

amílcar **THE** One Part
Jan. 2020
SECRETS
OF THE
OBTAINING

Acknowledgements

To may Family and to some special Friends who, promptly and selflessly, helped me with their support and understanding to alleviate my vicissitudes at a somewhat difficult time in my life and, despite their best efforts to prevent me from getting into more trouble, unknowingly contributed to the realization of this and others works, that I suppose will deeply irritate a lot of people. It does not seem to me name them here because, although they knew of my endeavour to write this text, they never even suspected the likely consequences of my temerarious intentions.

To Diana Fortier, who kindly and boldly agreed to translate this writing. It was absotutely unexpected to me that She has wanted to do it, and divinally enchanting to have found in Diana a great new Friend. My best thanks will always be insufient to counteract what Aristotle would have said: gratitude is a feeling that soon grows old. In me this feeling will remain and will be told to every soul I meet as long as I have a voice or can look them in the eyes.

amilcar
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Translator's Note¹

Translating Amílcar's text was not easy.

He is endowed with more singularities than could be listed here, and it is no surprise, therefore, that the translation of his text would result in a singular product, riddled with very particular lexical and syntactic choices that are dear to their author, whose expressive needs spoke louder than traditional language conventions. Every word has been negotiated, not always in a peaceful way; Amílcar defended emphatically his creation against my inevitable technical recommendations. Nothing was left to chance. Everything the author of this text says is exactly what he wanted to say.

Participating in this work was a unique, singular, unforgettable experience. And difficult, challenging, taxing. Amílcar's work has enough unusual literary tricks and style shifts to give any translator a hard time. However, the long proofreading sessions, author and translator side by side, constituted a situation dreamed of by many colleagues in the craft. Translating Amílcar's text was the densest, most immersive, most real-time experience I have had in over 20 years in this job.

I hope that the resulting text faithfully reflects the intentions of the author and effectively contributes to the dissemination of his ideas around the world. In that case, the translation will have fulfilled its purpose and I will be able to savor the sweet taste of a job well done.

Fortaleza, January 21, 2020.

Diana

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Idle reader,

It was not easy to write this. My knowledge of Physics and Mathematics, miserably incipient, are completely insufficient for what I intend to expose. I get really upset about it, but it's too late to start learning everything I would like to know. To make matters worse, I became a very irascible and lazy geezer.

I got very apprehensive when I saw an [article](#)^[a] on The Guardian's website in which the incomparable Dame Jocelyn Bell Burnell, the astrophysicist who discovered the pulsars, referred to the impostor syndrome, and another where Science editor Pete Etchells wrote: *In the age of internet search engines, everyone believes they have become experts – all it takes is a quick google, and your first ten hits constitute an apparently unequivocal evidence base.* My impulse turned into hesitation: my search number was below ten. The certainty of the inevitable catastrophe came to me when I saw what Dr. Sybille Anderl published on the last day of 2018: *Being unable to explain the cosmos can be painful. Even worse is when you understand it - and nobody believes you do.*

I believe I am not able to understand the cosmos, much less to explain it, and I imagine that the consequences of writing this will probably be very painful. I take solace in what Dr. Jocelyn Bell said in an interview about Physics: ... *once you understand, it is so easy. (...) You don't have to learn lots and lots and lots of facts; you just need to learn a few key things, and if you really get hold on them, then you can apply them and build and develop from them.* My grey matter has few neurons that require jumpstarting, I know very few facts and I hope Dr. Bell does not regret having said that when she sees what I wrote here.

On my first *google*, I could not even imagine I was getting myself into hot water: it was pure chance. I was looking for something on YouTube and my curiosity woke up from its usual lethargy when I saw the title of the video A PARTÍCULA AI MEU DEUS! (Oh-My-God Particle) on the irreverent young Brazilian Pedro Pinheiro Cabral channel, then a Physics student at UFRN, Brazil. He reports on the detection of a particle with kinetic energy far above the GZK limit, which ranks it as a ultra-high-energy cosmic ray (UHECR) and whose speed was *so close to the speed of light that, if a photon*

were travelling with that particle, it would take over 215,000 years for the photon to gain a 1 cm lead, as seen from Earth's reference frame.

I knew a little about particles, but, as things in underworld Physics present an alarming uncertainty today, I [browsed](#) the [web](#) as a desperate one^[7.1-7.12] and I learned that *the GZK limit is derived from the assumption that ultra-high energy cosmic rays are protons*, although measurements carried out at the [Pierre Auger Observatory](#) ^[7.13-7.14] and other large cosmic ray observatories suggest that most UHECRs are heavier elements. (...) [\[7.1 7.2 7.3;1 7.3.2 7.4 7.5 7.6.1 7.6.2 7.6.3 7.7.1 7.7.2 7.7.3 7.7.4 7.7.5 7.8 7.9 7.10a 7.10b 7.11 7.12\]](#) [\[7.13.1 7.13.2 7.14\]](#)

The observation of these particles constitutes the so-called GZK paradox or cosmic ray paradox, (...) and These observations seem to contradict the special relativity theory and particle physics predictions as they are presently understood. Despite the conceptual restriction that The GZK limit only applies if ultra-high energy cosmic rays are mostly protons, (...) there is no fundamental contradiction in the observation of cosmic rays with energies levels that violate the limit. Although high statistical significance data indicate that ultra-high energy cosmic rays are not purely protons, such data are not yet enough to establish a distinction between the pure proton hypothesis and the mixed-nuclei hypothesis.

The nice, disheveled, lucid, fearless and relentless Dr. Sabine Hossenfelder [wrote](#) on 29 Nov. 2016 that COSMIC RAYS CAN REVEAL NEW PHYSICS JUST OUT OF LHC'S REACH. She suggested that Cosmic rays are created either by protons or atomic nuclei which come from outer space, and that the apparent incompatibility between the results obtained at the Pierre Auger Cosmic Ray Observatory and the [Standard Model](#) of particle physics seems to suggest the existence of phenomena still unexplained.

Dr. Hossenfelder refers to an [article](#) by Dr. Glennys R. Farrar and Jeffrey D. Allen published on 9 Jul. 2013, where they report having built a [toy model](#) of the New Physics inspired by chiral symmetry restoration (CSR) as an existence proof that a proton-only model which is fully consistent with data can be found. She suggests chiral symmetry restoration in cosmic ray collisions is maybe more important than in the LHC, But it might be something more exotic, such as new short-lived particles that become important at high energies and which make interaction probabilities deviate

70 *from the Standard Model extrapolation.* — I then checked out what chiral symmetry is, and I got Lost in Math; I understood almost nothing of it, but it seems that in Chirality things are reflected in the wrong way.

The authors of the *New Physics toy model* did not refuse to compare their proposition with the trivial hypothesis that the UHECRs are iron
75 nuclei to propose the existence of a new physical phenomenon and suggest, in a humorous footnote, that CSR may stand for something like "*Completely Surprising Regime*". I think it would be more surprising if it were something very, very long lived and easily explicable by the experimentally proven part of Particle Physics.

80 In 2018, Dr. Jamie S. Farnes, of Oxford's e-Research Center, published a toy model suggesting the unification of dark energy and dark matter to propose that these hitherto unexplained astrophysical haunts may be unified in simple phenomenon: a negative mass fluid that fills the Universe, ensuring that galaxies rotate without shattered out. Obviously, I do not
85 understand the rugged mathematics Dr. Farnes used to demonstrate his proposition, but as far as I got it, such a fluid would explain the frightening kinetic energy of the UHECRs, although he acknowledged that the way they are produced remains a mystery. — One of the variables in the proposed equation to calculate the maximum characteristic energy for a
90 cosmic ray is the atomic number Z , but the values actually used in the calculations are presented in another article, and to have access to it and any others for 24 hours I would have to shell out £20, which I absolutely refuse to do; The Guardian agreed with me in an editorial, as well as some other people. [11.1 11.2]

95 In an article of Aug. 2018, Dra. Hossenfelder e Stacy S, McGaugh ask: *IS DARK MATTER REAL?* I could not read the article – I have to pay to read it –, but the initial comment says that *Astrophysicists have piled up observations that are difficult to explain with dark matter. It is time to consider that there may be more to gravity than Einstein taught us.* The doubt
100 seems to be well founded, but... What if Einstein has nothing to do with it?

In another article of 5 Apr. 2019, Dr. Hossenfelder stated that *we don't know what the incoming particles* (the UHECRs) *are to begin with*, and that *astrophysicists currently think they are a combination of protons and light atomic nuclei, but they really do not know for sure* – as far as I understand,

the focus of the article is to present his restrictions to building a larger particle collider. Dr. Hossenfelder points out that *One of the key motivations for building a larger particle collider that particle physicists like to bring up is that we still do not know what dark matter is made of.*

Now, [dark matter](#) is pop. It is getting hard not to hear anyone talk about it or some of its derivatives, such as a possible inexhaustible source of energy, the [ultimate fuel](#) to propel spacecrafts into space travel, or the red matter that creates singularities and imploded Vulcano in *STAR TREK: THE MOVIE* – after the publication of this text, it will not be a surprise if a super hero or super villain made of dark matter appears. Although it is already a part of most people's daily life, dark matter was not initially within the scope of this text, but now there is no escape from this subject.

It seems that most research is based on the assumption that dark matter is composed of few particles, perhaps only one, and identifying it is like finding a needle in a haystack, supposing that only such a needle serves our purposes, despite the fact that there are many more needles in the sewing box, thousands more scattered throughout the city and billions worldwide.

In an [article](#) dating of 19 Aug. 2015 – I only read the first three paragraphs; to read everything, I would have to pay –, Drs. Sabine Hossenfelder e Naomi Lubick, inspired by the news that the pentaquarks would have unexpectedly appeared in the LHC, declared that *Dreaming up new particles to explain the Universe's missing mass has got us nowhere. Great clumps of quarks stuck together in weird ways could do the trick.* Drs. Hossenfelder and Lubick also stated that Dr. Glenn Starkman *is banging the drum for a bold idea: that there are even more exotic configurations of ordinary matter out there just waiting to be discovered. (...) He even argues that ordinary matter in extraordinary formations could solve one of the greatest cosmological mysteries of our time – dark matter. (...)*

Dr Starkman & Co [asserted](#) that *We have few clues about the nature of the dark matter, except that, based on observations; it must satisfy a series of negative requirements: it should not ruin the success of big bang nucleosynthesis (BBN) nor the physics of the cosmic microwave background (CMB); largescale structure must be allowed to grow to form galaxies and clusters, and the dark matter must remain undetected in any of the direct or*

140 *indirection measurements. In fact, dark matter might only interact gravitationally (...).* — Really? Despite these initial restrictions stemming from the *status quo* of Physics and the effort to demonstrate its theses in a somewhat quantitative way using unpalatable mathematics – there are 90 parameters and equations in his work, some of which are huge, but I think
145 that, essentially, Dr. Starkman’s idea is correct.

