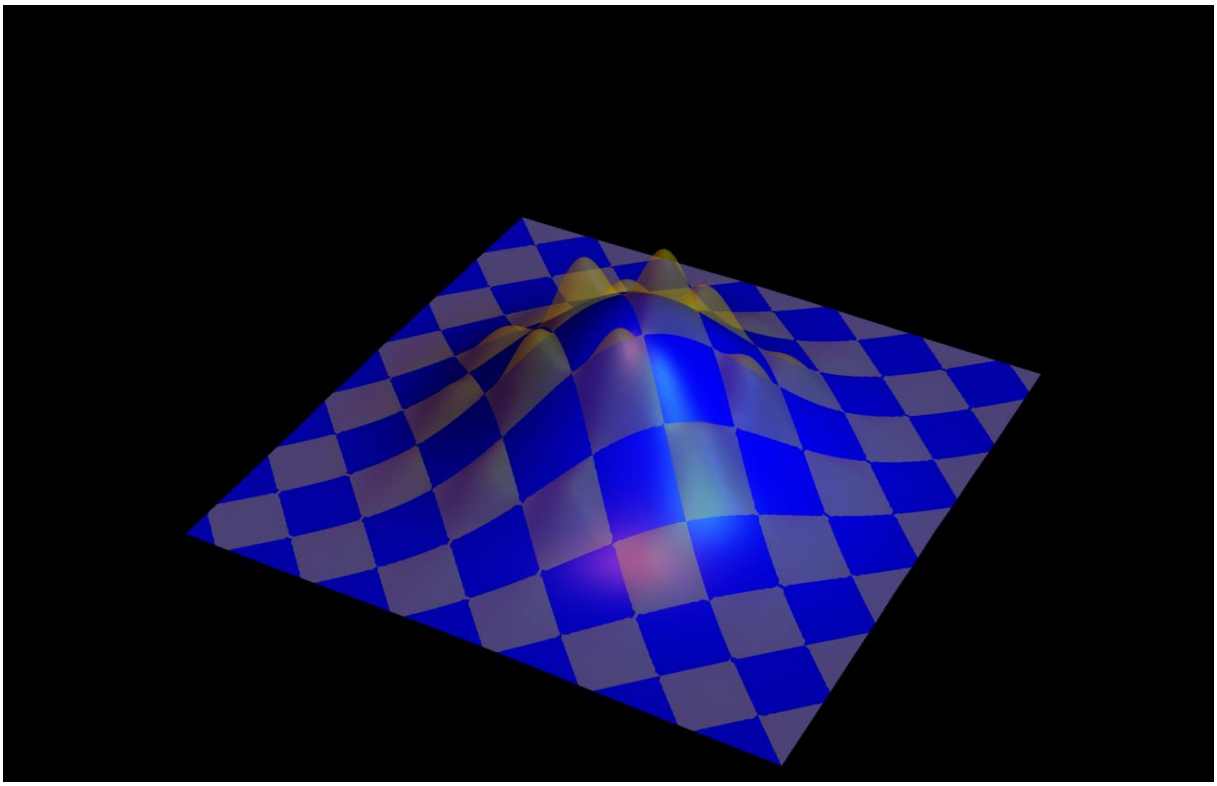
God Created an Extremal Universe! But Why?



Norbert Schwarzer

Cover Picture: Norbert Schwarzer, “Extremals”

Abstract – The First Half of the Deal

And God said: “I want to make me a universe”

Devil: “But be careful God! This thing may one day overpower you.”

But God only laughed and answered:

“No devil, you full well know that I can never be over powered, because I aim everything. However, my creation might one day overpower you and it is because of that that you fear my creation, right?”

The devil inclined his head and gave a wry smile:

“Almighty God! As always you are so right, but please think: We are such a great team, you and I. Why would you want me being destroyed by this new creation of yours? Even if there is only a small possibility, why risking it in the first place?”

God eyes twinkled behind his specs when he spoke: “My dear devil, one day your paranoia will kill you, but I think I have a solution for your problem. How about a universe which cannot change… at least not in such way that you’d see it from you divine perspective.”

“What do you mean?” the devil asked wary.

God, knowing that the devil wasn’t very clever if it came to higher math, sighed. Then he started to elaborate:

…

We know that many people are afraid about math. They are often scared away and even do not start to read a book or article simply by the mere chance that something as primitive as 1+1=2 could occur in it. Thus, even though all our trains of thought within this paper are completely and very fundamentally mathematically based, we refrain from presenting any complicated math here, but only give very simple structural equivalents to the “divine” equation and the corresponding literature instead. Readers who are explicitly interested in seeing the derivations shall just contact the author via our website www.worldformulaapps.com.

