything

3.2. A Most Fundamental Starting Point and how to Proceed from There

3.3. The Ricci Scalar Quantization

3.3.1. About the Origin of Matter

3.3.2. Postulation of a Constant Ricci Scalar

3.3.3. Intermediate Sum-Up

3.3.4. The Situation in n Dimensions

3.3.4.1. The 2-dimensional Space

3.3.4.2. The 3-dimensional Space

3.3.4.3. The 4-dimensional Space → see sub-sections above

3.3.4.4. The 5-dimensional Space

3.3.4.5. The 6-dimensional Space

3.3.4.6. The 7-dimensional Space

3.3.4.7. The 8-dimensional Space

3.3.4.8. The 9-dimensional Space

3.3.4.9. The 10-dimensional Space

3.3.5. Periodic Space-Time Solutions

3.3.6. Spherical Coordinates

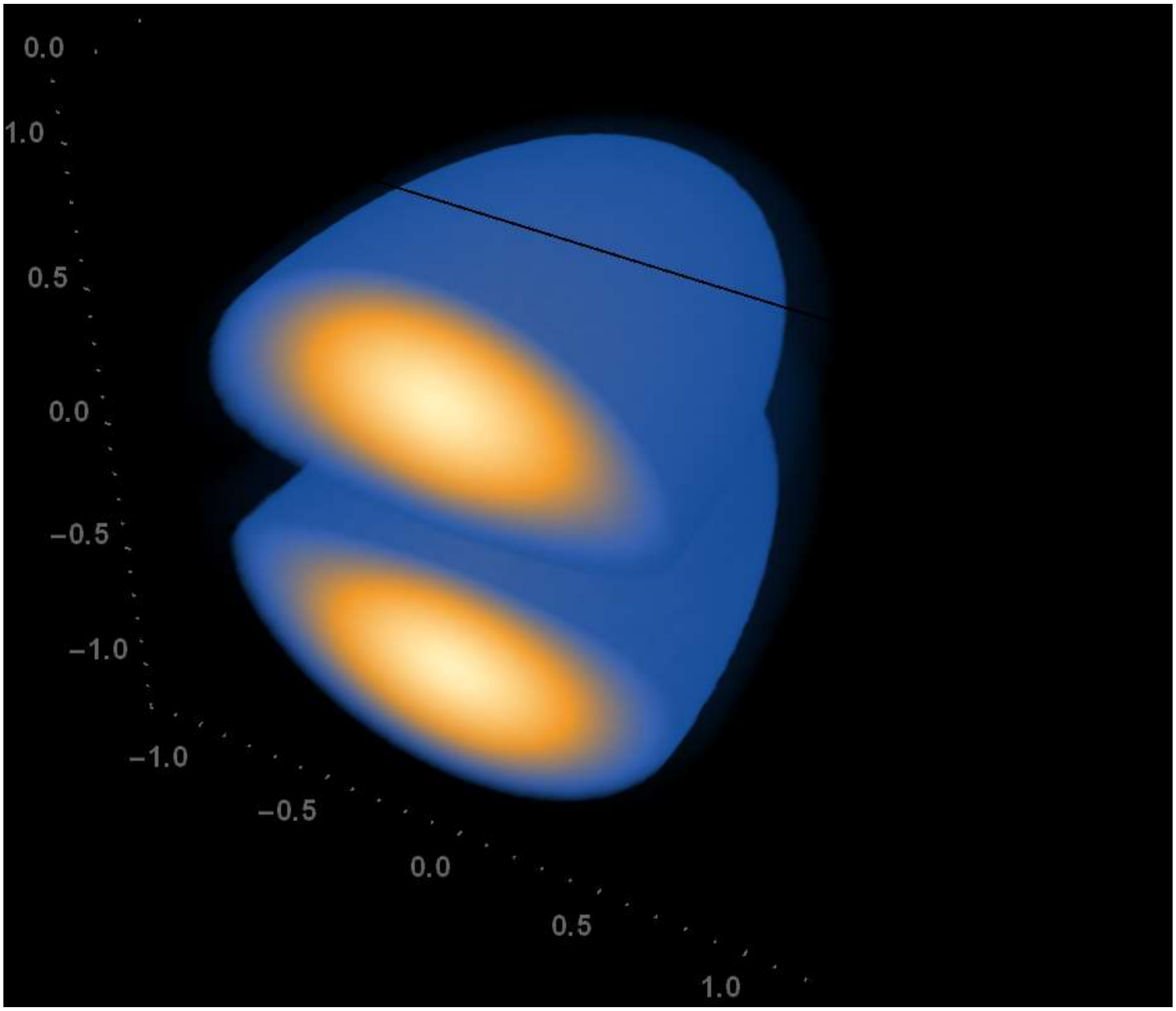
3.3.7. Cartesian Coordinates

3.3.7.1. A Somewhat More General Case

3.3.7.2. The 1D Harmonic Oscillator

3.3.8. Cylindrical Coordinates

3.3.9. Schwarzschild Metric in its Quantum Transformed Form



Inner Quantum Gravity solution for a Black Hole as derived in this section.

3.3.9.1. Discussion

3.3.9.2. The Other Quantum Number

3.4. The Other Hydrogen

Repetition

USE

6. A PROBLEMATIC MATTER OR WHAT IS THE MATTER WITH MATTER

With this we should have enough material to sum up our derivation of the worldformula and start on some applications. However, before we can do that, we have to discuss the matter term $T^{\delta\gamma}$, or, as it is also called, the energy momentum tensor from the Einstein-Hilbert-Action integrand $R^{\delta\gamma}-\frac{1}{2}R\cdot\gamma^{\delta\gamma}+\Lambda\cdot\gamma^{\delta\gamma}+\kappa\cdot T^{\delta\gamma}$.

Hilbert [137] and Einstein [138] had to postulate this term and introduced it into the General Theory of Relativity. They were not able to give a fundamental origin other than the suggestion that “matter simply had to be there”.

From the previous chapter we know that the extension of the variation of the Einstein-Hilbert-Action [137] surprisingly automatically brings in mass and potential forms as yet another form of metric variation [128, 129].

For convenience, we here briefly repeat both derivations. We start with a brief repetition of the derivation of the Klein-Gordon equation out of the functional wrapper approach.

6.1. The Other Metric Origin of the Klein-Gordon Equation

6.2. The Metric Origin of Scalar Fields like the Higgs Field and Symmetry Breaking

6.3. The Metric Origin of Mass

6.3.1. Anisotropy of Inertia

6.3.2. Appendix to the Metric Origin of Mass via Entanglement

6.4. The Metric Origin of Spin and Spin Fields

7. Solving the Flatness problem

7.1. Introduction

7.2. A Cosmological Balance Between Spin and Cosmological Constant

7.3. Extension to Higher Dimensions

7.4. Cosmological Balance and the Flatness Problem

7.5. Conclusions

8. Anti-Gravity

9. The Expansion of the Universe

9.1. A few Thoughts at this Point

As according to [184] our universe is still be found in a state of accelerated expansion, it must either be extremely huge or its state differs significantly from the ground state we have assumed here. At any rate, our extended variation of the Einstein-Hilbert-Action has lead us to solutions which would not only explain the expansion behavior of our universe, but also provide interesting potential structures with respect to spontaneous symmetry breaking and the Higgs field [140].

In this context also another explanation appears meaningful, namely the one based on a grainy substructure of our space-time. Just as suggested in the public stories by Bodan [1, 2, 3] the space time could be considered to consist out of many spherical entities with mass M. Depending on the parameter of M these entities would tend to reach a certain optimum size of radius R. Being currently on their way of getting expanded, the whole universe, consisting of these "little beauties" would expand, too and the observer within that very universe (himself consisting of the spherical entities and therefore, unable to see them directly with his means at hand) would just register this expansion, assuming the universe is growing, while in fact "only" its cells are. Now the question would come up, of course, why these cells are acting so seemingly well-coordinated. The answer to this could already have been given in [79 - 84] by our assumption of the creation of all these cells in approximately the same moment at the beginning or our universe in a state of great pressure (perhaps within the center of a huge black hole [84]). It was shown that one single cell could split up in many if sufficiently – uniformly - compressed. With all the resulting new cells just having the right M-parameter and being very similar (because they were created in the same instant and all under – almost – the same conditions) we would easily end up with exact the right structure to describe our “peculiar” universe.

As a nice side effect, we would have a background of spherical universal cells of just the right field behavior for the Higgs field (figures 8.1 and 8.2 for M>1 and fig. 8.3).

Considering all cells (or the majority of them) to be in the ground state as investigated in this paper (figure 7.1 to 8.4), we would also be able to predict the future of our universe. Assuming namely (due to the existence of the Higgs field with its Mexican head structure) an omnipresent parameter M>1 for “most of the cells”, we automatically have extremely shallow minima at certain r=R. Thus, the cells currently exploding outwards, will continue to do so for a very long time, simply because the slope of the potential outside the minimum is so low. Then the expansion slows down, finally comes to a hold and then the cells will eventually start to shrink again. Now it will depend on the amount of inner friction how far this shrinking will go, whether a kind of pulsating leads to an endless oscillating of the cells around the r=R size (and in consequence also the universe) or whether everything just comes to a standstill at the r=R-minima-positions for all cells (perhaps after a few ever more feeble pulses). Bringing in some kind of “secondary quantization” there may even be another ground state of endless lowest energy vibration of some kind.

10. An Elastic Worldformula

Tree formed by Wind

10.1. A Fundamental Top-Down Approach and Two Problems

10.1.1. The Two Options Problem or Einstein's (and Hilbert's) True „Blunder"

10.1.2. Gravitational Fields

10.2 The "Elastic" Dirac Equation

Scales & Zero-Sums

11. THE ORIGIN OF TIME

Some of the aspects and results we are going to present in this section have already been shown previously in this book. But as the topic merits a compact presentation we are risking a bit of redundancy and repeat them here. This will also help to get a holistic picture and supports the understanding.

11.1. An Introduction in a Somewhat Informal and Illustrative Form

11.2. A Variety of Timely Dimensions

11.3. Interpretation of the Result

11.4. Principle Consequences

11.5. What Happens with Time in a Black Hole?

11.5.1. The Bekenstein Bit-Problem [146]

11.5.2. Consequences With Respect to the Dimension of Time

11.6. A Timely Conclusion

We conclude that time is not simply there, but that it comes with processes as entanglement. Without entanglement there is no time.

11.7. Questions to the Skilled and Interested Reader and One Answer

11.8. Centers of Gravity as Origin of Time

12. A Time Before Time or What was Before the BigBang

12.1. A Variety of Timely Dimensions

12.2. A Different Allocation and Interpretation of the Entangled Solutions

12.3. Metric-Free Spaces in Higher Dimensions

12.4. Interpretation of the Result

12.5. Conclusions With Respect to the Premordial Universe

We conclude that there is no space with any measurable distance within certain systems of entangled dimensions. In fact, with this type of entanglement there is no distance “within” manifolds of dimensions of such an entanglement. We also conclude that the primordial universe probably existed in such a “non-metric” state.

13. Why is Gravity so Weak?

"Using the weakness of Gravity"

In this section we will see that our almost miniscule extension of the Einstein-Hilbert-Action [137], as introduced earlier in this book (c.f. especially section 10.), also helps us to understand the huge differences between the force of gravity and the other fundamental interactions, which are the strong, the electromagnetic and the weak interaction.

While the strong interaction is about 100 times more powerful than the electromagnetic force, we have the weak interaction to be about 1000 times weaker than the electromagnetic one. These differences, however, are nothing in comparison to gravity which is 10^{35} times weaker than the weakest weak interaction.

Where does this huge difference come from?

Why does gravity stick out so much?

These questions will be answered within this section.

13.1. An Elastic Worldformula with Scale

13.2. Consequences

Teaching

14. THE OTHER APPLICATIONS

From a true worldformula it can be expected to give answers to just everything. However, as we saw in the simplest cases how quickly the math of the worldformula-approach can become very complex, we have to admit that in some cases its application is not only cumbersame, but perhaps even foolish or just impossible. One question, however, which definitively requires the most holistic view point there can be probably is the question of "What is good?"

14.1. What is Good?

14.2. Quantum Gravity Computer or Is there an Ultimate Turing Machine?

The answer to the question in the headline is „Yes there is!" [70, 71, 145].

14.3. Can the Worldformula-Approach be Used for Optimum Decision Making

Yes, see [100]!

14.4. Is there a way to bring Ethic Problems in Mathematical Form?

The author things yes, there is [101, 105].

14.5. Theoretical Biology and Evolutionary Stable Stregies

See [67].

15. HOW TO DERIVE A WORLD FORMULA

Please note: As this text is only an excerpt of the book "The World Formula (from 1915) - A Late Recognition of David Hilbert's Stroke of Genius", some equations my not be shown and some references to equations will only appear as "Fehler! Verweisquelle konnte nicht gefunden werden. **= missing".**

In principle this should still allow to get the gist about the theory.

In the first part of this section we will just sum up (in a very compact form) what is of need for the derivation of a world formula "to a certain problem". Thereby the author is aware of the irony residing in the choice of the words in "…"-signs, which should be understood as a certain restriction or rather a reasonable confinement of the problem. Obviously one does not need to consider all scales and dimensions there can be in general if only being interested in a miniscule aspect of this universe. Which is to say: if only being interested in the analysis of the mechanical contact problem of a pen's tip on a sheet of paper, it is probably of low importance what the holder of the pen's wife would be thinking about his writing. This holds even more so if she would be already dead for a couple of years. But well, her influence should not be neglected if the holder of the pen thinks about her, thereby emotionally being carried away and pressing the pen hard onto the sheet of paper. So hard perhaps, that it leads to small fractures. Then, of course, the woman is not negligible.

The recipe shall be summed up as follows:

Find all properties and degrees of freedom of the system you intend to consider and treat them as dimensions of the space in which you are going to deal with the matter in question.

a) Write down the corresponding Einstein-Hilbert-Action in the most general manner, which is: $\delta_g W = 0 = \delta_g \int_V d^n x \left(\sqrt{g} \left[f[R] - 2 \cdot \kappa \cdot L_M - 2 \cdot \Lambda \right] \right)$. Thereby note that the matter term L_M is not fundamental and only of artificial character. So whenever possible try to avoid it. Matter will come in automatically with the further (complete) variation of the metric tensor. In fact the holistic evaluation of the action does reveal it as it will be demonstrated later within this chapter (sub-section 15.5 and following).
b) Check whether you can simplify to linearized Ricci scalars, potentially on various levels of scales, leading to (here already given without the Langrange matter density L_M):
$$\delta_g W = 0 = \delta_g \int_V d^n x \left(\sqrt{g_1} \cdot (R_1 - 2\Lambda_1) + \sqrt{g_2} \cdot (R_2 - 2\Lambda_2) + \sqrt{g_3} \cdot (R_3 - 2\Lambda_3) + \ldots \right).$$
c) Now derive the corresponding Einstein-Field-Equations, which gives:
    a. in the f[R]-case:
$$\delta_g W = 0 = \delta_g \int_V d^n x \sqrt{g} (\ldots)^{\delta\gamma} \delta g_{\delta\gamma}; \quad (\ldots)^{\delta\gamma} = (\ldots)_{\mu\nu} g^{\delta\mu} g^{\gamma\nu}$$
$$\text{with:} \quad (\ldots)_{\mu\nu} = F'[R] \cdot R_{\mu\nu} - \frac{1}{2} F[R] \cdot g_{\mu\nu}$$
$$+F''[R] \left[R_{;\mu\nu} - \Delta_g R \cdot g_{\mu\nu} \right] + F'''[R] \left[R_{;\mu} R_{;\nu} - R^{;\sigma} R_{;\sigma} \cdot g_{\mu\nu} \right]$$

b. in the linear R-case:

$$\delta_g W = 0 = \delta_g \int_V d^n x \sqrt{g}\,(\ldots)^{\delta\gamma}\,\delta g_{\delta\gamma}; \quad (\ldots)^{\delta\gamma} = R^{\delta\gamma} - \frac{1}{2} R \cdot g^{\delta\gamma} + \Lambda \cdot g^{\delta\gamma}$$

c. in the case of multiple scales:

$$\delta_g W = 0 = \delta_g \int_V d^n x \left(\sqrt{g_1}\,(\ldots)_1^{\delta\gamma}\,\delta g_{1\delta\gamma} + \sqrt{g_2}\,(\ldots)_2^{\delta\gamma}\,\delta g_{2\delta\gamma} + \sqrt{g_3}\,(\ldots)_3^{\delta\gamma}\,\delta g_{3\delta\gamma} + \ldots \right)$$

$$(\ldots)_k^{\delta\gamma} = R_k^{\delta\gamma} - \frac{1}{2} R_k \cdot g_k^{\delta\gamma} + \Lambda \cdot g_k^{\delta\gamma}$$

d. one should not forget that also the constant under the integral may be seen as a possibility, which might just be written as:

$$\delta_g W = 0 = \delta_g \int_V d^n x \left(\sqrt{g} \left[f[R] - 2 \cdot \kappa \cdot L_M - 2 \cdot \Lambda \right] \right) = \delta_g \int_V d^n x \text{ const}$$

d) Check for the possibility to variate with respect to:

a. The number of main dimensions
b. The number of centers of gravity
c. The positions of the centers of gravity
d. The intrinsic degrees of freedom residing within the metric. Thereby you need to be aware that the most general form of metric variation should be given as:

$$\delta_\gamma W = 0 = \int_V d^n x \sqrt{g} \cdot (\ldots)^{\delta\gamma} \times \left(\delta g_{\delta\gamma} = g_{ij} \delta F^{ij}_{\delta\gamma} \right)$$

e) Solve the resulting addends under the integral either with respect to the metric (s. the various types of Einstein-Field-Equations under point c), or achieve a zero-outcome for the total variational task via the options given under point d). Please note that there are often multiple options. Make sure you consider them all, because these options are making up your – most holistic – model of the problem, which you intent to consider via a world formula approach.

15.1. The Simplest Example

The main headline for this part of the book was chosen to be "Teaching". Now we all know that the best way of teaching is via examples and therefore we want to finish our book with the most simple example of a world formula this author could think of.

We assume that we are able to describe our problem, which in this case should be the whole universe (after all we are very humble), via a set of properties and seek them to form an ensamble of states all being defined by the extremal principle given by the Einstein-Hilbert-Action in its simplest form:

$$\delta W = 0 = \delta \int_V d^n x \left(\sqrt{-G} \cdot R \right). \tag{1}$$

Thereby G shall denote the determinat of the metric tensor $G_{\alpha\beta}$. Further assuming that the action W, being a constant, would automatically variate to zero, we may demand:

$$\sqrt{-G} \cdot R = \text{const} = K. \tag{2}$$

Now we use the simplest form of metric adapation we could think of, namely:

$$G_{\alpha\beta} = F\left[f\left[t, x, y, z, \ldots, \xi_k, \ldots, \xi_n \right] \right]_{\alpha\beta}^{ij} g_{ij} \rightarrow G_{\alpha\beta} = F\left[f\left[t, x, y, z, \ldots, \xi_k, \ldots, \xi_n \right] \right] \cdot \delta_\alpha^i \delta_\beta^j g_{ij} \tag{3}$$

and evaluate the resulting Ricci scalar first in n and then simplify to four dimensions:

$$\begin{aligned} R \xrightarrow{g_{\alpha\beta}^{\text{diagonal}}} &= \frac{1}{F[f]^3} \cdot \begin{pmatrix} \left(C_{N1} \cdot \left(\frac{\partial F[f]}{\partial f} \right)^2 - C_{N2} \cdot F[f] \cdot \frac{\partial^2 F[f]}{\partial f^2} \right) \cdot \left(\tilde{\nabla}_g f \right)^2 \\ -C_{N2} \cdot F[f] \cdot \frac{\partial F[f]}{\partial f} \cdot \Delta_g f \end{pmatrix} \\ \xrightarrow{n=4} &= \frac{1}{F[f]^3} \cdot \left(\left(\frac{3}{2} \cdot \left(\frac{\partial F[f]}{\partial f} \right)^2 - 3 \cdot F[f] \cdot \frac{\partial^2 F[f]}{\partial f^2} \right) \cdot \left(\tilde{\nabla}_g f \right)^2 - 3 \cdot F[f] \cdot \frac{\partial F[f]}{\partial f} \cdot \Delta_g f \right). \\ \xrightarrow{\frac{3}{2} \cdot \left(\frac{\partial F[f]}{\partial f} \right)^2 - 3 \cdot F[f] \cdot \frac{\partial^2 F[f]}{\partial f^2} = 0} &= -\frac{3}{F[f]^2} \cdot \left(\frac{\partial F[f]}{\partial f} \cdot \Delta_g f \right) \end{aligned} \tag{4}$$

Thereby we have used the following function F[f]:

$$F[f] = C_1 \cdot f + \frac{C_1^2 \cdot f^2}{4 \cdot C_2} + C_2 \tag{5}$$

in order to satisfy the condition in the third line (on the arrow), reading:

$$C_{N1} \cdot \left(\frac{\partial F[f]}{\partial f} \right)^2 - C_{N2} \cdot F[f] \cdot \frac{\partial^2 F[f]}{\partial f^2} = 0. \tag{6}$$

Please note that the Laplace operator in the third line of (4) is to be performed with respect to the untampered metric $g_{\alpha\beta}$ and not $G_{\alpha\beta}$! This we tried to make clear by the index g.

Now we can set R from (4) into our condition (2) and end up with the equation:

$$\frac{3}{F[f]^2}\cdot\left(\frac{\partial F[f]}{\partial f}\cdot\Delta_g f\right)=\frac{3\cdot\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)}{\left(C_1\cdot f+\frac{C_1^2\cdot f^2}{4\cdot C_2}+C_2\right)^2}\cdot\Delta_g f=-\frac{K}{\sqrt{-G}}=\frac{K_0}{\sqrt{G}}$$

$$\Rightarrow\frac{3\cdot\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)}{\left(C_1\cdot f+\frac{C_1^2\cdot f^2}{4\cdot C_2}+C_2\right)^2}\cdot\Delta_g f=\frac{K_0}{\left(C_1\cdot f+\frac{C_1^2\cdot f^2}{4\cdot C_2}+C_2\right)^2\cdot\sqrt{g}}\quad. \tag{7}$$

$$\Rightarrow 0=\frac{K_0}{\sqrt{g}}\cdot\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)^{-1}-3\cdot\Delta_g f$$

In order to see that this equation already contains the classical Klein-Gordon equation, we may want to rush there and assume that the constant C_2 is huge compared to C_1 and thus, we have:

$$0=\frac{K_0}{\sqrt{g}}\cdot\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)^{-1}-3\cdot\Delta_g f$$

$$\xrightarrow{\frac{C_1^2\cdot f}{2\cdot C_2}\ll C_1}\simeq\frac{K_0}{\sqrt{g}}\cdot\left(\frac{1}{C_1}-\frac{f}{2\cdot C_2}+\ldots\right)-3\cdot\Delta_g f\xrightarrow{h\equiv\frac{1}{C_1}-\frac{f}{2\cdot C_2}}=\frac{K_0}{\sqrt{g}}\cdot h+6\cdot C_2\cdot\Delta_g h\quad. \tag{8}$$

Applying the definition of the Lapalce operator in curvilinear cooridnates, we can reshape the last equation as follows:

$$0=\frac{K_0}{\sqrt{g}}\cdot h+6\cdot C_2\cdot\Delta_g h=\frac{K_0}{\sqrt{g}}\cdot h+\frac{6\cdot C_2}{\sqrt{g}}\cdot\left(\sqrt{g}\cdot g^{\alpha\beta}h_{,\beta}\right)_{,\alpha}$$

$$\Rightarrow 0=K_0\cdot h+6\cdot C_2\cdot\left(\sqrt{g}\cdot g^{\alpha\beta}h_{,\beta}\right)_{,\alpha}\quad. \tag{9}$$

We can conclude that (7) already is (a relatively simple) Quantum Gravity equation, but, most interestingly, it is not truly becoming non-linear before the function f becomes big enough to bring the term $\frac{C_1^2\cdot f}{2\cdot C_2}$ into the scale range of C_1. This is exactly the current notion of Quantum Theory versus General Theory of Relativity. Only with the quantum effects becoming huge, there would be a need for Quantum Gravity, which would then be accessible via (7). Finding general solutions to (7), however, seems to be relatively difficult, as we result in cumbersome differential equations already in the second step of our Taylor expansion of the term $\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)^{-1}$. Here is the example for the second order approximation:

$$0=\frac{K_0}{\sqrt{g}}\cdot\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)^{-1}-3\cdot\Delta_g f$$

$$\xrightarrow{\frac{C_1^2\cdot f}{2\cdot C_2}\ll C_1}\simeq\frac{K_0}{\sqrt{g}}\cdot\left(\frac{1}{C_1}-\frac{f}{2\cdot C_2}+\frac{C_1\cdot f^2}{4\cdot C_2^2}+\ldots\right)-3\cdot\Delta_g f\quad. \tag{10}$$

For completeness we now want to incorporate mass via entangled dimensions as derived in section 6.3 and thereby need to move to 6 dimensions. The corresponding evaluation would be:

$$R=\xrightarrow{g_{\alpha\beta}^{\text{diagonal}}}=\frac{1}{F[f]^3}\cdot\begin{pmatrix}\left(C_{N1}\cdot\left(\frac{\partial F[f]}{\partial f}\right)^2-C_{N2}\cdot F[f]\cdot\frac{\partial^2F[f]}{\partial f^2}\right)\cdot\left(\tilde{\nabla}_g f\right)^2\\ -C_{N2}\cdot F[f]\cdot\frac{\partial F[f]}{\partial f}\cdot\Delta_g f\end{pmatrix}\xrightarrow{n=6}\qquad(11)$$

$$=-\frac{5}{F[f]^2}\cdot\left(\frac{\partial^2F[f]}{\partial f^2}\cdot\left(\tilde{\nabla}_g f\right)^2+\frac{\partial F[f]}{\partial f}\cdot\Delta_g f\right)\xrightarrow{\frac{\partial^2F[f]}{\partial f^2}=0}=-\frac{5}{F[f]^2}\cdot\left(\frac{\partial F[f]}{\partial f}\cdot\Delta_g f\right)$$

Setting $F[f]=C_1+f$ and again demanding $\sqrt{-G}\cdot R=\text{const}=K$ leads to the same principle structure as we had in a 4-dimensional space-time:

$$\begin{aligned}-\frac{5}{F[f]^2}\cdot\left(\frac{\partial F[f]}{\partial f}\cdot\Delta_g f\right)=\frac{5}{\left(C_1+f\right)^2}\cdot\Delta_g f&=-\frac{K}{\sqrt{-G}}=\frac{K_0}{\sqrt{G}}\\ \Rightarrow\frac{5}{\left(C_1+f\right)^2}\cdot\Delta_g f&=\frac{K_0}{\left(C_1+f\right)^3\cdot\sqrt{g}}\\ \Rightarrow 0=\frac{K_0}{\sqrt{g}}\cdot\left(C_1+f\right)^{-1}&-5\cdot\Delta_g f\end{aligned}\qquad(12)$$

We note that for the case of K=0 we have two solutions, namely:

$$\begin{aligned}n=4:\quad 0&=\left(C_1+\frac{C_1^2\cdot f}{2\cdot C_2}\right)\cdot 3\cdot\Delta_g f\Rightarrow\begin{cases}0=1+\frac{C_1\cdot f}{2\cdot C_2}\Rightarrow f=-2\cdot\frac{C_2}{C_1}\\ 0=\Delta_g f\end{cases}\\ n=6:\quad 0&=\left(C_1+f\right)\cdot 5\cdot\Delta_g f\Rightarrow\begin{cases}0=C_1+f\Rightarrow f=-C_1\\ 0=\Delta_g f\end{cases}\end{aligned}\qquad(13)$$

We see that not only the classical Klein-Gordon equation emerges without any approximation, but also that there is an additional Higgs-like solution the moment f would be a constant (c.f. section 6.2.). Of course, with f being a constant, also $0=\Delta_g f$ would automatically be fulfilled, but the important point is the fact that such a scalar or Higgs-like solution exists as well.

