What's so special about quantum computers?

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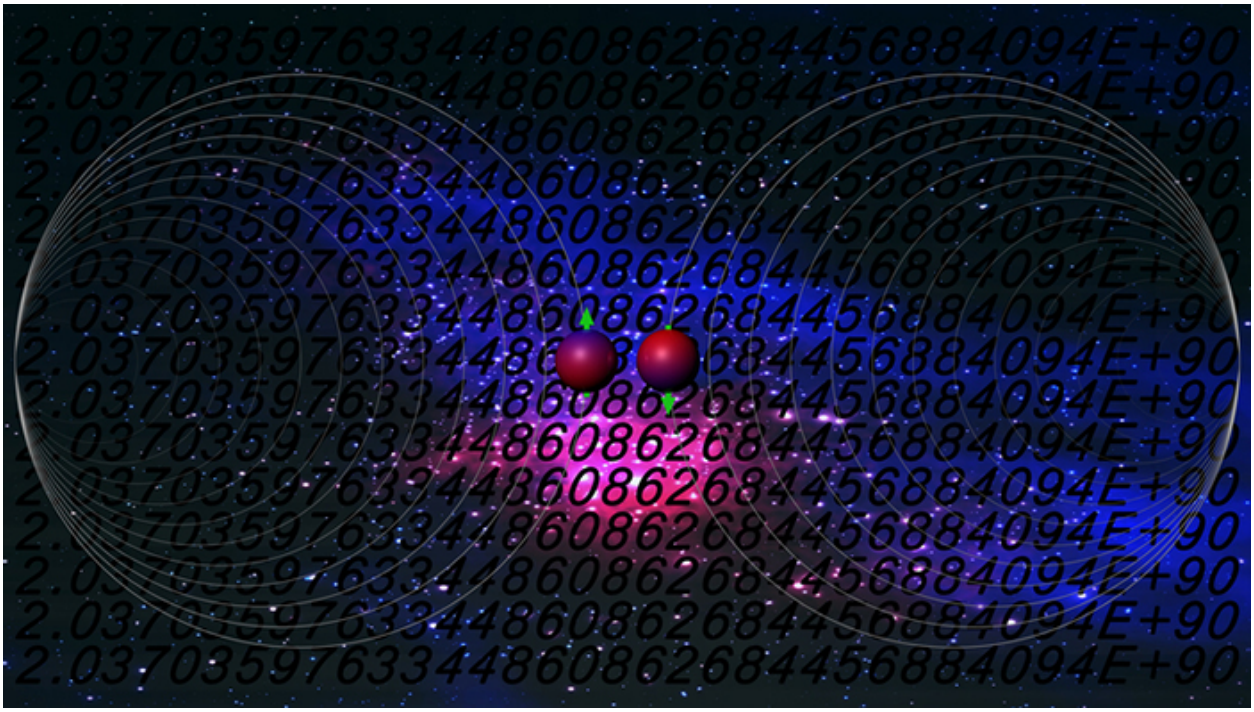

The area of physics known as quantum mechanics shows that, at the most fundamental level, classical physics theories no longer apply. The same is true for quantum computing.

While classical computers (what most people use today) translate information into bits consisting of "ones" or "zeros," the quantum computing world of "qubits" (or quantum bits) can represent additional states beyond those two—called "superimposition" and "entanglement"—at the same time.

This additional level of complexity means that quantum computers could eventually far surpass current computers in their ability to process information and do it quickly and accurately.

Another advantage of quantum computing is that classical computers have hit scalability in terms of energy consumption. Larger machines will just use up too much energy. Quantum computing can also potentially operate much more efficiently.

And, while quantum computing is still in its infancy, during the past two years that we've had a quantum computer, we've learned about how to operate it and its limitations. However, we've yet to obtain what's called "quantum supremacy," that is, performing a computation on a quantum computer that would be impossible to execute on the best classical computers within a reasonable amount of time, such as within a year.

Still, that day may come as the quantum machines get bigger and faster.

The eventual applications could be wide ranging, from the development of medicine and materials to even advanced artificial intelligence.

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