There are those who today go so far as to say that Witten and Hawking could be or have been scientists of the same level, or even greater than Einstein. With all due respect to Witten and Hawking, this is colossal nonsense. Scientists know very well that the researches of Witten and Hawking, although being great and respectable, are not even close to the discoveries of Einstein who, in fact, revolutionized Science at the beginning of the 20th century by giving new physical laws to Nature. Science popularizer Aczel underlined this point by criticizing Hawking for the fact that he had the habit of quoting God like Einstein did, emphasizing that Hawking was not Einstein because neither he nor his colleagues derived such majestic theories as general relativity [1]. More generally, it happens that some good scientist is defined as a potential "Einstein's heir", if not really a "new Einstein". In 2008 Discover Magazine published a list of 6 possible new Einsteins capable of operating a new revolution in physics. Here is the humble and interesting reply from one of them, Amelino-Camelia [2]: *It makes no sense to look for Einstein's "heirs". Certainly there is a way of doing physics, which is not only mine, but that of a community of people who work, I like to say, in the spirit of the young Einstein, who was inspired more by experimental data than by individual speculations. In this I feel like his disciple, and like me many other physicists. And then, let's face it, looking for Einstein's heir is a "game" that sells many copies to the press*. The statement *looking for Einstein's heir is a "game" that sells many copies to the press* is the key point. The search for a "new Einstein" is part of a business, a spectacularization of Science which, like all other human activities, has to deal with, shall we say, "political-economic" interests of the scientific establishment. While this, on the one hand, does not shock us, being part of human nature, on the other it makes us smile when we hear those who are part of the aforementioned scientific establishment point out that a scientific establishment does not actually exist. It does exist, and we are forced to deal with it when we embark on a scientific career. What is the truth here? On the one hand some individual scientists, who often define themselves, more or less explicitly, as a sort of fearless knights, claim that official Science is dominated by judeo-masonic conspiracies or by a scientific mafia in the service of not better known strong and criminal powers, and who defend the independence of their research and pay for all this with marginalization and ostracism. On the other hand, the scientific orthodoxy contemptuously defines the researchers previously mentioned as "crackpots". As the ancient Latin wisdom reminded us, maybe the truth lies somewhere in the middle. On the one hand, it makes no sense to argue that some, if not all, of the foundations of Science are wrong, starting with relativity theories, which are often the main target of the cited fearless knights, and arriving at almost all standard physics. On the other hand, it doesn't even make sense to argue that mainstream Science is completely correct. There are several problems within mainstream physics, and often controversies arise over what is the best way to approach such problems. Clearly, those who have become eminent and famous for pursuing a particular approach in order to solve the cited problems are unlikely to later come to recognize that their approach actually leads nowhere. Often the ego and vanity of scientists are so great that it is difficult for them to recognize that they are wrong even in the face of all evidence. Van Flandern, an American astronomer famous internationally for his theories often not accepted by his colleagues, said [3]: "*I have taken aside* *several colleagues whose pet theories are now mainstream doctrine, and asked quizzically what it would mean to them personally if an alternative idea ultimately prevailed. To my initial shock (I was naive enough that I did not see this coming), to a person, the individuals I asked said they would leave the field and do something else for a living. Their egos, the adulation they enjoy, and the satisfaction that they were doing something important with their lives, would be threatened by such a development. As I pondered this, it struck me that their vested interests ran even deeper than if they just had a financial stake in the outcome (which, of course, they do because of grants and promotions). So a challenger with a replacement idea would be naive to see the process as anything less than threatening the careers of some now-very-important people, who cannot be expected to welcome that development regardless of its merit*". Thus, Science is strongly influenced by "politics", lobbies and economic interests. This does not scandalize us or make us unworthy, as it is part of human nature, but it places serious limitations on the development of Science itself and on the introduction of new ideas. There are sectors of our society which, unfortunately being led by worthless people, penalize those who do their duty well. Since in these cases incompetence and schemes have almost become strengths and dishonesty a necessary attitude in order not to succumb, those who show that they are very capable and upright instead of arousing admiration they generate doubts. Sometimes, unfortunately, this also happens in the Scientific Community, but, fortunately, there are also many cases where excellence and competence are rewarded even if they may disagree with the dominant orthodoxy. We would not have had Galileo and Einstein if this did not happen, and we hope it will continue to happen in the present and in the future.

