

<https://www.youtube.com/watch?v=ZsTWqlmNGak&t=12s>

Brian Greene - Should We Ditch String Theory?


Brian Greene - Měli bychom se zbavit teorie strun?



[Science Time](#)

526 tis. odběratelů

86 282 zhlédnutí 24. 6. 2023 [#stringtheory](#) [#briangreene](#) [#science](#)

In this thought-provoking video, renowned theoretical physicist Brian Greene delves into the complexities of String Theory and its role in unifying our understanding of the universe. He explains that the current understanding of the universe is based on two major theories: quantum physics and general relativity, which respectively explain the behavior of microscopic particles and the large-scale structure of the universe. However, these two theories seem incompatible when combined. Brian Greene elucidates how scientists have been trying to reconcile this paradox through a quest for a theory of everything. Among the proposed solutions, String Theory stands out. According to String Theory, the most basic constituents of the universe are not particles, but rather tiny, vibrating strings of energy. Different vibrations of these strings give rise to different particles, and hence the diversity we observe in the universe. This idea provides a unified framework, encapsulating matter particles and force particles within the same theoretical structure. As Greene articulates with passion, String Theory suggests that everything in the universe, at its core, is made up of these tiny vibrating strings. He illustrates this concept through an analogy of examining an object closely until we see its constituents like atoms, and then even further down to the level of quarks. But conventional ideas stop at quarks, and here is where String Theory proposes the new idea of vibrating strings of energy within these particles. However, String Theory is not without its challenges. Greene explains that the mathematics of String Theory implies the existence of extra dimensions beyond the familiar three dimensions of space and one of time. String Theory requires ten dimensions of space and one dimension of time. These additional dimensions are believed to be compact and hidden from our perception, making them incredibly challenging to investigate. Towards the end of the video, Brian Greene addresses skepticism around String Theory. Despite the beauty and elegance of its mathematical framework, String Theory has not yet made testable predictions or yielded experimental evidence. This raises questions about whether it is still a viable candidate for the theory of everything. This video is ideal for anyone interested in physics, cosmology, or the fundamental nature of the universe. Brian Greene's ability to distill complex ideas into accessible language makes this a must-watch for both experts and laypeople alike. Subscribe to Science Time:  [/sciencetime24](#)



Brian Greene – Měli bychom se zbavit teorie strun? Čas vědy 526 tis. odběratelů 86 282 zhlédnutí 24. 6. 2023 [#stringtheory](#) [#briangreene](#) [#science](#) V tomto podnětném videu se

renomovaný teoretický fyzik Brian Greene ponoří do složitosti teorie strun a její role při sjednocování našeho chápání vesmíru. Vysvětluje, že současné chápání vesmíru je založeno na dvou hlavních teoriích: **kvantové fyzice a obecné teorii relativity**, které vysvětlují chování mikroskopických částic a strukturu vesmíru ve velkém měřítku. Tyto dvě teorie se však zdají být neslučitelné, když se spojí. Brian Greene objasňuje, jak se vědci pokoušeli usmířit tento paradox prostřednictvím pátrání po teorii všeho. Mezi navrhovanými řešeními vyniká teorie strun. **Podle teorie strun nejsou nejzákladnějšími složkami vesmíru částice, ale spíše drobné, vibrující struny energie**. Různé vibrace těchto strun dávají vzniknout různým částicím, **podle vás se tedy zrodila nejdříve energie a pak hmota?, z energie hmota? Ou, ou ou** a proto rozmanitost, kterou pozorujeme ve vesmíru. Tato **myšlenka** poskytuje jednotný rámec, zapouzdřující částice hmoty a částice síly do stejné teoretické struktury. Jak Greene s vášní artikuluje, Teorie strun naznačuje, že **vše ve vesmíru** je v jeho jádru tvořeno těmito drobnými vibrujícími strunami. **A konečně už pochopte: tyto struny nejsou nic jiného než zkroucené dimenze dvou veličin Délka a Čas.** http://www.hypothesis-of-universe.com/docs/c/c_411.jpg **Časoprostor našeho vesmíru se 3+3 dimenzemi prezentuje křivením dimenzí.** Ve velkoměřítku je křivení časoprostoru (viz OTR) jako „gravitační projev“ (nelineární rovnice), a v mikroměřítku na planckovských škálách se „křivením dimenzí“, časoprostor projevuje jako pole a hmota (zde pak interakce – lineární rovnice), což fyzikové si nazvali jako „základní složky“ vesmíru a dál to nazvali „**vibrující struny**“ „**Z NIČEHO**“.

