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# On Einstein: an Edge Symposium

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Several points I wish to raise as three supposed experts on Einstein have a talk. The subtext of what they say can be read as - physics is in a mess initiated by Einstein, but its not what they would openly admit to, because they idolise Einstein too much to ever want to consider such a possibility. Most significantly they point out that Einstein did not commit mathematical formalism to his theories, which really translates to that Einstein left a mess in the maths. Ideally we would like to know who gave the definitive mathematical formalism to Einstein's theories of relativity. But they do not supply that information, nor does anyone else. That leaves the mainstream able to generate lots of different versions of Einstein's relativity and pretend its the same thing when it isn't.

Looking at some supposed experts on Einstein in the article “Einstein: an Edge Symposium” [1] - Brian Greene, Paul Steinhardt and Walter Isaacson.

BRIAN GREENE: Naturally, scientists quite generally and string theorists in particular often describe their work without giving all of the associated qualifications all of the time. I, for example,have spoken of string theory as a possible final theory, as the possible theory that would unite all forces and all matter in one consistent framework—and I generally try to say—but perhaps not always—that this is not yet a proven theory; this is our hope for what it will achieve. We aren’t certain that this is where it is going to lead. We just need to explore and see where we land.

The thing I note from him is a belief that a theory can be “proven”, in the case of string theory he thinks it not yet “proven.” So his philosophy is that a theory can be proven. There are those in support of Einstein I have argued with that believe theory cannot be proven, and can just be shown to fit data until a better theory might come along. So its inte4resting to note these different philosophic beliefs that these physicists have -result – they are not all talking about the same thing.

PAUL STEINHARDT: What angers people, I think, is the notion that the ultimate theory of physics might allow a googol possibilities.

By “googol” this means a very large number. So he thinks there are lots of possibilities as to the final theory.

PAUL STEINHARDT: That is, even though everywhere we look in the universe has the same laws as far as we can see and seems remarkably smooth and uniform—more uniform than we needed for human existence—somehow we are supposed to believe that the greater universe that we can't ever see is completely different. I think many people wonder whether a theory like that is science, or metaphysics?

Now he just wanders off into philosophical issues that some people claim physics is outside philosophy. But physics generates lots of philosophical problems like – what is physics anyway?

WALTER ISAACSON: That's exactly it: we were talking about why it is that it arouses such passion and then started directly debating string theory. I'd love to take it right back to Einstein—twice you said something that I find very interesting, which is, we have to find a way to make his two grand pillars of 20th century physics compatible, general relativity and quantum theory.

Yes that is the major problem in theoretical physics how to match general relativity and quantum theory.

WALTER ISAACSON: [referring to the unification] Of course Einstein totally would believe that, because he loved unification, he loved unity. Secondly he and Newton agreed on one big thing, which is that nature loves simplicity.

OK

WALTER ISAACSON: But I've always wondered about the more metaphysical philosophical question: how do we know that God likes simplicity? How do we know he wants these things to be compatible? How do we know that quantum theory and relativity have to be reconcilable?

So he too wanders off into philosophical issues.

The problem in that regard was the split between philosophy and physics. Steinhardt refers to that time when Einstein was still pursuing his unified field theory research based on philosophy and physics, as when the American attitude was to split them, he says-

STEINHARDT: By that time, something that might be called an American attitude towards physics had taken over. It was an attitude where the connection between physics and philosophy was broken. You were supposed to focus on what was calculable: take your theory, make predictions with it, calculate with it, test if your calculations are right using experiments; and just stay away from philosophical questions. With this approach, the ideas was that we can systematically inch our way forward in science.

So when they start talking about their philosophical difficulties with physics, well the Americans split the two things apart, and many are still under the impression that philosophy and physics are two different things which should be kept separate.

Einstein created a lot of philosophical difficulties with physics and he still pursued those issues. But the “American attitude” was to split them. And this is one of the big areas of the difficulties in modern physics- Einstein created the problems, but its in an area the “American attitude” to physics

prevents it being fixed.

