

# OpenTheo

## Cold Fusion and the End of Scientism? | Ian Hutchinson

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### The Veritas Forum

This week on The Veritas Forum podcast we're featuring a conversation with Ian Hutchinson, a professor of nuclear science and engineering at MIT. A powerful advocate for the compatibility of scientific inquiry and religious belief, Ian has been a featured speaker at Veritas Forums since we began in 1992. In this interview with New York Times columnist Ross Douthat, Ian discusses his work in the field of nuclear science, his journey to Christian faith, and his hope for a more fruitful dialogue surrounding science and religion.

### Transcript

I believe the natural world is the creation of God and that when we are discovering about that, whether it's in physics or biology or chemistry or any of these other areas, we are discovering about God's creation. Welcome to The Veritas Forum podcast. This week we're featuring a conversation with Ian Hutchinson, a professor of nuclear science and engineering at MIT.

A powerful advocate for the compatibility of scientific inquiry and religious belief, Ian has been a featured speaker at Veritas Forum since we began in 1992. In this interview with New York Times columnist Ross Douthat, Ian discusses his work in the field of nuclear science, his journey to Christian faith, and his hope for a more fruitful dialogue surrounding science and religion. Hi Ian, thanks for being here with me.

It's a pleasure. So you're a professor of nuclear physics and engineering at MIT which are both pretty daunting and impressive fields. Can you tell me a little bit about your work? Well my research focuses on nuclear fusion.

Nuclear fusion is a type of nuclear energy which is different from the type of energy we have currently. The type of nuclear energy we're familiar with is based on the fission that is taking heavy elements like uranium and breaking them down and getting energy out of them. Fusion is the opposite.

It's taking light elements like hydrogen and its isotopes and bringing them together and forming heavy elements and it turns out that yields energy. In fact it's the energy source of the sun and stars. And so fusion research is trying to answer the question, can we bring the energy source of the sun and stars down to the human scale and make energy on earth that can generate electricity and power our society.

And that's what my research is focused on. And is the answer yes soon tomorrow? The answer is sort of maybe. We've been studying fusion for probably 60 years and it involves the physics of what is called plasma.

Plasma is a state of matter that it enters when it's at very high temperatures. Very high temperatures are needed to make fusion reactions take place because we need very energetic collisions between the nuclei that are reacting. And so my, the physics that I study is the physics of plasmas.

I'm a plasma physicist in that sense. And plasmas have a wide range of interesting behavior and what we have to do in order to try to make fusion work is to heat these plasmas to perhaps 100 million degrees Celsius. Well if you have something that is that hot, you don't put it in a regular bottle or material container, you have to use something immaterial to contain it with and what we use is magnetic fields.

So we build magnetic bottles, magnetic confinement devices, which contain this incredibly hot plasma and we heat it to these very high temperatures and we study how fast it's leaking out of the bottle and whether we can make the bottle good enough so that we can light fusion fire inside of that confinement device and yield useful energy. And there's a lot of excitement about the fact that we're nationwide and actually worldwide we are building a big experiment in the south of France at the moment called Ito, which is intended to be a scientific demonstration of controlled fusion energy using magnetic confinement. So if successful it will yield perhaps 500 megawatts of fusion power for hundreds of seconds at a time.

It'll still be a scientific experiment, it won't be generating electricity and putting it on the grid, but it will be a demonstration that yes it is feasible to make fusion energy a reality on the human scale. And what are the risks associated with this? Because when we talk about nuclear power and you know I'm a political journalist, the politics of nuclear power in the west are completely bound up in fears of reactor meltdowns and so on, is that do those fears apply to fusion? Fusion has many advantages compared with fission energy and a lot of those are associated with safety. So in principle fusion is both safer than fission, there's no fear of meltdown and a fusion reactor because there's far less fuel at any one time in the reactor.

Fusion has essentially inexhaustible resources for the long term, more so than fission, although we've got plenty of uranium in the world as well. It is free from most of the fears that are associated with weapons technology proliferation, which are associated

with fission. And these types of advantages are the why is it fear from those? Well because instead of using fissile materials like uranium and all the enrichment technologies that are required to fabricate fission fuel, fusion uses light elements like hydrogen and therefore it doesn't involve the same types of technologies that are involved in fission power.

