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1 Hour of "WHAT EXISTED BEFORE TIME?" With Brian Cox to Fall Asleep
Co existovalo před časem, s Brian Cox Brian.Cox@manchester.ac.uk

Night Curiosities
458 odběratelů
Odebírat
52
Sdílet
2 933 zhlédnutí 1. 11. 2025 ; My opinion will be in red in the document
Brian Cox Brian.Cox@championsukplc.com is a renowned British physicist and professor at the University of Manchester, **firstname.lastname@manchester.ac.uk** known for his work in particle physics and for presenting some of the BBC's most iconic science documentaries. His poetic and accessible way of explaining the universe has inspired millions around the world. This is an UNOFFICIAL tribute channel created to offer relaxing, sleep-inducing videos inspired by Brian Cox's voice and storytelling style. Please note that all content here is generated with Artificial Intelligence (AI) and should not be considered an official scientific source. Our mission is simple: to help you drift peacefully into sleep while contemplating the wonders of the cosmos. For content removal or usage requests, please check the contact information in the channel description.
1 hodina pořadu „CO EXISTOVALO PŘED ČASEM?" s Brianem Coxem k usínání →
←
2 933 zhlédnutí 1. 11. 2025
Brian Cox je renomovaný britský fyzik a profesor na Manchesterské univerzitě, známý svou prací v částicové fyzice a uváděním některých z nejikoničtějších vědeckých dokumentů BBC. Jeho poetický a přístupný způsob vysvětlování vesmíru inspiroval miliony lidí po celém světě.

Toto je NEOFICIÁLNÍ tributní kanál vytvořený s cílem nabízet relaxační a uspávající videa inspirovaná hlasem a stylem vyprávění Briana Coxe. Upozorňujeme, že veškerý zde uvedený obsah je generován pomocí umělé inteligence (AI) a neměl by být považován za oficiální vědecký zdroj.

Naše poslání je jednoduché: pomoci vám klidně usnout a zároveň rozjímat o zázracích vesmíru. Pro žádosti o odstranění nebo použití obsahu se prosím podívejte na kontaktní informace v popisu kanálu.

My opinion will be in red in the document. I am not a scientist, I am a layman and I am aware that there will be primitive flaws in my opinions. Nevertheless, we are here in the world to present = communicate our imperfect opinions to others in order to attack their thinking.

0:00
(01)- Can you explain what existed before time, how it began, and whether time itself could emerge or even cease to exist? I've been thinking about the limits of physics recently, and I

think, well, it's one of those things that the more you think about it, the stranger it gets. I mean, we have these two great pillars of modern science, general relativity on one side and quantum mechanics on the other, and they both work so well, right? just brilliantly. One describes the universe on the largest scales, galaxies, black holes, even the expansion of space itself and the other one, well, the other one governs the microscopic world. Particles, atoms, uh the quantum fields that underly everything. But the problém is they don't fit together. That's the thing. It's like having two pieces of a jigsaw puzzle that both seem to show the same picture, but you just you just

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can't quite get them to lock into place. And uh and this mismatch, this clash between the two, it becomes really obvious, really unavoidable when you ask one very simple question. What happened at the beginning? What happened at the start of the universe? Because according to general relativity, which is our best description of gravity and spacetime, the universe had a beginning. It started about 13.8 billion years ago in an incredibly hot, dense state. We call it the big bang, right? But what's strange is if you follow the equations back far enough, the density and the temperature go to infinity. And when something goes to infinity in physics, that's a sign. That's a red flag. It's like the theory is throwing up its hands and saying, "I don't know what to do with this." Um, so we call that a singularity, a point or rather a region where our laws of

2:05

physics break down completely. It's not just that we don't know what happened there. It's that the theory doesn't know. It doesn't even make sense to ask the question not within the theory itself. It's like asking, "I don't know what's north of the North Pole." You can say the words, but the question isn't really meaningful in the usual way. And yet, we do ask that question. We can't help ourselves. What came before the Big Bang? Was there a before? And here's where the limits of our physics start to really show. Because general relativity tells us that time itself began at the big bang. That's the key thing. The equations, the solutions we get, they imply that time didn't exist before that moment. So the beginning of the universe wasn't the beginning of a process in time. It was the beginning of time itself. But that's difficult to accept,

3:04

isn't it? Because our intuition, our everyday experience, they're all embedded in time. We imagine events happening in time. Something comes after something else. A cause comes before its effect. But if time began at the Big Bang, then what caused the Big Bang? That's the question. And if there's no before, then how can you have a cause? So we're left with this philosophical cliff edge really uh a kind of boundary where our understanding ends. Um and it's not just a boundary in our knowledge. It's it's a boundary in the applicability of our theories. They just stop working. And that's where quantum mechanics comes in or tries to because and this is the point general relativity is a classical theory. It doesn't include quantum effects. And when you

4:03

get to regions of extreme density and energy like the very early universe or the inside of a black hole, you need quantum mechanics. You need a quantum theory of gravity. But we don't have one. Not yet. And that's the real limit. That's the wall we keep bumping into. We've made progress. There are candidates like string theory or loop quantum gravity, but we don't have experimental evidence. Nothing concrete, nothing like the precision tests we have for the standard model or for general relativity in its domain. So, we're left with this peculiar situation where our best theories describe the universe brilliantly in their own regimes, but they break down precisely at the place where the most profound questions lie. The origin of space and time, the birth of the cosmos, the moment when it seems everything that exists came into existence. And the

5:00

question that keeps bubbling up, the question that really challenges our physics is, was there something before? Not just what came before, but even more fundamentally, can we make sense of before if time itself hadn't begun? There's an analogy that sometimes helps. Think about a balloon being inflated, not a balloon in space. The balloon is space. As the balloon expands, every point moves away from every other point. That's like the expansion of the universe. But the surface of the balloon doesn't have an edge. It curves back on itself. And in a similar way, maybe time curves back too. Maybe time doesn't begin with a hard edge, a singularity, but instead gently emerges, smooths out in some higher dimensional structure.

(01)-

Can you explain what existed before time, how it began and whether time itself could have come into being or even ceased to exist? I have recently been thinking about the limits of physics and I think it is one of those things that the more you think about it, the stranger it becomes. Unfortunately, you have invented everything possible, but you have not yet seen or understood the vision from HDV. Time did not come into being, before the big bang, "it was (spacetime) forever", time did not run, because it was not curved, the 3+3 dimensions of spacetime were not curved, it was flat with k=0. So I repeat: time was/existed, but it did not run, because it was not curved, curvature zero. After the big bang, which is an "instantaneous jump", spacetime curved to k= ∞, so a "foam of dimensions" appeared, plasma. From this moment on, the flow, the passage of time, started, because It began to unroll. The rate of expansion is different in each location, but gradually the rate converges, and after 13.8 billion years the global rate is apparently the same everywhere. (?) Ditto the expansion of length dimensions. We have two great pillars of modern science, general relativity on the one hand, and quantum mechanics on the other, and they both work so well, don't they? Simply brilliant. One describes the universe on the largest scales, nonlinear equations galaxies, black holes, even the expansion of the universe itself and the other, well, the other governs the microscopic world. Linear equations, or interactions in the microworld Particles, atoms, er, quantum fields, which are the basis of everything. But the problem is, they don't fit together. That's it. It's like having two puzzle pieces that both seemingly show the same picture, but you just can't

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put them in their place. And uh, and this discrepancy, this clash between them, becomes really obvious, really inevitable, when you ask yourself one very simple question. What happened in the beginning? What happened at the beginning of the universe? At the beginning of "our" (!) universe, i.e. after the Big Bang, the state k=infinity was there and the foam of dimensions is expanding. In that foam, the equation of gravity "settles" as the dominant state that "floats" in the boiling space-time, the plasma. In parallel with gravity, another state of dimensional curvatures is recruited for interactions in the microworld. They are linear. https://www.hypothesis-of-universe.com/docs/eng/eng_209.pdf ; Because according to general relativity, which is our best description of gravity and space-time, the universe had a beginning. It started about 13.8 billion years ago in an incredibly hot, dense state. We call that the Big Bang, right? But what's strange is that if you follow the equations back far enough, the density and the temperature go to infinity. And when something in physics goes to infinity, that's a sign. That's a warning sign. It's as if the theory throws up its hands and says, "I don't know what to do with this." So we call that a singularity, a point or rather a region where our laws

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of physics completely break down. It's not just that we don't know what happened there. It's that the theory doesn't know. It doesn't even make sense to ask the question outside of the theory itself. On the contrary... It's like asking, "I don't know what's north of the North Pole." You can say the words, but the question usually doesn't make sense. The question is wrong. We can't ask, "Where does the dog end up" (?), even if it does.
And yet we ask it. And yet you ask "where does the dog end up"... We can't help it. What was before the Big Bang? There was a 3+3 space-time with flat dimensions. Done. It's a kind of stoic inert state, that... without dynamics. Was there a "before"? And this is where the limits of our physics really start to show. Because general relativity tells us that **time itself began**, (phew) with the Big Bang. Time didn't begin, but the flow of time began, the pace of time began. That's the key thing. The equations, the solutions that we get, suggest that time did not exist before this moment. Wrong. Time existed, but it did not run. So the beginning of the universe was not the beginning of a process in time. It was the beginning of time itself. But that's hard to accept, isn't it?
3:04
Because our intuition, our everyday experience, all of that is grounded in time. We imagine events happening in time. Something comes after something else. A cause comes before its effect. But if time began with the Big Bang, what caused the Big Bang? That's the question. And if there's no "before," how can you have a cause? So we're left with this philosophical cliff edge, a kind of limit where our understanding ends. your understanding ends... And it's not just a limit in our knowledge. It's a limit in the applicability of our theories. They just stop working. And that's where quantum mechanics comes in, or at least tries to, because, and that's the point, general relativity is a classical theory. It doesn't include quantum effects. And when
4:03
you get to regions of extreme density and energy, like the very early universe or the interior of a black hole, you need quantum mechanics. You need a quantum theory of gravity. But we don't have one. Not yet. And that's not enough for you OTR?? And that's the real limit. That's the wall we keep hitting. We've made progress. There are candidates like string theory or loop quantum gravity, but we don't have the experimental evidence. Nothing concrete, nothing like the tests of accuracy that we have for the Standard Model or for general relativity in its domain. So we're left with this strange situation where our best theories describe the universe brilliantly in their own modes, but they break down right where the deepest questions lie. The origin of space and time, the birth of the universe, the moment when everything that exists seems to **come into being**. Why don't you settle for not coming into being, but just still "being"?? And the
5:00 question,
that keeps coming up, the question that really challenges our physics, is whether there was anything before? Before what? Before the Big Bang, there was an infinite flat spacetime, going on... on...forever. And what would you like to "been before"? Not just what was before, but more fundamentally, can we make sense of it before if time itself had not begun? The flow of time began in "our" big bang. Before that, time did not run, it just was and…and as I've said a million times: there was, there was an infinite flat space-time, still… still…eternal. There is an analogy that sometimes helps. Imagine an inflatable balloon, not a balloon in space. A balloon is space. As the balloon expands, every point moves away from every other point. It's like the expansion of space. But the surface of the balloon has no edge. It curves back around itself. And perhaps time curves back in a similar way. But I've been saying this for 25 years on the internet, that time, the dimension, packs itself up, rolls itself into a ball with the dimension of length, and in doing so produces matter, elementary particles of matter. Don't you read it? Why not? Maybe time doesn't start with a sharp edge, a singularity, but

instead emerges softly, smoothed out in some higher dimensional structure. ?? And what kind of model is that??

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(02)- But even then, even then you're trying to picture it in time, right? You can't help but imagine some process, some unfolding. But if time is part of the thing you're trying to describe, then you're kind of

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stuck because you can't step outside of it. It's like asking a fish to describe water from the outside. And that's the problem with the limits of physics as they stand. It's not just a technical limitation. It's conceptual. It's about the nature of explanation itself. We explain things by showing how they arise from prior causes. But what if there is no prior? What if cause and effect are themselves emergent features of time? And time isn't fundamental. It's unsettling, but it's also thrilling, I think, because it means there's something we don't understand, something deep, something beyond the edge of our knowledge. And maybe maybe just beyond the edge of our imagination. Because when we talk about the beginningof the universe, we're not just talking about astronomy or cosmology or physics.

7:01

We're talking about existence itself, about why there's something rather than nothing. And physics, for all its power, isn't yet equipped to answer that. Not fully, not yet. But we're working on it. Physicists are right now trying to develop new theories that could unify gravity and quantum mechanics that could reveal what space and time really are. That might show us that the Big Bang wasn't the beginning, but just a transition, a phase change, a bounce maybe, or a collision of something more fundamental. And when we find that theory, if we find it, it might reshape everything, not just our understanding of the universe, but of reality itself. And that's the beauty of physics. It's always pushing at the boundaries. It's always asking questions that seem at first unanswerable. And maybe the most profound question of all is whether time had a beginning or whether that question

8:05

doesn't even make sense. If you're enjoying these deep explorations of the universe, please consider subscribing to the channel. It helps us keep doing what we do and brings more curious minds into the conversation. One of the most remarkable things, I think, about Einstein's theory of general relativity is that it doesn't just describe gravity. It actually redefineses what gravity is. It says that gravity isn't a force in the traditional sense, not like the electric force or the magnetic field. No, it's the curvature of spaceime itself. So, when you feel yourself being pulled toward the earth, what's really happening is you're following the straightest possible path through a curved geometry. That's what a geodessic is, right? It's the natural path through curved spaceime and that curvature is caused by mass and energy. Now, what's

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fascinating and still quite counterintuitive um really is that time is part of that geometry. That's the leap Einstein made in 1915. He didn't just say that space is curved. He said that space and time together form a four-dimensional fabric. So if you change the energy distribution in that fabric, you change the geometry and you change the way time flows. Which means, and this is the key thing, time isn't absolute. It's not the same for everyone. It stretches and bends depending on where you are and how fast you're moving. And we've measured this. I mean, this isn't speculation. You can take two atomic clocks, incredibly precise clocks, and put one at the base of a mountain and the other one at the top, and they will tick at slightly different rates. Just because of the

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difference in the gravitational field, the clock closer to the center of the Earth, where the gravity is slightly stronger, ticks more slowly. That's called gravitational time dilation. And it's not just theory. It's an effect we have to correct for in GPS satellites. They orbit high above the earth where time moves faster and so their clocks have to be adjusted so we don't all end up in the wrong place on the map. So time is not some universal backdrop. It's woven into the fabric of the universe and its passage depends on geometry. That's the starting point. And then if you follow that idea to its extreme, you get the early universe to the origin of cosmic time. Because according to general relativity, as you go back in time, as you reverse the expansion of the universe, the density and temperature rise, the distances shrink, and the time intervals, they

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collapse. Eventually, and this is what the mathematics tells us, you reach a moment when the curvature of spaceime becomes infinite. It's not a place really. It's a limit, a boundary where the equations break, a singularity. But here's what's interesting. That point, that singularity isn't just where matter becomes infinitely dense. It's where time in a sense begins. It's the edge …………………………………………………………………………………………………..

