**Alan Lightman Interview**

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**Lightman**

If you're at a research institution like MIT and one of the best, I think that in order to teach Well, you really need to have that sort of tactile contact with the field that comes only from doing research.

**Fessenden**

Hi, it's glimpse co producer, Tim Fessenden. And I've dug up an interview I did with MIT professor Alan Lightman back in 2019. Alan was a professor of physics, but jumped over to teach creative writing and Media Studies. And now he spends his time teaching writing. I had a really good time chatting with him. We talked about the intersections between Humanities and Sciences, and about science fiction and the history of science. And I'm just really pleased that I could pull it out of our archive to share with you all so without further ado, here we go.

**Lightman**

I'm Alan Lightman. I am Professor of the practice of the humanities. Formerly, I was john burchett, professor of humanities and senior lecturer and physics.

**Fessenden**

Thank you so much for being with us. Dr. Lightman. I just first like to start, if you could just very briefly go over your research and what led you to your position today, if you could just give us a brief history?

**Lightman**

Well, my research has been in astrophysics, I got my PhD in theoretical physics. And I was in Kip Thorne’s relativity group at Caltech, kept just won the Nobel Prize for detection of gravitational waves. And my research for the 20 years or so that I did. research was in black hole physics, the interaction of black holes with their environment with gas and stars, unusual radiation processes, and space. And I also did some research on the fundamentals of gravitation theory, testing Einstein's theory of gravity and comparing it to other theories of gravity.

**Fessenden**

And from from that point, while you were at Caltech with with kipps group, did you envision yourself going into academia and continuing research?

**Lightman**

Oh, yes. alty Yeah, I was definitely headed for an academic career or research career. I also, since childhood had been writing, and I was interested in the arts, from from a young age as well as science. And so when I was in graduate school, getting my PhD in physics, I was also writing stories and poems, and I was publishing them in small magazine. So I sort of had the idea that, that I would have a double career. But I didn't know exactly how to go about that. I knew of a few scientists who later became writers like CP snow, but I didn't know of any writers who later in life became scientists. So I sort of understood intuitively that at least at the beginning of my career career, I would need to put most of my time in scientific research. So after I got my PhD, for the next 20 years or so most of my time was spent on research and physics. And I continued writing but doing it in the weekends and evenings, I had a postdoctoral fellow fellowship at Cornell. And then I was on the faculty of Harvard for a few years, I became a senior scientist at the Harvard Smithsonian Center for Astrophysics. And then in the late 1980s, I came to MIT with this joint position in both the sciences and the humanities, by that time, by the late 1980s. That's when I decided I was going to shift my center of gravity from scientific research to writing, but I had been writing all along.

**Fessenden**

And did you did you find that you shared your writing and this sort of other other passion that you had with your colleagues in physics, or was it something that really was divided?

**Lightman**

I didn't share it in any demonstrative way. I was publishing essays, literary essays since the early 1980s. And some of my scientific colleagues read those and knew about them. But I was kind of quiet about my literary writing, even though I was publishing essays.

**Fessenden**

I mean, I found and I've also been told from other people who've made sort of similar trends sessions that, you know, the perception is that if you have sort of surplus, intellectual energy, it should go into your research. Yep. If you find that to be the case?

**Lightman**

well, I got some pushback, but not a lot. I think that my role models of people who were scientists who started writing were Stephen Jay Gould and Lewis Thomas. And both of those guys, both in the biological area, started writing essays in the early 1970s, the early 70s. They wrote columns for magazines, and I was about 10 years later than them. I started writing columns for magazines in the early 1980s. But it was the same kind of shift. And I imagined that Lewis Thomas is Stephen Jay Gould got a little bit more pushback

than I did because they were earlier. Uh huh. There was perhaps a little bit more tolerance, there was a little more tolerance for for bona fide scientists spinning part of their intellectual energy, as you put it, Mm hmm.

**Fessenden**

I mean, that's a good introduction, actually, to one thing I wanted to ask about was a book he wrote Einsteins dreams is sort of, of science. You know, it's, it's, it's really about Einstein's theories, but it's placing all of those ideas in a more fantastical kind of real world context. Yeah. And I think there's a there's a way you could look at it that it is strictly could be strictly considered scientific writing.

**Lightman**

I don't think there's any way that you can look at it.

**Fessenden**

Okay. How do you how do you?

