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Spectroscopy of high-L Rydberg levels of Fr-like U and Th Ions¹ MARK E. HANNI, STEPHEN R. LUNDEEN, Colorado State University, CHARLES W. FEHRENBACH, Kansas State University — High-L Rydberg levels of Fr-like U^{5+} and Th^{3+} have been studied using the Resonant Excitation Stark Ionization Spectroscopy (RESIS) technique. Beams of Rn-like U^{6+} and Th^{4+} , obtained from a 14 GHz permanent magnet ECR source at Kansas State University, capture a single electron from a dense Rb Rydberg target, becoming Fr-like ions in very highly excited states, $n \sim 50$. These Rydberg states are selectively excited to much higher levels, using a Doppler-tuned CO_2 laser, partially resolving the fine structure of the lower Rydberg level. Analysis of the spectrum with the long-range polarization model can be used to determine the polarizability of the Rn-like ion cores. The technique is analogous to previous studies of Kr^{5+} Rydberg levels [1], but is more challenging because of the presence of background due to auto-ionizing Rydberg levels bound to metastable Rn-like ions.

[1] S.R. Lundeen and C.W. Fehrenbach, Phys. Rev. A 75, 032523(2007)

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