Forces fondamentales, énergie du vide, masse manquante...

UN TROU NOIR AU CŒUR DE L’ATOMÉ!

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Croissance
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Mémoire
Peut-on soigner son passé?

Myopie
La corriger en dormant

Grippe espagnole
Quand l’aspirine tue

A BLACK HOLE AT THE HEART OF THE ATOM!

La découverte qui révolutionne la physique

The discovery that is revolutionizing physics

Vin
De la chimie à l’alchimie

novembre-décembre 2013 n° 89
As this edition goes to press, the blockbuster Gravity, which features two astronaut-engineers servicing the famous Hubble space telescope, is making headlines in all the media. Our well-known astronaut Jean-François Clervoy, who went on spacewalks in servicing missions himself, visited many TV sets and made fascinating remarks on aerospace history and on the current status of that field. However, obviously, no one reported on the comments he made in Enquêtes extraordinaires (Extraordinary Inquiries), a documentary that was broadcast this summer on M6. There, he evoked the reality of the regular forays of unidentified objects into this planet, and he proposed an exogenous origin as their most likely explanation. In response to his comments, we have compared the surprisingly divergent views of two leading figures of French aerospace who are officially involved in researching this phenomenon. Enough to sharpen your judgement and recall the strategic stakes around this issue, as well as the solutions to energy and environmental crises that it potentially holds.

This is also the subject of our front-page report, which announces THE next revolution in the world of physics. Protons as mini-black holes? To be honest, my reaction to this premise was initially very sceptical, even hostile. A black hole swallows everything in its path, right? And yet, atoms would necessarily weigh tonnes, and we would surely have noticed that! In short, if it was true, we would know! Unless… do read on! How a self-taught man discovered a simple, elegant answer to the great enigmas that have defied physics and astrophysics for decades! And where does the arrow of time fit into all that? At a time when physicists come to doubt the existence of this evasive dimension, the psychology of memory contributes an unexpected element: yes, not only can we change our memories, that is, our past, but it appears that we do it permanently! And what about our relations with our future? This famous “law of attraction,” which has made some New Age authors rich, what kind of reality does it refer to? Promised: we will give you answers on that point too.

Also in our table of contents, you will find enough to free ourselves from this myth of ecocide growth which politicians promise in every election, as well as the hold that lobbies have on our lives… and even on our glasses to correct short-sightedness. With a bonus for the Christmas season: an invitation to rediscover a local treasure, authentic wine.

Basically, everything necessary to trigger the only valid form of addiction: being hooked on a real news magazine like the one you are holding right now.

So enjoy your reading! Till next time!

David Dennery
What if... Nassim Haramein was right?

By Marc Mistiaen

Is a new paradigm emerging in the world of Physics? That is what the recent publication of the work of Nassim Haramein in a scientific journal with a reading committee appears to indicate. His theory of “the connected universe” offers an alternative vision on gravity. The key issue: the discovery of an energy that is potentially undefined.

About the author
An agricultural engineer, Marc Mistiaen is a graduate of the Université Catholique de Louvain-la-Neuve (Belgium). He is a building energy performance advisor and a representative of the Resonance Project Foundation.

How I met Nassim Haramein
Through my training as a building energy performance advisor, I observed that none of the proposed energy solutions, such as solar panels and other procedures, allow us to put in place a system that produces abundant energy without pollution. For example, manufacturing a photovoltaic solar panel requires smelting silicon, which takes up a lot of energy! Mission impossible, then... and it is to be blamed on the constraints of thermodynamics: energy cannot be created ex nihilo, that is to say, from nothing. It can only be transferred from one system to another. Besides, the entropy of an isolated system can only increase or remain constant, which is why your coffee naturally gets colder.
And yet, quite unexpectedly, I discovered that there were certain individuals - geniuses? naive people? crooks? utopians? - who were conspiring against these principles. Pragmatic and economical by nature, I started my inquiry with Nassim Haramein, who was just coming to France to hold a two-day seminar. There I was, en route to meet him. I immediately felt ill at ease at this first meeting, a feeling of outrage quickly took over me. Nassim's remarks seemed illogical to me, they seemed to contradict everything I knew and had learned. Nassim Haramein was saying that there was no such thing as a vacuum, that a proton could have a mass of more than several billion grammes...