That's one issue: (1) The mess made in connection between Philosophy and the Physics.

On to the next issue:

BRIAN GREENE: but I'd say my Einstein surrounded learning—not learning, really hearing—in junior high-school that there is this feature of time whereby if you're moving relative to somebody else time elapses at a different rate compared to the person who's stationary, and thinking to myself, that sounds completely nuts, I really want to understand what this is all about. And little by little finally learning what it actually means, and going on from there to try to push the story a little bit further.

I would say that the time being relative as dealt with in Einstein's relativity is a bodge. I doubt whether Brian came to that conclusion about Einstein's treatment of time. But his initial impression that “sounds completely nuts” is what those opposed to Einstein's relativity still hold against Einstein's relativity.

WALTER ISAACSON: Einstein is obviously my father," he said, "who as an engineer loved science and instilled that in me, but also has a lot of Einstein's moral nature to him, and political morality to him. I remember every day growing up, his asking me questions and pushing me in a certain way. One of the things I've learned as a biographer, and the first thing you learn, is that as you write about your subject, it's all about Dad—for Ben Franklin it's all living up to his father in a certain way; even to Einstein, a bit— his father's an engineer. And then the second thing you learn is, even for the biographer, it's all about Dad, and that's why I wanted to write about Einstein—I shouldn't say my father's an Einstein, he's just an engineer in New Orleans, but that was his aspirational secular saint, and so I wrote the book and dedicated it to my father."

I find that very disturbing – he is idolising Einstein as a father figure. Given the possibility that Einstein is wrong, such a person with so much emotional investment in Einstein would be loath to consider such a possibility.

Paul had a similar response. "One of my earliest memories of childhood," he recounted, "was sitting on my father's knee and his telling me stories about scientists and discovery. He wasn't a scientist, he was a lawyer, but for some reason he used to tell me stories about scientists and different discoveries they made—I remember stories about Madame Curie and Einstein and others."

"From that very initial instance, what I wanted to do was be in a field where you got to make discoveries. The thing that always impressed me the more I learned about Einstein was his uncanny ability to take the wealth of phenomena that people were studying at the time, and pick out not only which were the important questions, but which were the important questions that were answerable. There are always lots of questions you'd like to answer, but knowing whether or not you have the technology, the mathematical technology and the right ideas to attack them at the time—that's a real talent. Einstein had the incredible talent to do that over and over and over again, ahead of any of his contemporaries. So, for me he's the ultimate discoverer. That is my Einstein."

This is also disturbing. So out of these three people – two of them are putting a great deal of emotional investment in idolising Einstein, I suspect similar of the third; so all three cannot engage in proper critical appraisal of Einstein's physics because of their emotions.

BRIAN GREENE: When it comes to Albert Einstein, his contributions are of such incredible magnitude that to get inside his head, and even for a moment to get a feel for what it would be like to see the world with such clarity and such insight, would be amazing. But if I was going to ask him one question, I would probably stick to one a little bit more down to earth, which is—he famously said that when it came to the general theory of relativity, in some sense he wasn't waiting for the data to show whether it was right or wrong; the theory was so beautiful that it just had to be right. And when the data came in and confirmed it, he claimed he wasn't even surprised, he in fact famously said that had the data turned out differently, he would have been sorry for the [dear lord?] because the theory was correct. That's how much faith he had in theory.

That shows prejudice by Einstein in his preconceived ideas. Ideally he should have been open to the possibilities but saying it like this is suggestive that he wasn't open to other possibilities. As Einstein supporter it is suggestive he has acquired this same prejudice. But as we look at other things Einstein said it is suggestive that he was open minded on some issues if not this one about his relativity at the time circa 1919. And it also suggestive in his later years that he changed his mind about his circa 1919 opinion and thought his relativity might be wrong. [2]

BRIAN GREENE: So the question I have is, we, many of us, are working on Einstein's legacy in a sense, which is trying to find the unified theory that he looked for such a long time and never found, and we've been pursuing an approach called super string theory for many years now. And it is a completely theoretical undertaking. It is completely mathematical. It has yet to make contact with experimental data. I would like to ask Einstein what he would think of this approach to unification. Does he see the same kind of beauty, the same kind of elegance, the same kind of powerful incisive ideas in this framework to give him the confidence that he had in the general theory of relativity?

