Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Double and triple ionization of silver clusters by electron impact
AVIK HALDER, ANTHONY LIANG, University of Southern California, CHUNRONG YIN, Argonne National Laboratory, VITALY KRESIN, University of Southern California — Metal clusters are finite droplets of delocalized electrons with discrete energy levels, due to the small confinement volume, often referred to as "artificial atoms" or "superatoms." Ionization processes involving clusters provide insight into the energetics of charging of finite quantum systems. While the evolution of the single-ionization energy with cluster size has been extensively studied, less is known about multiple ionization thresholds and efficiencies. We probed the production of several selected silver cluster cations Ag_n^{2+} and Ag_n^{3+} by electron impact ionization. The scaling of ionization thresholds with particle radius follows the metallic droplet model, but, curiously, with a slope which is significantly different from the previous literature values for single ionization. Another observation is that as the electron energy increases, the yield of high-charge cations grows faster than that of singly-charged Ag_n^+. This behavior is consistent with the power-law dependence of post-threshold ionization known for atomic systems. Mechanisms involved in multiple ionization phenomena in metal clusters appear far from completely understood and call for further experimental and theoretical examination.

Avik Halder
University of Southern California

Date submitted: 20 Jan 2012 Electronic form version 1.4