It was too much for me. I looked at the 80 participants, and very few of them seemed shocked... Good grief! I was in France, the homeland of Descartes. Did such comments not upset anyone, then?

I told myself that there were probably no scientists among the audience. So I asked my neighbour what he thought about this, and he said: "It's amazing!" I replied with a touch of arrogance, filled with both my own certainties and my confidence in my studies, readings and training: "I am an (agricultural) engineer, and what this guy is saying is absurd."

He replied: "I am an engineer too (in applied mathematics), and this is not absurd..." I told myself that he must have been stoned... At the end of the weekend (there was no refund for leaving early!), I expressed to Nassim my incredulity at his research. He looked at me with a big smile, he gave me some references and wished me good luck in my research. His patience and the fact that he listened touched me and made me think: I can't be the only one to have questioned him like that. And yet, he persists... A question was nagging me: if a vacuum is not empty, could one in that case use that energy and make it readily accessible, despite the constraints of thermodynamics?

► An uncommon path

Nassim Haramein was born in Geneva, in 1962, to an Iranian father and an Italian mother. From the age of 9, he was passionate about nature and about how the universe, matter and energy worked. He grew up in eastern Canada, where he spent a lot of time observing nature and the way it was organised. Haramein devoted most of his time to his independent research on physics, geometry, chemistry, biology, consciousness, archaeology and the world’s different traditions. That led him to developing a pioneering approach on quantum gravity and to working on unified field theory. Speaking in English and French, Haramein has given many lectures and seminars on the unified theory around the world over more than 20 years. In 2003, he founded The Resonance Project Foundation in Hawaii, where he is the research director. He leads teams of physicists, engineers, mathematicians, and other scientists. He shares the results of this work through scientific publications and courses within the framework of the Resonance Academy.

Haramein is currently focusing on quantum gravity (and its technological applications), on researching new forms of energy, on “applied resonance,” on the life sciences, on permaculture and on the study of consciousness. He currently lives in Kauai (Hawaii) with his two children, and surfs on his rare moments of leisure.
So I tried to understand this problem of a vacuum which is no such thing and of a proton which does not have the same mass as we would usually measure. Archimedes and my scuba diving club helped me: I imagined replacing this vacuum which is not empty all around me with water from the pool. Since there is a vacuum everywhere, there is water everywhere, both within me and outside. I am composed of about 60% water (so are you). I imagined an ultra-light bottle that holds one litre and weighs one milligramme, which I fill with water. When I put it on the scales, I will read 1,000.001 grammes (as long as the water is pure, which is of course quite far from being the case). If I plunge the lot into the pool, I will read one milligramme (due to Archimedes’ principle). That is, a difference of one million between the two measurements, and both of them are right! So I understood that a proton could have two different masses, both of them exact, one of which takes into account the density of the vacuum while the other one does not. Next, I imagined our universe as an ocean, with us as fish, and I asked myself whether the fish were aware that they were in water, and what would be the mass of everything that we, as fish, could estimate inside this ocean without taking the water into account... Probably a few per cent of the total mass. Good grief! What percentage does the mass of identified matter in our universe amount to? A few per cent... That very evening, I sent an email to Nassim Haramein.

Can one question the standard model?
Reading the latter's published material allowed me to relocate what I had been taught to the place where it belongs. I have too often been a submissive member of the audience as I listened to unequivocal speakers. Goodbye to my certainties. Welcome, doubts that impose on me never again to consider anything true or false. In short, I got back to the foundations of scientific method.

I have too often been a submissive member of the audience as I listened to unequivocal speakers. Goodbye to my certainties. Welcome, doubts that impose on me never again to consider anything true or false. In short, I got back to the foundations of scientific method.
The standard model describes all the elementary particles that matter is composed of - including electrons, quarks and photons, - the interactions between elementary particles and the forces of the universe such as strong interaction, weak interaction, electromagnetic interaction and finally gravitational interaction - which the standard model does not succeed in either explaining or integrating. Particles, the energy mass of the standard model, represent only 4% of the mass of the universe. The remaining 96% would be dark matter and dark energy. The standard model is not the fruit of a revolution at the fundamental level, but rather of laborious development, experiment after experiment. For example, the CERN and its 2,400 employees - not counting the eight thousand scientists who use these tools around the world - have been trying since its creation in 1954 to validate this model. In short: we may need to return to atomic and subatomic physics at the point where Max Planck left them. It would not be a surprise: the founders of quantum mechanics - Werner Heisenberg, Paul Dirac and Niels Bohr - were convinced that there would need to be another revolution in the foundations of physics in order to explain nuclear force.