Gravity quantization is one of the most important problems in mainstream physics. In fact, the two main pillars of modern physics are Einstein's general relativity (GR) and quantum theory. GR well-describes gravitational phenomena at large scales, starting from observations from cosmological distances to millimeter scales, while quantum theory well-describes phenomena at small scales, dominated by strong and electroweak interactions, from a fraction of a millimeter down to 10^{-19} meters. Historically, GR obtained great success (Landau said that GR is the world's best scientific theory at the same level of quantum mechanics [4]) and results consistent with a lot of experiments and observations. On the other hand, it also has some flaws and weaknesses, like the presence of singularities in its theoretical framework and the famous dark energy and dark matter problems in the cosmological contest. Thus, today scientists question whether it has a definitive behavior. Differently from other theories, like, for example, electromagnetism, GR resulted, till now, as being impossible to be quantized. Hence, gravity cannot be treated like other quantized theories, being a strong obstacle in the root to unify gravitation with other forces. Currently, a consistent *quantum gravity theory,* which should lead to the unification of gravity with the other interactions, has not been yet realized. Einstein had the conviction that quantum mechanics should not be complete. Thus, scientists should attempt to subject quantum mechanics to a final deterministic theory [5]. Today Einstein's opinion is partially endorsed by some scientists. During the last 50 and more years, GR and quantum theory have been the object of an important scientific discussion. There are several approaches attempting to quantize gravity, but the only two that are truly considered by the “gravity theory’s establishment” are string theory and loop quantum gravity (LQG). In fact, neither approach has so far been definitive in the search for quantum gravity, although string theory is more than 50 years old and LQG more than 35. Nevertheless, if one looks for an alternative approach to these two theories, it is not considered at all even if this approach is published in prestigious journals. This fact has to do with what was said earlier, namely, the influence of "political" and economic interests in Science. We sometimes hear from devotees of these two theories, "Einstein would have liked string theory," or "Einstein would have liked LQG." Too bad such claims are not provable, unless one wants to summon Einstein’s spirit through a séance... In addition, string theory people and LQG people often quarrel with each other, sometimes even using manners and language that are certainly not suitable for the scientific world, just think of Motl’s squalid insults to Smolin, Woit and others [6].

It is a general conviction that the role and the importance of black holes (BHs) are fundamental in order to realize the final quantum gravity theory. BHs are indeed considered as being theoretical laboratories for testing different models of quantum gravity. Bekenstein was the first physicist who observed that, in some respects, BHs play the same role in quantum gravity that atoms played in the early decades of the 20th century in the nascent quantum mechanics [7]. This analogy implies that BH energy could have a discrete spectrum. Therefore, BHs combine in some sense both the “hydrogen atom” and the “quasi-thermal” emission in quantum gravity [8]. As a consequence, BH quantization could be the key to quantum gravity and, for that reason, it became, and currently remains, one of the most important research fields in physics of the last 50 years. Various Authors proposed and still propose various different approaches. A famous problem concerning BHs is the so-called "BH information paradox," which was originally enunciated by Hawking verbatim as [9]: “*Because part of the information about the state of the system is lost down the hole, the final situation is represented by a density matrix rather than a pure quantum state*". In other words, physical information should be ultimately lost in BH evaporation and this should add a further uncertainty in physics. The devastating consequence of the paradox is that quantum gravity should be not unitary. After Hawking’s original claim, enormous time and effort were and are currently devoted to solving the paradox. Some scientists remained convinced that quantum information should be destroyed in BH evaporation. Other ones claimed that Hawking was wrong and information should be, instead, preserved. Susskind wrote a popular Science book on details of the so-called “Black Hole War” [10]. In fact, the paradox was introduced into physics folklore. Hawking made two famous bets, one, with Thorne like co-signer, with Preskill, another with Page, that BHs do destroy information. Susskind claimed that he and others were able to persuade Hawking that the BH evaporation preserves physical information through Maldacena conjecture [11], an application of the holographic principle that became celebrated later, which is supported by the mathematics of string theory and results in the AdS/CFT correspondence. The holographic principle (originally proposed by ’t Hooft in the early 90’s and furtherly developed by Susskind, see [10] for details) states that all the physical information within a volume of space is encoded in the surface that encloses the volume itself. Maldacena conjecture is a correspondence between two kinds of physical theories. On one side, via string theory, there are the anti-de Sitter (AdS) spaces used in quantum gravity. On the other side there are conformal field theories (CFTs), which are quantum field theories describing elementary particles. Since CFTs are definitely unitary, string theory must preserve physical information. Consequently, all information