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Towards Laser Controlled Generation of Rydberg State, One-Electron Ions JOAN DREILING, National Institute of Standards and Technology, AUNG NAING, University of Delaware, JOSEPH TAN, National Institute of Standards and Technology — We report on progress towards the goal of producing hydrogen-like ions in Rydberg states for laser spectroscopy measurements of fundamental constants [1]. Fully stripped neon atoms (Ne^{10+}) are produced in an electron beam ion trap (EBIT). These bare nuclei are extracted via a beamline from the EBIT into a second apparatus where they are captured at low energy in a unitary Penning trap [2]. The second apparatus has a cross-beam configuration, with a perpendicular beam of laser excited Rb atoms intersecting the ion beam at the Penning trap. While stored in the trap, the ions can interact with the Rb and, through charge exchange interactions, the bare nuclei can capture one or more electrons from the Rb. The charge states of the stored ions can then be analyzed by dumping the ions from the trap to a time-of-flight (TOF) detector [2]. To search for enhanced electron capture due to the laser excitation, initial studies compare the charge exchange rates in the TOF data for ground state Rb and for laser excited Rb. [1] U.D. Jentschura et al., Phys. Rev. Lett. **100**, 160404 (2008). [2] S.F. Hoogerheide et al., Atoms **3**, 367 (2015).

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