Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Spectroscopy of HfF^+ for the JILA electron electric dipole moment search DANIEL GRESH, KEVIN COSSEL, TYLER COFFEY, LAURA SINCLAIR[1], JUN YE, ERIC CORNELL, JILA, National Institute of Standards and Technology and University of Colorado Department of Physics — A low lying $^3\Delta_1$ state in HfF^+ and ThF^+ is an ideal candidate for a precise measurement of the electron electric dipole moment (eEDM). However, the electronic level structure of these species is not very well studied, and theoretical uncertainties are on the order of 1000 cm^{-1} for many levels. We have used a recently developed novel technique, frequency comb velocity modulation spectroscopy (VMS), as well as cw-laser VMS for high-sensitivity, high-resolution, ion sensitive detection from 675-1000 nm (10000-14700 cm^{-1}). We report the measurement and assignment of 15 ro-vibrational bands in HfF^+ including accurate fits for the $^3\Delta_1$ metastable state and the $^1\Sigma^+$ ground state. In addition, we have characterized six excited states and discuss the implications for state preparation and readout in the eEDM experiment. This system will allow rapid characterization of ThF^+, which should further improve the sensitivity of the eEDM experiment. In addition to supporting the eEDM experiment, these studies provide data for testing and refining relativistic molecular structure calculations.

[1]Current affiliation: National Institute of Standards and Technology

Daniel Gresh
JILA, National Institute of Standards and Technology and
University of Colorado Department of Physics

Date submitted: 31 Jan 2012 Electronic form version 1.4