(02)- But even then, even then, you try to imagine it in time, right? You can't help but imagine some process, some development. But if time is part of the thing you're trying to describe, then you're kind of

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stuck because you can't get out of it. It's like asking a fish to describe water from the outside. And that's the problem with the limits of physics as it stands. It's not just a technical limitation. It's conceptual. It's the very nature of explanation. We explain things by showing how they arise from prior causes. But what if there is no prior? What if cause and effect are themselves emergent features of time? Well, sure. In flow, the flow of time in one direction is like that. But my HDV model is 3+3 dimensional, and the flow of time is one direction in all three dimensions in the macroworld and... and two directions - back and forth - in all three dimensions in the microworld. And time is not fundamental. Time as a physical quantity is fundamental, but the flow of time is not necessarily fundamental… the arrow of time is not necessarily fundamental. The artifact TIME is fundamental! It is disturbing, but I think it is also exciting, because it means that there is something that we do not understand, something deep, something beyond the limits of our knowledge. However, it has nothing to do with the (un)fundamentality of time. And perhaps even just beyond the limits of our imagination. Because when we talk about the beginning of the universe, The beginning of time in your concept is a flawed reasoning. Time has no beginning, but the flow of time (maybe) has a beginning… we are not just talking about astronomy, cosmology or physics.

7:01

We are talking about existence itself, about why something exists and not nothing. Because Something, the universe, is in the phase and state when it "is/exists". And physics, for all its power, is not yet equipped to answer that. Not quite, not yet. But we are working on it. The result will still be abstract. Physicists are currently trying to develop new theories that could unify gravity and quantum mechanics and reveal what space and time **really** are. space and time are "something" that lives here, exists and dynamically changes… This could show us that **the Big Bang was not the beginning, but only a transition, a phase change**, I am of the same opinion that VT was a jump action of space-time from the state k=0 to the state k= ∞. Then the dynamics of the changes of those curvatures 3+3 will begin…and that is our existence and the environment for them… perhaps by a reflection or collision of something more fundamental. I do not believe that a collision would be necessary for the Big Bang to occur. And when we find that theory, if we find it, it could change everything, not just our

understanding of the universe, but reality itself. O.K. And that's the beauty of physics. O.K. It's constantly pushing the boundaries. It's constantly asking questions that at first seem unanswerable. And perhaps the most profound question of all is, did time have a beginning, oh my god, understand that atrefact = quantity has no beginning, but flow, the passage of time has a beginning... or whether this question
8:05
even makes sense. If you enjoy these deep explorations of the universe, please consider subscribing to the channel. It helps us continue what we're doing and brings more inquisitive minds into the conversation. One of the most remarkable things about Einstein's theory of general relativity, I think, is that it doesn't just describe gravity. It actually redefines what gravity is. **He says gravity is not a force** in the traditional sense, not like an electric force or a magnetic field. No, **it's the curvature of space-time itself**. O.K. And the curvature of dimensions is the act of building matter, elementary particles… why not?
So when you feel that you are being pulled towards the Earth, what is actually happening is that you are following the most direct possible path through the curved geometry. That is a geodesic line, right? It is a natural path through the curved space-time and this curvature is caused by matter and energy. And matter is made by the curvature of 3+3 dimensions… What is incomprehensible about that? What is fascinating and still quite counterintuitive is that time is part of this geometry. (*)) That is the leap that Einstein made in 1915. He didn't just say that space is curved. He said that space and time together form a four-dimensional structure. Why doesn't anyone study the structure of the 3+3 dimensions in space-time? So if you change the distribution of energy in this structure, you change the geometry and you change the way time flows. Which means, and this is key, that time is not absolute. Repeat: time is a physical existential quantity. In the demonstration it is stoic (k=0) or it is dynamic, k=infinity in the 3+3D system… It is not the same for everyone. It stretches and bends depending on where you are and how fast you are moving. And we have measured it. I mean, this is not speculation. You can take two atomic clocks, incredibly accurate clocks, and place one at the foot of a mountain and the other at the top, but here you are trying to **explore the pace of time**, not the three dimensions of the quantity time, and not time itself, stoic as an artifact of Being… and they will tick at a slightly different speed. Just because of the difference
10:00
in the gravitational field clocks closer to the center of the Earth, where gravity is a little stronger, tick slower. No, mistake. Clocks tick constantly and constantly at the same set rate, but time ticks at different rates (on the ground and in the satellite). Clocks must not change their "production" rate of flow, but time can and must change it. This is called gravitational time dilation. And it is not just a theory. It is an effect that we must correct for GPS satellites. We correct clocks (on the ground or on the satellite) because we cannot correct time itself, physical time in a physical environment… They orbit high above the Earth, where time flows faster, O.K. Faster because here - on the surface of the curvature of the dimensions of the point in place - the satellite rotates, or the satellite system rotates relative to the system at the ground... (gravity does not change the curvature of the dimension, but the curvature of the dimensions changes gravity)… and therefore it is necessary to adjust their clocks so that we do not all find ourselves in the wrong place on the map. So time is not some universal background. It is woven into the fabric of the universe, and its flow of time depends on geometry. And geometry depends on the change in the rate of time… That is the starting point. And if you take this idea to the extreme, you get from the early universe to the beginning of cosmic time. Because according to general relativity, as you go back in time, as you reverse the direction of the expansion of the universe, density and temperature increase, distances decrease, and time intervals collapse. Eventually, and this is what mathematics tells us, you reach a point where the curvature of spacetime becomes infinite. You have to do the

physical description of reality more carefully: The Basic Observer is set to rest. And he then observes. What? Well, the movements (+ speeds of movements) of other objects – observers. You say that the higher the speed of the (observed) object, the greater the curvature of spacetime. But it is a little different. The rocket changes speeds $v_1 < v_2 < v_3 < v_n < c$ using accelerated motion $a_1 < a_2$ or only with additions of only a_1, which rotates the system proper to the observed object, i.e. we observe a higher curvature of space-time at the location of the rocket with changes in speed using acceleration. And we observe this (in our observable) by sensing the rotation of its system. No time dilation occurs on the rocket itself, only the Observer sees-observes here in the projection, where the intervals from the rocket sensed change for him... It is not actually a place. It is a limit, a boundary where equations do not work, a singularity. But here is what is interesting. That point, that singularity is not just a place where matter becomes infinitely dense. It is a place where, in a certain sense, time begins. The flow, the passage of time begins. It is an edge.
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(03)- of the past. There's no before in the usual sense because time itself reaches a kind of zero point. And that's what the standard model of cosmology suggests that time started at the big bang. And asking what came before is a bit like asking what's south of the south pole. But that feels incomplete or maybe just unsatisfying because we don't usually think of time as something that can begin. We think of it as a kind of container, the stage on

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which events unfold. But in Einstein's view, time is part of the set. It's part of the play. It's not outside of it. Which means if the universe had a beginning, then time began, too. Now, here's something else in this framework. The direction of time, the arrow of time, isn't built into the equations. That's another strange thing. The fundamental laws of physics are mostly time symmetric. That means you can run them forwards or backwards and they still make sense. Newton's laws, Maxwell's equations, even the Schrodinger equation, they don't care which way time flows. But our experience obviously is very asymmetric. We remember the past. We don't remember the future. Eggs break but don't unbreak. Stars burn fuel and age but they don't

13:02

go backwards. So where does that arrow come from? It seems to emerge from the initial conditions of the universe from the fact that it began in a very low entropy state. A kind of ordered beginning from which disorder has been increasing ever since. And that disorder entropy gives time its direction. But entropy is statistical. It's about probabilities. And so the arrow of time isn't fundamental either. It's emergent. And all of this ties back to the question of beginnings. Because if time is part of the universe, if it's not something outside it, but something that arises with it, then talking about what happened before the big bang might not even be a meaningful question. Not unless we have a deeper theory that can describe the origin of time itself and maybe even show us how time can emerge from something more fundamental. something beyond geometry. But sticking just to relativity, what's beautiful is how it reshapes our entire conception of

14:03

time. You can no longer think of it as a straight universal line. Instead, you have to imagine it as a flexible local feature. In fact, two observers moving at different speeds or in different gravitational potentials will actually experience different intervals of time between the same two events. This was confirmed in 1971 in the Hafle Keating experiment. They flew atomic clocks on commercial airliners around the earth and compared them with clocks that stayed on the ground and they did indeed show tiny but measurable differences. So this idea that time is relative is real and it has deep implications not just for cosmology but for how we think about causality because if simultaneity is relative, if different observers can disagree about the order of events, then the structure of causality itself becomes more subtle. You can no longer say absolutely that one thing causes

15:02

another unless the cause lies within the light cone of the effect. That's the limit. That's the constraint that relativity imposes. No influence can travel faster than light. And so the structure of spaceime determines what can affect what. And when we apply that to the early universe to the state near the big bang, we find that there are regions that couldn't have been in causal contact. That's the horizon problem. Parts of the cosmic microwave background are in thermal equilibrium, but they're separated by vast distances too far apart to have exchanged information given the age of the universe. And that's what led to the idea of cosmic inflation, a brief period of exponential uh expansion that stretched a tiny causally connected region into the observable universe. But inflation isn't part of Einstein's original theory. It's an add-on, a hypothesis that helps explain certain observations, and it's not fully

16:01

understood. We don't yet know what drove it or if it really happened the way we think. But what it shows is that our standard model of cosmology is still evolving, still incomplete, especially when it comes to time. Because time in relativity isn't something that flows independently of space. It's affected by motion, by gravity, by energy. And at the most fundamental level, it's not even clear that the distinction between space and time is absolute. In some formulations, like the ADM formalism, spacetime is split into a three-dimensional space and a one-dimensional time. But that's a choice, a mathematical convenience. Nature doesn't necessarily draw that line. So what if time as we experience it is just one way of slicing up a deeper structure, a more general geometry in which the difference between space and time is fluid or maybe even

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elucory. Um, and if that's the case, then the beginning of time might be less like a hard

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(03)- past. There is no "before" in the usual sense, because time itself reaches a kind of zero point. And that's what the standard model of cosmology suggests, that time began with the big bang. And asking what was before is a bit like asking what's south of the south pole. But that seems incomplete or maybe just unsatisfying, because, we don't usually think of time as something that can begin. We think of it as a kind of container, a stage on which events take place. O.K. But from Einstein's perspective, time is part of the set. It's part of the game. It's not outside of it. Which means that if the universe had a beginning, then time began ?? too. And now there's something else in this framework. The direction of time, the **arrow of time, is not built into the equations**. (*)) and yet the equations work... That's another strange thing. The fundamental laws of physics are mostly time-symmetric. That means you can run them forward or backward and they still make sense. Newton's laws, Maxwell's equations, even Schrödinger's equation, they don't care which way time flows. O.K. But our experience is obviously very asymmetrical. We remember the past. We don't remember the future. Eggs break, but they don't break again. Stars burn fuel and age, but they don't go back.

13:02

So where does the arrow come from? Spacetime is expanding, and so the >observed< intervals ("on dimensions") of unit sizes are getting bigger. It seems to come from the initial conditions of the universe, from the fact that it started in a state of very low entropy. So the foam of dimensions has the lowest entropy, right? Some sort of ordered beginning, from which disorder has been growing ever since. And this disordered entropy gives time its direction. But entropy is statistical. It's about probabilities. And so the arrow of time is not fundamental either. It's emergent. And it all comes back to the question of origins. Because if time is part of the universe, and if it's not something outside of it but something that comes into being with it, then talking about what happened before the big bang might not even be a meaningful question. I don't think so. Unless we have a deeper theory that can describe the origin of time itself and maybe even show us how time can emerge from something more fundamental. We just can't imagine time standing still, not ticking, not running intervals on time dimensions. But that's how it is before the big bang... Something that goes beyond geometry. But if we stick to just relativity, the beauty is how it reshapes our whole concept of time.

14:03

You can't imagine it as a straight universal line anymore. Instead, you have to think of it as a flexible local element. In fact, two observers moving at different speeds or in different gravitational potentials will experience different time intervals between the same two events. For example, one will experience almost infinite intervals and the other will experience zero intervals. Is that possible? This was confirmed in 1971 in the Hafle Keating experiment. They flew atomic clocks in commercial airplanes around the Earth and compared them with clocks that remained on the ground, and they did show small but measurable differences. Because the clocks (all) by being set to the same rate of ticking showed a different cumulative interval on the ground at sea versus the cumulative interval on the satellite. The rate of ticking is different, not the watches,… they must not be made to tick at different rates. So this idea that time is relative, time is not relative, but the rate of ticking is different in different environments…

is real and has profound implications not only for cosmology but also for how we think about causality, because if simultaneity is relative, if different observers can disagree about the order of events, then the very structure of causality becomes more subtle. You can no longer absolutely say that one thing causes

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another unless the cause lies within the light cone of the effect. That's the limit. That's the constraint that relativity imposes. No effect can travel faster than light. And so the structure of spacetime determines what can affect what. And when we apply this to the early universe, to a state close to the big bang, we find that there are regions that could not have been in causal contact. That's the horizon problem. Parts of the cosmic microwave background are in thermal equilibrium, but they are separated by vast distances that are too far apart to exchange information given the age of the universe. And that led to the idea of cosmic inflation, a short period of exponential expansion (hh) that stretched a small causally connected region into the observable universe. But inflation is not part of Einstein's original theory. It's an add-on, a hypothesis that helps explain certain observations, and it's not fully

16:01

understood. We don't yet know what drove it, or whether it really happened the way we think it did. But it shows that our standard model of cosmology is still evolving, that's probably what it is, is still incomplete, especially when it comes to time. Because time in relativity is not something that flows independently of space. It's affected by motion, gravity, energy. And at the most basic level, it's not even clear whether the distinction between space and time is absolute. In some formulations, like the ADM formalism, spacetime is divided into three-dimensional space and one-dimensional time. This is how physicists divide it themselves without experimental verification, verification. Physicists divide it into 3+1D, but what if the universe itself divides spacetime into 3+3 dimensions?? No one has really investigated it yet. But that is a choice, a mathematical advantage. Nature does not necessarily set this boundary. What if time, as we perceive it, is just one way to divide a deeper structure, a more general geometry, in which the distinction between space and time is fluid or perhaps even illusory. ??

not even the dictionary knows. Ehm, and if that is the case, then the beginning of time might be less like a hard
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(04)- boundary and more like a phase transition, a change in the nature of the geometry itself. That's one of the directions modern physics is exploring, not within relativity alone, but in attempts to go beyond it. To find a theory that unites gravity with quantum mechanics, and in doing so reveals what time really is, not just how it behaves, but what it's made of, whether it's fundamental or emergent, whether it had a beginning or whether that word beginning needs to be redefined altogether. There's this idea, one that's been, I suppose, slowly gaining traction in recent years, that time, the thing we experience second by second, minuteby minute, might not actually be fundamental at all. That's to say, it might not be well part of the foundational architecture of the

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universe. It might be something that emerges from something deeper, something more fundamental, like a kind of illusion. Not an illusion in the sense that it's not real. We we we experience it after all, but in the sense that it it might not be woven into the fabric of reality at the deepest level. Now, that's that's quite a radical shift in perspective, right? Because for most of human history, time was just assumed to be there. It ticks, it flows, things change. There's a before, there's an after. But in modern physics, especially in some of the approaches to quantum gravity, there's a growing sense that time might arise from more primitive ingredients. That it's a consequence of something else, something statistical, maybe something that only appears when you look at the universe in a particular way. It starts with a question really.

