||
https://www.youtube.com/watch?v=gpgor5hdD8s

# The Big Bang Theory | Roger Penrose, Sabine Hossenfelder, Sean Carroll, Chris Impey and more

**Teorie velkého třesku** (Penrose, Hossenfelder, Carroll)

14 994 zhlédnutí • 14. 6. 2021 • Roger Penrose, Sabine Hossenfelder, Sean Carroll, David Tong, Laura Mersini-Houghton, Chris Impey and Bjørn Ekeberg debate the Big Bang Theory.

**(01)**

[Music]
in the beginning there was a big bang except there wasn't here is a theory that tells us everything from the first fraction of a second to present day but that picture does not tell us what was there before that's the fundamental mystery of cosmology why was it like that these are all ideas which are hugely speculative based on a lot more interpretations and metaphysical assumptions than is commonly supposed that's the weak point of conventional cosmology and then we take those theories and just import them to the big bang where we see that they just fit all the observations perfectly there as well i'm going to start at the beginning and as you all know in the beginning there was a big bang except there wasn't this is not what the beginning of the universe looked like there was no bang in the big bang theory there's no explosion in the big bang theory in fact um and this may come as a bit of a surprise the big bang theory has absolutely nothing to say about the question of how the universe started what it does describe is what the universe looked like when it was very much younger and the entire theory is based on an extremely simple premise it's the following we look out in the universe around us and we see all the stars and the galaxies and all of those galaxies are moving further away so tomorrow they're going to be further away from each other than they are today the big bang theory really just winds the clock back and makes the very obvious observation that if you go back into the past everything's closer together so the big bang theory takes that and just pushes it to the most extreme limit imaginable it suggests the following as you squeeze things closer together they get hotter and the big bang theory says that if you take that to the limit there was a time in the very distant past it's about 14 billion years ago when there were no stars there were no galaxies there were no planets instead the entire universe was filled with a fireball this is the entire universe this is the the history of history itself that this uh sort of you know white blurry bit here is what we would colloquially call the big bang for the first period of the universe there was a fireball which filled the universe this is this kind of mottled green and blue uh color in the diagram here but at some point of course that the fireball cooled at around 380 000 years after the big bang and then when it cooled there was a bunch of stuff more or less just hydrogen atoms but very slowly over a long period of time the hydrogen started to gather and clump together it did this just because of gravity and as they got bigger the pressure inside the clump would get larger and larger after about 500 million years the pressure inside the clumps got so large that the hydrogen ignited this was the birth of the very first stars there are stars being born there are stars dying when they die they have these wonderful supernova explosions they spew out all these heavy elements that they've created into the void forms new stars it forms galaxies it forms planets and the reason we know it's true is because we can see it so this is the photograph of the fireball that filled the big bang in the early universe it's called the cosmic microwave background radiation there are bits in the fiber that are hot they're red and there

are .,bits in the fibers that are cold they're blue and there's information in these flickers 380 000 years after the big bang at this time the fireball is roughly 100 thousand degrees centigrade at a hundred thousand degrees centigrade atoms melt the electrons just can't cling on anymore so they get stripped away from the nucleus of the atom so at this temperature what you have is a gas not of atoms but a gas of the nuclei and then electrons which are which are flying around it's usually called a plasma rather than a gas so that that's what's going on so that's 380 000 years and now we wind the clock back and as we go backwards in time things get hotter until you reach a temperature we get this right of 10 000 million celsius
……

**(01)** [Music] There was a big bang in the beginning, except there was no theory, but there was = HDV, but you were too lazy to read it which tells us everything from the first split second to the present, but this picture it doesn't tell us what was there before, that's the fundamental mystery of cosmology, why it was is that it's all ideas that are highly speculative O.K. , unfortunately for a long time they will be speculative… based on a lot more interpretations and metaphysical assumptions than is commonly believed to be the weak point of conventional cosmology, and then we take these theories and just import them into the big bang, where we see that they just there all the observations fit perfectly, I'll start at the beginning and as you all know at the beginning there was a big bang except that it wasn't what the beginning of the universe looked like that there is no bang in the big bang theory in fact there is no explosion in the theory of the big bang, and this may come as a bit of a surprise, the big bang theory your VT theory has nothing to say it has **absolutely** ugh nothing to say about how the Universe started, which describes what the Universe looked like when it was much younger and the whole theory is based on an extremely simple assumption that in the following we are watching the universe around us and we see all the stars and galaxies and all these galaxies are moving away, sure, but not in the way that only you imagine. HDV offers an unwrapping of space-time dimensions so that tomorrow they will be further apart than they are today, O.K. but like this http://www.hypothesis-of-universe.com/docs/c/c_032.gif ; the big bang theory really just turns back the clock and makes the very obvious observation that if you go back in time everything is closer together so the big bang theory takes that and just pushes it to the most extreme limit imaginable suggests the following , when you squeeze things closer together, they will be hotter Caution ! The scenario that a ball appeared after the VT = a singularity in which no matter was packed and thus could not even be hot is not excluded. If there was another scenario for discussion, that the Big-bang is only "a subtle inaudible change of the state of dimensions, the state of 3+1 (or 3+3D) flat, i.e. flat space-time to the opposite, i.e. extremely curved space-time, **then only**! !!! matter would be created, which would be a state of plasma, in which quanta čp = objects = packages, packed into balls, made of dimensions (!) as elementary particles would be separated GRADUALLY. Yes, dimensional warping is matter-forming and thus energy is a state of matter, so the state of extremely warped dimensions is boiling "burning" plasma. However, understand that no one supplied energy to this state, it is hot only because it is curved, curved dimensions are the essence of "hot matter". There are only two elements in the primordial plasma = quark packets U, D, then an electron and then a photon and maybe "already" gluons. Enough. This state weighs $10^{52}$ kg. = boiling mass of dimensions, not mass, but dimensions. Baryonic matter. (I am not evaluating exotic black matter yet. Black energy is easier to explain, because even today in a vacuum on Planck scales, curved space-time emerges emergently and curvature (as we know, is - the principle - of the structure of matter, i.e. energy. On scales of $10^{-43}$ m energy still emerges, the dark energy of the vacuum and brings the global universe into disequilibrium - the energy density is constant). Here is the cause, the birth-recruit of elements with mass. Mass will then be a "property" of matter, i.e. a property of wrapped