What is exposed here does not explain why the *big bang* has never existed nor that cosmic microwave background formation is a continuous process, that the large-scale structure of the Universe has not grown to form galaxies, and much less clusters, and that nucleosynthesis continues
150 to happen naturally – all this is for later –, but I explain why dark matter consists of conventional arrangements of already known fundamental particles, that it is easily detectable and interacts with all other matter forms in perfect accordance with Faraday, Newton, Maxwell, Planck, Einstein & Co – this is solved ahead; read on.

155 In the few references I have consulted, the supposition of the extragalactic origin of the UHECRs is widespread, and this complicates matters a little: it is difficult to trace the sources, for there seems to be no place in the cosmic neighborhood where the UHECRs would be accelerated to such high energy. Running outside, the ICECUBE NEUTRINO OBSERVATORY reported^[15.1-15.5] the identification of the likely source of an extremely high
160 energy neutrino in 2017. It was reported internationally^[16.1-16.7] but apparently there is no desired relation with the UHECR. [15.1 15.2 15.3 15.4 15.5] [16.1 16.2 16.3 16.4 16.5 16.6 16.7]

Dr. James H. Matthews & Co stated in a publication dated of 27 Feb.
165 2019 that the origin of the UHECRs has been a mystery for decades, and that it has not yet been possible to associate them with individual sources. The focus of the scientific article is to suggest possible mechanisms for acceleration of UHECRs in radio-galaxies, without, however, proposing the identification of the particles that compose them; in passing, the authors
170 of article also suggest that the UHECRs are composed mainly of heavy nuclei.

In the end, the quest for conclusive information about the UHECRs has resulted in almost nothing; despite numerous attempts to explain them, it seems that they are today only a curiosity difficult to understand. It

would be a case to make a parody of what Sir Arthur Eddington said: *I think there should be a law of Nature to prevent particles from behaving in this absurd way.*

It is no longer possible to intend to know about particles without observing what is happening at the LHC, but the aura of divine wisdom and overwhelming competence of the personnel there scares away even the most daring snooper. Even so, I could not resist following the link in an article in The Guardian to see the original text which, in the end, reports an excess of events above the background observed in the 8 TeV data, near a mass (...) of 28 GeV, which would reveal a new particle – 28 GeV is already something, but it seems that it was all just false alarm; something similar happened in 2016.

Inadvertently, my search on CERN also led me to a certain leptoquark, *predicted to be nearly as heavy as an atom of lead, could only be created at high energies, and would decay rapidly.* (...) *Some theorists proposed that data recorded in experiments at the HERA accelerator at DESY could hint at leptoquarks (...).* *More detailed analyses could, however, not confirm these hypotheses. Leptoquarks could explain the reason for the three generations of matter (...) and also explain why the same number of quarks and leptons exist and many other similarities between the quark and the lepton sectors of the Standard Model* – lots of statistics, no clarification for me, nothing to do with the UHECR or then I did not understand what I read, which is more likely. I also didn't understand right Dr. Glennys Farrar's proposition of a possible stable Sexaquark which, *If it exists, as a good Dark Matter candidate.*

Anyone who reads a little about Physics finds the Standard Model everywhere; there is even a small image showing some colored little bricks to illustrate the elementary particles that make up the matter, all of them already provided with experimental records. I knew that the second and third generation quarks apparently only serve to form very short-lived particles, which decay into others, which in turn decay, until... Never mind! And there are still the heavy leptons: the second-generation muon μ^- , and the third-generation tau τ^- , which also decay into other particles until there are only electrons, neutrinos, something like that.

Prof. Brian Greene states¹ that *Conventional theory claims, and experiments confirm, that these particles (electrons and quarks) combine in various ways to produce protons, neutrons and the wide variety of atoms and molecules making up everything we've ever encountered, and that fundamental second and third generation particles are not constituents of anything we typically encounter*². – typically? He inquires: *Why are there so many fundamental particles, especially when it seems that the great majority of things in the world around us need only electrons, up-quarks, and down-quarks?*^(2,1)

In an article in The Guardian, Dr. Lily Asquith, a good-humored researcher at CERN, [declared](#) that *in fact every bit of matter in the universe (...) is basically made up of just these three particles; up quark, down quark and electron. A few months later, she [stated](#): So there we have it: the first three quarks: up, down and strange. (...) All of matter is made of the first two and electrons. Every single atom in the Universe has nothing in it other than some combination of up quark, down quark and electron. Shortly after, she [restated](#): We are made of these little bits and bobs in our entirety. In fact we consist completely of electrons, up quarks and down quarks, as does all matter on the planet, in the solar system, everywhere. All matter, made up of just three particles, in some configuration, with not one of them being in exactly the same state as any other.*

To me, what Lady Asquith said is consistent with what was [published](#) on the CERN website: *All matter around us is made of elementary particles, the building blocks of matter. These particles occur in two basic types called quarks and leptons. Each group consists of six particles, which are related in pairs, or “generations”. The lightest and most stable particles make up the first generation, whereas the heavier and less-stable particles belong to the second and third generations. All stable matter in the universe is made from particles that belong to the first generation; any heavier particles quickly decay to more stable ones.*

In a 2008 in a scientific [article](#), Dr. Andreas S. Kronfeld stated that *Almost all of the mass (or weight) in the world we live in comes from atomic nuclei, which are composed of neutrons and protons (collectively called “nucleons”). Nucleons, in turn, are composed of particles called quarks and gluons, and physicists have long believed that the nucleon’s mass comes from*

the complicated way in which gluons bind the quarks to each other, according to the laws of quantum chromodynamics (QCD) – Gluons? Quantum Chromodynamics? To me, this is a grand complication created to explain why things have inertia and feel heavy.

I like to think I am a space guy. I love *FLASH GORDON* and *STAR WARS* and I pay visits to NASA's website almost daily. Besides seeing spectacular images of the cosmos and reports of the adventures in the ISS – I've seen the movie *GRAVITY* several times –, I read articles of scientific and technological content. I found the [article](#) about the heat shield of the [Parker Solar Probe](#), and wanted to know [more](#) about it. In the next [article](#), I learned that *Something mysterious is going on at the Sun. In defiance of all logic, its atmosphere gets much, much hotter the farther it stretches from the Sun's blazing surface.* This is the opening of the article, where are briefly described the hypotheses to explain *the curious case of the hot corona of the Sun.*

The origin of the puzzle: the [discovery](#), during the [Sun eclipse in 1869](#), of a green streak in the spectrum of the solar corona which did not correspond to any of the already known elements, and the explanation provided by someone quoted in the article simply as a Swedish physicist – Dr. [Bengt Edlén](#). He revealed that such a *deceptively simple green line* would be emitted by iron *superheated to the point that it's ionized 13 times* (green line Fe XIV of Fe¹³⁺ at 5303 Å), *leaving it with just half the electrons of a normal atom of iron. And therein lies the problem: Scientists calculated that such high levels of ionization would require coronal temperatures around 2 million degrees Fahrenheit – nearly 200 times hotter than the surface.*

The article presents the two main theories to explain such high temperatures: *One theory proposes electromagnetic waves are the root of the corona's extreme heat. Perhaps that boiling motion launches magnetic waves of a certain frequency – called [Alfvén waves](#) – from deep within the Sun out into the corona (...), and Another suggests bomb-like explosions, called [nanoflares](#), across the Sun's surface dump heat into the solar atmosphere, this second [proposed](#) by Dr. [Eugene Parker](#), who lends his [name](#) to the solar probe; (...) nanoflares are thought to result from an explosive process called [magnetic reconnection](#) – that seems to exist, but I have no idea what it is.*

I have also seen references [to Coronium](#) and [Nebulium](#), elements which are supposedly non-existent on the Earth and which are present in the nebulae and the solar corona. Those studies reveal the great efforts made by remarkable scientists to establish relationships between the coronal lines and proven observational and theoretical facts. By not explaining the observations in a consistent way with the presently valid theories nor eliminating the extraterrestrial phantoms, both were discarded. There are also records of observations, now discredited, of such a green line in gas spectra on volcanoes, made by Italian and French scientists.

Anyone who wants to know more about the Sun finds NASA's [Skylab](#). Everything in that audacious [mission](#) was spectacular, from the beginning, a little messed up, to the dramatic end, when the 91t station crashed into the Indian Ocean and Australia after frying in the atmosphere. One of the mission [reports](#) succinctly describes, besides the large equipment, some of the results of solar measurements.

The Figure [p2](#) on Skylab's report SP-402 illustrates the distribution of atmospheric density and temperature as a function of altitude, from $\sim 6 \times 10^3$ to over 10^6 K, and the region of the supposed temperature catastrophe. It is stated in [chapter 2](#) of report SP-402: *Spectral lines of the photosphere and chromosphere were associated, one by one, with chemical elements found on Earth, but the lines from the coronal spectrum matched nothing that could be reproduced in the laboratory. For about 70 years they were ascribed to a hypothetical new element, coronium. In 1940 the emission lines of the corona were finally recognized – by Dr. Edlén – as features of common metals at extremely high temperature and very low densities.*

This discovery gave the first clear indications – clear? – of the true temperatures of the Sun's corona – 10^6 K and more. (...) The green coronal line was shown to be due to atoms of iron, which at these million-degree temperatures and vacuum densities lose half their electrons in successive ionization stages. Other coronal lines in the visible spectrum correspond, we now know, to iron, calcium, nickel, and other heavy elements, which are even more highly ionized, revealing the existence of local regions in the corona that are even hotter. Here it is! Apparently, the Skylab Mission found the God

blessed hot corona, which was confirmed by other apparatuses on more recent NASA missions, such as the SOLAR DYNAMICS OBSERVATORY ([SDO](#)).

It found nothing! Just checked, in more detail, what has long been supposed to happen in the Sun. At that time, almost half a century ago, no one had recorded in Earth laboratories the spectra of iron supposedly corresponding to the coronal spectrum; it seems that they only made new calculations using well-known theoretical concepts using the better and more numerous data obtained during the Skylab observations.

Today, iron spectrum records are possible with the use of new [laser and plasma](#) techniques, but the NIST [Atomic Spectra Database](#) informs that only the ionization energies of Fe I - IV, Fe VI - VIII, Fe XV(?) and Fe XX were [recorded experimentally](#); it seems all others were obtained by *interpolation, extrapolation, or other semi-empirical procedures relying on some known experimental values or from ab-initio calculation or by other means not involving evaluated experimental data*, something like what was done by Mark J. May & Cia and some others. Perhaps for historical reasons, the reference text on the observation of the line at 5303 Å, listed in a highlighted row in the NIST table for all lines [assigned](#) to Fe XIV, is still the text in which Dr. Bengt Edlén published his calculations – [L15833](#). The association of the coronal spectrum with that of the ionized Iron initially proposed by him still remains.

