Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

New method to determine nuclear charge radius based on EUV spectroscopy of Na-like ions R. SILWAL, Clemson Univ., A. LAPIERRE, Michigan State Univ., J. D. GILLASPY, NSF, J. M. DREILING, Honeywell, S. A. BLUNDELL, Univ. Grenoble, D. FNU, NIST, A. BOROVIK. JR, Univ. of Giessen, G. GWINNER, Univ. of Manitoba, A. C.C. VILLARI, Michigan State Univ., Y. RALCHENKO, NIST, E. TAKACS, Clemson Univ. — Nuclear charge radii are a fundamental property that is key to understanding nuclear structure. Their measurement with electron scattering and muon spectroscopy is accurate but limited to stable isotopes. Though relative shifts in charge radii along isotope chains from optical isotope shifts measurements are very precise, many-electron atomic calculations can contribute to systematic offsets. Transition energies of Na-like ions are particularly sensitive to nuclear size and their simple electronic structure results in highly accurate atomic-structure calculations. A new method based on EUV spectroscopy of Na-like ions observed in an electron beam ion trap has been implemented to measure the isotope shift of Na-like D1 (3s - $3p_{1/2}$) transitions between ^{124}Xe and ^{136}Xe. Comparison of the measured shift with atomic-structure calculations was used to determine the mean-square charge radius difference to be 0.297(28) fm^2, which agrees with previous measurements. The new method requires much smaller sample size than conventional methods, making it ideal to take first measurements of short-lived radioactive isotopes when new isotope beam facilities come online in near future.

R. Silwal
Clemson Univ.

Date submitted: 26 Jan 2018 Electronic form version 1.4