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Experimental demonstration of a quantum router XINXING YUAN, JIAJUN MA, PANYU HOU, XIUYING CHANG, CHONG ZU, LUMING DUAN, Center for quantum information, IIIS, Tsinghua University, QUANTUM NETWORK LAB TEAM — The router is a key element for a network. We describe a scheme to realize genuine quantum routing of single-photon pulses based on cascading of conditional quantum gates in a Mach-Zehnder interferometer and report a proof-of-principle experiment for its demonstration using linear optics quantum gates. The polarization of the control photon routes in a coherent way the path of the signal photon while preserving the qubit state of the signal photon represented by its polarization. We demonstrate quantum nature of this router by showing entanglement generated between the initially unentangled control and signal photons, and confirm that the qubit state of the signal photon is well preserved by the router through quantum process tomography.

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