**Lightman**

Well, because only one of the dream worlds corresponds to the theory of relativity, the 30 dream worlds in the book, and only one of them reflects the theory of special relativity, and the others, the others are all flights of the imagination. The and one, one clear indication that the book is not about really considered a science book is that that it was not embraced by the science fiction community. Interesting. It was embraced by the literary community, but not the science fiction community. I never regarded that book as a book about science. But of course, it's not really how the author regards his book. It's how the readers regard it. And if a reader wants to consider that a science book, that's fine with me, but in fact, only one of the 30 dream worlds is accurate scientifically, I could say that the other dream worlds draw, some of them draw from the world of science, that is the use of vocabulary and certain concepts that come from science. And I sometimes ask myself whether a non scientist could have written that book. But I don't consider it a science book.

**Fessenden**

Are you ever attracted to writing science fiction in the genre as it's sort of canonically known? Or was that never really interesting?

**Lightman**

Well, I wish it has been an interest on and off. And actually, last summer, I did write my first science fiction story. But I, I respect the genre. But in science fiction, the emphasis is much more on the science, the technology futurism, than it is on creating good characters or a compelling narrative. The essence of most novels is the complicated psychology of human beings and all of its manifestations were in science fiction. Most of the books are about the strange new world, that's the future technology will bring.

**Fessenden**

Well, that being said, Would you could you share a little bit about the work that you just did last summer?

**Lightman**

The work that I did last summer which I consider science fiction. Yeah, it's, it's called the second singularity. And it's set in the future may be 100 or 200 years in the future, the first singularity, which has been predicted by Ray Kurzweil, that technologists is the point where computers become the smartest we are, and the second Singularity, and my science fiction story is when the point in time where everybody all Humans have a computer chip implanted in their brain. And they can communicate with each other through the internet. And the combined brainpower of millions of people creates a consciousness that is qualitatively different from the consciousness of a single person.

**Fessenden**

Interesting.

**Lightman**

And in some people, some of the people think that, that it's going to make us closer to God. So there's a religious cult that develops over this. And they think that when the second singularity happens, and it's going to happen suddenly, that we will feel this, we will, we will understand the cosmos. Hmm. And other people react against that. Right. So that that's just a little bit of the story. But, but I consider that to be science fiction, because it really hinges around this this future. Yeah. Technology. I, by the way, I do think that that's going to happen. I do think that at some point in the future, that we will have computer chips implanted in our brain that will connect us directly to the internet, or thoughts directly. Do you think so is the sort of fictional part of your book, the sort of universal consciousness, they're a group of political leaders who are fearful that when this second Singularity is reached, and there's a single consciousness that it will be a challenge of their power and authority?

**Fessenden**

Okay. You do see that happening?

**Lightman**

I do think it will happen. Yeah. What, what in the book, or what you're imagining sort of forward? Do you? Are you not so sure about after that, you know, oh, well, I think that, that, that there going to be all kinds of consequences when we are directly connected to the internet. And they're just unforeseen, right? It's going to be absolutely mind boggling. When when we can connect our thoughts directly to the internet. Because it does mean that people will be able to communicate with each other via the internet. Yeah, mentally. And you would be able to, for example, learn a new language in three seconds. Because all of the the information of online which could be downloaded into your brain, and even the required new muscle motor movements of your mouth to make vowels and consonants that you weren't familiar with could be taught to you. Instantly, instantly. So it I mean, it's unimaginable. It's like genetic engineering, which is unimaginable. We haven't even scratched the surface with with what's going to happen with genetic engineering. Right. Right. And this will be the same in terms of the the the unimaginable consequences of it. And I think it's it's almost a certainty that we will have the basic science and the engineering and technology to do this, within a few 100 years.

**Fessenden**

So on that note, that what that really leads me to his core sort of what like, how do we how do humanists helping scientists, and how do we help each other?

**Lightman**

Well, I think this is, this is the reason why it's so wonderful that MIT has a strong humanities program, right? I mean, we're known mainly in the wider world as the temple of science and technology. And it's sort of our excellent humanities are a secret that we would like to reveal. Right. But I think that, that Paul Gray, who was the president before Chuck Vest, and I don't know, when he first became president, it might have been in the 50s, President of the Institute, president of the Institute, president of MIT. But I think it was under his presidency, that MIT began really building up its humanities programs. And I think that you're absolutely right, that we have to have humanities to accompany our science and technology to help guide us and the human issues. Science and Technology, by themselves don't have values. It's how we human beings use the science and technology, how we employ it. We we impart the values and how we use it. And so when we're talking about these these drastic changes, or developments, like genetic engineering and implants in the brain that connects us to the internet, that have that will have vast social and cultural consequences. It's really important that the The generation of those technologies and especially the use of them involve a large interdisciplinary group of people. Right, that would include not only the scientists and engineers, but will include social scientists, ecologists, maybe via an anthropologist, ethicists, a wide range of, of people who can ponder the larger implications of these technologies.

