Recent breakthroughs in optical quantum computing with continuous variables

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Quantum computing is poised to offer revolutionary capabilities for medicine, materials, and cybersecurity. With several platforms showing promise as a viable quantum computing architecture, the ultimate winner remains unclear. Optical quantum computing offers the tantalising promise of room-temperature operation and vast scalability. This technology has advanced far beyond its single-photon origins to encompass more robust and interesting states of light that serve as quantum information carriers with built-in resilience to decoherence. These so-called bosonic codes, when combined with a demonstrably scalable architecture like a continuous-variable cluster state, bring fault-tolerant quantum computing with optical systems within reach. The missing pieces are high enough squeezing in laboratory experiments and optical production of the exotic states used as the information carriers. In this talk, I will give an overview of recent key advances in scalability and fault tolerance for optical quantum computing.