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Eric Weinstein or Brian Greene: Who's RIGHT About String Theory?

Eric Weinstein nebo Brian Greene: Kdo má pravdu o teorii strun?



[Dr Brian Keating](#)

303 tis. odběratelů

29 864 zhlédnutí 26. 1. 2024 [Full-length episodes of Brian Keating's Into The Impossible Podcast](#)

Please join my mailing list here <https://briankeating.com> to win a meteorite 🌟 In this clip from my interview with the one and only Brian Greene, we discuss string theory, Eric Weinstein, Peter Woit, and Juan Maldacena. Enjoy! Check out the full interview: [_ !\[\]\(003082e50e3009141f59bd5df831749f_img.jpg\) • Brian Greene: The Truth About String ...](#)

0:00

(01)- Eric Weinstein and and of course you know Peter white and and many others that have alternative theories alternatives to string theory and you did your thesis I believe in 1986 on string theory which is you know kind of the salad days and I want to ask you if you had to appraise AR priz String Theory I asked Mike Turner about inflation and dark energy recently gave him the same thing give strength Theory a grade A report card and break it down into the sub categories of strength where is it conceded where does it need more work and where is the parent teacher conference going to happen the only reason I'm laughing is because the 25th and this is not a plug folks so it doesn't matter but it's just because you ask the question the 25th anniversary edition of the elegant universe is coming out in August and on the final pages of this new chapter I've written I give String Theory a report card so part of me is like hey I don't really want to spill the beans right here but but I'll give you a rough feel for it so it's a good way of phrasing it because you need to judge a theory among uh many different Criterion right and and some

1:01

strength has done extremely well and some it hasn't done as well so let me start with this stuff where it hasn't done as well when it comes to making contact with experimental data the very question that we began with strength here is not as far along as I would have hoped right so back in 1986 I don't want to calculate how many years ago that was it was a long time ago and if you would have asked me then and I think most string theor at the time 2023 are we going to know through experiment or observation whether these ideas are correct 95% of the community said of course we'll know by then and yet here we are and and we don't know so on that I would give a relatively low grade but I'm going to come back to how I'll give the final grade on that in just a second because the theoretical developments in strength Theory have been so astonishingly powerful well beyond anything that I would have anticipated

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back in 1986 and one development in particular that no doubt you know something about because it's the most famous development in the last 20 years this ads CFT correspondence by Juan Mala and actually again it's a whole great it's a whole community of people of course but Juan wrote the paper that really took the World by storm the relevance of that well it's got a huge degree of relevance but the relevance to the experimental question is interesting because once we learned as we did with Juan's Insight that string theory is not as a radical separation from previous methodology as we once thought which is a great development there's a deep connection to older techniques that are still at the Forefront because they're our most powerful techniques Quantum field Theory once you learn that Quantum field Theory and string theory are joined at the hip which is what onean showed us Quantum

3:00

field theory is the most powerfully tested theory in the history of of particle physics in the history of quantum mechanics it's a framework that works tested in what sense tested in terms of internal consistency philosophical expediency in what way has it been I'm talking flat-footed here take the standard model of particle physics it's a PE Quantum field Theory and that particular Quantum field Theory makes predictions that we can confirm I mean uh you know take the Magnetic Moment of the electron right yeah that's is that not the most insane it's the most accurately known number yeah so so so think about the fact that you can do a calculation using this framework of quum and field Theory it agrees to Observation to that many decimal places right so so that's the sense in which these ideas have been rigorously tested when you learn that that framework is intimately connected to the framework of string theory that they're not these two radically different things

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which is what we initially thought it doesn't prove string theory of course but it shows you that we are within the same universe of ideas all of a sudden and that to me mitigates to some extent that string theory has not gone as far as we had hope to actually make an experimental prediction that we can confirm but the fact that it has joined together with the most experimentally tested approach that is good that's strong did I leave somebody out of the discuss your friend you guys have debated and had a memorable exchange at the Ia conference where he said something and you said well maybe we were over exuberant he said like the Meli Massacre as only Eric Weinstein could do Brian Green like I had this interchange with Brian Green where I said we're not being honest about the failure of string theory and Brian's like oh well maybe we were a little bit exuberant and I I blurred out

