

## Bibliography

- [1] L. E. Hargrove, R. L. Fork, and M. A. Pollack, "Locking of He-Ne laser modes induced by synchronous intracavity modulation," *Appl. Phys. Lett.* **5**, 4–5 (1964).
- [2] R. L. Fork, C. H. Brito Cruz, P. C. Becker, and C. V. Shank, "Compression of optical pulses to six femtoseconds by using cubic phase compensation," *Opt. Lett.* **12**, 483–485 (1987).
- [3] J. Zhou, J. Peatross, M. M. Murnane, H. C. Kapteyn, and I. P. Christov, "Enhanced high-harmonic generation using 25 fs laser pulses," *Phys. Rev. Lett.* **76**, 752–755 (1996).
- [4] J.-C. Diels, J. J. Fontaine, I. C. McMichael, and F. Simoni, "Control and measurement of ultrashort pulse shapes (in amplitude and phase) with femtosecond accuracy," *Appl. Opt.* **24**, 1270–1282 (1985).
- [5] P. W. Milonni and J. H. Eberly, *Lasers* (John Wiley and Sons, Inc., New York, 1988).
- [6] A. Yariv, *Optical Electronics* (Saunders College Publishing, Philadelphia, 1991).
- [7] R. W. Boyd, *Nonlinear Optics* (Academic Press, San Diego, 1992).
- [8] J. R. de Oliveira, M. A. de Moura, J. M. Hickmann, and A. S. L. Gomes, "Self-steepening of optical pulses in dispersive media," *J. Opt. Soc. Am. B* **9**, 2025–2027 (1992).
- [9] D. J. Bradley and G. H. C. New, "Ultrashort pulse measurements," *Proc. IEEE* **62**, 313–345 (1974).
- [10] E. B. Treacy, "Measurement and interpretation of dynamic spectrograms of picosecond light pulses," *J. Appl. Phys.* **42**, 3848–3858 (1971).
- [11] J. Jansky and G. Corradi, "Full intensity profile analysis of ultrashort laser pulses using four-wave mixing or third harmonic generation," *Optics Commun.* **60**, 251–256 (1986).

- [12] N. G. Paulter, Jr. and A. K. Majumdar, "A new triple correlator design for the measurement of ultrashort laser pulses," *Optics Commun.* **81**, 95–100 (1991).
- [13] H.-S. Albrecht, P. Heist, J. Kleinschmidt, D. Van Lap, and T. Schröder, "Single-shot measurement of femtosecond pulses using the optical Kerr effect," *Meas. Sci. Technol.* **4**, 492–495 (1993).
- [14] A. S. L. Gomes, V. L. da Silva, and J. R. Taylor, "Direct measurement of nonlinear frequency chirp of Raman radiation in single mode optical fibers using a spectral window method," *J. Opt. Soc. Am. B* **5**, 373–379 (1988).
- [15] R. Trebino, C. C. Hayden, A. M. Johnson, W. M. Simpson, and A. M. Levine, "Chirp and self-phase modulation in induced-grating autocorrelation measurements of ultrashort pulses," *Opt. Lett.* **15**, 1079–1081 (1990).
- [16] G. Szabó, A. Müller, and Z. Bor, "A single shot method to determine duration and chirp of ultrashort pulses with a streak camera," *Optics Commun.* **82**, 56–62 (1991).
- [17] T. F. Albrecht, K. Seibert, and H. Kurz, "Chirp measurement of large-bandwidth femtosecond optical pulses using two-photon absorption," *Optics Commun.* **84**, 223–227 (1991).
- [18] S. P. Le Blanc and R. Sauerbrey, "Ultrashort pulse characterization using plasma-induced cross-phase modulation," *Optics Commun.* **111**, 297–302 (1994).
- [19] K. Naganuma, K. Mogi, and H. Yamada, "General method for ultrashort light pulse chirp measurement," *IEEE J. Quantum Electron.* **25**, 1225–1233 (1989).
- [20] K. Naganuma, K. Mogi, and H. Yamada, "Time direction determination of asymmetric ultrashort optical pulses from second-harmonic generation autocorrelation signals," *Appl. Phys. Lett.* **54**, 1201–1202 (1989).
- [21] J. E. Rothenberg and D. Grischkowsky, "Measurement of optical phase with subpicosecond resolution by time domain interferometry," *Opt. Lett.* **12**, 99–101 (1987).
- [22] C. Yan and J.-C. Diels, "Amplitude and phase recording of ultrashort pulses," *J. Opt Soc. Am. B* **8**, 1259–1263 (1991).