We see that already our simplest world formula approach brought two essential things classical Quantum Theory had to postulate:

A) The Klein-Gordon quantum equation
B) A scalar field (possibly the Higgs field)

Only for simplicity we concentrate on the n=4-case with the following discussion:

With the backwards transformation h→f from our substitution used in (9) and the subsequent full solution for the metric $G_{\alpha\beta}$:

$$\begin{aligned}&h\equiv\frac{1}{C_1}-\frac{f}{2\cdot C_2}\Rightarrow f=2\cdot C_2\left(\frac{1}{C_1}-h\right)\Rightarrow F[f]\to F[h]=C_2\cdot\left(C_1\cdot h-2\right)^2\\&\Rightarrow G_{\alpha\beta}=C_2\cdot\left(C_1\cdot h-2\right)^2\cdot g_{\alpha\beta}=C_2\cdot\left(C_1\cdot h\left[x_{k=0,1,2,3}\right]-2\right)^2\cdot g_{\alpha\beta}\end{aligned}, \tag{14}$$

we automatically also have a complete solution to the variation of the Einstein-Hilbert-Action. Any function h, which satisfies the condition in the last line of (9) (definitively being a quantum equation) and for which also holds that $C_1\cdot h\ll 2$, built into a metric tensor according to the second line in (14), also fulfills the extremal condition for the Einstein-Hilbert-Action and therefore, has to be considered to be a solution of the General Theory of Relativity, too. This indeed makes our result (9) a world formula or Theory of Everything equation.

For compleness we now also derive the corresponding equations for the case in 6 dimensions. Thereby we have from (12):

$$\begin{aligned}&0=\frac{K_0}{\sqrt{g}}\cdot\left(C_1+f\right)^{-1}-5\cdot\Delta_g f=\frac{K_0}{C_1\cdot\sqrt{g}}\cdot\left(1-\frac{f}{C_1}+\frac{f^2}{C_1^2}-\ldots\right)-5\cdot\Delta_g f\\&\xrightarrow{C_1\gg f}\simeq\frac{K_0}{C_1\cdot\sqrt{g}}\cdot\left(1-\frac{f}{C_1}\right)-5\cdot\Delta_g f\\&\Rightarrow 0=\frac{K_0}{C_1\cdot\sqrt{g}}\cdot\left(1-\frac{f}{C_1}\right)-5\cdot\Delta_g f\xrightarrow{h=1-\frac{f}{C_1}}0=\frac{K_0}{C_1\cdot\sqrt{g}}\cdot h+5\cdot C_1\cdot\Delta_g h\\&\Rightarrow 0=K_0\cdot h+5\cdot C_1^2\cdot\left(\sqrt{g}\cdot g^{\alpha\beta}h_{,\beta}\right)_{,\alpha}\end{aligned}. \tag{15}$$

The resulting metric is similar to the 4-dimensional case, namely:

$$\begin{aligned}&h\equiv h=1-\frac{f}{C_1}\Rightarrow f=C_1\left(1-h\right)\Rightarrow F[f]\to F[h]=C_1\cdot\left(2-h\right)\\&\Rightarrow G_{\alpha\beta}=C_1\cdot\left(2-h\right)\cdot g_{\alpha\beta}=C_1\cdot\left(2-h\left[x_{k=0,1,2,3}\right]\right)\cdot g_{\alpha\beta}\end{aligned}. \tag{16}$$

As it is widely assumed that the universe should have some kind of flat ground state, we obviously have a quite reasonable structure. While the metric $g_{\alpha\beta}$ may be seen as a pure gravity motivated solution (perhaps to the classical Einstein-Field-Equations=EFE), the "pertubated" metric $G_{\alpha\beta}$ would effectively consist of the classical EFE solution plus the perturbation, with the latter definitively being of quantum origin. In other words: In the approximated case where we have $1\gg\frac{C_1\cdot f}{2\cdot C_2}$ (in four dimensions) or $f\ll C_1$ (in six dimensions), the quantum fields add upon the gravitational metric distortions. In the flat case the quantum field even is the only source of distortion. Only for very strong quantum fields, where the conditions $1\gg\frac{C_1\cdot f}{2\cdot C_2}$, $f\ll C_1$ and so on do not hold, we need to worry about the original equations (7) and (12) (both last line).

The same principle result is also obtained for all other numbers of dimensions except n=2. However, we shall leave it to the interested reader to perform the evaluations as presented for n=4 and n=6 also for other numbers of dimensions, thereby applying the results presented in sub-section 3.3.4.

15.2. Extraction of the Dirac Equation (Trials)

With the derivation of the Klein-Gordon equations in various dimension from our metric approach as shown in the section 15.1 above, we might already be satisfied and simply assume that, just as Dirac did [143], his famous first order differential equation would evolve as a square root out of the Klein-Grodon equation. Having derived the latter, the task could be considered completed. However, as said earlier also in this book (c.f. sub-section 3.11.7), we merely consider the success of the Dirac equation a “peculiar accident” and think that there is a deeper metric meaning behind it. Not being satisfied with the complicated second order differential eqations resulting form our Quantum Gravity approach above (c.f. equations (7) and (12) (both last line)) anyway, we here intend to derive the Dirac equation in a different way than done by Dirac in [143]…

15.2.1. Towards a Curvilinear Generalization

15.2.2. A few Thoughts about Further Variations

15.2.3. Schwarzschild Metric for Entertainment

As illustrative example we want to consider the stationary Schwarzschild problem with radius dependency only, which is to say f=f[r]. For simplicity we bring **Fehler! Verweisquelle konnte nicht gefunden werden.** into Dirac form:

$$f_{,\alpha}\mathbf{e}^{\alpha} - i\cdot\left(C_1 + f\right)\cdot\mathbf{M} = \mathbf{C}_D^{-}, \tag{17}$$

$$\mathbf{e}^{\beta}f_{,\beta} + i\cdot\left(C_1 + f\right)\cdot\mathbf{M} = \mathbf{C}_D^{+} \tag{18}$$

and demand $-i\cdot C_1\cdot\mathbf{M} = \mathbf{C}_D^{-}$, $i\cdot C_1\cdot\mathbf{M} = \mathbf{C}_D^{+}$. The resulting equations give the following solutions:

$$f[r] = C_r\cdot e^{\pm i\cdot M\cdot\left(r\cdot\sqrt{1-\frac{r_s}{r}}+\frac{1}{2}\cdot r_s\cdot\log\left[2\cdot r\cdot\left(1+\sqrt{1-\frac{r_s}{r}}\right)-r_s\right]\right)}. \tag{19}$$

Thereby we have assumed the following metric with “entangeled mass” M (c.f. section 6.3):

$$g_{\alpha\beta}^{6} = \begin{pmatrix} -c^2\cdot h[r] & 0 & 0 & 0 & 0 & 0 \\ 0 & \frac{1}{h[r]} & 0 & 0 & 0 & 0 \\ 0 & 0 & r^2 & 0 & 0 & 0 \\ 0 & 0 & 0 & r^2\cdot\sin[\vartheta] & 0 & 0 \\ 0 & 0 & 0 & 0 & g[v] & 0 \\ 0 & 0 & 0 & 0 & 0 & g[v] \end{pmatrix}. \tag{20}$$

$$\text{with:}\quad h[r] = 1-\frac{r_s}{r};\quad g[v] = \frac{C_{v1}^2}{C_{v0}^2\cdot\left(1+\cosh\left[C_{v1}\cdot\left(v+C_{v2}\right)\right]\right)};\quad \frac{C_{v0}^2}{5} = M^2$$

The following figures 15.1 to 15.6 give some insight into the metric distortion caused by the function f[r] for a variety of parameter settings. For simplicity, we fixed C_r=1.

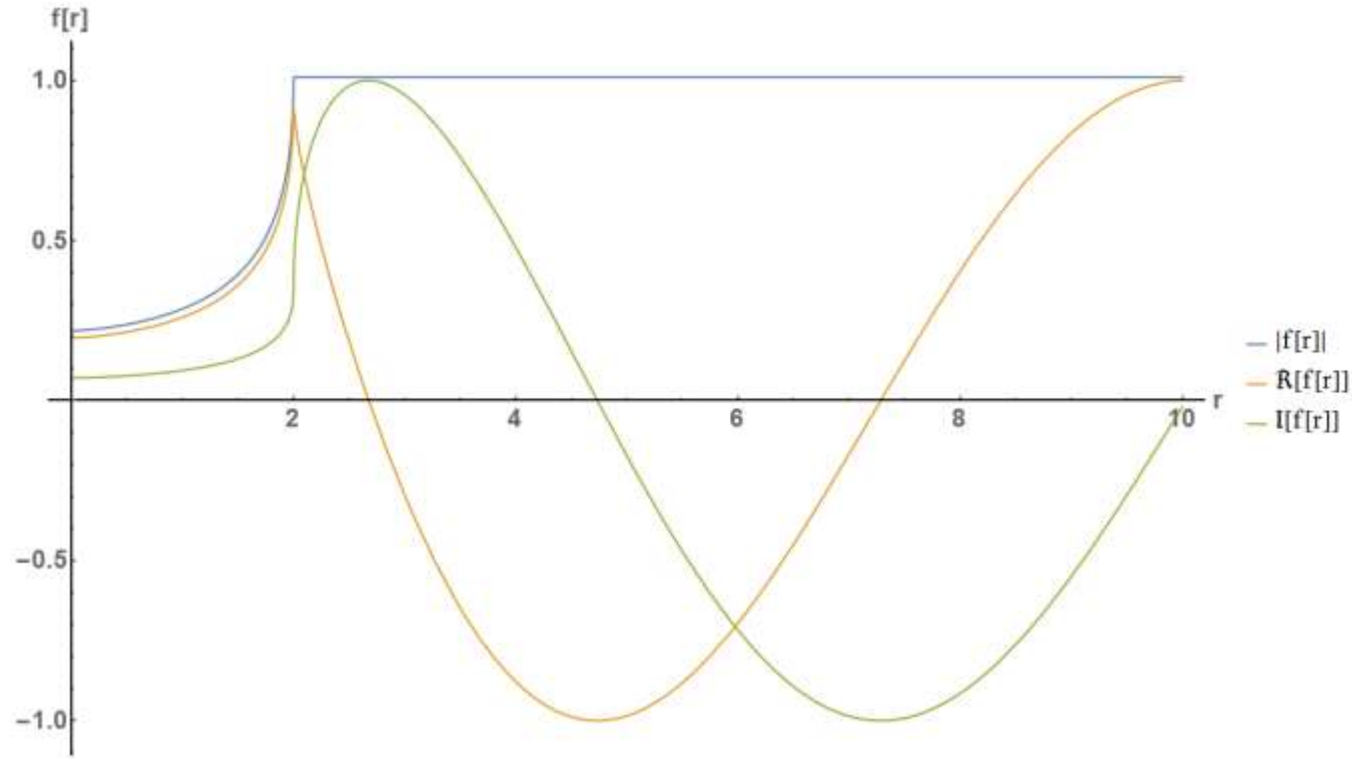


Fig. 15.1: Absolute (blue), real (yellow) and imaginary (green) part of f[r] according to the Dirac Schwarzschild solution (19) for M=0.5 and r_s=2.

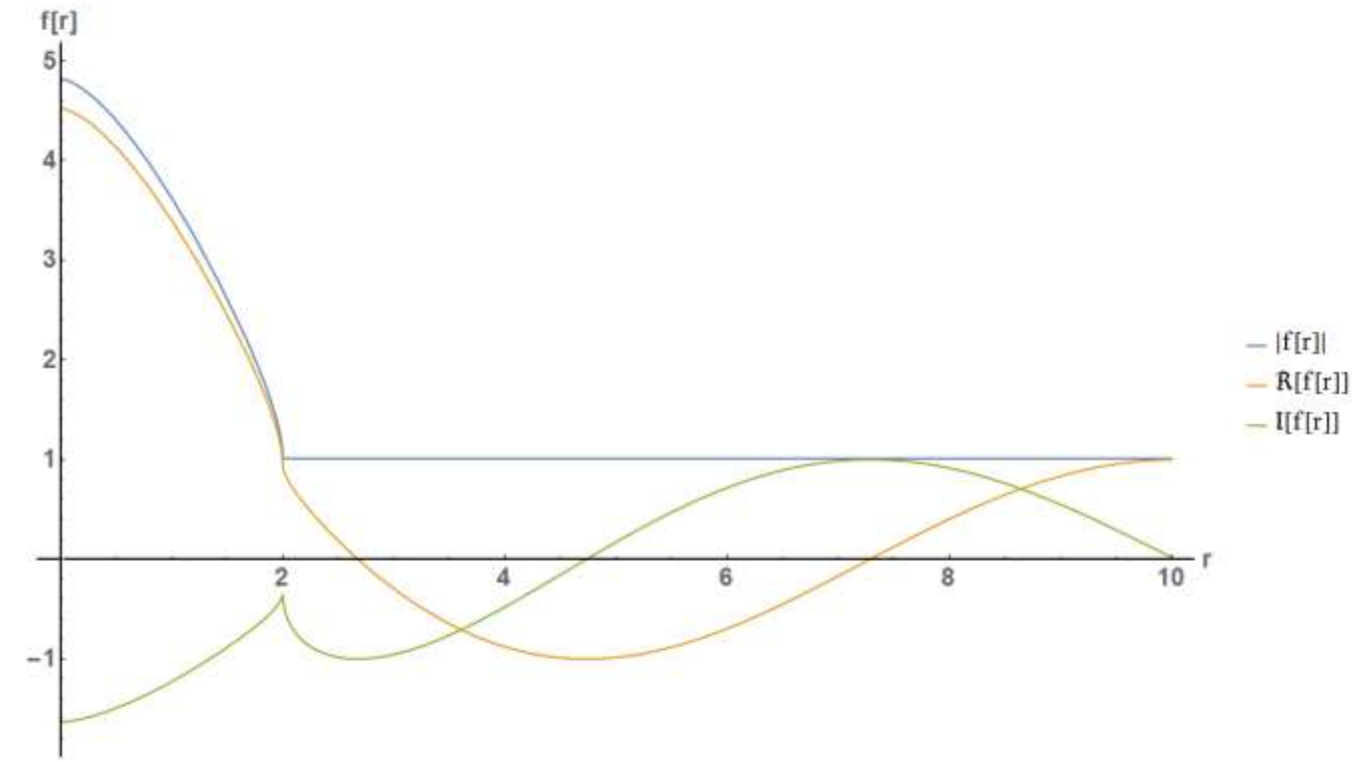


Fig. 15.2: Absolute (blue), real (yellow) and imaginary (green) part of f[r] according to the Dirac Schwarzschild solution (19) for M=-0.5 and r_s=2.

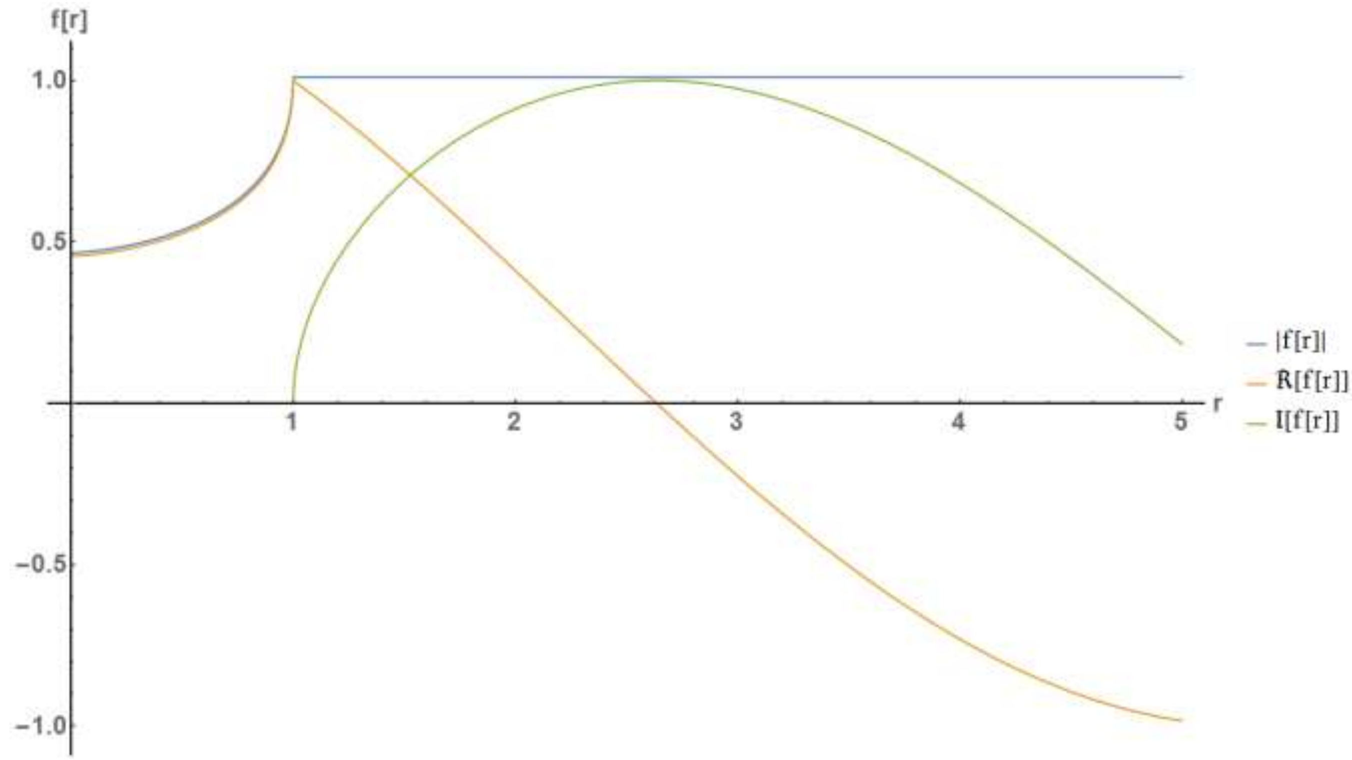


Fig. 15.3: Absolute (blue), real (yellow) and imaginary (green) part of f[r] according to the Dirac Schwarzschild solution (19) for M=0.5 and r_s=1.

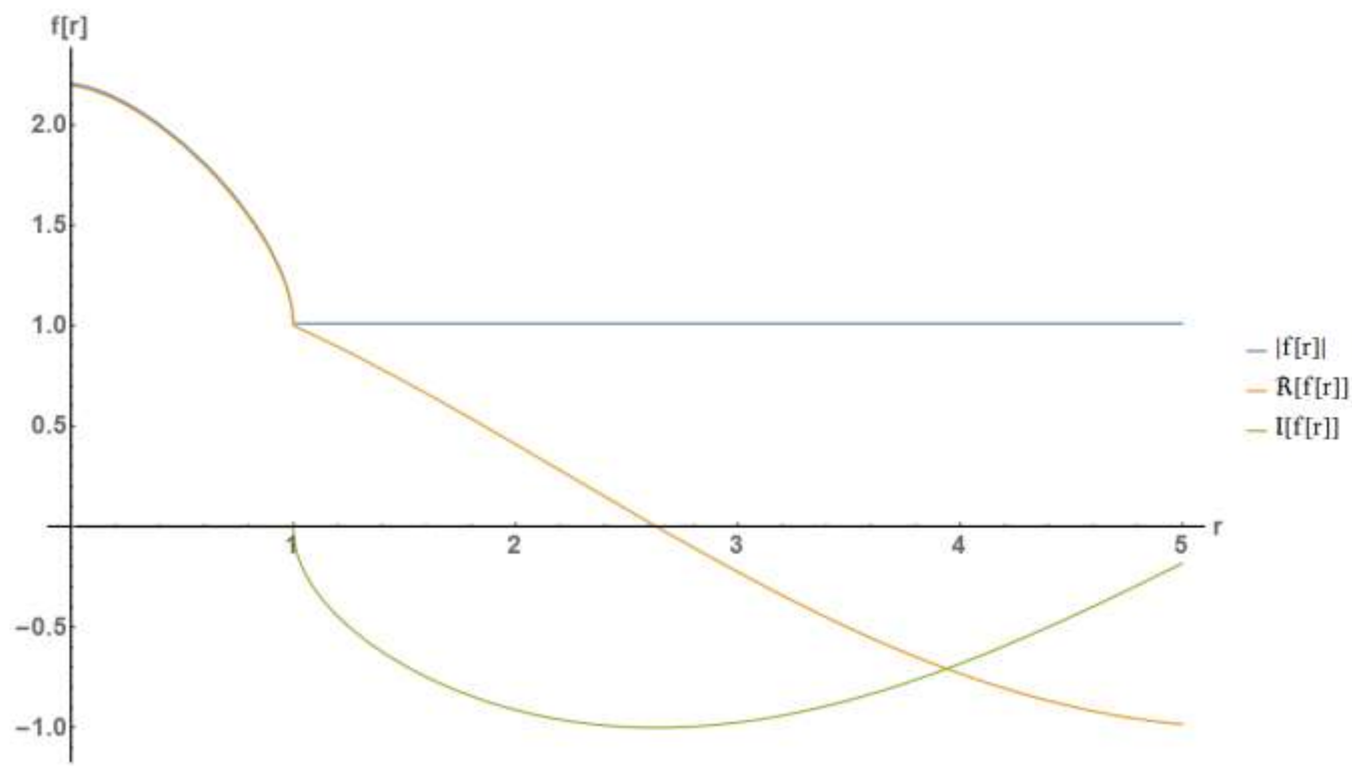


Fig. 15.4: Absolute (blue), real (yellow) and imaginary (green) part of f[r] according to the Dirac Schwarzschild solution (19) for M=-0.5 and r_s=1.

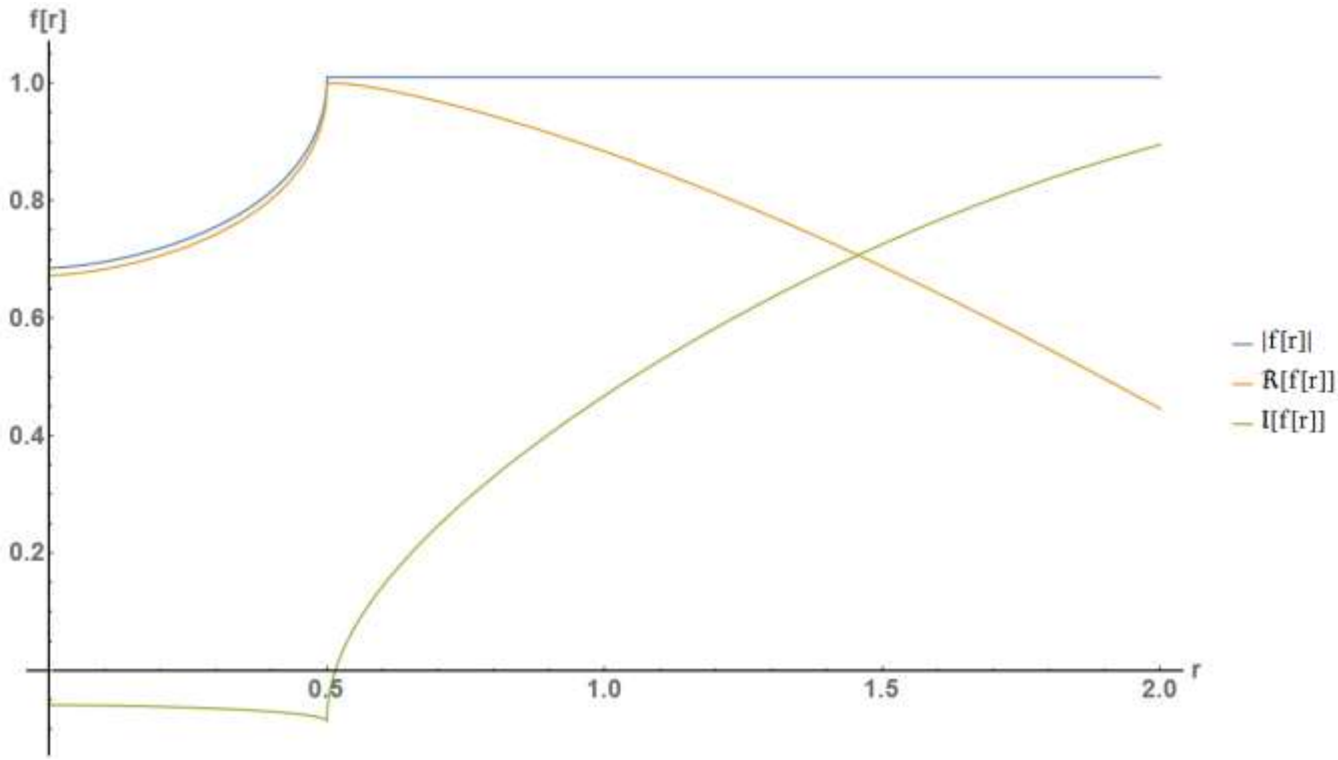


Fig. 15.5: **Absolute (blue), real (yellow) and imaginary (green) part of f[r] according to the Dirac Schwarzschild solution (19) for M=0.5 and r_s=0.5.**

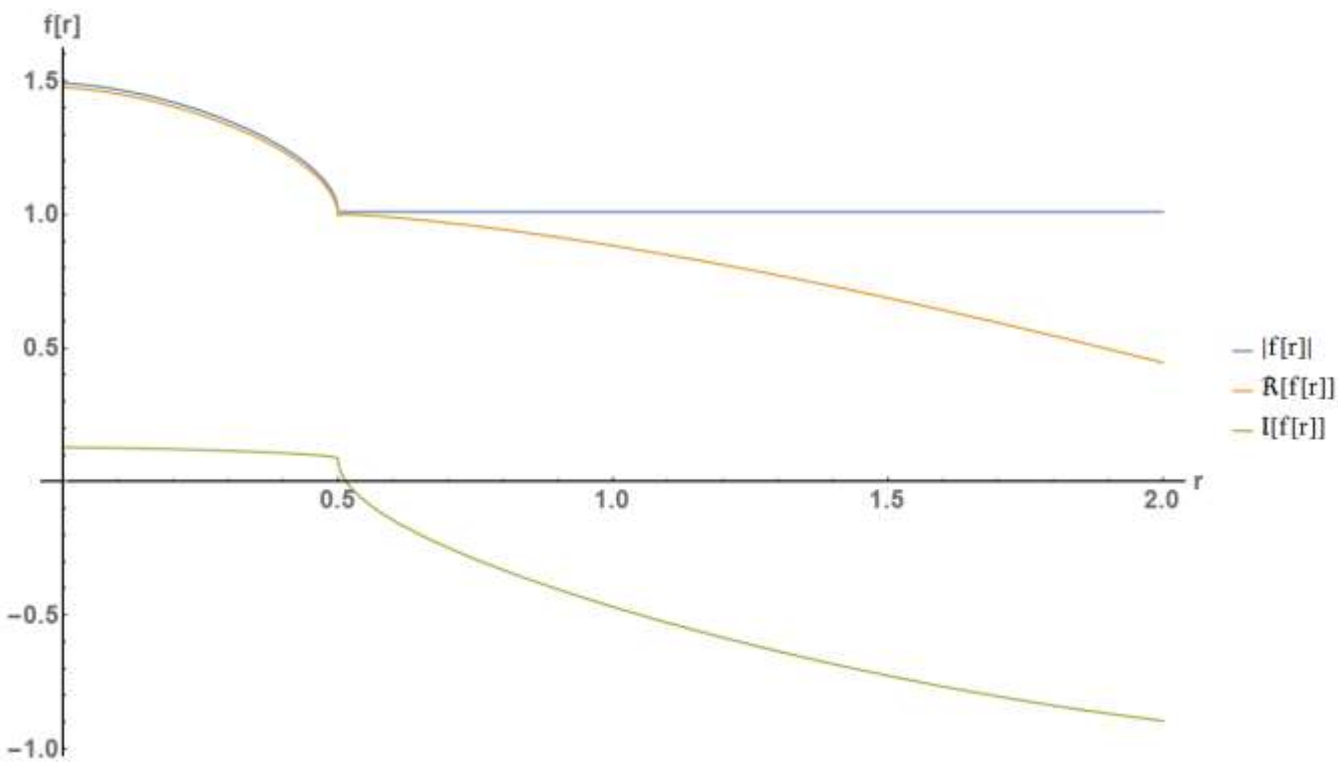


Fig. 15.6: **Absolute (blue), real (yellow) and imaginary (green) part of f[r] according to the Dirac Schwarzschild solution (19) for M=-0.5 and r_s=0.5.**

For better orientation and in order to make the absolute curves distinguishable from the real curves, a small constant was added to the |f[r]| graphs in all figures.