cocoons of dimensions. **Weight** is printed on packages only because they are "**curved dimensions**". We only have to wonder that $10^{52}$ kg of weight was born by "**instant** warp change" from "zero-curvature before Bang to "near-infinite-curvature" after the Bang and that this "flash change produced $10^{52}$ kg of baryonic matter , and the big bang theory says that if you take it to the limit, there was a time in the very distant past, it's about 14 billion years ago, when there were no stars, there were no galaxies, there were no planets, O.K., there was only plasma = boiling 3+3D dimensions of space-time – it was just that.., and only in Big-Bang did the unfolding of time begin. Before Big-bang, there was only stoic time, only infinite dimensions. Thanks to the **unpacking** warping of time dimensions instead the entire universe was filled with a ball of fire this is the entire universe this is the history of history itself you know this kind of white blur here is what we would colloquially call the big bang for the first period of the universe, a ball of fire that filled the universe, And that would correspond with my idea: So there will be interesting objections to my interpretation - the model in HDV that : before big-bang the 3+3D state is infinite, it is " Megauniverse" and in this infinite state the final location is created !!!, in the Megauniverse the "big bang" for "our little Universe" will take place, i.e. the change of non-curved **dimensions to curved dimensions**. How big is the location? This is a special question, isn't it? Well, arbitrarily..., if it is a locality of finite sizes 3+3D, then it can also be suggested that big-bang is not a singularity, not even a single point singularity, and this Big-bang actually continues here, even today, still in the microworld on scales of $10^{-44}$m, that locality **f i n a l** emerges; So Big-bang is still always and everywhere. The formation of "our" universe is still ongoing. The location "our universe" is in the middle of the "Great Infinite Universe" ... in this logic, then Penrose's hypotheses **of many other universes could also apply, because they will = are all "curve-dimension locations" floating in infinite flat space-time** ( still no matter ) it's kind of a splotchy green and blue color in the diagram here, but at some point of course the fireball cooled down about 380,000 years after the big bang and then when it cooled where did the fireball go did it transfer its heat-energy?... it flew away in photons?..., and where if the reality is a) expanding space-time at a speed less than "c" and the heat-energy would have to go outside the location (?). . a lot of things were more or less just hydrogen atoms, but very slowly over a long period of time the hydrogen started to collect and clump together, O.K. Dimensional collapsing is "programmed" in such a dynamic FINAL universe… it only happened because of gravity and as they got bigger, the pressure inside the cluster got bigger and bigger after about 500 million years, the pressure **inside the clusters** got bigger and bigger , that hydrogen ignited, that was the birth of the first stars, stars are born, stars die, when they die, they have these amazing supernova explosions, they spew all these heavy elements that they have created into the void forms new stars forms galaxies forms planets model how in the "Location called our universe" he will realize the genesis, I will not analyze or attack this. I have no counterarguments. My pronoun was the vision that matter-matter will be realized by "curving the dimensions" of two quantities. What the geometry and topology will be is no longer "my research"…and the reason we know it's true is because we can see it, so this is a photo of a fireball that filled the big bang in the early universe, it's called cosmic microwave background radiation in the filament are bits that are hot, they are red and they are., the bits in the filaments which are cold are blue and in these flashes there is information 380,000 years after the big bang, at this time the fireball is roughly 100 thousand degrees Celsius at a hundred thousand degrees Celsius the atoms melt the electrons on which can no longer stick together so they separate from the nucleus of the atom so at this temperature you don't have a gas but atoms but a gas of nuclei and then electrons flying around is usually called a plasma rather than a gas so it is happening so it's 380,000 years and now we turn back the clock and as we go back in time things heat up until you reach a temperature we get this right 10,000 million celsius If this is true and if physicists "banally" pass it off as about trivial things, then they

shouldn't even be surprised that plasma can be a state of m+n dimensions numerically even hundreds of dimensions (mathematical processing without surprises...e.g. here, where 60 to 70 dimensions are revealed http://www.hypothesis-of-universe.com/docs/eb/eb_002.pdf (mathematical) How is this possible?, I don't know, I'm not a know-it-all...

……..