- [23] E. B. Treacy, "Direct demonstration of picosecond-pulse frequency sweep," *Appl. Phys. Lett.* **17**, 14–16 (1970).
- [24] E. P. Ippen and C. V. Shank, "Dynamic spectroscopy and subpicosecond pulse compression," *Appl. Phys. Lett.* **27**, 488–490 (1975).
- [25] E. B. Treacy, "Optical pulse compression with diffraction gratings," *IEEE J. Quantum Electron.* **QE-5**, 454–458 (1969).

- [26] W. H. Knox, R. L. Fork, M. C. Downer, R. H. Stolen, C. V. Shank, and J. A. Valdmanis, "Optical pulse compression to 8 fs at a 5-kHz repetition rate," *Appl. Phys. Lett.* **46**, 1120–1121 (1985).
- [27] J. A. Chilla and O. E. Martinez, "Direct determination of the amplitude and the phase of femtosecond light pulses," *Opt. Lett.* **16**, 39–41 (1991).
- [28] J. A. Chilla and O. E. Martinez, "Frequency domain phase measurement of ultrashort light pulses. Effect of noise," *Optics Commun.* **89**, 434–440 (1992).
- [29] J.-P. Foing, J.-P. Likforman, M. Joffre, and A. Migus, "Femtosecond pulse phase measurement by spectrally resolved up-conversion: Application to continuum compression," *IEEE J. Quantum Electron.* **28**, 2285–2290 (1992).
- [30] J. Paye, "The chronocyclic representation of ultrashort light pulses," *IEEE J. Quantum Electron.* **28**, 2262–2273 (1992).
- [31] D. J. Kane and R. Trebino, "Characterization of arbitrary femtosecond pulses using frequency-resolved optical gating," *IEEE J. Quantum Electron.* **29**, 571–579 (1993).
- [32] K. C. Chu, J. P. Heritage, R. S. Grant, K. X. Liu, A. Dienes, W. E. White, and A. Sullivan, "Direct measurement of the spectral phase of femtosecond pulses," *Opt. Lett.* **20**, 904–906 (1995).
- [33] A. M. Weiner, J. P. Heritage, and E. M. Kirschner, "High-resolution femtosecond pulse shaping," *J. Opt. Soc. Am. B* **5**, 1563–1572 (1988).
- [34] A. Sullivan, W. E. White, K. C. Chu, J. P. Heritage, K. W. Delong, and R. Trebino, "Quantitative investigation of optical phase-measuring techniques for ultrashort pulse lasers," *J. Opt. Soc. Am. B* **13**, 1965–1978 (1996).
- [35] K. C. Chu, J. P. Heritage, R. S. Grant, and W. E. White, "Temporal interferometric measurement of femtosecond spectral phase," *Opt. Lett.* **21**, 1842–1844 (1996).
- [36] J.-K. Rhee, T. S. Sosnowski, A.-C. Tien, and T. B. Norris, "Real-time dispersion analyzer of femtosecond laser pulses with use of a spectrally and temporally resolved upconversion technique," *J. Opt. Soc. Am. B* **13**, 1780–1785 (1996).
- [37] V. Wong and I. A. Walmsley, "Ultrashort-pulse characterization from dynamic spectrograms by iterative phase retrieval," *J. Opt. Soc. Am. B* **14**, 944–948 (1997).
- [38] M. A. Bolshtyansky, N. V. Tabiryan, and B. Y. Zel'dovich, "BRIEFING: beam reconstruction by iteration of an electromagnetic field with an induced nonlinearity gauge," *Opt. Lett.* **22**, 22–24 (1997).

- [39] T. Feurer, S. Niedermeier, and R. Sauerbrey, "Measuring the temporal intensity of ultrashort laser pulses by triple correlation," *Appl. Phys. B* **66**, 163–168 (1998).
- [40] F. Reynaud, F. Salin, and A. Barthelemy, "Measurement of phase shifts introduced by nonlinear optical phenomena on subpicosecond pulses," *Opt. Lett.* **14**, 275–277 (1989).
- [41] D. Strickland and P. B. Corkum, "Resistance of short pulses to self-focusing," *J. Opt. Soc. Am. B* **11**, 492–497 (1994).
- [42] J. K. Ranka, R. W. Schirmer, and A. L. Gaeta, "Observation of pulse splitting in nonlinear dispersive media," *Phys. Rev. Lett.* **77**, 3783–3786 (1996).
- [43] R. L. Fork, C. V. Shank, C. Hirlimann, R. Yen, and W. J. Tomlinson, "Femtosecond white-light continuum pulses," *Opt. Lett.* **8**, 1–3 (1983).
