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Experimental Raman adiabatic transfer of optical states in rubidium JÜRGEN APPEL, EDEN FIGUEROA, University of Calgary, FRANK VEWINGER, University of Bonn, KARL-PETER MARZLIN, ALEXANDER LVOVSKY, University of Calgary — An essential element of a quantum optical communication network is a tool for transferring and/or distributing quantum information between optical modes (possibly of different frequencies) in a loss- and decoherence-free fashion. We present a theory [1] and an experimental demonstration [2] of a protocol for routing and frequency conversion of optical quantum information via electromagnetically-induced transparency in an atomic system with multiple excited levels. Transfer of optical states between different signal modes is implemented by adiabatically changing the control fields. The proof-of-principle experiment is performed using the hyperfine levels of the rubidium D1 line. [1] F. Vewinger, J. Appel, E. Figueroa, A. I. Lvovsky, quant-ph/0611181 [2] J. Appel, K.-P. Marzlin, A. I. Lvovsky, Phys. Rev. A **73**, 013804 (2006)

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