https://www.youtube.com/watch?v=TqqFij2O3L0&t=1225s

Are there Extra Dimensions? | Episode 406 | Closer To Truth

Roger Penrose
My comment is red nipples
295 798 zhlédnutí
9. 1. 2021

Transcript from YouTube
(01)- …. dimensions seem the stuff of science fiction. We know three dimensions -- length, width, height. But what about other dimensions beyond length, width, height? What could that mean? What would extra dimensions be like, and anyway, why would we care? What about the 4th dimension -- time -- not as metaphor, but as fact? Now some speak of 10 or 11 dimensions as the foundation of the cosmos. Is deep reality so strange? I'd be astounded. Are there extra dimensions? I am Robert Lawrence Kuhn, and closer to truth is my journey to find out. To understand extra dimensions, i should know how this unexpected idea developed. That's why i begin with physicist Lawrence Kraust, a science writer who is a real scientist. Lawrence is passionate about origins.
Te idea of extra dimensions has been around for a long time in different contexts, partly because i think people crave this unknown universe in one form or another. I think we're hard wired to really want there to be more out there than we can see. I would say that the modern precursor, the thing that really started driving us in that direction, were the experiments of michael faraday back in the 1860s and 70s in England where we began to learn about electricity and magnetism. And that was a beautiful episode in the history of science where what was discovered was that these two very different ideas -- electricity and magnetism -- these apparent very different forces, were really different manifestations of the same thing. What came out of that was one of my favorite calculations, is this remarkable fact that when you shake an electric charge, you predict that an electromagnetic wave will go out. And you can calculate from first principles the speed of that wave. That was what Maxwell did. And it was beautiful calculations, and what did he find? It was the same speed that light had been measured to have. Therefore suggesting light was an electromagnetic wave. Great. But that causes a problem, and it was einstein who really began to recognize that problem and people often don't understand the genius of the revolution that Einstein created. We have been told, since Galileo, that if you're on a plane that's moving at a constant velocity and the windows are closed and there aren't any bumps, or a train, you don't know you're moving. The laws of physics are the same, as long as you're moving at a constant speed. What's the problem? Well, i shake a charge on my plane, an electromagnetic wave goes away from me, and i can calculate the speed because i'm a physicist and i can calculate it and i can measure it and, lo and behold, they agree. But what if you're on the ground watching that whole thing happen? Well, since the plane is moving with respect to you, then the light ray must be moving with respect to you, not only to the person on the plane, but with respect to you, too, and it's speed must be greater. It's the speed of light plus the speed of the plane. But that's a problem, because on the ground i can calculate the speed of light from first principles, given the

strength of electricity and the strength of magnetism, and if it's different, than that means that the strength of electricity and the strength of magnetism are different from me on the ground than in the airplane. But galileo tells us that can't be the case. That's a huge paradox. And it was Einstein's genius to realize, well, they're both right, maybe it's the way we measure * (note: it is necessary to **distinguish** how we measure time and space and how we observe time and space, respectively speed) space and time. Maybe space and time are personal things, and they depend upon your motion in order to get a measurement. So, each person's space and time is, in some sense, unique to them. And that was the genesis of special relativity. It was actually Einstein's teacher, the only one by the way that he said that he actually had any respect for as a mathematician, a guy named Mikowsky, who really, however, pointed out that this weird thing that, if i'm moving with respect to you lengths will change, get smaller, and if i'm moving with respect to you, my clock will go slower. It all seems crazy, it seems like it's completely relative. But in fact there is an absolute there. There is an absolute in the sense that if you think of the world as four dimensional, time being an extra dimension, then when i'm moving with respect to you, what i'm really kind of doing is rotating in this four dimensional space. So, my space is your time and your time is my space a little bit. And when those get mixed up, you explain the wonderful results of einstein. So, we now say that we live in a four dimensional Mikowsky space. So, suddenly time is like an extra dimension. Not exactly like space, but suddenly we see we live in this four dimensional universe. And by the way, that, that idea- Einstein shook up our static, three dimensional world by boldly adding time as a fourth dimension. His radical insight enabled other scientists to ask, what else might be lurking deep within the foundations of the forces of reality?