In an 11-page long [extract](#) of the 35-page long original German [article](#) dated of 1942 – not even think about reading it – Dr. Bengt Edlén presents some calculations and the conclusions of his studies, and suggests that the temperature of the solar corona is about 2.5×10^5 K, based in the ionization of iron atoms and other elements. For Dr. Edlén, *The discovery of this enormously high stage of ionization has obviously introduced a new argument in the discussion of solar phenomena. Several attempts to give the established facts – established? – a physical explanation have already been made.* He lists five of the more obvious arguments for the existence of a very high temperature in the corona and claims: *Independently of the identification of the coronal lines, (Hannes) Alfvén came to the conclusion that the corona might consist altogether of particles with very high energy and derived from the density function a temperature of about one million degrees.*

In the end of the paper, Dr. Edlén says that *a quite different explanation has been put forward by (Meghnad) Saha, who suggests that the highly ionized atoms emitting the coronal lines are the fragments of a kind of nuclear fission, similar to the uranium fission, occurring somewhere near the solar surface*, and points out: *Before the various suggestions have been more thoroughly examined it would be unwise to judge in favour of the one or the other*. Finally, concludes: *In that respect the physical explanation of the solar corona still remains a problem*. That was stated in 1945.

By the way, it seems that the problem persists to this day, and the business was getting interesting, because what the theories to explain *the curious case of the hot corona* have in common is the origin of the high energies: the Sun, the only place from where they could have been derived. However, this seems to be a direct insult to the Second Law of Thermodynamics. Although the estimated temperature of the Sun's core is about 15×10^6 K, the temperature of the photosphere is around a mere 6×10^3 K. Therefore, there is no way energy can flow from a relatively cool area to a much warmer place, which could take place as a phase transition at the border between the chromosphere and the corona, something like the passage of boiling water from liquid to steam – not a discrete banal vapor, but overheated steam.

Did I get it? As far as I know, heating water to the boiling point causes the breaking of the cohesive forces between the molecules that predominate in the liquid phase – hydrogen bonds, etc. – causing vaporization. However, in pans, kettles and similar things, above the surface of the liquid there is an open system, where the environment is colder than the interior of the liquid due to the dispersion of the vapor in the air – this does not work the same way in boilers and pressure cookers; they are closed systems where steam overheats, and sometimes they explode.

To make matters worse, considering the estimated densities of the chromosphere and the solar corona, there does not seem to be enough mass to sustain very high temperatures for a long time. Although all this contradicts Thermodynamics in a downright offensive way, there is the suggestion of a temperature catastrophe in the region of the supposed phase transition to explain these bizarre propositions – I suspect that the

graph in figure p2 was made based on the known temperature in the photosphere and the supposed extreme temperature in the corona, the curve was adjusted in the transition region, and it seems that this was done by force.

It's getting hard! It seems that after Max Planck solved the ultraviolet catastrophe and inadvertently started Quantum Theory – Albert Einstein gave a good nudge on this, explaining the photoelectric effect in 1905; others did the nonsense later, and everything was mixed up in the Copenhagen Interpretation –, it is becoming a habit in Physics to consider as a catastrophe everything that cannot be explained right: there is the vacuum catastrophe, the infrared catastrophe ... — I know a catastrophe happens when I forget I'm cooking eggs and all the water goes away, but explaining this is quite easy: besides the phase transition, it is pure and simple silliness.

To Solar Physics, however, it seems that the thing is serious, and I decided to peruse the web a bit more to avoid the greater embarrassment of ignoring some notorious observational or experimental fact; there are too many that I do not know, but the really important ones are disclosed in the daily press, a very reliable source of scientific knowledge, especially where it is not necessary to pay to read.

Summing up: it seems that the only evidence for the hot corona are the lines attributed to strongly ionized iron atoms and other elements on the same shelf in the Periodic Table. However, I have not found a satisfactory explanation for a trivial detail: if iron is heavy on Earth and its nucleus does not change easily – it is the most stable of the whole periodic table –, in the Sun it weighs much more, so it does not seem reasonable to suppose that it floats away in the rarefied solar corona with only half of the electrons. Who knows it is a liquid, a gas, a vaporized liquid, or all that?

It has long been known that our Sun is not the only source of ghostly lights. In 1867, *Charles Wolf and Georges Rayet (...) discovered three stars in the constellation Cygnus (...) that displayed broad emission bands on an otherwise continuous spectrum. Most stars only display absorption lines or bands in their spectra (...), so these were clearly unusual objects. The nature of the emission bands in the spectra of a Wolf–Rayet star remained a mystery for several decades. Edward C. Pickering theorized that the lines were caused*

by an unusual state of hydrogen, and it was found that this "Pickering series" of lines followed a pattern similar to the Balmer series, when half-integer quantum numbers were substituted. It was later shown that the lines resulted from the presence of helium (by Niels Bohr); a chemical element that was discovered in 1868.

In 1896, Prof. Edward C. Pickering reported that the regular examination of photographs by Mrs. Fleming (the admirable Williamina P. Fleming) led to the identification of 12 stars, in three of which peculiar spectral lines were detected. (...) *The spectrum of the first of these stars (Zeta Puppis) is very remarkable and unlike any other already as yet obtained. (...) These six lines form a rhythmical series like that of hydrogen (Balmer series) and apparently are due to some element not yet found in other stars or on the Earth. (...) The last two objects (...) have similar spectra (...) to that of the spectrum of ζ Pupis. (...) Pickering attributed the observation to a new form of hydrogen with half-integer transition levels in Ryberg's formula, which is a generalization of Balmer's formula – I learned that it was Mrs. Fleming who discovered this and I do not doubt it; the greedy disposition of some science bigwigs to get hold of the results achieved by disciples and collaborators is well known.*

In a 1912 announcement to the Royal Astronomical Society, Prof. Alfred Fowler refers to the lines of ζ Pupis observed by Prof. Pickering and informs that *A very prominent line near 4688 (Å) had, in fact, been observed in stars (...) and in some of the gaseous nebulae, and this was also been assigned to hydrogen, in accordance with (Johannes) Rydberg's calculations.*

Besides the green line, there is another line that science pays particular attention to: the 21cm microwave Hydrogen line observed in the 1930s and taken for a disturbance in radio transmissions. Although it disrupted the hearing of programs, there were no scientific references to the 21cm Hydrogen line until 1940, when the technical characteristics of the discovery were published. In 1944, Hendrik van de Hust predicted by calculations that the transition of an electron between two levels of the hyperfine structure of neutral Hydrogen – *spin-flip* transition – would produce the 21cm line, and it was first detected in astronomical observations by H. I. Ewen and E. M. Purcell on 25 Mar. 1951. It seems that

with the 21cm line happened the opposite of what happened with the green line: calculations first, and then the observation.

In 2001, ESO reported the first optical observation of the stellar corona by Jürgen Schmitt and his collaborators, and the detection of the coronal emission line of 12-time ionized iron (Fe XIII of Fe12 + at 3388.1 Å) in the ultraviolet area of the spectrum of the red dwarf star CN Leonis – Wolf 359 –, confirming the occurrence of solar corona characteristics in stellar coronas.

Certainly similar things happen in other stars, and the sky seems to be a very lively place; astronomers, astrophysicists, astrochemists, cosmologists and their partners scattered around the planet have fun like crazy; by the way, the rest of the things will only be solved in the Sun and the stars, but, for now, this is not possible; we do not have the MILLENNIUM FALCON or the NCC 1701 USS ENTERPRISE yet.

The sky haunts and fascinates humans ever since the first time one of them looked up. Many still look, especially after Galileo Galilei perfected the telescope, but, even with the naked eye, almost everyone realizes that there is an entire Universe beyond the horizon, and I do not think it wise to imagine that He creates particles just to have fireworks space-time away, and even less in particle accelerators on Earth.

Looking at the news, it seems there are things happening out there which Earth science does not yet understand well; some of them turn into puzzles, some end in catastrophes, and many others are explained with extreme creativity. In the absence of LGM to clear up doubts, NASA spent a lot of money, ~ US\$ 1.5×10^9 , on the Parker Solar Probe, so it can check more closely, or at least from not as far, what actually happens in the solar corona.

To help, besides the telescopes on Earth and the satellites and other telescopes already in space, the NASA/ESA/CSA Collaboration will launch in 2021 the JAMES WEBB SPACE TELESCOPE, ESO is building in Chile the *world's biggest eye on the sky*, the EXTREMELY LARGE TELESCOPE (ELT); and the TMT Collaboration is trying to build the THIRTY METER TELESCOPE INTERNATIONAL OBSERVATORY (TMT) in Hawaii in order to be able to better watch the visible universe – I suppose it will get a little bigger, and the people who believe in the accelerated expansion of the Universe will get

very confused: the Hubble constant, which has been presenting a worrying inconstancy these days, is likely to become less reliable.

While the universe still remains about the same size as in recent times, NASA has reported that the Parker Solar Probe has been in space for over a year, has already *completed its third close approach (or perihelion) of the Sun* and everything is running smoothly. Some mission data have been released, but, although thought-provoking, it seems they are still inconclusive, and *the curious case of the hot corona* remains, as well as the efforts to explain it.

On 6 Jun. 2019, news on the Parker Solar Probe page on the NASA's website refers to James Lynch's comment on a scientific article by Dr. Justin C. Kasper and Kristopher G. Klein of the University of Michigan, in which they propose that *STRONG PREFERENTIAL ION HEATING IS LIMITED TO WITHIN THE SOLAR ALFVÉN SURFACE* – does that exist? It is a very complicated scientific article for me, but Mr. Lynch explained that *individual elements are heated to different temperatures, or preferentially. Some heavier ions are superheated until they're ten times hotter than the hydrogen that is everywhere in this area – hotter than the core of the Sun.* If I understood it right, it seems that solar corona works like a microwave oven and at the same time heats up different things to different temperatures, some higher, some lower.

Dr. Kasper and Klein propose *that there is a zone close to the Sun where ion species experience strong preferential heating and that within this zone of preferential heating ions reach an equilibrium temperature with an unspecified heating mechanism resulting in different steady temperature ratios for different ion species relative to protons. The start of this zone is seen in the spectroscopic observations just a few 0.1 $R_{\odot}$ above the photosphere – outside the chromosphere.* The authors acknowledge that *the curious case of the solar corona* will only be clarified with the help of the definitive data from solar probe, in some two years.

In this text, scientific articles have been cited that date back to 1869, 150 years ago, but the one that seems most interesting and most important to me was published only 34 years ago: in Mar. 1985 the NATIONAL CENTER FOR ATMOSPHERIC RESEARCH (NCAR) published a Technical Note in which D. G. Sime, R. R. Fisher and R. C. Altrock present an *ATLAS OF SYNOPTIC*

CHARTS with the data collected throughout 1984 for white light, the green line at 5303 Å, the red line at 6374 Å, and the yellow line at 5694 Å, attributed to Fe XIV, Fe X e Ca XV, respectively. I liked that, because a lot of highly technical information is shown in graphs that seem to be very simple, and I thought even I could understand them.