15.3. Extraction of More Dirac-like Equations

15.4. Avoiding the Quaternions and Going to Curvilinear Coordinates (But Diagonal Metrics)

…

In other words: The various dimensions form vector components, which, if being summed-up straight away, would give zero. But with the universe keeping these vector components properly separated into different dimensions, the zero is not been realized. It needs to be pointed out that only this separation – obviously – makes it possible for something to be. Without it, which is to say without the separation, nothing could exist. This is essential and it totally contradicts all equality ideologies [44].

15.5. Going Back to the Elastic Space-Time and Forming Particles

15.5.1. A few Auxiliary Calculations

…

As this does not seem to be very helpful (except in the case n=6 where we already have the simple equation **Fehler! Verweisquelle konnte nicht gefunden werden.**), we try the general form **Fehler! Verweisquelle konnte nicht gefunden werden.**, which leads us to:

$$\begin{aligned}\delta_\sigma W = 0 &= \int_V d^n x\sqrt{-g}\cdot\left(\begin{array}{c}\overbrace{\frac{\sqrt{F[f]^n}}{F[f]^2}\cdot\left(C_{N2}\cdot\frac{\partial^2 F[f]}{\partial f^2}-\frac{C_{N1}}{F[f]}\cdot\left(\frac{\partial F[f]}{\partial f}\right)^2\right)}^{\{\dots\}}\cdot g^{\alpha\beta}\cdot f_{,\alpha}f_{,\beta}\\ +\underbrace{C_{N2}\cdot\frac{\sqrt{F[f]^n}}{F[f]^2}\cdot\frac{\partial F[f]}{\partial f}}_{[\dots]}\cdot\Delta_g f\end{array}\right)\cdot g^{\sigma\chi}{}_{,\sigma}\delta x_\chi\\ &= \int_V d^n x\left(\sqrt{-g}\cdot\{\dots\}\cdot g^{\sigma\chi}{}_{,\sigma}\cdot g^{\alpha\beta}\cdot f_{,\alpha}f_{,\beta}+\sqrt{-g}\cdot[\dots]\cdot g^{\sigma\chi}{}_{,\sigma}\cdot\Delta_g f\right)\delta x_\chi\\ &= \int_V d^n x\left(-\left(\sqrt{-g}\cdot\{\dots\}\cdot g^{\sigma\chi}{}_{,\sigma}\cdot g^{\alpha\beta}\cdot f_{,\alpha}\right)_{,\beta}+\sqrt{-g}\cdot\frac{[\dots]}{f}\cdot g^{\sigma\chi}{}_{,\sigma}\cdot\Delta_g f\right)\cdot f\cdot\delta x_\chi\\ &= \int_V d^n x\sqrt{-g}\cdot\left(g^{\sigma\chi}{}_{,\sigma}\cdot\left(\frac{[\dots]}{f}-\{\dots\}\right)\cdot\Delta_g f-\left(\{\dots\}\cdot g^{\sigma\chi}{}_{,\sigma}\right)_{,\beta}\cdot g^{\alpha\beta}\cdot f_{,\alpha}\right)\cdot f\cdot\delta x_\chi\end{aligned} \quad .(21)$$

Here now we realize a great flexibility to derive quantum gravity equations of sufficiently convenient forms, simply by adapting the wrapping functions F[f] in accordance with the number of dimensions and our needs, respectively intentions.

For those who miss the classical Hilbert form we recall the general starting point **Fehler! Verweisquelle konnte nicht gefunden werden.** and apply the chain rule for differentiation, yielding:

$$\begin{aligned}\delta W = 0 &= \delta_\sigma \int_V d^n x \left(\sqrt{-G}\cdot R\right) = \int_V d^n x \left(\sqrt{-G}\cdot\left[R^{\alpha\beta} - \frac{R}{2}G^{\alpha\beta}\right]\right)\delta_\sigma G_{\alpha\beta} \\ &= \int_V d^n x \left(\sqrt{-G}\cdot\left[R^{\alpha\beta} - \frac{R}{2}G^{\alpha\beta}\right]\right)\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta} f_{,\sigma} + F[f]\cdot g_{\alpha\beta,\sigma}\right) g^{\sigma\chi}\delta x_\chi\end{aligned} . \tag{22}$$

It is very important to point out that the Ricci scalar and the Ricci tensor in the equation above are the corresponding Ricci-curvatures with respect to the transformed metric $G_{\alpha\beta}$ and not the undisturbed metric $g_{\alpha\beta}$ (c.f. sections 3.3 and 16).

Integration by parts in (22) leads us to either:

$$\begin{aligned}\delta W = 0 &= \int_V d^n x \left(\sqrt{-g}\cdot\overbrace{\sqrt{F[f]^n}\left[R^{\alpha\beta} - \frac{R}{2}G^{\alpha\beta}\right]}^{[\cdots]^{\alpha\beta}}\right)\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta} f_{,\sigma} + F[f]\cdot g_{\alpha\beta,\sigma}\right) g^{\sigma\chi}\delta x_\chi \\ &= \int_V d^n x \sqrt{-g}\left([\cdots]^{\alpha\beta}\cdot\frac{\partial F[f]}{\partial f}\cdot g^{\sigma\chi} g_{\alpha\beta} f_{,\sigma} + [\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi} g_{\alpha\beta,\sigma}\right)\frac{\partial}{\partial x^\chi}\delta x \\ &= \overbrace{\int_{Surface} d^n x \sqrt{-g}\left([\cdots]^{\alpha\beta}\cdot\frac{\partial F[f]}{\partial f}\cdot g^{\sigma\chi} g_{\alpha\beta} f_{,\sigma} + [\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi} g_{\alpha\beta,\sigma}\right)\delta x}^{=0} \\ &\quad - \int_V d^n x \left(\sqrt{-g}\left([\cdots]^{\alpha\beta}\cdot\frac{\partial F[f]}{\partial f}\cdot g^{\sigma\chi} g_{\alpha\beta} f_{,\sigma} + [\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi} g_{\alpha\beta,\sigma}\right)\right)_{,\chi}\delta x \\ &= -\int_V d^n x \sqrt{-g}\left(\begin{array}{c}\left([\cdots]^{\alpha\beta}\cdot g_{\alpha\beta}\right)_{,\chi} g^{\sigma\chi}\frac{\partial F[f]}{\partial f} f_{,\sigma} + [\cdots]^{\alpha\beta}\cdot g_{\alpha\beta}\cdot\Delta_g F[f] \\ +\left([\cdots]^{\alpha\beta}\cdot F[f]\right)_{,\chi}\cdot g^{\sigma\chi} g_{\alpha\beta,\sigma} + [\cdots]^{\alpha\beta}\cdot F[f]\cdot\Delta_g g_{\alpha\beta}\end{array}\right)_{,\chi}\delta x\end{aligned} , \tag{23}$$

or:

$$\begin{aligned}
\delta W=0=&\int_V d^n x\left(\sqrt{-g}\cdot\overbrace{\sqrt{F[f]^n}\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]}^{[\cdots]^{\alpha\beta}}\right)\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
=&\int_V d^n x\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot\frac{\partial F[f]}{\partial f}\cdot g^{\sigma\chi}g_{\alpha\beta}f_{,\sigma}-\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi}\right)_{,\sigma}g_{\alpha\beta}\right)\delta x_\chi\\
=&\int_V d^n x\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot\frac{\partial F[f]}{\partial f}\cdot g^{\sigma\chi}g_{\alpha\beta}f_{,\sigma}-\begin{pmatrix}\sqrt{-g}\cdot[\cdots]^{\alpha\beta}g^{\sigma\chi}\cdot\frac{\partial F[f]}{\partial f}\cdot f_{,\sigma}\\+\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}g^{\sigma\chi}\right)_{,\sigma}\cdot F[f]\end{pmatrix}g_{\alpha\beta}\right)\delta x_\chi\\
=&-\int_V d^n x\left(\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}g^{\sigma\chi}\right)_{,\sigma}\cdot F[f]\cdot g_{\alpha\beta}\right)\delta x_\chi\\
\Rightarrow&\left(\sqrt{-g}\cdot\sqrt{F[f]^n}\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]g^{\sigma\chi}\right)_{,\sigma}\cdot g_{\alpha\beta}=\left(\sqrt{-g}\cdot\sqrt{F[f]^n}\left[R^{\alpha\beta}-\frac{R}{2}\cdot\frac{g^{\alpha\beta}}{F[f]}\right]g^{\sigma\chi}\right)_{,\sigma}\cdot g_{\alpha\beta}=0
\end{aligned}\quad ,(24)$$

or:

$$\begin{aligned}
\delta W=0=&\int_V d^n x\left(\sqrt{-g}\cdot\overbrace{\sqrt{F[f]^n}\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]}^{[\cdots]^{\alpha\beta}}\right)\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
=&\int_V d^n x\left(-\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot\frac{\partial F[f]}{\partial f}\cdot g^{\sigma\chi}g_{\alpha\beta}f_{,\sigma}+\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\right)\delta x_\chi\\
=&\int_V d^n x\left(-\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot g^{\sigma\chi}g_{\alpha\beta}\right)_{,\sigma}F[f]+\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\right)\delta x_\chi\\
=&\int_V d^n x\left(-\begin{pmatrix}\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot g^{\sigma\chi}\right)_{,\sigma}g_{\alpha\beta}\\+\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot g^{\sigma\chi}\right)g_{\alpha\beta,\sigma}\end{pmatrix}F[f]+\sqrt{-g}\cdot[\cdots]^{\alpha\beta}\cdot F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\right)\delta x_\chi\\
=&-\int_V d^n x\left(\left(\sqrt{-g}\cdot[\cdots]^{\alpha\beta}g^{\sigma\chi}\right)_{,\sigma}\cdot F[f]\cdot g_{\alpha\beta}\right)\delta x_\chi\\
\Rightarrow&\left(\sqrt{-g}\cdot\sqrt{F[f]^n}\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]g^{\sigma\chi}\right)_{,\sigma}\cdot g_{\alpha\beta}=\left(\sqrt{-g}\cdot\sqrt{F[f]^n}\left[R^{\alpha\beta}-\frac{R}{2}\cdot\frac{g^{\alpha\beta}}{F[f]}\right]g^{\sigma\chi}\right)_{,\sigma}\cdot g_{\alpha\beta}=0
\end{aligned}\quad .(25)$$

15.5.2. Deriving a Simple Equation of Elastic Space-Time

Now we have enough material for the derivation of quantum gravity equations sporting the typical structure of the equation of elasticity. In order to have an even more general derivation, we use
Fehler! Verweisquelle konnte nicht gefunden werden. and apply the procedure from the end of the previous subsection:

$$\delta_\sigma W = 0 = \int_V d^n x\sqrt{-g}\cdot\left(\begin{array}{c}\overbrace{\frac{\sqrt{F[f]^n}}{F[f]^2}\cdot\left(C_{N2}\cdot\frac{\partial^2 F[f]}{\partial f^2}-\frac{C_{N1}}{F[f]}\cdot\left(\frac{\partial F[f]}{\partial f}\right)^2\right)}^{\{\ldots\}}\cdot g^{\alpha\beta}\cdot f_{,\alpha}f_{,\beta}\\ +\underbrace{C_{N2}\cdot\frac{\sqrt{F[f]^n}}{F[f]^2}\cdot\frac{\partial F[f]}{\partial f}}_{[\ldots]}\cdot\Delta_g f\end{array}\right)\cdot g^{\sigma\chi}{}_{,\sigma}\delta x_\chi \qquad .(26)$$

$$= \int_V d^n x\sqrt{-g}\cdot\left(\{\ldots\}\cdot g^{\alpha\beta}\cdot f_{,\alpha}f_{,\beta}+[\ldots]\cdot\Delta_g f\right)\cdot g^{\sigma\chi}{}_{,\sigma}\delta x_\chi$$

Now we assume the scalar f to be a divergence $G^\sigma{}_{,\sigma}$ and incorporate this into (26) plus the simpler form (because of F[f]=f) **Fehler! Verweisquelle konnte nicht gefunden werden.**:

$$0=\{\ldots\}\cdot g^{\alpha\beta}\cdot\left(G^\sigma{}_{,\sigma}\right)_{,\alpha}\left(G^\sigma{}_{,\sigma}\right)_{,\beta}+[\ldots]\cdot\Delta_g\left(G^\sigma{}_{,\sigma}\right), \qquad (27)$$

$$\begin{array}{c} 0=C_{N2}\cdot\Delta_g\left(G^\sigma{}_{,\sigma}\right)-\frac{C_{N1}}{\left(G^\sigma{}_{,\sigma}\right)}\cdot G^\sigma{}_{,\sigma\beta}g^{\alpha\beta}G^\sigma{}_{,\sigma\alpha}\\ \xrightarrow{n=4} 0=2\cdot\left(G^\sigma{}_{,\sigma}\right)\cdot\Delta_g\left(G^\sigma{}_{,\sigma}\right)-3\cdot G^\sigma{}_{,\sigma\beta}g^{\alpha\beta}G^\sigma{}_{,\sigma\alpha}\\ \xrightarrow{n=6} 0=\Delta_g\left(G^\sigma{}_{,\sigma}\right)\end{array}. \qquad (28)$$

Applying integration by parts to the product term with the first derivative would just also give us an Laplace operator. As this is not exactly what we were aiming for, we simply consider another scalar term, formed from G-vectors, namely $G^\lambda G_\lambda+\alpha\cdot h\cdot G^\lambda{}_{,\lambda}$. Setting this into (22) gives us:

$$\begin{array}{c} \delta W=0=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\ \times\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}\left(G^\lambda G_\lambda+\alpha\cdot h\cdot G^\lambda{}_{,\lambda}\right)_{,\sigma}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\ =\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\ \times\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}\left(G^\lambda{}_{,\sigma}G_\lambda+G^\lambda G_{\lambda,\sigma}+\alpha\cdot h_{,\sigma}\cdot G^\lambda{}_{,\lambda}+\alpha\cdot h\cdot G^\lambda{}_{,\lambda\sigma}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\ \xrightarrow{G^\lambda=h^{,\lambda};G_\lambda=h_{,\lambda}}=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\ \times\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}\left(h^{,\lambda}{}_{,\sigma}h_{,\lambda}+h^{,\lambda}h_{,\lambda\sigma}+\alpha\cdot h_{,\sigma}\cdot h^{,\lambda}{}_{,\lambda}+\alpha\cdot h\cdot h^{,\lambda}{}_{,\lambda\sigma}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi \end{array}. \qquad (29)$$

Looking for some suitable integration by parts may lead us to:

$$\xrightarrow{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}g^{\sigma\chi}\cdot\sqrt{F[f]^n}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]=\{\dots\}^{\sigma\chi}}$$

$$=\int_V d^n x\begin{pmatrix}\{\dots\}^{\sigma\chi}\left(h^{,\lambda}{}_{,\sigma}h_{,\lambda}+h^{,\lambda}h_{,\lambda\sigma}+\alpha\cdot h_{,\sigma}\cdot h^{,\lambda}{}_{,\lambda}+\alpha\cdot h\cdot h^{,\lambda}{}_{,\lambda\sigma}\right)\\+\sqrt{-g}\cdot\sqrt{F[f]^n}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\end{pmatrix}\delta x_\chi$$

$$=\int_V d^n x\begin{pmatrix}-\begin{pmatrix}\left(\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\left(g^{\lambda\gamma}h_{,\gamma}\right)_{,\sigma}\right)_{,\lambda}+\left(\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}g^{\lambda\gamma}h_{,\lambda\sigma}\right)_{,\gamma}\\+\alpha\cdot\left(\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\left(g^{\lambda\gamma}h_{,\gamma}\right)_{,\lambda}\right)_{,\sigma}\end{pmatrix}\cdot h\\+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\alpha\cdot h\cdot h^{,\lambda}{}_{,\lambda\sigma}+\sqrt{-g}\cdot\sqrt{F[f]^n}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\end{pmatrix}\delta x_\chi$$

$$=\int_V d^n x\begin{pmatrix}-\begin{pmatrix}\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}{}_{,\lambda}g^{\lambda\gamma}h_{,\gamma\sigma}+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\Delta_g h_{,\sigma}+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}{}_{,\gamma}g^{\lambda\gamma}h_{,\lambda\sigma}+\dots\\+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\Delta_g h_{,\sigma}+\alpha\cdot\left(\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}g^{\lambda\gamma}\right)_{,\sigma}h_{,\gamma\lambda}+\alpha\cdot\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}g^{\lambda\gamma}h_{,\gamma\lambda\sigma}\end{pmatrix}\cdot h\\+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\alpha\cdot h\cdot g^{\lambda\gamma}h_{,\gamma\lambda\sigma}+\sqrt{-g}\cdot\sqrt{F[f]^n}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\end{pmatrix}\delta x_\chi . \quad (30)$$

Here, too, however, the result is not truly mirroring the fundamental equation of elasticity as all third order derivatives not resulting in Laplace operators vanish:

$$=\int_V d^n x\begin{pmatrix}-\begin{pmatrix}\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}{}_{,\lambda}g^{\lambda\gamma}h_{,\gamma\sigma}+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\Delta_g h_{,\sigma}+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}{}_{,\gamma}g^{\lambda\gamma}h_{,\lambda\sigma}+\dots\\+\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}\Delta_g h_{,\sigma}+\alpha\cdot\left(\sqrt{-g}\cdot\{\dots\}^{\sigma\chi}g^{\lambda\gamma}\right)_{,\sigma}h_{,\gamma\lambda}\end{pmatrix}\cdot h\\+\sqrt{-g}\cdot\sqrt{F[f]^n}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]F[f]\cdot g^{\sigma\chi}g_{\alpha\beta,\sigma}\end{pmatrix}\delta x_\chi . \quad (31)$$

Something obviously is missing. Either there is no elastic space-time option (not even in approximated form) or our approach is incomplete.

Remembering that the variation should not exclude certain options, we extend our approach in such a way that only the condition of W remaining a scalar will be fulfilled. Still staying as simple as possible, though, we start with (22) and apply a special variation for the function f:

$$\delta W = 0 = \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right)$$
$$\times \left(\frac{\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta}}{1+\alpha} \left(\left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \right)_{,\sigma} + \frac{\alpha}{2 \cdot n} \cdot \left(\begin{array}{c} \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\sigma} \right)_{,\gamma} \\ + \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\gamma\sigma} \right)_{,\lambda} \end{array} \right) \right) + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi$$
$$= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right)$$
$$\times \left(\frac{\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta}}{1+\alpha} \left(\left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \right)_{,\sigma} + \frac{\alpha}{n} \cdot \sqrt{-g} \cdot \Delta_g \left(h_{,\sigma} \right) \right) + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi$$
$$= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right)$$
$$\times \left(\frac{\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta}}{1+\alpha} \left(\left(\sqrt{-g} \cdot g^{\lambda\gamma} \right)_{,\sigma} h_{,\lambda\gamma} + \sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma\sigma} + \frac{\alpha}{n} \cdot \sqrt{-g} \cdot \Delta_g \left(h_{,\sigma} \right) \right) + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi . \quad (32)$$

In this context f would have to be considered as an internally structured scalar, which is subjected to a more general variation as follows:

$$f = \sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma}; \quad \delta \to \frac{\delta_\sigma}{1+\alpha} \cdot \left(1 + \frac{\alpha}{2 \cdot n} \cdot \left(\delta_\gamma^\sigma \delta_\sigma^\gamma + \delta_\lambda^\sigma \delta_\sigma^\lambda \right) \right)$$
$$\Rightarrow \delta f = \frac{\delta_\sigma}{1+\alpha} \cdot \left(1 + \frac{\alpha}{2 \cdot n} \cdot \left(\delta_\gamma^\sigma \delta_\sigma^\gamma + \delta_\lambda^\sigma \delta_\sigma^\lambda \right) \right) \sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma}$$
$$= \frac{\delta_\sigma}{1+\alpha} \cdot \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} + \frac{\alpha}{2 \cdot n} \cdot \left(\delta_\gamma^\sigma \sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \delta_\sigma^\gamma + \delta_\lambda^\sigma \sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \delta_\sigma^\lambda \right) \right)$$
$$= \frac{1}{1+\alpha} \cdot \left(\delta_\sigma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \right) + \frac{\alpha}{2 \cdot n} \cdot \left(\delta_\gamma^\sigma \delta_\sigma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \delta_\sigma^\gamma \right) + \delta_\lambda^\sigma \delta_\sigma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \delta_\sigma^\lambda \right) \right) \right) \cdot \quad (33)$$
$$= \frac{1}{1+\alpha} \cdot \left(\delta_\sigma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \right) + \frac{\alpha}{2 \cdot n} \cdot \left(\delta_\gamma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \delta_\sigma^\gamma \right) + \delta_\lambda \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \delta_\sigma^\lambda \right) \right) \right)$$
$$= \frac{1}{1+\alpha} \cdot \left(\delta_\sigma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \right) + \frac{\alpha}{2 \cdot n} \cdot \left(\delta_\gamma \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\sigma} \right) + \delta_\lambda \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\sigma\gamma} \right) \right) \right)$$
$$= \frac{1}{1+\alpha} \cdot \left(\left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\gamma} \right)_{,\sigma} + \frac{\alpha}{2 \cdot n} \cdot \left(\left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\lambda\sigma} \right)_{,\gamma} + \left(\sqrt{-g} \cdot g^{\lambda\gamma} h_{,\gamma\sigma} \right)_{,\lambda} \right) \right) \delta x^\sigma$$

Similarly, one may also keep the simple variation and consider the intrinsic degrees of f instead:

$$\begin{aligned}
f &= \frac{1}{1+\alpha}\cdot\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}+\frac{\alpha}{2\cdot n}\cdot\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\gamma}\delta_{\gamma}^{\sigma}+\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\lambda}\delta_{\lambda}^{\sigma}\right)\right);\quad \delta\to\delta_{\sigma}\\
\Rightarrow \delta f &= \frac{\delta_{\sigma}}{1+\alpha}\cdot\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}+\frac{\alpha}{2\cdot n}\cdot\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\gamma}\delta_{\gamma}^{\sigma}+\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\lambda}\delta_{\lambda}^{\sigma}\right)\right)\\
&= \frac{\delta_{\sigma}}{1+\alpha}\cdot\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}+\frac{\alpha}{2\cdot n}\cdot\left(\delta_{\gamma}^{\sigma}\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\gamma}+\delta_{\lambda}^{\sigma}\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\lambda}\right)\right)\\
&= \frac{1}{1+\alpha}\cdot\left(\delta_{\sigma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\right)+\frac{\alpha}{2\cdot n}\cdot\left(\delta_{\gamma}^{\sigma}\delta_{\sigma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\gamma}\right)+\delta_{\lambda}^{\sigma}\delta_{\sigma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\lambda}\right)\right)\right)\cdot \qquad (34)\\
&= \frac{1}{1+\alpha}\cdot\left(\delta_{\sigma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\right)+\frac{\alpha}{2\cdot n}\cdot\left(\delta_{\gamma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\gamma}\right)+\delta_{\lambda}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\delta_{\sigma}^{\lambda}\right)\right)\right)\\
&= \frac{1}{1+\alpha}\cdot\left(\delta_{\sigma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\right)+\frac{\alpha}{2\cdot n}\cdot\left(\delta_{\gamma}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\sigma}\right)+\delta_{\lambda}\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\sigma\gamma}\right)\right)\right)\\
&= \frac{1}{1+\alpha}\cdot\left(\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}\right)_{,\sigma}+\frac{\alpha}{2\cdot n}\cdot\left(\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\sigma}\right)_{,\gamma}+\left(\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\gamma\sigma}\right)_{,\lambda}\right)\right)\delta x^{\sigma}
\end{aligned}$$

The reader may prove easily that without the variation f just reduces to the following scalar:

$$f=\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\gamma}. \qquad (35)$$

Thus, we have introduced just an intelligent 1 as factor, namely in:

$$1=\frac{1}{1+\alpha}\cdot\left(1+\frac{\alpha}{2\cdot n}\cdot(n+n)\right);\quad 1=\frac{n}{n}=\frac{\delta_{\sigma}^{\gamma}\delta_{\gamma}^{\sigma}}{n}=\frac{\delta_{\sigma}^{\lambda}\delta_{\lambda}^{\sigma}}{n}. \qquad (36)$$

With the identity $G^{\lambda}=h^{,\lambda};G_{\lambda}=h_{,\lambda}$ we recognize the essentials of the governing equation of elasticity in the last line (32). Therby the vectors $G^{\lambda}=h^{,\lambda};G_{\lambda}=h_{,\lambda}$ represent simple displacement vectors. The similarity becomes obvious (c.f. [148 - 158]) when assuming an almost flat space and very nearly Cartesian coordinates, which simplifies (32) as follows:

$$\delta W=0\simeq\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\sqrt{-g}\cdot\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\alpha}\left(g^{\lambda\gamma}h_{,\lambda\gamma\sigma}+\frac{\alpha}{n}\cdot\Delta_g\left(h_{,\sigma}\right)\right)\right)g^{\sigma\chi}\delta x_{\chi}\ ,(37)$$

$$\Rightarrow 0=g^{\lambda\gamma}h_{,\sigma\lambda\gamma}+\frac{\alpha}{n}\cdot\Delta_g\left(h_{,\sigma}\right)$$

where for $\frac{\alpha}{n}=1-2\cdot\nu$ (ν giving the Poisson's ratio, s. e.g. [152]) we recognize the typical linear elastic equation for isotropic bodies in the absence of gravitational forces (thereby we only refer to the gravitational forces in the classical 3-dimensional linear theory of elasticity, as being meant in classical text books like [192] and not the quantum-gravimetric fields considered and derived here). Just as with the classical elasticity we find a vanishing Laplace operator for the case of incompressibility ν=0.5, where only shear would be allowed. We may assume that elementary particles with vanishing of very low masses would be described by such shear fields (see section 15.5.3).

