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Inside the Smallest Scale of the Universe: Nothing Makes Sense
Uvnitř nejmenšího měřítka vesmíru: Nic nedává smysl

Hive Mind
187 odběratelů
Odebírat
10
Sdílet
251 zhlédnutí 5. 12. 2025 #Atoms #QuantumMechanics #ScienceExplained
What is reality really made of? When we zoom into an atom, things stop making sense. Atoms are mostly empty space. Electrons aren't tiny balls — they're probability clouds. Protons are made of quarks, but quarks (and electrons) have no size at all. And deeper than that lies something even stranger: quantum foam, a chaotic "noise" in the fabric of spacetime itself. →
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0:01
(01)- What is the smallest thing in the universe? Why is that the closer we look inside an atom, things just seem to vanish? Is there actually anything? Or is God preventing us from seeing what the universe is actually made of? Check this animation. A boy plays with a ball, which then turns into a trampoline. I know this might not be pixel level stuff, but the shock comes from its resolution. Yes, this short was animated by moving single atoms. To make it, IBM scientists had to use a scanning tunneling microscope operating at a temperature of -268° C. That's just a few degrees above absolute zero. They had to create one of the coldest places in the known universe just to nudge a few atoms into place. This animation, apart from being an amazing technical feat, demonstrates one
1:02
fundamental fact. Atoms are real. So real, in fact, that we can make cute animations with them. But wait, so what's the size of an atom? Well, about 0.00000000 0 0 0 0 01 m. Go figure. A single human hair measures about 1 million atoms across. Picture this. If we were to turn every atom in a grapefruit to the size of a blueberry, the grapefruit would then be the size of the entire planet Earth. There are more atoms in a single teaspoon of water than there are teaspoons of water in the entire Pacific Ocean. But did you know atoms are mostly empty space? Some people say 99.9% of it is just empty space. that since
2:00
the particles that form it, the protons, neutrons, and electrons are so small compared to an atom's size that it's fair to consider it mostly just empty space. The thing is, since all these particles are also waves, in some sense, none of them are really there, but rather spread in space inside what's known as a probability cloud. The cloud is the particle. Then if for you a wave doesn't have a particular location, then an atom will be 100% empty space. Following this logic, if you took out all of the empty space from between and within the atoms making up each human being, the entire human race would fit into the volume of a single sugar cube. Just to be super clear, you could argue an atom is 100% filled by the electrons wave function, making it 100% full. This way of looking at it explains why we
3:00

don't fall through the floor. And that's why you can never really touch anything because the electron clouds in your fingers repel the electron clouds on everything else. We recommend watching this video by Minute Physics which has in our opinion one of the best and most beautiful representations of orbitals. These clouds that I've been talking about. If you found that interesting, stay around because what's next will blow your mind. Quantum foam. So, what's beyond all elemental particles? Emptiness. But this emptiness is full of weirdness. This is the world of the plank length. The smallest scale current physics models allow us to think about. Quantum foam is our current understanding of what's happening at the tiniest scales according to science is 10 to the minus 35.
4:02
[Music] To understand it, we must first talk about the uncertainty principle. Quantum physics teaches us that in any system, there is a certain level of uncertainty about its state. A kind of mystery or hidden information about reality itself. When we look at empty space, reality tells us, uh-uh, you can't know everything about me. So, a special kind of noise arises. A noise made out of virtual particles. Empty space constantly flickers with tiny short-lived particles, antiparticle pairs. These virtual particles pop in and out of existence so quickly that they cannot be directly observed, but their brief presence affects forces and energy at very small scales. This is as far as our current physics models go.
5:00
But what's beyond quantum foam? a point and a step. Remember I mentioned previously particles are also waves. Well, there is one more thing because they are also pointlike which means that experiments have never detected any size or internal structure. As far as current measurements can tell down to about 10 theus9 m. Elemental particles like the electron behave like a single point with mass and charge but no measurable volume. The pointlike nature of elemental particles creates a monstrous problem for physics. The energy density at that point would be infinite creating what physicists call a singularity. This is one of the biggest open questions in physics today. How can all these particles exist if they only occupy a single point in space? Does that mean the universe is made out of points? In
6:01
other words, do we live in a discrete universe where even space is quantized or are we getting something wrong? String theory says spaceime must be smooth. But over the last three decades, a new contender, loop quantum gravity has emerged, suggesting that space itself might not be smooth at all. But made out of tiny indivisible space-time chunks. If true, then
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(01)- What is the smallest thing in the universe? Why does it seem that the closer we look inside an atom, things simply disappear? Is there really something there? Or is God preventing us from seeing what the universe is really made of? In order to compose/compose something, you must have that "something". (And then you can compose), so you must first create Something, make something out of something, ...and that's the point. That's why there is no wonder that interactions in the microworld science/physicists build as **equations of sums**. (!) And it should be ***equations of factors*** (!) Sample: https://www.hypothesis-of-universe.com/docs/eb/eb_004.pdf ; Why? Well, because matter cannot be created, built, made from anything other than from already real existing valid unimagined things, which are not invented, are not some mirage. you still don't know what matter is made of. you can find artifacts (according to the behavior of realities in nature), and give them names and labels and...but then you can only add them up to give that interaction. Finally, think about how you would make elementary particles from the dimensions of two quantities: Length and Time. https://www.hypothesis-of-universe.com/index.php?nav=eb ; https://www.hypothesis-of-universe.com/index.php?nav=e . Look at this animation. A boy plays with a ball, which then

