Michio Kaku is a world-renowned physicist, futurist, and author of numerous bestselling books including "Beyond Einstein," "Parallel Universes," "The Future of the Mind," and "Physics of the Impossible."

In this talk, he discusses the groundbreaking first image of a black hole as well as a range of topics related to his latest book, "The Future of Humanity," in which he explores how humanity might gradually develop a sustainable civilization in outer space.

Following is the full transcript of the talk:

FEMALE SPEAKER: So I think before we get into some of the exciting things that come up in your book, today was a pretty big day in astronomy. There is some news about a black hole. Can you talk about that?

MICHIO KAKU: Yes. A black hole is a cosmic roach motel. Everything checks in, nothing checks out. And we photographed this. This is incredible. History was made when we actually showed a photograph of a gigantic black hole. It weighs 6.5 billion, with a B, billion times more massive than the sun. It is 55 million light years away. It is a gigantic monster. And it's sort of like a unicorn.

We physicists knew at some point this exotic object would be found. Einstein's equations predicted it in 1916. We've known for a hundred years that a black hole could be lurking in the heavens, but we finally — we finally photographed it. And it was revealed this morning.

Next, in a few weeks, we'll reveal the black hole at the center of the Milky Way Galaxy.

So tonight, when you go outside, look in the direction of Sagittarius. There's a raging black hole in the constellation Sagittarius, in the center of the Milky Way Galaxy. It weighs about two to four million times more massive than the sun. And it's in our backyard.

So children ask the question — if the moon goes around the Earth and the Earth goes around the sun, what does the sun go around? And the answer is — a black hole.

FEMALE SPEAKER: So you talk about children asking questions. And you've talked about that you had a moment when you were growing up, of what sparked your interest in science.

MICHIO KAKU: Yeah, when I was eight years old, something happened which changed my life completely. They made the announcement, when I was in elementary school, that a great scientist had died. And they flashed a picture in the newspaper of his desk. And on the desk was a book, an unfinished book. And the caption said, this is the unfinished manuscript of the greatest scientist of our time.

So I was eight years old. I said to myself, why couldn't he finish that book? It's a homework problem, right? Why didn't he ask his mother?

So, I went to the library. And I later found out his name was Albert Einstein. And that book was "The Theory of Everything." He wanted an equation no more than one inch long that would allow us to, quote, "Read the Mind of God."

So I said to myself, wow, that's for me. I want to work on this theory of everything. And in fact, that's what I do for a living. I'm the co-founder of string field theory, one of the main branches of string theory. And we think that that is the theory of everything, that everything we see around us is nothing but vibrations of tiny strings. Each subatomic particle is a note on a vibrating string.

What is physics? Physics is the harmonies we can write on vibrating strings. What is chemistry? Chemistry is the melodies we can play on vibrating strings. What is the universe? The universe is a symphony of strings.

And then what is the mind of God? The mind of God is cosmic music resonating through 11 dimensional hyperspace. That is the mind of God.

FEMALE SPEAKER: I think for all of us who are not theoretical physicists in the room, we appreciate that clarifying explanation, really elegant metaphor as well. One of the things that I found when I was sort of thinking about questions that I might want to ask you, or that might be interesting, is that, in looking at the breadth of your work, it's really hard to know where to start, because your work spans an incredible range of fields from the history of astronomy, to string theory, to theories of consciousness.

And so I was going to ask you, what do you feel like is at the heart of your work? If your body of work were a solar system, say, what would be the sun at its center?

MICHIO KAKU: Well, when I write books, I write for myself as a child. Because when I was a child going to the library, I would look up things like the fourth dimension, like anti-matter, like parallel universes. And there was nothing, absolutely nothing in the library for a young kid who wants to know about all these fantastic things they see in the movies.

So I said to myself, when I grow up, and I become a professor of theoretical physics, and I work at the unified field theory, I want to write for myself, as a child.

And then when I was in high school, I decided to put this into motion. So I went to my mom one day, and I said, "Mom, can I have permission to build an atom smasher in the garage?"