that falls into a BH in AdS space must come out of it. Based on Maldacena conjecture, Hawking reversed his opinion on the information lost in 2002 [12]. But he changed again his opinion by verbatim claiming that "*there is effective information loss*" in 2014 [13]. In the last years of his life, he attempted, along with his collaborators, to solve the problem through the concept of *supertranslation hair*. These should be low-energy quantum excitations that could release information during BH evaporation [14]. Maldacena was awarded with the 2012 Breakthrough Prize in Fundamental Physics for the gauge/gravity duality. But another string physicist, Mathur, pointed out that, actually, Maldacena conjecture does not resolve the paradox [15]. Mathur's argument is that Maldacena conjecture implies that correlators in AdS backgrounds should be reproduced by correlators in CFT without gravity. As CFT is unitary, it should appear that there cannot be any information loss in gravity either. But the key point is that the agreement of correlators in the duality is checked only for low energy processes, where BHs cannot form. Thus, this resolves nothing. One has no problems of information loss in processes where there are no BHs. Then, the AdS/CFT correspondence fails when BHs are present. Mathur's criticism seems correct. Then, maybe the Breakthrough Prize in Fundamental Physics given to Maldacena was not deserved but due to "political" motives? Is this the famous political power of string theory criticized by Smolin and Woit? Not necessarily. While there are several string physicists on the Selection Committee of the Breakthrough Prize in Fundamental Physics, and often the Prize itself has been awarded to devotees of string theory, it should be emphasized that Maldacena conjecture is certainly a nice piece of theoretical physics with important implications. For example, it represents an interesting approach to the study of strongly coupled quantum field theories. Since this is a strong-weak duality, if the fields of quantum theory are strongly interacting, those of gravity are weakly interacting and thus can have a mathematically simpler description. This has allowed an approach to certain branches of condensed matter physics and nuclear physics that allows to translate problems from these fields of research into problems that can be analyzed more simply in string theory. So, the award given to Maldacena may well be deserved, while the "political" aspect of the issue should be the fact that, as noted by Mathur, Maldacena conjecture does NOT solve the BH information paradox, as several of Maldacena's fellows, starting with Susskind, would have liked. Mathur's proposal in order to resolve the BH information paradox is the so-called fuzzball paradigm. Mathur was awarded with various different prizes by the Gravity Research Foundation for such an approach, see for example [16]. In addition, General Relativity and Gravitation dedicated a Topical Collection to the fuzzball paradigm edited by the same Mathur among others [17]. A fuzzball would be the true BH quantum description realized by string theory. The paradigm postulates that the region below the BH event horizon is actually a ball of strings that turn out to be the fundamental constituents of matter and energy. In their works Mathur and his collaborators emphasize that BHs are redefined in terms of quantum objects with neither horizons nor singularities. The BH interior is replaced by a quantum structure at the Schwarzschild scale having no horizon. In particular the horizon's absence means no creation of entangled pairs by Hawking mechanism and, consequently, no information loss in BH radiance because a fuzzball will emit radiation like any other body. In fact, the fuzzball paradigm denies the existence of Hawking radiation. Thus, quantum gravity corrections to the BH semiclassical picture become important at the Schwarzschild scale instead of the Planck scale as a general belief held. Later we will see how Vaz and Corda arrived at similar conclusions too, but starting from a different scenario. Another interesting proposal to solve the BH information paradox is due to Zhang et al. In 2013 they won the Gravity Research Foundation Essay Competition with their solution to the paradox by finding correlations among Hawking radiations [18]. The key point of this approach is the non-thermal radiation spectrum originally found by Parikh and Wilczek [19]. Via this non strictly thermal behavior, the works of Zhang et al. have shown that the amount of information encoded in the correlations among emissions exactly equals to the same amount of information claimed lost by the paradox. The solution of Zhang et al. created a controversy between the same group and Mathur. Indeed, in one of his papers [20], Mathur argued that the approach of Zhang et al. was wrong. This led to a piqued response from Zhang et al. in an article posted on arXiv [21]. One can see how in the comments accompanying the article's arXiv entry, Zhang et al. wrote rather curtly that "*We submit this comment in order to prevent any further propagation of the misconceptions of the paradox*". This controversy has scientific value since in 2013 the opponents won respectively the first prize (Zhang et al.) and the third prize (Mathur) of the Gravity Research Foundation Essay Competition for their proposals to solve the paradox. In any case, in our opinion, the fundamental result that should close the paradox's controversy is the one obtained by Vaz in 2014, for which Vaz himself was awarded the second prize in that year's Gravity Research Foundation Essay Competition [22]. Vaz supported Hawking's idea in [13] that the final result of the gravitational collapse should not be an event horizon, but an apparent horizon instead, where matter and energy is temporarily suspended, but then released. Hawking did not give a mechanism for how this