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The Multiverse, the Polygraph, and the Resurrection | Tom Rudelius

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The Veritas Forum

Our latest podcast episode features an interview with rising physicist Tom Rudelius. We discuss String Theory, polygraph tests, fine-tuning, and our place in the cosmos.

Transcript

For me, when I look up at the vastness of the universe and the cosmos, what I see is not evidence of how small we are, but how great God is. I'm here with Tom Rudelius, who's just graduated with a PhD in physics from Harvard. Tom is a rising star on the study of String Theory, and we're catching him before he moves to Princeton to take up a postdoctoral fellowship there.

We're going to talk about everything from lie detector tests to String Theory, and from Multiverse Theory to the 2010 earthquake in Haiti. Tom, you have a pretty unusual story of coming to faith in Jesus. Can you tell us about your childhood background and what you believed by the time you showed up as an undergrader corner? Sure, so I was raised in a very non-religious family, in a very non-religious educational environment.

We celebrated Easter with chocolate bunnies in Christmas with presents, but that was sort of the extent of my religiosity. I think I was probably about eight years old and read this picture book about how someday the sun would become a red giant and swallow up the earth, but it said don't worry because this won't happen in your lifetime or your grandchildren's lifetime or even your great-great-grandchildren's lifetime. So basically you just shouldn't worry about it.

My thinking back then, which is still my thinking today, was that this seems sort of like an exercise in self-deception because any kid knows that you don't judge the happiness of a story by its beginning or its middle, but by its ending. And humans might do all these great things, but if in the end our story ends in death, that doesn't seem like a very happy story to me. Did you just shelve those questions between ages eight and eighteen? Yeah, I guess so.

It sort of felt to me like there might well be something out there, but I sort of just put it out of my mind and focused on other things in life. When I went off to college at Cornell, I was, I guess, pretty much an agnostic. I hadn't really thought very much about the questions of God or religion or really any of the big questions of life.

So you went to Cornell, your twin brother went to Northwestern, and he, as I understand it, became a Christian through a relationship with their friend at Northwestern. Can you tell us what was your initial response to your brother becoming a Christian? I thought it was strange. I remember telling him that he shouldn't change too much.

I said, "Don't become like Ned Flanders, who's a very religious character in the television show *The Simpsons*." He tried to give me a Bible one time, and I told him, "Look Steve, I have trouble finding time to read books that I want to read, much less time to read books that I don't want to read." So that's sort of where it was on all these questions. Honestly, I can't really remember what got me to start taking him more seriously. Part of it, I think, was just not wanting to be ignorant or not wanting to seem like I wasn't willing to give it a try.

I eventually started reading the New Testament, some other books that he gave me, even started going to church with him. I believe you read some books by atheists at that point as well to get a fair hearing from both sides. That's right.

I read *The God Delusion* by Richard Dawkins. I didn't find it very compelling at all. I think Richard Dawkins had a lot of good things to say against what I might say or more of the quote-unquote fundamentalist views of Christians.

But from where I was sitting, I wasn't considering embracing young earth. Creationism was sitting there considering embracing Jesus, and it felt like Richard Dawkins had very little value to contribute to those conversations. It seems like you still didn't feel like you had a real need for Jesus.

What was it that changed you to a place where you felt like you did? In the midst of these conversations with my twin brother, I applied for some internships for the summer after my sophomore year of college. I got an offer from the NSA contingent upon completing a polygraph. Going into this polygraph, I think my feelings were sort of like my feelings towards heaven, which is I'm basically a good person.

I get good grades. I haven't done anything seriously wrong. I should be fine.

But I went into this polygraph room, answered the first round of questions, failed, and realized very quickly that I was going to continue to fail. Not only if I were lying, but if I simply felt guilty about anything. So for about four hours, I shared everything that I could think of that I'd done wrong in my life.

And for the first time, I started to realize, "Wow, you know I'm not maybe such a good

person after all." These good grades, the fact that I don't do drugs, these sorts of things, they don't really, it heart made me a good person. And so for the first time, I sort of started to recognize my need for a savior, all this stuff about the gospel, all this stuff about Jesus that my brother had been telling me, started to make sense not only at an intellectual level, but also at a personal level. And how did that transition then for you impact how you've thought about your academic work? I think becoming a Christian really affected how I saw the motivation for my work, in that it's just not for me and my success and trying to form a happy life for myself.