---

**02)** okay that's 10 to the 10 degrees um it takes a long time for things to get that hot long time going backwards um you reach this temperature only when you get to 100th of a second after the big bang itself but one hundredth of a second after the big bang you hit this temperature at this temperature nuclei melt that means that the nuclei contain protons and neutrons but when you hit this temperature they fall apart into just protons and neutrons they can't stick together anymoreokay that's one hundredth of a seconafter the big bang then we go further back in time until we reach one millionth of a second after the big bang one millionth of a second after the big bang the temperature is 10 to the 13 degrees and now the protons and neutrons melt when you get to a million for a millionth of a second after the big bang the higgs boson melts so these temperatures the higgs boson stops giving mass to everything else and all the other particles that are floating around suddenly become really kind of light and breezy and they they fly around this is the stuff that we're sure happened that we just we just know about and i'd like to explain why um it's because all the things that i've listed here to one degree or another we can recreate here on earth we can develop theories which will work perfectly for these situations and then we take those theories and just import them to the big bang where we see that they just fit all the observations perfectly there as well we know exactly what the universe was doing one minute after the very beginning of the big bang that first minute is a little bit up for grant might the big bang theory be mistaken sean would you like to to start right so to answer that we first have to say what we mean by the big bang theory because this phrase is meant in two very different contexts right we all know the universe is expanding so if you run the clock backwards if you run the film uh to the past 14 billion years ago it was in a hot dense state and we have something called the big bang model of cosmology which is simply the statement that 14 billion years ago the universe was in a hot dense state it expanded and cooled and went from being very smooth to relatively lumpy which it is right now with all these stars and galaxies and so forth that's the big bang model it is true there's no point in doubting the big bang model okay we don't let people up here on stage if they doubt that part of the big bang model but if you take seriously general relativity and you say well what happened at the very beginning what happens if so we know exactly what the universe was doing one minute after the very beginning of the big bang okay from one minute after to 14 billion years after we understand that first minute is a little bit up for grabs so uh classical general relativity the theory that einstein gave us for space and time would say according to roger and stephen Hawking that at that moment t equals zero at the very beginning there was a singularity but there's also this thing called quantum mechanics which gets in the way which is not part of general relativity so if you want to say the big bang event the big bang moment the beginning of everything we don't know whether that is right or not we have room as theoretical physicists and cosmologists to invent new scenarios and debate over which is right which is wrong and so that's where our disagreement comes in um i'm pretty agnostic to be honest about whether or not that moment because it's a moment in time the big bang not a place in space it's not an explosion in a pre-existing space it's the beginning of everything it's the moment before which there were no other moments and that's the model and the question is is that model right so i i have two favorite theories and neither one of them is roger's favorite theory so that gives us something to talk about um the one theory that i think is is very at least on the table is plausible is yes that is the beginning of the universe and it's because time and space themselves are not fundamental that when you get deep into the guts

of quantum mechanics you realize that all the stuff around us the tables the chairs space itself time itself are emergent approximate phenomena they're like talking about the air as a fluid with a temperature and a pressure rather than talking about the molecules maybe even time is just a good approximation and it started 14 billion years ago that's one possibility that i think is very plausible the other if time is truly fundamental if time is real and there and inextricable from the fundamental equations then i think it's very likely that the big bang was not the beginning in that case but i also think that as Roger

…….

**(02)** Okay, that's 10 to 10 degrees Celsius. It takes a long time for things to heat back up that long, um you don't get to that temperature until you get to the 100th of a second after the big bang itself, but a hundredth of a second after the big bang, at that temperature you hit that temperature, the cores melt, meaning nuclei contain protons and neutrons but when you get to that temperature they disintegrate into just protons and neutrons they can't stick together anymore that is one hundredth of a second after the big bang then we go further back in time , until we reach millionth of a second after the big bang a millionth of a second after the big bang the temperature is 10 to 13 degrees and now protons and neutrons melt when you get to a million in a millionth of a second after the big bang the higgs boson melts so these temperatures the higgs boson stops giving matter i think the author meant "mass" to everyone else and all the other particles that are floating around suddenly become really related d light and fresh and they fly around, that's the thing we're sure it's about we just know, and I'd like to explain why it's because all the things I've listed here, to one degree or another, that we can recreate here on Earth, we can develop theories that will work perfectly for these situations, and then we take these theories and just import them into the big bang, that is, the behavior "today" on the scales of $10^{-44}$m is identical to that immediately after the big-bang... what role of "structural significance" >time< plays here, I don't know, but it certainly plays some... where we see that all the observations just fit perfectly in there and we know exactly what the universe was doing one minute after the very beginning of the big bang, that first minute is a bit of a credit, could the big bang theory be wrong, Sean, you'd like to start right, to answer that first we need to say what we mean by the big bang theory because the phrase is meant in two very different contexts, we all know the universe is expanding so if you run the clock backwards the clock is a mechanism for "interval chopping" " on the time dimension (i.e. on all time dimensions) but physical real-time runs even without a watch, that... on the scales of the macrocosm, the time dimension expands and therefore time runs with one arrow..., in the microcosm on the Planck scales, time (does not) expand , there is a chaos of alternating "forward and backward" arrows , therefore the interactions of elementary particles are symmetric, the equations are linear.. if you run the movie uh last 14 billion years ago, it was in a hot dense state and we ha Something called **model** of the big bang cosmology, which is simply the statement that 14 billion years ago the universe was in a hot dense state, expanding and cooling and went from a very smooth to a relatively lumpy shape, well, isn't it a coincidence the other way around? In the microcosm, space-time is "lumpy" http://www.hypothesis-of-universe.com/docs/c/c_461.jpg ; and in the macro world it's continuous, smooth, it's gravity = geomentricky a parabola which is right now with all these stars and galaxies and so on, that's the big bang model, it's true that there's no point in doubting the big bang model, ok, we're not going to leave people on stage here if they doubt that part of the big bang model, but if you take general relativity seriously and say well what happened at the very beginning, what happens if so, we know exactly what the universe was doing one minute after the very beginning of the big bang, well from one minute to 14 billion years later, I'm not a mathematician, yet such a good mathematician could appear and show a way how a non-linear equation turns into a linear one. I can do it "lapidly": if I remove the