FEMALE SPEAKER: As one does.

MICHIO KAKU: Yeah. I grew up in Palo Alto, where a lot of young people in their garages built machines. So I built a beta-tron particle accelerator.

I got 400 pounds of transformer steel, 22 miles of copper wire, and I built a 6-kilowatt, 2.3 million electron vol beta-tron in my mom's garage. I plugged it in finally. I closed my eyes. I shut my ears. And I heard this huge crackling sound as 6 kilowatts of raw power surged through the capacitor bank. And then I heard this pop, pop, pop, sound, I blew out all the circuit breakers and fuses in the house.

So my poor mom, she'd come home from a hard day's work and say to herself, why couldn't I have a son who plays baseball? Maybe if I buy him a basketball — and for God's sake, why can't you find a nice Japanese girlfriend? Why does he have to build these machines in the garage?

But it earned the attention of another physicist. A physicist took an interest in me at the National Science Foundation — at the National Science Fair in Albuquerque. And he arranged for me to get a scholarship to Harvard. His name was Edward Teller, father of the hydrogen bomb.

FEMALE SPEAKER: And from then to now, how do you feel like the course of your career has changed, or what — have your interests shifted since then, since that beginning of you want to solve the theory of everything?

MICHIO KAKU: Yeah, that's still the goal. But as a hobby I like to read science books. I'm a science junkie. And I have the privilege of interviewing hundreds of scientists for BBC Television, the Discovery Channel. And whenever I interview these scientists — about one a week, for my radio show and TV — I always ask them the key question, the question of all questions. And that is — is there intelligent life on the earth?

Well, I was watching the Kardashians on TV last night. And I'm convinced that there's no intelligent life on this planet. But maybe in outer space, maybe in outer space there's intelligent life out there.

FEMALE SPEAKER: So, in your book, you talk about how we might leave the earth to possibly meet intelligent life elsewhere.

MICHIO KAKU: And we may have to. The dinosaurs — the dinosaurs did not have a space program and that's why they're not here today. That's why there are not dinosaurs in this room, because they didn't have a space program. But we do have a space program. And prices are dropping every day. Things are getting cheaper. Silicon Valley billionaires are writing checks.

And, for example, how many people in this room have seen the movie, "The Martian"– raise your hand– with Matt Damon? Whoa. That movie cost $100 million. But the Indian government sent a probe to Mars for $70 million. So a Hollywood movie about going to Mars costs more than actually going to Mars. That's how much prices have dropped.

And rockets are going to be reusable in the future. When we commute to work, and you drive your car to work and park the car, do you junk your car and sell it for scrap after one trip? That's what we do for rocket ships. We take one trip in a rocket ship and dump it in the ocean. You'd bankrupt the world if every car had to be junked after one ride. That's going to change the economics of space travel when we have reusable rockets.

FEMALE SPEAKER: So, one thing I like about your book is you've structured it as sort of like, we're starting with, how do we get off the planet? How do we colonize our solar system? And then how do we think beyond that and beyond that? So, when someone asks you, like, well, how close are we actually to living on Mars, how do you answer that?

MICHIO KAKU: Well, first of all, we're going to the moon next year. After a 50-year gap, the SLS booster rocket is going to be fired up and we're going to go to the moon. And not only that, there's going to be a traffic jam around the moon, because Elon Musk has his Falcon Heavy rocket capable of going not just to the moon, but Mars. He has sent a Tesla sports car on a trajectory to Mars.

And then we also have the richest man in the world, Jeff Bezos — or the former richest man in the world — he has the Neil Armstrong rocket. And then the Chinese have the Long March rocket. We're going to have a traffic jam around the moon pretty soon. And I think our grandkids — our grandkids may have the option of honeymooning on the moon. The moon is — the moon is only three days away. It's a hop, skip, and a jump.

FEMALE SPEAKER: So the moon is closer, Mars is a little bit farther. So, you talk in your book about also possibly colonizing some of the moons around Jupiter and Saturn. How do you imagine us getting there? How far — I mean, is this within our generation, our lifetime?