All impossible to now answer as to Einstein's opinion on these things because he is no longer with us. It is still suggestive by asking these questions of idolising Einstein too much.

BRIAN GREENE: It would be great to have a response from him in that regard, because we don't know when we're going to make contact with experimental data. I think most of us in the field absolutely will never have faith that this approach is right until we do make contact with data, but it would be great to have the insight of the master as to whether he feels that this smells right. That it is going in the right direction. Many of us think that it is, but it would be great to have his insight on that question as well.

He says “most of us” - which is suggestive that there are “some” not of that opinion. And what difference would Einstein's insight supposedly have on such an issue? It is suggestive that as Einstein-supporters if Einstein had lived long enough and gave an answer on this issue then they might have adopted a different faith. It is a very sad state of affairs of physics to be reduced to faith on issues like this.

Isaacson offers a good guess at what Einstein might have thought:

WALTER ISAACSON: […] Brian posed the question of whether or not Einstein would approve of this—and I really think he would, because if you look at the maybe 12 serious efforts he made towards a unified theory, they do have so much in common with the mathematics and the mathematical approach that is being done by super string theory, including looking at extra dimensions and using the mathematics that way, to try to find the elegant mathematical solution.

Putting aside this good guess. What we have is over-idolisation of Einstein and too much emotional investment by these supposed experts in Einstein, that prevents them from having an objective opinion of Einstein's physics, and that is bad. - issue (2)

On to the next issue -

WALTER ISAACSON:That would lead to the next question I have about Einstein, which is, in the first part of his career and, may I posit, the more successful part of his career, he didn't rely that much on mathematical formalism.

It is this lack of "mathematical formalism" which many of us opposed to Einstein's relativity would say was Einstein messing up the maths. [See for instance Claes Johnson [3]]

WALTER ISAACSON:Instead, in all of the 1905 papers and in the main thought experiments that set him on the way towards general relativity culminating in 1915, he had some physical insight. In fact, the people looking at his general theory of relativity call it the mathematical strategy and the physics strategy. Obviously they're not totally separate, in their iterative process, but he spent the period from 1905 through at least 1914 almost disparaging mathematics as a clean-up act that people would come along and help him do once he understood the equivalence of gravity and acceleration or the other great thought experiments he did.

On this "clean-up" act it is not clear who has given the definitive clean-up of Einstein's relativity. From reading these supposed supporters of Einstein they claim different things. Hence why there is a challenge to them. [see An Open Letter to the Physics Community The Twin Paradox [4]]

And that is point (3) – there is an admission that Einstein did not sort out the mathematical formalism of his theories and left that to others, and in the literature there is no definitive version of the theories to credit who is the authority on having sorted out the maths, instead its just lots of people saying lots of different things but all claiming its Einstein's relativity. Hence the dissidents that I am part of – challenge these supposed experts to give the definitive version!

Onto the next issue-

WALTER ISAACSON:If you look at what he does later in life, with the unified theory, people like Banesh Hoffman and others who were his collaborators say, we had no physical insight to guide us, nothing like the principle of the equivalence of gravity and acceleration, or some other great insight, and instead it became more and more mathematical formalism, without what Einstein called the ground lights that would touch us, as we've just said, to physical reality more. And there are some who think—and I kind of feel this way, which is why I've adopted this idea—he had used the

physical strategy, the physics approach, so much from 1905 to around 1913–1914, and even in the Zurich notebooks where he tries to get general relativity and the equations of gravity right, and he just can't quite get them, and he's racing against David Hilbert, who's a Göttingen mathematician who has the advantage of being a better mathematician but also an added advantage of not being as good of a physicist.

