How can we measure the Size of a Thought

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Abstract

Yes, the size of a thought can be measured. But we have to dig quite deep before we are able to see how it can be done. At first we need to understand how the universe stores information and from there we derive a universal measure for the thing we call information. An almost miniscule extension of the Einstein-Hilbert-Action [1, 2] helps us along the way. In the end, we find that the size of a thought can have measures in very different scales, but there is always one fundamental scale which holds absolute within our universe. Interestingly, this scale is been defined by objects we know as Black Holes. With this, we can allocate an absolute size to each and every thought, simply by the amount to information this very thought contains.

But does this also tell us about the “greatness” of the thought?

No it does not!

If we also want to know the thought’s impacting potential, we require more than its own absolute size. We also need to know about its weight within a background of many other thoughts, ideas, inventions, innovation, including all the dark matter and energy there is in just every somewhat more complex system.

We know that many people are afraid of 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 math here, but only give 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 Fundamental Equation for Everything

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].

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 is going to be the one we are most interested in here, 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.

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

Spheres in n Dimensions

Let us assume that there are spheres in all n-dimensional spaces. Yes, of course, we already know that a point could be seen as a sphere which has zero dimension, that a line of a certain length 2*R has one dimension and could just be taken as a sphere with radius R and that a circle is just a sphere in 2 dimensions. Our ordinary sphere is then 3-dimensional - naturally. But, even though we might have problems in imagining it, there are spheres also in higher numbers of dimensions.

Now the funny thing we need to learn here is the fact that for a given radius R there is always one certain n, which is to say one certain number of dimensions, for which the volume of the sphere is maximum. And the higher R, the higher also is n.

We learned: There are spheres in any arbitrary number of dimensions and we call them n-spheres. To each radius R exists just one dimensions where the n-sphere has maximum volume.

Making the Connection to Hilbert's "Volume Integral"

"…for a given radius R there is always one certain n… for which the volume of the sphere is maximum."

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

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

But wait a moment! Didn’t we just say that the Hilbert equation in fact wasn’t much more than an instrument which searched for “volume integral maxima”? Now we also learned from a completely different field (mathematical spheres in n dimensions), that such maxima exist for all sorts of spheres for a given radius, only, that the area in which to search for these maxima covers all numbers of dimensions. Apparently, neither Hilbert nor anybody else ever looked for this possibility.

We learned: One thing Hilbert and Einstein apparently forget to look for, was the number of dimensions.

But what does this tell us?

The Other Sphere

In 1916, in the middle of World War I, Karl Schwarzschild published a short paper [4] about a solution to Einstein’s gravity equations (which also were Hilbert’s equations). This solution contained an object which later became known as Black Hole, an object so dense and massive that not even light could escape from it. In fact, these Schwarzschild solutions also were spheres, but they were slightly deformed, which means time and space in which they existed and which actually they just were, was deformed. Very near to the center of the Black Hole the deformation was so dramatic that – as it seems – these object cut themselves off the rest of the universe. At a certain radius, being given the name **Schwarzschild radius**, namely, everything around the Black Hole becomes so abnormal and extreme that one may well characterize this region and everything inside it as “being out of this world”. Just as n-spheres, these objects can exist in any arbitrary number of dimensions n and they sport perfect spherical symmetry. They also follow the same radius-to-dimension-maximum-volume rule as ordinary n-spheres do.

We learned: There are n-spheres with mass. We call them Black Holes.

But, so the question any astronaut wants to get answered before ever climbing into a space ship and coming in danger of potentially being swallowed by a Black Hole, what does happen to the poor things falling into those Schwarzschild monsters?

What Happens to a Photon when it Falls into a Black Hole?

In the early seventies J. Bekenstein [5, 6] investigated the connection between black hole surface area and information. Thereby he simply considered the surfaces change of a black hole which would be hit by a photon just of the same size as the black hole (fig. 1).