But rather that I'm part of this bigger story and I'm part of this bigger family. So thinking about that larger family and that new sense of purpose and mission, I understand you went down to Haiti in 2010, not long after becoming a Christian, to serve some of the folks there who've been impacted by the earthquake that year. Can you tell us a little about how that experience shaped you as a young Christian? The first thing I would say about that experience was that it was very strange, right? I'd been a Christian for about six months at that time and after being in a non-religious environment my whole life, all of a sudden I was thrown into this group of people who really loved Jesus and it was quite a culture shock, not only going to Haiti but also just being surrounded by Christians all the time.

Probably the thing I remember most about Haiti, the thing that my biggest takeaway was meeting some of the people there who had lost everything in the earthquake and yet were still just so passionate about it. Just so passionate about their faith who were just so grateful to God for all that he'd given them, even though they basically had nothing at that point. Here in the United States I know for myself so often look at God and get upset with how things are going in my life and get upset.

You know God why aren't you doing this? Why aren't you doing that? What we got to see there is people who have so much less and they recognize that God isn't the problem. God is the solution to their problems. A lot of people as they consider the Christian faith are troubled by the question of suffering and how could there be loving, creative God given all the suffering in the world.

For you as a young Christian at that stage, how are you processing that and how did your experiences in Haiti relate to that? The Christian view is that someday God is going to come and set all things right and to me that solution seems like a far better one than any other belief system has to offer. If you take God out of the picture, I think we're still left with this problem of evil but now we've taken away the only solution that we have to that problem. Some people find faith to be antithetical to a scientific mindset.

As you think as a Christian and as a scientist, do you feel like there's an opposition in your mind between faith and your scientific enterprise? Do those two things come together? There are a few things I could say on this. I think the first thing is that science

and faith tend to address different questions. C.S. Lewis says this famous quote where he says, "Even if science someday became so complete that we knew literally everything there is to know about the universe." Would not the questions, why is there a universe at all? Does it have any meaning behind it? Still go on just as they were.

Beyond that, something that I really appreciate about the Christian faith in particular is that it's based on a historical history. It's based on a historical truth, namely the divinity, teachings, resurrection of Jesus. And since it's based on something that actually happened here in history in our space-time universe, it's something that we can actually explore and investigate like we could with any sort of scientific hypothesis.

Some of our listeners would have heard of the fine-tuning argument that some people see as pointing to the existence of a creator God. And then we would have to explain what that is, where modern science is at on that, and then how that might connect to your academic interests. The fine-tuning of the universe is something that virtually all theoretical physicists acknowledge.

The idea is that if you were to take the laws of physics that operate in our universe and you were to tune them just slightly, so you were to take some constant of nature and tune it just slightly, you'd get a universe that no longer permits life. And so it looks as though all of these constants have been somehow finely tuned into this life-permitting range that just is exactly what we need for us to be able to live here. The existence of fine-tuning is a fact.

The controversy comes when we start to occupy how we explain it. I'd say that virtually all of my non-theistic colleagues today would go to a multiverse as an explanation. And the idea behind a multiverse is that there's some infinite collection of universes out there, and most of them are going to be not in this life-permitting range.

But just by chance you expect that some universe or another will fall into a life-permitting range. And so, of course, we find ourselves living in that universe. I think that as far as the multiverse goes, most people tend to fall off sort of on one side or the other too far.

Either people think that it's a totally crazy theory and it's just not worth talking about, or people think it's just the greatest thing ever. It's solid science. It's something that we've completely figured out.

And I think that both of those are just exaggerations. There's some decent theoretical arguments to be made for the multiverse. On the other hand, all of these multiverse theories are very speculative, and even our best ones are beset with paradoxes, so that even our best multiverse theories seem like they also require some level of fine-tuning.

I guess it's kind of hard to say where we are on this. I think it definitely lends credibility

to the idea of a designer, which is dialed the knobs just right. I wouldn't say that it's a knockdown argument, but I think it's part of a cumulative case for some sort of God.

