Quantum Photonics: How Far Can We Go?

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Although existing experiments have implemented protocols employing up to 10 or even 12 photons, the inefficiencies of sources has resulted in exceedingly low rates of these high-photon events. Single and entangled-photon emitters both suffer from probabilistic operation, substantial losses, or both, so that extrapolating even to 20 photons is discouraging. However, recent experiments employing multiplexing techniques can trade overall rate (or component count) for increased probability, e.g., factors of 10-30 enhancement have been demonstrated. How far can such experiments be pushed? Using our best guesstimates on what system capabilities may be feasible, we discuss the near-term future for multi-photon quantum processing.