The Holy Grail Never Was a Goblet – It is a Machine, Part I: About the Theory

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Abstract

This little series will deal with the mathematical and physical foundations of intrinsic structures in non-solid phases without being limited to matter, which is to say, not restricted to fluids, gases, plasmas, degenerated matter, neutron stars, black holes, and so on.

Based on a quantum gravitational approach, we obtain highly astonishing solutions and structures for suitable, non-solid systems, which, if practically realized or even realizable, could produce seemingly real wonder worlds.

... and we know that in some fields the latter have already been created:

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In this paper here we are going to introduce the essential theoretical foundation.

Introduction

"The Holy Grail is a treasure that serves as an important motif in Arthurian literature. Various traditions describe the Holy Grail as a cup, dish, or stone with miraculous healing powers, sometimes providing eternal youth or sustenance in infinite abundance, often guarded in the custody of the Fisher King and located in the hidden Grail castle. By analogy, any elusive object or goal of great significance may be perceived as a "holy grail" by those seeking such."

This piece of text can be found in [1] and it already indicates that the "holy grail" isn't necessarily a goblet, but that in fact the whole legend is more about a "powerful" object, whereby it is not always really clear what powers are meant. The one set of properties, however, which quite consistently appears in almost all "Holy Grail" stories are the healing powers and the transformative attribute onto almost everything the object comes in contact with.

In this series of papers, we will undertake the "quest for the Holy Grail" strictly on a Quantum Gravity approach, showing in the first issue that it requires only a small adaptation of the classical Hilbert and Einstein achievements [2, 3] to come up with Quantum Gravity Theory or – as it is sometimes also been called - a "Theory of Everything". In a variety of previous publications [4 – 13], this author has shown how a simple scaling factor to the metric tensor already leads to a quantum gravity field equational outcome. The "problem" with this finding of course is, that Hilbert should get all the credit for already having found a - or THE - "Theory of Everything" over 100 years ago. There wasn't much to be done, unless one counts adding a scaling factor as "much", which this author definitively does not. He sees such a "work" as a mere finding in another's paper, namely, Hilbert's "Die Grundlagen der Physik" from 1915 [1]. However, with tens of thousands of jobs at stake because they all depend on the fact that – apparently - there is no Theory of Everything yet, people obviously have problems or – to use a psychological term in order to give - at least - some of these scientists an excuse for their blindness – face an undeniable cognitive dissonant barrier to recognize that Hilbert has already done almost all the work. Worse still, it was also shown [12] that – in principle – variational kernels in the Einstein-Hilbert action of the type f[R], as they are necessary to produce the endless output of new field equations some of the more creative and paper-productive researcher are permanently proposing, and as they are also necessary for so many other Trans-Planckian approaches (e.g. [13, 14]), are not of need, because those could always be substituted by a suitable metric scaling factor [12] without changing the total variational (Hilbert!!!) integral, which – after all – is a scalar. With the potential wall of recognition too high to be overcome by most of the string, loop gravity, trans Planckians and whatever else researchers, perhaps the quantum mechanical tunneling will help them to just – one day – miraculously diffuse through this barrier. Until then, the circus will probably produce tens of thousands more of completely useless "scientific" "contributions", while the simple fact that the job was already done over 100 years ago continues to be hushed up.

Nevertheless, in here, we will apply the rather straight forward and very rich Hilbert approach… just a tiny bit expanded, respectively, generalized.

A Quantum Gravity Theory of Coherent Domains

Coherent Domains

According to the unanimous opinion of many sufficiently holistically oriented scientists, the key to understanding internally structured fluids and the resulting property changes can be found in the so-called "coherent domains" that can form in some fluid substances.

In this series we will therefore concentrate on a fundamental and mathematically rigorous derivation of such phases. In order to avoid the usual mistake of making a premature decision by starting from a predefined concept and our possibly too limited imagination and immediately taking the currently scientifically accepted description of a liquid and then using this as the foundation of the entire work, we will start here with an ensemble of properties and only later "liquefy" them in an appropriate manner in the course of the derivations.

An arbitrary set of properties, attributes, or degrees of freedom can mathematically be seen as dimensions forming a space or space-time and hence, when starting from there, we would only need to think what to do with such an n-dimensional set. So, our question is:

What is the correct recipe to cook a set of dimensions in this universe in the right way?

Well, the more or less classical answer would be the Hamilton extremal principle, but is this truly general and fundamental enough?

We will have to find out!