So anyway in general there are many potential advantages of fusion energy but it's a lot harder to make work than fission and that's why it's taken us so long to reach the point of being able to embark upon a scientific demonstration. And this is the ultimate layman's question but I have to ask it anyway, cold fusion is essentially a fantasy that involves doing what you do but without heat or what is cold fusion and why does it show up in Hollywood blockbusters? The short answer is that cold fusion is bunk. But Elizabeth Shoe's character in the movie *The Saint without killer* has the secret to cold fusion in her physicist's brain so I just had to ask you.

But yeah I mean cold fusion refers to the idea that it might conceivably be possible to make fusion work without having extremely high temperatures. And in fact we've known since the 1940s that it actually is possible to cause fusion reactions to take place by catalyzing them using muons. But it's also been known since the 1940s that to do so would never yield net energy because you'd use more energy to generate the muons in the first place than you then you would get energy out.

Cold fusion as it is commonly imagined and since about the late 80s when people promulgated the idea that they'd actually achieved cold fusion is largely a mistake and it's based on incorrect science. Unless you're part of the cover up because that's what I would expect you to say if you were. So let's pivot a bit or not pivot but make a kind of bridge from your scientific work and your scientific vocation to your religious faith.

We're here having these conversations at the intersection of faith and reason, religion and science got in the university. And I wondered if you could talk a little bit about how you came to be a Christian, a believer. And I suppose also how or if that is sort of integrated with your scientific work.

Yeah. I didn't, I wasn't raised as a Christian. It wasn't that I was, I'm English by person and so by definition you were.

But it wasn't that I was ignorant of Christianity. You know the school I went to had was adjacent to Wistic Cathedral. So you know Christianity was part of the culture but I, but my parents were not Christians and I didn't go to church as a, as a school boy.

I became a Christian when I was an undergraduate at Cambridge University. The many events led up to that, that step. But the most important ones, you know ultimately that provoked my commitment to Christ was that I had some good friends who fellow undergraduates at Cambridge University whose lives seemed to me attractive, whose

Christian faith seemed important to them and, and seemed coherent.

And they invited me to go and hear a series of lectures given by Michael Green who was a well-known preacher and evangelist at the time in Britain. And, and despite the fact that I had previously, you know studied the New Testament from an academic point of view in order to pass exams and so forth, the things that he said about the Christian faith, about the possibility of a personal relationship with God about the, about the reality of Jesus' sacrifice for, for the sin of the world and for individual sins. This, that seemed to me at the time to be almost the first time that I'd heard the gospel as I now understand it, explained.

And, and after a period of consideration, I did reach the point of realizing that I kind of did believe this, that Christianity made sense to me, made intellectual sense to me, and that I needed to, if I were to be true to what I thought was reality and what I now think is reality, that I needed to take a step of commitment and faith and, and become a follower of Jesus. And, and that's, I did that, and I was baptized as on my 20th birthday actually in the chapel of King's College Cambridge. And at that point as an undergraduate, did you feel clear on your scientific vocation? What were you studying as an undergrad? Yeah, I was studying mathematics and physics at Cambridge and so there was a sense in which my Christianity and my science kind of grew up together.

So I was learning about the natural world in my, in my academic studies, but I was also learning about Christianity and becoming a serious believer and practiceer, a follower of Jesus at the same time. And it's never really in my academic career seemed to me that there's been a very strong contradiction or controversy between those two parts of my intellectual and personal life. And so perhaps that's one of the reasons why I don't feel that the supposed conflict between science and the Christian faith is, is really nearly so deep or significant as is, as it is often portrayed in our society today.

So, but you must have been you know, I mean, when I think about at least in certainly in the American popular imagination, if you combine English and scientists, the first thing you don't think of is a believing Christian, right? And so you must have spent a fair amount of time and still spend a fair amount of time in your professional life and in your friendships with people who share your scientific vocation, who do feel that tension, who feel that there is, that by in choosing to be scientists, they are choosing to sort of set the childish things of religion aside. And I guess assuming that that, you do feel that, I wonder how, I guess, why you think that they think the way they do when you do not. Well, I think, I think your portrayal of the opinions of today is probably fairly accurate, but I don't think that's a good reflection of actual history.

