

Contents

Part I Attoseconds and High Harmonics

Sub 100 attosecond XUV pulses	3
E. Mével, I. J. Sola, L. Elouga, E. Constant, V. Strelkov, L. Poletto, P. Villoresi, G. Sansone, E. Benedetti, J.-P. Caumes, S. Stagira, C. Vozzi, and M. Nisoli	
Quasi phase matching of high harmonic generation in waveguides using counterpropagating beams	6
X. Zhang, A. L. Lytle, M. M. Murnane, H. C. Kapteyn, and O. Cohen	
Observation of Intra-molecular Vibrational Dynamics Using High-Harmonic Generation as a Probe	9
N. L. Wagner, A. Wüest, H. C. Kapteyn, and M. M. Murnane	
Ultrafast Soft X-ray Absorption Spectroscopy in Si with 20fs Resolution Using HH Radiation	12
E. Seres and C. Spielmann	
Enhanced High Harmonic Generation from Ions using a Capillary Discharge	15
T. Popmintchev, B. Reagan, D. M. Gaudiosi, M. Grisham, M. Berrill, O. Cohen, B. C. Walker, M. M. Murnane, H. C. Kapteyn, and J. J. Rocca	
Tunable isolated attosecond pulses	18
G. Sansone, E. Benedetti, F. Calegari, C. Vozzi, S. Stagira, S. De Silvestri, and M. Nisoli	
Measurement and control of attosecond pulse formation	21
N. Dudovich, O. Smirnova, J. Levesque, Y. Mairesse, M. Y. Ivanov, D. M. Villeneuve, and P. B. Corkum	
Continuum Harmonic Radiation in the Extreme Ultraviolet Region Using Synthesized Sub-10-fs Two-Color Field	24
M. Kaku, Y. Oishi, A. Suda, F. Kannari, and K. Midorikawa	

Basis for ultrafast imaging of molecular orbitals with high-order harmonic generation	27
T. Kanai, S. Minemoto, and H. Sakai	
Adaptive Spatial Control of High-Harmonic Generation	30
C. Winterfeldt, J. Lohbreier, A. Paulus, T. Pfeifer, R. Spitzenfeil, D. Walter, G. Gerber, and C. Spielmann	
A proposed tabletop atto-second pulse coherent X-ray source	33
T. Plettner and R. L. Byer	
Attosecond pulse production and orbital tomography with orthogonally polarized two-color few-cycle pulses	36
M. Kitzler, J. Caillat, A. Scrinzi, and A. Baltuska	
Isolated EUV Pulses via CEP-insensitive Nonlinear Stabilization in a Waveguide	39
A. S. Sandhu, E. Gagnon, A. Paul, I. Thomann, A. L. Lytle, T. Keep, M. M. Murnane, H. C. Kapteyn, and I. Christov	
Ultrafast Extreme Ultraviolet Holography: Dynamic Monitoring of Surface Deformation	42
R. I. Tobey, M. E. Siemens, O. Cohen, Q. Li, M. M. Murnane, H. C. Kapteyn, and K. A. Nelson	
Femtosecond VUV Photon Pulse for Time-resolved Photoelectron Spectroscopy	45
P. Wernet, K. Godehusen, O. Schwarzkopf, and W. Eberhardt	
Laser-Assisted Photoelectric Effect on Pt(111)	48
L. Míaja-Avila, G. Saathoff, C. Lei, M. Aeschlimann, J. L. Gland, M. M. Murnane, and H. C. Kapteyn	
Is high harmonic generation a single-active-electron process?	51
A. Gordon and F. X. Kärtner	
Multi-Cycle Driven Isolated Attosecond Pulse Generation	54
T. Pfeifer, L. Gallmann, M. J. Abel, P. M. Nagel, D. M. Neumark, and S. R. Leone	

Part II Generation and High-Power Propagation

Generation of Terawatt Sub-8 fs Laser Pulses Using Optical Parametric Chirped Pulse Amplification	59
S. Witte, R. T. Zinkstok, W. Hogervorst, and K. S. E. Eikema	