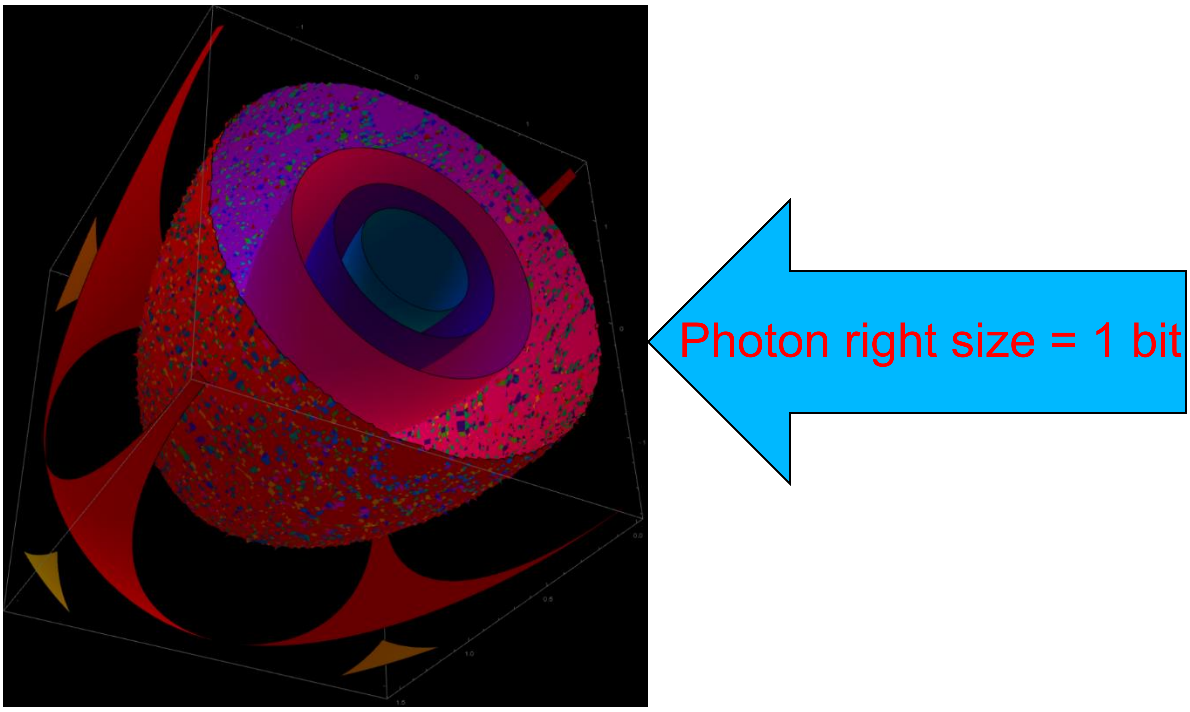

Fig. 1: Illustration of the Bekenstein thought experiment.

His idea was that with such a geometric constellation the outcome of the experiment would just consist of the information whether the photon fell into the Black Hole or whether it did not. Thus, it would be a 1-bit information. Bekenstein's calculations led him to the funny proportionality of area and information. He found that the number of bits, coded by a certain Black Hole, is proportional to the surface area of this very Black Hole if measured in Planck area ℓ_P^2. This is an extremely small amount of surface. In other words, each photon falling into the Black Hole is similar to a bit falling into that very Black hole and each bit increases the size of the Black Hole by a tiny little bit. Bekenstein was even able to give a nice equation for the growth of the Black Hole in dependence on the number of bits thrown into it.. Instead of presenting that very equation we simply illustrate its results (fig. 2 solid line).