"G-constant, i.e. its dimensions" in the OTR equation, I get a nonlinear equation from a linear equation. http://www.hypothesis-of-universe.com/docs/c/c_463.jpg Who will show me the fundamental error??? as we understand that the first minute is a little ready to grab, so uh classical general relativity, the theory that einstein gave us for space and time, would according to **Roger Penrose** and **Stephen Hawking** said that at that moment **t** equals zero at the very beginning there was a singularity, but there is also this thing called quantum mechanics that gets in the way that is not part of general relativity, so if you want to say an event the big bang, the moment of the big bang the beginning of everything we don't know if it's right or wrong, we have room as theoretical physicists and cosmologists to come up with new scenarios and debate what's right, what's wrong, and so that's where our disagree, I'm pretty agnostic to be honest whether the moment is or isn't because it's a moment in time the big bang is not a place in space it's not an explosion in a pre-existing space,I repeat it for the hundredth time in the last year and for the thousandth time in the last 20 years: Time is a quantity, it has three dimensions as the quantity Length, and before the Big Bang time did not run, it was a stationary state in 3+3D space-time. The Big Bang was just an "INSTANT" change of state from non-curved dimensions to warped dimensions. And it is only at this >moment< that the flow = passage of time..., which is a shift along the time dimension, begins. What's moving? Well, in essence, it doesn't matter "who" cuts the intervals on the time dimensions. Whoever does not understand this has no right to understand reality. it is the beginning of everything, the beginning of the unfolding, the beginning of the passage of time it is the moment, O.K. before which there were no other moments, well, there were, but they "didn't run ".. and that is the model O.K. your model. Mine is HDV and the question is, is the model right, is it right, so I have two favorite theories and neither of them is Roger's favorite theory, which gives us something to talk about, um, the theory that I think is at least on the table is plausible, yeah, that's the beginning of the Universe and it's because that time and space are not essential in themselves, jesus, just the opposite !! Time and Duration are fundamental, the rest comes >after<… that when you get deep into quantum mechanics, you realize that all those things around us, the tables, the space of the chairs, the time itself, are themselves **emerging** approximate phenomena, arising from the transformation of the curvature of the dimensions of two quantities 3+3D… as if they are talking about air as a fluid with temperature and pressure, rather than talking about molecules, maybe even time is just a good approximation ?? What and started 14 billion years ago, that's one an option that I think is very likely, secon, if time is really of the essence, if time is real and there and inseparable from the underlying equations, then si I think it is very likely that the big bang was not the beginning in that case, BB was the beginning of the start of the flow-flow of time, because the unfolding of dimensions began but I also think that like Roger

…….

**03)** has emphasized better than anyone there's something very profound about the nature of time in our observable universe namely that it has a direction right that the past is different from the future and if we can get into this i hope the reason why the past is different from the future in your everyday life the reason why you remember yesterday and not tomorrow is ultimately because of what conditions were like at the big bang that's what set up the arrow of time and that's the fundamental mystery of cosmology why was it like that so my favorite view of that is that there is a much larger universe that we don't see that our little universe is a tiny little part of the whole picture and the whole picture is actually symmetric that there are people in our past who think that we are in their past the time runs in the opposite direction for them as it does for us this is not by any means set in stone we don't know it for sure but these are the kinds of scenarios that we're talking about as professional cosmologists to understand why the universe that we do live in looks the way it does we eventually run into a

face of the universe where all the matter was plasma anything before that is just speculation we have very good evidence that the universe is expanding i think there's pretty much no one in the scientific community who would doubt that and it follows from this that if we try to run the evolution of the universe back in time the universe must have been smaller it must have been denser and with that we eventually run into a face of the universe where all the matter was just one hot plasma with fluctuations in it and i think up to this point uh we're we're on pretty safe ground um yes we did have to introduce some new things like dark matter and dark energy to actually make this time evolution pitch fit with the observations uh but having said that it works just fine now if we try to go further beyond that it gets much more complicated because there's um if we go back in time we go to higher and higher energy scales and at some point they get higher than the energy scales that we have been able to test so far um the highest energies that we have tested were probed at the large hadron collider and anything before that is just speculation so you can continue to push the theories to higher and higher energies uh but really we we don't know if that's actually what's going on and now there are lots of um theoretical physicists who nevertheless have come up with theories for that um so all this matter is supposed to be um created by some other field uh the infertion field there is supposed to be a phase of exponential expansion that's called inflation um which is also supposed to be caused by that field and ultimately the universe supposedly came out of some quantum fluctuation and so on and so these are all ideas which are hugely speculative uh and i personally think the evidence is not very good for that um there is some evidence that one can discuss and then beyond this there is this question like uh where did it all come from the core i think it rests on a lot of faith that there actually are universal mathematical laws that hold true far beyond what's possible to test my philosophical work is on the limits of scientific knowledge and so for me why i got interested in cosmology is because i think this is the science where the lines between metaphysics and physics or faith and knowledge are the most obviously blurred and this calls for some some questioning um and the big bang theory is really based on a lot more interpretations and metaphysical assumptions than is commonly supposed and at the core i think it rests on a lot of faith that they actually are universal mathematical laws that hold true far beyond what's possible to test and so just to put this very briefly in perspective we know already with reasonable confidence from observation and testing that general relativity works for about 0.1 of the universe according to big bang theory so the big bang model is essentially an extension of einstein's general relativity into the remaining 99.9 percent of the theoretical universe and although there are ways that which we can measure using measuring methods to get far beyond this and to probe beyond the or 1.0.1 percent the further out we go the more model dependent we also become and it becomes more and more difficult to calculate things with precision and this is why you see so many different discrepancies pop up in in the last years when it comes to measurements so [Music]

…….