Holographic Snapshots of Laser Wakefields	62
N. H. Matlis, S. Reed, S. S. Bulanov, V. Chvykov, G. Kalintchenko, T. Matsuoka, P. Rousseau, V. Yanovsky, A. Maksimchuk, S. Kalmykov, G. Shvets, and M. C. Downer	
Phase-Mask Control and Stabilization of Optical Filamentation ...	65
T. Pfeifer, L. Gallmann, M. J. Abel, D. M. Neumark, and S. R. Leone	
Development of a Multi-Terawatt Ultrabroadband Optical Parametric Chirped Pulse Amplifier	68
A. Marcinkevicius, F. Tavella, and F. Krausz	
High energy self-phase-stabilized pulses by difference frequency generation and optical parametric amplification	71
C. Vozzi, C. Manzoni, E. Benedetti, G. Cirimi, G. Sansone, S. Stagira, O. Svelto, S. De Silvestri, M. Nisoli, and G. Cerullo	
5.1 fs pulses by filamentation - future prospective of self-compression to one optical cycle	74
A. Couairon, A. Mysyrowicz, J. Biegert, and U. Keller	
Interfering Lasing Filaments in Dense Absorbing Media	77
L. Guyon, F. Courvoisier, V. Boutou, R. Nuter, A. Vinçotte, S. Champeaux, L. Bergé, P. Glorieux, and J.-P. Wolf	
Non-relativistic Magnetic Continuum Generation	80
S. L. Oliveira and S. C. Rand	
Mode-locked ytterbium fiber laser with dispersion compensation by a fiber taper	83
R. Herda, M. Rusu, S. Kivistö, and O. G. Okhotnikov	
Soliton-effect pulse compression of supercontinuum in photonic nanowires	86
M. A. Foster, Q. Cao, R. Trebino, and A. L. Gaeta	
eXtreme Chirped Pulse Amplification Using Semiconductor Optical Amplifiers	89
K. Kim, S. Lee, and P. J. Delfyett	
Direct Comparison of the Hollow-Core Fiber and Filamentation Techniques for Few-Cycle Pulse Generation	92
L. Gallmann, T. Pfeifer, M. J. Abel, P. M. Nagel, D. M. Neumark, and S. R. Leone	

Grism based stretcher/compressor system for amplified, femtosecond kilohertz lasers	95
D. M. Gaudiosi, E. A. Gibson, S. Kane, R. Huff, M. M. Murnane, H. C. Kapteyn, C. Durfee III, J. Squier, and R. Jimenez	
High Power Femtosecond IR Laser Source Based on Noncollinear Optical Parametric Chirped Pulse Amplification	98
D. Kraemer, R. Hua, M. L. Cowan, K. Franjic, and R. J. D. Miller	
Generation of high-fidelity sub-10-fs millijoule pulses through filamentation for relativistic laser-matter experiments at 1 kHz ...	101
C. P. Hauri, M. Merano, A. Trisorio, and R. B. Lopez-Martens	
MHz-rate white light generation using a novel positive-dispersion cavity-dumped Ti:sapphire laser	104
X. Zhou, H. C. Kapteyn, and M. M. Murnane	
High Spectral Irradiance White Light Continuum Z-scan	107
M. Balu, D. J. Hagan, and E. W. Van Stryland	
Generation of 460nm femtosecond laser by sum frequency synchronized picosecond Nd:YVO4 laser and femtosecond Ti:Sapphire laser	110
H. Zhao, P. Wang, J. Zhu, H. Han, and Z. Wei	
Generation of Sub 3-fs Optical Pulses Using Induced Phase Modulation in an Ar-Gas-Filled Hollow Fiber	113
E. Matsubara, K. Yamane, T. Naoi, T. Kito, E. Haraguchi, T. Sekikawa, and M. Yamashita	
Multi-wavelength Erbium-doped Fiber Lasers on the Assistance of High-nonlinear Photonic-crystal Fibers	116
X. Liu and W. Zhao	

Part III Combs

Femtosecond enhancement cavity – direct frequency comb spectroscopy and coherent extreme nonlinear optics	121
J. Ye, R. J. Jones, M. J. Thorpe, K. D. Moll, D. Yost, T. Schibli, and D. D. Hudson	
Spectral Line-by-Line Pulse Shaping of a Mode-Locked Laser and a Phase Modulated CW Laser	124
Z. Jiang, C. Huang, D. E. Leaird, and A. M. Weiner	

Mapping of the Optical Frequency Comb to the Atom Velocity Comb	127
T. Ban, D. Aumiler, H. Skenderovic, and G. Pichler	
Demonstration of Frequency Comb Laser Spectroscopy in the Vacuum-Ultraviolet	130
R. T. Zinkstok, S. Witte, W. Ubachs, W. Hogervorst, and K. S. E. Eikema	
Determination of the CEO Phase - ionization of He with Circularly polarized 5.5-fs Pulses	133
P. R. Eckle, P. Schlup, J. Biegert, M. P. Smolarski, A. Staudte, M. Schöffler, O. Jagutzki, R. Dörner, and U. Keller	
Direct distinction between phase shift and time delay with carrier-envelope phase-controlled pulses	136
S. Adachi, A. Ozawa, and T. Kobayashi	
Spectral Dependence of Phase Noise of Stabilized Optical Frequency Combs	139
Q. Quraishi, S. A. Diddams, and L. Hollberg	

Part IV Ultrafast Optics

Shaped UV Pulses with 20 fs Substructures	145
C. Schrieffer, S. Lochbrunner, and E. Riedle	
Direct UV-AOPDF ultrafast laser pulse shaping	148
S. Coudreau, D. Kaplan, and P. Tournois	
Acousto-optic shaping of femtosecond pulses directly in the mid-IR	151
D. B. Strasfeld, S.-H. Shim, and M. T. Zanni	
Measurement of the Complete Electric Field of an Ultrashort Laser Pulse From a Single-Exposure Digital Hologram	154
P. Gabolde and R. Trebino	
Ultrasensitive Second-Harmonic Generation Frequency-Resolved Optical Gating Using a Fiber-Pigtailed Aperiodically Poled Lithium Niobate Waveguide at 1.55μm	157
H. Miao, A. M. Weiner, S.-D. Yang, C. Langrock, R. V. Roussev, and M. M. Fejer	
Two-dimensional spectral shearing interferometry for few-cycle pulse characterization and optimization	160
J. R. Birge, R. Ell, and F. X. Kärtner	