The white light data shows the overall distribution of density in the corona, and is reported here for the height of 1.3 R_☉. The emission line data, taken at a height of 1.15 R_☉, trace the distribution of coronal ions radiating at particular wavelength bands and as a result represent the distribution of material at particular temperatures. In general, this emission comes from regions of the corona with elevated temperatures; the red line from regions of about 1.5×10^6 K, the green line from about 1.8×10^6 K, and the yellow line from about 5.0×10^6 K (Billings, 1966). (...) However, the overall relationship of structures seen in these lines to other coronal structures has never fully been examined. (...) With this Note, we provide a tool to explore this relationship more completely.

In another [article](#) from Feb. 1988, the same authors present observations results of the Fe XIV coronal green line at 5303 Å and 1,15 R_☉, performed between 1973 and 1985, and, based on comparison with the coronal white light, they conclude that, *on average the Fe XIV corona rotates more rigidly than do features in the photosphere or chromosphere* – although the photosphere is not solid, it seems to be something like what happens to the atmospheres of the planets.

An especially notable and easily observable relationship on NCAR maps is that the fact that the green, red, and yellow lines are emitted from the same positions on the solar corona, which are presumably at different temperatures. These positions are slightly offset from the regions of higher white light intensity, and it seems this is due to the probable differential rotation of the solar corona in relation to the photosphere and chromosphere. Thus, the immediate conclusion from the 1984 observation graphs is that the emissions attributed to Fe XIV, Fe X e Ca XV at same positions on the solar corona are not mere coincidences: on the contrary, it seems they originate from different energy levels of the same element – Coronium?

555 Strictly speaking, almost everything I wrote above is idle talk – pure exhibitionism – and it is only meant to show that I have read a little, (3 or 4) $\times 10^3$ articles and news, maybe more, most of the time in the scholars' way: only the abstracts, introductions and conclusions of papers, and I have understood almost nothing – there is a lot of links in this text, most
560 of them one can absolutely dispense with. I think I will be seen as just another goof saying silly things, like someone who picks up a few sentences from the book *GRAVITATION*, by Misner, Thorne and Wheeler, a heavyweight trio of the Theoretical and Experimental Physics, and cites them as reference – I saw the first news about this book on *WAS EINSTEIN*
565 *RIGHT?* by Clifford. Martin Will. I have never seen one, but Ulf von Rauchhaupt, science editor at FAZ, [said](#) it is made of more than 3kg of paper, with nearly 1,300 pages. I am a great admirer of Dr. Thorne, but from the frightening title of the book I can imagine the content with many, many pages stuffed with heavy math, and think I will not read it; I would
570 need a huge amount of time just to skip these pages and the many others that I will not understand.

I was not equally cautious of the other articles and books cited here, notable products of lifetimes of study, restlessness and hard work. I have skipped the things that are very complicated for me and have just picked
575 up a few sentences about generalities that seem useful to me for this explanation. I confess that this is very uncomfortable for me, and I apologize to the authors for doing so in such a blunt way. It seems to be hypocrisy, but I think it is just my submission to the narrow limits of my meager knowledge, regrettably insufficient to understand everything as I
580 would like to. To make matters worse, I will hear many derogatory criticisms from those who cannot do it and speak ill of those who do it.

The observational commented facts mentioned above, being so far from everyday reality, have been treated over time as peripheral issues, but have returned to the spotlight due to the current and insistent suggestions
585 of the need for a New Physics to explain many other things, and they go with the flow. Hence, I decided to propose, in a somewhat skewed way, an explanation to the UHECRs that seems reasonable to me, a connection between them and the solar corona, and, as a bonus, to assign some usefulness to what seems to be superfluous in the Standard Model.

590 Stretching the idea, I dare to suggest explanations for some stars that behave very strangely, as well as a way of fitting the observations to some very intuitive theories that are currently blocked due to lack of evidences — LHC is too small; CERN is planning a much larger accelerator to smash more things and recognize that Quantum Theory, although not as stupid
 595 as Einstein declared it in 1912, is still a huge mess that Particle Physics try to fix with statistics, which have serious application in casinos, but He did not believe that the Creator rolls dice³.

Like almost everyone who has seen the Standard Model, having learned about the existence of quarks and the composition of protons, I
 600 have long ago produced a hypothesis for the possible application for those seemingly useless quarks and for the other two electron-like particles, the heavy muon (μ) and the super heavy tau (τ). I saw that my hypothesis was promising, but, because I did not have any experimental or observational information suggesting occurrences and that confirmed my ideas to a
 605 minimally acceptable extent, I did not publicize it. If, at that time, absolute discredit would be inescapable, a few quotes from the eminences of Physics probably will not save me of the guffaws of ridicule now – luckily, the obsession of tying impertinent guys to stakes and roast them over bonfires has been abolished, at least temporarily.

610 Back to the Sun. Basically, everything we know about the Sun and the stars and what is thought to happen in the cosmos is grounded in what is observed on Earth and the Solar System, which is tiny, ~ 3 ly, when compared to the estimated size of the observable Universe, $\sim 28,5 \times 10^9$ pc $\approx 93 \times 10^9$ ly. Even though extrapolations must be taken extremely cautiously,
 615 it seems that one detail is not properly considered: the low energies that predominate in our cosmic place and are reflected in the drastic limitations of our Periodic Table, which apparently make some Standard Model elementary particles completely superfluous.

In fact, Tungsten, Wolfram in same places, symbol W and $Z = 74$, is
 620 the known element with the highest melting point, which melting at $\sim 3,7$ kK and boiling at ~ 6.2 kK – this is even getting more fun. Since the boiling temperature of Tungsten is practically the same as that which is supposed to predominate in the photosphere, $\sim 6 \times 10^3$ K, it seems reasonable to

assume there are no known elements in liquid form in the Sun; at most, in gas state and only at the outside, because inside, almost all known matter is in a plasma state.

Maybe now it is time to change some ideas.

What if there is another explanation for that green line? What if it came from some other place? Well... Starting from the basics: it is known, with justifiable certainty, that there are characteristic spectra for each element, and specific wavelengths to each electronic level, although they are not exactly unique. Thus, in addition to *tons sur tons*, overlapping is natural, and there are those who believe that to be the case of such green line. However, as it is well defined, it seems to be private, although it is not yet legitimately known, for sure, of what or of whom.

It is intuitive to imagine – it seems that the Quantum Theory people hate this – that there are phenomena occurring throughout the Universe about which we can only conjecture, and those described above cause uproar and chills. One phenomenon, however, Physics knows with justified certainty, because it also happens here and everywhere: in the submicroscopic world, scientists have long ago discovered that negatively charged particles tend to spin around positively charged ones, not matter where they come from; it is just their obedience to some little rules.

To shorten the conversation, it is known that there are atoms in which an electron is replaced by a muon to form muonic atoms, in which the muon rotates much closer to the nucleus than an ordinary electron – that is what they say. To make things more interesting, there are the antiparticles, and the muon has its own, the anti-muon, or positive muon (μ^+). When an electron orbits one of them, it forms an exotic muonium atom, a hydrogen pseudo-isotope with about a ninth of the mass of common hydrogen.

That is it! It's all there. The Standard Model, even though in need of some repairs – I will deal with it later – still serves to explain the UHERCs and *the curious case of the hot corona*, and dismisses the chiral exoticisms and the electromagnetic contortionism, incomprehensible to me, a mere nosy internet user.

After someone spread the news that mass grows as speed increases – I suspect it is not exactly like that – it seems that some guys have the bad

habit of blaming kinetic energy and its disastrous consequences for almost everything that happens to particles, just like the police does with regard to catastrophic traffic accidents, and it seems to be the case with the UHECRs: the energy of these particles is entirely attributed to kinetic energy. Since the data are insufficient for unambiguous identification of input particles, the high kinetic energy of the UHECRs becomes a secondary part of the problem, and it seems that the people who thought of relativistic masses walked away: it is a temerity to face General Relativity without being absolute sure not to invert the mathematical signs and carelessly conclude that there has been a *big bang*.

Apparently, everything indicates that it is not anything as exotic as Dr. Hossenfelder suggested. In an [article](#) meant to briefly expose the scope of his negative mass fluid theory for the unification of *dark phenomena* – dark mass and energy –, Dr. Jamie Farnes offered a direction for an explanation of the UHECRs: (...) *it is often the out-of-the-box ideas that provides answers to longstanding problems*, and, in an [article](#) written to reaffirm of her admirable solitary [crusade](#) against the building of the FCC, Dr. Hossenfelder was even more scathing when she stated that *Particle physicists have all the information they need. They just refuse to use it. They prefer to believe that the FCC will [reveal](#) the much sought after new particles to solve the Physics mayhem and that the little German lady is wrong*.

I think they were moments of bright inspiration for Dr. Farnes and the brave *Little German Lady*, because the explanation, so simple, is even laughable: as suggested by the alternative solutions to the GZK enigma, what seems to be ultra-high kinetic energy for a proton becomes moderate, or even small, if the particle is not a proton, but another one, much heavier or very much heavier, with a positive charge and the same stability, what no atomic nucleus has and that, right off the bat, puts them out of the game.

It is enough that, similarly to the good old proton, there is the union of a strange quark and two charm quarks to form what would be a heavy proton, which does not even have to have such high speed to produce the damage it does when it arrives here as a UHECR, provoking a scared Oh My God! The **scc** combination proposed here, a natural consequence of the Standard Model, is not new: it is on the list of baryons as a double

charmed omega (Ω_{cc}^+), not yet seen in experiments on Earth or under that name. The **sss** and **ssc** combinations, which constitute the omega (Ω^-) and charmed omega (Ω_c^0) particles have already been detected, they decay rapidly and seem to be only temporary useless matter, like almost all other particles appearing on the accelerators – there is an account of the probable recent [discovery](#) of a few more particles in the CERN to increase the variety of the zoo, but none matches Ω_{cc}^+ .

If the charm and strange quarks appear in particle accelerators, it is inevitable to assume that they also appear naturally in places where very high energies predominate. Hence, the formation of heavy protons is an immediate consequence, differing only in that much more energy is needed.

At first sight, the ideal place for this to happen is our Sun, whose crumb is very hot and has been burning for a very long time, but the Sun is a very modest star. It is more likely that the heavy protons were already present in the primordial matter from which the Sun was made, as well as all protons of all the elements that make up the Solar System – it seems that the production of leptons does not require so much energy. Regardless of where they are created, the UHECRs are certainly those heavy protons (hp, of heavy proton, to internationalize the idea, or $\mathfrak{p}$).

There is a clear deployment to this idea: it suffices to imagine a muon revolving around this heavy proton; then, yes, we would have an atom that really deserves the name of heavy Hydrogen (hH or $\mathfrak{H}$, to simplify the notation) – it is hard to resist the temptation to call it Coronium. If the charges are the same as those of our old explosive Hydrogen gas, 1 and -1, and the muon is a longtime acquaintance, I think that, by making some simple little calculations with the masses for the determination of orbitals, energy levels, etc., it does not seem difficult to demonstrate that that green line has come out of one of them, when excited.