19:02

What if at the most fundamental level there are no clocks, no ticks, no intervals, just a set of possible configurations, possible states the universe could be in. And what we call time is just the ordering of those states from less probable to more probable, from low entropy to high entropy. And that ordering, that's what gives the impression of time flowing. But the flow itself might not be real. It might be a reflection of the perspective of observers embedded within the system. This view, it's linked to the idea of time as an emergent phenomenon like temperature. Temperature doesn't exist at the level of individual atoms. It only makes sense when you've got lots of them, when you can talk about averages and distributions um and behavior on a larger scale. So just like temperature emerges from the motion of particles, maybe time emerges from correlations between quantum events, from entanglement, maybe from

20:06

complexity from something that only exists when you zoom out. And if that's true, if time isn't fundamental, then that changes everything. It means we might be asking the wrong questions when we talk about the beginning of time. Because beginning already assumes the existence of time. But if time itself is emergent, then what we think of as the beginning might just be the point at which the conditions for the emergence of time were first met. A kind of threshold, a phase transition almost. There are models, mathematical ones that try to formalize this. One of the most intriguing is called causal set theory. In that framework, the fabric of spacetime is built out of discrete events like dots connected by arrows, causal relationships, and there's no smooth geometry at the base, just a

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network of these fundamental units. Time in this picture is simply the ordering of events, the pattern of cause and effect, but it's not continuous. It's granular like a digital clock, not an analog one. Then there's loop quantum gravity which also suggests that spacetime is quantized made of tiny loops or quant of geometry and again time doesn't appear in the fundamental equations not explicitly. It's something rather than having a single external time parameter you look at how one variable changes in terms of another. a kind of relational picture of change, not a timeline. It's difficult to visualize because we're so used to thinking of time as something that flows independently of what it's measuring. But in these models, there is no master clock. There's no universal tick.

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Instead, you have a system where the concept of time arises when the observer interprets a sequence of events. And if there are no observers or no interactions complex enough to support that interpretation, then maybe there's no time, just a static structure frozen in potential waiting for the right conditions to unlock its dynamics. There's also this idea drawn from the ads divided by CFT correspondence. That's a a a duality in theoretical physics that connects a theory of gravity in a higher dimensional space with a quantum field theory on its lower dimensional boundary. And in that context, space and time can both be emergent. That

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(04)- boundary and rather a phase transition, a change in the nature of geometry itself. This is one of the directions that modern physics is dealing with, not only within relativity, but in an attempt to go beyond it. To find a theory that connects gravity with quantum mechanics and thereby reveals what time really is, not just how it behaves, but what it is made of, !! my HDV builds a model of spacetime as 3+3D and so far I have not found any reason for it not to be so. And neither have physicists…otherwise they would have already said whether it is fundamental or emergent, whether it had a beginning, or whether the word beginning needs to be redefined entirely. There is an idea, that has been slowly gaining momentum in recent years, I believe, that time, the thing that we experience second by second, minute by minute, may not actually be fundamental at all. That is, it may not be part of the basic architecture of the universe. I find it embarrassing if physicists are going to deliberately invent all sorts of gibberish/gibberish just so they don't have to study and admit the three-dimensionality of time. It could be something that comes from something deeper, something more fundamental, like a kind of illusion = gibberish gibberish. Not an illusion in the sense that it's not real. After all, we experience it, but in the sense that it doesn't have to be woven into the fabric of reality at the deepest level. It doesn't have to be woven into the fabric of reality that the Moon is a sphere when I see it as a cube, right? That's a pretty radical shift in perspective, isn't it? Because for most of human history, time was simply assumed. It ticks, it flows, things change. It exists before, it exists after. But in modern physics, especially in some approaches to quantum gravity, there's a growing sense that time could arise from more primitive ingredients. That it is a consequence of something else, something statistical, maybe something that only appears when you look at the universe in a certain way. It actually starts with a question. Are you making up nonsense/crap…

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What if at the most basic level there are no clocks, no ticks, no intervals, just a set of possible configurations, possible states that the universe could be in? And what we call time is just the arrangement of these states from less probable to more probable, from low entropy to high entropy. And still nonsense/crap… And this arrangement, that is what creates the impression of time passing. But the flow itself may not be real. It could be a reflection of the perspective of observers embedded in the system. This view is linked to the idea of time as an emergent phenomenon, like temperature. Temperature does not exist at the level of individual atoms. It only makes sense when you have a lot of them, when you can talk about averages and distributions, ahem, and behavior on a larger scale. So just as temperature arises from the motion of particles, maybe time arises from correlations between quantum events, jitters from

entanglement, maybe from the complexity of something that only exists when you zoom out. And if that's true, if time is not fundamental, then that changes everything. It means that we might be asking the wrong questions when we talk about the beginning of time. I guess so. Time has no beginning, but the rate of time does have a beginning (the Big Bang). Because the beginning of the passage of time already presupposes the existence of time. In spacetime before the big-bang. But if time itself is emergent, then what we think of as the beginning can only be the point at which the conditions for time to arise were first met. ?? Time did not originate in the big bang, but the flow of time did, it was triggered in big-bang. https://www.hypothesis-of-universe.com/docs/c/c_486.jpg ; how simple… A kind of threshold, almost a phase transition. There are models, mathematical ones, that try to formalize this. One of the most interesting is called causal set theory. In this framework, the structure of spacetime is built from discrete events, like dots connected by arrows, causal relationships, and there is no smooth geometry at the base, just a network of these basic units. Time in this picture is simply an arrangement of events, a pattern of cause and effect, but it is not continuous. It is granular like a digital clock, not analog. Then there is loop quantum gravity, which also suggests that spacetime is quantized from tiny loops or quantum geometry and I think that the "quanta" (on dimensions 3+3) are packages = balls. The flat dimension and the ball "on dimension" are simply connected and it feels like a >quanta< to us. Quantum = ball → https://www.hypothesis-of-universe.com/docs/c/c_426.jpg and time again does not appear in the fundamental equations, not explicitly. It is something that, rather than a single external parameter of time, tracks how one variable changes depending on another. It is a kind of relational image of change, not a timeline. It is hard to imagine because we are used to thinking of time as something that flows independently of what it measures. But in these models there is no master clock. There is no universal ticking.
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Instead, you have a system where the concept of time arises when an observer interprets a sequence of events. And if there are no observers or interactions complex enough to support this interpretation, then maybe there is no time, as a flow of time just a static structure frozen in potential, waiting for the right conditions to unleash its dynamics. There is also this idea derived from the advertisements split by the CFT correspondence. This is a duality in theoretical physics that connects the theory of gravity in a higher dimensional space with the quantum field theory at its lower dimensional limit. And in this context, both space and time can be emergent. That
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(05)- is the bulk geometry. The thing with gravity can arise from the entanglement structure of the boundary theory which is astonishing because it means geometry itself and with it time might come from quantum entanglement
23:01
from information not the other way around. So maybe maybe at the heart of the universe there's no space no time just a vast network of correlations. And when those correlations are strong enough, when they become sufficiently structured, what we see is a smooth spaceime with causality, with geometry, with time. But those things aren't fundamental. They're descriptive. They're what it looks like, not what it is. And if that's true, then asking what happened before the Big Bang. Well, again, it becomes a kind of category error. Because the big bang might not be a moment in time, but the point at which time itself crystallized out of some deeper timeless state, a condensation, maybe a shift in the rules of the game. You get something similar in condensed matter physics actually in systems like superconductors or super fluids where you get emergent behavior collective
24:00

phenomena that don't exist in the individual particles. You cool things down or you change the density and suddenly the system starts behaving in a new way. New degrees of freedom appear. New laws emerge. And maybe that's what happened with time. Maybe it's a phase of the universe, not a background to it. All of this, of course, is still speculative. We don't have a complete theory that shows how time emerges or what it emerges from, but we have hints. We have pieces. And one of the most compelling comes from something called the Wheeler Dwit equation. It's a central equation in attempts to combine quantum mechanics with general relativity. A kind of timeless Schrödinger equation for the universe as a whole. And the strange thing is time disappears from it. There's no t no variable marking the flow of moments. Instead, it describes a wave function of the universe, a mathematical object that

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contains all possible configurations, all possible geometries. And in this view, time must be reconstructed from correlations within that wave function, from relationships between variables. So again, we're back to this idea that time is not something you put in, it's something you get out if you know how to look. Um, and I think that's that's where a lot of the excitement is really because it means that time, the thing we take for granted, the medium of our lives might not be as fundamental as we thought. It might be provisional, emergent, even fragile, dependent on the existence of observers or memory or entropy gradients, dependent on a certain kind of complexity. Which raises another question. If time can emerge, can it also disappear? Could there be regions of the universe or phases of the

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universe where time doesn't exist? Where everything is static in a kind of timeless state? And if that's possible, what does that mean for causality, for change, for the very notion of existence? Because if time is a feature of our perspective of the way we interact with the world, then what we call reality might be a kind of emergent film projected from something far more abstract. A timeless substrate humming with potential but silent until observed. And that's a profound shift because it means the questions we ask about beginnings, about causes, about what came before might not be questions about the universe, but questions about us, about our way of interpreting what we see, about our limitations, and maybe, just maybe, about our role in

27:01

bringing time into being. There was this this uh idea quite a bold one really and it came from Steven Hawking the notion of imaginary time and it sounds odd at first right I mean how can how can time be imaginary we think of imaginary numbers those square roots of -1 as abstract mathematical tools not something physical but Hawings proposal was that if you take time and And instead of treating it as a real number as we do in everyday experience, you allow it to become imaginary in the mathematical sense. Then something quite elegant happens. The whole concept emerged out of an attempt to understand the beginning of the universe using quantum cosmology. You see, the problem with the big bang as it's usually presented is that you have this singularity, this point where the equations break down, where everything kind of diverges. It's infinite. The curvature of spaceime becomes infinite. Density becomes infinite. And that doesn't sit well with quantum mechanics. You don't really want infinities popping up in your physics. they're usually a sign that something's gone wrong, that you've pushed the theory beyond its domain of validity. So what Hawking along with James Hartle suggested was that maybe the singularity wasn't physical. Maybe it was a kind of artifact of the way we'd been using time. And they proposed something they called the no boundary

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(05)-)- is a volume geometry. The gravity thing might come from the structure of the boundary theory entanglement, which is amazing because it means that geometry itself, and

with it time, could come from the quantum entanglement of what with what? If so, I think it's a 3+3D spacetime that's not flat and teeming with bundles of collapsed dimensions and when these are conglomerated, it's complex matter...
23:01
of information, not the other way around. So maybe there's no space or time at the heart of the universe, just a vast network of correlations. Of what? And when these correlations are strong enough, when they become structured enough, we see where do you see it from? a smooth spacetime with causality, with geometry, with time. But these things are not fundamental. They are descriptive. They are how it looks, not what it is. Oh, they look like devils, but they are not devils… And if that is true, then asking what happened before the Big Bang. Well, again it becomes a kind of categorical error. Because the Big Bang may not be a moment in time, but a point at which time itself crystallized from some deeper timeless state, a condensation, perhaps a shift in the rules of the game. Something had to change. "Big Bang what is it (!) It is **"jump change" in the curvature of dimensions**… from k=0 to k= ∞. The Universe or rather 3+3 dimensional space-time, before the Bang was infinite flat smooth and without mass, time did not run and space did not expand, it had nowhere to expand, when it was already infinite. Then one day the "Creator" took a Locality (arbitrarily large!!!) from such a universe and in it changed by a jump k=0 to k=infinite…, which will be an extremely curved space-time **foam of dimensions**, plasma. Only now can the creation of matter occur, the construction of matter, elementary particles as packages-balls of dimensions. (!) There are only 26 of them, see the standard model and… and for baryonic matter only three packages are enough, packages-particles: electron, proton and neutron, or leptons, six leptons and quarks, also six. Now the genesis of the universe can occur. The flow of time will start (by expanding dimensions to the state of the macroverse) and the expansion of space. Etc., as I describe elsewhere in HDV.

After the Big Bang, matter in that foamy, boiling plasma of curved dimensions was born quite rapidly and gradually less and less of it was born, slower and slower along the "descending exponential curve". No inflation (!). It was different with the complexity of material elementary particles: from simple entities to more complex conglomerates (physical interactions, chemistry, biology…DNA).

The universe existed before BB as a "dead", flat, inert, stoic space-time, infinite, without matter. And the Big Bang (then) was an act of a jump change in the curvature of dimensions, i.e. an action from k=0 (a flat universe without matter) to the reality k= ∞ with extreme curvature, boiling vacuum, foam of dimensions, plasma… and here begins "our universe"(!), where matter is born. Here begins the flow, the passage of time, the unfolding of space-time, laws, principles, rules are born, interactions are recruited, four forces, etc.
Where you "discovered" the singularity, there may be billions of other singularities around it. Like here on Earth. When we look around us in Planck scales of 10^{-43}m, energy/matter springs up there. https://www.hypothesis-of-universe.com/docs/c/c_032.gif ;That locality, called singularity, can be as big or as small as half the **pre-big-bang** universe. Why not? It also depends on the choice of the size of the "unit". So what is it about? The fact that the universe before the big bang was absolutely flat, and after the BB it was absolutely curved into foam, into plasma from dimensions, and at t=0 still without matter. Matter is realized after the big bang. That's the point.
If the energy density must remain constant, Einstein suggested that **new particles of matter should be constantly being created**. And I believe that too. Only in a different coordination. Just after BB, i.e. >one second< after BB, for example, 86% of matter was created, then >three seconds< 6% of matter was created, then 1801 seconds< 2.2% of matter was created,

and then >half a billion seconds< a meager 0.00000000000002% of matter was created… etc. So these are exponentially descending and ascending curves. Even today, new matter is created on Earth. In one cubic kilometer, one atom (or particle) in half a year, the others annihilate each other,..
Guth called it inflation. Unfortunately, Guth assumed that the big bang **created** all matter immediately in the singularity that we know today, all at once (the visible baryon one, and then only a little more), but he did not create it, but **made** it by packing the dimensions of two quantities!!! He had the chaotic boiling plasma "ready" and in it he created packages of elementary particles, realistically, not like God = Alan Guth, who supposedly created it "out of nothing".
There was a sudden change in the curvature of the dimensions from k=0 to k= infinity. That was the big bang.

A hot, dense Big Bang, meaning that **everything** in the universe used to be really close together and much hotter than it is today, definitely happened. What is this >everything<? I offer a state of Being before the Bang: a two-dimensional spacetime 3+3D, smooth (k=0) without matter, without the passage of time, without the expansion of space, infinite, without laws, rules, principles…, which "once" changed the curvatures of dimensions from k=0 to k= ∞ by means of a jump event in a finite location of infinite spacetime. With this step "our dynamic Universe came into being". (with a description in another story, https://www.hypothesis-of-universe.com/index.php?nav=aa).
When asked if they believed that the Big Bang was the beginning of time, most of them actually agreed that it says nothing about when time in our universe began. Oh, see. Time did not begin ! ! !, time stands still !, but the passage of time has begun. But you still do not know what the passage, the flow of time is, because…because time does not pass for us, but we, human objects in the universe, pass for it. We move "through time", the three dimensions of time, and thus we cut intervals into the dimension. The sequence of those intervals, that is the flow of time, the passage of time. It is even possible to explore an alternative vision for the passage of time, that if we choose an Observer at rest, both length and time will expand from the big bang, so time will unroll" and in such a situation the Observer will perceive the space-time that is unrolling before his eyes, that it is being rotated, rotated on the dimensions, and these intervals are then of different sizes in the Observer's projection, so time will have a different pace in the observatory "at home" and a different pace of flow (when rotating, unrolling the curvatures, the commander of the rocket will have.) The pace of time changes according to the pace of unrolling the curvatures of the space-time in which the Observer is and observes...