Stačí jen vyměnit brýle a **struny se promění v miniaturní balíčky zakroucených dimenzí dvou základních veličin**. A je to. Velký skok pro lidstvo, a malý skok pro mě...pokud se konečně fyzikové zamyslí a konečně si představí, **že ty struny jsou „balíčky dimenzí“** (je jich jen 25 ...kvarky, leptony, bosony) a jejich „topologická stavba“ je přímo „vdechnutím vlastností“ těm elementárním částicím hmoty (náboj, spin, barva, atd. i hmotnost je vlastnost !) http://www.hypothesis-of-universe.com/docs/c/c_426.jpg ; http://www.hypothesis-of-universe.com/docs/c/c_416.jpg Ilustruje tento koncept pomocí analogie zkoumání objektu zblízka, dokud neuvidíme jeho složky jako atomy, a pak ještě dále **až na úroveň kvarků**. Ale **konvenční myšlenky** se zastavují u kvarků. A zde Teorie strun **navrhuje** novou myšlenku vibrujících strun energie v těchto částicích. **A jiná teorie HDV navrhuje jinou novou myšlenku**. Teorie strun však není bez problémů. Greene vysvětluje, že **matematika teorie strun předpokládá existenci dalších dimenzí za známými třemi dimenzemi prostoru a jednou dimenzí času**. A HDV také předpokládá další dimenze za čp 3+3. Další dimenze už nejsou „fyzikálního“ charakteru, ale „matematicko-topologického významu“, a slouží (ty další dimenze) ke stavbě elementárních částic „balíčkováním dimenzí“, ukázka http://www.hypothesis-of-universe.com/docs/eb/eb_002.pdf Teorie strun vyžaduje deset dimenzí prostoru a jednu dimenzi času. **HDV vyžaduje i časové dimenze..., proč ne???** **Předpokládá se**, že tyto dodatečné dimenze jsou kompaktní a skryté našemu vnímání, takže jejich zkoumání je **neuvěřitelně náročné**. Ke konci videa se Brian Greene vyjadřuje ke skepticizmu ohledně teorie strun. Navzdory kráse a eleganci svého matematického rámce Teorie strun dosud nečinila testovatelné předpovědi ani nepřinesla experimentální důkazy. **HDV také ne, ale alespoň jsem ukázal myšlenkový směr stavby elementárních částic „z dimenzí“** <http://www.hypothesis-of-universe.com/index.php?nav=ea> **tabulky nejsou dokonalé, nejsou bez chyb, ale ukazují směr...; dodnes odborníci nepomohli** To vyvolává otázky, zda je stále životaschopným kandidátem na teorii všeho. Toto video je ideální pro každého, kdo se zajímá o fyziku, kosmologii nebo základní podstatu vesmíru. Schopnost

Briana Greena destilovat složité myšlenky do přístupného jazyka z toho dělá nutnost, kterou by měli sledovat jak odborníci, tak laici. Přihlásit se k odběru Science Time: / sciencetime24.

Resumé : Ne, nemusíme se zbavovat teorie strun, (jak hlásá název článku), ale musíte konečně zapřemýšlet nad návrhem HDV, nad vylepšenou teorií strun, tj. HDV.

