Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

High-precision Stark-shift measurements in excited states of indium using an atomic beam[1] BENJAMIN AUGENBRAUN, PRIYANKA RUPASINGHE, PROTIK MAJUMDER, Williams College Physics Dept. — In recent years, we have pursued a series of precise atomic structure measurements in Group III elements thallium and indium to test *ab initio* theory calculations in these three-valence-electron systems. Our measurement of the indium scalar polarizability within the 410 nm $5p_{1/2}-6s_{1/2}$ was in excellent agreement with a new atomic theory calculation. We are now measuring the scalar polarizability within the $6s_{1/2}-6p_{1/2}$ excited-state transition. In our experiment, two external cavity semiconductor diode lasers interact transversely with a collimated indium atomic beam. We lock the 410 nm laser to the $5p_{1/2}-6s_{1/2}$ transition, and overlap a 1343 nm infrared laser to reach the $6p_{1/2}$ state. The very small infrared absorption in our atomic beam is detected using FM spectroscopy. Sideband features in our demodulated spectrum offer built-in frequency calibration. We apply electric fields up to 20 kV/cm to the atomic beam to observe Stark shifts of order 100 MHz for this excited state. Comparing our polarizability value to theoretical predictions will lead to precise new values of $6p-5d$ matrix elements in indium. The same infrared laser will be used to study the scalar and tensor polarizabilty of the $6p_{3/2}$ state in a future experiment.

[1]Work supported by NSF grant # 1404206.

Protik Majumder
Williams College Physics Dept.

Date submitted: 29 Jan 2015 Electronic form version 1.4