Rose vs. Moore: Quantum computing's evolutionary pace is passing up classical computing

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Companies such as IBM have been driving quantum computing's rapid qubit evolution.

Scientists have been working on quantum computing-related theories and experiments for almost 100 years. The world of non-scientists is just starting to understand what quantum computing is and what it might be capable of.

While it might seem like this technology evolution has moved slowly, it’s starting to ramp up extremely quickly, fast enough that Rose’s Law, which suggests quantum computing qubits should double every two years, is close to or already moving faster than Moore’s Law, the notion guiding the classical computer evolution that suggests the number of transistors in a computer should double over the same span.

That’s according to Christian Bauer, Theory Group Leader and PI of Quantum Computing for the Physics Division of Lawrence Berkeley National Laboratory, who provided the virtual keynote presentation for Day 3 of Sensors Converge on Thursday.

That doesn’t mean, however, that quantum computers are going to replace classical computers anytime. The quantum computers that exist today are good for solving problems of quantum mechanics and for applications that classical computers would require too much time to

process, such as examinations of chemical properties and the effects of combining various chemicals.

“For quantum computers to realistically do more, many things need to be solved in both research and industries,” Bauer said, such as the challenge of providing error correction for quantum computers to make them more accurate; the challenge of building quantum computers feasible for different industrial settings; and the challenge of programming quantum computers to address a variety of applications.

“What are the tools and the software that will be needed? These are things we are working on in our lab and that are being addressed by different companies,” he said.

And while it often has been observed that quantum computing eventually will be capable of cracking current encryption technology, Bauer said that is not as fearful a scenario as it might seem to be. “If encryption standards were to stay the way they are now, this should freak everybody out,” he said, “but it will take longer for quantum to develop to this level, and by the time it happens there will be new encryption standards in place.”

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