Chirped mirrors without dispersion oscillations by Brewster's angle incidence	163
P. Baum, M. Breuer, E. Riedle, and G. Steinmeyer	
Pulse Polarization Splitting with Propagation through an Ultrafast Transient Waveplate	166
K. Hartinger and R. A. Bartels	
Design and Fabrication of Efficient Reflection Grisms for Pulse Compression and Dispersion Compensation	169
S. Kane, F. Tortajada, H. Dinger, B. Touzet, R. Huff, J. Squier, C. Durfee III, E. A. Gibson, R. Jimenez, D. M. Gaudiosi, and H. C. Kapteyn	
A Novel Fast-mixing Microfluidic Device for Studying Nonequilibrium Systems using Femtosecond Spectroscopies	172
E. A. Gibson, D. Schafer, W. Amir, D. W. M. Marr, J. Squier, and R. Jimenez	
20-fps motion capture of phase-controlled wave-packets for adaptive quantum control	175
K. Horikoshi, K. Misawa, and R. Lang	
Detection of Ultrafast Infrared Electric Fields by Chirped-Pulse Upconversion	178
M. Nee, R. McCanne, M. Joffre, and K. J. Kubarych	
Enhancement of two-photon excited fuorescence by sub-micron photonic jets	181
S. Lecler, S. Haacke, N. L. Cong, O. Crégut, J.-L. Rehspringer, and C. Hirlimann	
Spatiotemporal femtosecond pulse shaping using a MEMS-based micromirror SLM	184
K. W. Stone, M. T. W. Milder, J. C. Vaughan, and K. A. Nelson	
Secure Communications over a Public Network using Ultrafast Optical Technology	187
B. Wu and E. Narimanov	
Amplitude and Phase Shaping of Ultra-broad-bandwidth Femtosecond Laser Pulses	190
B. Xu, Y. P. Coello, D. A. Harris, V. V. Lozovoy, and M. Dantus	

Laser-Induced Breakdown Spectroscopy Analysis of Bacteria: What Femtosecond Lasers Make Possible	193
L. Guyon, M. Baudelet, T. Amodeo, E. Frejafon, P. Laloi, J. Yu, and J.-P. Wolf	
Spatially Resolved Spectral Interferometry	196
P. Bowlan, P. Gabolde, A. Shreenath, S. Akturk, and R. Trebino	
Measurement of pressure dependent dispersion of femtosecond pulses in air down to 0.01 mbar	199
A. Börzsönyi, K. Osvay, A. P. Kovács, M. Görbe, R. Balogh, and M. Kalashnikov	
Gradient- and vortex-shaped fs pulses in air	202
A. Vinçotte and L. Bergé	
The General Theory of First-Order Spatio-Temporal Couplings of Gaussian Pulses and Beams	205
S. Akturk, X. Gu, P. Gabolde, and R. Trebino	
Coherent control of two photon fluorescence with a high-resolution spectral phase shaper	208
S. Postma, H. L. Offerhaus, V. Subramaniam, and N. F. van Hulst	
Control of Third-Order Dispersion of Ultrashort Laser Pulses	211
M. Erdélyi, A. P. Kovács, K. Mecseki, and G. Szabó	
Ultrasimple extremely broadband transient-grating frequency-resolved-optical-gating device	214
D. Lee, S. Akturk, P. Gabolde, and R. Trebino	
Phase-sensitive resonance in scattering of continuous waves on femtosecond solitons in photonic crystal fibers	217
A. Efimov, A. J. Taylor, A. V. Yulin, D. V. Skryabin, and J. C. Knight	
Distortion of ultrashort pulses caused by aberrations	220
Z. L. Horváth, A. P. Kovács, and Z. Bor	
All-Fiber Temporal Differentiator for Sub-picosecond Optical Waveforms	223
Y. Park, J. Azana, M. Kulishov, and R. Slavik	
Quantum Control of Two-Photon Fluorescence in Solution	226
D. G. Kuroda and V. D. Kleiman	