MICHIO KAKU: Well starting next year, we're going back to the moon with an unmanned space probe that will orbit around the moon. Around 2023, humans will go back to the moon. And so we'll begin the process of making the moon a base, to eventually go to Mars. And then SpaceX already has the preparations for a Mars rocket. It is a huge rocket, the biggest one ever conceived. It's called the BFR, the biggest rocket. B for Big, R for Rocket, and F for your imagination. It's already being built. So we're already laying out the steps to go to Mars.

And when Elon Musk was a high school student, he read the book, "Foundation" by Isaac Asimov. How many people have read the "Foundation" series by Isaac Asimov? Then you know that that is a dream of becoming a multi planet species. It's not going to happen anytime soon. But we begin the process of terraforming Mars perhaps in this century.

FEMALE SPEAKER: I love how you talk a lot about science fiction and that there's — that science fiction has both inspired and predicted some of the technological advances that we've seen and some of the things that we learn about our universe. Do you have a favorite anecdote or story of where fact and fiction have intersected?

MICHIO KAKU: Well, I'm on radio. And people call me. And many times people say, professor, you're wrong. You're wrong because the aliens are already here. They're not in outer space. They've already landed with their flying saucers.

ALSO READ: Revisiting Her Side of the Story: Esmé Patterson at TEDxMileHigh (Full Transcript)

So, I tell them, well, how do you know? And they say, well, they've been kidnapped, kidnapped by flying saucers. So if any of you have ever been kidnapped by a flying saucer, for God's sake, steal something. There's no law against stealing from an extraterrestrial civilization, no law whatsoever. Steal anything — an alien chip, an alien hammer, an alien paperclip, anything, so you have bragging rights about going into outer space on a flying saucer.

FEMALE SPEAKER: I like that idea. Noted. Not that Google endorses any kind of that activity.

MICHIO KAKU: But there's no law against stealing from an extraterrestrial civilization.

FEMALE SPEAKER: Should there be?

MICHIO KAKU: No.

FEMALE SPEAKER: No. So what are the — once we've established a presence within our solar system, and we know how to get around, what's beyond that?

MICHIO KAKU: Well, already we physicists are looking at starships. NASA has a 100 year starship program. My colleague, the former Stephen Hawking, already was responsible for the break through Star Shot program to send the first starship to a nearby star. It would be the size of a postage stamp. It's a chip with a parachute, inflated by a bank of laser beams, which would accelerate it to 20% the speed of light. And it would reach Alpha Centauri in 20 years.

And so we are talking about the first microchip starship to take us to the heavens. And then we physicists have looked at Ram jet fusion engines. Fusion engines — of course, we don't have them yet, but one day we will — Ram jet fusion engines require no fueling whatsoever. They scoop up hydrogen in the forward direction like an ice cream cone, burn interstellar hydrogen in the engine, and run forever with no refueling whatsoever. That's the Ram jet fusion engine, which could possibly take us to the nearby stars.

And then even beyond that, there's a possibility of maybe using a black hole. And, of course, just this morning we had the first picture ever of a black hole that's been revealed to the public.

And what is a black hole? A black hole is a cosmic roach motel. Everything checks in, nothing checks out. And we photographed it. And there's a controversy as to what's on the other side of the black hole. Some people say nothing. Things just fall in, and that's the end of the story.

But if you look at the mathematics, we have an exact solution of Einstein's equation, given by Roy Kerr in 1963, of a rotating black hole. A rotating black hole does not collapse to a dot. That's the old fashioned thinking. It collapses to a ring, a ring of neutrons. And if you fall through the ring of neutrons vertically, you wind up in Wonderland. You wind up on the other side of forever. It's a gateway to a wormhole.

And if you fall through a second time, you wind up on a second parallel universe. So it's sort of like hitting the up button of an elevator. You have different floors. Each time you go to a different floor, every time you go through the gateway. And then the question is, is that a solution of Einstein's equations? And the answer is, yes.