**We are conceptually stuck**

According to mathematician Alain Connes, "no one thinks that the standard model is the final word in the story, particularly due to the very large number of free parameters (1) that it contains²." From 1968, string theory emerged in an effort to perpetuate the standard model. David J. Gross, who contributed to re-inventing this theory in the 1980s (which earned him the Nobel Prize for Physics in 2004), ended up admitting that it was not quite as revolutionary as we had hoped...

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6 - **Discrete value**

Discrete value is the opposite of continuous value. The term value is ill-chosen. It is preferable to speak of a discrete or continuous set, with relation to a distance or a topology of this set. We say that a set N is discrete if N's elements represent a finite number of elements.

Example: the set of real numbers R is not discrete, since [0,1] contains an infinity of elements, while N, on the other hand, is discrete since it represents natural integers such as 0, 1, 2, 3...

7 - **Spontaneous emission**

It is, for example, when an atom emits a photon following a spontaneous displacement from a higher energy level to a lower energy level.

8 - **Magnetic moment**

It is a vectorial value which allows us to measure the intensity of a magnetic source. In quantum physics, we regard electrons and other elementary particles as having their own magnetism. Indeed, the fundamental idea of the magnetic moment of a quantum system rests on the fact that we associate a magnetic moment to each charged particle that has an angular momentum. (Wikipedia)

9 - **Wormhole**

It was John Wheeler who described in 1956 the properties of connections between different points in space and named them wormholes. A few years later, at Harvard University, Stephen Hawking and Richard Coleman went back over Wheeler’s concept and suggested that spacetime could be subjected to the aforementioned tunnel effect, based on an idea that had been put forward by Hugh Everett. Just like electrons that can jump from one point in space to another, the universe could do the same. The tunnel effect would create openings within spacetime that would lead to other universes, cul-de-sac universes or universes as vast as our own (Wikipedia).

10 - **Dimensionless number**

It is a number without a unit. For example, the number of Planck volumes by the volume of a proton equals a size without a unit, since the unit ratio m³/m³ simplifies and equals 1.

11 - **Kinetic energy**

It is the energy that an object possesses due to its motion with relation to a given reference point (Wikipedia).
These attempts show that we are stuck conceptually. Our spacetime model, as modified by Einstein, is extremely useful, but perhaps it is not fundamental. To illustrate the remarks above, I am going to turn to the proton radius puzzle.

Protons, along with neutrons, constitute an atom's nucleus. Electrons gravitate around this nucleus at speeds about 9/10 of the speed of light. In principle, atoms make up all the known matter in the universe. A proton itself is made up of three quarks. Until recently, the radius of a proton, which appeared on the list of nature’s fundamental constants, was regarded as a certain value in physics.

Measuring a proton

We can measure the radius of a proton using two methods, both of them with relation to the interaction between a proton and an electron. One is the study of high-energy collisions between an electron and a proton, the other is the spectroscopy of a hydrogen atom. Dr. Randolf Pohl and his colleagues at the Max Planck Institute of Quantum Optics in Munich wanted to measure protons more precisely, that is, to add a few more decimals at the end of the official value, as we do with the value of pi. To do that, they used a peculiar hydrogen atom: muonic hydrogen. Muons have the same electric charge as electrons, but they are 207 times heavier. Why use this type of hydrogen atom? First of all, a hydrogen atom is a logical choice, since its nucleus has only one proton, without a neutron and with just one electron gravitating around the nucleus. A proton itself is made up of three quarks. Until recently, the radius of a proton, which appeared on the list of nature’s fundamental constants, was regarded as a certain value in physics.