The Quantum Gravity Approach

We start with the following scaled metric tensor and force it into the Einstein-Hilbert action variational problem [2] as follows:

$$G_{\alpha\beta} = g_{\alpha\beta} \cdot F[f] \quad \rightarrow \quad \delta W = 0 = \delta \int_V d^n x \sqrt{-G} \cdot \left(R^* - 2 \cdot \Lambda\right) \qquad (1)$$

Here Λ is the cosmological constant, G denotes the determinant of the metric tensor from (1) and R^* gives the corresponding Ricci scalar. Performing the variation with respect to the metric $G_{\alpha\beta}$ results in:

$$0=\left(\begin{array}{c}\boxed{\boxed{R_{\alpha\beta}-R\frac{g_{\alpha\beta}}{2}+\Lambda\cdot g_{\alpha\beta}}}\\ -\frac{1}{2F}\left(\begin{array}{c}F_{,\alpha\beta}(n-2)+F_{,ab}g_{\alpha\beta}g^{ab}+F_{,a}g^{ab}\left(g_{\beta b,\alpha}-g_{\beta\alpha,b}\right)-\\ F_{,\alpha}g^{ab}g_{\beta b,a}-F_{,\beta}g^{ab}g_{\alpha b,a}+F_{,d}g^{cd}\left(\begin{array}{c}g_{\alpha c,\beta}-\frac{1}{2}ng_{\alpha c,\beta}-\frac{1}{2}ng_{\beta c,\alpha}\\ +\frac{1}{2}ng_{\alpha\beta,c}+\frac{1}{2}g_{\alpha\beta}g_{ab,c}g^{ab}\end{array}\right)\end{array}\right)\\ +\frac{1}{4F^2}\left(F_{,\alpha}\cdot F_{,\beta}(3n-6)+g_{\alpha\beta}F_{,c}F_{,d}g^{cd}(4-n)\right)\\ +(n-1)\left(\frac{1}{2F}\left(\begin{array}{c}2\Delta F-2F_{,d}g^{cd}{}_{,c}\\ -\frac{n}{(n-1)}F_{,d}g^{cd}g^{ab}g_{ac,b}\end{array}\right)+\frac{g^{ab}F_{,a}\cdot F_{,b}}{4F^2}(n-6)\right)\cdot\frac{g_{\alpha\beta}}{2}\end{array}\right)\delta G^{\alpha\beta} \qquad (2)$$

and shows us that we have not only obtained the classical Einstein Theory of General Relativity [3] (see boxed terms exactly giving the Einstein Field Equations in vacuum plus the cosmological constant term), but also a set of quantum field equations for the scaling function F, clearly playing the role of the wave-function. It was shown in our previous publications [4, 5, 6, 7, 8] that these additional terms are quantum equations, fully covering the main aspects of relativistic classical quantum theory. Everything else can be obtained by a few generalizations, structural shaping and the introduction of the variation with respect to the degrees of freedom or number of dimensions [4, 5, 6, 7, 8]. So, we conclude, that we indeed have a Quantum Gravity Theory or Theory of Everything, as one also calls it, at hand, whereby it should be pointed out that (2) has to be considered the simplest possible – and still general (see [4, 5, 6, 7, 8]) - form for the corresponding quantum gravity field equations.

"Weak Gravity" and Linearity – The Transition to the Classical Quantum Theory

It was shown in [5, 6, 7, 8] that the so-called "weak gravity" condition:

$$\delta G^{\alpha\beta}=G^{\alpha\beta}\cdot\delta_0+\overbrace{G^{ab}\delta_{ab}^{\alpha\beta}}^{\text{Gravity}}\xrightarrow{\forall\,\delta_{ab}^{\alpha\beta}\ll\delta_0}=\frac{g^{\alpha\beta}}{F}\cdot\delta_0\,, \qquad (3)$$

together with a setting for the scaling function F[f] as follows:

$$F[f]=\begin{cases}C_F\cdot\left(f+C_f\right)^{\frac{4}{n-2}} & n\neq 2\\ C_F\cdot e^{f\cdot C_f} & n=2\end{cases}. \qquad (4)$$

leads to a significant simplification and scalarization of the quantum gravity field equations (2), namely:

$$0=R-\frac{F'}{2F}\left((n-1)\left(2g^{ab}f_{,ab}+f_{,d}g^{cd}g^{ab}g_{ab,c}\right)-nf_{,d}g^{cd}g^{ab}g_{ac,b}\right). \qquad (5)$$

This equation is completely linear in f, which not only has the characteristics of a quantum function, but – for a change – gives us the opportunity to metrically see what QUANTUM actually means, namely, a volume jitter to the metric of the system in question… at least this is one quantum option, because we have already seen others, like the perturbated kernel (e.g. see [8]).