turns into a trampoline. I know it may not be at the pixel level, but the shock comes from its resolution. Yes, this short film was animated by the movement of individual atoms. To create it, IBM scientists had to use a scanning tunneling microscope operating at a temperature of -268 °C. That's just a few degrees above absolute zero. They had to create one of the coldest places in the known universe just to get a few atoms into place. This animation, besides being an amazing feat of engineering, demonstrates a
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fundamental fact. Atoms are real. So real that we can make cute animations with them. But wait, what is the size of an atom? Well, about 0.00000000 0 0 0 01 m. Imagine that. A single human hair is about 1 million atoms. Imagine that. If you shrunk each atom in a grapefruit to the size of a blueberry, the grapefruit would be the size of the entire planet Earth. There are more atoms in a teaspoon of water than there are teaspoons of water in the entire Pacific Ocean. But did you know that atoms are mostly empty space? https://www.hypothesis-of-universe.com/docs/aa/aa_532.pdf <-- I recently used this physics fact to explain what matter is "made of"… Some people say that 99.9% of it is just empty space. That since
2:00
the particles that make it up, protons, neutrons and electrons, are so small compared to the size of an atom that it is fair to consider it mostly just empty space. Really? The thing is that since all these particles are also waves, in a sense none of them actually exist, No, they are not just waves, they are balls of dimensions. Physics throws around the words "quantum, quantum…" but it has never committed to explaining what is the result of quantization, what is the ""famous"" quantum…, **well, finally think about it**, what could be a "spacetime quantum"? what? Well, only that package of collapsed dimensions and...and this package is the elementary particle of matter https://www.hypothesis-of-universe.com/docs/c/c_275.gif (with properties such as mass, spin, charge, etc.). https://www.hypothesis-of-universe.com/docs/c/c_461.jpg I know that physics is not surprised by the description of space-time at a deep level, that it is cubed, but these cubes, when in reality and in the mind of physics "transform" into packages of dimensions, matter is born, elements of matter are produced. Why is it so totally incomprehensible? but rather it spreads out in space inside the so-called probability cloud. The cloud of what? is a particle.
Then, if a wave has no specific location for you, then an atom is 100% empty space. By this logic, if you removed all the empty space between and within the atoms that make up each human being, the entire human race would fit into the volume of a single sugar cube. To put this into perspective, one could argue that an atom is 100% filled with the wave function of electrons, making it 100% full. This way of looking at it explains why we don't fall through the floor. And that's why you can never touch anything, because the electron clouds in your fingers repel the electron clouds on everything else. We recommend watching this video from Minute Physics, which has one of the best and most beautiful representations of orbitals in our opinion. Those clouds I was talking about. If you're interested, stick around because what's coming next will blow your mind. Quantum Foam. So what's behind all the elementary particles? They are unmistakably shaped packages of dimensions - that's matter. Emptiness. But this emptiness is full of weirdness. This is the world of plank lengths. Planck lengths, Planck lengths... The smallest current physical models allow us to think about... *quantum foam* is our current understanding of what happens at the smallest scales, a quantum foam of two dimensions is actually the same thing as plasma after the big bang. according to science, it's 10 to the minus 35.
4:02
[Music] To understand this, we first need to talk about the uncertainty principle. Quantum physics teaches us that in every system there is a certain amount of uncertainty about its state. Some kind of secret or hidden information about reality itself. When we look at empty space,