Repeating the evaluation with an approach for f as follows:

$$\begin{aligned}f&=\frac{\sqrt{-g}}{1+\beta}\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}+\frac{\beta}{2\cdot n}\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta_\sigma^\gamma\delta_\gamma^\sigma+h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta_\sigma^\lambda\delta_\lambda^\sigma\right)\right);\quad \delta\to\delta_\sigma\\ \Rightarrow\delta f&=\frac{1}{1+\beta}\cdot\left(\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\right)_{,\sigma}+\frac{\beta}{2\cdot n}\cdot\left(\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\sigma}\right)_{,\gamma}+\left(\sqrt{-g}\cdot h_{,\sigma}g^{\lambda\gamma}h_{,\gamma}\right)_{,\lambda}\right)\right)\end{aligned},\quad (38)$$

leads us to:

$$\begin{aligned}\delta W=0&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\ &\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\beta}\left(\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\right)_{,\sigma}+\frac{\beta}{2\cdot n}\cdot\begin{pmatrix}\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\sigma}\right)_{,\gamma}\\ +\left(\sqrt{-g}\cdot h_{,\sigma}g^{\lambda\gamma}h_{,\gamma}\right)_{,\lambda}\end{pmatrix}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\ &=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\ &\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\beta}\begin{pmatrix}\left(\sqrt{-g}\cdot g^{\lambda\gamma}\right)_{,\sigma}h_{,\lambda}h_{,\gamma}+\sqrt{-g}\cdot g^{\lambda\gamma}\left(h_{,\lambda\sigma}h_{,\gamma}+h_{,\lambda}h_{,\gamma\sigma}\right)\\ +\frac{\beta}{n}\cdot h_{,\sigma}\sqrt{-g}\cdot\Delta_g h+\frac{\beta}{2\cdot n}\cdot g^{\lambda\gamma}\sqrt{-g}\cdot\left(h_{,\lambda}h_{,\sigma\gamma}+h_{,\sigma\lambda}h_{,\gamma}\right)\end{pmatrix}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\ &=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\ &\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\beta}\begin{pmatrix}\left(\sqrt{-g}\cdot g^{\lambda\gamma}\right)_{,\sigma}h_{,\lambda}h_{,\gamma}+\frac{\beta}{n}\cdot h_{,\sigma}\sqrt{-g}\cdot\Delta_g h\\ +\sqrt{-g}\cdot g^{\lambda\gamma}\left(1+\frac{\beta}{2\cdot n}\right)\left(h_{,\lambda\sigma}h_{,\gamma}+h_{,\lambda}h_{,\gamma\sigma}\right)\end{pmatrix}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\end{aligned}\quad .(39)$$

Integration by parts helps us to linearize parts of the integrand:

$$\begin{aligned}&\xrightarrow{\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]g^{\sigma\chi}=(\because)^{\alpha\beta\sigma\chi};\ \frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\beta}=A_{\alpha\beta}}\delta W=0=\int_V d^n x\,(\because)^{\alpha\beta\sigma\chi}\\ &\times\left(A_{\alpha\beta}\begin{pmatrix}\left(\sqrt{-g}\cdot g^{\lambda\gamma}\right)_{,\sigma}h_{,\lambda}h_{,\gamma}+\frac{\beta}{n}\cdot h_{,\sigma}\sqrt{-g}\cdot\Delta_g h\\ +\sqrt{-g}\cdot g^{\lambda\gamma}\left(1+\frac{\beta}{2\cdot n}\right)\left(h_{,\lambda\sigma}h_{,\gamma}+h_{,\lambda}h_{,\gamma\sigma}\right)\end{pmatrix}+F[f]\cdot g_{\alpha\beta,\sigma}\right)\delta x_\chi\\ &=\int_V d^n x\begin{pmatrix}(\because)^{\alpha\beta\sigma\chi}F[f]\cdot g_{\alpha\beta,\sigma}\\ -h\cdot\begin{pmatrix}\left((\because)^{\alpha\beta\sigma\chi}A_{\alpha\beta}\left(\sqrt{-g}\cdot g^{\lambda\gamma}\right)_{,\sigma}h_{,\lambda}\right)_{,\gamma}+\frac{\beta}{n}\cdot\left((\because)^{\alpha\beta\sigma\chi}A_{\alpha\beta}\sqrt{-g}\cdot\Delta_g h\right)_{,\sigma}\\ +\left(1+\frac{\beta}{2\cdot n}\right)\left(\left((\because)^{\alpha\beta\sigma\chi}A_{\alpha\beta}\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\lambda\sigma}\right)_{,\gamma}+\left((\because)^{\alpha\beta\sigma\chi}A_{\alpha\beta}\sqrt{-g}\cdot g^{\lambda\gamma}h_{,\gamma\sigma}\right)_{,\lambda}\right)\end{pmatrix}\end{pmatrix}\delta x_\chi\end{aligned}\quad .(40)$$

Once again considering the case of an almost flat space and very nearly Cartesian coordinates, the integrand simplifies to:

$$\simeq\int_V d^n x\left(-h\cdot\left(\begin{array}{c}\frac{\beta}{n}\cdot\left(\left(\because\right)^{\alpha\beta\sigma\chi}A_{\alpha\beta}\sqrt{-g}\cdot\Delta_g h\right)_{,\sigma}\\+\left(1+\frac{\beta}{2\cdot n}\right)\left(\because\right)^{\alpha\beta\sigma\chi}\sqrt{-g}\cdot g^{\lambda\gamma}\left(2\cdot A_{\alpha\beta}h_{,\lambda\gamma\sigma}+\left(A_{\alpha\beta,\gamma}h_{,\lambda\sigma}+A_{\alpha\beta,\lambda}h_{,\gamma\sigma}\right)\right)\end{array}\right)\right)\delta x_\chi$$

$$=\int_V d^n x\left(-h\cdot\left(\because\right)^{\alpha\beta\sigma\chi}\sqrt{-g}\cdot\left(\begin{array}{c}\frac{\beta}{n}\cdot\left(A_{\alpha\beta,\sigma}\cdot\Delta_g h+A_{\alpha\beta}\cdot\left(\Delta_g h\right)_{,\sigma}\right)\\+\left(1+\frac{\beta}{2\cdot n}\right)g^{\lambda\gamma}\left(2\cdot A_{\alpha\beta}h_{,\lambda\gamma\sigma}+\left(A_{\alpha\beta,\gamma}h_{,\lambda\sigma}+A_{\alpha\beta,\lambda}h_{,\gamma\sigma}\right)\right)\end{array}\right)\right)\delta x_\chi \quad (41)$$

$$\xrightarrow{F[f]=f}=\int_V d^n x\left(-h\cdot\left(\because\right)^{\alpha\beta\sigma\chi}\sqrt{-g}\cdot A_{\alpha\beta}\cdot\left(\frac{\beta}{n}\cdot\left(\Delta_g h\right)_{,\sigma}+2\cdot\left(1+\frac{\beta}{2\cdot n}\right)g^{\lambda\gamma}h_{,\lambda\gamma\sigma}\right)\right)\delta x_\chi$$

$$\Rightarrow 0=\frac{\beta}{n}\cdot\left(\Delta_g h\right)_{,\sigma}+2\cdot\left(1+\frac{\beta}{2\cdot n}\right)g^{\lambda\gamma}h_{,\lambda\gamma\sigma}\simeq\frac{\beta}{n}\cdot\Delta_g\left(h_{,\sigma}\right)+2\cdot\left(1+\frac{\beta}{2\cdot n}\right)g^{\lambda\gamma}h_{,\lambda\gamma\sigma}$$

As before in (37), we recognize the typical features of the fundamental equation of linear elasticity, only that this time we have the connection to the Poisson's ratio via:

$$\frac{\beta}{\left(2\cdot n+\beta\right)}=1-2\cdot\nu\quad\Rightarrow\quad\beta=n\cdot\left(\frac{1}{\nu}-2\right);\quad\nu=\frac{n}{2\cdot n+\beta}. \quad (42)$$

We note that for β=0 we would have incompressibility. Setting the result for β into our approach for f in (38):

$$f=\frac{\sqrt{-g}}{1+n\cdot\left(\frac{1}{\nu}-2\right)}\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}+\frac{\left(\frac{1}{\nu}-2\right)}{2}\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta^\gamma_\sigma\delta^\sigma_\gamma+h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta^\lambda_\sigma\delta^\sigma_\lambda\right)\right);\quad\delta\to\delta_\sigma$$

$$\begin{array}{l}\Rightarrow f=\frac{\sqrt{-g}\cdot\nu}{\nu+n\cdot\left(1-2\cdot\nu\right)}\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}+\left(\frac{1}{2\cdot\nu}-1\right)\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta^\gamma_\sigma\delta^\sigma_\gamma+h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta^\lambda_\sigma\delta^\sigma_\lambda\right)\right)\\=\frac{\sqrt{-g}}{\nu+n\cdot\left(1-2\cdot\nu\right)}\cdot\left(\nu\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}+\left(\frac{1}{2}-\nu\right)\cdot\left(h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta^\gamma_\sigma\delta^\sigma_\gamma+h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\delta^\lambda_\sigma\delta^\sigma_\lambda\right)\right)\\\Rightarrow\delta f=\frac{1}{\nu+n\cdot\left(1-2\cdot\nu\right)}\left(\begin{array}{c}\frac{\left(1-2\cdot\nu\right)\cdot\left(\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\sigma}\right)_{,\gamma}+\left(\sqrt{-g}\cdot h_{,\sigma}g^{\lambda\gamma}h_{,\gamma}\right)_{,\lambda}\right)}{2}\\+\nu\cdot\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\gamma}\right)_{,\sigma}\end{array}\right)\end{array},\quad (43)$$

results in the surprising constellation that, with a vanishing Poisson's ratio, the variation of f is dominated by the scalar f's intrinsic degree of freedom, namely the part:

$$\lim_{\nu\to\infty}\delta f=\frac{\left(\sqrt{-g}\cdot h_{,\lambda}g^{\lambda\gamma}h_{,\sigma}\right)_{,\gamma}+\left(\sqrt{-g}\cdot h_{,\sigma}g^{\lambda\gamma}h_{,\gamma}\right)_{,\lambda}}{2\cdot n}. \quad (44)$$

15.5.2.1. Conclusions with Respect to our Elastic Quantum Gravity Equations

We note, that in contrast to the f-situation, our intrinsic vector-approaches lead to some surprising equations not just sporting the fundamental structures of the classical equations of elasticity, but also revealing the inner degrees of freedom for a metric variation F[f], whereby f shows itself as structurally complex. This is the same situation as Dirac found when moving from the Klein-Gordon equation to his very own equation, which – of course – was the Dirac equation [143]. There, too, the formerly scalar function f became a vector function.

But can our elastic equations truly be the metric equivalent to the Dirac equation?

If so, we should expect to be able to derive some particle solutions, which we will attempt within the next sub-section.

15.5.3. From the Elastic Equation to Particles

15.5.3.1. Potential Elementary Particle Solutions?

In the previous setcion we have shown that a metric wrapper of the kind:

$$G_{\delta\gamma} = F\left[f\right] \cdot g_{\delta\gamma}, \tag{45}$$

subjected to the usual Hilbert variation and applying the chain rule during the variation process, results in quantum gravity equations as follows:

$$\begin{aligned} \delta W = 0 = \delta_\sigma \int_V d^n x \left(\sqrt{-G} \cdot R\right) &= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta}\right]\right) \delta_\sigma G_{\alpha\beta} \\ = \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta}\right]\right) &\left(\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta} f_{,\sigma} + F[f] \cdot g_{\alpha\beta,\sigma}\right) g^{\sigma\chi} \delta x_\chi \end{aligned}. \tag{46}$$

Allowing the scalar function f to be internally structured (e.g. being a divergence of a vector), brought us to equations with the typical structure known from the fundamental equations of elasticity (e.g. see (37)), where the internal vectors G_α forming the scalar f revealed themselves as displacement vectors. We suspect these vectors and their fields to describe elementary particles. However, as our resulting elastic equations from the previous section and their derivations are quite complicated and as we are only interested in the nearly flat space solutions anyway, we want to use simpler paths to obtain them.

15.5.3.2. Spin Due to Shear → Neutrino (?)

15.5.3.3. Electric Charge due to Contact Solutions → Electron & Positron (?)

Now we apply the same harmonic function H as used in the subsection above, set it as the G-harmonic G=H:

$$G = H = \int \frac{dt}{t^2 + x^2 + y^2 + z^2} = \frac{\arctan\left[\frac{t}{\sqrt{x^2+y^2+z^2}}\right]}{\sqrt{x^2+y^2+z^2}}; \quad \lim_{t\to\infty} G = \frac{1}{2}\pi\sqrt{\frac{1}{x^2+y^2+z^2}} \tag{47}$$

and consider the first solution in **Fehler! Verweisquelle konnte nicht gefunden werden.** in four dimensions t, x, y, z in the following form:

$$G^j = \partial^j G; \quad \partial^j = \delta^{jl}\partial_l = \partial_j. \tag{48}$$

With the function f[…] given as:

$$\mathrm{f} = \mathrm{f}\left[\mathrm{t},\mathrm{x},\mathrm{y},\mathrm{z}\right] = \frac{t}{\left(x^2+y^2+z^2\right)^2\left(1+\frac{t^2}{x^2+y^2+z^2}\right)} + \frac{\arctan\left[\frac{t}{\sqrt{x^2+y^2+z^2}}\right]}{\left(x^2+y^2+z^2\right)^{3/2}}, \tag{49}$$

the vector field G^j does read:

$$\mathrm{G}^{\mathrm{j}}\left[\mathrm{x}_{\mathrm{k}}\right] = \mathrm{C}_{\mathrm{f}} \cdot \mathrm{f} \cdot \left\{\frac{1}{\mathrm{f}\cdot\left(t^2+x^2+y^2+z^2\right)},\mathrm{x},\mathrm{y},\mathrm{z}\right\}. \tag{50}$$

The attentive reader recognizes the potential of a point charge for the limiting case of t→∞, because we have the following limit:

$$\mathrm{f}_{\infty} = \lim_{\mathrm{t}\to\infty}\mathrm{f}\left[\mathrm{t},\mathrm{x},\mathrm{y},\mathrm{z}\right] = \frac{\pi}{2}\cdot\frac{1}{\left(x^2+y^2+z^2\right)^{3/2}}, \tag{51}$$

$$\lim_{\mathrm{t}\to\infty}\mathrm{G}^{\mathrm{j}}\left[\mathrm{x}_{\mathrm{k}}\right] = \mathrm{C}_{\mathrm{f}}\cdot\mathrm{f}_{\infty}\cdot\left\{0,\mathrm{x},\mathrm{y},\mathrm{z}\right\} = \frac{\pi}{2}\cdot\frac{\mathrm{C}_{\mathrm{f}}}{\left(x^2+y^2+z^2\right)^{3/2}}\cdot\left\{0,\mathrm{x},\mathrm{y},\mathrm{z}\right\}. \tag{52}$$

We realize that with the constant:

$$\mathrm{C}_{\mathrm{f}} = \frac{2}{\pi}\cdot\frac{\mathrm{Q}}{4\cdot\pi\cdot\varepsilon_0} \tag{53}$$

we have in (52) the electric field of a point charge with charge Q. The constant ε_0 is the electric field constant.

The resulting vector field for a combined solution (52) and
Fehler! Verweisquelle konnte nicht gefunden werden. is been illustrated in figure 15.9.

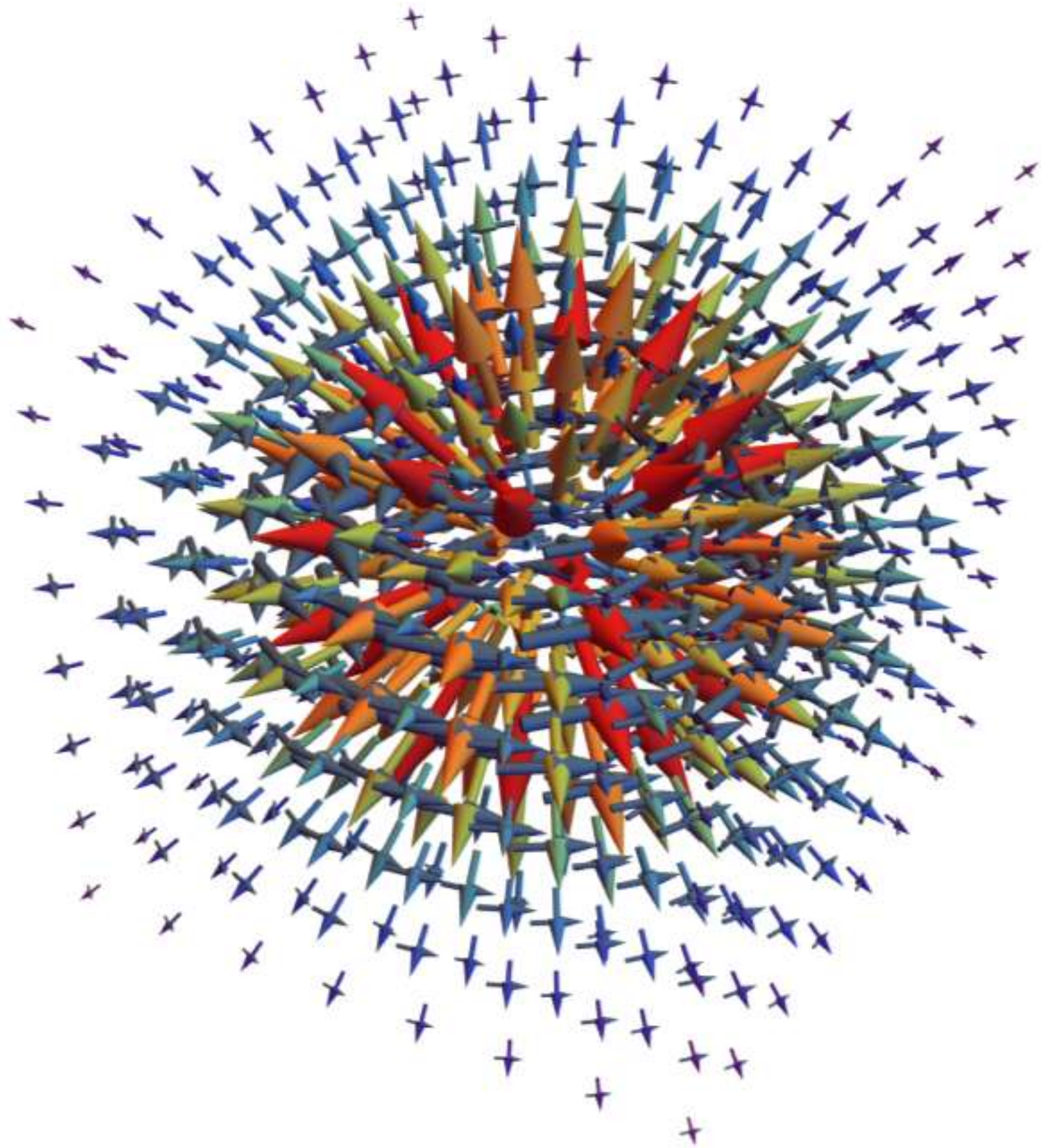


Fig. 15.9: Vector field for the particle coded with the solutions (52) (rainbow colored arrows) and Fehler! Verweisquelle konnte nicht gefunden werden. **(grey arrows).**

It is not illogic to assume that (50) together with **Fehler! Verweisquelle konnte nicht gefunden werden.** describes or at least has something to do with the metric form of the electron or the positron, leading to the total solution:

$$\begin{array}{l} G^j[x_k] = C_f \cdot f \cdot \left\{ \frac{1}{f \cdot (t^2 + x^2 + y^2 + z^2)}, x \pm \frac{y}{\chi}, y \mp \frac{x}{\chi}, z \right\} \\ \xrightarrow[t \to \infty]{\lim} C_f \cdot f_\infty \cdot \left\{ 0, x \pm \frac{y}{\chi}, y \mp \frac{x}{\chi}, z \right\} \\ G^j[x_k] = C_f \cdot f \cdot \left\{ \frac{1}{f \cdot (t^2 + x^2 + y^2 + z^2)}, x \pm \frac{z}{\chi}, y, z \mp \frac{x}{\chi} \right\} \\ \xrightarrow[t \to \infty]{\lim} C_f \cdot f_\infty \cdot \left\{ 0, x \pm \frac{x}{\chi}, y, z \mp \frac{x}{\chi} \right\} \\ G^j[x_k] = C_f \cdot f \cdot \left\{ \frac{1}{f \cdot (t^2 + x^2 + y^2 + z^2)}, x, y \mp \frac{z}{\chi}, z \pm \frac{y}{\chi} \right\} \\ \xrightarrow[t \to \infty]{\lim} C_f \cdot f_\infty \cdot \left\{ 0, x, y \mp \frac{z}{\chi}, z \pm \frac{y}{\chi} \right\}; \quad \text{with}: \ \frac{1}{\chi} = \frac{C_s}{i \cdot C_f} \end{array} . \tag{54}$$

For simplicity and brevity we assume in the following a unit system where we can set:

$$\frac{1}{\chi} = \frac{C_s}{C_f} = \frac{1}{i}. \tag{55}$$

From the structure of f we directly extract that +t- and –t-solutions are anti-symmetric except for their t-component, because for pairings of +t- and –t-solutions with equal spins we would obtain:

$$G^j[+t,\ldots] + G^j[-t,\ldots] = C_f \cdot \left\{ \frac{2}{(t^2 + x^2 + y^2 + z^2)}, 0, 0, 0 \right\} \xrightarrow[t \to \infty]{\lim} C_f \cdot \{0, 0, 0, 0\}. \tag{56}$$

In the case of antiparallel spin pairings our result would be as follows (we only present the evaluation for the case of spin in z):

$$\begin{array}{l} G^j[+t,\ldots]\uparrow + G^j[-t,\ldots]\downarrow = C_f \cdot f \cdot \left\{ \frac{1}{f \cdot (t^2 + x^2 + y^2 + z^2)}, x + \frac{y}{i}, y - \frac{x}{i}, z \right\} \\ \qquad - C_f \cdot f \cdot \left\{ \frac{-1}{f \cdot (t^2 + x^2 + y^2 + z^2)}, x - \frac{y}{i}, y + \frac{x}{i}, z \right\} \\ = 2 \cdot C_f \cdot f \cdot \left\{ \frac{1}{f \cdot (t^2 + x^2 + y^2 + z^2)}, \frac{y}{i}, -\frac{x}{i}, 0 \right\} \xrightarrow[t \to \infty]{\lim} 2 \cdot C_f \cdot f_\infty \cdot \left\{ 0, \frac{y}{i}, -\frac{x}{i}, 0 \right\} \end{array} . \tag{57}$$

Considering the result in (57) of photonic character we might conclude that, in order to account for the law of conserved energy, only the annihilation process (57) would be allowed, while (56) could only appear in connection with virtual particles.

15.5.3.4. Postulation

15.5.3.5. The Three Generations of Particles

15.5.3.6. Back to the Neutrino – About its Oscillations

15.5.3.7. An Asymmetry

15.5.3.8. Towards Metric Quark Solutions

15.5.3.9. Testing the Theory

Apart from the option to test the theory outlined here by the means of the matter anti-matter asymmetry in our universe as hinted in the subsection "An Asymmetry" above, we could also try and investigate the time dependencies of the particles. Either directly after creation or briefly before annihilation, the supposed to be stable particles (e.g. electrons and positrons) following the t-dependencies as given in states
Fehler! Verweisquelle konnte nicht gefunden werden. to
Fehler! Verweisquelle konnte nicht gefunden werden. and
Fehler! Verweisquelle konnte nicht gefunden werden. should appear significantly different than during their $t \rightarrow \infty$-period of existence. As a suitable assumption for the time scales, one requires to observe the evolution of these particles, automatically leads to the lifetime of the heavier entities. Thus, experimentalists would face the problem of resolving electron properties within the range $<<10^{-6}$seconds after their creation.

In other words, one would have to make the actual creation process of positron-electron pairs visible in order to see whether or whether not the theory outlined here provides anything of use.

A third testing option arises from the fact that in the current hypothesis to explain excited particle states as timely integrations, there is no condition to be seen which would restrict the number of such "exciting integrations". It is therefore to be concluded that in principle also heavier leptons than the tauon should exist. However, as their life time will most likely be extremely short and their probability to even come into existence will surely be overshadowed by many lighter particles, it is of little wonder that so far no observations of such particles have been reported.

Last but not least, we expect a permanent creation and annihilation of the quark-particles within mesons and hadrons. As the only explanation for the confinement of the quarks is been seen in the manifestation of excited states **Fehler! Verweisquelle konnte nicht gefunden werden.** to
Fehler! Verweisquelle konnte nicht gefunden werden. and
Fehler! Verweisquelle konnte nicht gefunden werden., there, so must be concluded, has to be an infinite ongoing of birth and decease of these particles in a circle of permanent interchange. Observations of this cyclic interior within the mesons or hadrons should also help us to reveal the intrinsic nature of the particles in connection with our corresponding metric solutions.

15.6. Summing up the Simplest Example

Simply by demanding that the integrand of the Einstein-Hilbert-Action gives a constant, we were able to derive quantum equations in Klein-Gordon and Dirac style for any arbitrary number of dimensins $n \geq 2$ (n integer) and any arbitrary metric. We therefore conclude that not only the Einstein-Field-Equations, respectively the General Theory of Relativity resides within the Einstein-Hilbert-Action, but also Quantum Theory. The problem just was to get it out from there.

As a by product it was found that the metric equivalent of the Dirac equation, where we obtain function vectors instead of scalar functions, is just some kind of elastic equation of space-time, with then those vector functions being equivalent to displacement vectors in the theory of elasticity. The introduction of quaternions is not of need anymore.

15.7. Using a Base Vector Approach → Leading us to a Metric Dirac Equation

Even though we already resulted in the Dirac equation by simply considering the Ricci scalar of the transformed (wrapped or scaled) metric tensor $G_{\delta\gamma} = F[f] \cdot g_{\delta\gamma}$ in section 15.2 in connection with a Minkowski space-time, we are still interested to obtain first order metric equations in Dirac style (but potentially without the need to resort to quaternions) in the most general manner possible.

Thus, for completeness, we also want to consider the variation (22) with an f-setting of the kind:

$$\begin{aligned}
f = \mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} &= \frac{\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} + \alpha \cdot \mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} + \beta \cdot g^{\xi\rho} \mathbf{e}_{\rho} \cdot \mathbf{G}_{\xi}}{1+\alpha+\beta} = \frac{\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} + \frac{\alpha}{n} \cdot \delta_{\xi}^{\sigma} \mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \delta_{\sigma}^{\xi} + \frac{\beta}{n} \cdot \delta_{\sigma}^{\rho} \delta_{\rho}^{\sigma} g^{\xi\rho} \mathbf{e}_{\rho} \cdot \mathbf{G}_{\xi}}{1+\alpha+\beta} \\
\Rightarrow \delta_{\sigma} f &= \frac{\delta_{\sigma}}{1+\alpha+\beta} \cdot \left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} + \frac{\alpha}{n} \cdot \delta_{\xi}^{\sigma} \mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \delta_{\sigma}^{\xi} + \frac{\beta}{n} \cdot \delta_{\sigma}^{\rho} \delta_{\rho}^{\sigma} g^{\xi\rho} \mathbf{e}_{\rho} \cdot \mathbf{G}_{\xi} \right) \\
&= \frac{1}{1+\alpha+\beta} \cdot \left(\delta_{\sigma} \left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \right) + \frac{\alpha}{n} \cdot \delta_{\xi}^{\sigma} \delta_{\sigma} \left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \delta_{\sigma}^{\xi} \right) + \frac{\beta}{n} \cdot \delta_{\rho}^{\sigma} \delta_{\sigma} \left(\delta_{\sigma}^{\rho} g^{\xi\rho} \mathbf{e}_{\rho} \cdot \mathbf{G}_{\xi} \right) \right) \\
&= \frac{1}{1+\alpha+\beta} \cdot \left(\delta_{\sigma} \left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \right) + \frac{\alpha}{n} \cdot \delta_{\xi} \left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\sigma} \right) + \frac{\beta}{n} \cdot \delta_{\rho} \left(g^{\xi\rho} \mathbf{e}_{\sigma} \cdot \mathbf{G}_{\xi} \right) \right) \\
&= \frac{1}{1+\alpha+\beta} \cdot \left(\left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \right)_{,\sigma} + \frac{\alpha}{n} \cdot \left(\mathbf{e}^{\xi} \cdot \mathbf{G}_{\sigma} \right)_{,\xi} + \frac{\beta}{n} \cdot \left(g^{\xi\rho} \mathbf{e}_{\sigma} \cdot \mathbf{G}_{\xi} \right)_{,\rho} \right) \delta x^{\sigma}
\end{aligned} \quad ,(58)$$

where $\mathbf{e}^{\xi}$ denotes the components of a contravariant base vector and $\mathbf{G}_{\xi}$ stands for the components of contravariant base vector-like form.

