

Questions	Answers
<p>What is plasma?</p> <p>Where will quantum technology be used?</p>	<p>Plasma is a gas composed by charged particles, for example electrons.</p> <p>Quantum technologies will be used for all kinds of optimisation problems: from medicine (how to build a molecule that would fight the coronavirus) to cyber security (how to protect information from quantum hackers).</p>
<p>My mum puts her finger nails on a machine and she said that the machine will send healing frequencies to her. She said this is quantum science.... how is this possible?</p>	<p>The answer would depend on the type of machine your mum is using. Motors and mechanisms frequently vibrate sending out acoustic waves and heat the surroundings emitting a low-frequency electromagnetic radiation. Such radiation may be used in medicine. Emission of any radiation can be described as a quantum effect, but it is also understandable within the classical physics (an effect of antenna).</p>
<p>Is nanotechnology linked to quantum physics? How are these two fields of research influencing each other?</p>	<p>Nanotechnologies allow making devices of the size of a few tens of atoms. At such short distances the laws of classical physics fail, and quantum physics becomes very important. Qubits (quantum transistors) are built with the use of quantum technologies.</p>
<p>Where can we find quantum technology in our daily life?</p> <p>How do Quantum technology help us in our daily life?</p> <p>What is the future of Quantum technology, where is it going to bring us?</p>	<p>Lasers, the quantum sources of light, are found in DVD players, laser printers, laser pointers. All micro-electronic and opto-electronic devices are using effects of quantum mechanics, such as quantum confinement of quasiparticles.</p> <p>The present-day computers, cell phones, and the internet are based on the achievements of the quantum physics of the 20th century. They use semiconductor nano-structures, where electrons are confined in ultrathin crystal layers, and their energy is confined.</p> <p>The future Quantum technology will be based on the achievements of the physics of XXI century, such effects as entanglement, quantum superposition, quantum blockade, quantum teleportation. They will bring us to the Moon and Mars, maybe even further.</p>
<p>Is there a limitation to Moore's law with the power of quantum physics?</p>	<p>Moore's law is a phenomenological observation that the number of transistors on a computer chip increases exponentially with time doubling every two years. So far, it cannot be applied to quantum transistors for a simple reason that they are much bigger than classical nano-transistors, and it is difficult to assemble them on a chip.</p>

	In the future a new Moore's law will have to be formulated for quantum networks.
What are the common uses of Quantum Technology in everyday lives? How does the study benefit humanity?	Quantum technologies will be used to solve optimization problems. These problems are multiple in medicine, material science, chemistry. A new synthetic fuel that would enable interstellar flights and a vaccine against cancer may become examples of the use of quantum technologies.
How can we relate quantum technology in real life?	The breakthrough will be visible when quantum computers will be available on a market. Nowadays, they are available only remotely. In real life, we shall first notice the results of their work, such as the traffic optimization in big cities, acceleration of delivery services, applications of artificial intelligence.
How to be a successful scientist?	Ask good questions. This is the most important. Study in good schools, travel, be curious, make good friends who are already working in science: they will help.
Why do we need to know Quantum Technology?	In 10-20 years, we shall live in a world full of quantum technologies. We need to familiarize ourselves with these new friends. To do so, we need to learn a bit of quantum mechanics, statistical physics and quantum optics. Some background in solid state physics and magnetism would help too.
Can I be a Professor of quantum? And how do I achieve that?	Probably, you can: every professor started as a student. Nowadays, professor positions are mostly given to those who achieved significant research results, have good publications. Do research: you can start doing it at home with a pen and pencil trying to figure out how a mobile phone works, for example.
In what fields can be applied quantum technology? What is the application form?	Medicine, chemistry, new materials, information security, scanners, radars, artificial intelligence.
What difference will this technology make in a child's education?	Hopefully, the education will become individualized. The artificial intelligence teaching systems based on quantum technologies will adapt the content, the style and the pace of every course to each individual child.
Is there a simple way to learn English for kids through film, drama & story?	Probably yes, but I am not an expert at teaching languages. Myself, I am trying to learn the Chinese language now. It goes on very slowly!
Alexey, why do you think children should know about quantum technology?	Our children will live in the world where quantum technologies will play a very important role. To succeed in