- [44] M. Sheik-Bahae, A. A. Said, T.-H. Wei, D. J. Hagan, and E. W. Van Stryland, "Sensitive measurement of optical nonlinearities using a single beam," *IEEE J. Quantum Electron.* **26**, 760–769 (1990).
- [45] T. D. Krauss and F. W. Wise, "Femtosecond measurement of nonlinear absorption and refraction in solids," *Appl. Phys. Lett.* **65**, 1739–1741 (1994).
- [46] Newport Catalog (Newport Corp., Irvine, 1994).
- [47] V. V. Yakovlev, B. Kohler, and K. R. Wilson, "Broadly tunable 30-fs pulses produced by optical parametric amplification," *Opt. Lett.* **19**, 2000–2002 (1994).
- [48] R. Trebino and D. J. Kane, "Using phase retrieval to measure the intensity and phase of ultrashort pulses: frequency-resolved optical gating," *J. Opt. Soc. Am. A* **10**, 1101–1111 (1993).
- [49] D. J. Kane and R. Trebino, "Single-shot measurement of the intensity and phase of an arbitrary ultrashort pulse by using frequency-resolved optical gating," *Opt. Lett.* **18**, 823–825 (1993).
- [50] K. W. DeLong, C. L. Ladera, R. Trebino, B. Kohler, and K. R. Wilson, "Ultrashort-pulse measurement using noninstantaneous nonlinearities: Raman effects in frequency-resolved optical gating," *Opt. Lett.* **20**, 486–488 (1995).
- [51] J. Paye, M. Ramaswamy, J. G. Fujimoto, and E. P. Ippen, "Measurement of the amplitude and phase of ultrashort light pulses from spectrally resolved autocorrelation," *Opt. Lett.* **18**, 1946–1948 (1993).
- [52] K. W. DeLong, R. Trebino, J. Hunter, and W. E. White, "Frequency-resolved optical gating with the use of second-harmonic generation," *J. Opt. Soc. Am. B* **11**, 2206–2215 (1994).

- [53] T. Tsang, M. A. Krumbügel, K. W. DeLong, D. N. Fittinghoff, and R. Trebino, "Frequency-resolved optical-gating measurements of ultrashort pulses using surface third-harmonic generation," *Opt. Lett.* **21**, 1381–1383 (1996).
- [54] J. N. Sweetser, D. N. Fittinghoff, and R. Trebino, "Transient-grating frequency-resolved optical gating," *Opt. Lett.* **22**, 519–521 (1997).
- [55] R. Trebino, K. W. DeLong, D. N. Fittinghoff, J. N. Sweetser, Marco A. Krumbügel, B. A. Richman, and D. J. Kane, "Measuring ultrashort laser pulses in the time-frequency domain using frequency-resolved optical gating," *Rev. Sci. Instr.* **68**, 3277–3295 (1997).
- [56] K. W. DeLong and R. Trebino, "Improved ultrashort pulse-retrieval algorithm for frequency-resolved optical gating," *J. Opt. Soc. Am. A* **11**, 2429–2437 (1994).
- [57] K. W. DeLong, D. N. Fittinghoff, R. Trebino, B. Kohler, and K. Wilson, "Pulse retrieval in frequency-resolved optical gating based on the method of generalized projections," *Opt. Lett.* **19**, 2152–2154 (1994).
- [58] J. W. Nicholson, F. G. Omenetto, D. J. Funk, and A. J. Taylor, "Evolving FROGS: phase retrieval from frequency-resolved optical gating measurements by use of genetic algorithms," *Opt. Lett.* **24**, 490–492 (1999).
- [59] D. N. Fittinghoff, K. W. DeLong, R. Trebino, and C. L. Ladera, "Noise sensitivity in frequency-resolved optical-gating measurements of ultrashort pulses," *J. Opt. Soc. Am. B* **12**, 1955–1967 (1995).
- [60] K. W. DeLong, D. N. Fittinghoff, and R. Trebino, "Practical issues in ultrashort-laser-pulse measurement using frequency-resolved optical gating," *IEEE J. Quantum Electron.* **32**, 1253–1264 (1996).
- [61] K. W. DeLong, R. Trebino, and D. J. Kane, "Comparison of ultrashort-pulse frequency-resolved-optical-gating traces for three common beam geometries," *J. Opt. Soc. Am. B* **11**, 1595–1608 (1994).
- [62] D. J. Kane, A. J. Taylor, R. Trebino, and K. W. DeLong, "Single-shot measurement of the intensity and phase of a femtosecond UV laser pulse with frequency-resolved optical gating," *Opt. Lett.* **19**, 1061–1063 (1994).