**(03)** He pointed out better than anyone else that there is something very profound about our observable Universe, about the nature of time, namely that it has a right direction, that the past is different from the future, O.K. the pasts are already realized configurations of curvatures of all dimensions (irreversibly) and if we can get into that, I hope that the reason the past is different from the future in your everyday life, the reason you remember yesterday and not tomorrow, is ultimately because of , what were the conditions in the big bang, nonsense.. conditions are not the reason why I remember the past.. that is what set the arrow of time the arrow of time occurs at the moment when linearity starts to change to non-linearity (I am not a mathematician, and I can't say it better) and that's the fundamental mystery of cosmology, why it was, so my favorite take on this is that there's a much bigger universe, O.K. After big-bang, "two quadrants" (in the macro world) come into play: a) our universe with the "right

arrow" and b) "our anti-universe" with the left arrow of time http://www.hypothesis-of-universe.com/docs /c/c_486.jpg which we do not see that our small universe is a small small part of the whole picture and the whole picture is actually symmetrical that in our past there are people who think that we are in their past running in the opposite direction for them, O.K., i take… as for us, it's not set in stone by any means, we don't know for sure, but these are the kinds of scenarios we talk about as professional cosmologists to understand why the universe we live in looks the way it does we do, eventually we'll hit the face of the universe where everything was plasma, whatever before that is just speculation, we have very good evidence that the universe is expanding, I mean there's hardly anyone in the scientific community who doubts that, me...because the expansion is the unwrapping of the dimensions of two quantities... and it follows that if we try to run the evolution of the universe back in time, the universe must have been smaller, it must have been denser, and thus we end up hitting the face of the universe where all the matter was just one hot plasma. Yes, after the big bang, space-time was extremely curved (perhaps compressed) and only then does time, flow - the passage of time, and expansion - the unfolding of space begin. And in the plasma, elementary particles will be born by "packing - packing dimensions", and a physical field. The genesis of the development of matter elements and complex matter will occur. I went into more detail on my website http://www.hypothesis-of-universe.com/ with the fluctuations in it and I think we are on pretty safe ground up to this point, yes we had to introduce some new things like is dark matter and dark energy here I'm a skeptic that this time the evolutionary playing field will adjust to the observation uh but having said that it works fine now when we try to go further it's much more complicated because when we go back it's um over time we'll go to higher and higher energy scales and at some point they'll get higher than the energy scales we've been able to test so far, the highest energies we've tested have been probed at the large hadron collider and anything before that is just speculation so you can keep scrolling theories to higher and higher energies, but we don't really know if that's the point, and now there's a lot of um theoretical physicists who have come up with theories anyway that um all this matter is supposed to um be created by some other field uh, the inference field is supposed to be phase of exponential expansion, which is called um inflation, which is also supposed to be caused by this field, and eventually the universe allegedly it came out of some quantum fluctuation and so on, so it's all thoughts that are highly speculative, O.K. and I personally think the **evidence for it isn't very good**, O.K. there is some evidence that can be debated. Then behind that is this question of like uh, where did it all come from at the core, I think it rests on a great belief that in **reality** there are universal **mathematical laws** that apply far beyond of what can be tested, my philosophical work is at the limit of possibilities. Scientific knowledge, and that's why I was interested in cosmology, because I think that in this science the lines between metaphysics and physics or faith and knowledge are most clearly blurred, which **requires some doubt and the big bang theory**. I have such HDV. It is actually based on a lot more interpretations and metaphysical assumptions than is commonly assumed, and at its core I think it rests on a great belief that there are in fact universal mathematical laws that apply far beyond the limits of what can be tested, so just to put this very briefly in perspective, we already know with reasonable certainty from observation and testing that general relativity works for about 0.1 universe according to the big ba ?? Model theory, so big bang model is basically an extension of general relativity ?? I haven't read that anywhere… Einstein on the remaining 99.9 percent of the theoretical universe, and although there are ways we can measure with measurement methods to go far beyond this and explore beyond or 1.0. The further one percent goes, the more dependent we become on the model and it becomes more and more difficult to calculate things with precision, which is why you see so many different discrepancies appearing in recent years, Numerical precision is not important in the model as far as about measurement so [ Music]

…….

**04)** all of this to say is i think that there are lots of problems with the model that are not generally acknowledged and that makes it worth asking the question the question for the big bang itself is from my point of view obviously beyond what we can say anything about imperative any alternative to the big bang has a very high evidentiary bar to clear if we frame the big bang as the fact that the universe started in a hot dense state roughly 14 billion years ago i think the evidence is very very strong for that premise and everything i'm about to say does not depend on the nature of dark energy or dark matter those absolutely affect the expansion history but they don't affect what i'm going to say as evidence for the big bang itself and i agree i'm an observer so i think cosmology should be empirical driven by observations and the basic observation is red ship which is one of the few pure observables in cosmology so we have the recession velocity of galaxies proportional to distance known for a century and most obviously interpreted as a 3d uniform expansion with no center so copernican principle holds in the context of general relativity the hubble law represents expanding space time this is an exercise we give our advanced undergraduates the dynamical evolution of the is part of the theory it's predicted and once you trace the expansion backwards you infer that there should be relic radiation left over from the dense hot state it was predicted and a rough temperature assigned in the 1940s and less than 20 years later accidentally observed by radio astronomers it's almost perfectly smooth or isotropic and almost perfectly thermal with a temperature just under three degrees kelvin a big check mark on the whole idea and this radiation fits the idea of the universe becoming transparent as stable atoms form when it was about a thousand times hotter and a thousand times smaller than it is now i'll also point to a large pile of evidence that's that's kind of messy but it's a lot of astrophysics about cosmic evolution the fact that the evolution of galaxies and active galaxies and the radiation of the universe and the regions between the galaxies there's many observations that point to evolution consistent and concordant with a early hot dense state that's that's a lot of astrophysics in there and then the light element abundances are a primary piece of evidence for the big bang stars in the universe over cosmic history could not have created a quarter of the universe by mass and helium the big bang theory accounts for that and then in a completely different observational realm the isotope of hydrogen deuterium which is essentially primordial intergalactic gas one part and ten to the five in abundance also matches perfectly with the big bang model with no free parameters basically because the only free parameter originally was the baryon to photon ratio which has been measured by microwave observations so i guess to finish i would say that any alternative to the big bang as i framed it has a very high evidentiary bar to clear and it's not true that other theories haven't been looked at tired light has been looked at and ruled out and so and there are cycling models obviously that can finesse a big bang but in the terms of the basic idea again independent of dark matter and dark energy in their nature i think it hangs together very well there's consistency checks on the age from the age of individual stars so independent of expansion history the age cross checks so i think it's a strong theory it is not wrong and by big bang i in cosmic inflation it is not wrong it's incomplete cosmic inflation gives us this beautiful picture where the large-scale structure in the universe and the cosmic microwave background basically everything we observe around us is seeded from those primordial quantum fluctuations and how the whole universe started small and stretched all its non-uniformities as as cosmic inflation made that universe to accelerate and grow big very quickly so we have a set of observations our precision cosmologist is a very advanced field by now so all our observations agree perfectly well with this picture of cosmic inflation it does not mean they prove cosmic inflation it's conceivable that someone else might come along with a different picture that also agrees with this set of observations however we are happy because here is a theory that tells us everything