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(01)- You know Peter White and many others who have **alternative theories alternatives to string theory** and you did your thesis. I believe in 1986 **ehm...** on string theory which is you know, kind of salad days and I want to ask you if you had to award the AR prize String Theory. I asked **Mike Turner** about inflation and dark energy recently he gave him the same give power. The theory divided it into grade A where it is needed and where it is needed work and where there will be a conference for parents of teachers. The only reason I'm laughing is because 25. and this is not a socket, **I don't understand, I don't know what this is about...** guys so it doesn't matter but it's just because you ask, **25. anniversary of the elegant universe**, **damn this is flying, I devoured Brian back then...** is coming out in August and in the last few pages of this new chapter that I wrote I give string theory a report card, so I'm giving you some of me, but I want to give you the truth, the rough feel for it, so that's a good way to put it because you have to judge a theory against a lot of different criteria correctly and

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the force has done extremely well and some not so well, so let me start with where it hasn't done so well in terms of making contact with the experimental data. The question itself that we started here with the force is not as far off as I would have hoped, so in 1986 **38 years** I don't want to count how many years ago that was and if you had asked me about most 2 or you had asked me then 2 or a chain of 2 through experiment or observation whether these ideas were correct, 95% of the community of course said that we would know by then and yet here we are and we don't know so I would give a relatively low grade, **yeah, yeah...** but I'll come back to how I'm going to give a final grade on that in just a second because the theoretical **development in force theory**, **?? I'm tripping** has been so amazingly powerful than I expected.

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In 1986 and one development in particular that you no doubt know something about because it's the most famous development of the last 20 years with this advertisement of CFT correspondence by **Juan Mal, who is that?** and actually it's great again, it's a whole community of people of course, but Juan wrote a paper that really took the world by storm, the relevance of that well which has a huge degree of relevance to the experiment, but the significance is for us once we did it, with Juan. Understand that string theory is not as radical a departure from previous methodology as we once thought, **which is a great development**, 😊 there is a deep connection to older techniques that are still at the forefront because they are our most powerful techniques. **?? Quantum field theory, CFT** once you learn that quantum field theory and string theory are connected at the hip, which is what O'nean showed us quantum.

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Field theory is the most heavily tested theory in the history of particle physics, in the history of quantum mechanics, it's a framework that works tested in what sense tested for internal consistency philosophical appropriateness, in what way it was. I'm talking straight here take the standard model of particle physics, it's PE. Quantum field theory and specific electro that we can confirm. Magnetic field theory. We know that predictions we have in mind. Yes, that's it's not the craziest, **I'm still waiting for the actors to talk about something new, interesting, and so far nothing...** it's the most accurate number known, yes, so think about the fact that you can do a calculation using this framework quantum theory and the field agrees with the observation to so many decimal places, so that's the sense in which these ideas have been rigorously tested, when you learned that the radical framework is closely related to this framework of string theory

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which is what we originally thought, of course it doesn't prove string theory, **still just babbling...** but it shows you that we're suddenly in the same universe of thought and that somewhat mitigates for me that >string theory hasn't gone as far as we hoped< to actually make an experimental prediction that we can confirm, but the fact that it's coupled with the most experimentally tested approach, which is good, is powerful, **^** I let your friend have an exchange and discuss me. He said something and you said okay maybe we were too cheerful, he said like the Meli massacre because only **Eric Weinstein** could do Brian Greene like I had this exchange with Brian Greene where I said **we're not being honest about the failure of string theory** and Brian is like oh okay maybe we were a little cheerful and I got carried away

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(02)- Institute for arts and ideas I blurred out that's like saying

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mili my mili was irrational exuberance no you put a lot of people's careers in the in the shredder so his geometric Unity Theory which features some testable predictions and again I'm an experimentalist right so I'm looking for well what things could we do say how would the prediction of Garrett's Theory or Steven's Theory or Ava Silverstein you know any idea how will that affect observables that say the Simon's Observatory can measure one of the things we can do is measure abundances we can measure look for spin depend phenomena and those theories and I think the thing that Eric always harps on is that we don't we seem I say we collectively as physicist and I'm including myself uh even though I'm not a theorist but um in in the things that seem to not trouble us troubles Eric in other words why is it that we have three families of Fons and we don't have an explanation for that we just we just sort of know it as a taxonomy and as binan said just because you know the name of something tells you bubus about it right does that trouble you I mean is that part of hey if you go back

6:00

Yeah you mentioned my thesis which I haven't thought about in a very long time but um you know the point of that thesis was to try to answer why there are three generations from a string theoretic perspective and way back then there were only a handful of known shapes for the extra Dimensions that string theory requires and in string theory the number of generations of particles is related to a geometrical quantity in the extra dimensions half the oiler characteristic for those who are keeping score at home and so if you have three generations you're looking for Oiler characteristic six okay and there were only really three known examples that had been constructed around those times and with a colleague another graduate student at Ox we proved that two of them were actually the same ah so unified so we unified them so we're sort of down you know by one and uh I may be a grand ising but I think we also in the third one so I think we