Part V Chemistry

Ultrafast spectroscopy of single molecules	231
E. van Dijk, M. te Paske, J. Hernando, J. P. Hoogenboom, M. F. Garcia-Parajo, and N. F. van Hulst	
Observation of Raman-Induced Nuclear Wavepacket Motion in S_1 <i>cis</i>-Stilbene: Adiabatic Change of a Potential Curvature and Anharmonicity of Multidimensional Potential	234
S. Takauchi, S. Ruhman, K. Ishii, and T. Tahara	
Femtosecond laser-assisted catalytic surface reactions of syngas and their optimization by tailored laser pulses	237
P. Nuernberger, D. Wolpert, H. Weiss, and G. Gerber	
Vibrational spectroscopy of nonlinear excitations via excited-state resonant impulsive Raman spectroscopy	240
F. X. Morrissey and S. L. Dexheimer	
Two-Color Electric Field Resolved Transient Grating Spectroscopy of an Oligophenylenevinylene Dimer	243
A. M. Moran, J. B. Maddox, J. W. Hong, J. Kim, R. A. Nome, G. C. Bazan, S. Mukamel, and N. F. Scherer	
Dissociative Wave Packets in Large Molecules: Control and Measurement	246
B. J. Pearson, D. Cardoza, and T. C. Weinacht	
Control of 1,3-Cyclohexadiene Ring Opening	249
E. Carroll, A. Florean, J. L. White, P. H. Bucksbaum, and R. J. Sension	
Coherent Infrared Pulse Sequences for Probing Molecular Chirality	252
W. Zhuang, D. Abramavicius, and S. Mukamel	
Robust Basis Functions for Control from Dimension Reduction of Adaptive Pulse-Shaping Experiments	255
M. A. Montgomery, R. Meglen, and N. H. Damrauer	
Control strategies for molecular switches in donor-bridge-acceptor systems	258
D. Geppert and R. de Vivie-Riedle	

Ultrafast Chelation Dynamics of Model Photoswitches: Cyclopentadienyl Manganese and Arene Chromium Tricarbonyl Derivatives with Pendant Sulfides	261
T. T. To, C. B. Duke III, T. J. Burkey, and E. J. Heilweil	
A Femtosecond IR and Raman Look on a Nucleophilic Addition in the Electronic Ground State	264
S. Laimgruber, H. Schachenmayr, W. J. Schreier, and P. Gilch	
Electron transfer and triplet state formation in Merocyanine/TiO₂ systems	267
M. O. Lenz and J. Wachtveitl	
Dynamics of electron injection from the excited state of anchored molecules into semiconductors	270
L. Gundlach, R. Ernstorfer, and F. Willig	
Ultrafast Dynamics of Fe(II) Polypyridyl Chromophores: Design Implications for Dye-Sensitized Photovoltaics	273
A. L. Smeigh and J. K. McCusker	
Ultrafast Electron Dynamics in C₆F₆/Cu(111) after Localized or Delocalized Excitation	276
P. S. Kirchmann, P. A. Loukakos, U. Bovensiepen, M. Wolf, S. Vijayalakshmi, F. Hennies, A. Pietzsch, M. Nagasono, A. Föhlisch, and W. Wurth	
Chirped molecular vibration after impulsive Raman excitation in a stilbene derivative molecule in solution	279
T. Kobayashi, A. Colonna, A. Yabushita, I. Iwakura, and E. Tokunaga	
Control of molecular fragmentation using binary phase shaped femtosecond laser pulses	282
V. V. Lozovoy, M. J. Kangas, T. C. Gunaratne, J. C. Shane, and M. Dantus	
Accumulative quantum control of photochemical reactions	285
F. Langhojer, F. Dimler, G. Jung, and T. Brixner	
Adiabatic Passage in the Presence of Excited-State Absorption and Two-Exciton Processes	288
B. D. Fainberg and V. A. Gorbunov	

Ultrafast Photochromism: Structural and Electronic Dynamics of Indolyl Fulgimides	291
M. Braun, S. Malkmus, F. O. Koller, B. J. Heinz, W. Zinth, C. Schulz, S. Dietrich, and K. Rück-Braun	
Photo-Excitation Dynamics of Malachite Green in Ionic Liquids Studied by the Transient Grating Method	294
M. Fukuda, O. Kajimoto, M. Terazima, and Y. Kimura	
Fifth-order Raman spectroscopy: Liquid benzene	297
C. J. Milne, Y.-L. Li, T. I. C. Jansen, L. Huang, and R. J. D. Miller	
Dynamics of One-dimensional Exciton in Porphyrin J Aggregates by sub-5fs Transient Absorption Experiment	300
A. Ozawa and T. Kobayashi	
Enhancement of Raman Modes in Complex Molecules by Coherent Control	303
J. Hauer, T. Buckup, H. Skenderovic, K.-L. Kompa, and M. Motzkus	
Energy Transport Mechanisms in Doped Organic Films	306
S. Lochbrunner and M. Schlosser	
Electron Transfer in Triarylmethane Lactones: From the sub-100 fs Regime to Solvent Control	309
U. Schmidhammer, J. Karpiuk, S. Lochbrunner, and E. Riedle	
Pulse shape control of population transfer in LDS750	312
O. Nahmias, O. Bismuth, O. Shoshana, and S. Ruhman	
Real-Time Investigation of Elementary Steps for Photo-induced Phase Transition in a Model Dimer	315
L. Lüer, C. Manzoni, G. Cerullo, G. Lanzani, and M. Meneghetti	
Intermolecular communication and a vibrationally adiabatic basis treatment of small-molecule dynamics in low temperature solids ..	318
C. T. Chapman, M. A. Rohrdanz, and J. A. Cina	