I do not claim that my opinions are perfect and only correct. These are thoughts to provoke the thinking of the smart ones.
Something similar occurs in condensed matter physics, in systems like superconductors or superfluids, where collective phenomena of emergent behavior appear that do not exist in individual particles. You cool things down or change the density and the system suddenly starts behaving in a new way. New degrees of freedom appear. New laws appear. And maybe that's what happened to time. Maybe it's a phase of the universe, not its background. All of this is still speculative, of course. Speculative yes, but it provokes the thinking of the smart ones. We don't have a complete theory that shows how time arises or what it arises from, but we have hints. Hints of the emergence of time?? Why don't we have a firm belief that time did not arise? There was a "triggering of the flow of time" but Time itself as a universe-forming /quantity/ could not arise. It would be the same question as "how did the universe begin." We

have the fragments. And one of the most compelling ?? comes from something called the Wheeler-Dwit equation. It's the central equation in attempts to connect quantum mechanics with general relativity. A kind of timeless Schrödinger equation for the universe as a whole. And the strange thing is that time disappears from it. There is no variable that indicates the flow of moments. Instead, it describes the wave function of the universe, a mathematical object that
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it contains all possible configurations, all possible geometries. And from this perspective, time has to be reconstructed from the correlations within this wave function, from the relationships between the variables. I don't really understand this. So we're back to the idea that time is not something you put in, it's something you get out if you know how to look. Er, and I think that's where a lot of the excitement lies, because it means that time, the thing we take for granted, the medium of our lives, may not be as fundamental as we thought. On the contrary! It can be provisional, emergent, even fragile, dependent on the existence of observers or memory or entropy gradients, dependent on a certan kind of complexity. Which raises another question. If time can appear, can it also disappear? But who has proven that time appears? Time is a stoic physical quantity. Could there be regions of the universe or phases
26:03
of the universe where time does not exist? That is a stupid question. There cannot be a universe in which its building block = time does not exist. Where is everything static what is “everything”? The passage of time is something entirely different from the quantity time. The quantity Time has three dimensions, and the passage of time only occurs when “after time, i.e. after the dimension of time, i.e. on the dimension of time” an object begins to move and cut intervals on the “standing” dimension of time… in some kind of timeless state? And if possible, what does this mean for causality, for change, for the very concept of existence? Because if time is a feature of our perspective of the way we interact with the world, then what we call reality could be a kind of emergent film projected from something much more abstract. A timeless substrate buzzing with potential, but silent until observed. These are wrung-out speculations, sucked from the thumb… And that is a profound shift, because it means that the questions we ask ourselves about beginnings, about causes, about what came before, may not be questions about the universe, but questions about us, about our way of interpreting what we see, about our limitations, and maybe, just maybe, about our role in
27:01
bringing time into being. Before I was born myself, I didn't know that there was a world and time in it… (and yet time and the world were here before I was born). There was this, um, quite a bold idea, and it came from Steven Hawking with the concept of imaginary time. It sounds strange at first, doesn't it? I mean, how can time be imaginary. We think of imaginary numbers, those square roots of -1, as abstract mathematical tools, not something physical. Hawing's proposal was that if you take time and instead of treating it as a real number, as we do in everyday experience, you allow it to become imaginary in a mathematical sense. Then something quite elegant happens. The whole concept came from trying to understand the beginning of the universe using quantum cosmology. What is that? The problem with the big bang as it is usually presented is that you have this singularity, this point where the equations break down, where everything kind of diverges. It's infinite. The curvature of spacetime becomes infinite. And before 3+3 dimensional time with k=0 becomes infinitely curved, k= ∞, there are other **forms of curvature** (!), like balls, packages of dimensions. Why not? https://www.hypothesis-of-universe.com/docs/c/c_275.gif ; https://www.hypothesis-of-universe.com/docs/c/c_221.jpg ; https://www.hypothesis-of-universe.com/docs/c/c_231.jpg ; https://www.hypothesis-of-universe.com/docs/c/c_281.jpg ; https://www.hypothesis-of-universe.com/docs/c/c_282.jpg ; The density becomes infinite. And that doesn't sit well with

quantum mechanics. You don't want infinities in your physics. They're usually a sign that something's gone wrong, that you've pushed the theory beyond its limits. Hawking, along with James Hartle, suggested that the singularity might not be physical. Maybe it's some kind of artifact of the way we've been using time. And they proposed something they called a theory without limits.

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(06)- proposal. The idea was that just as the surface of the earth doesn't have a boundary, you can keep walking east and eventually return to your starting point. Maybe the universe in its earliest phase didn't have a boundary either. Not in space and crucially not in time. But to make that

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work, they had to rotate time into the complex plane. It's called a wick rotation. And it's something physicists do all the time in quantum field theory. You take time and you replace it with imaginary time. Tai tower. And when you do that, it changes the geometry of spacetime. Instead of a Lorenzian geometry, the kind that distinguishes between space and time, you get a uklidian one where time behaves like another spatial dimension. And that changes everything. Suddenly, the singularity at the beginning of the universe isn't a sharp edge. It's more like the south pole of the earth. A smooth rounded cap. There's no boundary, no edge, no point where time begins. Because in imaginary time there is no beginning. The geometry is closed, finite, but unbounded. It's like imagine a sphere. There's no point on the surface that you can say is the start.

30:00

It just is. And Hawking's suggestion was that maybe the universe is like that. Maybe time in its earliest form was spatial. It didn't flow. It didn't tick. It just existed as a direction in a curved four-dimensional geometry. And what we experience now, the passage of time, the flow of moments only emerged later when the universe transitioned from its uklidian phase to the Lorenzian phase we inhabit today. And and this isn't just a metaphor. It's backed by mathematical models. In the path integral formulation of quantum mechanics, the one developed by Fineman, you calculate the probability of a system evolving from one state to another by summing over all possible paths. And in quantum cosmology, you can apply the same idea to the universe itself. You sum over all possible geometries, all possible ways the universe could have evolved. And the dominant contributions to that sum often

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come from geometries where time is imaginary, where the signature of the metric is uklidian. So in that framework, the universe didn't start in time. It emerged from something timeless or at least something where time wasn't what we think it is now. And that's a powerful idea because it removes the singularity. It replaces the unphysica infinities with smooth, well-behaved geometry. And it gives you a picture of the universe that doesn't require a beginning in the usual sense. But of course, it raises questions. If time was imaginary, what does that mean physically? What does it mean for something to evolve in imaginary time? Can you observe it? Can you test it? And here's the thing. Imaginary time is a mathematical tool, but it might have physical implications. In thermal physics, for example, there's a deep connection between temperature

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and imaginary time. If you take a quantum system and wrap time into a circle, a periodic imaginary time, you get a system at finite temperature. That's how quantum statistical mechanics works. And so maybe that connection tells us something about the early universe, about why it had the properties it did, about how it transitioned from a timeless smooth geometry to the hot expanding cosmos we see today. And Hawking himself, he often said that this idea, the no boundary proposal was the point at which physics metaphysics. Because if the universe is finite but unbounded with no beginning and no edge, then it doesn't require something to to light the fuse. It doesn't need a cause. It just is. It exists because the laws of physics allow it to because the sum over histories includes a geometry where the universe simply appears smoothly naturally out of nothing or rather out of a kind of nothing. A state where time

33:04

is imaginary and space is curved and there is no singularity, no bang, just a transition, a phase change. Now this view isn't universally accepted. There are other models, other approaches. But what makes the imaginary time idea so compelling is its elegance. It doesn't require anything exotic. No new dimensions, no brains, no external fields, just a reinterpretation of time. A willingness to let go of our intuition and follow the mathematics even when it leads to strange unfamiliar territory. And it's part of uh a broader trend in theoretical physics. The idea that time as we understand it is a derived concept. uh that it only emerges under certain conditions and that in regimes where those conditions break down like the very early universe, time itself might vanish or morph or become

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something else entirely. You can see echoes of this in string theory where time is sometimes

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(06)- proposal. The idea was that just as the surface of the Earth has no boundary, you could keep walking east and eventually return to your starting point. Maybe the universe in its earliest stages had no boundary. Not in space and especially not in time. But to make it

29:00

work, they had to rotate time into the complex plane. It's called a wick rotation. And it's something that physicists do all the time in quantum field theory. You take time and replace it with imaginary time. Tai tower. And when you do that, the geometry of spacetime changes. Instead of Lorentzian geometry, which distinguishes between space and time, you get Euclidean geometry, where time behaves like another spatial dimension. And that changes everything. And why couldn't there be three-dimensional time? That would change *absolutely* everything. Matter is built by packing 3+3 dimensions of two quantities. That's the greatest discovery you can make...and I've been promoting it for 40 years in all of physics. Suddenly the singularity at the beginning of the universe is not a sharp edge. It's more like the South Pole of the Earth. A smooth rounded cap. There's no boundary, no edge, no point where time begins. Because in imaginary time there's no beginning. The geometry is closed, finite, but unbounded. It's like imagining a sphere. There's no point on the surface that you could say is the beginning.

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It just is. And Hawking's suggestion was that maybe the universe is like that. Maybe time was spatial in its earliest form. It didn't flow. !!! aha. It didn't tick.!!! Well, that's it. Time doesn't flow for us, but we flow for it, we travel "through it, through time, through the dimension of time"! Why is it so incomprehensible and why doesn't everyone read it and those who do condemn it??? It existed only as a direction in a curved four-dimensional geometry. Phew. And what we experience now, the passage of time, the flow of moments, only appeared later, when the universe went from its Euclidean phase to the Lorentzian phase that we inhabit today. And this is not just a metaphor. It is supported by mathematical models. In the path-integral formulation of quantum mechanics, which was developed by Fineman, you calculate the probability of a system evolving from one state to another by adding up all the possible paths. And in quantum cosmology, you can apply the same idea to the universe itself. You

add up all the possible geometries, all the possible ways the universe could have evolved. And the dominant contributions to this sum often
31:03
come from geometries where time is imaginary, where the metric signature is Euclidean. So in this framework, the universe did not begin in time. It arose from something timeless, ??? or at least from something where time was not what we think it is now. 😂☹ smiley And that is a powerful idea because it removes the singularity. I don't believe in the singularity either. If the singularity is different from zero, then it could be an "arbitrarily large location". How large is a location whose size approaches infinity, or zero?? "**Infinite spacetime minus one is a finite location**". (How big is one?) Yes?
It replaces the unphysical infinities with smooth, well-functioning geometry. And it gives you a picture of a universe that doesn't require a beginning in the usual sense. But of course that raises questions. If time was imaginary, what does that mean physically? What does it mean that something evolves in imaginary time? Can you observe it? Can you test it? And here's the thing. Imaginary time is a mathematical tool, but it can have physical consequences. For example, in thermal physics, there's a deep connection between the temperature
32:00
and imaginary time. If you take a quantum system and wrap time in a circle, a periodic imaginary time, you get a system with a finite temperature. That's how quantum statistical mechanics works. And maybe this connection tells us something about the early universe, about why it had the properties it did, about how it went from timeless smooth geometry to the hot expanding universe that we see today. And Hawking himself often said that this idea, the boundless proposition, was the point at which physics became metaphysics. Because **if the universe is finite but unbounded, without beginning and without edge, then it needs nothing to ignite it**. Yes. The finite universe is the "our universe", which arose after the Big Bang, which realized itself as a "locality in infinite space-time", before the Big Bang. The Big Bang was a jump event from the "previous" k=0 to the "subsequent" k= ∞ It does not need a cause. It simply is. It exists because the laws of physics allow it to, because the sum of history includes a geometry where the universe simply smoothly and naturally emerges from nothing, or rather from a kind of nothing. A state where time is imaginary and space is curved and there is no singularity, no bang, only a transition, a phase change. This and my interpretation are not identical. And I wonder how experts will judge it, which one they will prefer.
However, this view is not generally accepted. There are other models, other approaches. No one knows about my model yet. Otherwise, someone would have already come forward with a polemical opinion… But what makes the imaginary idea of time so convincing is its elegance. Do you know what elegance is? Elegances are elementary particles built from the dimensions of the quantities "x" and "t", or from only two "signs" → https://www.hypothesis-of-universe.com/index.php?nav=ea ; not one particle is the same as another/the other. And the elegant thing is that the interactions here are equations with just the multiplication of the factors "x" and "t", whereas in contemporary physics, interactions are written with the sums of particles in the form of "letters", ... and all the Cyrillic, Latin, Arabic, Greek, and artificially invented signs like the integral or Laplace's rectangle, etc. are almost not enough for that. https://www.hypothesis-of-universe.com/docs/eng/eng_096.pdf ; It doesn't require anything exotic. No new dimensions, no brains, no external fields, just a reinterpretation of time. A willingness to abandon our intuition and follow mathematics, even if it leads into strange and unknown territory. And it's part of, um, a broader trend in theoretical physics. The idea that time, as we understand it, is a derived concept. er, that it only appears under certain conditions, and that in regimes where those conditions break down, like in the early universe, time itself can disappear, ?? transform, or become something else

entirely. Even goats can become devils, because they have horns too… You can see echoes of this in string theory, where time is sometimes...

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(07)- treated as a coordinate that can undergo dualities, transformations just like space or in approaches to quantum gravity that treat time not as a variable but as a symmetry, something that arises from the deeper structure of the theory. And all of this points toward a universe where time isn't fundamental, but conditional, contextual. And if that's true, then imaginary time might not just be a trick. It might be a window into a realm where our concepts of before and after of cause and effect no longer apply. Where the universe doesn't begin, but simply is a closed surface in four-dimensional space without edges, without origin. And you might ask, well, does that mean there was no creation, no

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moment of inception? And maybe yes, in the usual sense, there was no moment when the universe began. Because the question of moment only makes sense after time has emerged. Before that, or rather in the regime that precedes the emergence of real time, there are no moments, no ticking clocks, no evolving systems, just geometry, just potential. It's it's a hard idea to hold in the mind because we're creatures of time. Our thoughts unfold in time. Our language is soaked in temporal assumptions. But if we take this seriously, if we trust the mathematics, then it suggests that time and its beginning might be illusions of perspective. That from a timeless vantage point, the universe just is. And that's what the imaginary time proposal offers. Not a mechanism exactly, but a different frame. A way of looking that removes the sharp boundary, the problematic singularity, and replaces it with something smoother,

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something oddly beautiful. A cosmos that emerges like a ripple on a pond, not with a bang, but with a gentle transition from nothing to something, from the timeless to the temporal, from geometry to experience. It's it's a quiet kind of creation, not an explosion, but a shift, a soft unfolding from mathematical symmetry into the asymmetry we inhabit. And it suggests that if we want to understand the origin of time, we may need to go beyond time itself, into the realm of complex geometry, into the strange abstract space where the boundary between nothing and everything blurs. There's this point, this place in physics where the classical world that we understand with its curves and its clocks and its gravity just collapses and what you're left with is something

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that looks more like noise. Not in the everyday sense, not like static on a radio, but something much stranger, much more fundamental. It's this thing called quantum foam and it's thought to be what spacetime itself becomes when you zoom in far enough down to the plank scale around 10 to the minus 35 m. That's unimaginably small, far smaller than anything we've ever been able to probe directly. But it's the scale at which the smooth geometry of space and time breaks apart. Where the rules, the classical rules stop working. And what's there instead? Well, it's not smooth at all. It's chaotic. It bubbles. It fizzes. That's where the idea of foam comes from. Coined by John Wheeler back in the 1,950 seconds. He imagined that if you could somehow look that deeply into spaceime,

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you wouldn't see a calm flat surface. You'd see a storm. Little loops of geometry popping in and out of existence. Tiny wormholes forming and collapsing. Distortions, topological defects, all of it happening not in spaceime, but as spaceime. Because that's the thing, space and time themselves at that scale are subject to quantum fluctuations. They're not fixed. They're not static. They jitter. They're uncertain in the same way that a particle's positional momentum is uncertain. And so the geometry of the universe instead of being this rigid stage on which things happen, becomes dynamic, wildly dynamic, almost unrecognizably so. Now this quantum foam, this foundational mess, it's important because it's where we think gravity and quantum mechanics finally have to come together. It's

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where the rules of general relativity no longer apply on their own. And it's where quantum field theory starts to become incomplete because it usually relies on a fixed background, a space-time that you can do your calculations in. But if the background itself is fluctuating, if it's not even clear what space or time mean anymore, then the whole framework starts to fall apart. So this foam, it's a clue, a hint that there's something deeper going on. That the smoothness we see on large scales, planets, galaxies, even atoms, is an illusion, an approximation. and that beneath it there's this roing uncertain structure where the very notions of distance and duration lose their meaning or at least their classical meaning. And it raises this

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question. How do you get from that to this? From the foam, from this sthing chaotic ground to the vast expanding universe to stars and time and life because something must have happened. some transition, some smoothing out. Maybe it's like boiling water on the surface. You see bubbles forming and breaking, but if you back away, it just looks like steam. Maybe the early ………………………………………………………………………………………………..

