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### **Quantum computation with photons**

ABSTRACT. Quantum information science has emerged to consider what additional power and functionality can be realized in the encoding, transmission, and processing of information by specifically harnessing quantum mechanical effects. Anticipated technologies include quantum key distribution, which offers perfectly secure communication; quantum metrology, which allows more precise measurements than could ever be achieved without quantum mechanics; and quantum lithography, which could enable fabrication of devices with features much smaller than the wavelength of light. Perhaps the most profound future technology is a quantum computer that promises exponentially faster operation for particular tasks. Of the various physical systems being pursued, an all-optical quantum computer, which encodes quantum information in single photons, has emerged as a leading approach. Here we give a brief review of this field, focusing on some of our recent work.

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