OPENING STATEMENT

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of the Subcommittee on Research and Technology

House Committee on Science, Space, and Technology
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"*American Leadership in Quantum Technology"*
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Thank you Chairwoman Comstock and Chairman Weber for calling this hearing. The last time this Committee focused on quantum technology was in 2000 when a hearing was held on quantum and molecular computing. The state of the science and technology has come a long way since then. So has the international competition.

The underlying theory of quantum mechanics began to take shape in the 1920s. The first accurate atomic clock was built in the 1950s. It wasn't labeled as a quantum technology, but it took advantage of the quantum phenomenon known as superposition. Physicist Richard Feynman first mused about the possibility of quantum computers in 1981. In 1994, mathematician Peter Shor developed the first efficient algorithm for a quantum computer, demonstrating that quantum computing, when it arrived, would topple our current system of public-key encryption. Until then, quantum information science was still largely the purview of physics departments. In the years following Shor's breakthrough, quantum information science became increasingly interdisciplinary, attracting scientists and engineers from diverse fields.

As we will hear from the witnesses today, quantum information science is at another significant turning point. Publications and patent applications are on the rise. Small companies are being formed. Major companies such as IBM, Google, and Microsoft are accelerating their investments in quantum-enabled technology. I want to highlight in particular the research partnership of the University of Chicago, Argonne National Lab, and Fermi National Accelerator Lab, which has been dubbed the "Chicago Quantum Exchange." As we will hear from Dr. Guha, the Exchange was created to develop and grow interdisciplinary collaborations for the exploration and development of new quantum-enabled technologies, and to help educate a new generation of quantum information scientists and engineers. Partnership with the private sector is also an important element of the Exchange. The Chicago Quantum Exchange may be a model for the future of R&D in quantum information science.

With respect to practical applications, the market for quantum sensing and metrology is very close to taking off. Technology developers envision a future in which quantum sensors eliminate the need to use GPS satellites for navigation, can be embedded in buildings to measure stress, can be woven into clothing to monitor vital signs, and can even be injected into our blood to help diagnose disease. Another practical application is quantum communications. This is an ultra-secure method that uses quantum principles to encode and distribute critical information, like encryption keys, and will reveal if they were intercepted by a third party in transit. Multiple countries are investing heavily in this technology, which may be next in line for the commercial market. The world especially took note of China's launch of a quantum-enabled prototype

communications satellite last year. Quantum computing may be further from becoming a reality, but the potential applications for both science and the commercial market are mind-boggling. These are exciting technologies. They also open the door to important policy discussions.

As other countries are increasing their investments in quantum technology, in some cases guided by long-term strategies, now is the time for the U.S. to start developing a more coherent strategy of our own. We must consider the scale, scope and nature of federal investments, how best to facilitate and strengthen partnerships with the private sector, and the education and workforce training that will be required to power a quantum revolution. I have no doubt other important policy issues will emerge in this hearing, including, importantly, the impact on cybersecurity. I hope this hearing is followed by additional hearings in this Congress and the coming years that more deeply explore specific technologies and policy implications. In the meantime, I look forward to today's introduction to quantum information science and technology.

I thank all of the witnesses for being here this morning to share your expertise, and I yield back.