There is controversy over maybe Hilbert got there first.

WALTER ISAACSON:Hilbert's not there worrying about whether it reduces to the Newtonian in the weak field or whatever—he's just pursuing general covariance as a mathematical strategy in order to get the field equations of gravity.

That issue I think it messed up, there are claims that general relativity reduces to Newtonian physics in certain ways, but how are these supposed experts going to prove that general relativity does reduce to Newtonian physics in the way that they claim. With various arithmetical manipulations we can claim other connections. And indeed that is what I do [ see my article “Introduction to Andertonian Relativity” [5]] Given Einstein's ineptness at maths he messes up the correct connections.

That is point (4) – they messed up the connections between Einstein and Newton, which is really still tied to point (3) – because they have not sorted out who is the authority on the mathematical formalism.

Onwards-

WALTER ISAACSON:Einstein finally adopts that approach and it puts him there, it makes him succeed through what is a very mathematical strategy, and then for the rest of his life he spends a lot of time on mathematical formalism instead of worrying about the intuitive physics behind everything.

In other words he messed up the maths and ever afterwards was trying to find out how to correct the maths mess he made.

WALTER ISAACSON:Was that the right approach? Is that what's happening with string theory? Is that the better way to do it; is that what you have to do? As Einstein said, when he was asked about this, that's the way you have to approach things now, we don't have any blinding new physics insight.

His insights he squandered by messing up the maths.

WALTER ISAACSON:Finally the bigger question is, when he fights—and I do think that his quest for a unified theory comes out of his discomfort with quantum mechanics—when he is pushing against the people in the realm of quantum mechanics, they push back, and they say things like, well, we're just doing what you used to do; we're questioning every assumption. We're saying, unless you can observe something there's no reason to posit that it exists. Einstein is saying, yes, but that doesn't make sense now. They responded, well you always questioned authority and questioned everything unless you could actually observe it, and now you're resisting us.

The thing to note here is that Einstein initiated the way they do things with Quantum theory then rebelled against it. He thought he had messed up, but those following his method refuse to consider

that possibility and carry on.

So that is point (5) – even though Einstein realised the mess he made and tried to correct, he has his followers refusing to acknowledge the mess and insisting on carrying on working from the mess.

Onwards -

WALTER ISAACSON:Einstein said, well, to punish me for my contempt for authority, fate has turned me into an authority myself. I'm no longer quite as rebellious, is what he's saying.

He was rebelling against Quantum theory though.

WALTER ISAACSON:So why is it that he becomes in some ways more defensive of the classical order and less rebellious, even as he's trying to pursue the unified theory?

There is a bit of speculating on theories such as inflation, so skipping on-

PAUL STEINHARDT:So a key conclusion according to the current view of string theory and inflationary theory is the fundamental nature of the universe is random. Although the universe seems to be remarkably the uniform everywhere as far as we can see, our leading theories currently suggest that the conditions we observe are actually very rare and unlikely phenomena in the universe entire. And I wonder what Einstein would have thought about that. I wonder if he would have found that idea that is, a theory of this type, to be acceptable. My own point of view is that we have to change one or both of these two key components of our understanding of the universe. We either have to dramatically revise them, or we have to overhaul them entirely, replace them with something that combines to make a powerful theory that really does explain, in a powerful way, why the universe is the way that it is.

By a round about way trying to gloss over the problem, that is really an admission there is something dramatically wrong in present day theoretical physics – point (6).

Skipping to next relevant bit-

STEINHARDT: I think it's for the reason that I was beginning to raise. In my view, and in the eyes of many others, fundamental theory has crashed at the moment. Instead of delivering what it was supposed to deliver—a simple explanation of why the masses of particles and their interactions are what they are—we get instead the idea that string theory allows googols of possibilities and there is no particular reason for the properties we actually observe.