- [63] T. S. Clement, A. J. Taylor, and D. J. Kane, "Single-shot measurement of the amplitude and phase of ultrashort laser pulses in the violet," *Opt. Lett.* **20**, 70–72 (1995).
- [64] D. N. Fittinghoff, J. L. Bowie, J. N. Sweetser, R. T. Jennings, M. A. Krumbügel, K. W. DeLong, R. Trebino, and I. A. Walmsley, "Measurement of the intensity and phase of ultraweak, ultrashort laser pulses," *Opt. Lett.* **21**, 884–886 (1996).

- [65] D. J. Kane, "Real-time measurement of ultrashort laser pulses using principal component generalized projections," *IEEE J. Select. Topics Quantum Electron.* **4**, 278–284 (1998).
- [66] D. J. Kane, "Recent progress toward real-time measurement of ultrashort laser pulses," *IEEE J. Quantum Electron.* **35**, 421–431 (1999).
- [67] M. Munroe, D. H. Christensen, and R. Trebino, "Error bars in intensity and phase measurements of ultrashort laser pulses," In Technical Digest. Summary of papers presented at the Conference on Lasers and Electro-Optics, **6**, 462–463 (1998).
- [68] K. W. DeLong, R. Trebino, and W. E. White, "Simultaneous recovery of two ultrashort laser pulses from a single spectrogram," *J. Opt. Soc. Am. B* **12**, 2463–2466 (1995).
- [69] D. J. Kane, G. Rodriguez, A. J. Taylor, and T. S. Clement, "Simultaneous measurement of two ultrashort laser pulses from a single spectrogram in a single shot," *J. Opt. Soc. Am. B* **14**, 935–943 (1997).
- [70] C. W. Siders, A. J. Taylor, and M. C. Downer, "Multipulse interferometric frequency-resolved optical gating: real-time phase-sensitive imaging of ultrafast dynamics," *Opt. Lett.* **22**, 624–626 (1997).
- [71] C. W. Siders, J. L. W. Siders, and A. J. Taylor, "Femtosecond coherent spectroscopy at 800 nm: measuring high-field ionization rates in gases with MI FROG," In Technical Digest. Summary of papers presented at the International Quantum Electronics Conference, **7**, 43–44 (1998).
- [72] C. W. Siders, J. L. W. Siders, F. G. Omenetto, and A. J. Taylor, "Multiple interferometric frequency-resolved optical gating," *IEEE J. Quantum Electron.* **35**, 432–440 (1999).
- [73] M. D. Thomson, J. M. Dudley, L. P. Barry, and J. D. Harvey, "Waveguide-enhanced frequency-resolved optical gating at 1.5  $\mu\text{m}$  using the Kerr nonlinearity in optical fibre," In ACOFT '98 Proceedings. 23rd Australian Conference on Optical Fibre Technology, pp. 57–60 (1998).
- [74] M. D. Thomson, J. M. Dudley, L. P. Barry, and J. D. Harvey, "Complete pulse characterization at 1.5  $\mu\text{m}$  by cross-phase modulation in optical fibers," *Opt. Lett.* **23**, 1582–1584 (1998).
- [75] L. Jusinski, A. Kwok, M. A. Krumbügel, J. N. Sweetser, and R. Trebino, "Frequency-resolved optical gating using cascaded second-order nonlinearities," In Technical Digest. Summary of papers presented at the Conference on Lasers and Electro-Optics, **6**, 464–465 (1998).

- [76] A. Kwok, L. Jusinski, M. A. Krunbügel, J. N. Sweetser, D. N. Fittinghoff, and R. Trebino, "Frequency-resolved optical gating using cascaded second-order nonlinearities," *IEEE J. Select. Topics Quantum Electron.* **4**, 271–277 (1998).
- [77] G. Taft, A. Rundquist, M. M. Murnane, H. C. Kapteyn, K. W. DeLong, R. Trebino, and I. P. Christov, "Ultrashort optical waveform measurements using frequency-resolved optical gating," *Opt. Lett.* **20**, 743–745 (1995).
- [78] G. Taft, A. Rundquist, M. M. Murnane, I. P. Christov, H. C. Kapteyn, K. W. DeLong, D. N. Fittinghoff, M. A. Krumbügel, J. N. Sweetser, and R. Trebino, "Measurement of 10-fs laser pulses," *IEEE J. Select. Topics Quant. Electron.* **2**, 575–584 (1996).