Part VI Multidimensional Spectroscopy

Ultrafast Chemical Exchange 2D IR Spectroscopy	323
J. Zheng and M. Fayer	

Two-Dimensional Optical Spectroscopy of Multi-Chromophore Protein Complexes	326
G. R. Fleming, D. Zigmantas, E. L. Read, T. Mancal, and G. S. Engel	
Multidimensional Population “Echo” Distinguishes Between Homogeneous and Heterogeneous Dynamics	329
C. Khurmi, E. van Veldhoven, X. Zhang, and M. A. Berg	
Observation of kinetic networks of hydrogen-bond exchange using 2D IR echo spectroscopy	332
Y. Kim and R. M. Hochstrasser	
2D-IR Photon Echo Spectroscopy of Liquid H₂O – Combination of Novel Nanofluidics and Diffractive Optics Deciphers Ultrafast Structural Dynamics	335
A. Paarmann, D. Kraemer, M. L. Cowan, N. Huse, M. Harb, B. D. Bruner, J. R. Dwyer, E. T. J. Nibbering, T. Elsaesser, and R. J. D. Miller	
Propagation, beam geometry, and detection distortion of peak shapes in two-dimensional Fourier transform spectroscopy	338
M. K. Yetzbacher, N. Belabas, K. A. Kitney, and D. M. Jonas	
2D IR Spectroscopy of Hydrogen Bond Switching in Liquid Water	341
J. J. Loparo, S. T. Roberts, and A. Tokmakoff	
Relaxation-Assisted 2D IR Using Weak Vibrational Modes	344
D. V. Kurochkin, S. R. G. Naraharisetty, and I. V. Rubtsov	
Different Two-Dimensional Infrared Spectral Signatures for 3₁₀- and α-Helix Octapeptides	347
H. Maekawa, C. Toniolo, A. Moretto, Q. Broxterman, and N.-H. Ge	
Multidimensional IR Spectroscopy of Site-Specific Hairpin Folding	350
A. W. Smith, H. S. Chung, Z. Ganim, and A. Tokmakoff	
Single-Shot Time Resolved Coherent Anti-Stokes Raman Spectroscopy	353
Y. Paskover and Y. Prior	
Two-Dimensional Optical Correlation Spectroscopy Applied to Liquid/Glass Dynamics	356
K. Lazonder, M. S. Pshenichnikov, and D. A. Wiersma	

2D optical spectroscopy of a conjugated polymer with tunable visible 15 fs-pulses from a 200 kHz NOPA	359
F. Milota, P. Baum, J. Sperling, E. Riedle, K. Matuszna, and H. F. Kauffmann	
Direct Probing of the Local Solvent Response During Intermolecular Electron Transfer	362
D. F. Underwood and D. Blank	
Femtosecond Multidimensional Imaging--Watching Chemistry from the Molecule's Point of View	365
O. Gessner, A. M. D. Lee, E. t-H Chrysostom, C. C. Hayden, and A. Stolow	
Polarized Optical Two-dimensional Fourier Transform Spectroscopy of Semiconductors	368
T. Zhang, X. Li, S. T. Cundiff, R. Mirin, and I. Kuznetsova	
Coherently Controlled Multidimensional Optical Spectroscopy ...	371
K. W. Stone, T. Hornung, J. C. Vaughan, and K. A. Nelson	
Transient 2D-IR Spectroscopy of Thiopeptides	374
J. Helbing, V. Cervetto, and R. Pfister	
Nonequilibrium 2D-IR Exchange Spectroscopy: Ligand Migration in Proteins	377
J. Bredenbeck, J. Helbing, K. Nienhaus, G. U. Nienhaus, and P. Hamm	
Lineshapes and Correlations in Two Dimensional Vibrational Signals of NMA	380
T. Hayashi, Wei Zhuang, D. Abramavicius, and S. Mukamel	
Manipulating Multidimensional Nonlinear Spectra of Excitons by Coherent Control with Polarization Pulse Shaping	383
D. V. Voronine, D. Abramavicius, and S. Mukamel	
Well-Resolved Coherent Raman Spectra from Femtosecond Pulses	386
S. Nath, D. C. Urbanek, S. J. Kern, and M. A. Berg	
Multidimensional Anisotropic Spectroscopy for The Study of Intramolecular Charge Transfer	389
L. V. Dao, D. McDonald, and P. Hannaford	

Two Dimensional Fourier Transform Electronic Spectroscopy: Evolution of Cross Peaks in the Fenna-Matthews-Olson Complex . . .	392
G. S. Engel, E. L. Read, T. R. Calhoun, T. K. Ahn, T. Mancal, R. E. Blankenship, and G. R. Fleming	
Dispersion Relations in Two-Dimensional Spectroscopy	395
K. A. Kitney, M. K. Yetzbacher, A. A. Ferro, and D. M. Jonas	
Multidimensional Infrared Spectroscopy of a Peptide NH•••O Intramolecular Hydrogen Bond	398
J. Park and R. M. Hochstrasser	
Signature of Chemical Exchange in 2D Vibrational Spectroscopy; Simulations Based on the Stochastic Liouville Equations	401
F. Sanda, W. Zhuang, T. I. C. Jansen, T. Hayashi, and S. Mukamel	
Femtosecond 3D IR spectroscopy	404
F. Ding, E. C. Fulmer, P. Mukherjee, and M. T. Zanni	