Subjecting this to the Hilbert variation and applying the chain rule during the variation process, results in:

$$\begin{aligned}
\delta W = 0 = \delta_{\sigma} \int_V d^n x \left(\sqrt{-G} \cdot R \right) &= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right) \delta_{\sigma} G_{\alpha\beta} \\
&= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right) \\
\times \left(\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta} \left(\frac{\mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} + \frac{\alpha}{n} \cdot \delta_{\xi}^{\sigma} \mathbf{e}^{\xi} \cdot \mathbf{G}_{\xi} \delta_{\sigma}^{\xi} + \frac{\beta}{n} \cdot \delta_{\sigma}^{\rho} \delta_{\rho}^{\sigma} g^{\xi\rho} \mathbf{e}_{\rho} \cdot \mathbf{G}_{\xi}}{1+\alpha+\beta} \right)_{,\sigma} \right. &\left. + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_{\chi}
\end{aligned} \quad . \quad (59)$$

Using the results from (58) we obtain:

$$
\begin{aligned}
&= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right) \\
&\times \left(\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta} \left(\frac{\partial_\sigma \left(\mathbf{e}^\xi \cdot \mathbf{G}_\xi \right) + \frac{\alpha}{n} \cdot \delta^\sigma_\xi \partial_\sigma \left(\mathbf{e}^\xi \cdot \mathbf{G}_\xi \delta^\xi_\sigma \right) + \frac{\beta}{n} \cdot \delta^\sigma_\rho \partial_\sigma \left(\delta^\rho_\sigma g^{\xi\rho} \mathbf{e}_\rho \cdot \mathbf{G}_\xi \right)}{1+\alpha+\beta} \right) + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi \\
&= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right) \\
&\times \left(\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta} \left(\frac{\left(\mathbf{e}^\xi \cdot \mathbf{G}_\xi \right)_{,\sigma} + \frac{\alpha}{n} \cdot \left(\mathbf{e}^\xi \cdot \mathbf{G}_\sigma \right)_{,\xi} + \frac{\beta}{n} \cdot \left(g^{\xi\rho} \mathbf{e}_\sigma \cdot \mathbf{G}_\xi \right)_{,\rho}}{1+\alpha+\beta} \right) + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi \\
&= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right) \\
&\times \left(\frac{\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta}}{1+\alpha+\beta} \left(\begin{array}{c} \mathbf{e}^\xi{}_{,\sigma} \cdot \mathbf{G}_\xi + \mathbf{e}^\xi \cdot \mathbf{G}_{\xi,\sigma} + \frac{\alpha}{n} \cdot \left(\mathbf{e}^\xi{}_{,\xi} \cdot \mathbf{G}_\sigma + \mathbf{e}^\xi \cdot \mathbf{G}_{\sigma,\xi} \right) \\ + \frac{\beta}{n} \cdot \left(g^{\xi\rho}{}_{,\rho} \mathbf{e}_\sigma \cdot \mathbf{G}_\xi + g^{\xi\rho} \mathbf{e}_{\sigma,\rho} \cdot \mathbf{G}_\xi + g^{\xi\rho} \mathbf{e}_\sigma \cdot \mathbf{G}_{\xi,\rho} \right) \end{array} \right) + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi .
\end{aligned}
\tag{60}
$$

Assuming an almost flat space-time in Cartesian-like coordinates again, where the metric derivatives may be zero, but not necessarily the derivatives of the base vectors, leads us to a set of first order differential equations, where we cannot help noticing that there is quite some matrix similarity to the classical Dirac equation [143]:

$$
\begin{aligned}
&= \int_V d^n x \left(\sqrt{-G} \cdot \left[R^{\alpha\beta} - \frac{R}{2} G^{\alpha\beta} \right] \right) \times \left(\frac{\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta}}{1+\alpha+\beta} \left(\begin{array}{c} \mathbf{e}^\xi{}_{,\sigma} \cdot \mathbf{G}_\xi + \mathbf{e}^\xi \cdot \mathbf{G}_{\xi,\sigma} \\ + \frac{\alpha}{n} \cdot \left(\mathbf{e}^\xi{}_{,\xi} \cdot \mathbf{G}_\sigma + \mathbf{e}^\xi \cdot \mathbf{G}_{\sigma,\xi} \right) \\ + \frac{\beta}{n} \cdot \left(g^{\xi\rho} \mathbf{e}_{\sigma,\rho} \cdot \mathbf{G}_\xi + g^{\xi\rho} \mathbf{e}_\sigma \cdot \mathbf{G}_{\xi,\rho} \right) \end{array} \right) \right) g^{\sigma\chi} \delta x_\chi . \\
&\Rightarrow 0 = \mathbf{e}^\xi{}_{,\sigma} \cdot \mathbf{G}_\xi + \mathbf{e}^\xi \cdot \mathbf{G}_{\xi,\sigma} + \frac{\alpha}{n} \cdot \left(\mathbf{e}^\xi{}_{,\xi} \cdot \mathbf{G}_\sigma + \mathbf{e}^\xi \cdot \mathbf{G}_{\sigma,\xi} \right) + \frac{\beta}{n} \cdot \left(g^{\xi\rho} \mathbf{e}_{\sigma,\rho} \cdot \mathbf{G}_\xi + g^{\xi\rho} \mathbf{e}_\sigma \cdot \mathbf{G}_{\xi,\rho} \right)
\end{aligned}
\tag{61}
$$

This suspicion becomes obvious when imagining all derivatives of base vectors as masses and / or potentials.

In order to better understand the result we apply the following approach for $\mathbf{G}_\xi$:

$$
\mathbf{G}_\xi = \mathbf{e}_\xi \cdot h \tag{62}
$$

and obtain:

$$
\begin{aligned}
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\
&\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\alpha+\beta}\left(\begin{array}{c}\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{e}_{\xi}\cdot h+\mathbf{e}^{\xi}\cdot\left(\mathbf{e}_{\xi}\cdot h\right)_{,\sigma}+\frac{\alpha}{n}\cdot\left(\mathbf{e}^{\xi}{}_{,\xi}\cdot\mathbf{e}_{\sigma}\cdot h+\mathbf{e}^{\xi}\cdot\left(\mathbf{e}_{\sigma}\cdot h\right)_{,\xi}\right)\\ +\frac{\beta}{n}\cdot\left(g^{\xi\rho}{}_{,\rho}\mathbf{e}_{\sigma}\cdot\mathbf{e}_{\xi}\cdot h+g^{\xi\rho}\mathbf{e}_{\sigma,\rho}\cdot\mathbf{e}_{\xi}\cdot h+g^{\xi\rho}\mathbf{e}_{\sigma}\cdot\left(\mathbf{e}_{\xi}\cdot h\right)_{,\rho}\right)\end{array}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}\\
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\
&\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\alpha+\beta}\left(\begin{array}{c}\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{e}_{\xi}\cdot h+\mathbf{e}^{\xi}\cdot\left(\mathbf{e}_{\xi,\sigma}\cdot h+\mathbf{e}_{\xi}\cdot h_{,\sigma}\right)\\ +\frac{\alpha}{n}\cdot\left(\mathbf{e}^{\xi}{}_{,\xi}\cdot\mathbf{e}_{\sigma}\cdot h+\mathbf{e}^{\xi}\cdot\left(\mathbf{e}_{\sigma,\xi}\cdot h+\mathbf{e}_{\sigma}\cdot h_{,\xi}\right)\right)\\ +\frac{\beta}{n}\cdot\left(g^{\xi\rho}{}_{,\rho}\mathbf{e}_{\sigma}\cdot\mathbf{e}_{\xi}\cdot h+g^{\xi\rho}\mathbf{e}_{\sigma,\rho}\cdot\mathbf{e}_{\xi}\cdot h+g^{\xi\rho}\mathbf{e}_{\sigma}\cdot\left(\mathbf{e}_{\xi,\rho}\cdot h+\mathbf{e}_{\xi}\cdot h_{,\rho}\right)\right)\end{array}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}\\
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\
&\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\alpha+\beta}\left(\begin{array}{c}\left(\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{e}_{\xi}+\mathbf{e}^{\xi}\cdot\mathbf{e}_{\xi,\sigma}\right)\cdot h+n\cdot h_{,\sigma}\\ +\frac{\alpha}{n}\cdot\left(\left(\mathbf{e}^{\xi}{}_{,\xi}\cdot\mathbf{e}_{\sigma}+\mathbf{e}^{\xi}\cdot\mathbf{e}_{\sigma,\xi}\right)\cdot h+\delta^{\xi}_{\sigma}\cdot h_{,\xi}\right)\\ +\frac{\beta}{n}\cdot\left(\left(g_{\sigma\xi}g^{\xi\rho}{}_{,\rho}+\mathbf{e}_{\sigma,\rho}\cdot\mathbf{e}^{\rho}+g^{\xi\rho}\mathbf{e}_{\sigma}\cdot\mathbf{e}_{\xi,\rho}\right)\cdot h+\delta^{\rho}_{\sigma}\cdot h_{,\rho}\right)\end{array}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}\\
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\
&\times\left(\frac{\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}}{1+\alpha+\beta}\left(\begin{array}{c}\left(\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{e}_{\xi}+\mathbf{e}^{\xi}\cdot\mathbf{e}_{\xi,\sigma}\right)\cdot h+\left(n+\frac{\alpha}{n}+\frac{\beta}{n}\right)\cdot h_{,\sigma}\\ +\frac{\alpha}{n}\cdot\left(\mathbf{e}^{\xi}{}_{,\xi}\cdot\mathbf{e}_{\sigma}+\mathbf{e}^{\xi}\cdot\mathbf{e}_{\sigma,\xi}\right)\cdot h\\ +\frac{\beta}{n}\cdot\left(g_{\sigma\xi}g^{\xi\rho}{}_{,\rho}+\mathbf{e}_{\sigma,\rho}\cdot\mathbf{e}^{\rho}+g^{\xi\rho}\mathbf{e}_{\sigma}\cdot\mathbf{e}_{\xi,\rho}\right)\cdot h\end{array}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}
\end{aligned}
\quad . \quad (63)
$$

The reader notes that once more we have introduced an intelligent constant n, because we have made use of the following identity:

$$
f=\mathbf{e}^{\xi}\cdot\mathbf{G}_{\xi}=n\cdot h=\mathbf{e}^{\xi}\cdot\mathbf{e}_{\xi}\cdot h=\ldots, \qquad (64)
$$

with the rest of the development of intelligent constants in f just following (58). In order to move forward, we set α=β=0 and simplify (63) as follows:

$$
\begin{aligned}
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\times\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}\partial_\sigma\left(\mathbf{e}^\xi\cdot\mathbf{e}_\xi\cdot h\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\\
&\times\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}\left(\mathbf{e}^\xi{}_{,\sigma}\cdot\mathbf{e}_\xi\cdot h+\mathbf{e}^\xi\cdot\mathbf{e}_{\xi,\sigma}\cdot h+n\cdot h_{,\sigma}\right)+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi
\end{aligned}
\quad . \qquad (65)
$$

Setting F[f]=f, we can further simplify and obtain a seemingly meaningless result:

$$
\begin{aligned}
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\times\left(g_{\alpha\beta}\left(\overbrace{\mathbf{e}^\xi{}_{,\sigma}\cdot\mathbf{e}_\xi\cdot h+\mathbf{e}^\xi\cdot\mathbf{e}_{\xi,\sigma}\cdot h}^{=\left(\mathbf{e}^\xi\cdot\mathbf{e}_\xi\right)_{,\sigma}\cdot h=0}+n\cdot h_{,\sigma}\right)+n\cdot h\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\times n\cdot\left(g_{\alpha\beta}h_{,\sigma}+h\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi
\end{aligned}
\quad .(66)
$$

However, things clear up a little bit, when assuming an after all perhaps not so unsual constellation for the curvature terms, being proportional to the metric tensor, namely:

$$
\begin{aligned}
&\xrightarrow{\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\simeq\frac{\omega}{n^2}\cdot g^{\alpha\beta}}=\int_V d^n x\left(\sqrt{-G}\right)\frac{\omega}{n^2}\cdot g^{\alpha\beta}n\cdot\left(g_{\alpha\beta}h_{,\sigma}+h\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
&=\int_V d^n x\left(\sqrt{-G}\right)\cdot\left(g^{\sigma\chi}h_{,\sigma}+\frac{\omega}{n}\cdot h\cdot g^{\alpha\beta}g_{\alpha\beta,\sigma}g^{\sigma\chi}\right)\delta x_\chi\\
&\Rightarrow 0=g^{\sigma\chi}h_{,\sigma}+\frac{\omega}{n}\cdot h\cdot g^{\alpha\beta}g_{\alpha\beta,\sigma}g^{\sigma\chi}
\end{aligned}
\quad . \qquad (67)
$$

Now we recognize quite some similarity to the Dirac equation, only that h is not a vector as it should be, but only a scalar. In order to move forward from here, we keep the $\mathbf{G}_\xi$: but maintain all other simplifications like the simple metric-proportional curvature assumption, F[f]=f and α=β=0. This gives us:

$$
\begin{aligned}
&\xrightarrow{\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\simeq\frac{\omega}{n}\cdot g^{\alpha\beta}}=\int_V d^n x\sqrt{-G}\cdot\frac{\omega}{n}g^{\alpha\beta}\times\left(g_{\alpha\beta}\left(\mathbf{e}^\xi{}_{,\sigma}\cdot\mathbf{G}_\xi+\mathbf{e}^\xi\cdot\mathbf{G}_{\xi,\sigma}\right)+\mathbf{e}^\xi\cdot\mathbf{G}_\xi\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
&=\int_V d^n x\sqrt{-G}\times\omega\left(\left(\mathbf{e}^\xi{}_{,\sigma}\cdot\mathbf{G}_\xi+\mathbf{e}^\xi\cdot\mathbf{G}_{\xi,\sigma}\right)+\mathbf{e}^\xi\cdot\mathbf{G}_\xi\cdot g^{\alpha\beta}g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\
&\Rightarrow 0=\mathbf{e}^\xi\cdot\mathbf{G}_{\xi,\sigma}g^{\sigma\chi}+\mathbf{G}_\xi\cdot\left(\mathbf{e}^\xi\cdot g^{\alpha\beta}g_{\alpha\beta,\sigma}+\mathbf{e}^\xi{}_{,\sigma}\right)g^{\sigma\chi}\quad /\quad\cdot\mathbf{e}_\varsigma\\
&0=\delta^\xi_\varsigma\mathbf{G}_{\xi,\sigma}g^{\sigma\chi}+\mathbf{G}_\xi\cdot\left(\delta^\xi_\varsigma g^{\alpha\beta}g_{\alpha\beta,\sigma}+\mathbf{e}_\varsigma\cdot\mathbf{e}^\xi{}_{,\sigma}\right)g^{\sigma\chi}\\
&=\mathbf{G}_{\varsigma,\sigma}g^{\sigma\chi}+\mathbf{G}_\xi\cdot\left(\delta^\xi_\varsigma g^{\alpha\beta}g_{\alpha\beta,\sigma}+\mathbf{e}_\varsigma\cdot\mathbf{e}^\xi{}_{,\sigma}\right)g^{\sigma\chi}
\end{aligned}
\quad .(68)
$$

Here we can see now that an introduction of an arbitrary constant vector **E** and an approach of the kind:

$$
\mathbf{G}_\xi=\mathbf{E}\cdot G_\xi \qquad (69)
$$

should bring us forward, because now we obtain the following from the variation (simply insert (69) into (68)):

$$\xrightarrow{\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\simeq\frac{\omega}{n}\cdot g^{\alpha\beta}} = \int_V d^n x\sqrt{-G}\cdot\frac{\omega}{n}g^{\alpha\beta}\times\left(g_{\alpha\beta}\left(\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{E}\cdot G_{\xi}+\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi,\sigma}\right)+\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi}\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}$$

$$\begin{aligned}
&\Rightarrow 0=\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi,\sigma}g^{\sigma\chi}+\mathbf{E}\cdot G_{\xi}\cdot\left(\mathbf{e}^{\xi}\cdot g^{\alpha\beta}g_{\alpha\beta,\sigma}+\mathbf{e}^{\xi}{}_{,\sigma}\right)g^{\sigma\chi}\quad / \quad\cdot\mathbf{e}_{\varsigma} \\
&=\mathbf{E}\cdot G_{\varsigma,\sigma}g^{\sigma\chi}+\mathbf{E}\cdot G_{\xi}\cdot\left(\delta_{\varsigma}^{\xi}g^{\alpha\beta}g_{\alpha\beta,\sigma}+\mathbf{e}_{\varsigma}\cdot\mathbf{e}^{\xi}{}_{,\sigma}\right)g^{\sigma\chi} \\
&=G_{\varsigma,\sigma}g^{\sigma\chi}+G_{\xi}\cdot\left(\delta_{\varsigma}^{\xi}g^{\alpha\beta}g_{\alpha\beta,\sigma}+\mathbf{e}_{\varsigma}\cdot\mathbf{e}^{\xi}{}_{,\sigma}\right)g^{\sigma\chi}
\end{aligned}\quad . \quad (70)$$

This clearly seems to resemble a metric Dirac equation.

Keen on performing the evaluation without the approximation $\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\simeq\frac{\omega}{n}\cdot g^{\alpha\beta}$, we need to remind ourselves that the Ricci curvature tensor $R^{\alpha\beta}$ and scalar R as used in this section 15.7 so far are based on the transformed metric $G_{\alpha\beta}$. Their appearance, if being given in dependence on the untransformed metric $g_{\alpha\beta}$, was already discussed in section 3.3 (c.f. also section 16). From there we extract the following:

$$\begin{aligned}
\delta W=0&=\delta_{\sigma}\int_V d^n x\left(\sqrt{-G}\cdot R^{*}\right)=\delta_{\sigma}\int_V d^n x\left(\sqrt{-G}\cdot\left(R_{*}^{*}+R_{*}^{**}\right)\right) \\
\xrightarrow{F_{\alpha\beta}^{\xi\zeta}\to F}&=\delta_{\sigma}\int_V d^n x\left(\frac{\sqrt{-G}}{F[f]}\cdot\left(R+R^{**}\right)\right)=\delta_{\sigma}\int_V d^n x\left(\frac{\sqrt{-g\cdot F[f]^n}}{F[f]}\cdot\left(R+\overset{=-2\kappa L_M}{R^{**}}\right)\right) \\
&=\int_V d^n x\,\delta_g\left(\sqrt{-g}\cdot\left(R-2\kappa L_M\right)\right)\times\delta_{\sigma}\left(\frac{\sqrt{F[f]^n}}{F[f]}g_{\alpha\beta}\right) \\
&=\int_V d^n x\left(\sqrt{-g}\cdot\left[R^{\alpha\beta}-\frac{R}{2}g^{\alpha\beta}+\kappa T^{\alpha\beta}\right]\right)\times\delta_{\sigma}\left(\frac{\sqrt{F[f]^n}}{F[f]}g_{\alpha\beta}\right) \\
&=\int_V d^n x\left(\sqrt{-g}\cdot\left[R^{\alpha\beta}-\frac{R}{2}g^{\alpha\beta}+\kappa T^{\alpha\beta}\right]\right)\cdot F[f]^{\frac{n-4}{2}}\cdot\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}
\end{aligned}\quad . \quad (71)$$

Please see section 16 and 3.3 with respect to the definition and derivation of the various Ricci scalars R, $R^{*},R^{**},R_{*}^{*},R_{*}^{**}$. Thereby the energy momentum tensor has to be evaluated from:

$$\int_V d^n x\,\delta_g\left(\sqrt{-g}\cdot\left(-2L_M\right)\right)=\int_V d^n x\left(\sqrt{-g}\cdot T^{\alpha\beta}\right)\cdot\delta_{\sigma} \quad (72)$$

with the matter Lagrange density given via:

$$L_M\equiv-\frac{R^{**}}{2\kappa}=-\frac{F[f]\cdot R_{*}^{**}}{2\kappa}=\frac{g^{\alpha\beta}}{2\kappa}\begin{pmatrix}\Gamma_{\sigma\alpha}^{\mu}\Gamma_{\beta\mu}^{**\sigma}-\Gamma_{\alpha\beta}^{\sigma}\Gamma_{\sigma\mu}^{**\mu}+\Gamma_{\sigma\alpha}^{**\mu}\Gamma_{\beta\mu}^{\sigma}-\Gamma_{\alpha\beta}^{**\sigma}\Gamma_{\sigma\mu}^{\mu} \\ -\Gamma_{\alpha\beta\,,\sigma}^{**\sigma}+\Gamma_{\beta\sigma\,,\alpha}^{**\sigma}+\Gamma_{\sigma\alpha}^{**\mu}\Gamma_{\beta\mu}^{**\sigma}-\Gamma_{\alpha\beta}^{**\sigma}\Gamma_{\sigma\mu}^{**\mu}\end{pmatrix} \quad (73)$$

and the “F[f]-transformed” affine connection:

$$\Gamma_{\alpha\beta}^{**\gamma}\equiv\frac{g^{\gamma\sigma}}{2\cdot F[f]}\left(F[f]_{,\beta}\cdot g_{\sigma\alpha}+F[f]_{,\alpha}\cdot g_{\sigma\beta}-F[f]_{,\sigma}\cdot g_{\alpha\beta}\right). \quad (74)$$

Inserting (69) into the last line of (71) now leads us to the non-approximated result:

$$
\begin{aligned}
&=\int_V d^n x\left(\sqrt{-g}\cdot\left[R^{\alpha\beta}-\frac{R}{2}g^{\alpha\beta}+\kappa T^{\alpha\beta}\right]\right)\cdot F[f]^{\frac{n-4}{2}}\\
&\times\left(\left(g_{\alpha\beta}\left(\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{E}\cdot G_{\xi}+\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi,\sigma}\right)+\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi}\cdot g_{\alpha\beta,\sigma}\right)\right)g^{\sigma\chi}\delta x_{\chi}\\
&=\int_V d^n x\sqrt{-g}\cdot F[f]^{\frac{n-4}{2}}\left(\left(\begin{array}{c}\left[R^{\alpha\beta}-\frac{R}{2}g^{\alpha\beta}+\kappa T^{\alpha\beta}\right]g_{\alpha\beta}\left(\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{E}\cdot G_{\xi}+\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi,\sigma}\right)\\ +\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi}\cdot\overbrace{\left[R^{\alpha\beta}-\frac{R}{2}g^{\alpha\beta}+\kappa T^{\alpha\beta}\right]}^{[\cdots]^{\alpha\beta}}g_{\alpha\beta,\sigma}\end{array}\right)\right)g^{\sigma\chi}\delta x_{\chi}\\
&=\int_V d^n x\sqrt{-g}\cdot F[f]^{\frac{n-4}{2}}\left(\left(\begin{array}{c}\overbrace{\left[R\left(1-\frac{n}{2}\right)+\kappa T^{\alpha\beta}g_{\alpha\beta}\right]}^{\equiv K}\left(\mathbf{e}^{\xi}{}_{,\sigma}\cdot\mathbf{E}\cdot G_{\xi}+\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi,\sigma}\right)\\ +\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot G_{\xi}\cdot[\cdots]^{\alpha\beta}g_{\alpha\beta,\sigma}\end{array}\right)\right)g^{\sigma\chi}\delta x_{\chi}\quad. \qquad (75)\\
&\Rightarrow 0=\mathbf{e}^{\xi}\cdot\mathbf{E}\cdot K\cdot G_{\xi,\sigma}g^{\sigma\chi}+\mathbf{E}\cdot G_{\xi}\cdot\left(\mathbf{e}^{\xi}\cdot[\cdots]^{\alpha\beta}g_{\alpha\beta,\sigma}+K\cdot\mathbf{e}^{\xi}{}_{,\sigma}\right)g^{\sigma\chi}\quad / \quad\cdot\mathbf{e}_{\varsigma}\\
&=\mathbf{E}\cdot G_{\varsigma,\sigma}g^{\sigma\chi}+\mathbf{E}\cdot G_{\xi}\cdot\left(\delta_{\varsigma}^{\xi}[\cdots]^{\alpha\beta}g_{\alpha\beta,\sigma}+K\cdot\mathbf{e}_{\varsigma}\cdot\mathbf{e}^{\xi}{}_{,\sigma}\right)g^{\sigma\chi}\\
&=G_{\varsigma,\sigma}g^{\sigma\chi}\cdot K+G_{\xi}\cdot\left(\delta_{\varsigma}^{\xi}[\cdots]^{\alpha\beta}g_{\alpha\beta,\sigma}+K\cdot\mathbf{e}_{\varsigma}\cdot\mathbf{e}^{\xi}{}_{,\sigma}\right)g^{\sigma\chi}
\end{aligned}
$$

Here we now have the full metric first order differential Quantum Gravity equation in an arbitrary number of dimensions n as follows (or a “Dirac Quantum Gravity equation”):

$$
0=G_{\varsigma,\sigma}g^{\sigma\chi}\cdot\left[R\left(1-\frac{n}{2}\right)+\kappa T^{\alpha\beta}g_{\alpha\beta}\right]+G_{\xi}\cdot\left(\begin{array}{c}\delta_{\varsigma}^{\xi}\left[R^{\alpha\beta}-\frac{R}{2}g^{\alpha\beta}+\kappa T^{\alpha\beta}\right]g_{\alpha\beta,\sigma}\\ +\left[R\left(1-\frac{n}{2}\right)+\kappa T^{\alpha\beta}g_{\alpha\beta}\right]\cdot\mathbf{e}_{\varsigma}\cdot\mathbf{e}^{\xi}{}_{,\sigma}\end{array}\right)g^{\sigma\chi}. \qquad (76)
$$

As also the energy momentum tensor is now given in completely metric manner (see (72) to (74)), we may consider our task of deriving the metric Dirac equation as completed. The next step could be the consideration of a variety of examples, perhaps in connection with potential particle solutions.

However, as we aready have some suitable particle equations by the means of our “elastic” derivations in section 15.5, we leave the discussion of (60) to (70) to the interested reader.