- [79] A. Baltuska, M. S. Pshenichnikov, and D. A. Wiersma, "Amplitude and phase characterization of 4.5-fs pulses by frequency-resolved optical gating," *Opt. Lett.* **23**, 1474–1476 (1998).
- [80] A. Baltuska, M. S. Pshenichnikov, and D. A. Wiersma, "SHG FROG characterization of < 5-fs pulses," In Technical Digest. Summary of papers presented at the Conference on Lasers and Electro-Optics, **6**, 461–462 (1998).
- [81] J. M. Dudley, L. P. Barry, J. D. Harvey, M. D. Thomson, B. C. Thomsen, P. G. Bollond, and R. Leonhardt, "Complete characterization of ultrashort pulse sources at 1550 nm," *IEEE J. Quantum Electron.* **35**, 441–450 (1999).
- [82] A. J. Taylor, G. Rodriguez, and T. S. Clement, "Determination of  $n_2$  by direct measurement of the optical phase," *Opt. Lett.* **21**, 1812–1814 (1996).
- [83] P. J. Delfyett, S. Hong, S. Gee, I. Nitta, J. C. Connolly, and G. A. Alphonse, "Joint time-frequency measurements of modelocked semiconductor diode lasers and dynamics using frequency-resolved optical gating," *IEEE J. Quantum Electron.* **35**, 487–500 (1999).
- [84] W. Theobald, R. Hassner, S. Niedermeier, K. Michelmann, T. Feurer, H. Schillinger, R. Sauerbrey, and G. Schafer, "Relativistic accelerations in femtosecond laser produced plasmas," In Technical Digest. Summary of papers presented at the International Quantum Electronics Conference, **7**, 75 (1998).
- [85] S. P. Nikitin, Y. Li, T. M. Antonsen, and H. M. Milchberg, "Ionization-induced pulse shortening and retardation of high intensity femtosecond laser pulses," *Optics Commun.* **157**, 139–144 (1998).
- [86] K. Furusawa, H. Yabe, and M. Obara, "Automatic ultrafast pulse compressor in chirped pulse amplification by FROG using fuzzy control technique," In Conference Proceedings. LEOS '98, **1**, 138–139 (1998).
- [87] T. Brixner, M. Strehle, and G. Gerber, "Feedback-controlled optimization of amplified femtosecond laser pulses," *Appl. Phys. B.* **B68**, 281–284 (1999).

- [88] V. D. Kleiman, S. M. Arrivo, J. S. Melinger, and E. J. Heilweil, “Controlling condensed-phase vibrational excitation with tailored infrared pulses,” *Chem. Phys.* **233**, 207–216 (1998).
- [89] H. K. Eaton, T. S. Clement, A. A. Zozulya, and S. A. Diddams, “Investigating nonlinear femtosecond pulse propagation with frequency-resolved optical gating,” *IEEE J. Quantum Electron.* **35**, 451–457 (1999).
- [90] A. A. Zozulya, S. A. Diddams, and T. S. Clement, “Investigations of nonlinear femtosecond pulse propagation with the inclusion of Raman, shock, and third-order phase effects,” *Phys. Rev. A* **58**, 3303–3310 (1998).
- [91] S. A. Diddams, H. K. Eaton, A. A. Zozulya, and T. S. Clement, “Amplitude and phase measurements of femtosecond pulse splitting in nonlinear dispersive media,” *Opt. Lett.* **23**, 379–381 (1998).
- [92] A. M. Weiner, “Effect of group velocity mismatch on the measurement of ultrashort optical pulses via second harmonic generation,” *IEEE J. Quantum Electron.* **QE-19**, 1276–1283 (1983).
- [93] Y. Ishida, K. Naganuma, and T. Yajima, “Self-phase modulation in hybridly mode-locked cw dye lasers,” *IEEE J. Quantum Electron.* **QE-21**, 69–77 (1985).
- [94] E. T. J. Nibbering, M. A. Franco, B. S. Prade, G. Grillon, C. L. Blanc, and A. Mysyrowicz, “Measurement of the nonlinear refractive index of transparent materials by spectral analysis after nonlinear propagation,” *Optics Commun.* **119**, 479–484 (1995).
- [95] E. T. J. Nibbering, G. Grillon, M. A. Franco, B. S. Prade, and A. Mysyrowicz, “Determination of the inertial contribution to the nonlinear refractive index of air,  $N_2$ , and  $O_2$  by use of unfocused high-intensity femtosecond laser pulses,” *J. Opt. Soc. Am. B* **14**, 650–660 (1997).