Part VII Hydrogen Bonding

Femtosecond Infrared Spectroscopy of HOD in Liquid to Supercritical Heavy Water	409
J. Lindner, P. Vöhringer, and D. Schwarzer	
Ultrafast Aqueous Bimolecular Acid-Base Proton Transfer: from Direct Exchange to Sequential Hopping	412
O. F. Mohammed, D. Pines, J. Dreyer, E. Pines, and E. T. J. Nibbering	
The role of water in intermolecular proton transfer reactions	415
B. J. Siwick and H. J. Bakker	
Picosecond Temperature and Pressure Changes in H-Bonded Systems	418
M. Schmeisser, H. Iglev, and A. Laubereau	
Multicolor IR Spectroscopy on Pure Liquid Water	421
D. Cringus, M. S. Pshenichnikov, D. A. Wiersma, M. Mostovoy, J. Lindner, and P. Vöhringer	
Towards a Molecular Movie: Real Time Observation of Hydrogen Bond Breaking by Transient 2D-IR Spectroscopy in a Cyclic Peptide	424
C. Kolano, J. Helbing, W. Sander, and P. Hamm	

An experimental and numerical study of the hydrogen-bonding in aqueous salts and methanol	427
D. A. Turton, A. R. Turner, N. T. Hunt, G. H. Welsh, and K. Wynne	
Structural Dynamics of Rotaxanes Studied by Infrared Photon Echo Spectroscopy	430
S. Yeremenko, O. A. Larsen, P. Bodis, W. J. Buma, J. S. Hannam, D. A. Leigh, and S. Woutersen	
Ultrafast Superheating of Ice	433
H. Iglev, M. Schmeisser, and A. Laubereau	
Ultrafast Relaxation Dynamics of O-H Bending and Librational Excitations in Liquid H₂O	436
S. Ashihara, N. Huse, E. T. J. Nibbering, and T. Elsaesser	
Ultrafast Intramolecular Energy Transfer in Water	439
D. Cringus, T. I. C. Jansen, M. S. Pshenichnikov, and D. A. Wiersma	
Understanding the Building Blocks of Life - Evidence of Hydrogen-Bonded Aggregation of N-Methylacetamide	442
N. T. Hunt, D. A. Turton, and K. Wynne	
Anharmonic Bend-Stretch Coupling in Water	445
J. Lindner, P. Vöhringer, M. S. Pshenichnikov, D. Cringus, and D. A. Wiersma	
Mode-selective O-H stretching relaxation in a hydrogen bond studied by ultrafast vibrational spectroscopy	448
W. Werncke, V. Kozich, J. Dreyer, S. Ashihara, and T. Elsaesser	

Part VIII Biology

Ultrafast Polarization-Sensitive Infrared Spectroscopy of Photoactive Yellow Protein and Model Compounds	453
O. F. Mohammed, K. Heyne, A. Usman, J. Dreyer, E. T. J. Nibbering, and M. A. Cusanovich	
What determines the success of isomerization of the Photoactive Yellow Protein chromophore? - A picosecond pump-probe study in the midIR	456
L. J. G. van Wilderen, I. H. M. van Stokkum, R. van Grondelle, M. van der Horst, K. J. Hellingwerf, and M. L. Groot	

Femtosecond Pump-Shaped Dump-Probe Control of Retinal in Bacteriorhodopsin	459
P. Nuernberger, G. Vogt, T. Brixner, and G. Gerber	
Experimental Coherent Control of Retinal Isomerization in Bacteriorhodopsin	462
V. I. Prokhorenko, A. M. Nagy, L. S. Brown, and R. J. D. Miller	
THz Radiation from Light-Induced Electron and Proton Motion in Bacteriorhodopsin	465
G. I. Groma, J. Hebling, I. Z. Kozma, G. Váró, J. Kuhl, and E. Riedle	
Ultrafast Photoreactions in the Green Fluorescent Protein Studied Through Time Resolved Vibrational Spectroscopy	468
S. R. Meech, J. Nappa, K. L. Ronayne, D. Stoner-Ma, and P. J. Tonge	
Ultrafast Energy and Electron Transfer in Photosystem I - Direct Evidence for two-branched Electron Transfer	471
A. R. Holzwarth, M. G. Müller, C. Slavov, R. Luthra, and K. Redding	
Decomposing the Excited State Dynamics of Carotenoids in Light Harvesting Complexes and Dissecting Pulse Structures from Optimal Control Experiments	474
E. Papagiannakis, I. H. M. van Stokkum, R. van Grondelle, M. Vengris, L. Valkunas, R. J. Cogdell, and D. S. Larsen	
Energy Transport in a Peptide Helix	477
V. Botan, E. H. G. Backus, A. Moretto, C. Toniolo, and P. Hamm	
Ultrafast Energy Transfer in the Soret Band of Linear Porphyrin Arrays	480
H. Rhee, T. Joo, N. Aratani, and A. Osuka	
Multiphoton quantum control spectroscopy of b-carotene	483
T. Buckup, T. Lebold, A. Weigel, W. Wohlleben, and M. Motzkus	
Direct Observation of Ultrafast Dynamics in DNA Bases	486
H. Satzger, D. Townsend, M. Z. Zgierski, and A. Stolow	
Following photoinduced dynamics in bacteriorhodopsin with 7 fsec impulsive vibrational spectroscopy	489
A. Kahan, O. Nahmias, M. Sheves, and S. Ruhman	