The arguments from fine-tuning do their part. Can you just give us a little insight into what you mean when you say that there seems to be fine-tuning to the extent of various light alterations in the fundamental constants of the universe, which make a radical difference to where there would be no life. Can you unpack that for those of us you aren't so familiar with those concepts? Probably the two most famous examples of fine-tuning and the ones that we theoretically physicists spend our most time pulling our hair out over are what are called the cosmological constant problem and the hierarchy problem.

The cosmological constant problem is this. Our universe seems to be expanding at an accelerating rate. So this is already by itself somewhat of a surprise, but what's really surprising is how slow this is.

You would expect from particle physics from quantum field theory that the cosmological constant, which is telling you that the order of expansion, should be something like 120 orders of magnitude larger than it is. And yet, if you compute what the cosmological constant needs to be in order to permit life, you find that it's almost exactly what we measure. So it's very hard to imagine why the cosmological constant should be so small unless it's there because this is the only value it can be to permit life.

And you might say, well, maybe we just haven't understood the physics well enough, maybe we'll understand something better, some new theory will come along. But it's very hard to imagine that that will be the case because for the cosmological constant problem, if there was some other theory, it's almost certainly we would have expected to see effects of this other theory already in our experiments. If somehow the universe is not fine-tuned, it was assembled in such a way as to fool us into thinking that it was.

And to me, and to just about every other theoretical physicist, that seems very strange and very unlikely. Some people would say, as we understand more about science and as we recognize how tiny our Earth is in the context of the solar system, how tiny our solar system is in the context of the universe, and how insignificant potentially our universes in the context of the multiverse. How can we think that a creator god would be even bothered with us tiny little humans on this tiny little Earth in an obscure part of an obscure galaxy? How does that for you fit with your Christian convictions? So the really amazing thing about Christianity is that what it's saying is that although we may be small, and although we may be just on this one planet in this one solar system, that yet God still loves us and he gives us intrinsic value.

And so for me, when I look up at the vastness of the universe and the cosmos, what I see is not evidence of how small we are, but how great God is. So for most of us, when we think about string theory, we probably think of Sheldon Cooper from the Big Bang Theory

and is charming, geekness, interest in all things theoretical. Can you tell us a little more about the relationship between string theory and the specifics that you study in your academic work, and even this idea of a multiverse, how those two are connected? The reason string theory is often brought up in multiverse discussions is because string theory seems to predict that there is not just one possible universe, or one possible set of laws of physics, but rather a huge collection.

This is what is referred to as the string landscape. Now, string theory by itself doesn't tell you that these universes are actually going to be realized in nature, but the fact that you have this huge collection of possible universes is giving some credence to the universe. Some credence, I think, to the multiverse idea that if you have all these universes, and especially if you don't believe in God, if you reject the idea of any sort of cosmic designer, then it's hard to see why our universe, the one that we live in, should be the only one of this entire landscape, which is actually realized in some physical way.

Let's talk about the Big Bang for a second. Some people think of the Big Bang as an explanation of the origin of the universe that removes the need for us to imagine a creator God. Yeah, I always think that's one of the funniest things I've heard.

I actually have no idea how that idea started creeping into the popular culture, but I've heard it too, so I know it's not a straw man. The Big Bang Theory is really the theory of everything after the Big Bang. We have a pretty good understanding of everything that's happened after the Big Bang, so from about 10 to the minus 34 seconds after the Big Bang, until now, we have this standard model of cosmology, which has a few puzzles left in it, but overall explains things very well.

We have basically no idea of what's going on at the Big Bang itself. Anytime that someone tells you that they know what's going on, you shouldn't listen to them, because everything is very speculative, and it's very hard to imagine that we could ever produce some experiments which would tell us what was actually happening at that time. However, even that I think sort of misses the point, because even if we somehow came up with this great theory which perfectly explains the Big Bang, that still wouldn't remove the role of God here, and that's because it's possible to have two explanations for an event operating at the same time.