(02)- Extra dimensions seem so bizarre. I need help. So i go to New York to meet Michio cochrane, a physicist known for explaining far-out science. Michio, extra dimensions is front and center in the scientific world. No longer just science fiction. How significant is this in our understanding? >
Let me tell you a story. When i was a child growing up in san francisco, i used to visit a japanese tea garden and visit the carp swimming just beneath the lily pads in a two dimensional pond. I used to spend hours looking at them. They would swim forward, backward, left and right, their eyes were to the side, and they couldn't see me. I was in the 3rd dimension, i was in hyper space, they were totally unaware that there was a universe beyond their pond. And then i thought, well, what happens if i reach down and grab one of the fish and lift the fish up? Maybe that fish was a scientist and the scientists would say, bah, humbug -- science fiction. There is no world of up. Up does not exist. Well, i would grab this scientist, lift him up in the world of up, hyper space, the 3rd dimension -- what would he see? He would see beings breathing without water - a new level of biology. He would see beings moving without fins -- a new law of physics. And then i would put the fish back into the pond. What kind of stories would he tell? Well, today, we physicists
Believe -- we cannot prove it yet -- but we are the fish. Thinking that anything beyond our pond, anything beyond our little puny universe is science fiction. We say, bah humbug. You see, in three dimensions, there is not enough room to put all the laws of physics. But when you go to this larger pond, this pond of hyper space, then all the laws of physics just fit together like a jigsaw puzzle. We live in a three dimensional world. We see pieces, we see the electromagnetic forces, we see gravity, we see nuclear force, little pieces of this unified field theory. We bring them together -- now we have the theory of the quantum theory, the theory of the small, the theory of atoms. We have the theory of Einstein, the theory of space, time, relativity. But they don't fit together -- until you go into hyperspace * (ie space with more extra dimensions) -- and then they fit together beautifully. Look at smoke. Smoke permeates throughout a room. Smoke permeates in all three dimensions, but smoke never disappears.

Smoke never floats into the fourth dimension. Therefore, a 4th, 5th, 6th dimension has to be smaller than smoke. But atoms also don't suddenly drift away into hyperspace. Therefore, these higher dimensions have to be smaller than an atom or else our universe would float away. Okay? all right. Now, we have, that's on the microscopic scale. What about large extra dimensions that seem to be talked about now in some theories of cosmology? Well, strings can only vibrate in 10 dimensions, but in the '90s, there was a revolution that, that it turns out that if you add an 11th dimension, one more dimension, then membranes can exist. Now just little strings, but beach balls and golf balls can vibrate and perhaps our universe is a membrane. In which case, perhaps some of these dimensions can be large, perhaps even infinite. So, once you go from the 10 dimensional world of strings where these dimensions are very tiny, and go to an 11th dimension, then you're talking about a whole new picture. A picture whereby some of these dimensions could be huge. And that may even explain why gravity is so weak. Gravity is a very weak force. Perhaps gravity oozes, oozes, escapes, into these higher dimensions, and that's why gravity is so weak. This so-called hierarchy problem, which gravity may be 10 to the 39th or 10 to the 40th times smaller than the electromagnetic gravity or the electromagnetic force, it seems, it seems that these two are fundamental forces to have such a vast difference in scale doesn't seem to make sense. That's right. I could put pieces of paper on the table, comb my hair, and -- we do this in elementary school -- pick up the sheets of paper. Well, i just defied gravity. The earth weighs 6 trillion trillion kilograms. I defied 6 trillion trillion kilograms with a comb by picking up pieces of paper with the electric force. That's how weak gravity is. We are like flies on fly paper. The fly paper represents our universe -- we're stuck, we can't get off. But gravity oozes between fly papers, and therefore, we can actually perhaps detect experimentally the presence of alternate universes. This is not just science fiction. Am i as if just a fish in a pond? Extra dimensions, small and large, weaving the new fabric of reality. But is reality so fantastic? The key, **Michio** says, is string theory, which requires 10 or 11 dimensions to unify the laws of physics. I need more on these compact extra dimensions. I'll ask David Gross, one of the founders of string theory, and a nobel laureate in physics. We meet at Cal Tech.

