Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Precision Lifetime Measurement of the Rubidium $5P_{3/2}$ State BRIAN PATTERSON, JERRY SELL, RANDY KNIZE, United States Air Force Academy — We will report measurement results of the rubidium $5P_{3/2}$ atomic state lifetime. The measurement technique uses a single pulse from a mode-locked Ti:Sapphire laser to excite rubidium atoms in counter-propagating thermal beams to the $5P_{3/2}$ state. A subsequent laser pulse is amplified in a regenerative amplifier and frequency-doubled, which ionizes atoms in the excited state (but not from the ground state). The photoions are collected and counted as the time delay between the excitation and ionization pulses is varied. The dominant systematic effects using this technique include radiation trapping, hyperfine quantum beats, and effects from the misalignment of the excitation and ionization laser beams. We recently used this technique to achieve a total measurement uncertainty of 0.12% for the $6P_{3/2}$ state lifetime of cesium, and anticipate a comparable precision may be achieved for the rubidium $5P_{3/2}$ state.

Brian Patterson
United States Air Force Academy

Date submitted: 04 Feb 2011 Electronic form version 1.4