(07)- understood as a coordinate that can go through dualities, transformations just like space, or in approaches to quantum gravity that treat time not as a variable but as a symmetry, something that follows from the deeper structure of the theory. Or from the deeper blabbering of nonsense. And all this points to a universe where time is not fundamental, but conditional, contextual. Yikes. And if this is true, then imaginary time may not be just a trick. It could be a window into a realm where our concepts of before and after, cause and effect, no longer apply. In the microworld, the arrows of time alternate, and if this is true, how does cause and effect manifest itself? Where the universe does not begin, but is simply a closed surface in four-dimensional space with no edges, no origin. And you may ask, does this mean that there was no creation, no

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moment of creation? And perhaps yes, in the usual sense there was no moment when the universe began. The universe did not begin, but "underwent" a change of state, for example before the Big Bang from the state k=0 to k= ∞. And the next genesis is already describable and described. Because the question of the moment makes sense only after time appeared. You have to be precise and say ***when the ticking of time appeared, the passage of time***, the flow of time and that appeared in the Big Bang, while time was already there before the BB with k=0 Before, or rather in the regime that precedes the emergence of real time, time does not arise, but the flow - the passage of time arises… there are no moments, no ticking clocks, no evolving systems, ~~only geometry~~, only space-time only potential. It's hard to keep this idea in mind because we are creatures of time. O.K. Our thoughts unfold in time. O.K. Our language is steeped in temporal assumptions. But if we take it seriously, if we trust mathematics, then it suggests that time and its beginning may be illusions of perspective. ?? and fantasizing again… That from a timeless perspective, the universe simply is. O.K. And that's what the imaginary time proposal offers. Not exactly a mechanism, but a different framework. A way of looking at things that removes the sharp boundary, the problematic singularity, and replaces it with something smoother, something strangely beautiful. In my views I write k=0, but rigorously that's a mistake. That "k" is not exactly zero, it's "**locality > 0**", and finite. I am not a good mathematician, so the reader must forgive me. The cosmos,

which emerges like a ripple on a pond, not with a bang, but with a gentle transition from nothing to something, from timeless to temporal, from an inert space-time in which there is no matter and nothing moves in it, it is a flat infinite space-time. And only after the Big Bang does the state of spacetime occur in which matter is born, and the "ticking" of time is born (objects run in time) (or the Observer, brought to rest, perceives the flow - the flow of time into his projection after the dimensions (in the macro-universe) are expanded and this is then presented as the flow of time), from geometry to experience. It is a silent kind of creation, not an explosion, but a shift, a gentle unfolding from mathematical symmetry to asymmetry, or from linearity to nonlinearity, and…and the parabola is nonlinear and that presents gravity…in the macrocosm, (OTR) , not in the interactions in the microworld ––> QM, that we inhabit. And it suggests that if we want to understand the origin of time, we may have to go beyond the boundaries of time itself, god, god. Beyond the boundaries of ***time flowing*** time is stationary, stoic, inert, **just as a quantity**… into the realm of complex geometry, into a strange abstract space, where the boundary between nothing and everything is blurred.
?? Before BB, where space-time https://www.hypothesis-of-universe.com/docs/c/c_486.jpg is infinite and eternal, "Something with Nothing" cannot be erased... or if so, then I don't know "Who" is behind it... ; There is this point, this place in physics, where the classical world that we understand with its curves, clocks and gravity, simply collapses and what you are left with is something that looks more like noise. Wouldn't it?...If our two-dimensional universe (after BB with matter then three-dimensional) collapses (mathematically), then always only into two-dimensional..., or "our universe" will gradually smooth out (big cruich) and that flat infinite stoic inert space-time will appear as it was before the Big Bang. Penrose's cyclic universe. So that two-dimensional space-time could look "like noise".... Not in the everyday sense, not like static on a radio, but something much stranger, much more fundamental. It's a thing called quantum foam. Quantum foam is k= ∞, and it materializes after the Big Bang, it's a three-dimensional quantity, if I'm going to count mass as a quantity. Today I count it as a "derived quantity" not a fundamental one... and it's supposed to be what spacetime itself becomes when you get close enough to the scale of a ~~plank~~ Planck's (translator's translation is crap) around 10 to the minus 35 m. That's unimaginably small, much smaller than anything we've ever been able to directly examine. But it's the scale at which the smooth geometry of spacetime breaks down. https://www.hypothesis-of-universe.com/docs/c/c_461.jpg ; Where the rules, the classical rules, of the macrouniverse stop working. And what is there instead? Microuniverse with QM. Well, it is not smooth at all. That "it" (boiling vacuum) is the substrate, the stage, the fabric, the network of cp, on which = in which the dynamic microworld lives. It is chaotic. In that foam (chaotic) however, our perfect linear interactions "float"… https://www.hypothesis-of-universe.com/index.php?nav=eb ; It bubbles. It fizzes. O.K. That is where the idea of foam comes from. O.K. John Wheeler invented it at 1950 seconds. ?? He imagined that if you could somehow look that deep into space-time,
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you wouldn't see a calm flat surface. You would see a storm. Small loops, packages of geometry that appear and disappear from existence. Amazing from Wheeler and it is a pity that he did not complete the last step in the thought construction, abstraction and **declared that those "loops = packages"** of 3+3 dimensions, and that they are already in their essence and MANIFESTATION matter elementary particles. Such a beautiful elegant idea … I have been presenting it for 44 years and no one reads it and the one who reads it insults me and persecutes me. For example https://www.hypothesis-of-universe.com/index.php?nav=z ;
Tiny wormholes that form and collapse. Deformations, topological defects, all this does not

happen in space-time, but as space-time. (?) What did he mean… Because that is the point, space and time themselves on this scale are subject to quantum fluctuations. They are not fixed. They are not static. They tremble. They are uncertain in the same way that the uncertain positional momentum of a particle is. And so the geometry of the universe, instead of being this rigid stage on which things happen, becomes dynamic, wildly dynamic, almost unrecognizable. This quantum foam, plasma, this fundamental chaos, is important because we think that **gravity and quantum mechanics must finally meet there**. O.K. But in this problem we still need to solve the gravitational constant, which physicists have assigned a dimension. (The universe has not assigned dimensions to it, but physicists...the gravitational constant is a number, not a quantity). Removing the dimensions from the gravitational constant will lead to a linear equation.

The question and problem of the gravitational constant – CZ

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It is
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a place where the rules of general relativity themselves no longer apply. And it is where quantum field theory begins to become incomplete, because it usually relies on a fixed

background, spacetime, in which you can do your calculations. But if the background itself fluctuates, if it is no longer even clear what space or time means, then the whole framework begins to collapse. The framework fluctuates because there is this error with the gravitational constant. I have been suggesting to physicists for a long time to think about this and to answer me. Unfortunately…deep silence or insults. So this foam is a clue, a hint that something deeper is happening. In the foam, "packages" are born = recruited here, and these are matter = elementary particles. That the smoothness that we see on large scales, planets, galaxies, even atoms, is an illusion, an approximation. https://www.hypothesis-of-universe.com/docs/c/c_221.jpg And that underneath it is this wandering uncertain structure where the very concepts of distance and duration lose their meaning, or at least their classical meaning. And that raises this

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question. How do you get from that to this? From the foam, from this chaotic soil to the vast expanding universe to stars and time and life, because something had to happen. Some transition, some smoothing out. Maybe it's like cooking...

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(08)- universe at its most fundamental level was a kind of boiling geometry. And then somehow as it expanded, as it cooled, those fluctuations evened out. They averaged. And the spaceime we know the smooth continuous kind emerged. And this ties into what people sometimes call the quantum origin of the universe. Because if you imagine the beginning, the very very beginning, not as a classical event, but as a quantum process, then it

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makes sense to think of it as a fluctuation, a fluctuation in well, in nothing really in the quantum vacuum. Not nothing as in absolute absence, but nothing as in the lowest possible energy state of the fields that make up reality. And even that isn't truly empty because quantum fields never sit still. They can't. That's one of the implications of Heisenberg's uncertainty principle. Even the vacuum has energy. It fluctuates. And those fluctuations can give rise to particles to virtual pairs popping into and out of existence and maybe maybe to entire universes. That's the speculation anyway. That under the right conditions, a quantum fluctuation in this vacuum can tunnel into a new state, a higher energy state, a bubble of true spaceime where

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expansion can begin. inflation perhaps and then cooling structure stars us. And this is where the idea of quantum cosmology becomes so powerful because it suggests that the universe didn't begin with a bang exactly. Not in the sense of an explosion from a point, but that it arose probabilistically from a fluctuation. That it was born not out of fire, but out of uncertainty. And that's a very different image. It's quieter, stranger, but it fits with what we know about quantum systems that they don't evolve deterministically but probabilistically that they can tunnel through barriers that they can be in multiple states at once. So maybe the the the the origin of of spaceime was something like that. Not a classical transition, not a single event, but a branching, a superp position, a set of possibilities that

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resolved into one. There's an approach called the Hartleal Hawking state. We mentioned it earlier uh in the context of imaginary time and it uses uh a path integral over uklidian geometries. What's interesting is that these geometries often include this quantum foam, not in the smooth average sense, but with all the mess and curvature and complexity built in. And yet when you sum over all of them, when you allow all the possible paths, even the wildly curved, highly fluctuating ones, what you get out is a smooth classical universe, a space-time like ours with an arrow of time, with expansion, with structure. So in a sense, the classical world emerges from the quantum one by statistical averaging by decoherence. Perhaps the process by which quantum possibilities collapse into definite outcomes when they interact with the

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environment. And the early universe, dense and hot and chaotic as it was,would have been the perfect environment for decoherence, for smoothing, for order to arise from foam. And that's a beautiful thing that from this storm of quantum uncertainty, you can get laws, you can get time, you can get physics, but underneath it all, the foam remains.It's still there, just hidden by scale. We don't see it because we're too big, too slow. Our instruments are blunt. But every point in space, every moment in time is rooted in that foam, in that jitter, that uncertainty. And so the implication is that spaceime is not fundamental, not fixed, that it can be created, that it can fluctuate, that it's a kind of emergent property like temperature or solidity. And if

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that's true, then it changes how we think about the beginning. It changes what we mean by origin because it's no longer about a point or a singularity. It's about a transition from quantum chaos to classical order, from foam to cosmos. And and we still don't know exactly how that happens. Um there are models, equations, hypothesis, but it's hard totest. is hard to see that far back to isolate the quantum structure of spaceime. Some people think maybe we'll see echoes of it in the cosmic microwave background, tiny imprints left over from the quantum fluctuations that seeded galaxies. Or maybe in gravitational waves, ripples from the earliest moments of expansion. But so far, the foam is hidden. It's out of reach. Still, it's a compelling idea that what we think of as the universe, the vastness, the stars, the flow of time, all of it emerges from something much stranger, much less intuitive.

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A realm where space and time are not given, but built, not from matter, but from possibilities, from patterns, from probabilities. And the foam, it's not just a metaphor. It's what the equations tell us. It's what happens when you takequantum mechanics seriously. When you apply it not just to particles, but to geometry itself, to the fabric of reality. And if that's right, ……………………………………………………………………………………………

(08)- the universe at its most basic level was a kind of boiling geometry. Oh great, finally the author "describes" from my HDV. Before the BB it was not boiling geometry, boiling spacetime, but only in that BB and after it. And then **somehow**, as it expanded, as it cooled, these fluctuations balanced out. https://www.hypothesis-of-universe.com/docs/c/c_221.jpg → here is a drawing by Mr. Ullmann about the (fictitious) "straightening" of crooked dimensions using observations "from afar" and "from close up"... They averaged out. And spacetime appeared, which we know as a smooth continuous kind. And this is related to what people sometimes call **quantum** origin (and what is quantized in your country?) of the universe. Quantum is just after the BB, then it is smoothed out by expansion = unwrapping. But…but be careful: in the smoothed space-time (plasma), dimensions are packed into a state of balls = elementary particles. So even though space-time is unpacked, it is also simultaneously packed into packages – into matter. Because if you imagine the beginning, the very complete beginning, not as a classical event, but as a quantum process, then it makes sense to think of it as a fluctuation, a fluctuation in nothing, actually in a quantum vacuum. And we have quantum vacuum around us even today, everywhere around us. On scales of 10^{-43} m, the vacuum boils and…and in the boiling environment, dimensions spring up "from Nothingness" that immediately warp into packages. Today only into virtual pairs, but in the plasma after BB it was all elementary particles. Not in absolute absence, but in the lowest possible energy state of the fields that create reality. O.K. And it is not really empty either, because quantum fields never stand still. O.K. They can't. That's one of the consequences of Heisenberg's uncertainty principle.

Heisenberg is beautiful, but he has one more flaw.

Purple Heisenberg's uncertainty principle
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Heisenberg needs to correct by the factor Δt/t… (which is not just a numerical correction, but a dimensional one).
Even the vacuum has energy. It fluctuates. And these fluctuations can lead to particles, virtual pairs, coming into and out of existence, and perhaps even entire universes. That is speculation in any case. That under the right conditions, quantum fluctuations in this vacuum can tunnel to a new state, a higher energy state, a bubble of real space-time, where
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expansion can begin. Perhaps inflation and then a cooling structure open us up. And this is where the idea of quantum cosmology becomes so powerful, because **implies** that the universe did not exactly start with a bang. It started with a transitional jump from k=0 to k=infinity. Not in the sense of exploding from a point, but that it arose probabilistically from a fluctuation. That it was not born from fire, but from uncertainty. And that is a very different picture. It's quieter, weirder, but it fits with what we know about quantum systems, that they don't evolve deterministically, but probabilistically, that they can tunnel through barriers, that they can be in multiple states at once. So maybe the origin of spacetime|| was something like that. Not a classical transition, not a single event, but a branching, a superposition, a set of possibilities that
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merged into one. There's an approach called Hartle's Hawking state. We mentioned it earlier, uh, in the context of imaginary time, and it uses, uh, a path integral over Euclidean geometries. What's interesting is that these geometries often involve this quantum foam, not in the sense of a smooth average, but with all the chaos, curvature, and complexity built in. And yet, when you add them all up, when you allow for all possible paths, even the wildly curved, highly fluctuating ones, you get a smooth classical universe, a spacetime like ours with an arrow of time, with expansion, with structure. So in a sense, the classical world emerges from the quantum by statistical averaging, decoherence. Perhaps the process by which quantum possibilities collapse into definite outcomes as they interact with the

