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Sub-ten nanosecond laser pulse shaping using lithium niobate modulators and a double-passed tapered amplifier C.E. ROGERS III, P.L. GOULD, University of Connecticut — We present progress on developing a laser pulse shaping system capable of generating pulses shorter than ten nanoseconds and frequency chirps of up to about 5 GHz in 2.5 ns. Shaped control of phase and amplitude on this timescale may prove useful for producing ultracold molecules [1] and controlling atomic hyperfine state populations [2]. The pulses are generated by passing 780 nm light from an external cavity diode laser through a fiber-coupled lithium niobate (LN) phase modulator (PM) in series with an LN intensity modulator (IM). The modulators are driven with a single-channel 8 GS/s arbitrary waveform generator configured with an RF delay line for quasi-two channel pulsed operation. The optical pulses are then amplified in a double-pass tapered amplifier (TA). The TA's intrinsic mode structure leads to an etalon effect that modulates the pulse amplitude during a frequency chirp. To reduce this unwanted effect, a compensating intensity modulation can be programmed onto the seed pulse. This work is supported by DOE.

[1] J. L. Carini, et al., Phys. Rev. A **87**, 011401(R), 2013.
[2] G. Liu, et al., Phys. Rev. A **89**, 041803(R), 2014.

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