Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Coherent one- and two-photon ionization of excited barium JOHN R. TOLSMA, University of Colorado, CHRIS H. GREENE, University of Colorado and JILA — We calculate the photoionization cross sections of the 6s6p 1Po state of barium by either one or two photons. In both cases the final state energies reach the vicinity of the 5d ionization thresholds. The effects of hyperfine interactions due to isotope mixing in naturally occuring barium are also examined. This study uses variational R-matrix and quantum defect techniques to calculate the rich array of autoionizing resonances in this energy range. The two-photon cross section calculation utilizes a small set of intermediate levels that arise in the second-order time-dependent perturbation expansion. Using the channel dependent scattering parameters we attempt to calculate photoelectron angular distributions, phase coherence effects, and branching ratios of the autoionized electrons. Experimental data[1] have shown that these physical observables can be controlled by varying the relative phase of the single and double photon excitation paths. Future applications in coherent control are discussed. [1] Rekishu Yamazaki and D.S. Elliott, Phys. Rev. Lett. 98, 053001 (2007)

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Date submitted: 01 Feb 2008 Electronic form version 1.4