TOWARD ROTATIONAL STATE-SELECTIVE PHOTOIONIZATION OF ThF^+ IONS

YAN ZHOU, KIA BOON NG, DAN GRESH, WILLIAM CAIRNCROSS, MATT GRAU, YIQI NI, ERIC CORNELL, JUN YE, *JILA, National Institute of Standards and Technology and Univ. of Colorado Department of Physics, University of Colorado, Boulder, Boulder, CO, USA*.

ThF^+ has been chosen to replace HfF^+ for a second-generation measurement of the electric dipole moment of the electron (eEDM). Compared to the currently running HfF^+ eEDM experiment, ThF^+ has several advantages: (i) the eEDM-sensitive state ($^3\Delta_1$) is the ground state, which facilitates a long coherence time [1]; (ii) its effective electric field (35 GV/cm) is 50% larger than that of HfF^+, which promises a direct increase of the eEDM sensitivity [2]; and (iii) the ionization energy of neutral ThF is lower than its dissociation energy, which introduces greater flexibility in rotational state-selective photoionization via core-nonpenetrating Rydberg states [3]. In this talk, we first present our strategy of preparing and utilizing core-nonpenetrating Rydberg states for rotational state-selective ionization. Then, we report spectroscopic data of laser-induced fluorescence of neutral ThF, which provides critical information for multi-photon ionization spectroscopy.

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