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Optical Switches for Quantum Information Processing BRYAN JACOBS, Johns Hopkins University, TODD PITTMAN, JAMES FRANSON, Johns Hopkins University — Many of the basic components required for optical quantum computing and quantum communications have recently been demonstrated, including: single photon sources, quantum memories, logic operations, and photon number resolving detectors. Although the results of these proof-of-concept demonstrations are encouraging, errors in the current devices limit the range of applications to relatively small quantum circuits. The majority of the errors in the current devices originates from photon loss and decoherence in the switching elements. The single-photon nature of the signal, when coupled with quantum coherence requirements, limits the feasibility of using standard telecom switches in these applications. Here we discuss our recent work toward the development of optical switches specifically designed to accommodate the characteristics of photonic qubits.

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