Williamina Flemming has already done something similar. I suggest that someone follows her example and performs this by replacing the mass of the electron with the muon in some very simple formulas, like those of Balmer, Rydberg, and even that of Schrödinger: if they work well for ordinary Hydrogen, which is not an atom, will also work for heavy Hydrogen, which is not one either; it may just be a matter of adequate

proportional constants and elementary arithmetic – Dr. Hans Zarkov e
 730 Montgomery Scott would love it.

Now, I think I am in trouble! If it was not easy to start writing this,
 the business has now become much riskier. So far, the conversation is
 restricted to the limits of the confirmed observations and reasonable
 conceptions offered by notable experimentalists and theorists, and
 735 everything was ready, already. Certainly, other minimally perspicacious
 people have already thought about it and it is even surprising that no one
 has advanced the idea and its likely and amusing consequences – is the
 idea too intuitive? Perhaps the precautions are due to its development,
 which naturally leads to decidedly hallucinated speculations. Although
 740 there are the obvious, more sensible and safer options, even though I was
 freaking out, I decided to go where no man has gone before – if someone
 did go there, they did not come back or did not tell the story.

For me, this idea leads to some tempting hypotheses, and some
 details seem important for the formation of heavy matter (hM or $\mathbb{M}$) from
 745 intermediate quarks and muons – to call it dark matter is an unforgivable
 insult! It is evident that the energy levels necessary for the production of
 heavy Hydrogen (hH or $\mathbb{H}$) are only reached on very massive stars, and our
 Sun is not one of them. However, if apparent evidence suggests that there
 are significant amounts of heavy Hydrogen in the Sun, there does not seem
 750 to be sufficient pressure there to promote heavy proton (hp or $\mathfrak{p}$) fusion
 reactions similar to the common proton-proton chain reaction for heavy
 neutrons (hn^0 or $\mathfrak{n}^0$) production and, by extension, heavy Deuterium (hD
 or $\mathfrak{D}$), heavy Helium (hHe or $\mathbb{He}$), and so on.

Today, there seems to be just enough energy in the Sun to ionize the
 755 heavy Hydrogen ($\mathbb{H}$) to the point of removing the muons, leaving behind
 only the heavy protiums ($\mathbb{H}^+$) that eventually arrive on Earth as the now
 frightening UHECRs, whose rarity results of the almost immediate
 recombination with the muon – it seems that in the Sun there are muons
 aplenty – and of their scarce migration out of the Sun while still with
 760 enough energy to be scattered everywhere. This, of course, does not
 exclude the extragalactic origin of UHECRs; on the contrary, it confirms
 that, but the difficulties remain to trace other sources beyond the Sun: there
 are billions of stars only in the Milky Way.

So far, organizing the ideas and summarizing:

765 1. all of the Sun's heavy Hydrogen (H) already existed within the primordial matter that originated the Solar System, predominantly in diatomic molecular form (H_2 or H_2); today only the production of leptons occurs;

770 2. it is known that, unlike the mono-atomic form which easily shatters, the diatomic form of common Hydrogen is stable in the absence of other elements to combine with, and this can be extended to H_2 : there are no other elements in the Sun in the same point on the mass scale;

775 3. the common matter in the interior of the Sun is not exactly compatible with H_2 ; while ordinary matter is converted into plasma and compressed at high densities by reactions that seem to be already theorized with some reliability – well-known, let's say – H_2 is not, because the muon degeneration pressure is much higher than that of the electron, due to the higher orbital angular momentum derived from the largest mass – is all that right?

780 4. from this result specific H_2 foci of lower density than plasma, despite the greater intrinsic mass of its components;

785 5. the interactions that predominate between H_2 and ordinary matter plasma within the Sun are not compatible with the formation of some static or dynamic equilibrium, which causes the migration of the H_2 to the photosphere and thence to the chromosphere and the solar corona;

6. eventually, high temperatures inside the Sun and even in the photosphere dissociate some H_2 molecules, resulting in individual excited and even ionized H atoms;

790 7. the lower temperature in the solar corona induces return jumps of the muons, producing the red, yellow and green lines now attributed to Iron and Calcium, and perhaps others with enough intensity to be seen here on Earth;

795 8. H_2 molecules are certainly also excited in the high temperature regions, and the return to the fundamental levels occurs at the lower temperatures in the solar and star coronas; due to the greater mass of the muons and their high orbital stability, they probably emit radiation only in the ultraviolet range;

9. in low-energies regions, the large mass of muons inhibits high-amplitude jumps of the H_2 , which leads to the emission of radio waves only, probably in the microwave range such as the 21 cm Hydrogen line. Although not naturally occurring in laboratories on Earth, the striking coincidence between the results obtained with the help of math and those of observations gives the Quantum Theory explanation to the 21 cm line its credibility, despite the blatant and embarrassing violation of the Electromagnetism rules.

10. from what has been said, it seems very natural to me to suppose the existence of H_2 in the Sun, as well as in numerous stars in the Universe. It goes beyond that: considering the way the Solar System was probably formed, it does not seem excessive to suppose that some H_2 leaked from the primordial Sun to the early Earth and would be floating today in the magma, which would explain the occurrence of the green line in volcanic gases.

There are also other likely consequences of this idea:

11. excited H^2 molecules within the Sun migrate to high latitudes by the action of magnetic fluxes – it seems that there is much of that there –, where the smaller volume induces a higher concentration that, upon reaching sufficient amount, is grouped by Van der Waals forces and other similar things;

12. as it was said about atoms, such groups of molecules, even though they are more massive in their components, by their lower density also emerge into the photosphere, probably as a hot liquid, at the same time cold enough not to radiate at high frequencies, and perhaps to appear to us as Sunspots;

13. as it is well known, Sunspots are dispersed in a phase transition in the photosphere, that is, they evaporate from the edges to the chromosphere and from there to the solar corona;

14. it also seems reasonable to suppose that the observed displacement of Sunspots from high to low latitudes results from the greater susceptibility of the H_2 mass to the rotation of the Sun;

15. the well-known absence of emissions in the X-ray range in the coronal holes is better explained by the presence of H_2 : with its only proton, Hydrogen does not radiate in the X-ray range, even in molecular

form – right? The idea proposed here seems to be confirmed by another notorious observational fact: apparently, coronal holes are relatively much colder than coronal rain: they do not emit radiation in the ultraviolet range, as shown by the images of the permanent coronal holes at the Sun's poles collected by the SDO ATMOSPHERIC IMAGING ASSEMBLY (AIA) at wavelengths 94, 131, 171, 193, 211, 304 e 335 Å.

16. the dominant low temperatures in the solar corona promote the cooling and grouping of the H_2 to form something like dispersed clouds that constitute the coronal holes, sufficiently rarefied to allow the passage of the photosphere emissions;

17. H_2 then condenses and precipitates back to the photosphere as a very nice rain, where it infiltrates so that the cycle begins again – it seems that there are only two seasons in the Sun: hotter and less hot; there Antonio Vivaldi would not be able reveal all his talent to compose The Four Seasons, but would certainly compose The Storm;

18. I have never seen a solar flare. They appear to be something like bubbles rising from the interior of the Sun and exploding at the lowest density of the photosphere. If so, it seems they are likely to consist of a liquid shell filled with H_2 and ordinary matter plasma, whose rupture discharges the plasma and H_2 with emission of radiation at all wavelengths, including a profusion of radio waves.

19. in the solar corona, the excited H returns to lower energy states or to the fundamental state, emitting the red, yellow and green lines at 6374 Å, 5964 Å and 5303 Å, respectively;

20. some ionized atoms (H^+) contained in the higher energy solar flares leave the solar corona and reach the Earth as UHECRs;

21. It is not yet known exactly what triggers the solar prominences, but they look very much like a gas under pressure that was contained and was suddenly released, carrying something that closely resembles a very hot liquid fluid that emits radiation in the ultraviolet range – H_2 ? – like vapor and water when a pressure cooker explodes – one of them exploded at home, burst open the stove and all the meat it was cooking got stuck to the ceiling; at the time, our junior assistant for domestic affairs, who did not know any thermodynamics, was home alone, not in the kitchen, no one was injured and I fixed the stove afterwards.

Speaking of rain, NASA [reported](#) on 5 Apr. 2019 that Dr. Emily Mason has identified coronal rain *in a smaller, previously overlooked kind of magnetic loop on the Sun*; such rain, like almost everything on the Sun, happens to be attributed to plasma. There is one detail that has not been overlooked: it appears that plasma does not condense to the point of precipitation at such low altitude, leading Dr. Spiro Antiochos, co-author along with Dr. Nicholeen Viall and Dr. Emily of the [paper](#) about the discovery published in ASTROPHYSICAL JOURNAL LETTERS, to state: *So that tells you that the heating of the corona is much more localized than we were thinking.*

I could not read the article – it is necessary to pay to read – but, given the succinct explanations available in the abstract, this raises serious suspicion, to a point that the authors acknowledge that *Further studies with higher spatial resolution data and MHD (magnetohydrodynamics) simulations will be required to determine the exact mechanism(s).* That is, to complicate, the newly identified rain returns to the chromosphere and the photosphere exactly from where the inexplicable solar corona warming should begin, indicating that the transition zone is much narrower than previously thought. It is also claimed in the abstract that the images shown in the study were assembled from SDO observations at 304, 171 and 211 Å. — At ultraviolet? What a coincidence!?

The [video](#) released during a previous NASA [announcement](#) on 5 Aug. 2016 shows *a mid-level solar flare* captured by INTERFACE REGION IMAGING SPECTROGRAPH, or IRIS, and what is most impressive is that *As the plasma falls down, it rapidly cools – from millions down to a few tens of thousands of Kelvins. The corona is much hotter than the Sun’s surface; the details of how this happens are a mystery that scientists continue to puzzle out.* Watching the video, the comparison with a garden hose nozzle squirting up and returning to the ground is inevitable, with only one slight difference: the reddish colors shown in the video were overlaid for viewing; the original emissions are in the ultraviolet range.

Of course! (...) *As the video continues, solar material cascades down to the solar surface in great loops, a (...) event called post-flare loops or coronal rain. This material is plasma, a gas in which positively and negatively*

charged particles have separated, forming a superhot mix that follows paths guided by complex magnetic forces in the sun's atmosphere.

Plasma? What if it is not plasma? And what if that is what it seems to be: a liquid?

No one knows yet for sure, with a justified certainty, what the solar flares, sunspots and coronal holes are, what causes them nor what the constitution of the newly identified rain is – it does not seem to be coronal plasma and much less condensed plasma, and I, obviously, did not resist the temptation to risk a few guesses. People who know the subject will certainly answer these questions by combining SDO data with the Parker Solar Probe data, and will confirm what is proposed here, relieving all the stress involving the current theoretical disagreements: the solar corona is cold! Finally, there will be peace between Solar Physics and Thermodynamics.