environment. And the early universe, dense, hot, and chaotic as it was, would have been the perfect environment for decoherence, for smoothing out, for order to emerge from the foam. And that's the beauty of it, that **you can get laws out of this storm of quantum uncertainty, you can get time, you can get physics, but underneath it all, the foam remains**. It's still there, just hidden by scale. !! We don't see it because we're too big, !! too slow. Our instruments are dull. But every point in space, every moment in time is rooted in this foam, in this vibration, in this uncertainty. And so it follows that spacetime is not fundamental, ugh it is not fixed, that it can be created, ugh it can fluctuate, that it is some kind of emergent property like temperature or solidity. This does not mean that when spacetime emerges in a vacuum on Planck scales by "unpacking" dimensions, that it "emerges from Nothing". I think not. https://www.hypothesis-of-universe.com/docs/c/c_032.gif ; And if
45:02
this is true, then it changes the way we think about the beginning. We think, yes… some about the beginning of the universe, some about the beginning of time, some about the beginning of the beginning of the flow of that time, some about the beginning of spacetime, some about the emergence from Nothing…etc. I present my thinking (politely) and yet no one responds to it, only the villains insult. It changes what we mean by the term origin, because it is no longer a point or a singularity. It is a transition from quantum chaos to classical order, from foam to cosmos. Yes, you can say it that way. Quantum foam is a disorganized linear environment, and the interaction of packets is an organized environment and order… https://www.hypothesis-of-universe.com/docs/eb/eb_002.pdf ; And we still don't know exactly how it happens. HDV… There are models, equations, hypotheses, but they are difficult to test. I have reviewers who test confidently with overview/insight. ––> https://www.hypothesis-of-universe.com/index.php?nav=x ; It is difficult to see so far into the past to isolate the quantum structure of space-time. Some people think we might see its echoes in the cosmic microwave background, tiny imprints left over from the quantum fluctuations that seeded galaxies. Or perhaps in gravitational waves, ripples from the earliest moments of expansion. But for now, the foam is hidden. It's out of reach. Still, it's a compelling idea, that HDV is too, that what we think of as the universe, the vastness, the stars, the flow of time, all emerge from something much stranger, much less intuitive.
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A realm where space and time are not given, but constructed, not from matter, but from possibilities, from patterns, from probabilities. 😊 Matter is constructed from space-time, not the other way around. And foam, that's not just a metaphor. It's what the equations tell us. It's what happens when you take quantum mechanics seriously. When you apply it not just to particles, but to the geometry itself, to the structure of reality. O.K. And if that's true,
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(09)- if the universe is built on quantum foam, then maybe the deepest truth isn't about things, but about transitions, about becoming, about the process through which order arises from chaos, through which time emerges from timelessness, through which everything comes from nothing, or at least from something that looks very much like it. There's
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something about the idea of cycles that feels natural, isn't there? Something intuitive. I mean, we see them everywhere in biology, in seasons, in orbits, in stars, the rise and fall, expansion, and collapse. So, it's not surprising really that physicists began to wonder whether the universe itself could behave like that. Not just once, not just a single beginning, a single explosion and then this long expansion,but rather a series of beginnings, a repeating structure, a cosmos memory, a universe that breathes. The idea of a cyclic universe isn't new, of course. It goes back well, it goes way back to ancient philosophy to the idea that the cosmos goes

through eternal recurrence, that the universe is reborn again and again. But in modern cosmology, it started to take on a more precise meaning in the 20th century, especially after we understood that the universe was expanding. Because if it's

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expanding now, could it one day stop? Could gravity win out in the end, slow everything down, pull everything back? That was one of the early proposals. The idea that after billions of years of expansion, the universe would reach a maximum size and then reverse collapsing in what came to be known as the big crunch. And the big crunch would then set the stage for a new big bang, a new cycle, expansion, contraction again and again forever. A kind of cosmic heartbeat. It's elegant and in some ways it solves problems like the question of what came before the big bang because in this view there was a before a previous universe collapsing. The bang wasn't the start of everything. It was just a transition, a bounce. But the difficulty with that idea, the simple expansion contraction cycle is entropy. That's the issue. Entropy always increases. The

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second law of thermodynamics says that disorder tends to grow. So if the universe just cycles endlessly, expanding and contracting over and over again, then the entropy would pile up. Each cycle would be more chaotic, more disordered than the last. You can't just reset everything with a bounce. So physicists started to explore other kinds of cyclic models, ones where entropy might not accumulate in the same way, where the universe doesn't just bounce back like a ball, but maybe undergoes a transformation, a renewal. Some proposals, for instance, suggest that entropy could be pushed outside our visible universe, diluted or stretched beyond our horizon. That's what happens in inflation, right? It takes small scale fluctuations and pushes them out, inflating them beyond view. So maybe the universe could be reset

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thermodynamically if something like that happened again at the end of a cycle. There's also this idea and it's quite subtle that what cycles isn't necessarily the whole universe in the traditional sense. Maybe what's repeating is the conformal structure, the way the universe scales. So at the end of expansion when everything is incredibly cold, incredibly dilute, perhaps the geometry becomes indistinguishable from the conditions of the big bang. That's the idea behind conformal cyclic cosmology proposed by Roger Penrose. And it's fascinating because it suggests that the remote future of one universe might be mathematically identical to the beginning of another. The death of one cosmos becomes the birth of the next. And it's not just a poetic idea. There's real mathematics there. Penrose's argument is that when all the mass in the universe decays, when black holes

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evaporate, when particles themselves lose their identity, then the universe forgets its scale. If there are no clocks, no rulers, then size becomes meaningless. And in that scale-free regime, the geometry of spacetime could in principle be matched to the scale-free beginning of a new universe. It's almost like the universe sheds its skin. It expands. It ages. It cools. And then when all the structures dissolve, it becomes young again. Not by turning back time, but by discarding the very notion of time's passage. But there's another route into cyclic models. One that comes not from gravity but from string theory from higher dimensional physics and that's where things get really strange and quite beautiful I think because in these models our universe isn't the only one it's a kind of membrane a three-dimensional surface floating in a higher dimensional space a

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brain they call it short for membrane and it's not alone there could be other brains parallel to ours separated by tiny distances in these extra dimensions. Um, and sometimes every so often

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(09)- if the universe is built on quantum foam, then perhaps the deepest truth lies not in things but in transitions, in becoming, in the process by which order emerges from chaos. O.K. by which time emerges from timelessness, no. Time, which people understand (only) as a flow, the passage of time, was triggered in the Big Bang, but did not originate in the BB. It is a universe-creating quantity… by which everything comes from nothing. ??, or at least from something very similar to it. There is something natural about the idea of cycles, isn't there? Something intuitive. We see them everywhere in biology, in the seasons, in orbits, in stars, in the rise and fall, the expansion and collapse. So it is no wonder that physicists have begun to wonder whether the universe itself might behave this way. Not just once, not just as a single beginning, a single explosion and then this long expansion, but rather as a series of beginnings, a repeating structure, a memory of the universe, a universe that breathes. The idea of a cyclical universe is not new, of course. It goes back a long way, it goes back to ancient philosophy to the idea that the universe is going through an eternal repetition, that the universe is being born again and again. But in modern cosmology it started to take on a more precise meaning in the 20th century, especially after we understood that the universe is expanding. Because if it is
48:03
expanding now, could it stop one day? Could gravity eventually win out, slow everything down, pull everything back down? That was one of the first proposals. The idea that after billions of years of expansion, the universe would reach its maximum size and then reversely collapse in what became known as the Big Bang. And the big bang would then set the stage for another big bang, a new cycle, expansion, contraction over and over again forever. I understand that a cyclical universe is possible. Little by little, k=infinity (hundreds of billions of years) changes to k=0 and then there comes another "**instant jump**", a change of state* from k=0 to k= ∞. The cycles will repeat. A kind of cosmic heartbeat. It is elegant and in some ways solves problems such as the question of what was before the big bang, because in this view it existed before the previous universe collapsed. The bang was not the beginning of everything. It was just a transition, a reflection. ––> change of state, an instantaneous jump change of state, of what? Well, by the curvature of 3+3 dimensions. But the problem with this idea, a simple cycle of expansion and contraction, is entropy. That is the problem. Why? Entropy always increases. The second
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law of thermodynamics says that disorder tends to increase. So if the universe were to just cycle on and on, expanding and contracting over and over again, entropy would accumulate. Each cycle would be more chaotic and disordered than the last. Every big bang is a jump event, (global) where k=0 ––> ordered state = flat infinite spacetime, will decrease in favor of disordered state, i.e. to k= ∞. These jumps will happen within each cycle, countless times, always and everywhere in a jumpy way. You can't just reset everything with one bounce. So physicists have started to explore other kinds of cyclical models, ones where entropy doesn't have to accumulate in the same way, where the universe doesn't bounce back like a ball, but perhaps undergoes a transformation, a renewal. For example, some proposals suggest that entropy could be pushed out of our visible universe, diluted or stretched beyond our horizon. That's what happens in inflation, right? It takes small fluctuations and pushes them out, inflates them out of sight. So the universe could
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reset itself thermodynamically if something like that happened again at the end of the cycle. There's also this idea, and it's quite subtle, that what's cycling isn't necessarily the entire universe in the traditional sense. Maybe the conformal structure, the way the universe scales,

is repeating itself. So at the end of the expansion, when everything is incredibly cold, incredibly rarefied, and incredibly the geometry maybe becomes indistinguishable from the conditions of the big bang. That's the idea of conformal cyclic cosmology that Roger Penrose proposed. And it's fascinating because it suggests that the distant future of one universe could be mathematically identical to the beginning of another. You can also fit that into a model in HDV. The death of one cosmos becomes the birth of another. And it's not just a poetic idea. There's real mathematics to it. Penrose's argument is that when all matter in the universe decays, this can be done in my model by "unfolding" the curvatures of dimensions in all elementary particles, which are built "at birth" by collapsing dimensions...
when black holes evaporate, when particles themselves lose their identity, then the universe forgets its scale. If there are no clocks, no rulers, then size loses its meaning. And in this scale-free regime, the geometry of space-time could in principle correspond to the scale-free beginning of a new universe. It's almost as if the universe sheds its snake skin. It stretches. It ages. It cools. And then, as all the structures dissolve, it becomes young again. Not by turning back time, but by rejecting the very idea of the passage of time. But there is another path to cyclical models. One that doesn't come from gravity, but from string theory from higher dimensional physics, and that's where things get really weird and I think quite beautiful, because in these models our universe is not the only one, it's a kind of membrane, a three-dimensional surface floating in higher dimensional space, the brain, which they call short for membrane, and it's not alone, there could be other brains parallel to ours, separated by small distances in these extra dimensions. Erm, and sometimes so often...
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(10)- these brains collide and when they do the energy released in that collision can manifest as a big bang. Um, that's the idea behind the epyotic model. The name comes from a stoic term eiodic destruction and rebirth. In this view, the Big Bang wasn't the origin of everything, but just the latest in a sequence of events, a result of two brains crashing together, flattening out, transferring energy, and then bouncing apart. And this brainworld scenario, it doesn't just explain the bang. It also suggests a mechanism for the cycles. The brains move slowly
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through the higher dimensional space. They're attracted. They approach, they collide and the collision is violent, but it's not a singularity in the usual sense. It's not a breakdown of physics because the extra dimension provides a kind of buffer, a direction in which things can move without becoming infinite. So instead of a singularity, you have a bounce, a smooth transition from contraction to expansion. The physics remains well behaved and the entropy problem which plagued the older cyclic models might be resolved because the brains stretch and flatten between collisions effectively diluting the entropy with each cycle. It's not a perfect solution but it's promising. It shows that there might be a path through. Um, and what's beautiful about this model is that it's it's grounded in something deeper in a theory that tries to unify all the forces including gravity in a consistent framework. String theory or M theory with its extra
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dimensions and its vibrational modes and its elegant mathematical structure is still speculative. Of course, we haven't seen direct evidence of these brains or the extra dimensions, but the mathematics allows for it. And if true, it would mean that our entire observable universe is just a slice of something much larger, a shadow on a higher dimensional stage. Um, and so when we talk about cyclic universes, now we're not just imagining rebounds or rhythmic expansions. We're exploring a landscape where time itself may be part of the cycle. where cause and effect stretch across dimensions where the arrow of time might reset or even reverse depending on the geometry of the bounce. It also means that

the question what happened before the big bang might have an answer that's testable because in

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some of these models the previous cycle could leave an imprint on the next. Tiny variations in temperature, in density, in the cosmic microwave background, subtle patterns that hint at something beyond the traditional beginning. There have been attempts to find those patterns. Circular structures, anomalies, nothing conclusive yet, but the search continues. And that's what makes the cyclic idea so powerful. It opens a door. It says that the universe might not be a one-off event, but part of a larger pattern. That the beginning wasn't the beginning. That time doesn't just stretch forward into infinity, but loops or folds or renews. And perhaps, just perhaps, it's not only the universe that repeats, but the laws themselves, the constants, the structure of reality. Or maybe they vary. Maybe each cycle is different. a new roll of the cosmic

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dice, a new chance at structure, at complexity, at life. And then then we're forced to ask, what drives the cycle? What makes the brains move? What fuels the recurrence? Is it gravity? Is it entropy? Or is it something deeper? Some principle of balance or harmony or inevitability? We don't know. Not yet. But the questions are sharpening. The models are maturing and the idea that the universe is part of a a a grand repeating story. It's no longer just philosophy. It's physics. And it might be the key to understanding what time really is. Not just a line, but a rhythm. Not just a direction, but a song. And the bang just a beat. One of many. There's this picture, this strange picture that comes out of some of the most speculative branches of theoretical physics where our universe, well, isn't

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the whole thing. It's just a slice, uh, a membrane, a brain embedded in a higher dimensional reality called the bulk. Um, and that bulk, it might be filled with other brains like sheets floating in some invisible multi-dimensional space. Now, in this scenario, the Big Bang isn't really the beginning in the traditional sense. It's not an origin from nothing, but rather the result of a collision, a cosmic event between brains. And it's not science fiction, not completely. This comes out of string theory, or more specifically M theory, which extends string theory into 11 dimensions. And one of the implications of these extra dimensions is that you can have entire universes, entire spaceimes

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existing as three-dimensional brains moving within this higher dimensional structure. So the idea is that our universe, the one we see, the one we live in, is a threebrain. It has three spatial dimensions. And everything we know, matter, radiation, forces is confined to it. Everything

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(10)- these brains collide what are these brains made of? and when they do, the energy released in this collision can manifest as a big bang. What form did such a Bang take? Erm, that's the idea behind the epyotic model. ? I don't know. The name comes from the ||Stoic term|| eiodic destruction and rebirth. In this view, the Big Bang was not the origin of everything, but just the latest event in a sequence of events, the result of two brains colliding, flattening, transferring energy, and then bouncing off each other. So the brains were "floating" in something and...and bouncing off "something"? Yes? And this brain-world scenario not only explains the bang. It also suggests a mechanism for cycles. Brains move slowly

