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Precise measurement of the Stark shift within the $5P_{1/2}\rightarrow 6S_{1/2}$ transition in ^{115}In A.T. LORENZO, G. RANJIT, P.K. MAJUMDER, Department of Physics, Williams College, Williamstown, MA — We are pursuing a series of precise atomic structure measurements in Group IIIA elements—currently thallium and indium—designed to test recent ab initio theoretical calculations in these systems. In indium, a two-step, two-color vapor cell hyperfine spectroscopy experiment was recently completed in our laboratory. Previously, an atomic beam system in conjunction with a thallium oven source and high-voltage field plates was used to complete a precise scalar polarizability measurement in thallium. In our current work, we have designed a new indium atomic beam source, and are pursuing a precision measurement of the indium atomic polarizability within the 410 nm $5P_{1/2}\rightarrow 6S_{1/2}$ transition. The new source is capable of reaching 1100 °C and contains a series of parallel effusive slits to produce a dense, collimated beam of indium. We intersect the laser transversely with the atomic beam in the presence of a precisely calibrated electric field of 30 kV/cm. Frequency modulation of the laser, and simultaneous piezoelectric modulation of the atomic beam allows a dual-frequency lock-in detection scheme. This produces a zero-background atomic absorption spectrum of high signal-to-noise ratio. Our goal is to achieve a polarizability measurement at the 1% level of accuracy or better, which will provide a stringent new test of the atomic theory calculations.

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