could work while Vaz endorsed this idea in a quantum gravitational model of dust collapse. Starting from the LeMaitre-Tolman-Bondi (LTB) collapse, Vaz indeed showed that continued collapse to a singularity can only be obtained if one combines two independent and entire solutions of the Wheeler-DeWitt equation. Vaz's interpretation of the paradox was in terms of simply forbidding such a combination. This leads naturally to matter condensing on the apparent horizon during quantum collapse. Hence, an entirely new framework for BHs has emerged. This approach is also consistent with Einstein's idea of the localization of the collapsing particles within a thin spherical shell [23]. Recently, Corda derived the BH mass and energy spectra of such *Einstein-Vaz shells* via a Schrodinger-like approach, by supporting Vaz's conclusions that instead of a spacetime singularity covered by an event horizon, the final result of the gravitational collapse is a quantum object [24]. By using the reduced mass of the Einstein-Vaz shell, a Schrodinger equation can be obtained, which results to be formally identical to the traditional Schrodinger equation of the s states ($l = 0$) of the hydrogen atom [24]. This Schrodinger equation obeys to a "Coulombian potential" in which the squared electron charge e^2 is replaced by the squared reduced mass of the Einstein-Vaz shell m^2. Thus, one gets a Schrodinger equation of a particle, the "electron", which interacts with a central field, the "nucleus". On the other hand, this is only a mathematical artifact because the real nature of the quantum BH is in terms of the Einstein-Vaz shell. In Vaz-Corda approach the quantum BH results to be a "gravitational atom" held up not by any degeneracy pressure but by quantum gravity in the same way that ordinary atoms are sustained by quantum mechanics. Corda also stressed that, together with collaborators, they obtained the same Schrodinger equation for the Einstein-Vaz shells via the quantization of the historical Oppenheimer and Snyder (OS) gravitational collapse by using Feynman's path integral approach [24]. This is intriguing, because a well known problem in quantum gravity is that different approaches to the same problem often give different results. Instead, in the present case, the two different gravitational collapses, i.e. the OS and the LTB, generate the same quantum object, the Einstein-Vaz shell. Now let's ask: what is the most important message that comes from the approach of Vaz and Corda (quantum shells) and the approach of Mathur (fuzzballs)? The answer will not be easy for the gravitational physics community to accept, indeed, it is quite shocking: Hawking radiation DOES NOT exist! In fact, in both approaches, which treat BHs from the quantum point of view, there is NO formation of the event horizon. Consequently, this prevents Hawking's process of formation of pairs of particles from the vacuum from taking place. So, no Hawking radiation and no BH information paradox. Both fuzzballs and Einstein-Vaz shells will emit radiation like any other physical body, not according to Hawking's process. Although both approaches have been carried out with extreme mathematical rigor (fuzzballs are a paradigm that originates from string theory while the Einstein-Vaz shell derives from the rigorous quantization of the LTB and OS gravitational collapses), it will however be extremely difficult that this result, i.e. the non-existence of Hawking radiation, can be accepted by the Scientific Community. This is for the "political-economic" reasons mentioned above. Let's reflect a bit on this. Hawking radiation has been considered one of the most important topics in theoretical physics for nearly 50 years. A lot of researchers have worked and continue to work on it, some have become famous for their achievements on Hawking radiation itself. How can they think that for years they have been working on "what is not there"? And, if they accept it, will they want to change their approach to the BH physics or will they prefer to devote themselves to something else if not even change jobs, as stated by the various researchers interviewed by Van Flandern? Yet, if we are to make any progress in understanding quantum BHs as "gravitational atoms" that could allow us to construct a quantum gravity theory, then the right way forward is to abandon Hawking radiation. Both the fuzzball approach and the Vaz-Einstein shells approach also eliminate another concept related to BH physics: the singularity that should be present in the classical theory, and this is another strong point of these two approaches. Penrose argued that quantum gravity rather than eliminating the singularity should explain to us what a singularity is [25]. In reality it would seem that, intervening at the Schwarzschild scale, i.e. well before arriving at the Planck scale, quantum gravity does not really consider the singularity, generating an object, the Einstein-Vaz shell or the fuzzball, which has neither horizons nor singularities. At this point, even the famous hypothesis of cosmic censorship, proposed by Penrose himself, would not need to exist. So, here we are saying something truly "sacrilegious": Both Hawking radiation and the ideas of singularity and cosmic censorship are not foreseen in quantum gravity, which should be an unitary theory. However, an important clarification is necessary. We are certainly not arguing that all the physics deriving from the ideas of Hawking and Penrose should be taken and thrown in a wastebasket. The names and results of both scientists have rightfully entered the History of Physics and are destined to remain there forever. Both have had the merit of drawing attention to those intriguing objects that are BHs (Penrose won a Nobel Prize for this), making an entire generation of theoretical physicists dream, including us. Both have developed very high-level computational procedures, which