Interestingly, for metrics without shear elements:

$$g_{ij}=\begin{pmatrix} g_{00} & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & g_{n-1n-1} \end{pmatrix}; \quad g_{ii,i}=0\,, \tag{6}$$

and applying the solution for F[f] from (4) the derivative terms in (5), which is to say:

$$(n-1)\left(2g^{ab}f_{,ab}+f_{,d}g^{cd}g^{ab}g_{ab,c}\right)-nf_{,d}g^{cd}g^{ab}g_{ac,b}\,. \tag{7}$$

converge to the ordinary Laplace operator, namely:

$$\begin{aligned} & R^{*}=0 \quad \rightarrow \quad 0=F\cdot R+F'\cdot(1-n)\cdot\Delta f \\ \Rightarrow \quad 0= & \begin{cases} \left(f-C_{f}\right)^{\frac{4}{n-2}}\cdot C_{F}\left(R+\dfrac{4}{n-2}\cdot\dfrac{(1-n)}{\left(f-C_{f}\right)}\cdot\Delta f\right) & n>2 \\ e^{C_{f}\cdot f}\cdot C_{F}\left(R+C_{f}\cdot(1-n)\cdot\Delta f\right) & n=2 \end{cases} \end{aligned} \tag{8}$$

We recognize the relativistic Klein-Gordon equation.

Thus, in the case of n>2 we always also have the option for a constant (broken symmetry) solution of the kind:

$$0=f-C_{f0} \quad \Rightarrow \quad f=C_{f0}\,. \tag{9}$$

In all other cases, meaning where $f \neq C_{f0}$, we have the simple equations:

$$0=\begin{cases} \left(f-C_{f0}\right)\cdot R+(1-n)\cdot\dfrac{4}{n-2}\cdot\Delta f & n>2 \\ R+C_{f0}\cdot(1-n)\cdot\Delta f & n=2 \end{cases}\,. \tag{10}$$

A critical argument should now be that this equation is not truly of Klein-Gordon character as it does contain neither potential nor mass, but this author has already shown that this problem is easily solved by adding additional dimensions carrying the right properties to produce masses and potentials due to entanglement, being provided by the right scaling function F[f] (e.g. [4 – 8]).

Using these results we were able to develop a quantum gravity statistics [9, 10], formulate a Heisenberg uncertainty principle containing gravity [12] and even suggesting a path for answering the riddle of the 3 generations of elementary particles [13].

Finding Matter

Observing our variational result (2) and comparing with the classical equations from [3]:

$$R_{\alpha\beta}-\frac{1}{2}R\cdot g_{\alpha\beta}+\Lambda\cdot g_{\alpha\beta}=-\kappa\cdot T_{\alpha\beta}\,, \tag{11}$$

where we have: $R_{\alpha\beta}$, $T_{\alpha\beta}$ the Ricci- and the energy momentum tensor, respectively, while the parameters Λ and κ are constants (usually called cosmological and coupling constant, respectively), we realize that the following terms of (2) are just the most natural energy momentum tensor elements, yielding the following identity:

$$\kappa\cdot T_{\alpha\beta}=\left(\begin{array}{c}-\frac{1}{2F}\left(\begin{array}{c}F_{,\alpha\beta}(n-2)+F_{,ab}g_{\alpha\beta}g^{ab}+F_{,a}g^{ab}\left(g_{\beta b,\alpha}-g_{\beta\alpha,b}\right)-\\ F_{,\alpha}g^{ab}g_{\beta b,a}-F_{,\beta}g^{ab}g_{\alpha b,a}+F_{,d}g^{cd}\left(\begin{array}{c}g_{\alpha c,\beta}-\frac{1}{2}ng_{\alpha c,\beta}-\frac{1}{2}ng_{\beta c,\alpha}\\ +\frac{1}{2}ng_{\alpha\beta,c}+\frac{1}{2}g_{\alpha\beta}g_{ab,c}g^{ab}\end{array}\right)\end{array}\right)\\ \frac{1}{4F^2}\left(F_{,\alpha}\cdot F_{,\beta}(3n-6)+g_{\alpha\beta}F_{,c}F_{,d}g^{cd}(4-n)\right)\\ (n-1)\left(\frac{1}{2F}\left(\begin{array}{c}2\Delta F-2F_{,d}g^{cd}{}_{,c}\\ -\frac{n}{(n-1)}F_{,d}g^{cd}g^{ab}g_{ac,b}\end{array}\right)+\frac{g^{ab}F_{,a}\cdot F_{,b}}{4F^2}(n-6)\right)\cdot\frac{g_{\alpha\beta}}{2}\end{array}\right). \qquad (12)$$

Towards “Holy Grail” Solutions

With these fundamental ingredients we can now start our quest of trying to find the “holy grail” as an object / set of solutions for which on first sight the ordinary physics seems to be defied while a quantum gravity approach delivers not only an explanation, but even allows for proper exploitation and optimization of the “wonderous” processes [4, 8, 16, 17].

Consequently, the “Holy Grail” cannot just be a goblet. It needs to be an apparatus which forms coherent domains.

References

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