from the first fraction of a second to present day and we know our universe started small and it's growing but that picture does not tell us what gave that first energy and what was there before and what lies beyond our universe is uh about 10 to the power 27 centimeters the visible universe and it's only 13.8 billion years old these are big numbers but but they are not inconceivably big so we all of us have tried to ask what was there 13.9 billion years
……

**(04)**- all I'm saying to this is that I think there are a lot of problems with the model that are not generally recognized and therefore worth asking the question, the question of the big bang itself is clearly beyond what we can do in my view say anything about the imperative any alternative to the big bang has a very high evidentiary line to clear if we frame the big bang as the fact that the universe began in a hot dense state about 14 billion years ago i think the evidence is very strong for that premise and everything i'm about to say doesn't depend on the nature of dark energy or dark matter, they absolutely affect the history of the expansion, but doesn't affect what i'm going to say as evidence for the big bang itself and i agree i'm an observer so i think cosmology should be empirically driven by observation, and the fundamental observation is the red boat, which is one of the few pure observables in cosmology, so we have a recession rate of galaxies proportional to known distance over a century, and most clearly interpreted as a 3d uniform centerless expansion, so the Copernican principle holds in context of general relativity, Hubble's law represents the expansion of spacetime, and it is objectionable. The global space-time expands, and mathematically it should be expressed as a rotation of the systems (I can't do the math myself). Here I have some unfolding curve http://www.hypothesis-of-universe.com/docs/c/c_239.jpg which may not be identical to the truth, smart people will already give me a suggestion for "expanding involute" this is an exercise we give our advanced college students dynamical evolution is part of the Theory it is predicted and once you trace the expansion back you figure there should be relict radiation from the dense hot state that was predicted and the harsh temperature assigned at 40 years and less than 20 years later observed by radio astronomers is almost perfect, smooth or isotropic and almost perfectly thermal with a temperature just below three degrees kelvin, a big mark on the whole idea and this radiation corresponds to the idea of the universe becoming transparent because stable atoms are formed when it was about a thousand times hotter and a thousand times smaller than it is now, I will also point to a large pile of evidence that is a little dirty, but there is a lot of astrophysics about cosmic evolution the fact that the evolution of galaxies and active galaxies and cosmic radiation and regions among galaxies there are many observations that show an evolution consistent and consistent with the beginning of "our universe" i.e. in shape and state after the Big Bang, because the Megaverse was already there before the BB, hot dense state, which is a lot of astrophysics there and then, the numerous elements of light are the primary evidence that the big bang stars in the universe during cosmic history could not have created a quarter of the universe with matter and helium, which is accounted for by the big bang theory, and then in a completely different observational field the hydrogen isotope deuterium, which is essentially primordial intergalactic gas, one part and ten to five in abundance, also perfectly fits the big bang model with no free parameters basically because the only free parameter was originally the baryon to photon ratio that was measured by microwave observations, so I think until the end, I would say that any alternative to the big bang as I have framed it has a very high evidentiary bar to clear, and it is not true that other theories have not been looked at in a tired light, O.K has been looked at and ruled out, and so and of course there are cycling models that can make a big bang, but in terms of the basic idea, again independent of dark matter and dark energy in their nature, I think it holds together very well, there is a check for consistency of age from