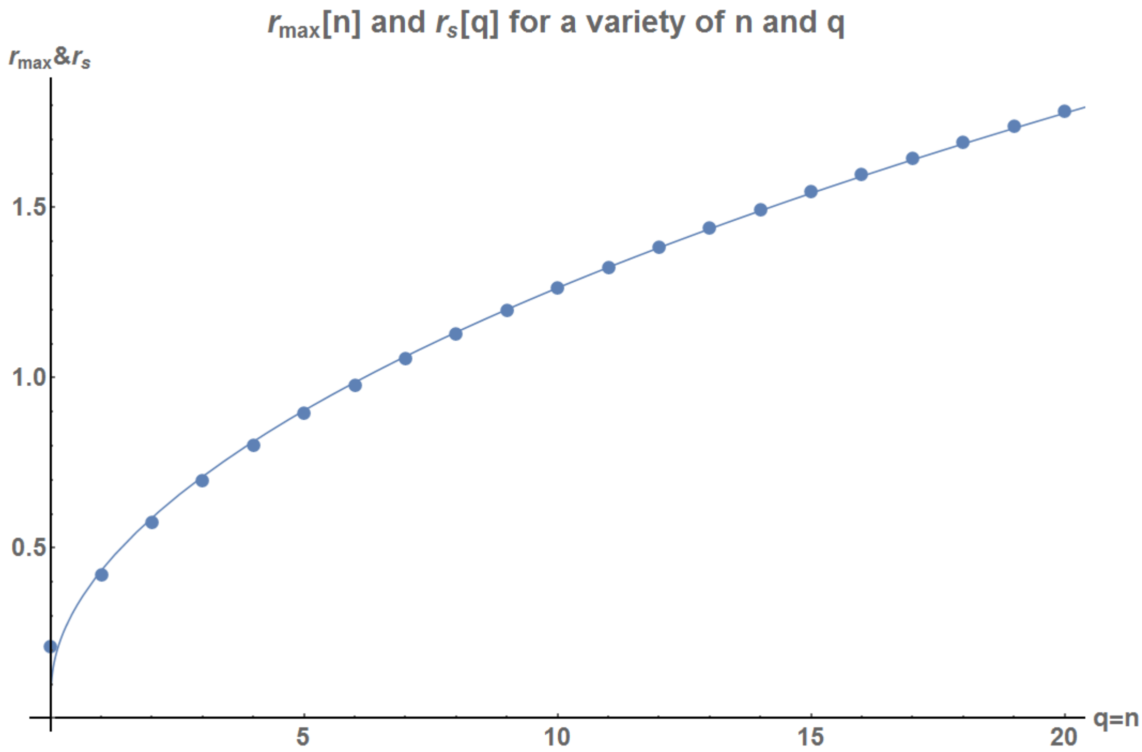

Fig. 2: Radius r_{max} for which at a certain number of dimensions an n-sphere or a Black Hole has maximum surface in dependence on n (dots) compared with the increase of the Schwarzschild radius r_s of a black hole in dependence on the number of bits q thrown into it by using the Bekenstein formula (solid line). We find that q=n.

We learned: Information let Black Holes grow if being fed with.

What Bekenstein could not answer, however, was the question of how the Black Hole actually collects and stores all these bits. What happens to them? In fact, what happens to all the things, including our astronaut, falling into Black Holes and – what is more important – what the hack happens to the information these things contained or just were?

Using the Connection we Already Found

We already have learned that spheres of a certain radius R find their maximum volume always in exactly one certain number of dimensions n. So, we ask ourselves, could it be possible that the number of dimensions, allowing a mathematical sphere to always stay in the optimum of content state to a given radius, also holds for Black Holes? Could it be that Black Holes have no fixed number of dimensions, but that they adjust their internal number of dimensions with respect to the amount of information (matter) they have swallowed?

If so, we should find some agreement between the mathematical n-spheres and their radius to dimensions behavior and the Bekenstein equation, right?

Well, the corresponding comparison is shown in figure 2. While, as already explained, the solid line shows the result for the Bekenstein bits, the dots give the radius as number of dimensions dependency. The agreement is not only perfect, it immediately also allows us to conclude that information in fact just is equal to dimension. One bit thrown into the Black Holes “reappears” as additional dimension to a slightly grown Black Hole.