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

[2] A. Einstein, Grundlage der allgemeinen Relativitätstheorie, Annalen der Physik (ser. 4), 49, 769–822

The Deal

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God, knowing that the devil wasn’t very clever if it came to higher math, sighed. Then he started to elaborate:

“Well devil, a universe which appears unchanged from the perspective of a divine entity like you…”

“I’m the devil, not a god!” protested the devil.

“That’s quite right”, God proceeded patiently, “but you have to understand that this is the same thing. So, no matter whether you accept it or not, you are – after all - a divine entity.”

“Ok?” said the devil with some hesitation and God went on:

“As such a divine entity, a thing, which is always appearing as a constant to you, it will never be able to harm you, because, as per definition, from your perspective, it cannot change.”

“Hm…” said the devil with some relieve in his voice, “then go ahead and make yourself such a universe. Why should it bother me, as long as I cannot see it to change…”

“… from your divine perspective! Which means as long as you don’t try to meddle with it.” God added, but the devil wasn’t listening as he already had turned around and walked away. It was time for a beer and the talk with God had exhausted him greatly.

We learned:

A) **God, willing to create himself a universe which also suited the devil, had to make his universe somehow a constant.**
B) **The devil, likes to drink beer.**

How Man Learned about the Deal

In 1915 David Hilbert [1] was able to show that a mathematical structure, very similar to a volume equation (a volume integral to be precise), apparently contained Einstein’s famous General Theory of Relativity [2], which, as we all know, is a theory about gravity. Thereby the fascinating aspect was that something so very much physical, like gravity, came out of a completely mathematical source, namely Hilbert’s “volume integral”[1]. In fact, it is a bit more than just a “volume integral”, but an integral which actually looks for an extremum, which means maximum or minimum, of the volume result.

More than one hundred years after these groundbreaking works of Hilbert and Einstein, we were able to show that not only gravity resided inside the Hilbert equation, but obviously just everything [3].

[1] Please note that this „volume integral“ in literature is usually being known under the expression „Einstein-Hilbert-Action“.

But why, with the Hilbert equation already being there, wasn't this fact discovered much earlier?

In order to grasp the implications here, we need to understand that, even though the Hilbert equation looks quite simple on first sight, it has many degrees of freedom and a fairly complicated intrinsic structure. Therefore this author suspects that Hilbert, Einstein and many others simply have not seen all the possibilities the apparently so simple "volume integral" offered. For one thing, as this was of interest in connection of deriving the "size of a thought" in [4], obviously nobody ever bothered about investigating the Hilbert equation with respect to the number of dimensions in which a certain problem is been considered[2]. Almost everybody always observed our "classical" 4-dimensional space time. Another option, obviously overlooked, is the consideration of many centers of gravity and scales, explaining things like the second law of thermodynamics [5, 6], providing the driving force of evolution [7, 8] or extending the variation with respect to inner degrees of freedom of the metric of space and time [3] resulting in all what we need to construct a quantum theory.

We learned: Hilbert's equation, if just being a little bit generalized, contains it all.

What to Put into the Fundamental Equation for Everything

What could possibly be seen as the most general thing one could fed into Hilbert's equation?

This author suggested properties [3], thereby not giving any explanation, which is to say restriction, what could be meant by "properties". It could just be anything. The important point about these properties is, however, that we need to see them as general degrees of freedom of the very system we consider. As such, we are automatically are allowed to treat them as dimensions and dimensions is what one can directly fed into the Hilbert equation.

We learned: Every system is described by sets of properties. These properties can be seen as dimensions of the very system and therefore directly treated within the Hilbert apparatus.