(03)- This is one of the surprising things that came out of string theory, even though the idea of extra dimensions has been contemplated before. And in string theory it was discovered * ??? how ??? ; I "clarify" again that we must have more than one time dimension, ie three flat dimensions of time and other already curved time dimensions (in matter) that we had to have more than the three spatial dimensions that we see around us. And, of course, since we don't see them, they have to either be very small or, as was discovered * ??? with what and where and how? "Discovered"? Or designed? more recently in the last decade, there could be large extra dimensions in what are called warped geometry.* (on large, the contrary small twisted) So that, again, the stuff we're made out of could be stuck in the three that are visible. So, these are all possibilities within string theory and in which there are myriad of many too many possibilities -- many too many for us to be very predictive about the consequences of the theory, and therefore, they should all be explored. * They have been explored for 40 years and still nothing… (!) Some of them give rise to very interesting scenarios, predictions, * even my HDV leads to interesting predictions or if those scenarios are correct, things that observers should look for. * Why didn't they start looking? !!! They give rise to different cosmological scenarios * HDV that could be tested. They give rise to objects such as cosmic strings * ??? but they are "out of nowhere" and the "nothing" vibrates. If it was "Nothing" from 3 + 3 spatiotemporal densities then the vibrations could be de facto by curving - wrapping - balling those dimensions into packages = elementary particles sometimes that could be detected and observed. They give rise to possible models * HDV is also a possible model and yet no one is

researching it where one might try to calculate phenomena in our standard theory of particle theory. So, they are all suggestive and fascinating scenarios and i certainly, you know, think it's great that people are looking into this, or even trying * no, it's not trying to read HDV to see the observational consequences. Okay, david, at least we agree we don't see extra dimensions -- they are either too small, or warped geometries. * Curvature is not excluded with the packaging of those dimensions, namely the dimensions of 3 length and three dimensions of time With all the myriad possibilities ** (countless) (HDV also belongs to innumerability, nevertheless it was omitted) of string theory, could there ever be real data? To find out, i go to Harvard, to ask a physicist exploring how high energy experiments might unify string theory and cosmology. **Nima Arkani Hamed**. **sgriffin@ias.edu ; arkani@ias.edu** Nima, how can there be extra dimensions beyond the three dimensions of space and the one of time? * The first three dimensions of length and time are developed, ie flat, ie geometric. But other dimensions of extra are no longer geometric, but mathematical and are rolled up - wrapped in packages (variously complex multi-packages) and these are already material elements - elementary particles of matter Well, it's certainly theoretically possible for there to be extra dimensions. * (Once you say dimensions, the second time dimension. I think it's necessary to distinguish. But I see from the original that the mistake is made by the "compiler") The usual analogy people use is to imagine that there are other dimensions there, but they're **curled** up to a very small size. * Yes, and here it is necessary to complete the thinking from the point of view of HDV, ie that elemental particles are "**packaged**" from the dimensions and the conglomeration of complex matter continues. So, it's like looking at a garden hose -- from very, very far away, a garden hose from very far away looks like a line, but as you get closer to it, you see that it has, ah, it has a little bit of a thickness there, a little circle there, with the, with a finite size. * Your thinking consists of a "new dimension" just as a tube, a tubing, just "curling" into the ring ..., but they are extra dimensions are curled not only to the "tube-hose", but also to "bizarre packages" ... Compactified. So, it would be compactified. So, if you went around this other dimension, that you would very rapidly come back to the same place.* And this is the imperfect, unpremeditated , view of "twisting" extra dimensions. Here physically ends before HDV gates. This twisting is n-shave more complex. That's the idea. The idea had a big resurgence in the '70s and '80s with the realization that, that string theory with the very, very rigid theoretical structure * What is "*rigid theoretical structure*"? ha-ha that you really couldn't monkey with too much, predicted that there should be10 dimensions -- 10 dimensions of space and time.* And what would you be for? What is the theory of strings in need? What does the string solve this? I need an extra dimension for the construction of elementary particles of matter More recent theoretical develops hooped that up to 11, but anyway, it's a number that wasn't definitive.* Is this an abstraction, or a theory, or a hypothesis, or what is it? For example, for the mystery of why gravity is so much weaker than all the other forces- by 10 to the 39th, or something like that compared to electromagnetism? * Gravity already has "expanded 3 + 3D space-time around bodies", so it is weak…, while the other three forces still have a very strong 3 + 3 D curvature and therefore appear (!) as strong forces Sure, right. So, one possibility is that, in fact, it isn't much stronger, that at the length scale of around 1/10 of a minus 17 centimeters, where we first start encountering this problem of why gravity is so weak compared to everything else, maybe gravity really catches up with everything else at $1/10^{17}$ centimeters, but there are extra dimensions in which only gravity propagates and the ordinary particles and forces don't propagate, so that gravity only appears weak because it's diluting it's strength in extra dimensions.* No, no, Gravity does not propagate in other extra dimensions, no, but it already has "expanded 3 + 3D space-time around solids", so it is weak…, while the other three forces still have a very strong 3 + 3 D curvature and therefore appear as strong forces How does this articulate with this so-called brains of cosmology,

