

PODCAST on Quantum technologies

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Voice 2: Sarah

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VOICE 1

You're listening to the European Parliamentary Research Service podcast on quantum technologies.

VOICE 2

As abstract and complex as it might sound, tools that harness the strange properties of quantum mechanics are already at work all around us! But could this weird theory make our computers run trillions of times faster? Let's take the quantum leap!

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VOICE 1

Quantum mechanics is the science of the very, VERY small... It was developed in the early 1900s by scientists such as Plank, Bohr and Einstein to explain the behavior of matter and its interactions with energy on the scale of subatomic particles.

VOICE 2

And it revolutionized our understanding of the universe! But what are its premises?

VOICE 1

Actually, quantum mechanics governs the behaviour of physical systems when they are NOT interacting with their surroundings. In classical physics, a system is always in a particular state (for example, at rest or in motion), but in the quantum world, a system can be in a superposition of two or more states.

VOICE 2

Let's think for a moment in terms of particles... They can exist in different states, which means that they can be in different positions, have different energies or be moving at different speeds. But instead of thinking about a particle being in one state, in quantum mechanics particles are thought of as existing across many different states at the same time.

VOICE 1

So, it's like being in two places at the same time?

VOICE 2

Exactly! I know this doesn't make intuitive sense but it's one of the weird realities of quantum physics... And so, performing a measurement on such a "superposition" of states can actually change the state of the system!

VOICE 1

A century after the discovery of this revolutionary law, scientists are now able to control the states of individual quantum systems with extreme precision. And this ability could lead to the development of new technologies in fields such as sensing, cryptography and computing.

VOICE 2

Today, the most precise clocks in the world, atomic clocks, are able to use principles of quantum theory to measure time with astonishing precision, losing or gaining a second every few billion years!

VOICE 1

In the field of cryptography, quantum technology could also prove the ultimate winner! as it would be, at least in theory, impossible to defeat. Because measuring a quantum system changes the nature of that system, the two parties using quantum cryptography to transmit information could find out whether someone has been listening to their messages...

VOICE 2

But the technology with perhaps the greatest potential is quantum computing, which could solve in a matter of hours calculations that would take billions of years for an ordinary computer!

VOICE 1

In view of this staggering potential some countries, such as the UK and the Netherlands, are pouring big money into the development of quantum technologies, and the Commission is planning to invest 1 billion Euros to put Europe at the forefront of this new revolution.

VOICE 2

Public investment programmes will be crucial to turn theoretical ideas into commercially viable products, and to help develop the necessary infrastructure, such as special optic fibres, to enable quantum cryptography.

VOICE 1

But besides costs, the potential uses of the new quantum systems also need to be studied carefully by policy-makers, to ensure that potential harm from technological break-throughs does not outweigh the benefits for citizens.

VOICE 2

If they are well developed and regulated, quantum technologies may open new opportunities to address grand challenges in fields such as energy, health, security and the environment, bringing transformative advances to science, industry and society.

VOICE 1

But are we ready to take the quantum-leap.... ?

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