What's the catch? There's always a catch someplace. And that is, we don't know how stable the wormhole is. That requires us to go beyond Einstein. Einstein's equations give us rotating black holes, where there's a gateway to a parallel universe. That's Einstein's theory. However, we don't know whether radiation effects, as quantum effects, will destabilize it. That's where string theory comes in.

String theory is a quantum theory. Now we can calculate quantum corrections and calculate the stability of the wormhole, but that is still an active area investigation. And then the question is, if you go through the wormhole, can you go backwards in time? And the answer is, yes. These things are potentially time machines as well.

And then the question is, what happens if you go backwards in time meet your mother before you're born, and she falls in love with you? Well you're in deep doo doo if that happens. But yeah, the quantum theory does make possible the fact that you might be able to build a time machine if you can stabilize the Kerr metric.

FEMALE SPEAKER: Did we have anyone who wanted to ask Professor Kaku any questions?

QUESTION & ANSWER SESSION

AUDIENCE: Hi, so, I wanted to ask about string theory specifically. And one of the things that I understand about string theory, is that it's proven very difficult to find tests, to find out whether string theory is actually the way the universe works, or maybe there's some other way that the universe works. And I wanted to get your thoughts on that in sort of a philosophical level. Do you think that you eventually will discover some aspect of string theory that will be verifiable? Or do you think that we're sort of destined to have to guess at some level of what's going on at the very most basic levels of the universe?

MICHIO KAKU: Well, first of all, we have the mystery of dark matter. Dark matter holds the galaxy together. And that's why we're here today. If there was no dark matter holding the galaxy together, the galaxy would have disintegrated billions of years ago, and we wouldn't be here to talk about this question.

And then, what is dark matter? It is invisible and it has gravity. If I held it in my hand, it would seep through my fingers, go right to China, reverse direction in China, and oscillate between here and China.

And then what is it? The leading candidate for dark matter is the **photino**, the next octave of the string. We are the lowest octave of vibrating strings. We can fit protons, neutrons, electrons, using a very low energy approximation to string theory. But string theory has higher vibrations.

The next vibration up is the photino. Photino has mass. It has gravity, but no electromagnetic interactions. It's stable. That, we think, is dark matter. And we hope to create it with the Large Hadron Collider or the next generation beyond that. Already, the Japanese, the Chinese, and the Europeans are proposing the next step beyond the Large Hadron Collider.

The Japanese have the ILC. It's a linear accelerator. The Chinese are also proposing a linear accelerator. And even CERN is proposing the next generation beyond that. We may find dark matter in the laboratory, and that could clinch it right there.

AUDIENCE: Hi Professor, what are your thoughts on quantum computing and the future of it? And how long you think Google will be able to deploy a quantum computer into our data center?

MICHIO KAKU: Well, as you know, Moore's Law is slowing down. Moore's Law is the reason why we're here today. If it wasn't for Moore's Law, there would be no Google. But it is slowing down. And it's bumping up against the quantum principle.

Right now, your Pentium chip has a layer about 20 or so atoms across at minimum. In another 10 or so years, if you just extrapolate, it'll be five atoms across. When you hit five atoms across, all hell breaks loose. The Heisenberg Uncertainty Principle takes over. You don't know where the electron is anymore. You get leakage. And you get heat generation, so much that you could for an egg on a microchip.

Moore's Law is already slowing down. You can talk to any physicist, we're beginning to hit the quantum limit. So we have to go beyond silicon. In other words, Silicon Valley could eventually become a rust belt, like the Rust Belt of Pittsburgh. Eventually, yes, Silicon Valley could become a rust belt, and we had to go to the post silicon era. We have to go to photonic transistors, molecular transistors, protein transistors, DNA transistors, atomic transistors, photonic transistors.

We physicists are looking at all sorts of alternatives to silicon. But there's a catch. None of them are ready yet for prime time. I will put my money on molecular transistors, like graphene. We can make a transistor out of a single atom of carbon. That's pretty good. But we cannot machine it. We cannot mass produce it. We cannot engineer it. It's a technical problem.