JN, 26.07.2023

0:00

as we know chapter one full of holes lacks mathematical support our comprehension of the

0:08

universe as it currently stands Harbors a profound Paradox on one side we have quantum physics which

0:15

is like a detailed guidebook for tiny particles and the forces that they use to interact with each

0:20

other on the other hand we have general relativity which with equal success describes the way that

0:26

matter and energy move through space and time as well as how space and time themselves evolve

0:32

in the presence of matter and energy each Theory works great on its own but when we try to use both

0:38

at the same time things get messy and confusing for more than a century scientists have been on a

0:44

quest for a Theory of Everything a comprehensive solution that would not only reconcile this

0:49

puzzling contradiction between quantum physics and general relativity but also makes sense of

0:54

all the forces particles and interactions in the universe through one all-encompassing equation

1:01

string theory is one such proposed solution it suggests that everything in the universe at its most basic level is made of tiny vibrating strings of energy well it's a theory that tries to answer

1:07

1:14

the question what are the basic fundamental indivisible uncuttable constituents making

1:21

up everything in the world around us the idea is like this so imagine we look at a familiar

1:28

object just a candle and a holder and imagine that we want to figure out what it is made of
1:34

so we go on a journey deep inside the object and examine the constituents so deep inside we
1:40

all know you go sufficiently far down you have atoms we also all know that atoms are not
the

1:44

end of the story they have little electrons that swarm around essential nucleus with neutrons
and

1:49

protons even the neutrons and protons have smaller particles inside of them known as quarks
that is

1:56

where conventional ideas stop here is the new idea of string theory deep inside any of these
2:01

particles there is something else the something else is this dancing filament of energy it
looks

2:07

like a vibrating string that's where the idea of String Theory comes from and just like the
2:12

by vibrating strings that you just saw in a cello can vibrate in different patterns these can
also

2:17

vibrate in different patterns they don't produce different musical notes rather they produce
the

2:22

different particles making up the world around us so these ideas are correct this is what the
2:26

ultra microscopic landscape of the universe looks like it's built up of a huge number of
2:33

these little tiny filaments of vibrating energy vibrating in different frequencies the different
2:39

frequencies produce the different particles different particles are responsible for all
2:45

the richness in the world around us and there you see unification because matter particles
electrons

2:51

and quarks radiation particles photons gravitons are all built up from one entity so matter
and

2:59

the forces of nature all are put together under the rubric of vibrating strings and that's what
3:05

we mean by a unified theory and here is the catch when you study the mathematics of string
there you

3:11

find that it doesn't work in a universe that just has three dimensions of space it doesn't work
in a

3:17

universe with four dimensions of space nor five nor six finally you can study the equations and

3:23

show that it works only in a universe that has 10 dimensions of space and one dimension of time

3:31

the extra dimensions are thought to be compacted or hidden from our perception despite the Allure

3:36

of string Theory's elegant mathematics and unifying potential it has yet to provide testable

3:42

predictions or experimental evidence leading some to question whether string theory is dead or still

3:48

a viable candidate for The Theory of Everything you say the problem is just hard rather than we

3:55

are barking up the wrong tree so that's kind of how I think about it plus it assumes that

4:01

their fun coherent theoretical understanding of all phenomena in the universe it assumes that

4:09

and you're putting your philosophical mission statement on the universe that

4:13

you're investigating and the history of that exercise has never proven to be successful so

4:20

I just like to take a step back and stay open to the possibility that there's a whole other idea

4:25

that could supplant everything they're doing that wouldn't take 30 people 40 years to try

4:32

to figure it out because that's a lot of brain power going in there in all fairness to them they

4:36

made certain progress with their string theory in interpreting using it to interpret things that we

4:43

Now understand more deeply okay so that works and by the way how close are we to proving it

4:49

experimentally you can have a hypothesis that is untestable in its core but if the hypothesis is