15.7.1. Transition to the Classical Dirac Equation

The true and most classical Dirac equation as derived by Dirac [143] and already metrically derived here in section 15.2 should – if our assumptions are correct – also (somehow) reside inside (76). Using the abbreviations introduced in (75), we can develop our metric equation (76) as follows:

$$
\begin{aligned}
0 &= G_{\varsigma,\sigma} g^{\sigma\chi} \cdot K + G_{\xi} \cdot \left(\delta_{\varsigma}^{\xi} \left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] g_{\alpha\beta,\sigma} + K \cdot \mathbf{e}_{\varsigma} \cdot \mathbf{e}^{\xi}{}_{,\sigma} \right) g^{\sigma\chi} \quad / : K \\
&= G_{\varsigma,\sigma} g^{\sigma\chi} + G_{\xi} \cdot \left(\delta_{\varsigma}^{\xi} \left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \frac{g_{\alpha\beta,\sigma}}{K} + \mathbf{e}_{\varsigma} \cdot \mathbf{e}^{\xi}{}_{,\sigma} \right) g^{\sigma\chi} \\
&= \left(G_{\varsigma,\sigma} + G_{\xi} \cdot \left(\delta_{\varsigma}^{\xi} \left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \frac{g_{\alpha\beta,\sigma}}{K} + \mathbf{e}_{\varsigma} \cdot \mathbf{e}^{\xi}{}_{,\sigma} \right) \right) \mathbf{e}^{\sigma} \cdot \mathbf{e}^{\chi} \\
&= \left(G_{\varsigma,\sigma} + G_{\xi} \cdot \left(\delta_{\varsigma}^{\xi} \left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \frac{g_{\alpha\beta,\sigma}}{K} + \overbrace{\mathbf{e}_{\varsigma} \cdot \mathbf{e}^{\xi}{}_{,\sigma}}^{\equiv \delta_{\varsigma}^{\xi} P_{\sigma}} \right) \right) \mathbf{e}^{\sigma} \\
&= G_{\varsigma,\sigma} \mathbf{e}^{\sigma} + G_{\xi} \cdot \delta_{\varsigma}^{\xi} \left(\left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \frac{g_{\alpha\beta,\sigma}}{K} + P_{\sigma} \right) \mathbf{e}^{\sigma} \\
&= G_{\varsigma,\sigma} \mathbf{e}^{\sigma} + G_{\varsigma} \cdot \left(\left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \frac{g_{\alpha\beta,\sigma}}{K} + P_{\sigma} \right) \mathbf{e}^{\sigma}
\end{aligned} \quad . \tag{77}
$$

We note that the second addend in the last line is just a vector of scalars. Let us name this scalar vector **M**. Perhaps it could stand for mess (yes mess, with an "e" – for justification of this peculiar naming c.f. sub-section 15.2.1). This gives us:

$$
0 = G_{\varsigma,\sigma} \mathbf{e}^{\sigma} + G_{\varsigma} \cdot \mathbf{M} \,. \tag{78}
$$

Now we take it for granted that the direction of **M** is of no importance and that therefore also another equation exists which does read:

$$
0 = G_{\varsigma,\sigma} \mathbf{e}^{\sigma} - G_{\varsigma} \cdot \mathbf{M} \,. \tag{79}
$$

We realize that both equations (78) and (79) can be brought into the typical quantum mechanical operator form, namely:

$$
\begin{aligned}
0 = G_{\varsigma,\sigma} \mathbf{e}^{\sigma} + G_{\varsigma} \cdot \mathbf{M} \quad &\Rightarrow \quad 0 = \overbrace{\left(\mathbf{e}^{\sigma} \cdot \partial_{\sigma} + \mathbf{M} \right)}^{O_{(\sigma)}^{+}} G_{\varsigma} \\
0 = G_{\varsigma,\sigma} \mathbf{e}^{\sigma} - G_{\varsigma} \cdot \mathbf{M} \quad &\Rightarrow \quad 0 = \underbrace{\left(\mathbf{e}^{\sigma} \cdot \partial_{\sigma} - \mathbf{M} \right)}_{O_{(\sigma)}^{-}} G_{\varsigma}
\end{aligned} \; , \tag{80}
$$

with the operators $O_{(\sigma)}^{+}, O_{(\sigma)}^{-}$. We note that the index σ, as a dummy index, is now arbitrary. By applying one of the two operators on the corresponding other one, thereby choosing different dummies, one obtains:

$$
\begin{aligned}
0 = O_{(\sigma)}^{+} O_{(\rho)}^{-} G_{\varsigma} &= \left(\mathbf{e}^{\sigma} \cdot \partial_{\sigma} + \mathbf{M} \right) \left(\mathbf{e}^{\rho} \cdot \partial_{\rho} - \mathbf{M} \right) G_{\varsigma} = \left(\mathbf{e}^{\sigma} \partial_{\sigma} \cdot \mathbf{e}^{\rho} \partial_{\rho} - \overbrace{\mathbf{M} \cdot \mathbf{M}}^{= M^2} \right) G_{\varsigma} \\
0 = O_{(\rho)}^{-} O_{(\sigma)}^{+} G_{\varsigma} &= \left(\mathbf{e}^{\rho} \cdot \partial_{\rho} - \mathbf{M} \right) \left(\mathbf{e}^{\sigma} \cdot \partial_{\sigma} + \mathbf{M} \right) G_{\varsigma} = \left(\mathbf{e}^{\rho} \partial_{\rho} \cdot \mathbf{e}^{\sigma} \partial_{\sigma} - \mathbf{M} \cdot \mathbf{M} \right) G_{\varsigma}
\end{aligned} \; . \tag{81}
$$

Assuming that the derivatives do not act on the base vectors (e.g. because they are Mikowski like just as it was originally assumed by Dirac in [143]), we can further simplify to:

$$0=\left(\mathbf{e}^{\sigma}\partial_{\sigma}\cdot\mathbf{e}^{\rho}\partial_{\rho}-M^{2}\right)G_{\varsigma}=\left(\mathbf{e}^{\sigma}\cdot\mathbf{e}^{\rho}\partial_{\sigma}\partial_{\rho}-M^{2}\right)G_{\varsigma}=\left(g^{\sigma\rho}\partial_{\sigma}\partial_{\rho}-M^{2}\right)G_{\varsigma}$$
$$0=\left(\mathbf{e}^{\rho}\partial_{\rho}\cdot\mathbf{e}^{\sigma}\partial_{\sigma}-M^{2}\right)G_{\varsigma}=\left(\mathbf{e}^{\rho}\cdot\mathbf{e}^{\sigma}\partial_{\rho}\partial_{\sigma}-M^{2}\right)G_{\varsigma}=\left(g^{\rho\sigma}\partial_{\rho}\partial_{\sigma}-M^{2}\right)G_{\varsigma}. \quad (82)$$

In our derivation (78) to (82) we recognize exactly the way the classical Dirac operators act, too.

Again we leave the generalization and further discussion to the interested reader.

16. Generalization and Interpretation

16.1. Generalization

16.1.1. The Mixed Form

So far, in order to obtain metric (quantum gravity) equivalents to the main quantum equations like Klein-Gordon and Dirac, it totally sufficed to just apply the following fairly simple extention to the metric tensor:

$$G_{\delta\gamma}=F[f]\cdot g_{\delta\gamma}. \quad (83)$$

Subjecting this to the Hilbert variation and applying the chain rule during the variation process, results in:

$$\delta W=0=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot R\right)=\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\delta_{\sigma}G_{\alpha\beta}$$
$$=\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left[R^{\alpha\beta}-\frac{R}{2}G^{\alpha\beta}\right]\right)\left(\frac{\partial F[f]}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi} \quad (84)$$

and, depending on the approach for the scalar f and functional wrapper F[f] can give us a great variety of Quantum Gravity equations (see especially section 15).

A logic and most tensor-like extension of (83) would be:

$$G_{\delta\gamma}=F[f]_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta}. \quad (85)$$

The variation process would then give us:

$$\delta W=0=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot R\right)=\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\right)\delta_{\sigma}G_{\delta\gamma}$$
$$=\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\right)\left(\frac{\partial F[f]_{\delta\gamma}^{\alpha\beta}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_{\chi}. \quad (86)$$

We see that this does neither change the principle structure of (84) nor our fundamental results from the previous section, which is to say “the most simple world formula”. As a logic consequence we have to conclude that with (86) we have a very fundamental and general Quantum Gravity equation for an arbitrary number of dimensions.

From (86) a scalar equation could be extracted as follows:

$$\begin{aligned}\delta W=0&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\right)\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\\&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\right)\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right)\mathbf{e}^\sigma\cdot\mathbf{e}^\chi\delta x_\chi\\\Rightarrow 0&=\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\right)\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right)\mathbf{e}^\sigma\cdot\mathbf{E}\end{aligned}\quad. \tag{87}$$

Thereby **E** shall just be a suitable constant vector.

It should be noted here that we always have the option to add a cosmological constant to the variation making the first factor under the integrand to:

$$\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\rightarrow\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}+\Lambda\cdot G^{\delta\gamma}\right] \tag{88}$$

and thus, changing the whole variation as follows:

$$\begin{aligned}\delta W=0=\delta_\sigma\int_V d^n x\left(\sqrt{-G}\cdot(R-2\cdot\Lambda)\right)&=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}+\Lambda\cdot G^{\delta\gamma}\right]\right)\delta_\sigma G_{\delta\gamma}\\=\int_V d^n x\left(\sqrt{-G}\cdot\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}+\Lambda\cdot G^{\delta\gamma}\right]\right)&\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right)g^{\sigma\chi}\delta x_\chi\end{aligned}\quad. \tag{89}$$

16.1.2. The Matter Form

To some scientists it may seem more convenient to obtain the variation in the classical form where the f-disturbances appear as matter term within the factor of the Einstein-Field-Equations. As the evalution was already performed for the simple case (83), we here repeat it only for the generalized transformation (85). Thereby, we assume R to be the Ricci scalar to the unperturbed (non-transformed) metric $g_{\alpha\beta}$. On the other hand, we know the Ricci scalar R to be defined by the metric tensor via:

$$R=R_{\alpha\beta}g^{\alpha\beta}=\left(\Gamma^\sigma_{\alpha\beta,\sigma}-\Gamma^\sigma_{\beta\sigma,\alpha}-\Gamma^\mu_{\sigma\alpha}\Gamma^\sigma_{\beta\mu}+\Gamma^\sigma_{\alpha\beta}\Gamma^\mu_{\sigma\mu}\right)g^{\alpha\beta}, \tag{90}$$

with:

$$\Gamma^\gamma_{\alpha\beta}=\frac{g^{\gamma\sigma}}{2}\left(g_{\sigma\alpha,\beta}+g_{\sigma\beta,\alpha}-g_{\alpha\beta,\sigma}\right). \tag{91}$$

Similarly we have for R^*:

$$\begin{aligned}R^*=R^*{}_{\alpha\beta}G^{\alpha\beta}&=\left(\Gamma^{*\sigma}_{\alpha\beta,\sigma}-\Gamma^{*\sigma}_{\beta\sigma,\alpha}-\Gamma^{*\mu}_{\sigma\alpha}\Gamma^{*\sigma}_{\beta\mu}+\Gamma^{*\sigma}_{\alpha\beta}\Gamma^{*\mu}_{\sigma\mu}\right)G^{\alpha\beta}\\&=\left(\Gamma^{*\sigma}_{\alpha\beta,\sigma}-\Gamma^{*\sigma}_{\beta\sigma,\alpha}-\Gamma^{*\mu}_{\sigma\alpha}\Gamma^{*\sigma}_{\beta\mu}+\Gamma^{*\sigma}_{\alpha\beta}\Gamma^{*\mu}_{\sigma\mu}\right)g_{\xi\zeta}F[f]^{\xi\zeta\alpha\beta}\end{aligned}\quad, \tag{92}$$

with

$$
\begin{aligned}
\Gamma^{*\gamma}_{\alpha\beta} &= \frac{g_{\xi\zeta}F[f]^{\xi\zeta\gamma\sigma}}{2}\left(\left[F[f]^{\rho\tau}_{\sigma\alpha}\cdot g_{\rho\tau}\right]_{,\beta}+\left[F[f]^{\rho\tau}_{\sigma\beta}\cdot g_{\rho\tau}\right]_{,\alpha}-\left[F[f]^{\rho\tau}_{\alpha\beta}\cdot g_{\rho\tau}\right]_{,\sigma}\right)\\
&= \frac{g_{\xi\zeta}}{2}\left(F[f]^{\xi\zeta\gamma\sigma}F[f]^{\rho\tau}_{\sigma\alpha}\cdot g_{\rho\tau,\beta}+F[f]^{\xi\zeta\gamma\sigma}F[f]^{\rho\tau}_{\sigma\beta}\cdot g_{\rho\tau,\alpha}-F[f]^{\xi\zeta\gamma\sigma}F[f]^{\rho\tau}_{\alpha\beta}\cdot g_{\rho\tau,\sigma}\right)\\
&\quad+\frac{g_{\xi\zeta}F[f]^{\xi\zeta\gamma\sigma}}{2}\left(F[f]^{\rho\tau}_{\sigma\alpha,\beta}\cdot g_{\rho\tau}+F[f]^{\rho\tau}_{\sigma\beta,\alpha}\cdot g_{\rho\tau}-F[f]^{\rho\tau}_{\alpha\beta}\cdot_{,\sigma}\cdot g_{\rho\tau}\right)\\
&\equiv \Gamma^{*\gamma}_{*\alpha\beta}+\frac{g_{\xi\zeta}F[f]^{\xi\zeta\gamma\sigma}}{2}\left(F[f]^{\rho\tau}_{\sigma\alpha,\beta}\cdot g_{\rho\tau}+F[f]^{\rho\tau}_{\sigma\beta,\alpha}\cdot g_{\rho\tau}-F[f]^{\rho\tau}_{\alpha\beta}\cdot_{,\sigma}\cdot g_{\rho\tau}\right)\\
&\equiv \Gamma^{*\gamma}_{*\alpha\beta}+\Gamma^{**\gamma}_{\alpha\beta}
\end{aligned}
\quad . \qquad (93)
$$

Setting this into the second line in (92) yields:

$$
\begin{aligned}
R^{*} &= R^{*}{}_{\alpha\beta}G^{\alpha\beta}=\left(\Gamma^{*\sigma}_{\alpha\beta,\sigma}-\Gamma^{*\sigma}_{\beta\sigma,\alpha}-\Gamma^{*\mu}_{\sigma\alpha}\Gamma^{*\sigma}_{\beta\mu}+\Gamma^{*\sigma}_{\alpha\beta}\Gamma^{*\mu}_{\sigma\mu}\right)G^{\alpha\beta}\\
&=\begin{pmatrix}
\Gamma^{*\sigma}_{*\alpha\beta,\sigma}-\Gamma^{*\sigma}_{*\beta\sigma,\alpha}-\Gamma^{*\mu}_{*\sigma\alpha}\Gamma^{*\sigma}_{*\beta\mu}+\Gamma^{*\sigma}_{*\alpha\beta}\Gamma^{*\mu}_{*\sigma\mu}\\
-\Gamma^{*\mu}_{*\sigma\alpha}\Gamma^{**\sigma}_{\beta\mu}+\Gamma^{*\sigma}_{*\alpha\beta}\Gamma^{**\mu}_{\sigma\mu}-\Gamma^{**\mu}_{\sigma\alpha}\Gamma^{*\sigma}_{*\beta\mu}+\Gamma^{**\sigma}_{\alpha\beta}\Gamma^{*\mu}_{*\sigma\mu}\\
+\Gamma^{**\sigma}_{\alpha\beta\ ,\sigma}-\Gamma^{**\sigma}_{\beta\sigma\ ,\alpha}-\Gamma^{**\mu}_{\sigma\alpha}\Gamma^{**\sigma}_{\beta\mu}+\Gamma^{**\sigma}_{\alpha\beta}\Gamma^{**\mu}_{\sigma\mu}
\end{pmatrix}g_{\xi\zeta}F[f]^{\xi\zeta\alpha\beta}\\
&=\overbrace{\left(\Gamma^{*\sigma}_{*\alpha\beta,\sigma}-\Gamma^{*\sigma}_{*\beta\sigma,\alpha}-\Gamma^{*\mu}_{*\sigma\alpha}\Gamma^{*\sigma}_{*\beta\mu}+\Gamma^{*\sigma}_{*\alpha\beta}\Gamma^{*\mu}_{*\sigma\mu}\right)g_{\xi\zeta}F[f]^{\xi\zeta\alpha\beta}}^{\equiv R^{*}_{*}}\\
&\quad+\underbrace{\begin{pmatrix}
-\Gamma^{*\mu}_{*\sigma\alpha}\Gamma^{**\sigma}_{\beta\mu}+\Gamma^{*\sigma}_{*\alpha\beta}\Gamma^{**\mu}_{\sigma\mu}-\Gamma^{**\mu}_{\sigma\alpha}\Gamma^{*\sigma}_{*\beta\mu}+\Gamma^{**\sigma}_{\alpha\beta}\Gamma^{*\mu}_{*\sigma\mu}\\
+\Gamma^{**\sigma}_{\alpha\beta\ ,\sigma}-\Gamma^{**\sigma}_{\beta\sigma\ ,\alpha}-\Gamma^{**\mu}_{\sigma\alpha}\Gamma^{**\sigma}_{\beta\mu}+\Gamma^{**\sigma}_{\alpha\beta}\Gamma^{**\mu}_{\sigma\mu}
\end{pmatrix}g_{\xi\zeta}F[f]^{\xi\zeta\alpha\beta}}_{\equiv R^{**}_{*}}\\
&\equiv R^{*}_{*}+R^{**}_{*}
\end{aligned}
\quad . \qquad (94)
$$

This makes the classical Hilbert variation problem to:

$$
\delta W=0=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot R^{*}\right)=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left(R^{*}_{*}+R^{**}_{*}\right)\right), \qquad (95)
$$

from where we directly obtain the usual (classical) structure for the Ricci scalar plus the matter Lagrange density term with $R^{**}_{*}=-2\kappa L_{M}$ under the integral via:

$$
\begin{aligned}
\delta W=0&=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot R^{*}\right)=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left(R^{*}_{*}+R^{**}_{*}\right)\right)\\
&=\int_{V}d^{n}x\ \delta_{g}\left(\sqrt{-G}\left[R^{*}_{*}-2\kappa L_{M}\right]\right)\times\delta_{\sigma}g_{\alpha\beta}
\end{aligned}
\quad . \qquad (96)
$$

Together with the cosmological constant option, the latter result would read:

$$
\begin{aligned}
\delta W=0&=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left(R^{*}-2\cdot\Lambda\right)\right)=\delta_{\sigma}\int_{V}d^{n}x\left(\sqrt{-G}\cdot\left(R^{*}_{*}+R^{**}_{*}-2\cdot\Lambda\right)\right)\\
&=\int_{V}d^{n}x\ \delta_{g}\left(\sqrt{-G}\left[R^{*}_{*}-2\kappa L_{M}-2\cdot\Lambda\right]\right)\times\delta_{\sigma}g_{\alpha\beta}
\end{aligned}
\quad . \qquad (97)
$$

We realize that in principle this is also a “mixed form” with two factors, just as derived in the sub-section above, only that this time we have the familiar matter Lagrangian density and / or the energy momentum tensor back in our equation.

We find that we have obtained the starting point for the derivation of the Einstein-Field-Equations with matter in classical form just out of the generalized metric set-up (85), now – in contrast to the vacuum metric $g_{\alpha\beta}$ – with respect to the matter metric $G_{\alpha\beta}$. This will not change the structure of the matter Einstein-Field-Equations as long as the variation is not been extended beyond the usual metric variation, which is to say as long as the internal structure of $G_{\alpha\beta}$ (c.f. (85)) is not been revealed by an explicit search for it.

We also immediately realize that with a complexly transformed metric $G_{\alpha\beta}$ as obtained with (85) the classical Einstein, respectively Hilbert approach can only be an approximation as it reads:

$$\delta W = 0 = \int\limits_V d^n x\, \delta_g \left(\sqrt{-g} \left[R - 2\kappa L_M - 2 \cdot \Lambda \right] \right) \times \delta_\sigma g_{\alpha\beta}, \tag{98}$$

while the correct form would be given with the last line of (97). This means that the matter equations of Einstein and Hilbert are results from the following approximation of the integrand under the Einstein-Hilbert-Action:

$$\sqrt{-G} \cdot \left[R_*^* - 2 \cdot \kappa \cdot L_M - 2 \cdot \Lambda \right] \xrightarrow[\text{approximation}]{\text{Einstein\&Hilbert}} \sqrt{-g} \cdot \left[R - 2 \cdot \kappa \cdot L_M - 2 \cdot \Lambda \right]. \tag{99}$$

It was shown in section 3.3 that in the simple case of (83) we just have $R_*^* = \frac{R}{F[f]}$ and:

$$R_*^{**} = \begin{pmatrix} -\Gamma^{\mu}_{\sigma\alpha} \Gamma^{**\sigma}_{\beta\mu} + \Gamma^{\sigma}_{\alpha\beta} \Gamma^{**\mu}_{\sigma\mu} - \Gamma^{**\mu}_{\sigma\alpha} \Gamma^{\sigma}_{\beta\mu} + \Gamma^{**\sigma}_{\alpha\beta} \Gamma^{\mu}_{\sigma\mu} \\ +\Gamma^{**\sigma}_{\alpha\beta\,,\sigma} - \Gamma^{**\sigma}_{\beta\sigma\,,\alpha} - \Gamma^{**\mu}_{\sigma\alpha} \Gamma^{**\sigma}_{\beta\mu} + \Gamma^{**\sigma}_{\alpha\beta} \Gamma^{**\mu}_{\sigma\mu} \end{pmatrix} \frac{g^{\alpha\beta}}{F[f]} \equiv \frac{R^{**}}{F[f]}. \tag{100}$$

In this case a dramatic simplification is possible, because the integrand of the Hilbert variation (84) reads:

$$\begin{aligned} \delta W = 0 &= \delta_\sigma \int\limits_V d^n x \left(\sqrt{-G} \cdot R^* \right) = \delta_\sigma \int\limits_V d^n x \left(\sqrt{-G} \cdot \left(R_*^* + R_*^{**} \right) \right) \\ \xrightarrow{F^{\xi\zeta}_{\alpha\beta} \to F} &= \delta_\sigma \int\limits_V d^n x \left(\frac{\sqrt{-G}}{F[f]} \cdot \left(R + R^{**} \right) \right) = \delta_\sigma \int\limits_V d^n x \left(\frac{\sqrt{-g \cdot F[f]^n}}{F[f]} \cdot \left(R + \overset{=-2\kappa L_M}{R^{**}} \right) \right) \\ &= \int\limits_V d^n x\, \delta_g \left(\sqrt{-g} \cdot \left(R - 2\kappa L_M \right) \right) \times \delta_\sigma \left(\frac{\sqrt{F[f]^n}}{F[f]} g_{\alpha\beta} \right) \\ &= \int\limits_V d^n x \left(\sqrt{-g} \cdot \left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \right) \times \delta_\sigma \left(\frac{\sqrt{F[f]^n}}{F[f]} g_{\alpha\beta} \right) \\ &= \int\limits_V d^n x \left(\sqrt{-g} \cdot \left[R^{\alpha\beta} - \frac{R}{2} g^{\alpha\beta} + \kappa T^{\alpha\beta} \right] \right) \cdot F[f]^{\frac{n-4}{2}} \cdot \left(\frac{\partial F[f]}{\partial f} \cdot g_{\alpha\beta} f_{,\sigma} + F[f] \cdot g_{\alpha\beta,\sigma} \right) g^{\sigma\chi} \delta x_\chi \end{aligned} \tag{101}$$

This time there is no appximation to the classical Einstein-Hilbert form (99) as we have had it for the general metric in (85). In other words: In cases of simple metric variations as given in (83) and the matter Lagrange density given via:

$$L_M \equiv -\frac{R^{**}}{2\kappa} = -\frac{F[f]\cdot R_*^{**}}{2\kappa} = \frac{g^{\alpha\beta}}{2\kappa}\begin{pmatrix}\Gamma^{\mu}_{\sigma\alpha}\Gamma^{**\sigma}_{\beta\mu} - \Gamma^{\sigma}_{\alpha\beta}\Gamma^{**\mu}_{\sigma\mu} + \Gamma^{**\mu}_{\sigma\alpha}\Gamma^{\sigma}_{\beta\mu} - \Gamma^{**\sigma}_{\alpha\beta}\Gamma^{\mu}_{\sigma\mu} \\ -\Gamma^{**\sigma}_{\alpha\beta\,,\sigma} + \Gamma^{**\sigma}_{\beta\sigma\,,\alpha} + \Gamma^{**\mu}_{\sigma\alpha}\Gamma^{**\sigma}_{\beta\mu} - \Gamma^{**\sigma}_{\alpha\beta}\Gamma^{**\mu}_{\sigma\mu}\end{pmatrix}, \tag{102}$$

the classical Einstein-Field-Equations for matter are exact Quantum Gravity equations with resepct to the gravity part (meaning, the gravity factor unter the variational integral). Solving these equations also solves the corresponding Quantum Gravity problem with the metric (83)).

16.2. Interpretation

16.2.1. The Two Factors for Gravity and Quantum are – Almost - Independent

Comparing our resulting equation (86) with the classical Hilbert result ((86) first line under the integrand) or just the Einstein-Field-Equations, we realize that we have two factors (therby not counting $\sqrt{-G}\cdot g^{\sigma\chi}\delta x_\chi$) under the integral. As already one suffices to make the whole variation problem to zero, and as the first one presents the Einstein-Field-Equations, while the second one (as shown in the previous main section 15) gives the quantum equations, we have to conclude that there is no need for an actual Quantum Gravity set of special solutions. Yes indeed, the metric terms in $\left[R^{\delta\gamma} - \frac{R}{2}G^{\delta\gamma}\right]$ contain the function f and the quantum-type equation part $\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma} + F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right)$ - of course – contains the metric, meaning the original unperturbed metric $g_{\alpha\beta}$, but without loss of generality one can fix one inside the factor of the other and solve it with resepct to either the gravity metric or the quantum function f. The author suspects that exactly this fact allows for any development (evolution) within this universe. Without the factorial structure – so this author thinks – the whole system would just find one minimum and gets stuck there for all iternity. With the factorial structure on the other hand the system can permanently choose between minima states either being achieved via $\left[R^{\delta\gamma} - \frac{R}{2}G^{\delta\gamma}\right] = 0$ (gravity-based solutions/minima) or $\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma} + F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right) = 0$ (quantum-based solutions/minima).

It also holds, however, that the combined form $\left[R^{\delta\gamma} - \frac{R}{2}G^{\delta\gamma}\right]\left(\frac{\partial F[f]^{\alpha\beta}_{\delta\gamma}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma} + F[f]^{\alpha\beta}_{\delta\gamma}\cdot g_{\alpha\beta,\sigma}\right) = 0$ gives only n-conditions, while the separated terms result in n² and more equations. We could even construct a complete scalar via the equation (87).

Thus, gravity and quantum together have much more degrees of freedom and subsequently more options to evolve than each of the two being kept apart. One may see here a very fundamental form of marriage with the potential offspring being of by far greater diversity than without the concept of a blessed connection. This may be a hard blow to the the gender-gagas, but it is simple very first principle physics.

16.2.2. The Meaning of…

Already with the first discoveries and developments within the field of theoretical quantum theory the question about the interpretation of the results became eminent. The structure of the general product variation (85) tells us that any non-covariant transformation of a tensor results in quantum effects. With its simple form (83) we recognize just a general metric scale. With the resulting quantum equations being wave equations, we can also deduce that quantum effects are obviously just ripples along the the various dimensions. These ripples are leading to an omnipresent jitter of space-time, being subjected to the metric system… no matter what the metric actually describes. Of course, as we can seen from the structure of both (83) and (85), F could always just be a constant, reducing the quantum factor to just $F_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta,\sigma}$, with all components of $F_{\delta\gamma}^{\alpha\beta}$ being constants. In this simple case no quantum effects can be observed and we have to have $\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]=0$ to be fulfilled, which is to say gravity and the vacuum Einstein-Field-Equations govern the situation. With $F_{\delta\gamma}^{\alpha\beta}$ not being a matrix of constants, however, gravity can be ignored as long as the equation $\left(\frac{\partial F\left[f\right]_{\delta\gamma}^{\alpha\beta}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F\left[f\right]_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta,\sigma}\right)=0$ for the quantum term within the Einstein-Hilbert-Action is been fulfilled.

Thus, we conclude:

A) Quantum Gravity is just considering the solutions of the Einstein-Hilbert-Action in a somewhat more general manner, using more degrees of freedom, than Einstein and Hilbert did.

B) Thereby Gravity can be seen as the solution of the metric to the equation $\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]=0$ (this equation also includes the Einstein-Field matter equations as shown in section 3.3 and 16.1.2).

C) Quantum effects are solutions of the function f to the equation $\left(\frac{\partial F\left[f\right]_{\delta\gamma}^{\alpha\beta}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F\left[f\right]_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta,\sigma}\right)=0$, leading to a jitter of the dimensions described by the metric $g_{\alpha\beta}$.

D) As the two terms $\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]$ (gravity) and $\left(\frac{\partial F\left[f\right]_{\delta\gamma}^{\alpha\beta}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F\left[f\right]_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta,\sigma}\right)$ (quantum) are factors within the same product, it suffices that one of the two vanishes in order to satisfy the whole generalized Einstein-Hilbert-Action, which is to say, in order to give complete Quantum Gravity solutions.

E) The dramatic decrease of boundary conditions for the product case via either $\left[R^{\delta\gamma}-\frac{R}{2}G^{\delta\gamma}\right]\left(\frac{\partial F\left[f\right]_{\delta\gamma}^{\alpha\beta}}{\partial f}\cdot g_{\alpha\beta}f_{,\sigma}+F\left[f\right]_{\delta\gamma}^{\alpha\beta}\cdot g_{\alpha\beta,\sigma}\right)=0$ or even the scalar condition (87) (last line) automatically leads to the concludion that the married couple of Gravity and Quantum can be much more poductive, because it has many more degrees of freedom, than the solitares alone. Thereby it requires the true couple consisting of Gravity and Quantum. In other words: The properly married ones are simply merrier and of greater evolutionary value.