Quantum computers are even worse because of the de-coherence problem. I was in Moscow just a few months ago. I actually met with Medvedev and the leader of Alibaba. And yeah, everyone's working on quantum computers. The Russians are, the Chinese are, we are, of course.

But there's a problem, de-coherence. Every time someone sneezes in a block away, the coherence of your quantum system disintegrates. So I'm not saying we can't do it. I'm saying it's probably decades away. The turning point is 50 qubits. If you hit 50 qubits — quantum bits — then you could surpass any known digital turing machine.

But how do you go beyond that yet? We don't know because of the de-coherence problem. I have friends upon — I have friends working on this. This is a multi-billion dollar question. There's going to be a new Silicon Valley. A new Silicon Valley emerging from all this, probably a quantum valley, and it's up for grabs. Nobody knows what's going to replace silicon.

AUDIENCE: Hi, Professor. I wanted to ask a general question about projecting or predicting into the future. So, generally, when sci-fi writers or futurists try to predict into the future, they'll look at the state of technology or the cutting edge around them, or in the last couple of years, and they'll try to extrapolate forward. We've already seen that, like back in the '60s, people were predicting that by now we'd have flying cars, and hoverboards, and we'd be vacationing on the moon. And instead, we're sending cat pictures across the world.

So, when you're predicting out into the future, how do you — how do you account for that kind of uncertainty? How do you have confidence in your predictions?

MICHIO KAKU: Well, first of all, people forget that when they look at flying cars, that was a creation of cartoonists. Most people's understanding of the future comes from cartoons. I'm a physicist, not a cartoonist. We knew that flying cars would be hard to do, but possible.

In fact, I was just in Dubai last month, and we are going to have flying cars. Dubai is already in the final stages of signing contracts for a fleet of flying cars. So yes, flying cars are coming, but hoverboards are not. Hoverboards would violate the Quantum Principle. We do not have anti-magnetism, because the anti particle or the photon is the photon, therefore there's no such thing as anti-magnetism, or even anti-gravity, that Michael J Fox can use to scoot across a wooden floor. And so, we're not going to have hoverboards, but we will have flying cars.

Now, I'm a physicist. When I try to project the future, first I look at Moore's Law. So I see where we might be in the coming decades, OK. And I realize that yes, artificial intelligence is coming, but we're going to hit a brick wall at a certain point, or perhaps a problem when Moore's Law is eventually sealed off and robots are not going to become arbitrarily intelligent.

But I'm a physicist. I realize that with ingenuity we could make them smarter and smarter. For example, right now, our most advanced robot, or one of them, is ASIMO. You've probably seen him on TV. It's like a little boy who can run, walk, climb up stairs, dance. And I interviewed the creator of ASIMO for BBC television. And I asked him, how smart is the world's smartest robot, your robot, ASIMO? And he was very frank.

ALSO READ: Barbara Oakley: Learning How to Learn @ Talks at Google (Transcript)

He said that ASIMO has the intelligence of a cockroach — a retarded cockroach — a lobotomized retarded cockroach. But I could see that, yeah, you could extrapolate. Eventually, they'll be as smart as a mouse, then as smart as a rat, then as smart as a rabbit, then as smart as a dog and cat, and then maybe as smart as a monkey.

Now, at that point, like in science fiction, I think they could be dangerous. I think Elon Musk is right, but in another 100 years. Because monkeys are self-aware. They know they're monkeys. They're potentially dangerous. But dogs — dogs are confused. Dogs think that we are a dog. We're the top dog and that's why they slobber all over us. They haven't quite figured it out yet, that we're not really dogs.

But monkeys, they have self-awareness. So how long will it take before we get robots with self-awareness? I think maybe by the end of the century. At that point, I think we should put a chip in their brain to shut them off if they have murderous thoughts. But again, going to the next century, the 22nd century now, robots will become self-aware and they'll remove the chip in their brain.

