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Photodissociation of ThF+ and the eEDM KIA BOON NG, YAN ZHOU, DANIEL GRESH, WILLIAM CAIRNCROSS, TANYA ROUSSY, KEVIN BOYCE, YUVAL SHAGAM, JILA, NIST and University of Colorado, and Department of Physics, University of Colorado, Boulder , LAN CHENG, Department of Chemistry, Johns Hopkins University, JUN YE, ERIC CORNELL, JILA, NIST and University of Colorado, and Department of Physics, University of Colorado, Boulder — ThF+ has been chosen as the candidate for a third-generation measurement of the electric dipole moment of the electron (eEDM). Compared to the current HfF+ eEDM experiment, ThF+ has several advantages: (i) the eEDM-sensitive state ($3\Delta 1$) is the ground state [1], which facilitates a long coherence time; (ii) and its effective electric field (35 GV/cm) is 50% larger than that of HfF+ [2], which promises a direct increase of the eEDM sensitivity. However, molecular state detection is complicated by the molecular internal structure. Furthermore, current efficiency levels in the state preparation of ThF+ limits us to only a few hundred ThF+ ions within the trap for the eEDM experiment. Hence, we require a high-efficiency state readout method. One such method involves state-selective photodissociation of the ions, and counting the dissociated ions on a time-of-flight detector. However, the dissociating states of ThF+, which are required for the eEDM state readout, have not been found previously. Herein, we present the results of our spectroscopy of the ThF+ dissociating states, and our current progress in the state preparation of ThF+ for the eEDM experiment. [1] Gresh, Daniel N., et al. JMS 319 (2016): 1-9. [2] Skripnikov, L. V., and A. V. Titov. PRA 91.4 (2015): 042504.

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