Now that it has become easy and I've got the hang of it, it is irresistible to continue with my insane provocations. An immediate conclusion is that with two top quarks, one bottom quark and an enormous amount of energy, the **ttb** composition is also naturally probable, and constitutes a super heavy proton (sp or $\mathfrak{p}$), which, orbited by a tau, results in a super heavy Hydrogen (sH or $\mathfrak{H}$). I have not seen in any of the few lists of particles that I have consulted any reference to any particle, even hypothetical, that contains the top quark, even though the existence of such a particle is implicit in the Standard Model – as I said, my web searches were not too numerous, it might be somewhere and I did not see it. Ok. But what is all this for?

Making stars, of course!

With these ideas, I suppose that Astrophysics, Astrochemistry and Cosmology will get much more interesting, but this is merely presumptuousness. I confess my complete ignorance of these matters, and the explanations for some things that scientists assume exist in the sky are very confusing to me, even after taking some little intensive internet courses to understand them. — The best teachings I found on the *BackReaction* blog; I believe that the master is highly qualified and competent, I am not so stupid and I think have learned some trivialities – my former home operations assistant said I was born almost smart.

The explanations for two heavenly things are particularly unsatisfactory to me: neutron stars – there is a Fundamental Law of Nature which prevents the formation of these absurd things – and black holes, both widely reported in the daily press.

And beyond! My natural aversion to useless calculations did not prevent me from making a statistical survey of the occurrences of a few words on the 739 pages – not even think about reading it – of the Abstract Session Table of Contents of the 235TH MEETING OF THE AMERICAN ASTRONOMICAL SOCIETY that took place in Honolulu, Hawaii, from 4 to 8 Jan. 2020, in which I found the following number of occurrences / occurrences in titles: Dark Matter 241/26; Dark Energy 87/7; Black Hole 629/86; and Neutron Star 199/21 – someone check it out...

Leaving dark phenomena aside for now, it seems that black holes originate from gravitational collapses in very massive stars that supposedly result in physical singularities, and neutron stars originate from not so massive stars where gravitational collapses did not work right.

What if we adopt a more reasonable conception for such neutron stars, that don't even exist? What if they are composed of heavy Hydrogen (H_2), super heavy (H_2) or a combination of the two in liquid, gaseous and perhaps solid states? There seems to be nothing else there, since the mass is insufficient for a gravitational collapse and for heavy nuclear fusion (hnf or hf) and synthesis of He , Li , etc. Although a recent article published by NASA suggests otherwise, H_2 and H_2 stars are cold and radiate mainly in the radio wave range – some electromagnetic sequins on the periphery are easy to explain, x-rays including. What if we simply named them stars S , S^* , SH_2 or $\text{S}_{\odot}$? – whatever.

In super massive stars the business seems to be more complicated: there is more than enough energy in them for super heavy nuclear fusion (snf or nf), which increases as they ferociously devour all forms of matter that come close to them. Basically, the same design applies to black holes, which we could name S , S^{**} , SH_2 or $\text{S}_{\odot}$ stars – whatever.

Considering the possible combinations between light matter (lM or simply M), heavy matter (hM or M) and super heavy matter (sM or M), it seems that the Universe has infinite options to create the craziest stars imaginable, from the strongest with heart of Kyber⁴ to entire galaxies

without a single gramme of heavy or super heavy matter, or made just from them – it seems that some of them has already been discovered. [[72.1](#) [72.2](#) [72.3](#) [72.4](#) [72.5](#) [72.6](#) [72.7](#) [72.8](#) [72.9](#) [72.10](#) [72.11](#)]

975 If I understood the astrophysical trivialities right, the predominant conceptions on black hole formation are based on established theories, especially General Relativity, and I do not comment on that, given my absolute ignorance of the heavy mathematics embedded in such theories, that I do not intend to learn. However, I think that a new natural law is
980 absolutely unnecessary for weird stars to be created, much less to create a profusion of UHECRs. It only takes obedience to the laws of Old Physics, long known, and the minimum sensible part of Quantum Theory. Heavy matter (hm or $\mathbb{M}$), composed of intermediate quarks and muons, and super heavy matter (sM or $\mathbb{M}$), composed of upper and lower quarks are also
985 subjected to these laws to compose very high tonnage periodic tables.

According to a recent NASA publication, the Milky Way is predicted to have about 2×10^{11} stars, and, if it is enough that a lot of them are made of heavy and super heavy matter to terminate definitely with this absurd idea of dark matter and confirm what Dr. Hossenfelder considered
990 *STRANGELY FAMILIAR: IS DARK MATTER NORMAL STUFF IN DISGUISE*. Naturally! But it is not so normal nor very common in our cosmic block. Indeed, it seems that attempts to detect WIMPs, Axions and other recently invented ghostly particles find almost everything except dark matter. [[73.1](#) [73.2](#) [73.3](#) [73.4](#) [73.5](#) [73.6](#)]

995 Although it no longer seems difficult to imagine how black holes are formed, the intention here is also to propose a hypothesis for how they end. Since the thermonuclear reactions with $\mathbb{M}$ are similar to those that occur with M on Earth, in the Sun, and where else they exist, only much more energetic, the stars $\mathbb{S}_{\odot}$ radiate, yes, but it seems that everything that
1000 comes out of them falls back. I have heard of people who have spent a great deal of time thinking about it and formulating theories and theorems, and I am sorry to inform: although one does not perceive this in the image of one recently obtained by the EHT and widely reported in the world press, black holes are not hairy nor evaporate.

1005 I also learned of some astronomical observations for which there is no acceptable explanation: the existence of vast voids between clusters of

galaxies, where apparently there is no matter, or if there is, the density is very low, even undetectable. On the other hand, there are filaments between the voids, like connecting a cluster to its neighbor – filaments are not made up of threads of matter, but galaxies!

Why all that? Why are almost all cosmic voids spherical? If the clusters' gravitational attraction attracted the matter that was in the voids, why do the filaments stay in place and are not attracted as well? All this seems very suspicious, and it is the case to ask: what if there was a monstrous explosion where the void is? — A monstrous explosion? I do not like these words; it makes me remember fight movies between furious gods or huge mechanical things immigrated from other worlds devastated by out-of-control AI. How about the explosion of a hyper massive black hole?

Explosion!? How so?! Let's see... As far as we know, sometimes a hole is the place where there was an explosion, but in the case of cosmic voids, how could the explosion of a black hole happen, if the current conceptions suggest the concentration of mass until a singularity, or something similar, is formed, and there seems to be no such thing in the astronomical holes? Well ... Despite the widespread notion that singularities are mere mathematical futilities that do not represent even right what happens in [dripping taps](#), there are those who believe and profess with great enthusiasm that there was at least a physical singularity that exploded into a tremendous *big bang*, although nobody says who lit the wick. — In the Translator's Note that precedes this text, Dr. Diana Fortier said that I am a guy *endowed with many singularities*. The Glory, at last.

If I understood right what I read in some sparse references, there are some solutions to the General Relativity Theory equations that lead to the somewhat exaggerated curvature of space-time in places where there are extreme concentrations of mass and energy, like the center of the Universe – this does not exist! – in the moment immediately before the big bang – this did not happen! – or at the center of a black hole, and this assumption implies an enormous amount of mass, or its equivalent in energy, concentrated in a single point, or almost. — Up ahead I reveal a Law of Nature so far inexplicably ignored to show why this absurd situation does

not take place, corroborating Einstein's insights, and, I imagine, the disbelief that Eddington did not manifest.

Freeman Dyson said that *Einstein rejected black holes*, and Stephen Hawking stated *that Einstein apparently never took the big bang seriously*⁵. Incidentally, upon learning that Hawking was considered the greatest specialist in black holes, a good and sagacious friend asked: how can a guy be expert at something that no one knows what it is? It seems Hawking was in fact a specialist in Mathematics, whose biggest advantage is that we can get the desired results by doing right calculations with the wrong numbers and vice versa, with everything wrong or, eventually and rarely, with everything right – accountants know this and the income tax inspectors as well.

•

Sole figure - Artistic conception of what would be a physical singularity.
Scale $10^{(a \text{ huge number})}$: 1

Mathematics is very useful for demonstrating why toasts fall with the butter side down, and for calculating the exact number of photons emitted from the supposed *big bang* until a few months ago (4×10^{84}). and exactly how much the Milky Way weights ($1,54 \times 10^{12} M_{\odot}$), but the problems arises even when the calculations are made with inverted signs: the toast not come back to the table and even less do it in the right way, the Universe is not located Into Darkness, our galaxy is not dispersing and we all get scattered out, nor do women repel me any more than they already do – it has nothing to do with math; it is only the natural repulsion at first glance. Although Universe things work on a credit and debit basis, and keeping all due reserves, math works well in physical accountancy to quantify verifiable phenomena, from falling buttered toast to correcting the aim to ensure that spacecraft reach the Moon or Mars – NASA's Artemis is going there in a few days.

It seems that things get much more complicated when it comes to make calculations involving the General Theory of Relativity, whose development seems to indicate the occurrence of irreversible phenomena like gravitational collapses, circumstances in which the laws of physics supposedly don't work and mathematics becomes completely useless. — To get around this annoying catastrophe, there is a desperate rush to find a way to combine General Theory of Relativity with Quantum Theory, and this does not seem to be difficult if we consider that space is a little different from what we think – Engineer Edson Seabra Júnior has already [proposed](#) something like that.

But what does it really mean to say that the laws of physics don't work? What there is another way of thinking to simplify the problem? And what if the problem does not have a solution because it does not even exist?

It seems that no one has yet paid due attention to some little questions: when and where do the laws of Physics provenly not work? And what if this happens not only in a supposed gravitational singularity, that no one will ever see? That is, what if this also happens elsewhere, in the LHC, in other particle accelerators, and even in kitchens?

If it seems wise to scrutinize what happens at the exact instant of a proton-proton collision at the LHC, it also seems rather childish to want to reach reasonable conclusions without considering the time and space scales involved in these events. See: what are the dimensions of protons that are moving at a speed close to that of light and what is the interval between the beginning and the end of one shock? — I shouldn't get into it! I shouldn't get into it! I shouldn't get ...

Disregarding relativistic implications that I have no idea about – it seems to have something to do with kinetic energy –, starting from elementary Arithmetic and rounding the radius and proton speed values, the interaction time would be about 20 orders of magnitude greater than Plank's time, where supposedly the General Theory of Relativity collapses. That is, it takes a long time – some orders of magnitude higher or lower seem unimportant to me, since all of this is absolutely out of the reach of my perception. However, it so happens that in particle accelerators only verifiable situations are considered, that is, what existed before and what came into existence after the dispersion. It seems that the LHC's sensors

can only register what forms long after of the crashes, but what happens in the instant immediately following that in which matter disintegrates? – Assume that an instant is less than Planck's time.

Nothing!