Our spacetime model, as modified by Einstein, is extremely useful, but perhaps it is not fundamental.
On 24th January 2013, Aldo Antognini and Franz Kottmann confirmed that the radius of a proton was slightly smaller than we had previously thought. It was to this surprising discovery that the *New Scientist* devoted its front page last July.
Stephen Hawking believed that the quantum information that fell into a black hole was destroyed upon entry, and that this happened from the event horizon, which is the limit beyond which the attraction of a black hole is regarded as irreversible. This point caused a controversy among many physicists, since it violated one of the principles that are dearest to physics, namely that energy or information are always preserved and cannot be destroyed. The debate was passionate to the point that, in 1997, John Preskill bet with Stephen Hawking and Kip Thorne that this information was not lost inside black holes but was indeed preserved, as quantum theory stated. This encouraged two researchers to find a solution: Gerard ’t Hooft considered a little point on the surface of the black hole’s event horizon, one bit of information - as in computers. To do this, he built on the work of Jacob Bekenstein, who proved that information has a minimal size equivalent to one Planck unit. Leonard Susskind studied holographs in the framework of string theory.

In a general way, Gerard ’t Hooft proved that all the information contained within the volume of a black hole can be explained in terms of information, or "Planck bits," on the black hole’s horizon, which thus preserves the information like a "holographic recording." He called that the holographic principle - by analogy to a hologram, - since it describes a mechanism in which all the information that falls into a black hole is represented on its surface by "pixels" with a side the size of a Planck length. The holographic solution he found is equivalent to temperature, represented by the entropy of a black hole, which corresponds to a quarter of the surface of the information area of the horizon ($S = A / 4 * k / l^2$), where $S$ is the entropy and $A$ is the surface in question, $k$ is the Boltzmann constant and $l$ is the Planck length in terms of Planck units. As an observation, the surface of a sphere is given by $4(pi)r^2$: this surface divided by 4 simply equals the sphere’s equatorial surface. (If we cut the sphere in two equal parts, each of the flat parts represents an equatorial surface.) In 2004, Hawking admitted that information could be preserved and that black holes’ horizons absorb and emit coherent information.

Unifying the four interactions

Strong interaction, also called “the strong force,” links quarks together to form, for example, protons and neutrons, which make up the atom’s nucleus. We also talk about the force of confinement, since it is the force that allows protons to find themselves stuck together within the small space circumscribed by the nucleus, although they have the same positive sign and should therefore intensely repel each other. The range of strong interaction is extremely small, about the size of the atomic nucleus. Strong interaction is the strongest (hence its name) of the four interactions; its coupling constant (5), for example, is $10^{39}$ times greater than that of gravity.

Nassim Haramein’s genius is to have turned a proton into a black hole and discovered that the gravitational attraction of a black hole the size of a proton precisely equals the strong force.

The enigma around variations in the radius of a proton leads us to think that the standard model should probably evolve, if not radically change. In that case, is there an alternative to this model? Can we do without dark matter and dark energy? What is it that gravity and mass really are? Is there a possible explanation for strong interaction? What about the Holy Grail of physics, the unification of fundamental forces?

If there is one scientist whose research could contribute to solving these problems, that seems to be Nassim Haramein. However, as we read what follows, let us remember that "all truth passes through three stages. First, it is ridiculed. Second, it is violently opposed. Third, it is accepted as being self-evident" (Arthur Schopenhauer).

Nassim Haramein’s genius idea is to have turned a proton into a black hole and discovered that the gravitational attraction of a black hole the size of a proton precisely equals the strong force.
that was expected by the fathers of quantum physics, to unify the four interactions, to finally unveil what mass, gravitational force, etc., are. Besides, for the first time, quantum and Newtonian physics would no longer be separate...It is therefore the cornerstone of the research of Nassim Haramein, and it calls for further development.

**World-eating black holes**

If they are not properly understood, black holes can be scary. We imagine them as monsters who attract, swallow and destroy everything. Let us get things straight. Although the black hole is indeed a glutton, its range is limited. Fortunately for us, otherwise we would be the next meal for Sagittarius A* (our galaxy’s black hole)! While the mass of a black hole is always high, its density, on the other hand, decreases depending on its size. A black hole’s density is therefore weaker the longer its radius, and vice versa. This gradient is probably essential to explain the rotation of celestial bodies... Indeed, it is for example thanks to a density difference that air masses form whirlwinds!

