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Precision Lifetime Measurement of the Cesium $6P_{3/2}$ State B.M. PATTERSON, T. EHRENREICH, R.J. KNIZE, United States Air Force Academy — We have refined our atomic lifetime measurement technique[1] and report a precision value for the $6P_{3/2}$ state of cesium. A single pulse ($\sim$nJ) from a mode-locked Ti:Sapphire laser excites atoms in counter-propagating thermal beams to the $6P_{3/2}$ state. A subsequent laser pulse is amplified using a regenerative amplifier to a few μJ and is frequency-doubled, and ionizes atoms in the excited state. The ions are collected using a channel electron multiplier and counted. The measurement is repeated using excitation and detection pulses that are increasingly separated in time, allowing the decay from the excited state to be determined. Our analysis indicates a lifetime of 30.44 ns with a statistical uncertainty of 0.02 ns. We will discuss improvements in our apparatus and address the dominant systematic effects. These include (1) the effects of imperfect extinction ratio of the electro-optic modulators used for laser pulse selection; (2) the effects of atoms moving through spatially non-uniform laser beams; and (3) the effects of misalignment of the excitation and ionization laser beams.

[1]B.M. Patterson, C.D. Lindstrom, T. Takekoshi, J.R. Lowell, C. Villarreal, and R.J. Knize, Opt. Lett. **28** (19), 1814 (2003).

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