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through higher-dimensional space. Ah… and what other (additional) crap do higher dimensions and brains do? They are attracted. They approach, collide, and the collision is violent, but it is not a singularity in the usual sense of the word. It is not a collapse of physics,

because the extra dimension provides a kind of buffer, a direction in which **things** can move without becoming infinite. Erm…, I would not invent such exciting physics, for that you need Einstein-like capacities. So instead of a singularity you have a reflection, a smooth transition from contraction to expansion. In my model I have the Big Bang as an instantaneous jump event of a change in the curvatures of the dimensions of the quantities Length and Time from k=0 to the state k= ∞ …, while a "vacuum foam of dimensions" appears as a plasma in which elementary particles will be realized as packages of dimensions. So my version is a pale decoction of the ideas of great minds. The physics remains intact, and the entropy problem that plagued older cyclic models could be solved because the brains stretch and flatten between collisions, effectively diluting the entropy with each cycle. It's not a perfect solution, but it's promising. It shows that there might be a way through it. And what's beautiful about this model is that it's based (!) on something deeper in the theory that is trying (!) to unify all forces, including gravity, into a consistent framework. And that effort manifests itself in hallucinations? String theory, or M theory, with its extra
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dimensions and vibrational modes and elegant mathematical structure, is still speculative. Of course, we haven't seen direct evidence of these brains or extra dimensions, but the math makes it possible. So that's "super extra math." And does this math allow for anything else? And if that were true, it would mean that our entire observable universe is just a slice of something much bigger, a shadow on a higher dimensional level. My teacher said, if something small doesn't eat you, something big will… And so when we talk about cyclical universes, we're not just imagining reflections or rhythmic expansions. We're exploring a landscape where time itself can be part of a cycle. Er, even that much? where cause and effect stretch across dimensions, where the arrow of time can reset or even reverse depending on the geometry of the reflection. It also means that the question of what happened before the big bang could have a testable answer, because in some of these models could leave an imprint on the next one. Tiny changes in temperature, density, the cosmic microwave background, subtle patterns that suggest something beyond the traditional beginning. There have been attempts to find these patterns. Circular structures, anomalies, nothing conclusive yet, but ||the search continues||. And that is what makes the cyclical idea so powerful. The idea is powerful because the search continues… It opens the door. It says that the universe may not be a one-time event, but part of a larger pattern. That the beginning was not a beginning. The model says… That >time does not just stretch to infinity, +Δ<, but loops, folds or renews itself. The model says…. And maybe, just maybe, it is not just the universe that repeats itself, but also =the laws, the constants=, the structure of reality. Or maybe are different. Maybe each cycle is different. A new roll of cosmic
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dice, a new chance at structure, at complexity, at life. **What a roll, a different number on the dice. And then we are forced to ask what drives the cycle? What moves the brains? What drives the repetition? Is it gravity? Is it entropy? Or is it something deeper? (!) Deeper… Some principle of balance, harmony or inevitability? We don't know. But you know, you're just fooling around with your body… Not yet. But the questions are sharpening. Models are maturing and the idea that the universe is part of a great repeating story. It's not just philosophy anymore. It's physics. And it could be the key to understanding what time really is. And damn, that's a lot to understand. Two brains, collision reflections as drivers for further cycles, the beginning is not the beginning. That's too much for my brain. <u>It's not just a line, it's a rhythm. It's not just a direction, it's a song.</u> And a bang is just a bang. (!) One of many. There's this image, this strange image that comes out of some of the **most speculative** branches of theoretical physics, where our universe, well, isn't

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the whole thing. It's just a bit, just a bit of speculative, er, er, membrane, a brain embedded in a higher dimensional reality called volume. Now that's interesting: higher dimensions are called volume... Er, and that volume could be filled with other brains, oh my... like sheets floating in some invisible multidimensional space. In this scenario, the Big Bang is not actually a beginning in the traditional sense. It's not origin from nothing, but rather the result of a collision, a cosmic event between brains. And it's not science fiction, not quite. It comes from string theory, more specifically M theory, which extends string theory to 11 dimensions. And one of the implications of these additional dimensions is that you can have entire universes, entire space-times that exist as three-dimensional brains moving around in this higher dimensional structure. So the idea is that our universe, the one we see, the one we live in, is a three-brain. The question of the day: will (pseudo)science progress to even more crazy crap… It has three spatial dimensions. And everything we know, matter, radiation, forces, is limited to it. And we're back to Newton…(finally). Everything
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(11)- except gravity. That's the key part. Gravity is different. It's a property of spaceime itself, not just of particles within it. So in these models, gravity can leak. It can move through the bulk. And that's why physicists started thinking seriously about the consequences of this higher dimensional setup because it could explain why gravity is so weak compared to the other forces. It's diluted, spread out into extra dimensions we can't see. But what's fascinating and really quite elegant is how these ideas give rise to a a
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possible explanation for the origin of our universe. Because if you've got two brains, two parallel universes moving through this higher dimensional space, then sometimes they can collide. They can slam into each other. And the energy released in that collision, well, that could be the big bang or at least what we experience as the big bang. It's not the creation of spaceime itself, but the birth of the hot dense state that evolves into the universe. We know this is the essence of the eperotic model. It says that before the bang there was something. There was structure. There was geometry. There were brains slowly drifting, stretching, approaching each other across a tiny compactifified extra dimension. And when they got close enough, their fields interacted, their geometry distorted, and the collision created a tremendous burst of energy enough to heat the brains, to fill them with radiation and matter to start expansion. And then they rebound. They separate
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again. And the universe cools, expands, forms galaxies, stars, life until eventually the cycle begins again. the brains drift and then another collision, another bang. What makes this model so compelling, I think, is that it offers a coherent way to think about what happened before the big bang. Because in the standard cosmological model, there is no before. Time itself begins at the bang, but here time continues. The brains existed before the collision. The bulk existed. the dynamics of motion through the higher dimensional space existed. So you don't have to imagine a universe emerging from nothing. Instead, it emerges from something deeper, something prior. And what's interesting is that this model avoids the traditional singularity. Because in
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general relativity, when you trace everything back to the bang, you get this point of infinite density, infinite curvature, a singularity where the laws of physics break down. But in the epyotic scenario, the collision isn't a singularity. It's a physical process describable by the equations of motion in this higher dimensional space. There's no infinite density, just a transfer of energy from motion in the bulk to heating on the brains. It's quite a different way

of thinking about the origin of the universe. Instead of an explosion from nothing, you've got a kind of conversion, a transformation of kinetic energy into thermal energy, a collision that sets everything in motion, but not a creation from absolute absence. And this leads to some really profound implications because it means that the Big Bang wasn't unique. It

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wasn't special in the sense of being a one-off event. If these collisions can happen more than once, if the brains oscillate, or if there's some force drawing them back together over time, then the universe might be cyclic after all. Not in the simple sense of expansion and contraction, but in a deeper, more fundamental rhythm. A cycle of approach, collision, separation, bang, evolution, drift, repeat. And each cycle could reset the conditions, could wipe the slate clean, or maybe not entirely, maybe some imprints remain, tiny variations, residual asymmetries that carry information from one cycle to the next. And that raises the question, could we see them? Could we find evidence of a pre-bang epoch hidden in the data? Some cosmologists have looked at this. They've searched for patterns in the cosmic microwave background for

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anomalies, concentric circles, things that don't quite fit the inflationary predictions. Nothing definitive yet, but it's tantalizing because if we could see evidence of a prior cycle, then that would change everything. It would push the boundary of our knowledge further back. It would make the before of the big bang a scientific question, not just a philosophical one. Now, one of the challenges with the eperotic model and its cyclic extensions is how to explain the uniformity of the universe. That's something inflation does very well. It stretches out in homogeneities, makes everything look flat, smooth. So for any competing model you need some mechanism that achieves the same thing. And the epyotic scenario does have one. It …………………………………………………………………………………………………

(11)- except gravity. That's the key part. Gravity is different. It's a property of spacetime itself, Well…I don't think so. If gravity were a "property", then everything would be *//property//*. not just the particles in it. So in these models, gravity can leak. It can move through volume. And that's why physicists started to seriously think about the implications of this higher dimensional arrangement, because it could explain why gravity is so weak compared to the other forces. To understand gravity and spacetime, you need to read and explore my HDV. It's diluted, spread out into other dimensions that we can't see. The macrocosm doesn't have and doesn't need higher dimensions. In the microcosm, they're what makes matter. But what's fascinating and really elegant is how these **ideas lead to** a possible explanation for the **origin of our universe**. Because if you have two brains, two parallel universes moving through this space of higher dimensions, then they can collide. That's a crazy idea. Maruška from 5A wouldn't have thought of that. (Galaxies don't collide, but brains can?) They can collide. And the energy released during this **collision**, that could be the big bang or at least what we experience as the big bang. Your model, erm. My model doesn't know (I don't know) how and when and why a jump event will "someday" occur in which the curvatures of all dimensions change to extreme positions, i.e. from k=0 to k= ∞. That's (my) problem. But I feel that it's not unsolvable if wise physicists take it on a challenge. It's not the creation of spacetime itself, but the birth of a hot dense state that evolves into the universe. I believe that the Big Bang is a jump change in the curvature of the dimensions of quantities. We know that this is the essence of the eperotic ? model. Isn't it supposed to be an ekpyrotic model?..? They say that something existed before the bang. Yes, they say that. I say it myself. It belongs to the basis of my hypothesis. There was structure. Probably not. There was geometry. Probably not. There were brains that slowly moved, stretched and approached each other through a tiny condensed extra dimension. Before the Big Bang, no dimension could be

condensed. Not even all the real 3+3D, let alone some extra-dimension that wasn't there at all. And when they got close enough, their fields interacted, their geometry distorted, and the collision created a huge burst of energy enough to heat up brains, not… to fill them with radiation and matter to start the expansion. No. That's where our visions are at odds. Before the big bang, there were no curved dimensions, and therefore! there was no matter, and therefore no explosion. The big bang could not have been an explosion. And then it bounces off. It separates again.
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And the universe cools, expands, forms galaxies, stars, life, and eventually the cycle begins again. Brains drift, and then another collision, another bang. No. I think what makes this model so compelling is that it offers a coherent way to think about what happened before the big bang. That's a lame argument… Because in the standard cosmological model, there is no "before." Time itself begins with the bang, that's also wrong. The bang begins the flow - the flow of time, not time itself, but here time continues. Brains existed before the collision. Most existed. The dynamics of movement through higher-dimensional space existed. So you don't have to imagine a universe that arises from nothing. Instead, it emerges from something deeper, something previous. And the interesting thing is that this model avoids the traditional singularity. Because in
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general relativity, if you trace everything back to the bang, you get this point of infinite density, infinite curvature, a singularity where the laws of physics break down. But in the epiotic scenario, the collision is not a singularity. It's a physical process that can be described by the equations of motion in this higher-dimensional space. There's no infinite density, just the transfer of energy from the motion of matter to the heating of the brain. It's a completely different way of thinking about the origin of the universe. Instead of an explosion out of nothing, you have some kind of transformation, a transformation of kinetic energy into thermal energy, a collision that sets everything in motion, but not creation out of nothing. And that leads to some really profound implications, because it means that the Big Bang was not unique.
It wasn't
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special in the sense of a one-off event. It was special in the sense of a unique event. If these collisions can happen multiple times, if brains oscillate, or if there's some force that pulls them back together over time, then the universe could ultimately be cyclical. Not in the simple sense of expansion and contraction, but in a deeper, more fundamental rhythm. A cycle of approaching, colliding, separating, banging, evolving, drifting, repeating. And each cycle could reset the conditions, could wipe the slate clean, or maybe not completely, maybe there would be some imprints, tiny variations, residual asymmetries that carry information from one cycle to the next. And that raises the question of whether we could see them? Could we find evidence of a pre-bang era hidden in the data? Some cosmologists have looked at that. They've been looking for patterns in the cosmic microwave background for
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anomalies, concentric circles, things that don't quite fit the inflationary predictions. Nothing definitive yet, but it's tempting, because if we could see evidence of a previous cycle, then that would change everything. It would push the boundaries of our knowledge back further. That would make the question of before the Big Bang a scientific one, not just a philosophical one. One of the challenges of the eperotic model and its cyclical extensions is how to explain the uniformity of the universe. That's something inflation does very well. It expands in homogeneities, so everything looks flat and smooth. So for any competing model, you need some mechanism that achieves the same thing. And the eperotic scenario has one.

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(12)- involves a slow contraction phase before the collision where the universe becomes flatter and more homogeneous

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over time. So instead of inflation after the bang, you have this ultra slow contraction before it. Different physics but similar result. And again, the advantage is that it avoids the singularity. The transition from contraction to expansion doesn't require an infinite point. It's smoothed out by the higher dimensional dynamics. The bounce is not instantaneous. It's mediated by the properties of the brains, their interactions, the geometry of the bulk. Another interesting feature is the role of the scalar fields. In many versions of the eperotic model, the brains aren't just drifting randomly. They're driven by scalar fields which act like potentials guiding their motion through the bulk. And those fields can also generate the density fluctuations that seed galaxies. So the origin of structure of the cosmic web could come not from quantum fluctuations during inflation but from quantum fluctuations in the position of the brains or in the

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dynamics of these fields. It's a rich complex picture and it connects cosmology with fundamental theory in a deep way. Because to really test these ideas, we need to understand the geometry of extra dimensions. We need to know how brains interact, how energy transfers across the bulk, how entropy behaves across cycles. And these are questions at the frontier, at the edge of what we can model, what we can simulate. But the reward is huge. If this picture is right or even partly right, then it gives us a coherent narrative that extends beyond the bang. It gives us a way to unify the beginning of the universe with high energy physics, with quantum gravity, with the geometry of space itself. And it gives us perhaps a new way to understand time. Because in this model, time isn't just a backdrop. It's part of the process. It's

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woven into the cycles. It flows not from nothingness but from motion from the geometry of the higher dimensional space. And maybe in a sense time itself is born a new with each cycle. Maybe the arrow resets. Maybe causality rewrites itself. It's difficult to visualize. Our brains aren't wired to think in 11 dimensions to picture brains sliding through a bulk. But the mathematics allows it. And that's often how physics works. We let the equations guide us beyond our intuition into places where reality is stranger than anything we could have imagined. And this place, this space between brains, it might be the true origin. Not a point in our past, but a process that continues unobserved behind the scenes. A cosmic dance that creates universes again and again through collisions and rebirths. Not out of

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chaos, but out of structure, out of geometry, out of the deeper fabric ofreality. If you try to strip everything away, the matter, the stars, the fields, even space itself, and ask what remains, what's left when there's truly nothing. What you're left with, at least according to quantum field theory, is the vacuum. But not an empty vacuum, not a perfect void. It's a quantum vacuum and that's something else entirely because even when there's no particle, no field excitation in the usual sense, there's still energy, there's still fluctuation, there's still activity. And that's the weird thing, the deeply unintuitive part. In quantum theory, nothing is never really nothing. The lowest energy state of any field still possesses uncertainty. The fields can't be pinned down to exact

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values. is they jitter. They oscillate. Even at zero temperature, even in perfect stillness, there's this background hum of energy. We call it zero point energy. And it's not a metaphor. It's measurable. The Casemir effect, for instance, where two metal plates placed very close together in a vacuum feel an attractive force. That's a real physical consequence of the vacuum energy between them being lower than outside. The quantum vacuum is doing something. So if we think about the origin of the universe and we imagine that before space and time emerged, there was no geometry, no background, no structure, what could that have looked like? Could it have been this kind of vacuum, a quantum state that wasn't empty in the classical sense, but that contained the seeds, the potential for for space and time to emerge? There's a proposal that goes something like this. The vacuum isn't

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the absence of existence. It's the source of it. Spacetime could be an emergent property of quantum fields. And what we experience as geometry, the distances between things, the passage of time might arise from the entanglement structure of the vacuum itself. That is the ………………………………………………………………………………………………….