17. Outlook: A Small Selection of Project Ideas Using the World formula Approach

In this final section of the book we want to present a selection of project ideas, which should be based on world formula approaches. Thereby our intention is lesser in the direction of completeness but rather with resepct to demonstrate the holistic character of the theory. It is therefore for a good reason that we start with the seemingly remote field of psychology.

As the following project ideas are from a variety of authors, we present them in either abstract or short-paper form, with the corresponding references directl allocated to the abstract or short paper.

17.1. The new Space-Time of Psychology

Authors: P. Heuer-Schwarzer, N. Schwarzer

Brief Description / Abstract

A) It obviously is no accident that our notion of psychological aspects is expressible in terms which we usually relate to material science. Obviously, it is not just an association or a metaphorical description when we speak about mental stress and strain, psychological defects, mismatches, dislocations or – rather general – elastic and inelastic deformations. Taking the many forms of cognitive dissonances alone and considering their deforming effects regarding various time and spatial levels and scales, we cannot ignore the striking similarity to the same or mirroring situations in the world of energy and matter.

So we ask:

Is it possible that there is a much deeper connection than this similarity of words and expressions?

Before falling under the suspicion of esoteric waffle, the authors want to point out that – after all – the origin of all our psychological activities is based on the interaction of electromagnetism. Thus, there may well be such a deeper connection, because the evolution of bigger and bigger brains [1] has had its starting point within the same fundamental laws, which are creating, forming and permanently reshaping our matter surrounding. It is therefore most likely that the matter-based interactions, which bring about our psychological self (our feelings, self-awareness, consciousness and our whole cognitive being), are following the same rules. Then, however, it should also be possible to apply these rules to the field of psychology.

B) Assuming the existence of a true "Theory of Everything" [2, 3] one should, of course, be able to extract from this theory all physical interactions, which are effectively creating the complex pattern of a psychological entity. Additionally incorporating what was said under point A, it has to be possible to formulate a psychology in consistent mathematical form (similarly to [4] in classical medicine or [5] in philosophy) and taking its fundamental origin, one might name it a Quantum Gravity Psychology.

C) The new approach should be seen as an essential part of the holistic "Virtual Patient" concept as proposed by Leuenberger [6].

[1] N. Schwarzer, "The Relativistic Quantum Bible - Genesis and Revelation", www.amazon.com, ASIN: B01M1CJH1B

[2] N. Schwarzer, "World formula", www.amazon.com, ISBN: 9781673032567

[3] N. Schwarzer, "The Theory of Everything - Quantum and Relativity is everywhere – A Fermat Universe", Pan Stanford Publishing, (2019), ISBN-10: 9814774472

[4] N. Schwarzer, "Einstein had it, but he did not see it – Part LXIX: The Hippocratic Oath in Mathematical Form and why – so often – it will be of no Use", www.amazon.com, ASIN: B07KDSMNSK

[5] N. Schwarzer, „Philosophical Engineering Part 1: The Honest Non-Parasitic Philosopher and the Universal "GOOD" Derived from a Theory of Everything", www.amazon.com, ASIN: B07KNWRDYW

[6] H. Leuenberger, "What is Life?, A new Human Model of Life, Disease and Death – a Challenge for Artificial Intelligence and Bioelectric Medicine Specialists", SWISS PHARMA, 41 (2019), Nr.1, see www.ifiip.ch

17.2. Towards a Deeper Understanding of Socio-Economy

Author: N. Schwarzer

Stresses and strains in societies are not principally different from their counterparts in material science [1]. The reason for this lays in the fact that both materials and socio-economic spaces consist of sub-structures (let us just name them atoms or molecules), with their interaction forming the actual material space or socio economy. Displacing atoms against each other automatically leads to strains and – depending on the strength and character of the interaction – subsequently also to stresses. Of course, while in material science the displacements are truly seen as actual movements or positions changes of the atoms, it means any kind of dimensional misfit with a generalized model.

Now we saw in section 15 of this book that the Quantum Gravity equivalent of the Dirac equation sports displacements as just the essential elements for all quantum effects. Quantum Gravity, on the other hand, is a "theory of everything" and as such it should also be possible to formulate a quantum metric (Quantum Gravity) discretion for societies.

Putting it all together is becomes evident that the way forward to obtain most holistic and truthful, which is to say ideology-free, models for socioeconomic simulations is to be seen in a Dirac-like displacement vector model as derived in sub-section 15.5 of this book. Thereby the number of dimensions is not only be determined by the number of properties the socio-economy one intends to develop shall contain, but also the number of gravity centers / atoms/ entities / individuals it will possess (c.f. section 4 of this book).

[1] N. Schwarzer, „Philosophical Engineering Part 1: The Honest Non-Parasitic Philosopher and the Universal "GOOD" Derived from a Theory of Everything", www.amazon.com, ASIN: B07KNWRDYW

17.3. Why Ideology-Affine Societies are per se Unethical?

Author: N. Schwarzer

More than 2370 years ago Aristotle made it clear in his great book about "Nicomachean Ethics" [1] that ethic in general is just a certain way to live. In fact, so Aristotle [1], a perfect ethic life is just the optimum good life. Considering systems of individuals within their societies in just THE most general manner, namely via a world formula approach (e.g. c.f. Abstract 17.?) it can clearly be derived that the optimum GOOD inside a universe like ours, which is based on extremal principles, can always only be the minimum of suffering. This minimum on the other hand can only be found if been sought for in the most holistic manner, which is to say: The search process can only be complete if it is not restricted (e.g. by some kind of political correctness, ideology, religion, esoteric or otherwise self-binding intellectual imprisonment).

In other words: Only with all effects, facts, interactions etc. etc. being taken into account, there is a chance to find the optimum good at all. Any attempt to find the system's good (best) state without considering it ALL, thereby taking everything most truthfully into account is in vain. Or even clearer: Any do-gooderish act, flooding the - mainly extremely short-sighted - do-gooder's blood stream with endorphins due to her or his do-gooder-dim-doing actions is usually the very opposite of the holistic good and thus, nothing else but emotional parasitism, as it generates the "good feeling" of the do-gooder-parasite on the costs of others.

Thesis: Ideology-Affine Societies are per se Unethical

Proof:

A) True Ethic behaviour of a society requires the most holistic optimization of that very society, thereby seeking the minimum state of suffering within a global variation process. That is just the definition of Aristotle's ethic in mathematical form [2].
B) The explicit or purposeful exclusion of certain topics, aspects, truths, facts etc. etc. from the variation or optimization process hinders or even completely contradicts the ethical quest. This is self-evident, because the exclusion of real-existing degrees of freedom from an optimization process automatically renders the process inholistic and thus, depending on the amount of "thought-control" and variation restrictions, from inconsistency via pretence or total nonsense to disastrous failure.
C) It is the nature of ideologies always to exclude certain real-existing truth, simply because these truth would reveal the purely ideological (non-scientifically or just rubbish) character of the latter.
D) From points A) to C) now directly follows that societies being affine to certain ideologies or even being dominated by such are per se unethical.

Now we just give examples for three ideologies being partially or even completely based upon lies and the informed reader will easily be able to see the reality-based circumstantial evidence for our general and comprehensive proof as outlined above.

1. The Gender ideology: There are so many publications about the OBVIOUS fact that this ideology is so self-evidently stupid that we here only refer to a very mathematical proof about the piled up nonsense content of this rubbish doctrine [3, 4].
2. The Climate ideology: e.g. see [4, 5]
3. Marxism: see [6] or simply study the history of the last century

[1] "Nicomachean Ethics", by Aristotle, 350 BC, translated by W. D. Ross, www.virtuescience.com/nicomachean-ethics.html

[2] N. Schwarzer, „Philosophical Engineering Part 1: The Honest Non-Parasitic Philosopher and the Universal "GOOD" Derived from a Theory of Everything", www.amazon.com, ASIN: B07KNWRDYW

[3] N. Schwarzer, "The ANTI-GENDER Proof: Mathematical Proof Against one of the most Stupid and Dangerous Ideologies, disguising itself as „Science"", www.amazon.com, ASIN: B07KPD9BD4

[4] N. Schwarzer, T. Bodan, "Sherlock, Watson, Stalin Part 2: The Hell of Gender, Merkel, Communism and

the Dictatorship of Parasites", as E-book on www.amazon.com ASIN: B07BJ9PZWM

[5] N. Schwarzer: "Climate Religion", https://principia-scientific.org/climate-religion-why-is-it-so-simple-to-cheat-the-mass

[6] N. Schwarzer, "Einstein had it, but he did not see it – Part XIII: Why Equality is Always Hostile to Life", www.amazon.com, ASIN: B07B6QZLMH

17.4. Water more important than CO2

Author: Prof. A. D. Wieck, Lehrstuhl für Angewandte Festkörperphysik, Ruhr-Universität Bochum, Universitätsstraße 150, D-44780 Bochum, Germany, ORCID 0000-0001-9776-2922

The current climate change discussion is based on the assumption that the CO_2-molecule has a strong optical impact in the infrared spectrum emitted by the earth. However, this assumption has never been discussed neither scientifically nor in the public, everybody takes this as a fact and nearly nobody compares the CO_2-optical modes with the ones of other molecules in the atmosphere. I would like to discuss exactly this important detail a bit more here:

In the CO_2-molecule, the two bonds between the carbon atom and the two oxygen atoms are aligned, it is a linear molecule. The oxygen atoms attract negative electron charge from the carbon atom in a symmetric way, so the charge distribution within the molecule is of the form - ++ -. The two dipoles are thus directing in opposite directions and the overall diploe momentum of the CO_2-molecule is zero. This means, that the electric field of a passing electromagnetic wave cannot couple linearly to this molecule, any coupling is of higher order, i.e. to the quadrupole moment or higher. It is well known that under these circumstances the interaction between the molecule and the electromagnetic wave is greatly hindered, if not to say quasi-forbidden or extremely weak. As a result, CO_2 in the atmosphere has a minimal impact on the transmission of infrared radiation and this is even more pronounced since its relative content is only roughly 0.04% in the air.

On the contrary, the water molecule H_2O is a non-linear, but angled, bent object: It looks like Mickey-Mouse's head as the oxygen atom, the two ears being the hydrogen atoms, which are positively charged $^{+}{}_{--}{}^{+}$. Consequently, Mickey's chin is negatively charged and there is in this way a huge static, vertical dipole moment, which strongly couples to any electromagnetic wave, especially in the near and mid-infrared. At 20°C and 60% humidity, there are 10,4 g/m^3 H_2O in the air, with an air density of 1,3 kg/m^3 this is 0,8%, 20 times more than CO_2. In clouds, we have 100% air humidity, this yields 1,3% water in the air which is 33 times more than CO_2.

In other words: Clouds have by their water density 33 times more impact than the CO_2 AND water is as a dipolar molecule by far more infrared (IR) active than the quadrupole-time CO_2. The product yields orders of magnitude more IR-impact by water than by CO_2. If humanity wants to reduce the IR-impact of the atmosphere, it would be more reasonable to ban clouds rather than reduce CO_2 by 0.01%! Even school-kids know that a clear, cloud-free night ends up in very low temperatures, while a cloudy sky guarantees moderate temperatures in the early morning.

17.4.1. Comment by N. Schwarzer

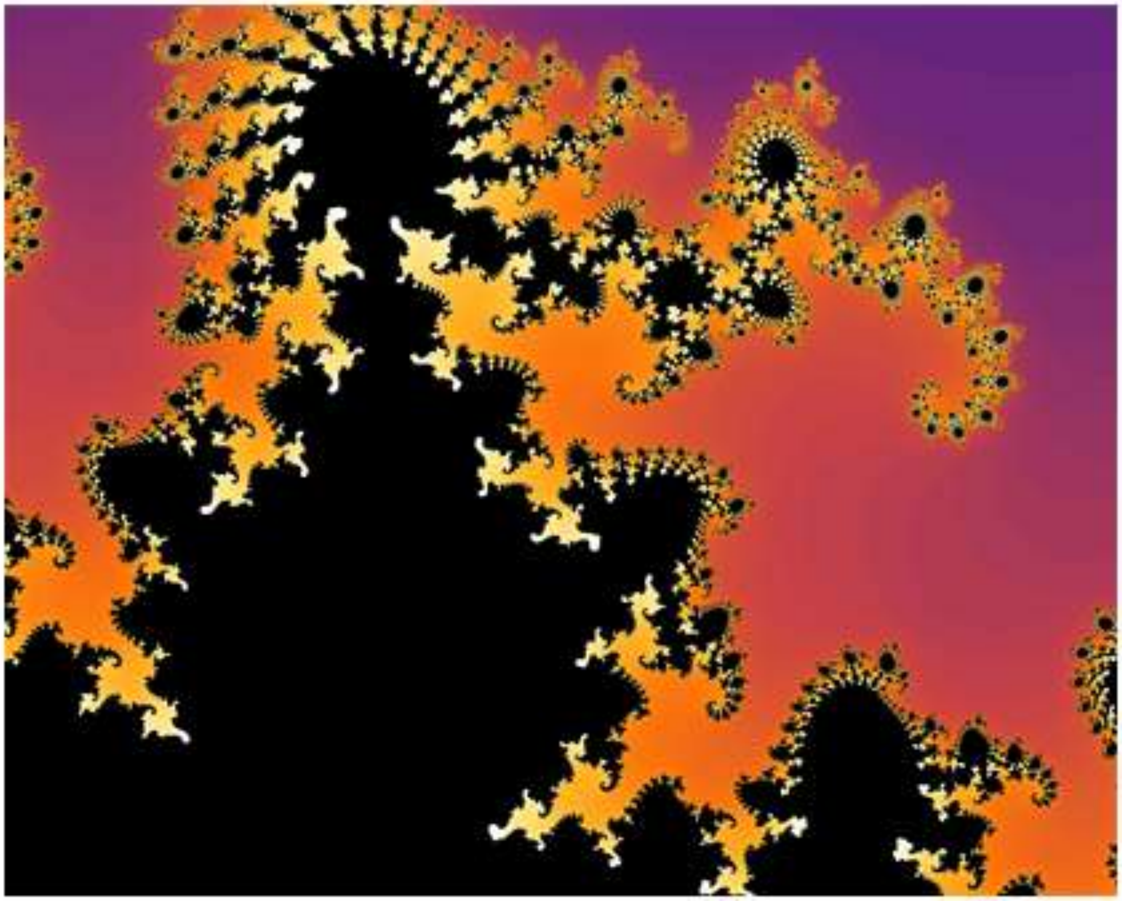
In addition to this one needs to point out the fact that the possible influence of CO_2 as greenhouse gas on the climate of the earth (even theoretically) is only 1/114 of the uncertainty of the cloud coverage [1, 2] (Mark: it is the uncertainty and not the absolute value). So, rather than following lies about CO_2, climate activists should watch man-made defects in the water cycle as these have by far greater effects. But of course, perturbations of the water cycle would immediately cast a critical view on things like e-mobility (Li mining), solar cell production, wind power plants and the TRUE ecological footprint and quite many other greenish projects, being sold to the tax-payer as "climate rescue" maneuvers, while in fact they are nothing else but lie- and ideology-based skullduggeries. In some cases, they also serve as bamboozle strategies in order to distract the mass from by far more important or even life-threatening problems like the migration being forced on the population of many western countries. In this context it is important to also try to understand why people are so easily made to believe often even the greatest nonsense. This we will therefore do in the next sub-section 17.5.

[1] www.quora.com/What-does-Michael-Mann-s-court-battle-loss-mean-to-the-notion-of-climate-change

[2] Patrick Frank, "Propagation of Error and Reliability of Global Air Temperature Projection", Front. Earth Sci., 06 September 2019 | https://doi.org/10.3389/feart.2019.00223
(or: www.frontiersin.org/articles/10.3389/feart.2019.00223/full)

17.5. Why is it so simple to cheat the mass?

Author: N. Schwarzer



Question of the author: “Is this just a fractal… or the typical outcome of a “climate simulation”?”

17.5.1. Abstract

There is never much of need to create a religion. What in the antique times just needed to be golden calve, somebody called holy, nowadays just requires a made-up (hockey stick) curve somebody declared as of scientific origin. As long as there are parasites who can feast on the outcome of the movement potentially erupting from such fairy tales or downright lies, there will also always be enough believers willingly and dumbly following the story, no matter how illogic, inconsistent, if not to say stupid or even dangerous it may be.

… and immediately we have a new religion, including the pious followers and – naturally – the parasitic “leaders”, who use the chance to press every penny out of everybody dim enough to trust them.

But why is it so simple to make people believe often even the greatest rubbish?

The question why man does believe, respectively where his spirituality comes from is an important one. It is so important, not because of the many cruel wars fought over belief and the millions of books been written about the infinite number of forms of spirituality (as many as there are thinking entities in this universe), but because it is just one fundamental aspect of the thing which brought us about: Evolution. In fact, evolution forced us to develop an inner spiritual core and thus, belief, which is to say spiritual belief, is not an option, but a must.

The question why man MUST believe was already answered in [1], but as many people don't like or partially are even afraid of math, we here reproduce the essentials.

[1] N. Schwarzer, "The Relativistic Quantum Bible - Genesis and Revelation", www.amzon.com, ASIN: B01M1CJH1B

17.5.2. Why Does Man Believe?

Are people with a certain belief worth more than others just because of that belief?

Our dogmatic answer to this question is NO.

Are priests, shamans, imams, rabbis or any other leader of a group of such believers above other men just because of their leading role for this group of believers? I mean above other men if the aspect of measuring is not connected with this leading role?

Again, our dogmatic answer to this question is NO.

Here just one example to make our point absolutely clear:

The pope is an ordinary man (Ask him, he'll tell you so himself!), being elected by other ordinary men to do a certain job. In his case it is to lead the Catholic Church. The Catholic Church on the other hand is nothing special, it is an organization, a kind of permanent gathering or community of people who all share a certain belief. In this case it is "the" Christian belief. Thereby we used the "…"-signed in order to point out that "the" Christian belief does not exist. It was, is and always will be a complex composition of thoughts, ideas and ideals, being splattered over a rather non-conform community. Even though some of these people will tell you and everybody else that they are special, simply because they are having that belief and because they are part of this community, named "Church", you should ALWAYS treat their "assertion about being special" with great care. The same just holds for all "Churches".

Why?

Because Moslems, Jews, other Christians (other than the Catholic ones), Hindus and so on, they will all say the same about themselves. They will all claim to be special above others. But with everybody being special above the other, because of such different beliefs, NO ONE is.

Things would be much easier here if we were talking about different political parties or supporters of certain sports teams, where it is not about various religious beliefs but about different political opinions or sportive groups.

But why is this so?

Why does everything which has to do with religion seems so very much more difficult to discuss about?

The answer to this requires us to investigate our own evolution. We will not be able to understand our own partially irrational, if not to say funny behavior, regarding religion if we do not understand the origin of spirituality.

As this is a very complicated topic, full of mines to tread on, the author will leave the elaboration to a fictive entity. It might help to imagine this purely fictive entity as something remotely similar to a child. Let us assume a very young “nothingness”, just realizing what the funny thing named evolution had come up with. Ok, some of you might perhaps find it easier to imagine this nothingness as a kind of a child God.

17.5.3. A Very Young Nothingness and Her / His Questions Explains Us Spirituality

There was a moment when evolution had the completely insane idea to develop consciousness. Evolution realized, which is to say the process of mutation and selection “discovered” that life forms equipped with consciousness actually weren’t the fittest. Thereby it needs to be pointed out that consciousness wasn’t the thing evolution had aimed for. It only wanted to have cleverness. With cleverness the evolution was able to form species being able to use tools, perhaps even create some themselves. With cleverness evolution could bring about entities, being able to help evolution with the ever more complicated inventions necessary to really make the difference. Consciousness, on the other hand, merely came as a by-product nobody really had wished for. One may say that consciousness was the true original sin. A sin, by the way, nobody should be blamed for, but evolution. After all, if we all had stayed dumb like earth worms, the word “sin” would not even exist.

On first sight it was good to have some kind of awareness or self-awareness, but within the cruel reality it often became a disadvantage to “feel” respectively to consciously recognize what was going on and what life or being consciously alive really meant. So, evolution had to learn it the hard way, that it could create sufficiently fit life forms, who also have consciousness only when adding yet another piece to that recipe and this was spirituality. Only spirituality allowed these self-aware and feeling life forms to put all those difficult or impossible to understand, often cruel or even unbearable experiences to a place in those bigger and bigger growing brains where it (meaning all the mess, cruelty and madness around) would hurt a bit less.

Of course, evolution never intended to make this storage for spiritual thought bigger than absolutely necessary. After all, evolution only wanted to create fitter life forms and had no interest what so ever in bringing dim and passive believers into being. Thus, the organ of spirituality only ever was thought as a temporary storage room for everything which could not be explained straight away. Unfortunately, however, it turned out that explanations for some things took longer than the typical life span of such life forms. In fact, there were problems where even the typical life span of a whole species would not suffice. Thus it happened, that there was always something in these storages. They were never empty and the bigger brains, keen to get also these unexplainable things explained, were extremely susceptible to all sorts of prophets who promised to have solutions, answers, hope. And so the epoch of the shamans, priests, imams, Gretas and CO2-smellers, esoterics, astrologists, politicians, politic scientists, soul-experts, climate-apostles, philosophers and coffee shop owners had begun.

Did you all understand that?

No!

Ok then, let’s try it a bit differently.

Spirituality is a complex organ allowing us to put things we do not quite comprehend into a state of:

“Ok, I’m not getting the gist right now, but I simply blame a fictive entity for this, I name this entity God and so I don’t need to bother about the unexplainable thing anymore!”

Now you understood right?

Yes!

Very good!

The good thing about spirituality for all those, shamans, politicians and so on, now is that we can easily manipulate people because of this organ. You simply need to assure that the broad mass thinks something like:

“Ok, I’m not getting the gist right now, but I simply believe that this or that politician does somehow know what he or she is doing… May God help them!

Or that this or that priest, who always claims to have a direct connection to God, knows much better what is good for me… and so I don’t need to bother about myself and my own life anymore!”

To make this actually work, one has to train that organ, of course. It is a bit like a muscle. You also have to train it to make it strong. There are many ways to train the spiritual organ, but in essence it is just a clever mix of act, carrot, stick and lies.

As a shaman, the moment you lose control over that organ of your people, you also lose them. This organ namely is the only way to truly have power over them all.

Why on earth do you think mediocre politicians are flooding Germany and the EU right now with such dim but super-believing “refugees”?

Why on earth do you think the pope and his colleagues from the other churches wants you to welcome more and more and more of those equally godly people from the south?

You only ever need enough of such uncritical believers becoming dominant among the other people and then…

Well, then for the leaders in church and politics there is no need any more to actually do anything - whatever it is - right. Oh no, it totally suffices to cry something like:

“Amen, Amen I tell you: **Yes we can!**” or in a more recent case:

“We can make it!”

But is it fair to abuse this spiritual organ in such a way?

Our dogmatic answer to this question is NO.

Does the mere existence of the organ of spirituality prove the existence of the divine?

Again, our dogmatic answer to this question is NO.

To cut it short we state: Spirituality is a product of evolution. Without it, consciousness could not have evolved, at least not in the way it did with a certain species on earth named homo sapiens. Of course, the foundation for the spiritual organ was laid earlier, long before men appeared on earth and probably right at the beginning when evolution started to experiment with bigger and somewhat more sophisticated brains… perhaps just right after the earth worms, I guess. Thus, the "spiritual organ" is so very deep down in our thought and brain structure that we do find it extremely difficult to stay rational if it comes to any topic having to do with spirituality.

Some people will say that the author is godless, but in fact, I'm the opposite. Those who call me godless are only afraid of me, because I'm telling you to think for yourself instead of blindly following modern shamans, priests, imams and all those who claim to have messages from God for you.

Yes, in fact this "I have a message from God for you" does even sound mad, does it not?

Doesn't it just sound as mad as "I can smell CO2!"?

Or let's have the typical: "I am having a message from God for you… it might even be two messages, I cannot tell, because sometimes God is only whispering…"

"How wonderful", I want to answer, "and did you make sure it is not coming from somebody else? From the inside of your own head, for instance, or God may help us, from the devil himself?"

They are God's massage machines. What an utter pile of rubbish.

No, they have no massages from God and especially they do have none for you.

If there was a God and he had a message for you, he would give it straight to you.

Why?

Because this is the shortest way and trust me, God does know that!!!

And why would he know that?

Because he is God, you idi… whatever… and because this whole universe always goes for the shortest ways, finds the extrema, the optima [2]. This is what we have just seen in the "New Genesis" in [1]. Good, if he exists and if it was him who created the universe, created this as an extremal ensemble of properties, thereby making it the most effective and innovative life- and thought-production machine there can be [1, 3, 4]. That his creation, with its inbuilt minimal principle, also provides the fairest conditions possible, was elaborated in [5].

Why would just God, of all entities, missed that important point in choosing the very ineffective way of only using those self-proclaimed "chosen ones" to send messages from him to you?

In fact, nobody ever had a message from God, not more than you had such massages yourself anyway.

It was evolution and a human being which developed the idea of God, it were human beings who carried that idea on to find solace in difficult times and it were human beings who abused the idea of God.

Shame on them!

They abused it to gain control over their fellow next, over their sisters and brothers for their own advantage -

Shame on them! - And of course, they must fight people like the present author who actually want to take that control from them in order give it back to the person to who it belongs, namely you.

We state: Everybody who tells you that he or she has a message from God for you, most certainly is lying and only wants to gain control over you. Do not give him or her that control!!!

So, now we are ready for the next question:

Does this all mean that there is no God, respectively no divine?

Again, our dogmatic answer to this question is NO. Because if something is in your head, it does not mean that it could not also be real.

Thus, the existence of spirituality only proves one thing: Evolution has made a lot of interesting inventions, but the mere idea of the divine does neither prove nor negates its existence.

However, as hinted above, the existence of that spirituality in our brain structures makes it difficult to rationally discuss the topic of the divine. This holds the more as there are other dependencies on the existence of the different forms of the divine. In order to understand that, you simply have to look at the economic dependencies of the Churches and its leaders. Simply imagine the financial disasters all those Churches and their preaching "holy men" would be in, the moment nobody believes in them anymore. The moment nobody believes anymore that these people have messages coming from the divine, they would simply have to stop their comfortable lives and start to work and scrape a living as ordinary men do. But they can't do this as most of them are completely unfit for such an ordinary life. Consequently, they all have to fight nail and tooth to keep their position as just the top-lairs among us. They are parasites and as the only way to keep this position they have suppress the one thing they fear most: You starting to think for yourself.

So, how neutral can these people be if it comes to honestly answer the question about the existence of God?

And even worse, how neutral can these people, whose complete life depends on their special connection to the divine (a most specific divine, of course, mostly), whose physical and spiritual existence totally and absolutely depends upon their uniqueness, their disparity from ordinary men if it comes to talk to, hear from or obtain messages from God?

Do you think you should give the words of an ordinary man, like the pope surely is, any more attention or credit than anybody else (perhaps yourself or your best friend)? Do you think, you should stop thinking for yourself, freeze in making up your own mind, only because a certain other person, a spiritual leader, has done some thinking for you… or pretends to have done so?

Assuming you have voted "No" in answering all these questions above, it is time for a bit more thinking.

Whenever in its long history has the Church, any Church, not put its own economic interests VERY high up, if not to say above anything else, including fate and wealth of whole civilizations?

Thus, and especially when also taking the history into account, can a Church, any Church, be considered a trustworthy and neutral judge on the matter of the divine?

And having gotten this far, can a spiritual leader, any spiritual leader, totally dependent on your belief in the divine and his special connection to it, ever be considered a trustworthy and neutral judge on any matter in society?

