

Review

# Chirped pulse laser sources and applications

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## Abstract

This paper presents recent results in the development of novel ultrafast technologies based on the generation and application of extremely chirped optical pulses. Linearly frequency-swept mode-locked optical pulses of ns durations are generated, at the infrared telecommunications wavelength of 1.55  $\mu\text{m}$ , by using chirped fiber Bragg gratings. The swept pulses appear as continuous wave signals, which completely fill the mode-locked pulse period which enables the implementation of semiconductor optical amplifying systems that completely circumvent the conventional limitation imposed by short pulse gain saturation. The use of these technologies is exemplified in a laser radar application that exploits the two characteristic coherent lengths in a chirped-pulse mode-locked laser, corresponding to the linewidth and the full lasing bandwidth, resulting in sub-mm resolution at the horizon. Finally, we show how stretched pulses can be used in a pulse shaping scheme to avoid detrimental nonlinearities associated with high power, optical pulse generation.

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