Could Nassim Haramein just have shown us what the Big Bang cannot explain, namely why all objects, be they galaxies, our Earth, our atoms, electrons, etc., have been rotating for 14 billion years? Black holes themselves do not destroy everything, at least not gravitational attraction, which allows us to locate them. They even seem to have a coherent structure which preserves information (see box on “The holographic principle”).

**How to obtain a $10^{14}$ g mass for a proton?**

If we take as a Schwarzschild radius the former value of the radius of a proton, 1.32 fm (femtometre, that is to say $10^{-15}$ m), we will obtain a proton black hole with a mass of $8.85 \times 10^{14}$ g (Schwarzschild mass, also called the holographic mass of a proton). This holographic mass is also consistent with the rest of the universe’s estimated masses. The table opposite shows that the proton black hole aligns itself on the right of the masses, unlike the proton mass ($10^{-24}$ g) measured in the laboratory.

First notion one should understand well: the vacuum. First of all, there is a lot of vacuum within matter. Simplistically, an atom has a size of approximately $10^{-10}$ m, that is to say, one tenth of a millionth of a millimetre. An atomic nucleus has a size of approximately $10^{-15}$ m, that is to say, it is one hundred thousand times smaller than the atom itself. The volume of the nucleus (let us remember that it is proportional to its size cubed) is one quadrillion times smaller than that of the atom. The volume of the atom is therefore at least 99.999% vacuum! Indeed, matter is made up of space, since there is a huge gap between the different atomic nuclei that unite to form molecules. An example to understand this better: if I enlarge the nucleus of an atom so as to get a sphere with a one-metre diameter, its electrons will be about 50 km apart. If two atoms come together, the two nuclei will be 100 km apart... two spheres with a one-metre diameter that are 100 km apart! The vacuum is therefore omnipresent, whether it is within matter or outside it.

**Geometry of Karl Schwarzschild**

German physicist Karl Schwarzschild (1873-1916) solved in 1916 Einstein’s equations using the principles of Minkowski’s complex geometry. Where Einstein proposed rectangular coordinates, Schwarzschild chose a “polar” system. One analogy is often made: spacetime is like a structure where mass (energy) creates a curvature, as if a bowling ball were placed on a trampoline. The curvature is present along the side where the ball is; spacetime is represented by the surface of the trampoline, while the mass, or the energy, is represented by the ball. If we place another ball on the same surface, it would seem to us that the second ball is attracted to the first by a sort of force, while the phenomenon is due to the spacetime curvature around the ball.

Einstein was impressed by the simplicity of the geometric calculations made by Schwarzschild, who quickly shared these results with his colleagues. Schwarzschild died soon afterwards, at the age of 41. The geometry that Schwarzschild used to solve Einstein’s equations became physicists’ standard approach to establish the gravitational properties of planets and stars.
Quantum gravity and holographic mass.

The first equation describes the ratio between the proton surface and the equatorial surface of Planck volume. It allows us to calculate the number of equatorial surfaces of Planck spheres there are on the surface of a Proton, that is, \(10^{60}\).

The second equation gives us the number of Planck spheres contained in a proton, that is, \(10^{60}\). In the third equation, the external surface is divided by the internal volume, and the result is multiplied by the Planck mass, which gives us the value of the proton mass (the result is written as "\(g\), not "\(gm\)"). It is a geometric calculation that allows us to obtain a mass.

The expected value of the energy of vacuum, when all excitation modes are regarded as the results of an infinite number of oscillations, represents an infinite amount of energy at each point.

Second notion: vacuum is not empty. Indeed, it contains energy in the form of fluctuations, of vibrations. This energy is gigantic, since the density of quantum vacuum fluctuation, also known with the name Planck density (see box below), is given by \(\rho_0 = 5.16 \times 10^{36} \text{ g/cm}^3\). Imagine a 1 followed by 93 zeros in your bank account!