An example that's often given is this idea of water boiling, you can ask me why the water is boiling, and I could give you a physical explanation and talk about the laws of thermodynamics, or it could give you a metaphysical explanation and say the water is boiling because I wanted to make a cup of tea, and you can have both those explanations operating simultaneously. And so even if we were to come up with this perfect theory that explains how the universe came into existence, there could still be this question of why it happened in the first place. Is there some deeper meaning behind it? And so there's room for this metaphysical explanation of God created this universe

using these laws of physics.

So a few years ago, Stephen Hawking, in collaboration with a Caltech scientist, led a lot enough, wrote a book called *The Grand Design*, in which they were claiming that the universe, we now have a scientific understanding of how the universe created itself, and that we don't need to wonder anymore about whether there's a God to light the blue touch paper as they put it. Do you think that's a scientific claim? I think Stephen Hawking and some of his collaborators have a theory of creation, but first of all, it's a very speculative theory. It's something that very few physicists outside of the people who have worked on it are convinced by.

But also I'd go to the same thing is that Stephen Hawking, I know, and that book says, because there's a lot like gravity, the universe can and will create itself. And of course, the question that arises is, well, why is there a lot like gravity in the first place? Stephen Hawking has to make these metaphysical assumptions, these assumptions about how the universe should work, and he claims to show that with those assumptions that we will get a universe. And in the end, what's produced is, again, a very speculative theory.

So let's go back to these fundamental questions around the Christian faith and the evidence for the Christian faith. When you were first investigating Christianity and looking at that evidence, particularly for the resurrection of Jesus, what were the pieces that impressed you? What were the pieces that you found troubling and are there still open questions for you on that? I guess when I first encountered the evidence for Christianity, the evidence for the resurrection, my thinking was that this doesn't seem totally crazy, which is not what I expected, right? I was in the environment that I was raised in and educated in. I sort of expected Christianity would just be this thing that was sort of easily swatted away.

I remember especially thinking that the conversion of Paul, that at the very least had to keep me from immediately dismissing the evidence for Christianity and the evidence for the resurrection. The idea of some skeptic or some opponent of the faith being converted in such a strange way by itself was enough for me to say, okay, there could be something going on here. I think my views on the resurrection have changed pretty significantly, just in the ways that I sort of assigned probabilistic weight to it.

I'd say now that the resurrection is really, I think, the workhorse argument for the Christian faith, the divinity and resurrection of Jesus. I think we can talk about things like the cosmological argument, the evidence for fine tuning, and we can weigh these against things like the problem of evil and suffering, the hiddenness of God, some of the strangeness of Christian doctrine. But I think that all of these questions really deal with metaphysics, and I think metaphysics is speculative.

As a scientist, what I'm really looking for is hard data, and I think that when we get to the resurrection, the divinity, the miracles, the teachings of Jesus, now we actually have

some hard data. We have some hard historical data that we can put our hands on, and I'm pretty confident that historical data is a more reliable source of truth than metaphysical arguments. When I look at the historical evidence for Christianity, I'm first of all struck by what an improbable series of events we have, that even the most skeptical of New Testament scholars will agree that Jesus performed some sort of faith healings and exorcisms, which they usually will attribute as psychosomatic cures, followed by the disciples experiencing Jesus resurrected in some way, followed by the conversion of Paul, not to mention the conversions of James, the evidence for the empty tomb, etc.

It seems to me what you have here is just a huge series of coincidences happening to a single person. Now, what do you do when you see huge coincidences? Usually you look for a story that ties them all together. If you're a detective and you come across some murder scene that looks almost exactly like a murder scene that you saw previously and another one, eventually you start to say, "Well, maybe this is the work of a serial killer." You find a story that ties these all together.

Now, sometimes that doesn't work. Sometimes there are just huge coincidences. For instance, you could ask, "Why is it that the sun and the moon looked to be almost exactly the same size from Earth?" So that we in particular have both solar eclipses and lunar eclipses.

I mean, that's actually an amazing phenomenon, right? You probably never even thought about it, but it's incredible that we have both solar and lunar eclipses. And you might ask, "Why?" And the answer is that it's actually just a coincidence. It's just this amazing coincidence we just happen to live on this Earth where that happens.

So sometimes we have to just swallow coincidences. But even in a case like that, right, your first thought is not, "I'm just going to say that it's a coincidence." Your first thought is to look for another reason, another story. And sometimes you just don't find another story.