the age of individual stars so independent of the history of expansion age cross-checking. So I think so
it's a strong theory, O.K. I have no objection to this described genesis of the evolution of elementary particles, thus stars... it is not wrong and we are not wrong about the big bang in the cosmic inflation, it is the incomplete cosmic inflation that gives us this beautiful picture where the large-scale structure in the universe and the cosmic microwave background basically everything we observe around us is inoculated from these primordial quantum fluctuations and from how the whole universe started small and stretched all its irregularities because cosmic inflation I don't believe in this inflation. And if it was, I think provocatively that "against ||longitudinal || inflation" also had to come ||"time || inflation', when several orders of time were 'packaged' and 'hidden' into matter... ; today's fusion in the sun, that is the "dissolving, dissolving, unwrapping" of the condensed time dimension" (( i know it sounds very unscientific and strange... still think about it )) and... and that's why fusion fails at CERN,...; physicists should think here!!! ,caused the universe to speed up grow rapidly so we have a number of observations, our exact cosmologist is now a very advanced field so all our observations perfectly agree with this picture of cosmic inflation, it does not mean that they prove that cosmic inflation is conceivable that could someone else come along with another picture that also agrees with this set of observations, however we are happy because here is a theory that tells us everything from the first split second to the present the theory you are praising here, yes it says "everything" about the construction of elementary particles, but it doesn't say the evidence for that inflation (longitudinal inflation is unnecessary for the production of matter) and we know that our universe started small and is growing, but this picture does not tell us what gave the first energy ha-ha… the basic postulate of "this universe" is that **"dimensional warping is matter-forming"**, thus also energy production…, every warped environment, i.e. space-time location that is a "warped dimensional state" carries energy , is a state of energy...plasma (after BB) is multi-curved spacetime, and the boiling vacuum (today) is also boiling spacetime .., and what was there before and what lies beyond our universe, beyond the edge of observability is there a time rotor with a higher curvature than 900, or is there a very, very curved space-time in the form of plasma… is about 10 to the power of 27 centimeters ( $10^{26}$ m ) http://www.hypothesis-of-universe.com/docs/c/c_017.jpg ; of the visible universe and it's only 13.8 billion years old, those are big numbers but not unimaginably big, http://www.hypothesis-of-universe.com/docs/c/c_262.jpg so we all tried to ask , what was there 13.9 billion years ago was thus a two-dimensional flat space-time, infinite, inert, without the passage of time, without expansion, without matter (!) and without fields and without a sequence of laws (perhaps two or three laws already existed. One could be "The principle of alternating symmetries with asymmetries").
…….

**05)** ago or what was that what's beyond 10 to the power 27 centimeters the big bang was not the beginning there was an eon prior to us one before that one before that etc there was supposed to be something within the first 10 to the minus 32 seconds now what does that mean you think of a number one fraction the bottom the denominator is a number which has 32 digits and that fraction ridiculously small fraction of a second the universe was supposed to have expanded far more rapidly than anything that we're aware of now it's called an exponential expansion which is supposed to have taken place and that's called inflation and it is very much part of conventional cosmology now to me that's the weak point of conventional cosmology because you you have to introduce ideas which there's no other reason for apart from making it do this but apart from that if you go one blip after that i completely agree with what sean's saying so the argument has to be from before that and i'm claiming that although

there was this idea of a steady state model which i grew up with i may say when i was in cambridge as a graduate student this was all going on and dennis sharma was a good friend of mine and bondi and gold and people i used to know fred hoyle and they were all dead keen on this idea that the universe went on expanding expanding and it didn't change much because new matter was created all the time okay i like that theory because philosophically it meant there was no beginning and you could talk about the universe in that kind of way now i'm picking up on that in a different way though i'm not disagreeing with the big bang there was a big bang i am rather disagreeing that quantum mechanics was important there and that's a big point of difference really the reason that you're allowed to continue before the big bang which is what i'm trying to claim is because in a certain sense i'm agreeing with sean that you don't have time how do we measure time we have extraordinarily accurate clocks today because a particle of mass is really a clock and this based on the two basic most famous formulae of 20th century physics namely einstein's E equals m c squared which tells you energy and mass equivalent and max planck's e equals h nu or f whatever you call it it tells you the energy and frequency equivalent put the two together that tells you that mass and frequency are equivalent that tells you that if you have a massive particle it is a clock of extraordinary precision now the point is when you don't have massive particles and this would apply to the remote future when basically the universe is dominated by photons running around either from stars or from black holes you see stephen hawking his most famous discovery if you like or a theoretical discovery was that black holes are not completely black or they're not completely cold that they have a temperature that temperature is so low that it's much lower than anything you could build in the lab certainly with the big biggest black holes uh sun uh galaxy has a black hole in its center which is about four million times the mass of the sun that's so cold that it puts everything else in the shade one minute now the thing is that according to Hawking these things eventually will evaporate away because the universe gets colder than the black holes they evaporate away and disappear so when those have disappeared there's nothing left but things which don't have any mass there's the photons basically that's true and that they're the only way of you don't have clocks anymore because you don't have mass and so the remote future you have no way of keeping time and the idea is that this remote future where you have this expansion of the universe which is becoming exponential expansion which is what we currently observe continues forever now i found that a really depressing picture it seems to me you know the universe is pretty exciting now but then you know what you've got eternity of boredom but then i thought who's going to be bored not well not us because we won't be around the main things that will be out there were photons and it's very hard to bore a photon i'll tell you because photons the main reason is probably they don't experience anything but that's not the point the main point is that they don't measure time photons right up to infinity and they're still there and they say what what we've got to do with the universe they're still there the idea is that the universe continues with what i call another eon our eons started with the big bang and ends with this ex exponential expansion that then roger becomes the big bang of another eon and there was an e on before i could go and talk endlessly with this if you allow me but the question is the big bang was not the beginning there was an eon prior to us one before that one before that etc for more debates talks and interviews subscribe today to the institute of art and ideas at iai [Music] tv [Music] you

……..

**(05)** or what it was that is above 10 to the power of 27 centimeters, that is, what was before the big bang. yes there was
http://www.hypothesis-of-universe.com/docs/eng/eng_098.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_085.pdf