Then what do we do when there are no more fail-safe systems? At that point, I think we only have one alternative. In a 22nd century, I think we should merge with them. Why not become super man or a super woman? Why not rule the universe by merging with our creations? That's not going to happen anytime soon, but I'm just simply projecting Moore's Law, projecting known physics into the next 200 years.

AUDIENCE: Thank you, Professor Kaku. And I have to say that I'm a big fan of you, and I've read many of your previous books, and looking forward to reading this one. And based on — based on my previous readings, you believe that humans have a very bright future. With the advancement of technology, we'll gradually conquer the solar system, and Milky Way, and beyond.

But there is the other stream of theories like, they are really pessimistic on the human future. Like, for example, the giant filter theory, and the great filter theory. Basically, they say that any advanced civilizations will — as they develop, will sooner or later encounter some very big obstacles. They call it filters. And be it like meteorites, or the nuclear war, or the advanced of the double edged sword, the technology. So what's your take on this? Can we humans really avoid this to happen?

MICHIO KAKU: Can we humans do what? Do you understand?

FEMALE SPEAKER: Yeah, so I think the question — and correct me if I get it wrong — but I think it's about that you have a really optimistic view of the future. But there are parties who don't have such an optimistic view, that believe that we'll succumb to some great catastrophe. Is that kind of the gist of it?

AUDIENCE: The great filter theory. They say we will become —

MICHIO KAKU: OK, well, let's take a look at the long view. I'm a physicist. And we like to quantify things — dangers, as well as progress — on the basis of two things — information and energy. That's how we parametrize the future. When you parametrize the future in terms of energy, we rank civilizations by type one, and type two, type three.

A type one civilization is planetary. They control the weather. They control the oceans, volcanoes, earthquakes. Planetary civilization controls planetary energy. Eventually, they exhaust the power of planet and begin to play with stars. They create Dyson spheres. They play with — they colonize our solar system. That's type two. For example, "Star Trek"– "Star Trek" would be a typical type two civilization.

Then there's type three. Type three is galactic. They roam the galactic space lane. They play with black holes. And "Star Wars" would be a typical type three civilization. And then, by the way, I was giving this talk in London once, and a little boy comes up to me — 10-year-old boy — and the boy says, Professor, you're wrong. You're totally wrong, there's type four.

And I was kind of tempted to say to the kid, shut up, kid. I was polite. I said, look, there are planets, stars, and galaxies. That's all there are. There's no type four.

And he insisted no, Professor, there's type four — the power of the continuum.

Now who's a "Star Trek" fan here? What is the only type four civilization on network television? The Q. That energy is dark energy. There is an energy source even bigger than galactic. Dark energy is the energy of the Big Bang. It's the anti-gravitational force that's creating the expanding universe.

So then the question is, where are we on this scale of energy? Are we type one, that play with the weather? Are we type two, that play with stars? Are we type three, that play with black holes? No, we're type zero. We get our energy from dead plants. But we can calculate when we will become type one. And the answer is, in 100 years. Around 2,100, we will become planetary. Now, we see that everywhere.

What is the internet? The internet is the first type one telephone system. The first type one technology to fall into the 21st century. That is what the internet is.

What language will the type one civilization speak? Well, already on the internet, English and Mandarin Chinese are the two — number one, number two languages. We see the beginning of a type one economy with the European Union. We see the beginning of a type one sports with soccer and the Olympics. We see the beginning of a type one fashion with Chanel and Gucci. We see the beginning of a type one culture spreading throughout the planet.

But as you pointed out, there are dangerous things facing us. A type two civilization is immortal. Nothing known to science can kill a type two civilization. Asteroids could be deflected. The weather can be altered so global warming is not a problem. Type two civilizations are immortal.

The danger is type zero to type one. That is the most dangerous transition of all, because we have all this sectarianism, fundamentalism, racism, whatever coming from the swamp. We just emerged from the swamp. And we're reaching for type one. Every time I read the newspaper, I see the birth pangs of a type one civilization. All the headlines, all the controversies, I see are the birth pangs of the birth of a planetary civilization. And it's not guaranteed we're going to make it. I think we will, but there's no guarantee.