4:58

true some other things might be true that you can then test so you can test the edges of it

5:03

that can still make progress on the thing that you're waiting to test if you can't do it today

5:11

testing for the existence of hidden Dimensions is a complex problem and a major challenge in

5:16

theoretical physics especially given that many theories which propose these Dimensions like

5:22

string theory suggest they are incredibly small possibly Compact and inaccessible

5:28

through conventional means if I take the most straightforward approach to string theory you

5:34

really are imagining that these dimensions are there they're real I mean just as you would

5:40

say that the three space dimensions around us you know left right back forth up down

they're

5:46

real they're here we are immersed within those Dimensions these other dimensions are as real

as

5:52

these with the one difference being their shape and their size differs from the shape and size

5:58

of the dimensions that we have direct access to through through human experience and one

approach

6:05

imagines that these extra dimensions are tightly coiled up curled up crushed together if you

will

6:11

into a beautiful geometrical form that's all around us but just too small for us to detect

6:20

with our eyes too small for us to detect even with the most powerful equipment that we have

6:24

nevertheless according to the mathematics the size and the shape of those extra Dimensions

leaves an

6:30

imprint in the world that we do have access to so one of the ways that we have hoped yet to

achieve

6:37

to make contact with experimental physics is to see a signature of those extra dimensions

6:42

in places like the Large Hadron Collider in Geneva Switzerland when you slam protons

together at very

6:48

high speed of the Large Hadron Collider if there are these extra dimensions and if they have

the

6:52

right form and that's a hypothesis that may not be correct but when the protons Collide they

can

7:00

create debris energetic debris that can in some sense leave our dimensions and insert

7:06

itself into the other dimensions and the way you'd recognize that is there'd be more energy before

7:12

the Collision than after the Collision because the debris would have taken energy away from the

7:18

place where our detectors can detect it so that's one real concrete way that you could find evidence

7:24

for extra dimensions and it hasn't happened yet doesn't mean it won't happen but that would be a

7:31

stunning moment in the history of the species if data that we acquired in these dimensions

7:37

gives us kind of incontrovertible evidence that these dimensions are not the only Dimensions I

7:43

mean how mind-blowing would that be despite Decades of research String Theory hasn't yet

7:49

provided a single prediction that could be experimentally verified is the string theory

7:54

dead it's a question many have asked due to the Theory's glaring predicament lack of empirical

8:00

evidence now that doesn't mean it's a scientific dead end quite the contrary as a field matures you

8:07

need to judge it by a different standard you need to judge it by is it making progress on

8:13

foundational issues deepening our understanding of the subject and by that measure string theory

8:19

is scoring in very high now at the same time you also need to judge whether it makes contact with

8:26

experiment too and in that measure we're still challenged so I would say that many

8:32

string theorists myself included are very sober about the theory it has the tremendous progress

8:39

that it had 30 40 years ago that hasn't gone away but we've become better equipped at assessing the

8:47

long journey ahead and that was something that we weren't particularly good at back say in the 80s

8:53

and that's the nature of science quick hits that resolve everything few and far between and so if

9:01

you were in for the quick solution to the big questions of the world then you would have been

9:07

disappointed and I think there were people who are disappointed and I moved on and work on other

9:12

subjects if you're in in the way that Einstein was in for a lifetime of Investigation to try to see

9:19

what the answers to the Deep questions would be then I think string theory has been a rich source

9:25

of material that has kept so many people deeply engaged in moving the frontier forward from the

9:33

smallest particles to the Grandeur of the cosmos science has always been our tool to peel back the

9:39

layers of the unknown to illuminate the darkness of ignorance with the light of understanding one

9:45

thing is certain the pursuit of science never ends each answer uncovers new questions each

9:51

Revelation leads to new Mysteries we move forward in our journey understanding that in the grand

9:56

scheme of the cosmos we are just beginning to scratch the surface of the vast unknown

10:04

foreign