1110 I imagine nothing else happens other than rendering useless the Mathematics and the laws of Physics that humans have discovered with such great effort, and that only work at the Universe as It is established and appears to us, pretentious humans; that is: if there is energy movement associated with matter – it seems that all fields and waves are always
1115 bound to matter in some way: electric, magnetic, gravitational, telepathic, etc., including light. At this special moment there seems to be only free energy, all the information about the previous situation have been lost, and simply there are not and will not be laws of physics for this very singular, though frequent, circumstance.

1120 Only after a while things begin to adjust to what exists, based on the information that lingers around the disaster, even though there are many huge magnets to disturb it nearby, as in the case of the LHC. But there is another small detail that seems important: the shocks that occur between two protons are not exactly simultaneous with all the others shocks
1125 between the numerous pairs contained in the two colliding beams; therefore, there is interference in the redistribution of the energies from some shocks, completed over the energies of other shocks that are just starting or in progress, and vice versa.

From there, the weirdest imaginable particles emerge – check the
1130 discriminations and tables of the whole zoo in the PARTICLE DATA GROUP (PDG) –, as if the Universe were looking for an acceptable solution to the mess and trying to build something stable, compatible with everything nearby – the Solar System, for example. It seems to me that there is a natural willingness of the Universe to repair the havoc, e this is certainly
1135 an unquantifiable manifestation of a Greater Law, beyond Physics, Philosophy, and all human inventions – this Fundamental Law has already been discovered!

I think that this idea of losing information will cause some discomfort, but the Quantum Mechanics people should already be used to
1140 it. For example, electron-positron annihilation at lower-energy results only

in gamma rays and the respective neutrinos ($e^+e^- \rightarrow \nu\bar{\nu}\gamma$). There are, however, some illusions deriving from the prior knowledge of the situation before the scattering, such as the conservation of the electric charge based on the arithmetic sum of the relative charges ($-1 + 1 = 0$), the conservation of the leptonic number – leptonic number? –, and of the linear and angular momenta – this is energy conservation; it works well to decays, but not so well for scattering. About what existed in the situation prior to the scattering, that is, of the electron, the positron and their charges, no information remains, as well as no other information is propagated from before to after, on these or in any other similar circumstances.

Thus, the apparent conservation of C symmetry is nothing but the arrangement provided by the Universe so that the balance is preserved strictly linked to the equality of total quantitative variations of the charges. That is, variations in individual totals is naturally possible, but the equality between the number of positive and negative charges will always be kept, even though there may be increases or reductions in each type: the variations in numeral totals will always be equal in module.

Obviously, extending this idea to its immediate consequences completely spoils the current conception of neutron formation, where an up quark is supposed to become a down quark, which violates symmetry C in a way that is absolutely incompatible with the equilibrium of the Universe, but this is easy to solve: It is enough, simply, consider that the C symmetry with respect to the quarks and not to the elementary charges as they are presently understood, 0, 1 and -1. Particle Physics have gone into this trap because particles charged neither $1/3$ nor $-2/3$ have been identified yet, but this is understandable: the negatively charged leptons electron, muon and tau, and their respective antiparticles, still are considered elementary particles, although there are long-known experimental facts that clearly prove otherwise.

If the photons that come to us from outer space are classified on the basis of what is known – which sometimes induces some weird formulations such as the hot Sun corona –, it does not apply to gamma rays: it is impossible to know what generated them. The same goes for the W and Z bosons during their very short life, $\sim 10^{-25}$ s: none of them contains

any information about what is destroyed to create them, and neither do the gluon nor the supposed Higgs boson.

This seems to completely ruin the causality and determinism beliefs – humans like their memories and need the apparent certainties of causes and effects – but there is no cause for despair; everything is circumstantial, from crashing particles to exploding black holes, mere eventualities in the infinite vastness – yes, black holes do explode; read on. – I love the Infinity! It is very reassuring to me to know that the inscrutable exists, that which my mind does not and will never reach. It reduces me to my insignificance and makes me stay quiet in my place. That is not the case now; everything here is made from what is proven and demonstrable.

It all boils down to a matter of scale: maintained the due proportions, the Universe uses the remaining information in the rest of infinity, mends the damage and keeps everything running smoothly according to Quantum Mechanics for underworld things, Newtonian Mechanics for small things at short distances, and General Relativistic Mechanics for big things at cosmic distances.

I do not know a single definition or even a reasonably concise concept of what energy is – and neither of what mass is. However, it seems reasonable to anyone to imagine that everything that exists is made up of something, and this was the sensational insight of a genius guy named Tales, who lived in Miletus some 26 centuries ago, when everyone believed that the gods provided everything and anyone who disagreed with it was slaughtered. As far as I know, he was the first guy to be temerarious enough to publicly propose that *there must be that of which everything is made of*.

Today, the conception of Tales is part of the most elementary basic knowledge, and it is not difficult to blend his idea with all that is known in Physics – the rest trails behind. Starting from the natural premise that all energy in the Universe constitutes the physical entities and their movements, including space and time – and knowledge, of course – in the end of the day all the intrinsic energy of matter is contained in electrically charged particles – except the dark energy, which does not exist, but that is for later; for now, solve the problem of what is dark matter, which

corresponds to about 85% of the mass of the known Universe, is already too good.

It is notorious that charges do not depend on or interfere with masses; charges just contain masses in some way that Quantum Mechanics does not seem to understand, and it even uses the gluon as a gummy thing to hold the mass that it does not know the whereabouts of – that of the proton, for example. Indeed, a considerable production of goo in the form of h-gluons and s-gluons would be necessary to explain the masses of the p and e of the p , of which, if the ratio between quarks and proton of masses is maintained, $\sim 1\%$, would be of the order of ~ 0.26 TeV and ~ 34 TeV, respectively; the mass of the p is 40% larger than that of ^{208}Pb – is this right? Probably not, but it is not important.

Even for the ambiguous General Relativity, the charges are invariant with respect to the displacements, that is, whatever the acceleration of one or a lot of particles is, the charges remain unaltered. To confirm this, the electron, muon and tau have the very same charge and very different masses, as well as the quarks of the three generations, three to three, regardless of whether they are stationary, in uniform motion – a useful fiction even for Special Relativity – or accelerated. Indeed, as the Universe works primordially with electric forces, it seems easy to demonstrate the extraordinary stability of the proton, to show what inertia is and why mass is invariant.

Why would not there be astrophysical singularities as suggested by the GTR equations, corresponding to the mathematical singularities? It is simple: because black holes, or **S** stars, explode before there is one! Indeed, that is their destiny that is written in the stars – at least in the big ones –, and the explanation for this seems to be in a common phenomenon already commented here, which happens naturally every moment in the Sun, the Earth, everywhere – even in kitchens – and artificially in the bumps between protons in the LHC: deep inelastic scattering, where charges and masses are annihilated and then very short-lived temporary particles are formed, leaving in the aftermath of catastrophe only stable particles and electromagnetic waves. Lady Asquith said that deep means penetration – nothing to do with perverted ideas –, *that we are firing things into*

something (...) in depth, *beyond its "surface"*, and *inelastic means that something has to disappear*.

1245 If I have understood right – I doubt it –, General Relativity predicts that gravity produces the concentration of matter and energy – which seem to be the very same thing –, resulting in extreme pressures and temperatures, and Quantum Theory informs that it causes the degeneration of electrons, neutrons, protons and whatever else there is,
1250 which would form a porridge of elementary particles that, in the end, would result in quark stars, where the charges are still supposed to last.

Nevertheless, I have not seen a single word about the degeneration of charges, and it is not difficult to conclude that it happens – it happens, a lot! –, and, when it happens, it smashes anything, whatever it may be,
1255 including the protons of any caliber that guarantee the Universe continues working smoothly. What can be expected to happen at the core of a **S**☉ star – a black hole – when charge degeneration occurs?

Bang!

To encourage those who doubt the cosmic expansion – there is a
1260 fundamental Law of Nature that liquidates this absurd idea – and they believe that, after all, gravity will bring the Universe to an end, causing a *big crunch* – another *big bang* would come afterwards, but we would be out of the game –, NASA has reported and The Guardian have pointed out that the latest measurements of Hubble's ridiculous constant suggest that *THE*
1265 *ANSWER TO LIFE, THE UNIVERSE AND EVERYTHING THERE IS MIGHT BE 73. OR 67*. Confirming what it had published in 2009, NASA later reported in 2019 that it is 74, but, in a something transcendental context, Douglas Adams tells us that the Deep Thought Computer calculated and declared, *with infinite majesty and calm, that the answer is Forty-Two*⁶.

1270 Big crunch not really! It is quite the opposite: it seems to me to be luminously evident that the unimaginable pressures and temperatures deriving from the concentration of mass and energy caused by gravity keep crushing the particles and result in the degeneration of charges, resulting in a chain reaction that releases all the energy contained in them. This is
1275 the Law meant to prevent physical singularities from happening in the stars: things explode before these singularities happen, and what remains

of the galaxies where they were located surfs away in gravitational waves.
 — Indeed, if we are quick enough to make surfboards appropriate for use
 with gravitational waves, there will be time for us to move from the Milky
 1280 Way when Sagittarius A* (Sgr A[●]) explodes, but let's forget about this for
 the moment and continue with the greatest gig: there was, there is and
 there will be only bangs, many of them, and that is exactly what makes the
 Universe continue to exist and function smoothly.

Em æternum ultra – I love Wikipedia!

1285 Speaking of surfboards, there are records of stars that apparently
 explode repeatedly, and it seems that even Sgr A[●] is showing its spasms
 and getting hungrier. Considering what was stated above, this does not
 seem weird to me: not always the energy derived from charge degeneration
 in a massive star results in a single catastrophe; there are certainly
 1290 situations in which the mass of the star is insufficient to complete the
 process with such intensity that results in a definite explosion.

Although the star loses some mass, the Universe promote the
 recomposition of the charges, of the matter, therefore, the star contracts
 and returns to an intermediate state so the process starts again, a new
 1295 collapse occurs after some time and the cycle repeats until mass acquisition
 by accretion or union with another massive body results in the
 accumulation of the critical mass for a decent gravitational collapse.
 Then... Bang! Afterwards, the Universe itself endeavors to repair the
 damage by adjusting what is left with what is in the periphery and leaves
 1300 the cosmic hole as it is for later arrangements via gravitation, electric
 forces, etc.

But the party is not over yet. Clifford M. Will discusses the possible
 variation of the gravitational constant G^7 , whose value is tabulated by
 CONDATA. When I saw the news of a recent measurement by Chinese
 1305 scientists to, once again, determine the value of G, I imagined Lord Henry
 Cavendish performing his remarkable experiment on the surface of a S[●]
 star or a S[●] star.

Considering the validity of what is exposed here – I stand up for it!
 –, the value of G, after all, is the same for all places, because although it
 1310 depends on the density, the radius, and the acceleration of gravity of the

star where Lord Cavendish would do the experiment, the results are also dependent on the masses of the spheres, made in each place with ordinary, heavy or super heavy matter. I imagine that proporcionalities are maintained if the spheres of different stars are not mixed. For the peace of mind of theoreticians, G is really the Universal Gravitational Constant!