Yes, the Church leaders will not like to read all this, but in order to show also them that I'm not writing this in order to substitute one "divine authority" by another one, I want to add the following:

The above said also holds – of course – for the author.

As an ordinary man he can be as wrong as everyone. So, think for yourself, check the arguments, recalculate the math and reconsider the logic behind. Then try for a new angel and do it all over again!

17.5.4. Climate Religion or Why should man believe in God(s) when he has holy Greta(s), Mama Merkel(s) or Saint Michael(s)?

Knowing now where spirituality comes from and being – hopefully – somewhat more aware of the susceptibility lurking inside of each and every one of us, we may just apply our previous finding to examples like "migration is always good", "gender is a science", "socialism and communism is for the working people", "politics can only be understood – and done - by the cleverest among us" or "CO2 is a climate killer" or…

In all these examples, mentioned here, it is quite easy to find the typical host-parasite structure one can make out in most religions. **But the huge difference to classical mono or multi-theistic religion is that these religions are based on the existence of god(s). This existence can neither be proven nor can it be disproven. This is just a principle and very fundamental fact. Those examples mentioned above, however, are not based on something being on dispute for eternity, they are based on downright lies. Lies, which were spread among the susceptible in order to construct comfortable structures for parasites.** So it was shown in many studies that the whole gender gaga is total nonsense and no science at all. As a very fundamental proof that the so-called "gender-since" is nothing but a huge swindle, it probably suffices to show that the number two holds a very unique place among all numbers in this universe [8]. The proof is based on the last theorem of Fermat and its connection with the fundamental laws of this universe, which dramatically favors the number two on all operation [9]. Reproduction, however, is nothing else as an operation and thus, the non-gender-conform appearance of two sexes is a natural and most logic result and by no means an accident (as the "gender-scientist" want to tell us). So, "gender-science" is a lie-based rubbish and nothing more. The other interesting example is the ideology of Marxism and all related equality ideologies. Here it can easily be shown that perfect equality with respect to any parameter or property always means the death of each and every system crucially depending on that very parameter [10]. Thus, Marxism and all its derivatives are based on a huge lie, too.

Let's now pick the climate example here. In order to keep the connection, we simply repeat the general discussion from above in a just slightly adapted form:

Thereby, in order to have an illustrative starting point (after all, if it comes to religion it is common practice to apply metaphors), we here want to use a completely fictive story about the origin of the current climate ideology, if not to say madness. In order to make it a bit entertaining, we apply the method of satire.

Why satire?

Isn't the topic a very serious one?

Yes indeed it is, but what else but satire can we use when seeing that the climate-simulators (or –liars [7]), seriously want to tell us that the solar activity is a constant. If they even - actually - **pretend** to see (or smell) a CO_2 greenhouse gas effect, when the uncertainty of the cloud coverage is already 114 times bigger than any such effect could ever be [6]. Mind you, we really meant the UNCERTAINTY of the cloud coverage and not the absolute value. This alone gives enough reason to resort to satire, but then learning that the German Government has just brought a new "climate rescue tax package" on the way, which actually taxes CO_2–emission more than poisoning the world with dioxin, leaves not options for reasoning with these people. Against such stupidity, only satire can be used, because where there is no reason whatsoever, one has to stick to the old saying that humor is when you just laugh anyway.

Let's just imagine an imaginary person with the name Michael, who always was a bit "funny". One day, on a toilet and combing his hair with the toilet brush, as he always did, he had a revelation. Namely, when combing his hair – as usual – with the toilet brush, he realized that there was this nasty smell all around him. It occurred to him that the smell was the more and – what is more – more intensive, the more often he combed his hair in the usual – toilet brush – way. Attention seeking as he was, he wanted to tell as many people as he could about this. In fact, he considered this such a great finding that he immediately drew a diagram on a stretch of toilet paper in which he connected the frequency of use of the toilet brush for hair combing with the smelly outcome for his head. Naturally he found that the more he combed, the smellier he became. In result he obtained a nice curve showing this functionality. As it was just a line, which Michael considered a bit boring, he added a few wiggles here and there, just in order to make it a bit more interesting. Then he drew two axes and wrote "COMB" on the x- and "SMELL" on the y-axis. He thought for a moment what might happen when doing even more hair combing this way (perhaps in some excessive, if not so say manic manner, thereby resorting to all public toilets in his town) and realized that this should lead into a rather dramatic increase in smelliness. He added this as steep "prediction" to his curve. Now he wanted to present his result to the public and as he wasn't completely dim, he sought for good substitutes for the two words he had used in his little diagram so far. After all, so he knew, it is the words which make the difference and not the facts. It took him quite a long time to come up with a good substitute (ten years or so), but finally he had the "COMB" changed to "CO", where, as Michael wasn't a very clean worker, some smeared out residual remained behind the "O". Then he changed the word "SMELL" with "CLIMATE", because it simply appeared quite natural to him to associate the two things. After all, with him in the room, especially after he had performed some hair combing action, the climate usually was not good at all.

Now he presented his result to the world and under the name "toilet brush curve" it become a huge success and the starting point for a new religion.

Thereby the first presentation was close to become a disaster for Michael as he could not answer the question what the hack the CO should stand for. Then a drunk journalist in the second row, who took the smeared out residual from the "MB" for some index stuff, babbled something like:

"Boa eh… not the stupid CO2 again."

But some Club-of-Rome people in his vicinity immediately saw their chance and shouted:

"This must be the CO2, of course!"

Then everybody just went crazy and there was nothing but a mix of applause, a lot of shouting and – above all - a great understanding about this important prediction at the end of the “toilet brush curve” where excessive combing had now, which is to say after all the word-changes and Michael-adaptations, led to a very bad “climate” prediction.

Among the first who listened to the “toilet brush curve” story of Michael, there were a totally imaginary Swedish father and his even more imaginary daughter Greta. They were in the first row and Greta, who was about to throw up because of the smell wafting around a freshly combed Michael, thought:

“Oh, I can smell CO2!” and in her slightly restricted brain a connection was built between this awful smell and the prediction part in Michael’s curve she saw right in front of her.

“Hell”, she thought in horror, “if this is getting even worse, I’d really throw up in the end.”

From this moment on, she fought CO2 wherever she could. She did it with such a ferocity that people around her got infected and faster than one could say “Climate Change is just normal” or “CO2 is an absolutely harmless gas”, a new religion was born and Greta was its Messiah.

So and now let us just repeat what we have already learned about the origin of spiritual belief. Thereby we want to incorporate our knowledge about the climate ideology:

We know that spirituality is a complex organ allowing us to put things we do not quite comprehend into a state of:

“Ok, I don’t understand the complicated quantum mechanical behavior of this funny gas CO2 and I have absolutely no inkling about what climate really is, but I trust Greta-gang and the Michael-Saint and all those holy higher entities around them that they are telling the truth. In order to make things simpler for my own internal spiritual filter, I even name these entities EXPERTS and so I don’t need to bother about understanding the whole topic anymore myself! They just do it all for me.”

The good thing about spirituality for all those, experts, fathers of Gretas, Michaels and so on, now is that they can easily manipulate people because of this inner spiritual organ. And this is what they do. They have made the ordinary people believe them and to trust them that they are not only right with this “toilet brush story” (lie) about the CO2 [6, 7], but also to accept a hell of a burden to feed these liars.

And just as it holds with the ordinary religion, in order to make this lie actually work, one has to train that organ. In the case of the climate lie, it is a permanent steady flow of corresponding rubbish and flawed association, cleverly combined with the cane for those who do not want to believe that easily, which does do the trick. They even founded a huge international council of global mafia-like structure in order to reach each and every corner of this world and fill it with this mephitic, pestilential rubbish about the bad CO2.

Now we intend to investigate the parasitic character of these ideological pseudo-religions. When starting with

Marxism and just taking the association of George Orwell's famous "Animal Farm", we easily see which pigs were "more equal than the others". All those higher-up party members, Marxism/Leninism and Stalinism teachers, polit-officers, Stasi, Securitate, KGB and so on members, none of them needed to worry about doing anything useful for the society any longer. The society had to work for them, while their own "contribution" was the uphold of the suppression and the assertion and permanent (cruel) enforcement of the underlying, in principle rubbish, ideology. They all were parasites of the society and it is of little wonder that in the end these societies had to fall.

Now you simply turn your gaze towards the gender and CO2-climate "scientist". You analyze what they could do in a system not accepting such lies and dangerous nonsense. Having done this in a very thorough manner, you now simply count all those who benefit from the lies in these fields. You investigate who is supporting them and to whom they prostitute themselves in return, like the cheapest whores who have nothing to offer but a worthless flood of obscene words, being whispered into the ear of a media-stultified mass.

Imagine you as a shaman in this anything but holy dance. The moment you lose control over that organ of your people, you also lose them. This organ namely is the only way to truly have power over them all.

And you need to find fellow parasites to connect with. It is not enough that you alone become a millionaire as a CO2-dealing father of Greta. Oh no, you have to share with many others. Journalists, politicians and – very effective – economic refugees. Simply call the latter "climate refugees" and they are becoming your most natural allies. These allies will easily assure the suppression of the little opposition you might have. As coming from nothing, having nothing and knowing nothing, they will also do the dirty work in case there is need. You may not even need to ask them. Don't worry, they'll get behind it quite easily on their own and then they'll just do what's necessary to crush the rebellion against your climate religion. There is no limits of means.

Why on earth do you think mediocre politicians are flooding Germany and the EU right now with such dim but super-eager and "climate-aggrieved refugees"?

You only ever need enough of such uncritical and – what is more – highly motivated (because selfishly egoistic) believers becoming dominant among the other people and then…

Well, then for the leaders in climate churches and green-rubbish politics there is no need any more to actually do anything - whatever it is - right. Oh no, it totally suffices to cry something like:

"Amen, Amen I tell you: CO2 is bad stuff!" or:

"We need to tax the CO2" ('and thereby fill our pockets with the dim believer's hard-earned money') or in a more recent case:

"I can smell it, too."

17.5.5. Conclusions

But is it fair to abuse this spiritual organ in such a way?

Our dogmatic answer to this question is NO.

There is no justification for such an abuse.

It is a crime and there is going to be no forgiveness those who committed it… not even if committed out of pure ignorance and bigotry.

And why wouldn't we accept ignorance as an excuse?

Because it is a crime not to use one's own brain… thereby meaning the whole brain and not just its inner spiritual part.

Evolution gave us the ability to think and the European epoch of illuminism gave us the right to think.

Thus, it is our duty to think!

17.5.6. Back to Science (extracted from a statement of J. O'Sullivan, T. Ball and J. Postma)

The true scientists involvement into holistic climate modelling shall be driven by our mission to support open and transparent empirical/testable investigations that uphold the traditional scientific method. Specifically, we (as true scientists) support the ethos of Professor Karl Popper in that a scientific theory must be falsifiable; submitted to the test of skepticism in open scientific discourse. Our premise on climate change is that our planet has a complex, chaotic, non-linear system whereby it is empirically demonstrable that CO2 plays no measurable part. We perceive that it is the sun and external cosmic forces which are the principle drivers, while planetary effects, including gravitational changes impacting geothermal drivers, play a supplementary role. We participate in the project** in the interests of seeking a unified theory of climate, which may be decades away, but which bears little, if any resemblance, to the fake climate models promoted by the UN IPCC.

** holistic world formula approach for most comprehensive climate modelling, thereby strictly avoiding the typical biased and very often purely parasitically motivated pre-assumptions of the current and rather non-scientific climate apologetics

For more information see: http://principia-scientific.org/

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17.6. Outlook toward artificial intelligence applications when competing against a top-down quantum-gravity approach.

Authors: T. vom Braucke, N. Schwarzer

17.6.1. Abstract

'Algorithms', knowing 'why they do what they do' or their decision making process and what uncertainties and constraints they took into consideration to achieve it is a mystery to users unless the code and data are completely open source and explainable. The situation is even more problematic if the software engineer is leveraging self-learning code with high complexity data. And consider the scenario of an engineer who designs a bridge that collapses killing hundreds of people. Around the world, that engineer and the engineering firm are held legally accountable. What if a self-driving car decides to veer out of the way into oncoming traffic for a 'dog' shaped balloon blowing in front of it knowing it can swerve back into its lane just in time. How will the human driver coming in the other direction react to such poor judgement, might they panic and have an accident? Will the software engineer(s) writing lines of machine learning code for the self-driving car 'unintentionally causing' the accident be liable? Will the self-driving algorithm even know what it just caused and - due this ignorance - therefore not even learn from the experience?

17.6.2. Key Problems of Artificial Intelligence

- Algorithms are often implemented without simple methods to find and address mistakes.
- AI encodes & magnifies bias by programmers not considering all degrees of freedom.
- Optimizing narrow metrics above all else can lead to negative outcomes.
- There is no accountability for big tech companies or the software engineers.

17.6.3. Solving the Problems

Machine learning (ML) being a bottom up approach of learning 'principles' to improve decision making will always lead to increasing complexity and lack a true estimation of all uncertainties due to the algorithmic nature of the approaches used. Neural-Network and deep learning architectures are restricted to this bottom up approach by the very fact they need to learn as our human brains do, to solve problems based on experience, because they don't know the unknown-unknowns. The additional problem of the ML approach is that the learned principles are hidden from us, thereby making the reuse and broad applicability of the learned problem set challenging to adapt to completely different problems without learning of completely new data sets. These data sets require great resources to effectively collect and inevitably will have 'in-complete' and biased data, thus limiting them to massive network effects only available via the internet and connected devices. Importantly the tools to determine Bias are limited and the challenge is to both assess the algorithm and the data sets.

The typical solution is to add additional Algorithms to try and remove bias from trained ML solutions, and improve predictability (a bottom up approach by adding complexity to the model, also true for the Monte Carlo methodology or just "trial and error"). However, with a top-down approach, there is no mathematical bias introduced as all possibilities (let's let bias equal 'degrees of freedom') and uncertainties are already included within the World Formula. Now we can determine the degrees of freedom available within the existing data sets and compare with the maximum universal uncertainties to discover, if in fact, the data already contains any missing degrees of freedom. There is no 'training' of an algorithm in this case in the classical sense, only determining the 'completeness' of the data and calculating with a holistic uncertainty that accounts for all degrees of freedom. The system trains with respect to the uncertainties instead with respect to the whole system, which – of course – is much more efficient. In a case with biased data, the potential result is an outcome where the uncertainty or error is larger due to missing degrees of freedom and/or data within a dimension, than the accuracy required to recommend a solution. At least in this case we know what the calculation is doing and why at all times, even if a 'good' decision cannot be made, we at least have the opportunity to knowingly accept risk (whether or not this is made transparent or accepted by the decision maker).

By using the top-down (world formula) approach as introduced and discussed within this book, we relegate inefficient machine learning based algorithmic (bottom-up) approaches to applications where data is already existing, well tested, readily accessible, and of low societal importance. Constraints on solutions can be pre-determined to meet design, safety, legal, societal and cultural values where the opportunity to review solutions falling outside of those constraints can still be accessed to see if there are better ways to make decisions that may be outside of current societal or cultural paradigms [1, 2, 3, 4]. Such methods also lend themselves to socio-economic models and constraints may be further optimized by leveraging the math of 'What is the Ultimate Good' [3, 4]. Combined with the knowledge about the role of entanglement as THE potential source of intelligence [5] one ends up in much more profound and fundamental building grounds for both soft- and hardware solutions. Such math allows a focus on a fundamental principle of 'growth' or the so called 'S' curves, while the potential downsides are minimized.

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[5] N. Schwarzer, "Is there an ultimate, truly fundamental and universal Computer Machine?", www.amazon.com, ASIN: B07V52RB2F

17.7. "Speed-of-Light" Computational Power with Quantum Gravity Based Computing.

Authors: T. vom Braucke, N. Schwarzer

The next generation of computing based on the 'World Formula' approach that can compute all possible solutions including all uncertainty is now upon us and address two major roadblocks of current computing methods for problem solving. Firstly, the classic binary computers require enormous computing power (time and energy) for problems with complex degrees of freedom, uncertainties and multiple solutions because of their linear calculation approach. Secondly, the classical quantum approach that parallel computes for multiple solutions, but does not do the linear approach well, and does not account for all uncertainties. Additionally quantum computers are 'room-sized' like early computers were, and require liquid helium cooling to maintain coherence between the quantum bits (Qbits) to maintain accuracy and reliability.

The Quantum-Gravity computer solution or the Einstein-Quantum (EQ) computer as we like to call it [1, 2, 3] provides for several orders of magnitude computing power increase over both traditional 'One or Zero' bit computers and classical quantum computers (where a Qbit represents both the One and Zero). The EQ computer will do this because it replaces such degenerated computational hardware architecture with a function such as f=G(x). The challenge to understand here is that this is a hardware solution that until now, only software could do, i.e. the hardware behaves like a true analogue solution. Furthermore, the function operates as the 'World Formula' thereby providing the 'theoretical' power of a universe in every Einstein-Qbit (EQbit). Start adding several of these EQbit's together and the potential impact on problem solving and applications will be nothing short of disruptive.

There are challenges with building the computer described, not the least of which, is that it still requires cooling. But by leveraging the World Formula, stable quantum coherence materials solutions have been theoretically determined for current scalable manufacturing technologies that will operate at Liquid Nitrogen (LN2) temperatures. LN2 is a much simpler implementation than liquid Helium, and since the 60's is readily available and is common in many universities and industrial materials science labs. Additionally, for the hardware function to work, the 3-dimensional architecture of the bits and their assembly requires a specific design to be translated to a fabrication process. However, these fabrication techniques exist [ref CQC2T Silicon 3D solution & Qdot/SQID], rather achieving the suitable coherence architecture to allow the function to operate is critical. This is where a deep fundamental quantum-gravity AND materials science understanding must be leveraged to build this capability.

This computing power will lead to a domination of the scientific and business computing market and applied applications for corporations and countries that can achieve this early and in an intelligently applied way [Paul-Smith Goodson, Forbes Oct 10 2019]. The top-down approach to problem solving will relegate current machine learning (ML) based algorithmic bottom-up approaches with current computing methods to lesser competitors. Further this novel top-down approach will allow hugely complex problems to be solved with significant efficiency compared to any current alternative.

This is not to say that ML won't also be used with the top down approach, but in this case, we know what it is doing and why at all times. Rather the machine learning approach can leverage the 'World Formula' to improve determination of the uncertainty remaining in human responses to automated questions (i.e. chat bots) and then make multi-degree of freedom optimization of the responses to further the conversation. This is important because it allows the interview of the user (i.e. subject matter expert) to determine the right questions to ask to assess the degrees of freedom, data type and quality to feed the 'World Formula' parameter inputs and then to determine constraints from the user to find the optimal decisions or solutions. That is, it provides for the software operating system of the EQ computer, and it raises the question if we may be at the precipice of another fundamental milestone described by Ray Kurzweil [Kurzweil, The Singularity is Near, Viking 2005]?

In Summary

- The Gravity or 'Einstein Quantum Computer', contains both the classical quantum and the classical digital computers "which are the degenerated forms of a true Turing computer" such that all calculation types are possible in the same architecture.

- Based on our theoretical understanding of Quantum-Gravity we have found several feasible materials solution pathways to solve the high temperature coherence stability problem. This development will accelerate with successive hardware builds leveraging EQ-bit computational power.

- Stable coherence solution is feasible operating at LN2 temperatures using currently scalable high volume manufacturing technologies allowing them to be placed in businesses and universities in a small desk-top form factor similar to an SEM.

- Being both QED +QCD combined, its computational development will be speed of light limited rather than speed of sound limited for all the current QED only approaches. And being a top-down computational approach to problem solving, server based capability together with computational and energy efficiencies will be significant to several orders of magnitude.

- Leveraging the World Formula for uncertainty and decision making capability [4], an EQ computer operating system is proposed providing the theoretical calculation power of a universe rains the question; are we peering at the event horizon of a singularity?

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17.8. Toward Top-Down Market Analysis and Guidance Using a Quantum-Gravity Approach.

Authors: M. Chapman, T. vom Braucke, N. Schwarzer

We discuss the proposed elastic field analogy toward macro socio-economic markets and how global market growth could be better understood and harnessed by a holistic, quantum gravity based approach with subsequent uncertainty budget and decision optimization calculations. Consideration is also given to a market guidance system leveraging the fundamental mathematical principle of “What is the Ultimate Good”. The outcome of which would be predictable market growth cycles with harm minimized downturns that are leveraged to drive the further development and evolution, similarly to the S-curves commonly observed in many fields, not the least of which, are innovation cycles. It should be pointed out thereby that the usual rather indifferent and very positive notion of "waves of growth" are not necessarily seen as the optimum for the whole socio-economy. It could well be that certain waves are not leading to optimum developments, some perhaps the total opposite and that they are "better left out" or even suppressed. After all, optimum decision making sometimes is also not to do certain things [1, 2].

Such a system has applications at both the macro, micro and nano-scales of financial markets (i.e. it is a scale invariant solution). Whereas, the micro-scale of local national markets are afforded stability and on the nano-scale individual businesses can leverage the same math to optimize their growth and risk exposure by effective holistic decision making that leverages the 2nd law of thermodynamics.

Having derived this law from fundamental Quantum Gravity approaches [3], we also found the source for evolution and its driving forces [4] within self-organizing processes. Knowledge of these internal interactions will allow for a much better prediction making and control of socio-economic systems of any scale.

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17.9. The Virtual Patient

Author: Hans Leuenberger, Professor emeritus, University of Basel, Switzerland and College of Pharmacy, University of Florida, Lake Nona Campus, Orlando, USA

The concept of the "Virtual Patient" and the "In-Silico Design of Solid Dosage Forms" are described in the publication "What is Life?" in SWISS PHARMA 41 (2019) Nr. 1, 20 – 36 and was first presented on November 27, 2018 at the College of Pharmacy in Gainesville FL, see Videopoint of the Galenus Privatstiftung (http://www.galenusprivatstiftung.at/60.0.html). The SWISS PHARMA article "What is Life?" can be downloaded at www.ifiip.ch/downloads and was also published in Japanese in the November, December 2019 and the January 2020 issues of PHARM TECH JAPAN.

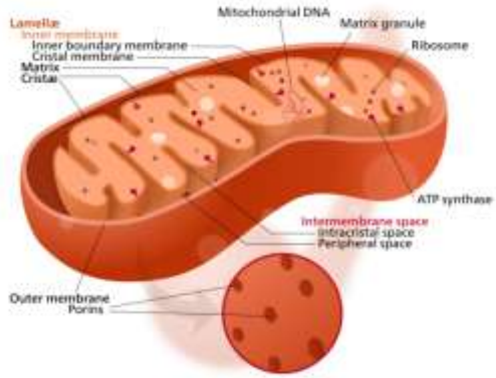

Fig.17.9.1: The mitochondrium, the power supply of a cell = microprocessor for doing the job.

The concept of the virtual patient is based on the idea that each human cell is a microprocessor (fig.17.9.1) and the cells of an organ shall closely collaborate being able to perform coherent decisions and actions similar to a flock of birds using a non-chemical, “wireless” communication. According to the underlying concept described in the publication “What is Life” the following axioms need to be taken into account for modeling the “Virtual Patient”:

Axiom 1 (Prigogine) Far from equilibrium conditions exist favoring transformations from disorder into order leading to the creation of life: Chaos $\Rightarrow$ Order.

Axiom 2 (Leuenberger) The same process is responsible for “inorganic life” represented by the formation of beautiful highly ordered crystals in nature: Chaos $\Rightarrow$ Order. It is important to realize that the same laws are governing the organic and the inorganic life!

Axiom 3 (Schrödinger): Life = Information = Software = Our Genetic Code

Axiom 4 (Schrödinger/ Prigogine): The human being is a living (super) computer leading to the conclusion that Life = Software and our Body = Hardware. For initializing organic and inorganic life, an open system and energy (see fig.1) are needed.

Axiom 5 (Fröhlich): The evolutionary process uses all existing physical laws of the present (imperfect) standard cosmological model to find a niche for a successful survival of the biological system!

Axiom 6 (Zwicky): The evolutionary process uses as well the yet unknown physical laws beyond the present standard cosmological model to find a niche for a successful survival of the biological system!

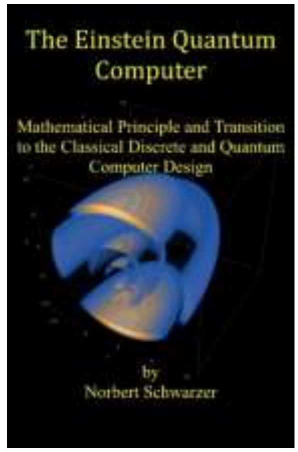

Fig. 17.9.2: Cover picture of one of Schwarzer's books on Gravity Quantum computers [1, 2, 3]

The emerging field of Artificial Intelligence and the availability of high performance computers such as a quantum computer or its advanced version such as an Einstein Gravity Quantum Computer (see fig. 17.9.2) will lead to realize the "Virtual Patient", which may even be visualized by projecting its hologram. This task will be a tremendous *transdisciplinary* challenge for specialists in Artificial Intelligence. As a first step for the implementation the audacious of the VIRTUAL PATIENT project it will be a prerequisite to realize the VIRTUAL LAB concept which will allow designing, developing and manufacturing in-silico tablets containing the active ingredient, which will be orally administered to the VIRTUAL PATIENT. In this context, recent results in modeling the tablet manufacturing process are promising. Thus, it will be possible to simulate a virtual human being who will serve as a virtual patient for discovering, developing and testing new therapies and drugs.

For the implementation of the VIRTUAL PATIENT project the following points have to be considered in detail:

1. The concept of "Virtual Patient" needs to be comprehensive, i.e. it needs to cover the basic human operating system governed by the autonomous nervous system (ANS), which includes to some extent the enteric nervous system (ENS) and the somatic nervous system (SMS). These nervous systems which are part of the central and the peripheral nervous system (CNS, PNS) are wired and the interaction between the anticipated wireless communications of the cells is not yet fully known. It is evident that a chemical communication is present since APIs exist which are able to interact with the nervous system.
2. In an optimal case, the concept of a "Virtual Patient" will be able to explain even the origin of the "placebo" effect or why the "acupuncture treatment" of pain is effective and presents a suitable alternative to a chemical treatment with a painkiller (according to the clinical studies of the Charité Hospital in Berlin).
3. Unfortunately, most of the functions which control life are not governed by linear differential equations responsible for linear pharmacokinetics. Thus, as soon as an enzyme function is involved, which can be saturated, the law of linear pharmacokinetics is no longer valid and is an exception.
4. As a result the classical top-down approach, the following Descartes principle of reductionism is not working properly since the complexity of the system is eliminated. Thus, it is possible to resolve an isolated problem of a much more complex system. On the other hand, it is not possible to describe a complete system which is governed by the network of interactions among the isolated subunits.
5. In this context, it is important to realize that a "bottom-up" concept of the VP will allow a better understanding of the "human operating system" leading to a better, more comprehensive pharmacology. Thus, the complex whole system is more than the sum of its parts.
6. Thus, for establishing the VIRTUAL PATIENT, a bottom up approach is needed, which is different from the top down method known as the reductionist approach. In fact, a living system differs from a conventional isolated one as follows: a) living systems often consist of closed loop systems which are used for catalytic processes. Thus, the reaction product may enhance the process as in case of an autocatalytic process or may slow down the process. As mentioned in 5.19 such catalytic reactions cannot be described on the basis of linear differential equations; b) the living system shows a high degree of complexity as a result of interacting processes leading to causal chains; c) The processes take place in an open system by exchanging energy (energy transfer), mass (mass transfer) and transfer of information; d) the processes are far from the thermodynamic equilibrium and may be irreversible.

7. Together with the "Virtual Lab" project, the "Virtual Patient" will ***revolutionize the workflow*** of the pharmaceutical industry manufacturing ***proprietory drugs leading to important savings in time and money.***

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ABOUT THE AUTHOR

As there is nothing interesting about this author to tell, we refrain from telling it.
Those still being interested in “the story”, we refer to the website www.world formulaapps.com.