Because if you think of the famous scientists of history, many of whom were Englishmen, okay, or Scots actually, many of them, that many of them were in fact Christian believers. So, if you, so if you think about James Clark Maxwell or Michael Faraday or

Eddington or Boyle or Newton or and so on and so forth and on and on, these were people who were not atheists, they were deeply believing Christians and yet the names of the people that I just mentioned, mentioned are names of the greatest scientists of history. And so I think it's simply a fallacy.

It's a myth that science, modern science, as we know it, and religious understanding of the world have always been at war. However, that said, it is often the case today that that conflict is portrayed as being the status quo. I just think that status quo is based on a misunderstanding and I think it's based on a belief that science somehow has disproved religion in a way which I think is just simply fallacious.

So there are many people that advocate that science has disproved religion. I just think it's wrong. And but do you think that that the fact that there is that sense today, do you think that that's primarily intellectual in the sense that people in scientific fields have heard the argument that science disproves religion felt convinced by it and that's why they believe what they do? Or do you think it's more cultural that there's just a sort of cultural gap and this has been my experience both as a college student and as a journalist that there is a sort of basic gap between the lived experience of the academy, let's say, and sort of religion and churches and religious experience and so on that accounts more than the intellectual element for the, I guess, the secularism of your profession.

I mean, how do you account for that? I would say first of all, people believe or disbelieve in religion for much more complicated reasons than simply their intellectual ideas. That's certainly the case. But I do think that there was in the late 19th century, early 20th century, an upheaval in the intellectual world, in universities, in the academy, which was a transition from what had before been largely a religious organization because after all, most of the universities that were founded in Europe in the preceding few centuries had been founded as Christian organizations, as Christian institutions.

So Christianity had been predominant in actually forming the whole academic world that you and I benefit from. But in the late 19th century, there was a transition away from that religious emphasis into a secularization of the academy. But I think that was a very important event which transformed the universities into secular places in which religious perspectives were regarded as being perhaps, at least were regarded with some suspicion, let's say, and certainly as perspectives that were about to be or in the process of being replaced by what we regard as being scientific perspectives.

But here's where I would want to say that I think those perspectives are actually that are purporting to replace the religious and metaphysical and philosophical positions of the academy prior to that time. Those positions that we now think of as being science today are largely, in my view, not scientific positions, they are scientific positions. In other words, I think that there is a tension in the academy and in our society as a whole

between the Christian faith and the predominant, let's say, attitude, prevailing attitude in the academy.

But not because that conflict or that tension is not between religion and science. It's actually a religion between religion and what I would call scientism, which is the belief that science is somehow all the real knowledge there is. That's the topic of my book.

Right. Which has the wonderful title, monopolizing knowledge, a scientist refutes religion denying, reason destroying scientism. I guess tell me a little bit about the argument there.

I'm also, I suppose, interested in particular, you're a physicist and I wonder it's sort of a cliché in these discussions that physicists are sometimes more open to religion than evolutionary biologists or maybe slightly less prone to scientism. And I wonder if you think that that part of your background explains your particular perspective. But first, the argument of the book.

So basically, the argument is to try to identify scientism, this belief that science is all the real knowledge there is and that other forms of knowledge are at best opinion or superstition or perhaps just plain nonsense. But that is just intellectually a mistake. And even though it's very, that attitude is very widespread in our society as a whole and in the academy.

And even though many of the disciplines that are really not sciences are trying or have been trying sort of turn themselves into sciences, I think that whole attitude is a mistake. It's a mistake in part based on a misunderstanding of what science is. And in my view, we use the word science these days when unqualified, almost universally to refer to what was once called natural philosophy.

In other words, it's natural science. And our eye is a natural scientist. As a physicist, regard natural sciences as something that is basically well-defined.

So when we talk about science today, we're talking about things like physics and chemistry and biology and physiology and geology and cosmology and things like that. We're not talking about in my view, most people are not thinking of what are sometimes called the social sciences. So I want to set those aside and explain what I mean by science.