I am not authorized to talk about this, but it seems that the existence of heavy and super heavy matter does not to imply any change in Newtonian Mechanics calculations or the impenetrable mathematics of General Relativity; just some rather strange results from Physics accounting, among others the Schwarzschild radius, the Chandrasekhar limit, the Tolman-Oppenheimer-Volkoff limit, in these little things, which will be even more particular depending on the effective composition and correct measurement of each celestial body. It also seems that chic hippie Dr. Kip Thorne will not need to rewrite any of the pages of his portentous book – maybe just add a small *post scriptum* concerning the densities.

Excluding the questionable existence of wormholes and the composition of the black hole ignored in the movie, I think there will be no significant changes in the conceptual basis for the continuation of the spectacular *INTERSTELLAR* movie, of which Dr. Thorne was one of the executive producers and Physics director. My expectations from the theoretical foundations is irrelevant compared to the dramatic anxiety for Cooper and Brand's reencounter to populate Edmond and reestablish Humanity – let's forget another thing that the movie does not show: the billions that were left to starve and get asphyxiated or cooked on Earth.

There are too many provocations in this text and I should not get into any more trouble, but the aforementioned article by Dr. Hossenfelder⁽¹²⁾ unleashed a lot of comments that eventually slipped into technical-operational or academic-philosophical bickering, and it seems that a small detail was left out of the quarrel: philosophers and amateur scientists study the World by watching, in the easy way, Physics happen, unlike most professional scientists, who cannot do their jobs without using huge and expensive instruments.

However, the mere existence and satisfactory functioning of such an apparatus does not guarantee that the conclusions drawn from the observations are correct. To complicate matters, sometimes scientists look

for the wrong things in the right way or for the right things in the wrong way; worse, sometimes they look for them in the wrong places: in logical formalism and mathematics, from which result concepts, not always consistent with reality, which contradicts Einstein's intention.

If the Sun is very hot and far away, the rest of the Universe is even farther, where we must believe that there are much hotter places out there. However, the only laboratory available to study what happens in high energy environments, though on a somewhat reduced scale, is our good and beautiful Mother Star. Although getting close to Her is a rather risky, it is the only place we have nearby to try to understand what goes on elsewhere and beyond – the LHC and its superfluous successor, though enormous to the human scale, are insignificant in the face of the stellar magnificence of the Sun. As Dr. Hossenfelder has [wisely stated](#), *neither the LHC nor the FCC will tell us anything about the “beginning” or “creation” of the Universe.*

It seems to me that solar probe data will be much more important than simply resolving a quarrel in Physics: they will confirm that, by its special constitution, our Sun is a very rare star. I believe that the Sun would probably long ago have become a white dwarf, or another lilac, pink, fuchsia bauble, or of any color, useless to Life as we know it, if there was no way to absorb in and expel out part of the energy released by the fusion reactions, and H_2 seems to be the ideal vehicle to perform this control function – it may be necessary to reevaluate the parameter $\mathbf{R}_*$ in the Drake Equation; I suggest $10^{-(\text{a very large number})}$, or smaller.

The search for extraterrestrial life does not seem to me exactly a futile, useless exercise. It will show, with irrefutable clarity, what is not yet understood by many in all its implications: it seems plain obvious to me that, regardless of its physical greatness, our Sun is not a star like any other: it is a precious jewel, a unique godsend from the Universe which holds together, stable and on a harmonious motion a set of small planets, in the third of which Life has sprouted strong, admirable and beautiful, but delicate and vulnerable. Perhaps this is the biggest revelation of the Parker Solar Probe.

Bon Voyage, Parker Solar Probe! Be our curious voyager and enlighten us from afar so that we may better understand the Heart and Light of our Star of Life.

Parodying once more – this is becoming a habit – what Sir Stanley Eddington said: *I do not know whether I shall escape from this pandemonium alive*, but this is already out of control and I think any effort to resist my suicidal impulses will not make too much a difference. I will go further.

If today's Physics is stumbling due to its promiscuous dependence on Mathematics – Dr. Hossenfelder struck hard at it –, the venerable and dignified Old Physics, initiated by Thales, reinvented by Galileo, Kepler and Copernicus and continued by Newton, Faraday, Maxwell, Planck, Einstein and so many others who have thought according to close and strict correspondence of Science to reality, is doing very well.

At first sight, everything I have written here may be no more than innocuous presumptuousness, but, repeating a sentence by a famous scientist in the last millennium, I dare say: the idea is correct! I didn't find *anything new out there*, but I think that the also incomparable Dr. Vera Rubin would agree that the *ratio of our ignorance to our knowledge* is a factor well below ten, and Dr. Wolfgang Pauli might say that idea is not only correct, but there would be no way it might be wrong. I also think that Dr. Sheldon Glashow now has good reasons to believe that much of the garbage that theorists have created *to fill the universe* has been eliminated. If you doubt it, read it all again.

In this age of insecurity in which the Internet displays abundant and solid reasons to believing in the ruin of the Politics, which has proved to be incapable to mediate interests, reconcile intentions and pacify belligerent spirits, in the certainty of the absolute impossibility of moving planets as some scientists frivolously suggested and watching the hopeful *frisson* caused by news of discoveries in outer space, it seems that, for the survival of Humankind, more than ever, Science is necessary as the one revealing the Laws of the Universe and its indifferent and merciless decrees – some recalcitrant medieval minds do not agree with this. I believe that scientists' role is to observe and observe, and to think and think, and from time to time to remember the lucid perplexity of Pascal:

1415 When I consider the short duration of my life, swallowed up in
the eternity before and after– *Memory hospitius unius diei*
1420 *praetereuntis** –, the small space which I fill or even can see, engulfed
in the infinite immensity of spaces whereof I know nothing, I which
know nothing of me, I am terrified, and wonder that I am here rather
than there for there is no reason why here rather than there, or now
rather than then. Who has set me here? By whose order and design
have this place and time been destined for me? (**Remembrance of a*
guest from a passing day – Book of Wisdom, IV, 14).

1425 ...

What is a man in the infinite?

...

The eternal silence of these infinite spaces alarms me.

*The Thoughts of Blaise Pascal*⁸

I look at the day and I see the horizon, I see the sky,
I look at the night and see the stars, sometimes I see the Moon,
I look at Earth and see Life...

I look to Life and see My Brothers and My Sisters,
and I want to encounter them,

I look at myself and want to know what I am.
I look at everything I can see, and I do not see it whole.
Do I see what I see or just what I imagine I see?

I do not know.

Sometimes I feel like nothing lacks.
I do not know if I feel just what I want to feel.

I cannot refuse my look at the questions.

In some enlightened instants
An indecisive intuition surprises me.
Like a distant and sublime song
To guide me in perplexed and dazzled hesitancy before the Eternal One
I feel, perhaps – who would know? – an invitation
to admire and inquire
The strange and wonderful Order that imperates in the Universe.
What do I pursue? A Consciousness?

amílcar

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Notes

Suggestions for Internet search are noted as here without links; quotes to earlier references in the text are noted as ^(here); auxiliary notes to the text are noted as [here].

Generally, references follow “A Brief Citation Guide for Internet Sources”, NASA, version 1.1, 30 Oct. 1995.

The original text was written in Portuguese. In the text translated into English, extracts of freely accessible documents written in this language are highlighted in italics.

Free translations of extracts from documents in other languages are also highlighted in the original text.



This text was made using fonts Linux Libertine, Linux Biolinum and Linux Libertine Display.

¹ Greene, Brian, “The fabric of the cosmos: space, time and the texture of reality”, p. 17, published by Alfred A. Knopf, ISBN 0375412883, 2004.

² Greene, Brian, “THE ELEGANT UNIVERSE: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory”, ed. bras. “O UNIVERSO ELEGANTE: supercordas, dimensões ocultas e a busca da teoria definitiva”, p. 23, published by Companhia das Letras, Editora Schwarcz S.A., ISBN 9788535900989, 2001.

^{2.1} Ibid. p. 24.

³ Albert Einstein, “*But an inner voice tells me that its is not yet the real thing. The theory says a lot, but it does not really brings us any closer to the secrets of the Old One. I, at any rate, am convinced that He does not play dice.*”, letter to Max Born, 4 dez. 1926, cit. in “EINSTEIN, HIS LIFE AND UNIVERSE”, Walter Isaacson, p. 335, SIMON & SCHUSTER PAPERBACKS, New York, ISBN 978-0-7432-6+473-0, 2008; Braz. ed. “EINSTEIN, SUA VIDA, SEU UNIVERSO”, 2007, p. 346, Editora Schwarcz Ltda., ISBN 878-85-359-1128-2.

⁴ Edwards, Gareth et. al.; talk of Chirrut Imwe, Donnie Wen’s character in “Rogue One: A Star Wars Story”, *Walt Disney Studios Motion Picture*, 1216.

⁵ Robinson, A., texto e organização, EINSTEIN: A HUNDRED YEARS OF RELATIVITY, ISBN 09545103-4-8, prefácio por Freeman Dyson; ed. bras. EINSTEIN: 100 ANOS DE RELATIVIDADE, *Elsevier Editora Ltda.* BR, 2005, ISBN 85-352-1827-7;

____ Hawking, Stephen W., THE UNIVERSE IN A NUTSHELL, ISBN 0-553-80202-X, ed. bras. O UNIVERSO NUMA CASCA DE NOZ, cap. 2, *Editora Arx*, BR, 2001, ISBN 85-354-0231-4.

⁶ Douglas Adams, THE HITCHHIKER’S GUIDE TO THE GALAXY, 1979, ISBN 0330258648; no Brasil GUIA DO MOCHILEIRO DAS GALÁXIAS, 2010, ISBN 978-85-99296-94-3, p. 132, *Editora Arqueiro Ltda.*, São Paulo SP BR.

⁷ Will, Clifford M., EINSTEIN TINHA RAZÃO, cap. 9, pag. 195, *Gradiva*, Lisboa PT, 1969.

⁸ Blaise Pascal, "PENSÉES SUR LA RELIGION ET SUR QUELQUES AUTRES SUJETS"

[\[https://www.ub.uni.freiburg.de/referate/04/pascal/pensees.pdf\]](https://www.ub.uni.freiburg.de/referate/04/pascal/pensees.pdf) ac. 290819.

68-205 Quand je considère la petite durée de ma vie absorbée dans l'éternité précédente et suivante – *memoria hospitis unius diei praetereuntis** – le petit espace que je remplis et même que je vois abîmé dans l'infinie immensité des espaces que j'ignore et qui m'ignorent, je m'effraye et m'étonne de me voir ici plutôt que là, car Il n'y a point de raison pourquoi ici plutôt que là, pourquoi à présent plutôt que lors. Qui m'y a mis? Par l'ordre et la conduite de qui ce lieu et ce temps a(-t-)il été destiné à moi?

...

Qu'est-ce qu'un homme, dans l'infini?

...

201-206 Le silence éternel de ces espaces infinis m'effraie.

* Book of Wisdom, V, 14.