- [96] J. M. Dudley, L. P. Barry, P. G. Bollond, J. D. Harvey, R. Leonhardt, and P. D. Drummond, “Direct measurement of pulse distortion near the zero-dispersion wavelength in an optical fiber by frequency-resolved optical gating,” *Opt. Lett.* **22**, 457–459 (1997).
- [97] A. Siegman, *Lasers* (University Science Books, Mill Valley, CA, 1986).
- [98] S. A. Diddams, H. K. Eaton, A. A. Zozulya, and T. S. Clement, “Characterizing the nonlinear propagation of femtosecond pulses in bulk media,” *IEEE J. Select. Topics Quant. Electr.* **4**, 306–316 (1998).
- [99] R. Hellwarth, J. Cherlow, and T.-T. Yang, “Origin and frequency dependence of nonlinear optical susceptibilities in glass,” *Phys. Rev. B* **11**, 964–967 (1975).

- [100] R. H. Stolen, J. P. Gordon, W. J. Tomlinson, and H. A. Haus, "Raman response function of silica core fibers," *J. Opt. Soc. Am. B* **6**, 1159–1166 (1989).
- [101] R. H. Stolen and W. J. Tomlinson, "Effect of the Raman part of the nonlinear refractive index on propagation of ultrashort optical pulses in fibers," *J. Opt. Soc. Am. B* **9**, 565–573 (1992).
- [102] C. Radzewicz, J. S. Krasinski, Y. B. Band, and M. Trippenbach, "Femtosecond light wavepackets," Presented at LASE '99, Photonics West, San José, CA, 1999.
- [103] N. A. Zharova, A. G. Litvak, T. A. Petrova, A. M. Sergeev, and A. D. Yanukovskii, "Multiple fractionation of wave structures in a nonlinear medium," *JETP Lett.* **44**, 13–17 (1986).
- [104] P. Chernev and V. Petrov, "Self-focusing of light pulses in the presence of normal group-velocity dispersion," *Opt. Lett.* **17**, 172–174 (1992).
- [105] J. E. Rothenberg, "Pulse splitting during self-focusing in normally dispersive media," *Opt. Lett.* **17**, 583–585 (1992).
- [106] J. T. Manassah and B. Gross, "Self-focusing of (3+1)-D femtosecond pulses in nonlinear Kerr media," *Laser Physics* **6**, 563–578 (1996).
- [107] G. P. Agrawal, *Nonlinear Fiber Optics* (Academic Press, San Diego, 1995).
- [108] D. Strickland and P. B. Corkum, "Short pulse self-focusing," In *Short-Pulse High-Intensity Lasers and Applications*, H. A. Baldis, ed., **1413**, 54–58 (1991).
- [109] J. K. Ranka and A. L. Gaeta, "Breakdown of the slowly-varying envelope approximation in the self-focusing of ultrashort pulses," *Opt. Lett.* **23**, 534–536 (1998).
- [110] J. H. Marburger, "Self-focusing as a pulse sharpening mechanism," *IEEE J. Quantum Electron.* **QE-3**, 415 (1967).
- [111] Y. Silberberg, "Collapse of optical pulses," *Opt. Lett.* **15**, 1282–1284 (1990).
- [112] R. McLeod, K. Wagner, and S. Blair, "(3+1)-dimensional optical soliton dragging logic," *Phys. Rev. A* **52**, 3254–3278 (1995).
- [113] D. E. Edmundson and R. H. Enns, "Robust bistable light bullets," *Opt. Lett.* **17**, 586–588 (1992).
- [114] J. H. Marburger, "Self-Focusing: Theory," *Prog. Quant. Electr.* **4**, 35–110 (1975).
- [115] G. G. Luther, J. V. Moloney, A. C. Newell, and E. M. Wright, "Self-focusing threshold in normally dispersive media," *Opt. Lett.* **19**, 862–864 (1994).

- [116] G. L. McAllister, J. H. Marburger, and L. G. DeShazer, "Observation of optical pulse shaping by the self-focusing effects," *Phys. Rev. Lett.* **21**, 1648–1649 (1968).
- [117] J. K. Ranka and A. L. Gaeta, "Nonlinear dynamics of the self-focusing of ultra-short pulses," presented at Ultrafast Optics 1997, Monterrey, CA, paper MB-3.
- [118] M. Trippenbach and Y. B. Band, "Dynamics of short-pulse splitting in dispersive nonlinear media," *Phys. Rev. A* **56**, 4242–4253 (1997).
- [119] A. A. Zozulya, S. A. Diddams, A. G. Van Engen, and T. S. Clement, "Propagation dynamics of intense femtosecond pulses: Multiple splittings, coalescence, and continuum generation," *Phys. Rev. Lett.* **82**, 1430–1433 (1999).