**Fessenden**

there's another actually a way that I'd like to approach this kind of the same issue, which is to say, sort of, maybe what could the natural sciences learn from humanities, and one thing that I really loved and reading your book discoveries is how in the introduction, you point out quite appropriately that, you know, in many humanistic fields, it's considered necessary that you read foundational texts in that field. So you might read texts that are 2000 years old, right, depending on your interest, and a lot of the sciences don't do that. They don't do that. And so you put together this wonderful collection of landmark discoveries from the 20th century? And do you do a great job of describing each one. And I, it's something that I've also wondered about in my own field, and with my colleagues, why don't we Why don't we read papers from the 1960s? in cancer biology?

**Lightman**

Yeah. Well, there's the feeling that the history of the subject doesn't matter. Yeah. And that if you just want to do research, you know, you want to get to the frontiers of research as soon as you can. Right? Right. So and you don't want to waste any time. So you, you, you only read and learn the latest thinking, right, and eat in each sub field so that you can get right to the frontier. So I think that that, that you can make an argument for that you can you can justify that. But But I also think that you, you lose a lot by not knowing history, you lose the human story. Exactly. And you also don't necessarily have an accurate picture of the way that Science Advances, you know, Science Advances with a lot of dead ends and trial and error and, and the history of the subject shows you that. Whereas if just learning the most up to date thinking, there's no history attached to it. So you don't really know that much about how you got to that point, right. I think it might change.

**Fessenden**

One thing I would imagine it could change is sort of what attitude do I take as a as a scientist, as a biologist? What attitude do I take as they go about my work? And and what do I expect to get out of it? Right? And how do I expect it to advance just like you said, I mean, in the book, as is, as you kind of pointed out is full of accidents, weird coincidences, wrong turns? Yeah. It's just it's phenomenal to take one sweeping look at a century worth of science. And look at how often

**Lightman**

Yeah, the accident does play a role. And yeah, serendipity. And, and sometimes the scientists make discoveries, and they don't really understand what they've discovered, like Penzias and Wilson's discovery of the cosmic radio waves, right? That they had this hiss in their antenna, and didn't know what was causing it. And they were very good scientists. So they were able to, to rule out the various sources of noise that could have been causing the hiss, including the pigeons were stealing the shirt on the right. And it took Robert Dickey at Princeton, to tell them what they had discovered. Yeah, exactly.

**Fessenden**

And there, and I mean, and they're sort of still rightfully credited as the discoverers.

**Lightman**

Yeah. But but you can ask whether you think the Dickey should have been included in the Nobel Prize? Yeah. Well, yeah.

**Fessenden**

So I just I think it's interesting what we can actually learn, even though I mean, you look at I mean, I look at a biology textbook from the 80s. And it's sort of silly, you know, yeah, it's just so much that I know is wrong, or it's not wrong, or it's this overly generalized, right. But it's amazing what things you do learn, if you if you don't restrict yourself to kind of like, right, super formal knowledge. Yeah.

**Lightman**

Well, I wish the history of science were part of the degree program and in all science fields, the history of the subject, I wish that that was, at least, you know, one course. Right. should be included, I think. Right. Yeah. I mean, as you pointed out, you kind of have to learn a history of philosophy. If you're going to practice, you know, if you're going to go into that field.

**Fessenden**

Yeah, another I kind of. Actually, this may be sort of looping back to what we discussed a little bit ago. There are certain areas of science that seem to be we've maybe, as a community, or governments or whatever, have chosen to really not investigate. I mean, if you look at, of course, the Nuremberg trials, right, the horrible things that were done to human beings in World War Two, medical research, you know, and biology research now have really strict ethical kind of boundaries that they adhere to, in part because of that. And so there are areas that are chosen are sort of explicitly kind of barred, investigating genetic basis for intelligence. Right, right, because you start to kind of sort societies into, you know, intelligence or homosexuality. Yes, exactly. And, you know, and, and there's some places where we just don't want to go. Yeah, and I think there is, it's not necessarily, I mean, you could make the argument that these cases are so rare that it's not a big deal. But it's interesting that as, for me, my training in biology doesn't really equip me to to understand how those calls get made and understand how, you know, what is what is off limits? Right? And what are the reasons right?

