Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Selective Removal of Electrons from a Penning Trap for Negative Ion Autodetachment Studies[1] L. SUESS, Y. LIU, F. B. DUNNING, Rice University, Department of Physics and Astronomy — It is shown that free electrons can be selectively removed from a Penning trap used to store heavy autodetaching negative ions by application of a series of small positive extraction pulses to one of the end electrodes of sufficient amplitude to extract the electrons yet not significantly perturb the heavy ion motion. This precludes electron reattachment processes in the trap, allowing accurate measurement of negative ion lifetimes. This has been used to determine the lifetimes of SF_6^- and $C_2Cl_4^-$ ions produced by electron transfer in collisions with K(np) Rydberg atoms. The data for $C_2Cl_4^-$ point to ion lifetimes in the range 3 to 500 μs. Those for SF_6^- range from 1 to 10 ms. The measurements for SF_6^- also provide evidence of radiative stabilization. For both targets the effects of post-attachment interactions involving the K^+ core ion become increasingly important for values of $n \leq 20$, leading to a sizable increase in the product ion lifetimes.

[1]Research supported by the NSF and Robert A. Welch Foundation.

L. Suess

Date submitted: 28 Jan 2005 Electronic form version 1.4