That is suggestive of a mess, and it is no surprise to us who say it was built on a mess

On to the next relevant bit-

STEINHARDT: Well I think there is a key difference, which is that no one believes the standard model is the ultimate theory, and string theory is claiming to be the ultimate theory.

GREENE: Oh, I think we should put claims of that sort…

STEINHARDT: But the question was raised, why are people upset about it? And the answer is, because whether you personally believe it or not, string theory has been advertised as being the ultimate theory from which we should be able to understand…

GREENE: I guess I would say it is unfortunate that people get worked up over that kind of advertising.

I note the use of “advertising” of modern theories. I am upset over the advertising that went into Einstein. The advertising for modern theories is just a continuation of the advertising that went into Einstein. - point (7)

GREENE:If you look at the history of string theory, I agree with you; there was a time when people thought this could be it—the final theory that would describe everything. In fact, it still may be it.

But those people are not so sure now.

GREENE: But I think there was a certain kind of youthful exuberance that took hold when the theory was in its early infancy in the 1980s and early ‘90s and so forth, which perhaps was a little bit unfounded because it was such an immature theory that you really couldn't make pronouncements about it that you could have any real faith in. I personally, as do I think many string theorists, view string theory as a possible next step towards a deeper understanding of the laws of physics. It could be the final step, we can't judge yet.

But I think the most sober way of looking at it is that we have quantum mechanics, we have general relativity, we have to put them together in some consistent way, string theory is a possible way of doing that, and therefore we should explore it and see where it goes. I think it would be unfortunate if simply by virtue of it's being advertised within a certain framework of it being the final theory, one then judges it differently from any other scientific theory, which is on its merits.

STEINHARDT: That's a stupendous retreat from what many people have claimed.

GREENE: You really think so?

STEINHARDT: Yes, sure. And it’s worse than that. Some people even claim this idea that you have this googol or perhaps infinite number of possibilities is something we should come to accept, that it's now derived from string theory, that string theory should be accepted as true, and since it has led to this multiplicity of possibilities, we should all accept this conclusion as true.

In other words they are learning to accept the mess as the way things are. - point (8)

GREENE: Naturally, scientists quite generally and string theorists in particular often describe their work without giving all of the associated qualifications all of the time. I, for example,have spoken of string theory as a possible final theory, as the possible theory that would unite all forces and all matter in one consistent framework—and I generally try to say—but perhaps not always—that this is not yet a proven theory; this is our hope for what it will achieve. We aren’t certain that this is where it is going to lead. We just need to explore and see where we land.

Similarly, I think that if you sat down and spoke to the folks you're referring to in a more informal setting—who talk about having all of these different universes emerge from string theory and about how it's a new framework that we have to think about things–in which we are one of many universes—they would say, yes, what we really mean is, this is the place string theory seems to have led us so we want to explore it. Is it necessarily the framework? I think most of them would say, we don't know; we are just shooting in the dark because this is our best approach to unified general relativity quantum mechanics, and we're going to explore where it leads us. They are not necessarily saying that this is definitely where it goes, because that's the nature necessarily of research: you don't know where it's going to lead, you just keep on going and see where it takes you.

– But this “informal” talk about things is of course different to how it would be advertised. What they say “informally” is different to how they want it presented to the general public. They can express doubts informally, but they don't want to advertise to public that they don't know what they are doing. - point (9)

Eventually, they start speculating as to whether general relativity and quantum mechanics should really be combined, for instance Greene says -

GREENE: There are actually some people who suggest that they don't necessarily have to be compatible. I've never really been convinced by their arguments at all; to me it seems evident that the laws that we are talking about, and quantum theory in particular, are not meant just to describe small things—that's where it was developed and that's where its unusual features manifest themselves more strongly, but quantum theory is meant to be a theory that applies everywhere, on all scales.

