The New Copenhagen Interpretation

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Abstract

We will present a new way to interpret quantum behavior. Thereby we do not use the postulated equations from Schrödinger, Klein-Gorden, Dirac and so on, but start from a consequent first principle (Hamilton) derivation of Quantum Gravity Field Equations [A1, A2] and extract the philosophical consequences from there in a rigorous – meaning, as rigorous as possible – manner.

References of the Abstract

[A1] N. Schwarzer, "Do We Have a Theory of Everything – One Pager", 2025, a SIO science paper, www.siomec.com; www.siomec.com/pub/2025/b17

[A2] N. Schwarzer, "Do We Have a Theory of Everything?", 2025, a SIO science paper, www.siomec.com; www.siomec.com/pub/2025/b22

Introduction

While the classical Quantum Theory interprets its often strange results within a pure probabilistic framework, our Quantum Gravity Field Equations obtain the quantum theoretical wave function (or its equivalent) as a metric scaling factor [1 - 8].

Thereby, which is to say in deriving the quantum extended Einstein Field Equations, we simply started with David Hilbert's fundamental variational integral [9], followed the usually Hilbert path in performing the variation and then ended up with the new equations. Thereby, we have already shown that this does not only provide us with Einstein's General Theory of Relativity [10], but also with Quantum Theory [1 – 8] in one consistent set of equations.

Interestingly, the new approach also gives another way of interpreting quantum results and quantum behavior.

Quantum Gravity Field Equations

We start with a scaled metric tensor and force it into the Einstein-Hilbert action variational problem [9]. Shall the scaling be done via a function F. After performing the variation with respect to the metric we results in a new set of field equations. Close observation of the latter shows us that we have not only obtained the classical Einstein Theory of General Relativity [10], 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 [1, 2, 3, 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 [3, 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 the field equation as obtained in this way has to be considered the simplest possible – and still general (see [3, 4, 5, 6, 7, 8]) - form for the corresponding quantum gravity field equations.

Pure Volume Variation and the Transition to the Classical Quantum Theory

It was shown in [5, 6, 7, 8] that the so-called "weak gravity" condition together with a suitable setting for the scaling function F[f] leads to a significant simplification and scalarization of the quantum gravity field equations.

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]).

Unfortunately, the linearity here is not truly general as it requires a restriction of the variation process via a certain condition for the scaling function and the variation itself. Consequently, in order to obtain genuine linearity, we have to find a different approach. Regarding these other approaches the reader is referred to our previous publications [8, 14, 15, 16].

No Matter Postulation Anymore

It should be pointed out that in the new field equations matter does not need to be postulated anymore (as done by both, Hilbert [3] and Einstein [4]), but appears naturally as terms of F.

Interpretation

Classically the wave function is been seen as a probability function for an object to be in a certain state or position.

Here now, we see that the true meaning of the wave function is given by its relation to the metric of the system being considered. We saw that what classically is the wave function actually is just the volume or scaling factor of the metric. Whatever the system describes, its characteristics are given throughout the metric and the Hamilton extremal principle in the form of the Hilbert variation integral [9] tells us what are the degrees of freedom of the system and consequently what are its possible behavioral patterns, states, evolutionary paths and so on. Thereby, the quantum mechanical aspect of these system characteristics are still determined by the wave function, only that it turned out to be the volume or scaling factor of the metric, defining this very system, which acts as the wave function.

Connection to the Classical Picture

Now, how can we connect the system's scaling or volume character of the wave function with the classical picture?

After all, intuitively one would want to see a huge difference in interpreting the wave function as a metric scaling factor or – classically – as a probability function.

Unfortunately, this question cannot be answered without math, because it is on the level of the statistical interpretation of the quantum theoretical results, where the two picture merge, reveal the true nature of the wave function and – as a by-product – also explain why the classical interpretation works so nicely even though it does not get the full gist of the metric reality. The math was worked out in our previous papers [11, 12] (see fig. 1) and we presented the connection in the mathematical version of this paper [17].

