Abstract Submitted
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Evidence of Double-Electron Capture by Highly-ionized Atoms Isolated at Very Low Energy[1] SHANNON FOGWELL HOOGERHEIDE, NIST - Natl Inst of Stds & Tech, ARDA SAHINER, Thomas S. Wootton High School, JOSEPH N. TAN, NIST - Natl Inst of Stds & Tech — Electron capture processes are important in the study of comets [1], controlled fusion energy [2], anti-matter atoms [3], and proposed one-electron ions in Rydberg states. There are few studies for low energy. At NIST, highly-charged ions extracted from an electron-beam ion trap can be isolated with < 10 eV energy using a recently developed compact Penning trap. By controlling the background gas pressure and composition, the charge exchange rates can be studied. Fully stripped neon ions are held in the trap for varying lengths of time and allowed to interact with different background gases at multiple pressures. The ions are then pulsed to a time-of-flight detector, to count the population of each charge state. Analysis yields information about the trap loss and single-electron capture rates. Moreover, evidence of double-electron capture is observed at low background gas pressures. Related work involves the resonant charge exchange of fully-stripped neon ions with laser-excited rubidium atoms to produce highly-excited one-electron ions, enabling a new measurement of the Rydberg constant.

[1] T. E. Cravens, Science 296, 1042 (2002)
[2] R. C. Isler, Plasma Phys. Control. Fusion 36, 171-208 (1994)
[3] C. H. Storry, et. al., Phys. Rev. Lett. 93, 263401 (2004)

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