Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Two- and three-photon double ionization of lithium G. ARMSTRONG, Theoretical Division, Los Alamos National Laboratory, M. SCHURICKE, G. VEERAVALLI, CH. DORNES, G. ZHU, K. JOACHIMSMEYER, Max Planck Institute for Nuclear Physics, Heidelberg, R. TREUSCH, HASYLAB, DESY, Hamburg, A. DORN, Max Planck Institute for Nuclear Physics, Heidelberg, J. COLGAN, Theoretical Division, Los Alamos National Laboratory — Motivated by current FEL experiments at FLASH, we present triple differential cross sections and recoil ion momentum distributions for two- and three-photon double ionization of the $1s^2 2s\ ^2S$ ground state of lithium at a photon energy of 50 eV. The time-dependent close-coupling (TDCC) method is used to solve the two-electron time-dependent Schrödinger equation in full dimensionality. The double ionization process is treated as a two-active-electron process, where the "active" 1s and 2s electrons move in the field of the "frozen-core" Li^{2+} 1s state. Recent experimental measurements of recoil ion momentum distributions have observed features associated with the absorption of both two and three photons. This work provides the first TDCC calculations to date of such two- and three-photon double ionization processes in lithium. The accurate treatment of these processes requires a detailed description of the final continuum containing both singlet and triplet S, P, D and F waves. We examine triple differential cross sections as a function of electron energy sharing for a variety of angular configurations. We also compare our calculated recoil ion momentum distributions with experimental measurements, providing the first such comparison for two- and three-photon processes.

Gregory Armstrong
Theoretical Division, Los Alamos National Laboratory

Date submitted: 31 Jan 2012 Electronic form version 1.4