We learned: Information is dimension.

What is Mass?

But does this also help us in understanding what actually makes the mass of a Black Hole?

Once again the answer is no, because the fact that we have found out that the Black Hole stores information as internal dimensions does not tell us anything about how the Black Hole actually does really, which means physically, do it. After all, photons are massless particles. So how can they suddenly give mass to an object they fell into?

In order to answer this question we need quantum theory. There we are able to show that mass is just entangled dimensions [7] (see also [3]). Applying this to our Black Hole information problem, we find that each bit and therefore each subsequently added dimension connects to (or entangles with) the other dimension already residing in the Black Hole. Non-entangled dimensions do not give mass (or other forms of matter), while entanglement leads to mass. A photon, falling into a Black Hole also consists of dimensions, but these dimensions are free or non-entangled in a massive manner. When passing the event horizon of the Black Hole, which is the Schwarzschild radius, the dimensions are made to entangle such that mass occurs. The math describing this process was described in [7].

We learned: Mass is entangled dimensions.

Bringing it all together

The evaluation of the greatness of a thought should start with the summing up of the substance of information this very thought is been made of. For this we simply decompose the thought into its bit-structure and by counting the number of bits we have the thought’s equivalent Schwarzschild radius r_s. Thus, if the thought would be compressed to a Black Hole, its size would be a sphere of exactly this radius. However, this would only be the size of the thought inside a world with no other or previous information in. From figure 2 we can easily deduce that the more thoughts (information) there is already inside the system, the more difficult it becomes for a new thought to really make a difference (a difference on the radius r_s, we mean). The change of radius to the system (Black Hole) is getting ever smaller with each bit of information already been collected. Thus, the evaluation of the greatness of a certain thought (or idea) always requires the consideration of the whole, because it depends on the background of total information how important the new piece of innovation would actually be.

And there is more!

As the Black Hole can only grow, respectively increase its mass, when information / dimensions added to it also entangle with the rest, it requires the new thought to connect with the information already residing within. A thought finding no connections to entangle with whatsoever is in there, is useless and would just be rejected as a gamma ray burst or something similar[3].

Yes indeed, what we found is a triviality. After all, every child knows (politicians don’t, though) that an idea is worth very little if it is just one which already has been spoken out many times before.

[3] In the case of thoughts from greenish or leftish politicians it will probably not be more than a lukewarm and very little fart… if at all.

But the difference here is that we have worked out a very fundamental origin for this simple rule… an origin, which actually gives us the means to evaluate each and every new idea, invention, innovation and – YES – thought, in a very fundamental and (that is probably even more important) impartial manner.

And there is more!

We can perform this evaluation with respect to the system as a whole, which is to say ideas, looking good on first sight, might turn out to be of no substance at all after our new purely mathematically based and very fundamental peer review. Let's take the example of the invention of the wheel. In a universe with no wheel, such an invention would definitively make a by far greater impact than in a universe already being brim full with wheel-driven cars, scooters, bicycles and so on.

Or we take the example of the climate-simulators (or –liars), who seriously want to tell us that the solar activity is a constant and who actually pretend to see 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 [8]. Mind you, we really meant the UNCERTAINTY of the cloud coverage and not the absolute value. Looking for a mass equivalent for such lies [9] immediately brings in the idea of antimatter.

In other words, many supposedly "great thoughts", especially if coming from the left greenish parasites and being considered "oh-so wonderful" from within the ivory tower of unworldly "experts" and quixotic politicians, will quickly reveal themselves as rather useless if not dangerous within our fundamental apparatus.

We learned: The size of a thought can be given by the Schwarzschild radius difference it would make to the system this very thought is been given to. Thereby the thought's connectivity to the existing network of knowledge is crucial, because it decides upon the usability of the thought's substance. Only the part being able to entangle with existing knowledge, thereby producing mass, is of use.

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