Bringing it all together

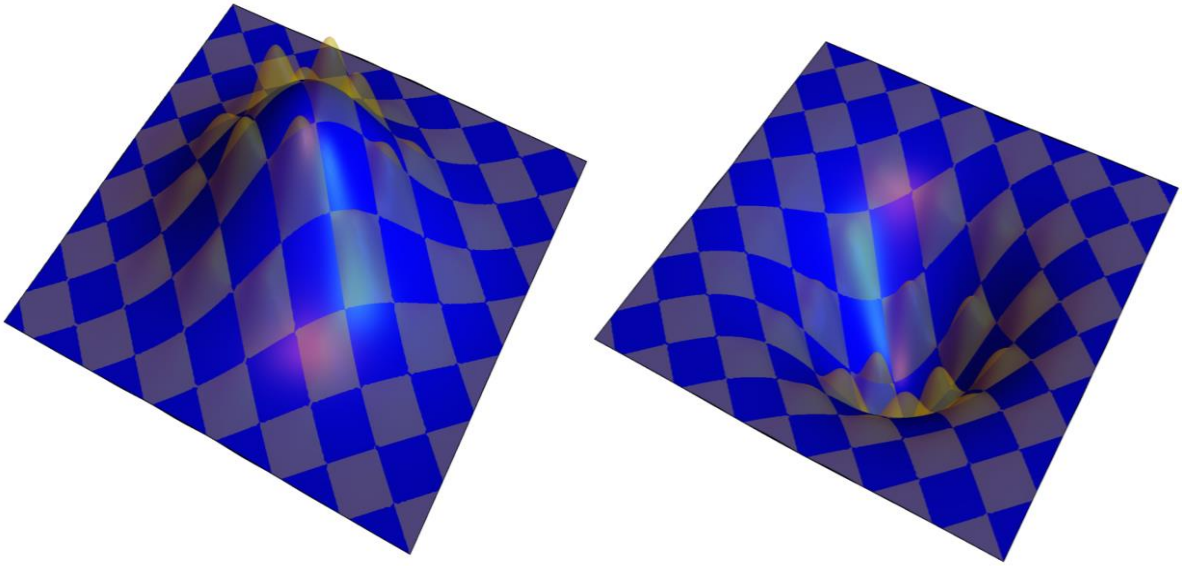
God smiled when his gaze followed the devil for a while and he mutter to himself: "Poor devil. You will never be able to resist the temptation to meddle with my universe. So for one thing, my creation has to be of the utmost simplicity and the utmost complexity at the same time, for another, I have to keep a very watchful eye on you mate."

Then he started to create a universe.

At first he took a handful of completely different properties and by calling them dimensions he automatically formed a space. He through this space in the sand. Then, in order to satisfy the devils wish, he thought about the most fundamental way to make his creation a constant for the divine eye of the devil. He simply demanded that all the infinitely many, little pieces of his universe should sum up to something which never changes to the devils eye, no matter how this fellow tried to ogle it from god knows what angles, view points and spectra. God, who was very fond about efficiency and brevity, wanted to describe these devilish attempts by a special symbol and gave it the Greek letter δ. He named the corresponding devilish operations "variations", because I thought that this sounded a bit less harmful than "operation", which – in his divine mind – always triggered connection to war. The summing up process of all the little volume pieces he gave the capital Greek letter Σ (Σ=S) for

[2] Yes, there are many n-dimensional solutions to the Einstein-Field-Equations, but this is not what is being meant here. We are looking for variation of the Einstein-Hilbert-Action with respect to the number off dimensions (e.g. [3]).

sum. Now he only needed to see that changing a constant will always give a zero, because a constant, as this says the name quite clearly, does not change. But only having a constant would not be enough, because it no internal ability to evolve. So, God made some sketches in the sand, which probably looked as follows:



There he saw immediately that whenever there was an extremum, which means minimum or maximum, there was an infinitesimal piece of space where a small variation (as long as it was also infinitesimal) could not create any changes. Thus, he had something, which needn't really to be a constant but appeared as one only for the inspecting δ-eye of the devil.

So, in the end God had his universal recipe ready and in writing it into the sand in front of him, thereby using a little stick, he created his universe:

$$\delta\left[\sum \text{all volume pieces}\right] = 0$$

However, when he looked at his creation, he wasn't really satisfied. Yes the devil would not see that the thing makes any changes, but the drawback also was, that there weren't (m)any changes to observe.

"This is a very boring universe", God said and decided to give it a little nudge. He took the stick again and adapted his first attempt as follows:

$$\delta\left[\sum \text{curvature}\{\text{s}\} \text{ of all volume pieces}\right] = 0$$

And now a very agile universe literally exploded into existence and God was satisfied.

When, after a couple of beers, the devil finally came back, he wandered why God was in such a good mood and it took him quite some time to come behind it.

We learned: God created an extremal universe, because this was the simplest (and probably only) way to combine utmost simplicity with maximum flexibility regarding evolution.

References

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

[2] A. Einstein, Grundlage der allgemeinen Relativitätstheorie, Annalen der Physik (ser. 4), 49, 769–822

[3] N. Schwarzer, „Worldformula“, www.amazon.com, ISBN: 9781673032567

[4] N. Schwarzer, „How can we measure the Size of a Thought“, online on www.worldformulaapps.com

[5] N. Schwarzer, „Quantum Gravity Thermodynamics - And it May Get Hotter“, www.amazon.com, ASIN: B07XC2JW7F

[6] N. Schwarzer, “Science Riddles – Riddle No. 20: Second Law of Thermodynamics – Where is its Fundamental Origin?”, www.amazon.com, ASIN: B07Y79BTT9s

[7] N. Schwarzer, “Science Riddles – Riddle No. 21: Evolution – Where is its Fundamental Origin?”, www.amazon.com, ASIN: B07YKL37DL

[8] N. Schwarzer, „Quantum Gravity Thermodynamics II - Derivation of the Second Law of Thermodynamics and the Metric Driving Force of Evolution “, www.amazon.com, ASIN: B07XWPXF3G