

Abstract Submitted
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Production and exploration of Rydberg highly charged ions¹ S. J. BROMLEY, E. TAKACS, J. P. MARLER, Clemson University — Highly Charged Ions (HCIs) may be considered ideal mini-laboratory in which one can study the physics of matter and light in an environment of high internal electric field that can not be recreated with standard lab equipment. Rydberg Highly Charged Ions (RyHCI) in which a single electron occupies a high principle quantum number state, in particular, provide excellent test beds for precision measurements of fundamental constants, quantum electrodynamics, and precision X-ray wavelength standards. Even though these systems are highly desirable, the formation of such extreme electronic states is not straightforward due to excitation energies that are many orders of magnitude higher than that of ordinary laser accessible transitions. We will create HCI beams of different kinetic energies at the Clemson University Electron Beam Ion Trap (CUEBIT) facility and intersect them with different neutral atoms of a gas jet target. High-resolution and broadband X-ray spectrometers will be used to observe transitions directly to the ground state simultaneously with alternative cascade channels.

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