where you have our whole universe would be on a 3 dimensional brain floating in a, in some 4th or n-th dimensional space? Right. So, brains are a crucial part of this picture, in fact, the existence of brains was what allowed us to do all these novel things with extra dimensions for the simple reason that when everything is spread out, then if you make the dimensions bigger or smaller, you make all the interactions weak or strong. * This is not about whether the dimensions "increase or decrease", here it is about the "curvature" of those dimensions - this is the essence for the magnitude of forces.. Whereas when some things are trapped living on a lower dimensional surface while gravity lives everywhere, it's possible to adjust the relative strengths to make only gravity weaker while keeping everything else strong. So, the brains are a crucial part of the whole story. And there is many, many different scenarios now that exploit brains in extra dimensions to do interesting things, and many of them have experimental consequences, so they will live or die on the near term time scale. Ten or eleven dimensions of space and time, all but are our common three dimensions astonishingly tiny. * They are not small, but they are "wrapped, curled-wrapped" !!! What is this nonsense to talk about "small or large dimensions"? Speculative? Surely. But they may explain the inexplicable.* Small?, You say small in the microworld can explain ???? and "wrapped" (in the microworld) can't explain ??? Like why gravity is so incredibly weak compared with other forces like electromagnetism.

(04)- most getting this, but then lose it. So how, again, could extra dimensions, fiendishly complicated, make the world simpler? * Understand that the "devilish complexity" lies in the packaging - the curvature of dimensions into elementary packages = elementary particles of which we have only 25 http://www.hypothesis-of-universe.com/index.php?nav=e in the Standard Model. Devilish complexity only occurs when elementary particles "combine" into multi-shapes, conglomerate into atoms, molecules and compounds, eg example http://www.hypothesis-of-universe.com/docs/eb/eb_002.pdf The place to go is Princeton, the institute for advanced study, where Albert Einstein walked and thought. I meet Juan Maldacena, whose startling discoveries have turned this unassuming argentinean into a kind of string theory rock star. Suddenly i'm hearing all about extra dimensions.What is all this extra dimensions? It's hard to comprehend. >a dimension is where a particle can move * Sure. Normal expanded geometric dimension, yes. But the "extra dimension" is rather a "mathematical dimension", which is built by "packing" physical dimensions, ie from geometric dimensions, and these then exist in the form of matter, within matter. There can also be "physical dimensions" inside matter plus the mathematical ones if they are twisted… So, how many variables do you need to specify the position of a particle? * But the "extra dimensions" are not "free" in ordinary = simple space-time, but are compacted "into matter". Okay. So, if we want to meet, we have to arrange where we are meeting, right? Right. We are meeting at a certain location in space-time 3 + 3D between two street intersections, on the first floor or the second floor, those are the three dimensions- right, right. The 3 spatial dimensions. We also have to arrange a time to meet. And the question is, do we also need to specify other things when we talk about a more elementary particle? Sure, that's what I'm trying to do So, could it be that elementary particles could really move in extra dimensions?* No…, because the other dimensions are "inside matter"… so I think that elementary particles do not move in other dimensions. Now, something we do know is that these extra dimensions are not infinitely big * O.K., geometric dimensions are infinite…; mathematical dimensions are coiled "into matter" and even there they may converge into singularities?!? and equal to the other dimensions, because we know that for many practical purposes, we can deal with three dimensions. Right? So, we are suddenly not moving in the extra dimensions.* Mass objects move only in geometric space-time But the question is whether elementary particles

