



## FREQUENTLY ASKED QUESTIONS ON QUANTUM

### WHAT IS QUANTUM TECHNOLOGY?

Quantum technology uses quantum mechanics principles from physics and advanced engineering to solve real world issues. Harnessing these principles requires manipulating the smallest possible units of energy and matter.

### WHAT ARE QUANTUM'S MAIN APPLICATIONS?

Quantum principles can be used for engineering solutions to extremely complex problems in computing, communications, infrastructure maintenance, climate prediction, sensing, chemistry, cryptography and mechanics.

### WHAT WILL A QUANTUM COMPUTER BE ABLE TO DO THAT A CONVENTIONAL COMPUTER CAN'T?

A quantum computer will be able to process massive data sets in ways advanced super computers and conventional computers cannot. This will allow for significant advancements in the computing power needed for transportation planning, pharmaceutical development and encryption, among other challenges.

### WHAT IS QUANTUM ENCRYPTION AND WHY IS IT SECURE?

Quantum encryption allows communication between two parties that is virtually impossible to break. If a third party intercepts and views a quantum signal, it would instantly change the signal in a detectable way.

### IS QUANTUM TECHNOLOGY ALREADY IN USE?

Yes, but in limited ways. Some quantum-enabled sensors, early-stage quantum computers, and limited quantum communication networks are already in use. With continued research and development, quantum technology will quickly become a very powerful tool.



## WHAT ARE SOME OF THE POTENTIAL EVERYDAY USES OF QUANTUM TECHNOLOGY?

Autonomous vehicle navigation, weather prediction, transportation planning, pharmaceutical development, secure financial communications, and resource exploration are among the many potential applications of quantum technology.

## HOW MUCH ARE OTHER COUNTRIES INVESTING IN QUANTUM?

China has already invested at least \$10 billion in quantum development. The European Union has invested at least \$1.2 billion and the United Kingdom has invested \$460 million. The U.S. must maintain its position as a global leader in this critical technology area with significant and sustained investment.

## WHY IS GOVERNMENT INVOLVEMENT NECESSARY?

If we don't invest, we risk falling behind. With a solid research base and workforce founded on significant and consistent government support, the U.S. will lead the creation of innovative applications by industries, thereby stimulating economic growth and job creation, which will feed back into a growing quantum-based economy. The government's financial and organizational support will ensure that both the public and private sectors will benefit from continued technological advances. What's more, the National Quantum Initiative Act ensures that a set of standards will be applied to all research and workforce development well into the future.

## WHEN WILL PUBLIC INVESTMENTS IN QUANTUM TECHNOLOGY PAY OFF?

Quantum technology will enhance our nation's economic and national security over time. Like any new, advanced technology, its maturation will take time. Quantum research and technology will have direct economic and security impacts within the next decade if adequate levels of research and funding are put in place for the coming decades. There is no question that sustained investment will be necessary.

## ABOUT THE NPI

The National Photonics Initiative (NPI) is a collaborative alliance among industry, academia and government to raise awareness of photonics and the impact of photonics on our everyday lives. For more information, visit [www.lightourfuture.org](http://www.lightourfuture.org) or contact David Lang at 202.416.1499 or Jennifer O'Bryan at 202.246.7348