(12)- involves a slow contraction phase before the collision, where the universe becomes flatter and more homogeneous over time

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So instead of inflation after the bang, you have this ultra-slow contraction before it. ? Different physics, but similar result. And again, the advantage is that it avoids the singularity. The transition from contraction to expansion does not require an infinite point. It is smoothed out by higher-dimensional dynamics. The bounce is not instantaneous. It is mediated by the properties of the brains, their interactions, the geometry of the volume. Another interesting feature is the role of scalar fields. In many versions of the eperotic model, the brains do not just move randomly. ?? These are fabrications for me. They are driven by scalar fields that act as potentials that control their movement through the volume. And these fields can also generate density fluctuations that seed galaxies. So the origin of the structure of the cosmic web could come not from quantum fluctuations during inflation, but from quantum fluctuations in the position of brains or in the dynamics of these fields. It's a rich and complex picture that deeply connects cosmology to fundamental theory. To really test these ideas, we need to understand the geometry of extra dimensions. I'd love to. To me, extra dimensions are the "mathematical entities" for making complex matter. We need to know how brains interact, how energy is transferred across matter, how entropy behaves across cycles. And these are questions at the edge of what we can model, what we can simulate. But the payoff is enormous. If this picture is right, or at least partially right, then it gives us a complete story that goes back beyond the bang. It gives us a way to unify the beginning of the universe with high-energy physics, with quantum gravity, with the geometry of space itself. And it gives us perhaps a new way to understand time. Understanding time is the same and just as difficult as understanding space. Because in this model, time is not just a backdrop. It is part of the process. O.K. It is

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woven into cycles. It does not flow from nothingness, but from movement from the geometry of higher-dimensional space. ?? And maybe in some sense, with each cycle, new time is born. Maybe the arrow resets. Maybe causality is rewritten. It's hard to imagine. Our brains are not wired to think in 11 dimensions but in some sense they do **think !!** in 11+ dimensions and imagine brains moving through volume. But mathematics makes it possible. And that's how physics often works. We let equations lead us beyond our intuition to places where reality is stranger than anything we could have imagined. And this place, this space between brains, could be the true origin. Not a point in our past, but a process that goes on unnoticed behind the scenes. A cosmic dance that creates universes over and over again through collisions and rebirths. Not out of chaos, but out of structure, out of geometry, out of the deeper structure of reality.If you try to remove everything, matter, stars, fields, even space itself, (*) and you ask

what is left, what is left when there is really nothing left. What you are left with, at least according to quantum field theory, is a vacuum. (*) If you remove space, you are not left with space, a vacuum does not exist without space. But not an empty vacuum, not a perfect void. It is a quantum vacuum (*) and that is something entirely different, because even though there are no particles, no excitations of the field in the usual sense, there is still energy, there is still fluctuation, there is still activity. And that is the strange thing, the deeply counterintuitive part. In quantum theory, nothing is ever really nothing. The lowest energy state of any field still exhibits uncertainty. Fields can't be pinpointed to a precise value, they vibrate. They oscillate. Even at zero temperature, even in perfect stillness, there's this humming of energy in the background. We call it zero-point energy.
And it's not a metaphor. It's measurable. For example, the Casemiro effect, where two metal plates placed very close together in a vacuum feel an attractive force. That's a real physical consequence of the fact that the energy of the vacuum between them is lower than the outside. Quantum vacuum does something. So if we think about the origin of the universe and imagine that before the emergence of space and time there was no geometry, no background, no structure, what might it look like? Could it be such a vacuum, a quantum state that was not empty in the classical sense, but which contained the seeds, the potential for the emergence of space and time? I think you're mixing apples with oranges here. If I have to think about what was before the emergence of space and time and think/consider that there was "such a" vacuum, and not yet completely empty, blah-blah, that's nonsense. After all, a vacuum doesn't exist without space, maybe even without time. And you say that the vacuum contains the seeds for the emergence of space and time, what nonsense is that (?) There is a proposal that goes something like this. Vacuum is not
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the absence of existence. It is its source. Vacuum is the source of existence?? What is this next delusion? For something to exist, I don't always need a vacuum. Spacetime could be an emergent property of quantum fields. Spacetime is a property of quantum fields?? That's the third delusion.! And what's more, spacetime **springs** from quantum fields? Oh, the horror. And what we perceive as geometry, distances between things, the passage of time, could arise from the structure of the interconnectedness of the vacuum itself. And the horror continues: the vacuum is interconnected, you say, and from this interconnectedness that geometry, distances (i.e. the dimension of the quantity Length) and the passage of time arise, that's madness... That's
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(13)- way quantum fields are correlated across space even in their lowest energy state might be the foundation for what we perceive as reality. And that's a radical idea really uh because it reverses the picture. We don't have space and then put fields into it. We have fields, fundamental ones, and their structure gives rise to the illusion of space. You can see this in some versions of the ads divided by CFT correspondence. That's a mathematical duality in string theory where a gravitational theory in a volume of space is exactly equivalent to a quantum theory without gravity on the
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boundary of that space. And the geometry of the interior, the shape of spaceime seems to be encoded in the entanglement of the boundary system. So space itself might be a kind of emergent code, a hologram. And the vacuum, far from being empty, is the deepest layer of that code. It contains all the instructions, all the rules, all the raw material. And time. Time could arise from the way that information changes, from transitions in the vacuum state, from correlations evolving. And if that's the case, then the origin of the universe wasn't a bang in space. It was a phase transition in the vacuum, a shift from one state to another. Maybe the the

vacuum fluctuated into a higher energy uh configuration, a false vacuum, and that state was unstable. It decayed. And when it decayed, the energy difference got released, inflating a bubble of spaceime, our bubble, our universe. This

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kind of scenario comes up in inflationary cosmology. The inflaton field, the field that supposedly drove the rapid expansion in the earliest fraction of a second, could have started in a metastable vacuum, a temporary plateau in the energy landscape. And when it rolled down to a lower energy state, the result was an enormous release of energy causing space itself to stretch. And then as the field settled, the energy turned into particles, radiation, the hot soup we associate with the early universe. But this process could happen again and again. Because the quantum vacuum isn't a fixed thing, it can have many possible configurations. There could be a whole landscape of vacua each with different energy levels, different physical laws, different constants. And the process of tunneling, of transitioning from one vacuum to another

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might never stop. New bubbles could form in other regions, other universes, other histories disconnected from ours. This is the multiverse idea at least in one version. A vast space or meta space filled with different pockets of reality each emerging from different vacuum states. Our universe in this view is just one region where the vacuum happen to take on a configuration that supports life, complexity, structure, the laws we observe, the constants we measure. They're not uniquely determined. They're environmental. They're local. And the question then becomes, what selects the vacuum? Why this one and not another? Is there a principle that governs which vacuum becomes real? Or is it just chance, a quantum roll of the dice? Some have argued that maybe all possible vacua exist. That every

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possible configuration is realized somewhere in this vast landscape and that what we call the beginning of the universe is just the nucleation of one such region. A local pocket where the vacuum transitioned, where space inflated and where time as we understand it began. And this brings us to a strange place because if time emerges after the vacuum transition, then the transition itself doesn't happen in time. It defines time. It's the origin of causal structure of before and after. So from our perspective, there's a moment when the vacuum changed. But from outside, if there is an outside, there is no moment, no flow, just a probability, a condition, a quantum event without temporal coordinates. And that's hard to grasp. It feels like a contradiction. But quantum mechanics is full of that kind of thing. Events that

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don't have definite positions until observed. States that evolve probabilistically, not deterministically. So maybe the birth of spacetime from the vacuum is the same kind of thing. An event without a cause, but with a probability, a fluctuation, not in something, but of something. And here's another layer. Vacuum energy isn't just a theoretical idea. It has observational consequences. The expansion of the universe is accelerating. That's what dark energy is, or at least what we call it. And one of the simplest explanations is that the vacuum has a small but nonzero energy. That even empty space has pressure. And that pressure pushes space apart gently but persistently. So the vacuum doesn't just create space. It stretches it. It

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(13)- This is the way quantum fields are correlated across space ? even in their lowest energy state, could be the basis of what we perceive as reality. And that's a radical idea, after a dose of meth er, because it turns the picture inside out. Yeah… We don't have space and then we put fields into it. We don't have a mother and then we give birth to a child from her… We have fields, the fundamental fields, and their structure gives rise to the illusion of space. The structure of the bed gives rise to the illusion of intercourse. You can see this in some versions of the ads split by CFT correspondence. This is a mathematical duality in string theory, where the gravitational theory in the volume of space is exactly equivalent to the quantum theory without gravity at the boundary of that space. And the geometry of the interior, the shape of spacetime, seems to be encoded in the coherence of the boundary system. So space itself could be some kind of emergent code, ? a hologram. And the vacuum, far from empty, is the deepest layer of this code. It contains all the instructions, all the rules, all the raw material. **And time**. Time could arise from the way information changes, information changes (dad was drinking yesterday, today he has a headache) and from this information (how it changes), you say that time arises. Stop smoking… from transitions in the vacuum state, from evolving correlations. ?? And if this is so, then the origin of the universe was not a bang in the universe. It was a phase transition in the vacuum, a shift from one state to another. That is a more sober consideration, it is closer to my vision: “our post-bang universe”, with matter, arose from the state of space-time before the Bang, (without matter) and this by a jump change in the curvatures of the dimensions of two quantities from k=0 to k=infinity. Etc. Maybe the vacuum went into a higher-energy configuration, ahem, a false vacuum, and that state was unstable. It collapsed. And when it collapsed, the energy difference was released and inflated a bubble of spacetime, our bubble, our universe. This

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kind of scenario occurs in inflationary cosmology. The inflaton field, the field that supposedly drove the rapid expansion in the earliest fractions of a second, could have started in a metastable vacuum, a temporary plateau in the energy landscape. And when it rolled down to a lower-energy state, the result was a huge release of energy that caused space itself to expand. And then, as the field stabilized, the energy turned into particles, radiation, the hot soup that we associate with the early universe. But this process could have been repeated over and over again. Because the quantum vacuum is not a solid thing, it can have many possible configurations. There could be a whole landscape of vacuums, each with different energy levels, different physical laws, different constants. And the process of tunneling, of going from one vacuum to another,

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need never stop. New bubbles could form in other regions, other universes, other histories disconnected from ours. This is the idea of the multiverse in at least one version. A vast space or metaspace filled with different pockets of reality, each emerging from a different state of the vacuum. Our universe, in this view, is just one region where the vacuum takes on a configuration that supports life, complexity, structure, the laws we observe, the constants we measure. They are not uniquely determined. They are environmental. They are local. And the question then becomes: what chooses the vacuum? Why this one and not another? Is there a principle that governs which vacuum becomes real? Or is it just chance, a quantum roll of the dice? Some have argued that perhaps all possible vacuums exist. That each

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maybe the configuration is realized somewhere in this vast landscape and that what we call the beginning of the universe is just the nucleation of one such region. A local pocket where the vacuum crossed over, where space inflated and where time, as we understand it, began. And that brings us to a strange place, because if time appears after the vacuum crossing over, then the crossing itself does not occur in time. It defines time. It is the origin of the causal structure before and after. So from our perspective there is a moment when the vacuum changed. But from the outside, if there is an external world, there is no moment, no flow, just a probability, a condition, a quantum event with no time coordinates. And that is hard to understand. There are many things that are hard to understand. ((I have a hard time understanding how it is possible that no smart person has read my HDV yet, even though

there are 6 billion people in the world)). It seems like a contradiction to me. But quantum mechanics is full of such things. Events that
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don't have definitive positions until they are observed. States that evolve probabilistically, not deterministically. So $\boxed{\text{maybe the birth of spacetime from a vacuum}}$ maybe the birth of a vacuum from spacetime is the same kind of thing. An event without a cause, but with probability, a fluctuation, not in something, but in something. And here's another layer. Vacuum energy is not just a theoretical idea. It has observational consequences. The expansion of the universe is accelerating. That's what dark energy is, or at least what we call it. That vacuum energy is created just enough to keep the density of the universe constant. Why did the universe choose it that way? And one of the simplest explanations is that a vacuum has a small, but non-zero energy. O.K. And why? Because the principle of realization, of the construction of matter is the "bending of dimensions" of those two fundamental quantities...by bending of dimensions, matter is produced. That even empty space has pressure. And this pressure gently but persistently pushes space apart. So vacuum doesn't just create space. It stretches it. A little differently, a different point of view: the universe – space-time is expanding https://www.hypothesis-of-universe.com/docs/c/c_032.gif and in order not to expand at an accelerated rate, only as much vacuum energy is created as is "needed" for the "parabolic expansion".
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(14)- shapes its fate. And if that energy is constant, if it doesn't decay, then the
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universe will continue expanding forever, growing colder, emptier, more diffuse. until galaxies fade from view. Stars die, matter decays, and all that's left is the vacuum again. Which brings us full circle. Because in that cold, dark future, the vacuum might still fluctuate. New bubbles might still form. New universes might still be born. The cycle doesn't repeat in the classical sense, but in the quantum sense as possibility, as potential eternally. And maybe that's the deepest truth that the vacuum isn't the end. It's the beginning. It's not nothing. It's everything that could be. And we we're just one expression of that potential. one configuration that happened to work to last to ask the question. And it's strange to think that the vast
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structured luminous universe we see could have emerged from something so simple, so silent, so seemingly empty. But the quantum vacuum is never truly empty. It's seething with possibility with virtual particles, fleeting connections, unstable configurations, with the raw ingredients of space and time and all the rest. So when we ask where did it all come from, one answer is that it came from the vacuum. Not from a place, not from a time, but from the underlying state of reality, a quantum foam of uncertainty, a sea of potential and one fluctuation became us. So in the end, when we trace it all back from the the expanding galaxies to the quantum foam, from the cycles of time to the silent vacuum, we find ourselves face to face with mystery. a mystery that science keeps
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illuminating bit by bit. If you'd like to keep exploring these questions with us, don't forget to subscribe. It really helps us continue this journey through space and time. And now go ahead and
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watch the video that's appearing on your screen. It's the next step deeper into the story of our universe.
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(14)- shapes its destiny. And if this energy is constant, if it does not decay, then

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the universe will forever expand, cool, become emptier and more diffuse, until the galaxies disappear from sight. Until the galaxies dissolve = dissolve. Stars die, matter decays, and all that remains is again vacuum = empty spacetime, flat, infinite, without matter, without the passage of time (but with stoic time), without principles, laws and rules, without fields and without people. Which closes us. Because in that cold, dark future, the vacuum can still fluctuate. New bubbles can still form. New universes can still be born. ? The cycle repeats itself not in the classical sense, but in the quantum sense as a possibility, as a potential forever. And perhaps this is the deepest truth that the vacuum is not the end. It is a beginning. It is nothing. It is everything that could be. And we are just one manifestation of that potential. One configuration that happened to work out and asked a question. And it is strange to think that the vast
1:16:03
structured, luminous universe that we see could have come from something so simple, so quiet, so seemingly empty. It came from just two quantities **"x" and "t"** and their 3+3 dimensions. But the quantum vacuum is never truly empty. It is teeming with possibilities with virtual particles, and these are made by "curving = packing" dimensions… fleeting connections, unstable configurations, with the raw ingredients of space and time and everything else. So when we ask where it all came from, **one** answer is that it came from a vacuum. And **another** one of the answers is that according to ***Principle of alternating symmetries with asymmetry*** i "point=god" (asymmetry) came onto the scene. The point (according to that Principle) transformed/doubled into two points (symmetry). And the two points transformed into a "flow of points", which is an infinite straight line (asymmetry)…, the straight line doubled into two straight lines, (symmetry), they rotated and there was a surface. A "surface vector" perpendicular to the surface grew on the surface, and there was volume=space (asymmetry).
Similarly with time. Until both quantities "met and united" into space-time (symmetry). Etc. End of making up nonsense. Not from place, not from time, but from the basic state of reality, a quantum foam of uncertainty, a sea of potential and one fluctuation became us. So, ultimately, when we trace it all back from expanding galaxies to quantum foam, from time cycles to the silent vacuum, we find ourselves face to face with a mystery. A mystery that science is still
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illuminating bit by bit. If you'd like to explore these questions with us further, be sure to subscribe. It really helps us continue this journey through space and time. And now, get started
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on the video that appears on your screen. It's another step deeper into the story of our universe.
JN, 11.11.2025 s překladem mi to trvalo do 15.11.2025

Poznámka: na můj vkus a na to, že to je těžká věda, je tu **až moc** slov:
„možná", „asi", „kdyby", „pokud", „mohlo by", „cokdyž", … (jako náhražka argumentů a důkazů). →
←
Note: for my taste and because it is a difficult science, there are **too** many words:
"maybe", "probably", "if", "if", "could", "what if", … (as a substitute for arguments and evidence).