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High-precision measurements and theoretical calculations of indium excited-state polarizabilities[1] DANIEL MASER, BINGYI WANG, NATHANIEL VILAS, PRIYANKA RUPASINGHE, Williams College, MARIANNA SAFRONOVA, University of Delaware, ULYANA SAFRONOVA, University of Nevada, Reno, PROTIK MAJUMDER, Williams College — Recent measurements in our group of indium scalar polarizability within two low-lying transitions showed excellent agreement with *ab initio* atomic theory at the $1-2\%$ level. We have completed measurements of the polarizability within the $6s_{1/2} \rightarrow 7p_{1/2,3/2}$ excited-state transitions. In our experiment, two external cavity semiconductor diode lasers interact transversely with a collimated indium atomic beam. We tune a 410 nm laser to the $5p_{1/2} \rightarrow 6s_{1/2}$ transition, keeping the laser locked to the exact Stark-shifted resonance frequency. We overlap a second (685 or 690 nm) laser to reach the $7p$ excited states, using lock-in detection to observe its very small absorption in the atomic beam. Monitoring the two-step excitation signal in a field-free supplemental vapor cell provides frequency reference and calibration. Scalar polarizabilities for the $7p$ states are 1-2 orders of magnitude larger than in previously measured transitions, so that application of modest, precisely calibrated electric fields of a few kV/cm produce Stark shifts of order 100 MHz. We also extracted the tensor polarizability of the $7p_{3/2}$ state by applying fields of roughly 15 kV/cm. Experimental details, results, and theoretical comparisons will be presented.

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