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Einstein's revolution: Quantum technology for the 21st century quantum computer

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Einstein's most revolutionary idea, of the light quantum, has led to the concept for a radical new type of computer that uses the strange rules of quantum mechanics to process information encoded in quantum bits, qubits. Especially promising qubits are ion implanted donor atoms in isotopically pure semiconductors including silicon. Successful development of large-scale devices that can solve important problems that cannot be solved by classical machines requires overcoming formidable scientific and technical obstacles. We will need to manipulate and interrogate single atoms with unprecedented precision. This presentation looks at the emergence of quantum technology, our group's work engineering quantum states into single atoms implanted in silicon and how we plan to build the first quantum machines.