reality says to us: "Um, you can't know everything about me." So a special kind of noise is created. Noise made up of virtual particles. Empty space is constantly flickering with tiny short-lived particles, pairs of antiparticles. Because empty space, i.e. spacetime at the Planckian level, is a boiling foam of curvature, this state of the environment is “dark energy” by virtue of the doctrine that 'everything that exists with curved dimensions, that matter, that materializes' and that “everything” is just spacetime. The curvature of dimensions produces matter and fields. Dark energy is therefore the foamy structure of spacetime itself and…and permeates the entire universe. It emerges emergently from even deeper scales, about 10^{-44}m. These virtual particles appear and disappear so quickly that they cannot be directly observed, but their brief presence affects forces and energy on very small scales. That is as far as our current physical models go.
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But what is beyond quantum foam? Point and step. Remember, I mentioned earlier that particles are also waves. And above all, they are bundles of topological shapes and act like true unquestionable matter. Well, there's one more thing, because they are also point-like, which means that experiments have never detected any size or internal structure. What is not today, may be tomorrow. As far as current measurements are concerned, they reach dimensions of around 10 theus9 m. Elementary particles, such as the electron, behave like a single point with mass and charge, but no measurable volume. The point-like nature of elementary particles creates a huge problem for physics. The energy density at this point would be infinite, creating what physicists call a singularity. This is one of the biggest open questions in physics today. Read HDV. How can all these particles exist when they occupy only one point in space? And what do you think the points look like when they are connected, e.g. into sulfuric acid? It is a conglomerate of packages of dimensions floating on a space-time network with a slight curvature of dimensions. Does this mean that the universe is made of points? https://www.hypothesis-of-universe.com/docs/c/c_282.jpg ; https://www.hypothesis-of-universe.com/docs/c/c_275.gif ; In other words, we live in a discrete universe, where space is also quantized, O.K. but it is an imperfect idea. The quantum spacetime is a package of packed dimensions. That is the cube on the time-space network., or are we wrong somewhere? Sure. And it has been 40 years since I submitted my HDV for consideration and resolution. String theory says that space-time must be smooth. And in it floats matter from packages of warped dimensions… But in the last three decades a new competitor has emerged, loop quantum gravity, how many theories is this in the last 130 years? which suggests that space itself may not be smooth at all. Sure But made up of tiny indivisible **chunks of spacetime**. Chucks = packages. And to the amazement of science, one day it will be matter from dimensions packed together. Why not? If that's true, then
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(02)- even fundamental particles like electrons, quarks, lepttons, and all the gang would be sitting on an even more fundamental kind of space-time grid. Similar to quantum physics, LQG sets a minimum for distances at 10 theus 35. Area has a minimum value of 10 the minus 75 m squared and volume has a minimum value of about 10 to the – 105 m cubed. Hopefully scientists reach some
7:02
consensus soon and give these space-time chunks a proper name so people like us writing scripts and making videos about them have an easier job. You know, this stuff is already hard enough to explain without having to use a term as unserious as space-time chunks. In the meantime, one thing is certain. The universe is full of questions and mysteries. From the huge to the tiny.

7:30
[Music]
7:43
[Music]
10.12.2025
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(02)- even fundamental particles like electrons, quarks, leptons and a whole bunch would be on an even more fundamental kind of space-time lattice. Like quantum physics, LQG sets a minimum for distances at 10 theus 35. Area has a minimum value of 10 minus 75 m squared and volume has a minimum value of about 10 to -10^5 m cubed. Hopefully scientists will soon reach some consensus and give these space-time blocks a proper name, scientists won't, I already gave them a name 25 years ago… so that people like us who write scripts and make videos about them have an easier job. You know, these things are hard enough to explain without having to use such a frivolous term as space-time blocks. In the meantime, one thing is for sure. The universe is full of questions and mysteries. One of the mysteries for me is why physicists assigned dimensions to the gravitational constant? Just so that dimensional analysis would suit them?? A G-object with dimensions, what is that? Is it flying through space? Have you caught one of those objects yet? **(*)** From huge to small.
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[Music]
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The question and problem of the gravitational constant – CZ

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The question of the **gravitational constant,**
This is a very difficult question
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