Its indicating a sort of despair with the mess and a beginning of accepting the mess. Greene continues-

GREENE:General relativity starts as a theory that describes big things because that is where gravity matters; but when you look at the equations of general relativity, in principle they can apply on arbitrarily small scales. The thing is, when you get to really tiny scales, you notice that there is a deep incompatibility between the two theories and moreover, you realize that there are realms of the universe that enter those domains. You have, for instance, a black hole, which you can say begins as a star that then exhausts its nuclear fuel, it collapses under its own weight, it gets smaller and smaller – at some point the star gets so small that quantum mechanics really starts to matter in a significant way. Gravity matters the whole time because it is so heavy. If those two theories don't work together, how do you describe what happens to this collapsing star?

A good question, but we find often the excuse in the literature that its talked of the laws of physics break down at the singularity of the black hole etc.

ISAACSON: That's true of the Big Bang as well?

At the start of the Big Bang is another place where it is sometimes talked of as the laws of physics break down. All of which meaning just accept the mess.

STEINHARDT: Yes and that is why cosmology is the key battleground for trying to sort out how quantum physics and gravity relate. You can't avoid using them both to understand where the universe emerged from, or whether it had a beginning, or what happened before the bang.

But singularity of black-hole etc. are not readily available areas to do experiments. The experiments that we do in areas that we can test in should provide answers as to what happens in extreme areas where we can't test. But things are a mess and so they don't.

ISAACSON: And it is impossible to imagine a cosmos in which those two theories aren't in some fundamental way totally reconcilable?

STEINHARDT: It would be a mistake. It would be inconsistency.

All the mistakes and mess made by Einstein leading to this problem!

GREENE: Although Freeman Dyson seems to have unusual views on this.

STEINHARDT: Yes, and I also would say I don't understand them…

ISAACSON: And that's where I got my question, but I tried to avoid Freeman Dyson because I was afraid I would totally misunderstood even his question.

Interesting admission, and how would the know whether they “misunderstood” Einstein physics. That's point (10) they don't understand it properly. If they understood it properly they would recognise it as a mess, but they don't recognise that.

The ten main points have been made, the rest is incidental.

STEINHARDT: But you ask a good question, and how do we know? The answer is, we don't know that things have to be simple. But a couple of interesting things have happened historically as we have followed that line of reasoning. We've managed to push the program of understanding the universe to small scales and large scales, by pursuing this approach of looking for simplicity. Particularly when we look at the cosmos; now we can see out to the farthest observable edges of the cosmos, we can see that the laws of physics are the same, and that the physical conditions are also remarkably similar throughout observable universe.

Except in places where those laws supposedly break down

STEINHARDT: Until we have hard evidence to the contrary, I think we push this program of looking for unification and simplicity until it takes us as far as we can go.

Which is an insistence of carrying on from the mess that Einstein started.

Skipping on.

GREENE: So long as you're willing to adjust the measure of simplicity and complexity as you learn more and more about the universe. If you were to present quantum mechanics to Newton, at first it might seem fairly complicated because it uses a completely different body of mathematics, different kinds of ideas, invokes concepts that you can't directly see, and that certainly feels like it's a layer of complexity. But when you study it for many decades and you become used to its unusual features,

Getting used to the usual features is just learning to accept the mess

GREENE: you look at it and you see that it is just one simple little equation—Schrödinger's Equation.

That can be thought of in classical terms as a classical wave equation, but then Quantum revolution was about interpreting it in a different way

GREENE: From a pure mathematical standpoint, it's a linear equation—in technical terms, the simplest kind of equation to analyze—and it describes data. So your sense of what is complicated and simple now gets shifted by a layer, because you're judging this framework, which to a 16th or 17th century scientist might seem really bizarre, but from a modern perspective, it works and you attune your aesthetic sense so that it actually feels pretty elegant, and pretty simple.

Where - “attune” as in accepting the mess.

Skipping on

ISAACSON: There's a wonderful book that Einstein wrote called The Evolution of Physics with Leopold Infeld in 1938, which is not easy to find. I've gone over it again two or three times because I just love the way it was written. It was written to make money for both of them, because it's the 30s, and Hitler, and refugees and stuff. It's a popular book, but it has a deep philosophical argument, and the publisher is reissuing the book because I was pushing them to get it out there. The deep philosophical argument is that it will be a field theory approach that will work. It starts with Galileo; he talks about matter and particles, and just makes the argument that in the end it is all going to be reconciled through field theory. It's about whether there is going to be a great distinction

between a field theory and a theory of matter.