Real-time observation of carbon double bond transformation during photo-isomerization of bacteriorhodopsin	492
A. Yabushita and T. Kobayashi	
Ultrafast conformational changes in carboxy-myoglobin studied by time-resolved circular dichroism	495
T. Dartigalongue and F. Hache	
Ultrafast Unzipping of a Beta-Hairpin Peptide	498
W. Zinth, T. E. Schrader, W. J. Schreier, F. O. Koller, T. Cordes, G. Babizki, R. Denschlag, P. Tavan, M. Löweneck, S.-L. Dong, L. Moroder, and C. Renner	
Molecular Basis of Non-Photochemical Quenching (NPQ); The Role of the Major Light-Harvesting Complex LHC II	501
S. Amarie, T. Barros, J. Standfuss, A. Dreuw, W. Kühlbrandt, and J. Wachtveitl	
Direct observation of the ‘lubricant of life’ using ultrafast spectroscopies	504
N. T. Hunt, D. A. Turton, L. Kattner, R. P. Shanks, and K. Wynne	
Mechanism of Radical Transfer during Photoactivation of the Flavoprotein DNA Photolyase	507
A. Lukacs, M. H. Vos, A. P. M. Eker, M. Byrdin, and K. Brettel	
Relaxation Paths and Dynamics of β-apo-8'-carotenal: An Ultrafast Electronic and Vibrational Study	510
A. J. Van Tassle, M. A. Prantil, J. M. Burchfield, and G. R. Fleming	
Slow Fluorescence and Fast Intersystem Crossing - The Xanthone Anomaly	513
B. J. Heinz, B. Schmidt, C. Root, F. Milota, B. Fierz, T. Kiefhaber, W. Zinth, and P. Gilch	
Ultrafast Relaxation of the S2 Excited State in β-Carotene and Its Homologs: A Role of Intermediate States	516
M. Yoshizawa, D. Kosumi, M. Komukai, K. Yanagi, and H. Hashimoto	
Resonance Hyper-Raman Spectroscopy of Organic Nonlinear Optical Chromophores	519
A. M. Kelley and L. C. T. Shoute	

Thymine Dimer Formation probed by Time-resolved Vibrational Spectroscopy	522
W. J. Schreier, T. E. Schrader, F. O. Koller, P. Gilch, W. Zinth, and B. Kohler	
Primary Reaction of Sensory Rhodopsin II Mutant D75N	525
M.-K. Verhoeven, S. Amarie, M. O. Lenz, J. P. Klare, M. Engelhard, and J. Wachtveitl	
Carotenoid Excited State Kinetics in Bacterial RCs with the Primary Electron Donor Oxidized	528
S. Lin, E. Katilius, and N. W. Woodbury	
Ligand Interconversion Dynamics in the Primary Docking Site of Heme Proteins in Various Solvents	531
S. Kim and M. Lim	
Time- and Frequency-resolved Two-dimensional Transient Absorption Imaging of <i>b</i>-Carotene in Solids	534
J. Takeda, Y. Makishima, and A. Ishida	
Determination of Electronic Mixing in Purple Photosynthetic Bacteria by Two-Color Three Pulse Photon Echo Peak Shift	537
D. Y. Parkinson, H. Lee, and G. R. Fleming	
Ultrafast Charge Transfer Dynamics of a Modified Double Helical DNA	540
P. Manoj, C.-K. Min, C. T. Aravindakumar, and T. Joo	
A New Class of Ultrafast Photoswitchable Chromopeptides	543
T. Cordes, K. Riesselmann, S. Herre, K. Rück-Braun, and W. Zinth	
<hr/>	
Part IX AMO Physics	
<hr/>	
Three-Pulse Photon Echo in a Dense Potassium Vapor	549
V. O. Lorenz, S. T. Cundiff, W. Zhuang, and S. Mukamel	
Coherent Population Control of Rydberg Atom by Adiabatic Rapid Passage	552
H. Maeda, J. H. Gurian, D. V. L. Norum, and T. F. Gallagher	
Ultrafast dynamics of autoionization in O₂ probed by laser-field-assisted XUV photoionization	555
C. Zhu, K. S. Kang, K. T. Kim, M. N. Park, T. Imran, G. Umesh, E. Krishnakumar, and C. H. Nam	