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basically got it down to one if I'm if I'm maybe being generous with myself 40 years later but it was it was one or two I believe it was one and so what we did was we then went further and tried to calculate the mass of the electron or the mass of the other particles from this particular geometrical form the extra dimensions and at that time with the limited mathematical understanding which has since become much more deep we got partway down that road but as we did more and more shapes for the extra Dimensions were discovered so all of a sudden this motivation to study one well if there're only four or five total and only one with three generations of course you're going to study it but then when they're 500 or 10,000 or 10 to the 500 your motivation for studying any specific example drops precipitously so that is the historical way but yes does it does it intrigue me this question of why there are three generations

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Absolutely

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(02)- Institute for Arts and Ideas I blurred it out as if I said it

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mili my mili was irrational exuberance no, you put many people's careers in the shredder, so his Geometric Theory of Unity, that's what ?? which contains some testable predictions and again I'm an experimenter right, so well looking for what we could do, ha, ha, after 40

years... I'd like to hear Motl here praising strings... how could one predict **Garrett's theory**, I've heard that before... or Steven's theory or **Ava Silverstein**, ****you call all hypotheses "theories" here...** which you know any observable idea **one of the things we can do is measure abundance**, **that's the first concrete physical language** after all that nonsense that we can measure, let's look at spin-dependent phenomena and these theories and I think the thing, on that Eric always brings up is that we don't seem to, I say collectively as a physicist and I include myself uh, even though I'm not a theorist, but in things that seem not to bother us, why do we have problems, we have Eric in other words. We just know it as taxonomy and as Brian said just because you know the name of something, bubus tells you about it correctly, it gives you a problem, I think that's the part hey, when you come back, **and again just gibberish.**

6:00

Yeah, you mentioned **my thesis**,?? which I haven't thought about for a long time, but you know the point of this thesis was to try to answer, **why are there three generations from the perspective of string theory that's what ?, which generations??** and back then there were only **a handful of known shapes for extra Dimensions**, **that's what I'm interested in: what shapes do those, that handful of dimensions have??, is it available for viewing somewhere?? And why do those dimensions have "shapes"?? that string theory requires, theory requires "shapes"?** **Tell me why ! !, for elementary particles? That's a good idea, and in string theory the number of particle generations is related to the geometric quantity in extra dimensions, yeah, that's good and interesting, I haven't seen that anywhere yet. Can someone write to me and show me that chapter from Theory??** if you have half the generation score for those who look at generational so that you have half the Oiler grease characteristic six is fine and in fact there were only **three known examples**, <https://www.hypothesis-of-universe.com/index.php?nav=ea> ; that were constructed at the time and with a fellow graduate student at Ox we proved that two of them were actually the same, oh so unified, so we unified them, so we're kind of down, **so, in fucked**, you know, by one and uh, maybe I'm grandiose, but I think we're also in the third, so I think we're

7:01

basically I've reduced it to one, **that's a stylistically beautiful speech... ^** if I'm being generous to myself **40 years later**, but it was one or two, I believe it was one, **what, what's the point?** and so we went further and **tried to calculate the mass of the electron or the mass of the other particles, finally one meaningful speech in this sea of gibberish..., of this particular geometric shape, the extra dimension. Good ...**, and at that time with a limited mathematical understanding that has since become much deeper **and the more we discovered all the shapes we have since acquired**, because we were part of. **Unintelligible.** Suddenly this motivation to study one **well, what is it?** if there are four or five in total and only one with three generations, ?? of course you will study it, but when there are 500 or 10,000 or 10 to 500, 10^{500} , **what ??? I am interested in it!!** https://www.hypothesis-of-universe.com/docs/eb/eb_002.pdf ; your motivation to study any particular example drops sharply, so that is a historical way, but yes, I am interested in this question, **why are there three generations.** https://www.hypothesis-of-universe.com/docs/ea/ea_002.pdf ; **If this configuration of quark and lepton generations did not exist, there would be no way for me to build a "table of elementary particles", or more complex matter from them (atoms, molecules, compounds...) That's exactly what those extra mathematical dimensions are for, from which Nature builds matter. It can't be done otherwise. - - If in the 20 years that I've been presenting**

my HDV on the internet, there had been an understanding among physicists and there had been a few who would have discussed and finally decided to "join in" and work on that beautiful hypothesis of HDV, it would have been finished a long time ago, as a theory.

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Absolutely This video was completely s.

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JN, 02/14/2025