Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Ultracold Ground-State $^{87}Rb_2$ Formation using Nanosecond-Timescale Frequency-chirped Light J.A. PECHKIS[1], C.E. ROGERS III, J.L. CARINI, P.L. GOULD, Department of Physics, University of Connecticut, Storrs, CT 06269 — We present results on ultracold molecule formation using frequency-chirped pulses. The chirps, either positive or negative, sweep 1 GHz in 100 ns through a photoassociation resonance located below the D_2 line in ^{87}Rb. The intensity pulses are Gaussian with a full width at half-maximum (FWHM) of 40 ns. We use resonantly-enhanced multi-photon ionization to directly detect ground-state $^{87}Rb_2$ formed through photoassociation by linearly frequency-chirped pulses and subsequent spontaneous decay. In particular, we measure the rates of formation (R) and photodestruction ($\Gamma_{\rm PD}$) for positive and negative frequency-chirped pulses, as well as for unchirped pulses. We find that unchirped pulses yield higher values of both R and $\Gamma_{\rm PD}$ than those of positively-chirped pulses, whose values in turn are greater than those of negatively-chirped pulses. Our results are an important step towards coherent control of ultracold ground-state molecule formation. This work is supported by DOE.

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Date submitted: 09 Feb 2011 Electronic form version 1.4