- [120] I. Ledoux, J. Zyss, A. Migus, J. Etchepare, G. Grillon, and A. Antonelli, "Generation of high peak power subpicosecond pulses in the 1.0-1.6  $\mu\text{m}$  range by parametric amplification in an organic crystal," *Appl. Phys. Lett.* **48**, 1564–1566 (1986).
- [121] S. R. Greenfield and M. R. Wasielewski, "Optical parametric amplification of femtosecond pulses tunable from the blue to the infrared with microjoule energies," *Appl. Opt.* **34**, 2688–2691 (1995).
- [122] T. S. Sosnowski, P. B. Stephens, and T. B. Norris, "Production of 30-fs pulses tunable throughout the visible spectral region by a new technique in optical parametric amplification," *Opt. Lett.* **21**, 140–142 (1996).
- [123] T. M. Jedju and L. Rothberg, "Tunable femtosecond radiation in the mid-infrared for time-resolved absorption in semiconductors," *Appl. Opt.* **27**, 615–618 (1988).
- [124] The Supercontinuum Laser Source, R. R. Alfano, ed., (Springer-Verlag, New York, 1989).
- [125] M. Nisoli, S. De Silvestri, and O. Svelto, "Generation of high energy 10 fs pulses by a new pulse compression technique," *Appl. Phys. Lett.* **68**, 2793–2795 (1996).
- [126] R. R. Alfano and S. L. Shapiro, "Emission in the region 4000 to 7000 Å via four-photon coupling in glass," *Phys. Rev. Lett.* **24**, 584–587 (1970).
- [127] M. Hercher, "Laser-induced damage in transparent media," *J. Opt. Soc. Am.* **54**, 563 (1964).
- [128] R. Y. Chiao, E. Garmire, and C. H. Townes, "Self-trapping of optical beams," *Phys. Rev. Lett.* **13**, 479–482 (1964).
- [129] E. T. J. Nibbering, P. F. Curley, G. Grillon, B. S. Prade, M. A. Franco, F. Salin, and A. Mysyrowicz, "Conical emission from self-guided femtosecond pulses in air," *Opt. Lett.* **21**, 62–64 (1996).

- [130] M. M. Loy and Y. R. Shen, "Study of self-focusing and small-scale filaments of light in nonlinear media," *IEEE J. Quantum Electron.* **QE-9**, 409–422 (1973).
- [131] W. L. Smith, P. Liu, and N. Bloembergen, "Superbroadening in H<sub>2</sub>O and D<sub>2</sub>O by self-focused picosecond pulses from a YAlG:Nd laser," *Phys. Rev. A* **15**, 2396–2403 (1977).
- [132] P. B. Corkum and C. Rolland, "Femtosecond continua produced in gases," *IEEE J. Quantum Electron.* **25**, 2634–2639 (1989).
- [133] R. R. Alfano and S. L. Shapiro, "Observation of self-phase modulation and small-scale filaments in crystals and glasses," *Phys. Rev. Lett.* **24**, 592–594 (1970).
- [134] T. R. Gosnell, A. J. Taylor, and D. P. Greene, "Supercontinuum generation at 248 nm using high-pressure gases," *Opt. Lett.* **15**, 591–593 (1990).
- [135] A. Brodeur and S. L. Chin, "Band-gap dependence of the ultrafast white-light continuum," *Phys. Rev. Lett.* **80**, 4406–4409 (1998).
- [136] P. B. Corkum, P. P. Ho, R. R. Alfano, and J. T. Manassah, "Generation of infrared supercontinuum covering 3–14  $\mu\text{m}$  in dielectrics and semiconductors," *Opt. Lett.* **10**, 584–586 (1985).
- [137] P. B. Corkum, C. Rolland, and T. Srinivasan-Rao, "Supercontinuum generation in gases," *Phys. Rev. Lett.* **57**, 2268–2271 (1986).
- [138] H. Nishioka, W. Odajima, K.-I. Ueda, and H. Takuma, "Ultrabroadband flat continuum generation in multichannel propagation of terawatt Ti:sapphire laser pulses," *Opt. Lett.* **20**, 2505–2507 (1995).
- [139] A. Penzkofer, A. Laubereau, and W. Kaiser, "Stimulated short-wave radiation due to single-frequency resonances of  $\chi^{(3)}$ ," *Phys. Rev. Lett.* **31**, 863–866 (1973).