**Casimir effect**

Vacuum energy fluctuations have been confirmed experimentally for decades. The first experimental validation of its existence came from the so-called Casimir effect, where two plates are drawn closer to each other thanks to a slight difference in the density of vacuum energy between and outside these plates. More recently, it has been shown that the dynamic Casimir effect, where the plates are reproduced electronically, is literally the result of the extraction of photon microwaves caused by vacuum energy fluctuations. The expected value of vacuum energy, when all excitation modes are regarded as resulting from an infinite number of oscillations, represents an infinite amount of energy at each point.

In Mathematics, infinity added or multiplied to a number always equals infinity, which does not allow us to go further. This problem has been dealt with by using a limit value, a "renormalisation." The limit used has been the Planck wavelength, since it is the smallest possible oscillation of the electromagnetic field. However, the resulting density of vacuum energy remains very large. Planck density, as it has been called, can be

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**Max Planck and the development of quantum mechanics**

The development of quantum mechanics started in 1894 with the work of a pioneer, Max Planck, who studied the problem of black-body radiation. In physics, a black body is regarded as an idealised body that absorbs all electromagnetic radiation, whatever the frequency or the incidence of emissions. Such an object, in thermal equilibrium, will emit electromagnetic radiation. So a major problem emerged: the spectrum of electromagnetic radiation of a given black body emits infinite energy into the ultraviolet region of the spectrum, which was called the ultraviolet catastrophe.

At the time, Planck put forward the view that the light that radiation gives off exists only in integers. The total amount of energy jumps from one value to another continuously, creating a quantified - rather than continuous and infinite - energy package. In other words, Planck put forward the hypothesis that the amount of energy that a wave can exchange with matter is discrete. His theoretical results were verified when he predicted the correct experimental value for the spectrum of a black body and naturally solved the ultraviolet catastrophe. Planck's law tells us that electromagnetic energy can only be emitted in discrete energy packages proportional to frequency. Thanks to the more precise results of later experiments, he was able to establish the parameters, known as Planck constants, deduced from a set of measures that represent an angular momentum or the wave length of the initial energy package. The idea was considered harebrained until Einstein applied it to the photoelectric effect, describing light as a particle which was later to be called a photon. Max Planck was eventually awarded the Nobel Prize in 1918 for his contribution to understanding the workings of this effect, which consolidated the quantum revolution.

In 1899, Max Planck extrapolated his fundamental units, now known as Planck units. Planck quantities are natural units, without arbitrary concepts, based on the fundamental constants of physics. For example, Planck time is defined as the time necessary for a photon (an energy package) to cover one Planck length.
calculation for the value of the density of vacuum energy by simply counting the number of small Planck volumes within a cubic centimetre of space, which would correspond to the oscillation mode present in the vacuum within this volume. The resulting value for the density of vacuum energy within a cubic centimetre of space (approximately $10^{35}$ g) far surpasses the mass energy of matter in our known universe (approximately $10^{38}$ g). Although the majority of this energy is bound to be neutralised, many physical phenomena are attributed to vacuum energy fluctuations. This energy is not apparent to us because there is equilibrium. Let us imagine that two equally strong forces, with the same direction but the opposite sense are applied to an object. This object will be in equilibrium, at rest, and we will not be aware of the presence of those forces.

**Black hole proton or Schwarzschild proton: is everything related?**

Calculating the volume of a proton and considering the vacuum it contains, we get, based on Planck density ($10^{-5}$ g), a mass of $4.98 \times 10^{-5}$ g by volume of the proton. While it is a lot larger than required to obtain a black hole proton ($8.85 \times 10^{14}$ g), this value is interesting because it corresponds to the value that is generally given for the mass of visible matter in the universe. That can be an indication of the interweaving of all protons through vacuum fluctuations, of everything being inside everything else. We observe that a very weak proportion of the energy mass available inside the volume of the proton (stemming from vacuum density) is necessary for a proton to obey the Schwarzschild criterion and become a black hole. Nassim Haramein finishes his publication as follows: "If the proton is regarded as a mini black hole due to its interaction with quantum vacuum energy, the energy mass associated with this black hole corresponds exactly to the gravitational force of confinement described in quantum physics as the strong force. The Schwarzschild proton (or black hole proton) system predicts remarkably well the interaction time, the electromagnetic radiation, the magnetic moment (8), and is perhaps at the origin of the confinement of nucleons within the nucleus in terms of the spacetime curvature. It is thanks to this spacetime curvature (think about the trampoline) that nucleons remain confined within the atomic nucleus. The Schwarzschild proton strongly suggests that matter, on many scales, can be organised by black holes (or by phenomena that are similar to black holes) and thus lead to a scale for the unification of the fundamental forces. A solution could be found to describe both the origin of mass (currently unknown within the standard model) and the origin of the strong force as a gravitational mechanism."  