can, in some sense, move in the extra dimensions. Now, why would you do this? And the idea is that perhaps the laws of physics * the laws of physics "occupy" not only the macroworld with 3 + 3D dimensions, but also the microworld with extra dimensions… must be examined are simpler when we add this extra dimension and that some of the complications we see in the laws of physics are due to the fact that where we have the same particles in these extra dimensions, but they are doing different things. * ?? no… extra space-time does not exist… But!, bat ! in normal ordinary 3 + 3D space-time, crooked states of extradimensions "float", it is surprisingly common and ubiquitous and we just "don't see" it… So, a particle can be moving faster or slower in the extra dimension, and then we would see them differently in our four dimensions. So the idea of an extra dimension is to make life simpler, not complicate it? * What is the difference between "simple laws" and "complex laws" ??? Yeah, yeah, exactly, it's to make it simpler. It sounds like it's more complicated. Yeah, yeah, yeah, it looks more complicated, but in a way, it's simpler. Okay. Because the idea is that you have simpler laws in extra dimensions that give rise to more complicated laws in four dimensions. What is the difference between "simple laws" and "complex laws" ??? Oh, okay. So, that's the beauty, if you wish, of extra dimensions. * It will be interesting when science understands HDV .. http://www.hypothesis-of-universe.com/index.php?nav=eb Let me give you an example. So the simplest and oldest idea was to construct a theory that puts together gravity and electromagnetism. So in the theory of gravity, we have gravity waves, and with electromagnetism, we have electromagnetic waves. So colusa and klein realized at the beginning of the 20th century that if you consider a theory of just purely gravity but in five dimensions, you add an extra small circular dimension, then the gravity would be a fluctuation, or a wave of gravity in four dimensions, but when this wave is twisting in this extra dimension circle, it would look like an electromagnetic wave in the point of view of four dimensions. So, in this way, two phenomena that are different, gravity and electromagnetism, are unified then put together in this five dimensional picture. * These are already mathematical constructions of "connections" So, that would actually make it simpler? Yeah, yeah, the theory in five dimensions, it's simpler. * (dimensions = mathematical… not in dimensions) Now, this simplest theory doesn't quite work. * Because it is a mathematical construction But, so, the more incarnations, while it's similar in spirit, but with a little, a few more dimensions, it's going to make it more consistent with what we see in four dimensions. The crucial thing is that we **introduce** extra dimensions * So you physicists are "introducing" to the Universe what suits you. You are not looking for reality, you are introducing ... you are ***introducing*** to simplify the theory, not to make it more complicated. So that is the point. Extra dimensions reduce the complexities * no no. Extradimensions reduce the complexity of physical equations for you physicists. However, extradimensions do not reduce the "complexity of the world of matter"… of our three dimensional world by unifying laws in those extra dimensions. Extra dimensions make the laws of physics simpler. * The law of physics cannot be "simplified"! The law must remain as a mirror of the "set reality", in the set state for reality What a realization. But there is sharp disagreement. Some scientists reject extra dimensions. I make a pilgrimage to oxford to meet one of the world's premier mathematicians, roger penrose. Roger has elevated humanity's grand understanding of the cosmos. Roger, what is your reaction to these extra dimensions? Um… I'm one ear Well, i'm not an enthusiast.* And ..and it is here. And it's out there about how "Roger" raised the "string theory" with extra dimensions. What does he probably not like about the strings? There's no evidence for them observationally * O.K. yes, agree! ; why ? ; in geometric space-time 3 + 3D extradimensions are not…, they are "used" in the construction of matter.. I have two troubles primarily with these extra dimensions. One of them is a more personal reason, which has to do with twister theory, O.K. yes, agree! ; why ? ; in geometric space-time 3 + 3D extradimensions are not…, they are "used" in the construction of matter.? which is something

i worked on and developed, over 40 years ago now. * ? And… and what came out after forty years ?? came out on paper ??? In what and how and how, then, did Penrose "demonstrate" an understanding of the Universe; It wasn't those twisters, was it? I see Mr Penrose's disappointment at the strings. (I'm also disappointed with them because they were conjured "out of nowhere") It was specifically based on the fact * ????? or was it based on the abstraction of physicists' fantasies ????? that we have three space and one time dimension. It's a scheme which gets it's power from that fact and it's particularly, works in that number of dimensions and doesn't really work in any other number of space and time dimensions. * I am surprised at how Roger elevated humanity to understand the Universe by "giving up" himself after 40 years "and resigning himself to the strings. Describe - that's important - so describe that briefly.* I'm very curious →. Basically, the idea is that space time points are secondary objects, * oh oh I'm surprised and you can think of the, if you like, when i describe a space time point, you think of all the light rays through it. ???