	<p>such a world, they'll have to be aware of quantum technologies basics and be able to apply them.</p>
<p>When I grow up, will ordinary computers still be in use or everyone will have quantum ones? Which programming languages should a learn if all computers will be quantum?</p>	<p>People will use ordinary computers on a daily basis. Quantum machines are good for a limited scope of tasks only, mostly, for optimization of processes when it is required to choose one solution out of many possible. For other kinds of tasks classical computers and programming languages suit much more.</p> <p>Quantum programming languages are yet to be created. So far only several quantum algorithms are developed.</p>
<p>My dad often says that I lack some of the quanta in my head. Is a quantum computer constructed of the same bits?</p> <p>How can a quantum computer be used for gaming? Can I make part of my computer quantum?</p>	<p>There are some quanta of light (photons) in our brain though not very many. One can say that we all lack photons as they could be very helpful in transferring information between neurons of our brain. Photons are very important in quantum technologies, mainly, in quantum communications and quantum cryptography. So, your dad is obviously right.</p> <p>For now, quantum computers cannot be used for gaming, the same for turning a part of an ordinary computer into a quantum one. The currently existing quantum computers are very bulky and inconvenient for use. They work in ultra-low temperatures close to the absolute zero and are very difficult to be used for gaming. Merging a quantum and classical computer is a very important task for engineers but, unfortunately, it is not solved yet.</p>
<p>How is information processed and read from particles in a quantum computer?</p>	<p>Quantum measurement methods are used for it. Google's quantum computer uses superconducting detectors of magnetic field for the read-out of information from qubits.</p>
<p>Is it possible to explore a human's soul?</p>	<p>Probably, but not with the help of physics. Physics is a science which studies phenomena existence of which is proved by objective methods. Physics does not know what a soul is.</p>
<p>How can quantum technologies be applied in daily routines in the nearest future?</p> <p>According to your opinion, which technology will appear or become most popular after quantum technology?</p> <p>Where can I study quantum technology?</p>	<p>In my opinion, quantum technology will first of all help improving the quality of life in big cities. They will be used to optimize public transport systems, eradicate us from traffic jams, and clear the air pollution.</p> <p>Post-quantum technologies can become the next stage of tech development.</p>

	You can start from studying in a specialized physics-mathematics school. Then you can enter a physics department of a university, for example, MIPT.
What physical process helps “the balloons” fly?	All the photons (or balloons) fly with the same speed, speed of light. Their speed is a fundamental physics constant. Usually, quantum sources of light use the transitions between different electronic states in semiconductor nanostructures to generate photons: the quanta of light.
Will artificial intelligence be quantum?	Not necessarily. A human brain is a classical system but it is not a classical computer. It is most likely to be based on non-binary logics. Instead of ones and zeros artificial intelligence as well as a human brain will use extended functions.
Is it possible to reach the speed of light with the help of quantum physics?	According to Einstein’s relativity theory, nothing can move with a speed faster than the speed of light. Nonetheless, there are physics processes which create an illusion of moving with a speed higher than the speed of light. Quantum teleportation is one of them: a quantum particle disappears in one space point and appears in another space point at the same time. This happens immediately. It is extremely difficult to transfer a human being or another macro object over a macroscopic distance but theoretically it is possible. If it were possible, people could walk through walls like a ghost or move to another planet within a second, etc. Yet it is more of a science fiction than science.
Will people be able to shrink space and time with the help of quantum computing?	People will be able to travel faster as quantum computers will allow them create new engines and fuel but space and time will not shrink.
Alexey, thank you! Which programming language should I study given that all the computers will be quantum soon?	I advise to study classical programming languages like Python or Fortran. Quantum programming languages are yet to be developed.