Although the majority of this energy is bound to be neutralised, many physical phenomena are attributed to vacuum energy fluctuations. This energy is not apparent to us, because there is an equilibrium.

Consequently, a Planck length is the minimum length of the electromagnetic field or, if you will, the smallest possible vibration of electromagnetic radiation. It is important to note, in the context of this article, that the initial theoretical construction of the black body happened a long time before the conceptualisation and discovery of black holes, which are in themselves almost perfect black bodies. Therefore, that clearly suggests that there can be certain more appropriate specific means through which the gravitational force and the mass of a black hole can be expressed in the form of discrete integers on the quantum scale, which is what Nassim Haramein is showing us! Spontaneous emission (7) could not be explained using the parameters of quantum mechanics. Quantum mechanics, on its own, was unable to explain this behaviour in the context of a theory in which the dynamics of the atom are quantified, but the electromagnetic field is not. (No probability was found for spontaneous emissions when calculations were made with the initial approach.) It was necessary to generalise quantum mechanics, on the one hand, to take into account spontaneous emissions and other dynamics observed in the quantum world, and, on the other hand, to find a means to link special relativity to the quantum scale. Quantum mechanics needed to expand its framework to express the electromagnetic field as quantified modes of oscillations at every point in space, which led to the development of the quantum field theory launched by Paul Dirac at the beginning of the 1920s, with his equation that has since become famous.

In other words, quantum field theory describes space as if it were filled with discrete, unconnected packages, of both energy and waves, like little masses linked by springs. In 1913, Albert Einstein and Otto Stern established that the quantum vacuum (the spacetime structure on the quantum scale), demonstrates major excitations even at a temperature of absolute zero kelvin, which earned it the name "zero-point energy."
It is not over!
From the moment when Nassim Haramein sensed that gravitational force could be the mechanism that keeps protons together, he needed to understand why this colossal force in the nucleus only has a very short range, the size of the atomic nucleus at most, that is, $10^{-15}$ m, while the Earth's attraction force can express itself over considerable distances: the Moon is 384,400 km away, and yet it is indeed attracted to the Earth! It is here that Nassim Haramein was to show his genius as ever, before: he used a holographic solution. The consequences and results of this approach are surprising, since they could provide answers to the questions that have been asked. Besides, it is an elegant solution. Based on the holographic principle, the information held inside a volume of space can therefore be described by what we find on its surface. Nassim Haramein goes further, by asking himself whether the information that falls into the black hole is not simply holographically encoded, but also holographically shared with every black hole in the universe. Each of the Planck spheres on the surface of a proton would be linked to other protons in the universe thanks to "wormholes." (9) Could this be the mechanism that defines mass and gravity? If a proton is a mini black hole, are its mass and its force of confinement the result of the information network that relates the internal volume of vacuum fluctuations, which holographically represents all the other protons in the universe, and its surface horizon outside?

In that case, it would be a mechanism within which the holographic influence of the information within $10^{80}$ protons (that is, the estimated total number of protons in the universe) would interact with a single proton, thus producing the exact value of this proton's rest mass, which is approximately $10^{-24}$ g.