To which I add it seems that Boscovich was the first to deal with a field theory.

A lot of what they say next is just them blundering around in their confusion. Picking up where it starts to get interesting again. They talk of Einstein's creative period from about 1900-1915, which they think wonderful, but from a dissident point-of-view is when most of the mess from Einstein was introduced into physics

Eventually they get to:

ISAACSON: What is particularly interesting to me is that Einstein was a radical who in 1925 becomes replaced with Einstein who's a conservative. That's overstating it a bit, but right as he makes his last contribution of greatness to quantum theory—basically the whole Bose-Einstein statistics—he almost instantaneously is spinning around into a defensive crouch and resisting everything from the lack of realism to the lack of rigid causality in quantum mechanics, and he's calling them the young Turks at the Solvay conference 1927-1931, and they're calling him ridiculously conservative and that saying he had abandoned your radicalism when he used to challenge everything.

Einstein had initiated all the changes and then rebelled at continuing with more changes. Isaacson just blames this change in opinion by Einstein as his old age-

ISAACSON: It's a theme that goes well beyond physics, which is, why is it that what at age 50 you used to think of yourself as a radical, and then you become age 50, and whether you're editing Time Magazine or doing theoretical physics, you start saying things like, no, we can't do that, we've tried that before, or, it doesn't work.

Anyway, continues-

ISAACSON: I were to give a real reason for Einstein's basic conservatism, it would go back to what Paul was talking about, which is the philosophical, which is just that the concept of realism is so at the core. There are three or four reasons that he doesn't like quantum mechanics, and if you had to pick one, it's not probabilities or the end of strict causality, even though he says strict causality is the greatest enduring gift that Newton gave us, it's the abandonment of realism, and to him that becomes a pillar of classical physics. If you have to define conservatism, I assume the definition would be, defending the classical order as opposed to radically throwing out the old order. That's what he quits doing in 1925.

The “classical order” before Einstein started all the changes in his period 1900-1915 (which he later rebelled against) still works as far as I am concerned. But that's not an option that these Einstein supporters are prepared to consider – they are locked into carrying on what Einstein started and not what he quit doing in 1925.

Picking up again the issue of mathematical formalism: Most significantly they point out that Einstein did not commit mathematical formalism to his theories, which really translates to that Einstein left a mess in the maths, which dissidents would say meant Einstein was bad at maths. (see again Claes Johnson [3]) Ideally we would like to know who gave the definitive mathematical formalism to Einstein's theories. But they do not supply that information, nor have I found does anyone else in the mainstream. That leaves the mainstream able to generate lots of different versions of Einstein's relativity and pretend its the same thing when it isn't. (The different versions of Einstein's relativity have been dealt with in my previous articles.) It is why the dissidents now

issue Open challenge to the mainstream to say what is the definitive theory (or theories) of Einstein's relativity instead of hiding behind numerous different versions and making numerous contradictory different claims among themselves.

**References**


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BRIAN GREENE is a professor of physics and of mathematics at Columbia University.

WALTER ISAACSON, the President and CEO of the Aspen Institute, has been the Chairman and CEO of CNN and the Managing Editor of Time magazine.

PAUL STEINHARDT, a physicist, is the Albert Einstein Professor in Science and on the faculty of both the Departments of Physics and Astrophysical Sciences at Princeton University.

[2] i.e. suggestive that he thought his relativity theories might be wrong- “I consider it quite possible that physics cannot be based on the field concept, i.e., on continuous structures. In that case, nothing remains of my entire castle in the air, gravitation theory included, and of the rest of physics.” (Einstein 1954) http://claesjohnson.blogspot.co.uk/2010_09_01_archive.html

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