http://www.hypothesis-of-universe.com/docs/eng/eng_092.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_089.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_088.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_082.pdf
and mode, and more
http://www.hypothesis-of-universe.com/en/index.php?nav=home
http://www.hypothesis-of-universe.com/docs/eng/eng_106.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_105.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_104.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_103.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_102.pdf
http://www.hypothesis-of-universe.com/docs/eng/eng_101.pdf
the big bang was not the beginning, there was an >**eon**< before us, aha, Penrose's invention one before that before that etc, there should have been something in the first 10 to minus 32 seconds which means you are thinking fraction number one , the lower denominator is a number that has 32 digits yes, the interval "t" from 0 to $10^{-32}$ seconds….in it the infinite **curvature of dimensions 3+3** "melted" to an acceptable degree (acceptable for our understanding) and here the 3+3D genesis of the construction of elementary particles (standard model) occurs in that plasma. Inflation wasn't… and that fraction of a ridiculously small fraction of a second the universe was supposed to expand much faster than anything we know now it's called exponential expansion, ?? I don't understand why "after the expansion" of n+m dimensions from point 0 to $10^{-32}$ seconds should take place the expansion of length dimensions, i.e. space ?? which should have happened, and this is called inflation and it's a very important part of conventional cosmology to me, which to me is a weakness of conventional cosmology because **you have to introduce ideas** that other than that there's no other reason to do it, but other than that, if you go one swing after that, I totally agree with what Sean says, so the argument has to come before that and I argue that although there was the idea of a steady state model, that I grew up with, I can say that when I was at Cambridge as a graduate student it was all happening and Dennis Sharma was a good friend of mine and Bondi and honey and people I knew **Fred Hoyle** and **were all deeply excited by this idea that the universe was expanding**, expanding everyone rejoiced that it was expanding = expanding ONLY space, so the 3 length dimensions x,y,z …what about time? You don't have to research there? And you don't want to? This is where science has a hole in knowledge. Time has 3 dimensions and should also exhibit "somewhere+sometime" inflation. Either in the period **t = 0** to **t = 10-$^{32}$sec**., or in the period t= 1 minute to t= 2 minutes after the Bang... ; I will mention again my suspicion that in the Sun (and in all stars) there is "wrapped" time, a time dimension that is unwrapped during fusion and that scientists are missing in the interaction equation... I personally do not claim anything, I do not know mathematics, but I have a "feel to problems"… and not much changed because new matter was created all the time well i like that theory because philosophically it meant there was no beginning and you could talk about the universe in that way now i look at it in a different way though i don't agree with the big bang there was a big bang i rather disagree that quantum mechanics was important and that's a big point difference is really why you're allowed to continue before the big bang, that's not so good and right logic. I describe the big-bang in my HDV as a "jump", as an "instant sudden change" in curvature!! dimensions. So, before the big bang, there is an infinite 3+3D space-time, without the flow of time (that is, without the beginning of time), without expansion (infinity cannot expand), without matter, without fields, without laws ◊ this is what I call logic that has logic. Matter is born after the BB by "dimensional warping" and that only happens after the BB, which is what I'm trying to argue because in a sense I agree with **Sean** that you don't have time, how we measure time is extremely accurate hours today,

it doesn't matter at all about accuracy, about some **super-accuracy of the flow-passing of time**, i.e. cutting time intervals somewhere in the middle of the universe, on some Earth, in a locality where the pace of the passage of time is "chosen by the universe", unreasonable, and where ambient (in other galaxies) flow rates are incomprehensible, or unknowable, or…or… because particles of matter are really clocks, based on the two basic most famous formulas of 20th century physics, which is Einstein's E equals m squared, which tells you the energy and mass equivalent, and Planck's maximum e equals hnu or f, as it you say tells you energy and frequency equivalent, put the two together which tells you that >mass and frequency are equivalent< which tells you that if you have massive particles it's an extraordinary precision clock, what is the extraordinary precision required for, needed…somewhere in the middle of the universe at 13.8 billion years after BB…? Now the thing is if you don't have massive particles star and that would be true for the distant future where basically the universe is dominated by photons running from either stars , or from black holes, you see Stephen digging up his most famous discovery, if you will, or the theoretical discovery was that black holes are not completely black or they are Not completely cold, that they have a temperature that is so low that it is much lower than anything , what could you build in a lab, certainly with the biggest biggest black hole, uh the sun, the galaxy has a black hole at its center that is about four million times the mass of the sun, which is so cold that it puts everything else in the shade in a minute, according to hawking these things will eventually evaporate away because the universe is cooler than black holes that evaporate and disappear so when they're gone there's nothing left but stuff that has no mass mass photons are basically true and that they are the only way to *do it*. What *to do*??... You don't have a clock anymore, and where did you put the alarm clock?? Don't have a watch or time? Where did time go? because you don't have matter, aha, aha..., when matter disappears, so does the flow - the passage of time, but time itself does not disappear, it is the "Existence-existential quantity" and so the distant future has no way to keep time and the idea is that this distant future has this expansion of the universe that becomes an exponential expansion that we're seeing now goes on forever, now I find that a really depressing picture, it seems to me, you know that the universe is now quite exciting but then you know what you have eternity of boredom but then I thought who is that we will not be bored no good because we will not be around the main things that will be there were photons and it is very difficult to carry a photon I will say you it because photons the main reason is probably that they don't experience anything but that's not the point the main point is that they don't measure time photons to infinity and they're still there saying what do we have to do with the universe there is still the idea that the universe continues it's not entirely clear to me "what" the author is explaining and what he's about, (?) in what I call another age, our ages started with a big bang and **ends ?** by this ex-exponential expansion, from which Roger will then become the big bang of the **next age**, probably this is a cyclical universe as I stated in my interpretation elsewhere. BB is here to change the state of flat space-time to a non-flat, extremely curved one. Here it will also be a question of whether the vision should be such that the "new state" of the universe, or n+m space-time, will be a "locality" floating "in the previous state" or whether the entire previous infinite space-time will flatly transform into a new "final" state of space-time albeit starting to expand the dimensions to total flatness at infinity…(?) And…and then a new BB #3, then BB #4 etc… and before I could go and endlessly talk to it, let me , but the question is that the big bang was not the beginning, there was an age before that, before that, before that, etc. for more debates interviews and interviews join the institute of art and ideas at iai today [Music] tv [ Music] you

19/06/2021 + 19/03/2024 This is me and my (bespectacled) boyfriend whose daughter is getting married.et