In concrete terms?
The Planck sphere is the smallest piece of information possible, like one bit of information. Remember that this Planck sphere is filled with vacuum; it is therefore the minimum size (a Planck length) of the oscillation of vacuum energy. In order to establish the information on the external surface of a proton, Nassim Haramein calculates the number of Planck sphere equatorial surfaces on its surface. To establish the information inside the proton, he calculates how many Planck spheres there are inside it. By drawing up a ratio of internal information divided by external information, he obtains a dimensionless number (10), since it is a size ratio which, multiplied by the Planck mass, gives us a mass. Using the radius of a standard proton ($0.8775 \times 10^{-13}$ cm), he obtains a value of $1.603498 \times 10^{-24}$ g, namely a 4% difference with relation to the value of the proton mass. Using the new value of the radius of a muonic proton ($0.84184 \times 10^{-13}$ cm), he obtains $1.6714213 \times 10^{-24}$ g, that is, a difference of 0.07% with relation to the proton mass reference ($1.672622 \times 10^{-24}$ g). Using this geometric method, he is able to calculate the value of the proton radius, that is, $0.841236 \times 10^{-13}$ cm! In this case we have exactly the same mass as we had for reference!
Even more exciting: Nassim Haramein’s geometric solution is equivalent to Schwarzschild solution to Einstein’s equations... Yes, more complicated formulae to get there! Then, multiplying the radius of any given black hole by the ratio of the Planck mass and twice the Planck length, we get the mass of the black hole! We therefore have an expression for black holes as a function of Planck measurements, independent of values such as $G$ (gravitational constant) and $c$ (speed of light). It is extraordinary! It gets more and more exciting: it was impossible to unify the four interactions, since gravitational interaction (unlike other interactions) could not be expressed in discrete values. The fact that he uses Planck spheres as one bit of information could not be expressed in discrete gravitational interaction (unlike other interactions) could not be expressed in discrete values. The fact that he uses Planck spheres as one bit of information gives him a discrete solution. Spacetime is no longer smooth, it has become granular, which can give him a discrete solution. Spacetime is no longer smooth, it has become granular, which can allow the unification of the four interactions. Nassim Haramein’s solution for gravity is totally innovative, and it functions as well at the cosmological level as it does at the atomic level.

What are the implications?

We could have access to an infinite form of energy, which could offer us a world of abundance, without poverty or exclusion. Free or insignificantly priced access to clean energy, not based on the combustion of our planet’s resources. Tomorrow’s mankind would no longer be like today’s, there would no longer be wars over oil! Let us return to our fish, which have now become conscious of the fact that the volume in which they live is made up of water. They therefore have at their disposal an almost infinite number of water molecules. That will allow them access to infinite energy. It only remains for them to establish how to obtain energy, using for example the hydrogen and the oxygen that the water contains.

Nassim Haramein also gives us important elements to know and therefore understand our universe. Grasping mass through the holographic principle allows us to finally define and understand it. And yet mass is one of the foundations of mechanics, since it plays a role in force ($m \times a$, that is to say, force multiplied by acceleration), in kinetic energy ($11/2$), and in potential energy ($mgh$). Likewise, understanding the structure of spacetime as dynamic and discrete, rotating, also allows us to contemplate changing its curvature, which corresponds to changing gravity. Imagine the possibilities, in terms of transport, but also in terms of space travel. We would no longer be confined to Earth. That is without considering that the philosophical implications that emerge from this research are themselves as revolutionary as the implications for physics, if not more. All that could accelerate if our universities and our researchers join Nassim Haramein’s research.

Marc Mistiaen

“From Cosmos to the atom. Unified field physics. The proton is a black hole!” such is the title of the two upcoming lectures that Marc Mistiaen is set to give in the framework of the Engineers’ Association of the Belfort-Montbéliard Technological University (ASSIDU), on the work of Nassim Haramein, on 19th and 20th November 2013, at 8 pm. On the 19th, Marc Mistiaen is set to present some equations that will allow the audience to fully understand the accuracy of Haramein’s discoveries. On the 20th, he will tackle their applications. These two lectures are open to all.

Venue: Grand amphi (i 102) at the UTBM, 4 rue Ernest-ThierryMieg, 90000 Belfort. Price: €5.

Notes:

3. String theory strives to provide a description of quantum gravity and to unify the four known elementary interactions. That is why we talk about the theory of everything. In practice, there are several theories, all of them complex, that do not allow us at this point in time to obtain usable results without inaccurate approximations.
5. This idea was developed in "The Schwarzschild Proton," by Nassim Haramein, The Resonance Project Foundation, December 2010.
8. $mv^2/2$, that is, the mass multiplied by the square of the speed, divided by two.
9. $mgh$, that is, the mass multiplied by the acceleration of weight (a constant value of 9.81 m/s²), multiplied by the height of the mobile.

Further reading