**Lightman**

Well, it's all the more reason that the our scientific investigations and we as a scientific community need to be embedded within a larger community of people who have the training, to discuss these issues, and the larger social and human context. We scientists and engineers should not be off just in a ghetto, working by ourselves, and making all of these these things that they can have various social consequences by ourselves, right.

**Fessenden**

Yeah, I mean, it's interesting how difficult it can be for me to describe what I'm doing to my family or friends who are not biologists and, and the work that I the mental work that I have to do to back up far enough to tell them, okay, this is the actual outcome that I'm working for. Right? That the fact that that takes me so long, and it's so hard to do, is a little bit of a concern, and speaks to what you just said about sort of being really siloed and people within your intellectual community. I think, and even Unfortunately, it seems, because we are pushed pretty hard to produce, right, there's less value placed on the ability even right communicate your work. And we we sort of have to specialize as we do. And part of specialization is isolating yourself from the larger world around you.

**Lightman**

Right, we have to specialize in order to to acquire the the intellectual tools that we need to do the work that we need to do. Yeah, we, you have to specialize to get to the forefront of a field, that that sort of at the same time means that you're going to leave behind a lot of the the embroidery of society around you.

**Fessenden**

That brings me Actually I think the issue of specialization is a is a sort of a growing concern, at least in my mind. Do you find when when you were doing your work, say back in, at Caltech or something in those days, was specialization, less emphasized than it is today? Or do you think no, we were specialized in the same?

**Lightman**

Okay. Yeah, I think we've been specializing since the early 1900s. Yeah, it's an interesting challenge. How do you if you're, if you're thinking if you if you could create the ideal graduate program, let's say, for a scientist, or biologists, chemists, how do you, on the one hand, give them enough, you know, the tools that they need to get to the forefronts quickly, while at the same time giving them this larger environment, and sensitivity and understanding of the larger social human context? You're basically fighting for credit hours, you know, right? We only have, you know, 24 hours a day, right? I once had this interesting conversation with a physicist named David gross, who was at the University of California, Santa Barbara, I believe, and he pointed out the very interesting facts Even though he was being a physics, but you probably could apply this to biology and chemistry and other sciences, that even though the amount of knowledge in physics increases with every decade, yeah, that the amount of time that it takes to get a graduate student, a good graduate student up to the forefront is remains about the same, huh? Yeah. And you wonder how could that be? Right? And the answer is that, that when we start training graduate students, in any field, we start with, with where, with an up to date position of where the field is, then. And everything has happened in the past, we have thrown out what's wrong, thrown out, what's it doesn't work, and condensed and distilled? Right, just those tools, which are still relevant. Yeah, you know, it might be mathematical tools, it might be experimental tools. We've just distilled out those that are still relevant. And those are what we teach to the first year graduate student, and then within three or four years, they're up to the forefront. Right. So that's sort of the model that we have now, and, and scientific training. And what we're talking about is, is there any room to add more material that deals with the humanities? Right, and the history? It would certainly slow down the education or the process of education? I mean, you might have to add a year or two? I don't know. But, yeah, I mean, if he it would be considered, you know, you're doing harm by removing those other credit hours. Right? You'd be crunching in more of the latest right? Yeah. Yeah, absolutely. So it's an interesting conundrum for thinking of the ideal science education.

**Fessenden**

And are you? Are you involved in any of the grad education here in terms of on the physics side?

**Lightman**

Not right now. Okay. But you are, and then in the here, and you're talking about in the education program, not in teaching physics itself. But the Oh, no, I mean, teaching physics, I don't know, I don't teach physics anymore. I did teach when I first came here. But okay, I stopped a while back, I stopped teaching physics when I stopped doing research and physics. Because if you're at a research institution, like MIT, and one of the best, I think that in order to teach Well, you really need to have that sort of tactile contact with the field that comes only from doing research. Right. Right. You know, if you're just teaching out of a textbook, you know, our, our MIT graduate students are not going to stand for that. They, they can sense the special energy that a teacher has when they're when they're actively involved in research, and that's what they want. Right? Yeah, it wouldn't be true of other colleges, let's say they're not principally research institutions. But, but my view is if you're at our institution that has a very high level of research going on, and very smart students like here, that, that the faculty need to be active researchers. And so I mean, nothing would have prevented me from continuing to teach physics courses. I could have continued doing it, but I think that that my level of energy and authority would have diminished, right.

**Fessenden**

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