But in the case of Jesus, I think there is a much better story, which is the Christian story. The idea that a loving God has come and he sent this Messiah Jesus to come to die on the cross, to pay the penalty for our sins, to conquer death, and to welcome us back into the family of God. And to me, that story explains all of the data, explains the miracles of Jesus, explains the resurrection, explains why Jesus is so quick to welcome sinners into the table of fellowship with him.

And that act, he's acting out symbolically what his resurrection is also doing. It's welcoming sinners back into fellowship with God. It's giving us hope for eternal life.

And to me, the question is, is what story do you find more compelling, a series of coincidences, a series of apparent miracles, or the Christian story? And to me, the

Christian story is much better. Yes, for a moment, let's pause on even the concept of miracles from a scientific perspective. Sure.

How do you reconcile the crazy miracles that we read about in the New Testament with your understanding of how the scientific processes of the universe and life work? Yes, so I think this is one of the biggest objections people have to Christianity is this idea of miracles. I actually think it's one of the smallest objections. I would say that science tells us what will happen in the absence of supernatural intervention.

It doesn't tell us whether or not supernatural intervention is possible in the first place. That's a question of metaphysics. I think it's perfectly consistent to have a universe that's governed simultaneously by the paradigm of science and physics, and also, at the same time, by some other paradigm, like miracles.

And to see this, you can, for instance, just look at, say, the world of Harry Potter. I'm a big Harry Potter fan. And something you see there, right, is that the Muggle world is exactly the same as our world.

It's governed by the same laws of physics as our world, and if I were a physicist in that world, I would measure exactly the same things that I do in our world. But the difference is that the Harry Potter world is also governed in part by this other paradigm, which is the paradigm of magic. And this magic paradigm coincides with this physics paradigm in a perfectly consistent way.

And what that is showing us is that it's perfectly consistent to have some other paradigm operating along with science. In our universe, of course, we don't see the magic of Harry Potter, but we do instead see miracles. We see the miracles of Jesus, which, again, are very well-attested, accepted, even by some of the most skeptical New Testament scholars.

We see the miracle of the resurrection, and I think it's perfectly consistent to have those go along with science. Have any of your colleagues who are not Christians seriously challenge your beliefs in ways that you've had to adjust your thinking? I'm well aware of this phenomenon of confirmation bias, and I generally try to adapt my theology, my beliefs, based on new evidence. I certainly have not had my beliefs challenged in any serious way by my studies of physics, because in the end, physics is telling us about how the world works, and it seems to me that at most this could change the way we view how God does something.

You know, if God wants to create the universe using this mechanism versus that mechanism, if God wants to create a multiverse rather than just a single universe, it's his prerogative, you know? It's his world. He can do whatever he wants. It's hard for me to imagine how some discovery of physics could really affect the heart of my faith.

It could affect the way that I think that God has done things, but I don't think it would affect whether or not I believe there's a God in the first place. Awesome. And what's been the highlight for you of Christian community at Harvard? I've been constantly impressed by the undergraduate at Harvard that I've worked with.

First of all, because I think that they're all extremely talented in many different ways. But also, more importantly, is I think the humility that I've seen amongst my friends and the way that they seek to bring their faith into whatever it is that they're working on. You actually interviewed here a good friend of mine, Obasi Shah, a few weeks ago on his rap album.

And I think that's a really good example where you see someone bringing their faith into their work and doing it in an excellent way. So last question as we think about next steps for you, Tom, as you moved to Princeton, what will you be doing there? What are you excited about? What are your aspirations for the future? In September, I'm moving to a place called the Institute for Advanced Study in Princeton, which is a place that's sort of long been recognized for its theoretical physics. It's actually where Einstein used to work.

And so, of course, for me, as a theoretical physicist, it's a really exciting opportunity to be able to go there and to learn from some of the best minds around. Like virtually every postdoc in physics, my goal is eventually to be a professor. So I'll just be there doing research, hoping that at some point someone will give me the nod and bring me up to a faculty position.

But we'll see. Find more content like this on veritas.org. And be sure to follow the veritas forum on Facebook, Twitter, and Instagram.

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