have allowed us a better understanding of GR (another reason for the Nobel to Penrose), and have paved the way for that intriguing branch of Science that is information physics today (Hawking via the BH information paradox). Only... now it's time to change course, even if this could annoy a lot of researchers in the field. So what is the main road to follow? A good way should be following the example of two other scientists, even greater than Hawking and Penrose, namely Einstein and Galilei. Einstein [26] warns us of the dangers of excess ego. According to him, a great variety of styles is present in the Scientific Community, which is often made up of very different men driven by different moral forces. Many of them turn to Science to show their superior intellects, interpreting Science as one's favorite sport allows them to live a busy life and to fulfill one's ambitions. Others are interested in bringing their own offering to the "effervescence of the brain". Einstein argues that if a divine angel should remove from the Scientific Community scientists of these two categories, this would remain disturbingly empty, if there were still some scientists who see it differently. In this way, a lot of scientists would be removed from the Scientific Community, who they built a large part of, perhaps the bigger, so much so that the same angel of heaven would consider his decision very bitter. On the other hand, if there had been exclusively scientists of those two categories the Scientific Community could not have risen, as well as certain climbers could not, by themselves, give life to a forest. According to Einstein [26], the true foundations of the Scientific Community are based on the work of a third category of people, those who study Science for its own sake, driven only by passion, imagination and curiosity. Einstein describes them as for the most part singular, closed, isolated individuals who, despite these characters in common, are basically alike among them far fewer than those who were ousted by the angel. What prompted them to do Science? Einstein [26] reconnects with Schopenhauer by arguing that the most powerful impulse that drives this category of people towards Science (but also towards Art and other Disciplines) is the desire to escape from everyday life, going beyond single individual desires and moving towards the world of contemplation and objective judgment. For them probably the fun and passion in Science, but also in Art, Painting, Poetry, Sculpture, Music, etc., are more important and more satisfying than any international prize they can win and any fame they can achieve. So here is Einstein's great lesson in one of his most famous philosophical maxims [26] : "*The most beautiful experience we can have is the mysterious. It is the fundamental emotion which stands at the cradle of true art and true science. Whoever does not know it and can no longer wonder, no* *longer marvel, is as good as dead, and his eyes are dimmed.*" The painter, the poet, the speculative philosopher, the naturalist act in this way, but Einstein also emphasizes that the point of view of the theoretical physicist has stricter demands regarding rigor and accuracy in carrying out your own analyses, which can only be obtained via the language of mathematics. In this way we are linked to the famous Galilean scientific method, which we could summarize as follows. It is right to have an open mind and a great imagination when we make Science, but we must start from plausible proposals and axioms, and then carry out our analysis through mathematical rigor and compare our results with experiments and/or observations. The Scientific Community should have the duty to pay close attention to any type of scientific study carried out in this way, even if it seems to go in a different direction from what is suggested by the eminence of great scientists or from what is present in textbooks. Great scientists remain men who, like all other men, can make mistakes. Indeed, many of these great scientists, including Einstein, in the course of their lives have made many mistakes, and told many nonsense. But in the end the things they were right about, perhaps less than those they were wrong about, made the History of Science. Likewise, errors can also be present in textbooks. Therefore our knowledge and understanding of physics cannot be limited to accepting everything written in textbooks as if they were the Bible. We must accept scientific facts following the Galilean method, i.e. we must propose new ideas, but we must then develop these through mathematical rigor and seek the consistency of what we will obtain with experiments and observations. Many great scientists were originally thought to be "heretics" in introducing new ideas. But what ultimately differentiated them from those we now call "crackpots" is precisely the mathematical rigor of their approach and the consistency of their results with observations and/or experiments. It is difficult to talk about consistency with experiments and/or observations when we refer to BHs. But if BHs are really "gravitational atoms" that help us to build quantum gravity and, in the future, to unify gravitation with other interactions, perhaps one day we will have observational and/or experimental evidence from this unified theory. In our eyes it would seem that it is worth a try. The Scientific Community is therefore ready to accept the fact that the characteristics of BHs could be completely different from those considered so far and therefore, while recognizing the undoubted merits of Hawking, Penrose and others, to deviate from that road which seemed to derive from their studies? The future will tell. In any case, we had a lot of fun writing this Essay, and this, from an Einsteinian point of view, is the most important and satisfying thing of all. We hope that the readers too can enjoy and benefit from this reading.