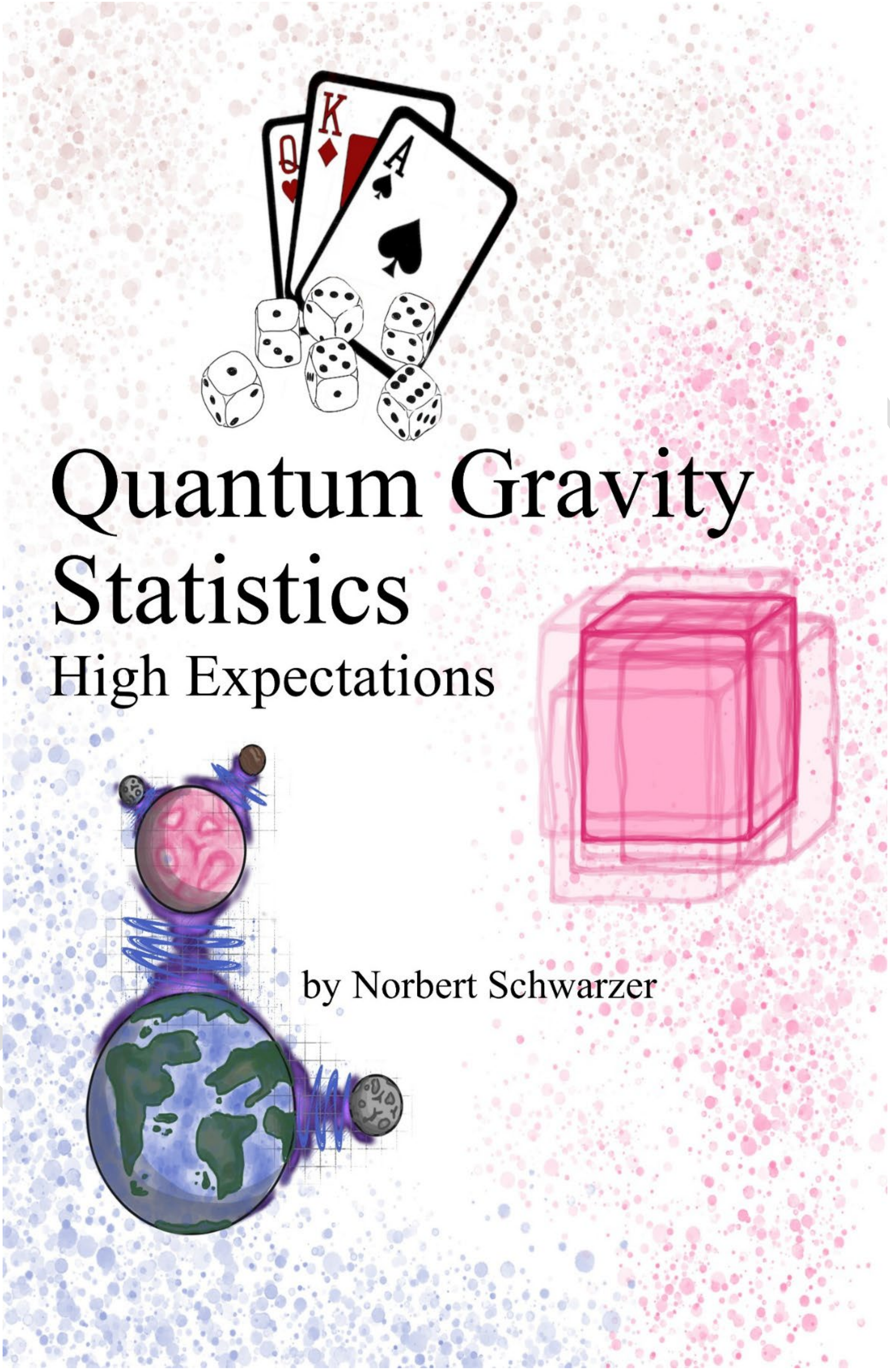

Fig. 1: "The Illustrated Quantum Metric" (by Livia Schwarzer)

Interestingly, the starting point towards the revelation of the connection is the rigorous derivation of the expectation value in both pictures. From there, everything just falls into place.

Why has Nobody Seen the Metric Nature of the Wave Function So Far?

The fact that this has not been discovered so far is explained by the infinitesimal character of the quantum mechanical volume changes on the metric in ordinary systems. While the quantum mechanical states can be detected and the transitions between those states can be observed, the metric volume fluctuations cannot directly be measured as they are by far too small in ordinary (earth-bound) experimental set-ups. Imagine an oscillating metal plane covered with iron filings. When measuring the bonding fields between the atoms in the plate you would not be able to measure anything else than the usual bond strength, caused by the quantum electrodynamic field of the atom residuals and the electron gas in between. This is so much stronger than the plate's jitter that it completely overshadows the – in comparison – infinitesimal small field fluctuations coming from the geometric oscillation moving the whole plate. Still, the iron filings (not a very sensitive measurement) detect the movement and form unique patterns. This is how we might understand/illustrate the volumetric space-time fluctuations, being completely overshadowed by the rather rigid and mainly Minkowski-like metric structure.

In addition, as we have worked out above, the math in systems of higher dimensionality is almost perfectly equal to the usual von Neumann treatment of the wave function and offers not significant edge for detecting any deviation from the classical picture. Even, as it was shown in [11], in well-defined systems with only very few attributes, differences to the Quantum Gravity statistics are small and as there is no absolute reference frame, there was little chance of an experimental discovery of the true nature of the wave function. Everything could always just be – almost perfectly - gauged back into the classical frame and for any direct scaling effect on the system's space-time metric, our current measurement capacities are many magnitudes too low.

That being said, however, this author is of the opinion that Quantum Computing might offer a chance of a more or less direct observation of the space-time jitter and thus, the experimental revelation of the true nature of the so-called wave function… which is – as shown here – nothing else but the scaling factor of the metric tensor.

Applications

It was demonstrated in [13] that the new Quantum Gravity Statistics helps in understanding the fundamental limit of current AI systems (so-called Large Language Models).

In fact, it appears that our new form of interpreting quantum mechanical effects will most likely find applications in the field of quantum or even quantum gravity computing. Indeed, it seems to be urgently needed there. In addition, the simple fact that we required a new quantum gravity statistics to work out the true nature of the wave function almost forces us into the direction of all sorts of economical, socio-economical and general scientifical statistical applications (see fig. 2).

< https://www.forbes.com/sites/phoebeliu/2026/05/15/billionaire-sas-jim-goodnight-built-an-analytics-profit-machine-ai-forcing-reinvention/ > (picture not shown due to copy-rights, waiting for permission)

Fig. 2: Cover of Forbes Magazine May 15, 2026

Conclusions

In this paper we discussed the fact that the classical (Copenhagen) interpretation of Quantum Theory as a probability framework is incomplete and that the true nature of the wave function is given as the volumetric or scaling factor of the metric describing the quantum mechanical system under consideration. The math necessary to show this (not presented in here, however) is forming a complete and consistent Quantum Gravity Theory.

References

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