Abstract Submitted
for the DAMOP20 Meeting of
The American Physical Society

Femtosecond optical frequency combs and applications to quantum control of three-level atomic systems ANEESH RAMASWAMY, SVETLANA MALINOVSKAYA, Stevens Inst of Tech — Mode-locked frequency combs provide a powerful way to assemble a spectrum of finely spaced frequencies over the duration of the pulse train. Altering pulse parameters and introducing pulse modulation can be used to develop control protocols to drive atomic systems to targeted states. We investigate models of frequency combs with Gaussian envelopes and various phase modulation functions and their mathematical descriptions in the frequency domain. Considering three-level atomic systems, we study how a single train of ultrafast mode-locked pulses can be used to gradually develop coherences and populations. Numerical simulations as well as control protocols, in the case of picosecond pulses, were used to study the effect of changing laser parameters on system state evolution.

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Date submitted: 27 Feb 2020 Electronic form version 1.4