AUDIENCE: Hi, Professor. Thanks for coming to talk to us today. There's a book series called, "The Three Body Problem," that I'm not sure you're familiar with. It basically presents humanity's first encounter with extraterrestrials. And sort of the intergalactic diplomacy that the book sort of advocates for is this preemptive strike. It says that the only way to stay safe in our universe is, as soon as we identify other intelligent life, you have to destroy it right away.

I was wondering if you would agree with that, and how you would recommend we navigate these intergalactic relationships, potentially in the future?

MICHIO KAKU: Well, if you're walking down a country road and you bump into an anthill, do you go down to the ants and say, I bring you trinkets? I bring your beads. I give you nuclear energy. Take me to your ant Queen.

Or do you have this politically incorrect urge to step on a few of them? And then the ants, do they have the idea that they can launch a pre-emptive strike against humans by flinging their weapons — little kernels of rice — at us?

So, like I said, if they can reach us from outer space, they're probably type two, or more than likely, type three. At that point, they already have mastered starships. Type three, you can access the Planck energy. The Planck energy is the energy of which space and time become unstable. In other words, wormholes become possible for a type three civilization. You take out a calculator and calculate. Growing at 3% per year — a modest growth in energy — how long before we become type three? In 100 years, we'll be type one. In a few thousand years, we'll be type two. In about

100,000 years, we'll be type three.

And 100,000 years is nothing, nothing on a cosmic scale. By the time you're type three, you have access to the Planck energy. Space and time become unstable. Bubbles begin to form. You can heat up space so that bubbles begin to form. These bubbles are gateways, gateways to other universes. And you're going to have a preemptive strike against these people? I don't think so.

Now, are they going to be dangerous? Well, I think we have not too much to fear from them, because what do they want? Do they want to plunder our resources? There are lots of dead planets out there, like Mars, that they can plunder at will. So, I think that there's really no reason for them to plunder the earth, because there's plenty of uninhabited planets out there to plunder.

And for the most part, what do we have to offer them? If you're going to a forest and you meet the deer and the squirrels, do you talk to the squirrels? Initially, yeah. Good boy. Yes, you talk to the squirrels. But then you lose interest because they don't talk back to you. And even if they did talk back to you, do they have a preemptive strike by throwing acorns at you?

So I think that on that scale, if they can reach us from another star, they're already type two, or more than likely, type three.

AUDIENCE: Do you think we will ever leave Earth forever?

MICHIO KAKU: I think at some point, we may have to leave the Earth forever. In five billion years, the sun will expand. The mountains will melt. The oceans will boil. The sky will be on fire and we will have the last nice day. We have to.

Five billion years from now — it's the law of physics. Physics is a death warrant for intelligent life. And in fact, 99.9% of all lifeforms go extinct. How do we prove that? Just dig right under your feet. Right under your feet are the bones, the bones of 99.9% of all species that have ever existed on the planet Earth. Extinction is the norm for life. We forget that.

Extinction is the norm. We have a brain. We can control our destiny, but most animals cannot. And so we forget the fact that extinction is the norm. So it's not a question of if, it's a question of when we leave the planet Earth.

There's no choice. It's the law of physics.

FEMALE SPEAKER: Thank you all so much for coming. That's the end of our talk. And we are just so grateful to have had you here. Thank you, so much.

MICHIO KAKU: OK, my pleasure.

For Further Reading:

The Universe in a Nutshell by Michio Kaku (Transcript)

How to Take a Picture of a Black Hole: Katie Bouman at TEDxBeaconStreet (Transcript)

Alex Filippenko: Dark Energy and the Runaway Universe at TEDxBerkeley (Transcript)

Taking the Fingerprints of the Universe: Julien Lesgourgues at TEDxCERN (Transcript)

LinkedinShare on Pinterest
Multi-Page