So I think that science has some very specific characteristics that govern the way it goes about acquiring its knowledge. It depends upon reproducible experiments or observations. And it depends upon a kind of clarity of understanding and expression of its results, which enable one to discover whether you are obtaining reproducible results.

And those are the key characteristics of natural sciences. We know it. And many things in our world, which are extremely important and in our lives, don't lend themselves to

investigation by those means.

And the sort of examples I like to give are something like history. Human history cannot be studied using the techniques of science by and large because it involves unique events that are not to be repeated. And the same is true of many things.

We hope. Well, at least cannot be repeated in the ways that scientists need in order to pursue their approach to discovering knowledge. And there are many other disciplines, which are common place in the academy, which are important knowledge, which possess important knowledge, but do not possess the characteristics of science.

And I'm thinking of things like literature, philosophy, sociology, economics, and jurisprudence, and on and on. And my belief is that what is important in this situation is to recognize that those disciplines have important knowledge, but it's not acquired in the same way as the natural sciences. And so when I then address the question of religion or theology, let us say, I am extremely happy to find the knowledge that is associated with the Christian faith and with theology in the same realm as those other types of knowledge.

In other words, Christianity theology is about knowledge per se, but it's not knowledge that is going to be established by the means which we use to establish the laws of physics. But do you feel that the, it seems like those other disciplines would often, people involved in them would recoil a little bit. And you use the term social sciences.

I mean, one of the things that's striking to me about the modern university is how many of those disciplines have a kind of science envy, where they would say, oh no, theology is something over here. And what we're doing in economics or law or any other field is actually closer to what people are doing up at the lab and so on. I mean, do you set that up? There's a good reason why there exists this kind of ambiguity about the word science.

And that is that once upon a time, 400 years ago, science did just mean any organized form of knowledge. But that today, it actually doesn't mean that. Today, the meaning of the word science has become narrower than it once was.

And so there is a sense in which sociology is a science in the way that someone in the 16th century would use the word. And if that was still the case, then theology might well be regarded as a science in that sense, even though perhaps the date wouldn't be regarded as the queen of the sciences. So there's an important distinction that I try to draw, but you're quite right, that some of my colleagues in the disciplines that I would regard as being not natural sciences do sometimes bristle if I say that their disciplines are not science, but they shouldn't bristle because I'm affirming the importance of their disciplines.

I'm saying they have real knowledge. I'm just saying that the way they acquire knowledge is different from the way we acquire it in the natural sciences. No, and I mean, I tend to see a lot of the anxieties around the humanities in particular, as flowing from this kind of science envy joined to the realization that if you're in the English department, you're never going to be doing science in the narrow sense, in narrower sense that you described.

Could you just finish up by just telling me if you do think there is a sort of divide at all between physicists and biologists in terms of religious beliefs? You know, I think the demographics would show probably that there are fewer Christian believers amongst biologists in the US than there are amongst the physicists, but I think that that is changing, and I think that in fact, even though there is a greater nervousness about evolution than there is about physics, there doesn't need to be amongst Christians. I think that Christians can have a constructive, and in fact historically have had a constructive relationship with the natural sciences, and that's one of the things that I most want to convey to those who are believers, who are followers of Jesus, is that we don't need to be nervous about what we're going to find out about the natural world. I believe the natural world is the creation of God, and that when we are discovering about that, whether it's in physics or biology or chemistry or any of these other areas, we are discovering about God's creation.

And so even though some of those discoveries probably make us a little bit uneasy about our interpretation, let's say, of the Bible sometimes, just as the Roman Church was uneasy about it when they discovered that actually the Earth orbits the Sun rather than the other way around. Well, the jury is still out on that. We're still, as speaking as a Catholic, we're still negotiating that one, but no.

But so yes, there are tensions there, but I think there are tensions which don't threaten our faith or the reality of Christianity, and I certainly don't think that those tensions are things which we should pay so great an attention to. Well, thank you so much for having this conversation. It's been a lot of fun.

You're welcome. And cold fusion I'm still holding up on the floor. Find more content like this on [baritas.org](http://baritas.org) and be sure to follow the Baritas form on Facebook, Twitter, and Instagram.

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