(05)- s like one moment you're looking out at the sky and you see stars all over the place, and each one of those stars has a history of a light ray coming into your eyes. So, it's in some sense relating the large space of relativity, or that's this complex celestial sphere, to the sphere of quantum mechanics. And it's making a link between the physics of the small, which is quantum mechanics, and the physics of the large, which is relativity. Which is the great problem of the 20th century, and continues to be the great problem. That's right. Well, this is a particular angle on that. You know, see, it's quite different from what most people do who do quantum gravity, that are just trying to make this link. They say, all right, well, quantum mechanics has to be applied to space time structure. Okay, it's hard to do because it means space time structure may be granular, * Yes, on the Planck scales the space-time is granular, which in a more careful distinction means that there is a foam of dimensions "there", this corresponds to the principle of "curvature of dimensions" there is a "density of curvature". Probably similar to the foam of dimensions after the Big Bang… as if "Bang" sprung up everywhere here, now from every "singular" point of the vacuum at that Planck level… or all sorts of funny things, you see. But what they don't say is that quantum mechanics needs to be monkeyed with. They say, take quantum mechanics as it is and it's got to be applied to our ideas of space time. Now, my view is that that is not correct. That we want a much more even hand in marriage where quantum mechanics has to give as much as space time structure has to give. * Roger doesn't say it exactly here, it's a vague interpretation And this means that you don't use quantum mechanics as it exists at all levels. You have to think of the right theory, which is a molding of these two separate theories into one scheme. * I have already said his idea many times that the "non-linear" foam of vacuum dimensions expands ... and expands to a state of high linearity, ie flat space-time, the expansion approaches zero curvature. It is not necessary to "combine" linearity with nonlinearity into one equation. I would rather see it through the perception of the Universe through the "principle of alternating symmetries with asymmetries." You said there were two reasons why you are not a fan of extra dimensions. That's right. I just don't think these extra dimensions are stable. * It can be seen here that Roger has diametrically "other speculations" = thinking about dimensions (hence the strings) than I have… When i say 'not stable', they will just collapse. * It would take a more comprehensive explanation of what you mean, Roger, that: *the extra dimension will collapse*, what does that mean for you ?? Think about it: it collapses into "packed balls" and they are then elementary particles .And what's interesting to me here is that maybe these string theory ideas can have a value in theories which don't require extra spatial dimensions. * HDV does not yet require "spatial dimensions" for the existing 3 + 3D space-time, but HDV requires extra "mathematical" dimensions for the construction of matter. And this, this would give

them, to me, a lot of extra plausibility. Harvard, Oxford, Caltech, Princeton, New York -- i've traveled thousands of miles in search of the smallest facets of our cosmos.* yeah-yeah, you haven't added to HDV yet, Mr. Roger…, it's a pity that you wish you read it and then it "lights up" for you **It's the great human quest to dig up the foundations of mass** and energy, **space and time**. * The drive is for simplicity, to explain how the world works concisely and elegantly. * I have an explanation, but I don't have the mathematical erudition to put it "on paper." HDV is a new perspective on reality. It's not in perfect shape at all, it's waiting for smart people. I believe that after my death, a new generation will explore and resolve it. When theories are complicated, then there's likely another theory simpler, and thus, deeper. HDV .., unfortunately no one still has the courage to think about her. And simplicity, when found, is breathtaking. ☺ That's the addicting appeal of extra dimensions.* The attraction is and will be that the Universe realizes the "curvature of dimensions." And therefore also the "balling of dimensions. So it is necessary to finally think once again about" what is curvature and balling ", what is" produced "by it. To show how the atomic zoo of what seemed to be very different particles are really different manifestations of the same singular atomic animal. http://www.hypothesis-of-universe.com/index.php?nav=e Unity from diversity.* Each ball = elementary particle has a different (Universally chosen) topological structure of dimensional curvature, and this fact then leads to the "individual unique properties" of elementary particles, as well as to the laws of interaction. The wonder of it all. How much more is there to discover? But do extra dimensions really exist? Either way, the exhilaration of exploration brings us closer to truth. * Exploring and researching HDV (40 years alone and alone) brings me closer to ending the suffering of the experience of humiliation and insult that I received for that effort; (HDV has been telling the truth for 40 years, which, for reasons unknown to me, no one reads)

JN, COMMENT 13.09.2021 + 03.10.2021