

Abstract Submitted  
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**Intuitive and counter-intuitive multiphoton adiabatic rapid pasasage** H. MAEDA, J.H. GURIAN, D.V.L. NORUM, T.F. GALLAGHER, Department of Physics, University of Virginia, Charlottesville, VA 22904 — In coherent population transfer via a sequence of adiabatic rapid passages through overlapping single-photon resonances, the oscillating dipole remains phase-locked to the field as the frequency of the radiation field is chirped [1]. The process is intuitive, and the atomic frequency follows that of the chirped radiation field [1]. Efficient counter-intuitive population transfer can also occur in which the atomic frequency changes in the direction opposite the change in the radiation frequency [2,3]. In such cases the sequence of single-photon transitions of the intuitive transfer is replaced by a single multiphoton transition, enormously reducing the range of the chirp required to effect the population transfer. Such multi-photon adiabatic rapid passage occurs in both an intuitive and a counter-intuitive manner. We present results of such population transfers among the Rydberg states of atomic Li around  $n = 70 \sim 90$  using a frequency chirped microwave pulse. This work has been supported by the NSF. [1] H. Maeda, D.V.L. Norum, and T.F. Gallagher, *Science* **307**, 1757 (2005). [2]N.V. Vitanov *et al.*, *Annu. Rev. Phys. Chem.* **52**,763 (2001); N.V. Vitanov *et al.*, *Adv. At. Mol. Opt. Phys.* **46**, 57 (2001).[3] B. Broers, H.B. van Linden van den Heuvell, and L. D. Noordam, *Phys. Rev. Lett.* **69**, 2062 (1992).

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