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Isotopic shift measurement of Na-like Xe ions as a new method to measure absolute and relative charge radii of rare isotopes. R. SILWAL, Clemson Univ., A. LAPIERRE, Michigan State Univ., J.D. GILLASPY, NSF, A.C.C. VILLARI, Michigan State Univ., G. GWINNER, Univ. of Manitoba, S.A. BLUNDELL, CEA-INAC, B.H. RUDRAMADEVI, Clemson Univ., A. BOROVIK, JR., Univ. of Geissen, J.M. DREILING, YU. RALCHENKO, NIST, E. TAKACS, Clemson Univ. — The absolute charge radius of unstable (radioactive) isotopes is mostly unavailable for elements heavier than Bi as current measurement techniques, e.g. electron scattering and muonic x-ray spectroscopy, require macroscopic amounts of the elements. Relative shifts in charge radii along isotopic chains, obtained from optical frequency shifts, strongly depend on semi-empirical approaches thereby adding further uncertainties. Transition energies of Na-like ions are sensitive to nuclear size, and because of their simple electronic structure, ab-initio atomic structure calculations can reach high accuracy. For heavy elements, it has even been noted that the precision of such calculations is limited by the large uncertainty in charge radii[1]. This suggests a new method for charge radius measurements using Na-like ions. We have measured energy shifts associated with the D1 and D2 3s-3p transitions for Na-like ^{124}Xe and ^{136}Xe. The relative shift in charge radius of these isotopes is inferred by comparing experiment and high-precision calculations. We present preliminary results obtained from EUV and x-ray spectra observed in an electron beam ion trap. [1] Gillaspy et al., PRA 87, 062503 (2013).

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