tons occur in quadratic nonlinear media and birefringent cubic nonlinear media.

In a series of works, an approach to find families of stationary walking solitons has been reported and the properties of optical walking solitons in two representative and important examples have been uncovered.[1–4] Namely, spatial solitons in quadratic nonlinear media in the presence of Poynting vector walk-off, and temporal vector solitons in birefringent optical fibers. In particular, solitons in second-harmonic generation geometries are made out of the mutual trapping of the fundamental and second-harmonic beams, and when a soliton is formed in the presence of Poynting vector walk-off, the interacting beams drag each other and propagate stuck, or locked together. Under such conditions a walking soliton is formed, opening the possibility to specific applications, some of which have already been experimentally demonstrated.[5] The walking solitons display features different from non-walking solitons, they can exist under different conditions, have different shapes and wavefronts, and carry different energies. Figure 1 (page 44) shows a typical example.

The important result is that the approach reported is intended to be a general tool to uncover new families of walking solitons in other scenarios. Because of their very nature, walking solitons have potential applications to all-optical switching and routing devices and to multiplexing techniques. Beyond optics, walking solitons might be relevant to mechanisms of energy and information transport in a variety of physical, chemical, and biological systems.

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ULTRAFAST TECHNOLOGY

A Compact All-Solid-State Sub-5-fsec Laser

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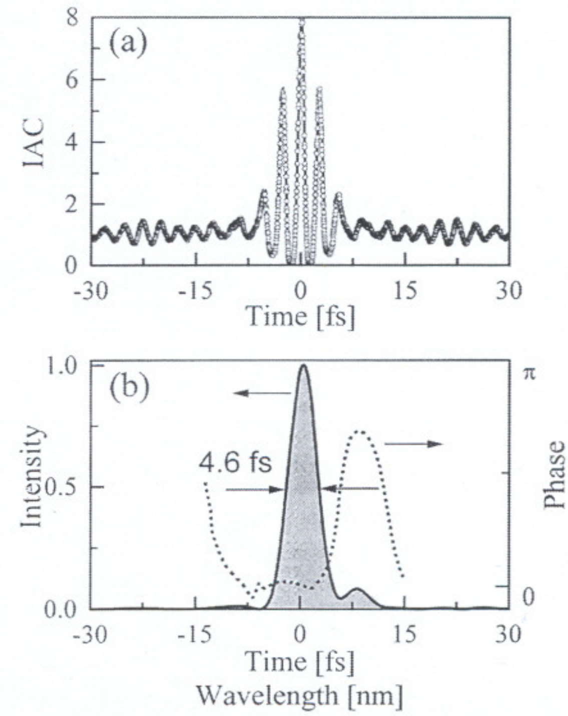
Recent developments in solid-state lasers,[1] chirp-mirror technology,[2] and methods of pulse characterization[3] made it possible to design an all-solid-state laser that delivers sub-5-fsec pulses at a 1-MHz repetition rate.[4] Such extremely short light pulses at a high repetition rate are most suitable for spectroscopic applications in condensed phase, and in particular in nonlinear optical studies of ultrafast chemical reaction dynamics in solutions.

The basic recipe for generating ultrashort pulses consists of four main ingredients:

- Generating a white-light continuum (WLC) with sufficient spectral bandwidth;
- Measuring the spectral phase of the resulting WLC;
- Designing a compressor capable of phase correction over the whole continuum bandwidth; and
- Determining the compressed pulse duration and its phase.

In our setup, the required ultrabroad bandwidth of WLC is produced upon injection of ~13-fsec, 35 nJ pulses from a Millennia-pumped cavity-dumped Ti:sapphire laser into a single-mode fused silica fiber.[4, 5] Due



Baltuška Figure 1. (a) Interferometric autocorrelation (circles are experimental points, and the solid line is the fit). (b) Retrieved intensity profile (filled contour) and phase (dashed line). (c) Measured spectrum of compressed pulse (filled contour) and retrieved spectral phase (dashed line).