- [140] A. Penzkofer, "Parametrically generated spectra and optical breakdown in H<sub>2</sub>O and NaCl," *Optics Commun.* **11**, 265–269 (1974).
- [141] A. Penzkofer, A. Seilmeier, and W. Kaiser, "Parametric four-photon generation of picosecond light at high conversion efficiency," *Optics Commun.* **14**, 363–367 (1975).
- [142] M. Wittmann and A. Penzkofer, "Spectral superbroadening of femtosecond laser pulses," *Optics Commun.* **126**, 308–317 (1996).
- [143] G. Yang and Y. R. Shen, "Spectral broadening of ultrashort pulses in a nonlinear medium," *Opt. Lett.* **9**, 510–512 (1984).

- [144] J. T. Manassah, M. A. Mustafa, R. R. Alfano, and P. P. Ho, "Spectral extent and pulse shape of the supercontinuum for ultrashort laser pulse," *IEEE J. Quantum Electron.* **QE-22**, 197–204 (1970).
- [145] N. Bloembergen, "The influence of electron plasma formation on superbroadening in light filaments," *Optics Commun.* **8**, 285–288 (1973).
- [146] A. Brodeur and S. L. Chin, "Ultrafast white-light continuum generation and self-focusing in transparent condensed media," *J. Opt. Soc. Am. B* **16**, 637–650 (1999).
- [147] Y. R. Shen, "Self-focusing: Experimental," *Prog. Quant. Electr.* **4**, 1–34 (1975).
- [148] A. A. Zozulya, 1999, department of Physics, Worcester Polytechnic Institute, private communication.
- [149] A.-C. Tien, S. Backus, H. Kapteyn, M. Murnane, and G. Mourou, "Short-pulse laser damage in transparent materials as a function of pulse duration," *Phys. Rev. Lett.* **82**, 3883–3886 (1999).
- [150] O. M. Efimov, K. Gabel, S. V. Garnov, L. B. Glebov, S. Grantham, M. Richardson, and M. J. Soileau, "Color-center generation in silicate glasses exposed to infrared femtosecond pulses," *J. Opt. Soc. Am. B* **15**, 193–199 (1998).
- [151] M. M. Denariez-Roberge and J.-P. E. Taran, "Experimental confirmation of self-trapping from the dependence of self-modulation on propagation distance," *Appl. Phys. Lett.* **14**, 205–207 (1969).
- [152] I. L. Fabellinski, in *Molecular Scattering of Light* (Plenum, New York, 1967), Chap. VIII.
- [153] R. F. Bonner, "Laser capture microdissection (LCM) and the future of molecular pathology," In *Conference Proceedings. LEOS 98*, **2**, 226–228 (1998).
- [154] J. S. Nelson, "Recent advances in laser treatment of human skin," In *Conference Proceedings. LEOS 98*, **2**, 335–336 (1998).
- [155] L. B. Da Silva, B.-M. Kim, M. D. Feit, and A. M. Rubenchik, "Use of ultrashort pulse lasers in medicine," In *Conference Proceedings. LEOS 98*, **2**, 443–444 (1998).
- [156] A. G. Van Engen, JILA, University of Colorado, private communication, 1998.
- [157] P. P. Ho and R. R. Alfano, "Optical Kerr effect in liquids," *Phys. Rev. A* **20**, 2170–2187 (1979).
- [158] P. T. Guerreiro, S. G. Lee, A. S. Rodrigues, Y. Z. Hu, E. M. Wright, S. I. Najafi, J. Mackenzie, and N. Peyghambarian, "Femtosecond pulse propagation near a two-photon transition in a semiconductor quantum-dot waveguide," *Opt. Lett.* **21**, 659–661 (1996).

- [159] in CRC Handbook of Laser Science and Technology, M. J. Webster, ed., (CRC Press, Boca Raton, FL, 1986), Vol. III, p. 270.
- [160] B. A. Rockwell, W. P. Roach, M. E. Rogers, W. M. Mayo, C. A. Toth, C. P. Cain, and G. D. Noojin, "Nonlinear refraction in vitreous humor," *Opt. Lett.* **18**, 1792–1794 (1993).
- [161] J. Piasecki, B. Colombeau, M. Vampouille, C. Froehly, and J. A. Arnaud, "Nouvelle méthode de mesure de la réponse impulsionnelle des fibres optiques," *Appl. Opt.* **19**, 3749–3755 (1980).
- [162] L. Lepetit, G. Chériaux, and M. Joffre, "Linear techniques of phase measurement by femtosecond spectral interferometry for applications in spectroscopy," *J. Opt. Soc. Am. B* **12**, 2467–2474 (1995).