Control of Dissociative Ionization of Ethanol Molecule by Cascaded Double Ultrashort Laser Pulse Excitation	558
H. Yazawa, T. Shioyama, F. Kannari, R. Itakura, and K. Yamanouchi	
Time-Resolved Imaging of H₂⁺ (D²⁺) Nuclear Wave Packets	561
T. Ergler, A. Rudenko, B. Feuerstein, K. Zrost, C. Dieter Schröter, R. Moshhammer, and J. Ullrich	
Slowing down molecular dissociation in strong laser fields	564
C. Guo	
Investigation of Coriolis Perturbations on the Ro-Vibrational n1 Band of H₂CO with fs-CARS.	567
G. Knopp, A. Walser, P. Radi, P. Beaud, M. Tulej, and T. Gerber	
Rotational wave packet dynamics correlated to ultrafast non-time- stationary linear and nonlinear optical susceptibilities	570
O. Masihzadeh, M. Baertschy, and R. A. Bartels	
Ac Stark-Mediated Quantum Control with Two-Color Pulses in Two- and Three-Level Systems	573
C. Serrat and Y. Loiko	
Molecular Orientation via Molecular Anti-Alignment	576
E. Gershnel, I. Sh Averbukh, and R. J. Gordon	
Optimal control of molecular alignment with the feedback of ion images	579
T. Suzuki, Y. Sugawara, S. Minemoto, and H. Sakai	

Part X Solid-State Physics

Evidence for Superfluorescent Recombination from Dense Magneto-plasmas	585
Xiaoming Wang, Y.-D. Jho, D. H. Reitze, J. Kono, A. A. Belyanin, X. Wei, V. V. Kocharovsky, Vl. V. Kocharovsky, and G. Solomon	
Insulator-to-Metal Transition Induced by Mid-IR Vibrational Excitation in a Magnetoresistive Manganite	588
M. Rini, J. Itatani, Y. Tomioka, Y. Tokura, R. W. Schoenlein, and A. Cavalleri	
Ultrafast coherent dynamics of the quantum Hall system	591
K. M. Dani, J. Tignon, M. Breit, D. S. Chemla, E. G. Kavousanaki, and I. E. Perakis	

Dynamics of Photoexcited Carriers in Heavy-electron Systems . . .	594
J. Demsar, V. K. Thorsmølle, J. L. Sarrao, and A. J. Taylor	
Energy relaxation and anomalies in the thermo-acoustic response of femtosecond laser-excited Germanium	597
K. Sokolowski-Tinten, U. Shymanovich, M. Nicoul, J. Blums, A. Tarasevitch, M. Horn von Hoegen, D. von der Linde, A. Morak, and T. Wietler	
Enhanced Photosusceptibility in the Insulator-to-Metal Phase Transition in Vanadium Dioxide	600
D. J. Hilton, R. P. Prasankumar, S. Fourmaux, A. Cavalleri, D. Brassard, M. A. E. Khakani, J.-C. Keiffer, A. J. Taylor, and R. D. Averitt	
Ultrafast Dynamics of the Itinerant Antiferromagnet UNiGa5 . . .	603
E. M. E. Chia, H. J. Lee, N. Hur, E. D. Bauer, T. Durakiewicz, R. D. Averitt, J. L. Sarrao, and A. J. Taylor	
Ultrafast Fano dynamics of quasiparticles in a semiconductor	606
J. Lee, J. Inoue, and M. Hase	
Unique Behavior of Lattice Modulation Phase Induced by Ligand Motion of a Mixed-Valence Metal-Halogen Complex	609
F. Araoka and T. Kobayashi	
Ultrafast Charge-Carrier Dynamics in Low-Dimensional Solids . .	612
L. Perfetti, T. Kampfrath, M. Wolf, and C. Frischkorn	
Femtosecond Dynamics of Fano-resonance in Zn	615
M. Hase, M. Kitajima, and J. Demsar	
Coherent Phonons in the Zone Boundary Region of Solid Ar doped with Cl2	618
M. Fushitani, N. Schwentner, M. Schröder, and O. Kühn	
Ultrafast gigantic photo-response in (EDO-TTF)2PF6 initiated by 10-fs laser pulses	621
J. Itatani, M. Rini, A. Cavalleri, K. Onda, T. Ishikawa, S. Koshihara, X. Shao, H. Yamochi, G. Saito, and R. W. Schoenlein	
Femtosecond Dynamics of Coherent Optical Phonons in Graphite	624
K. Ishioka, M. Hase, M. Kitajima, and H. Petek	
Subpicosecond Time-Resolved Photoluminescence of Carrier Transfer in AlGaIn Using Difference-Frequency Generation	627
G. A. Garrett, A. V. Sampath, H. Shen, and M. Wraback	

Part XI Plasmonics

Adaptive Control of Nanoscopic Photoelectron Emission	633
M. Aeschlimann, M. Bauer, D. Bayer, T. Brixner, F. J. G. de Abajo, W. Pfeiffer, M. Rohmer, C. Spindler, and F. Steeb	
Femtosecond Microscopy of Surface Plasmon Propagation in a Silver Film	636
A. Kubo, N. Pontius, and H. Petek	
Ultrafast Optical Nonlinearities of Single Metal Nanoparticles . . .	639
N. F. Scherer, M. Pelton, R. Jin, J. E. Jureller, M. Liu, H. Y. Kim, S. Park, and P. Guyot-Sionnest	
Dynamical Electric Metamaterial Response at Terahertz Frequencies	642
W. J. Padilla, A. J. Taylor, C. Highstrete, M. Lee, and R. D. Averitt	
Nanocalized Nonlinear Photoprocesses under Coherent Control	645
M. I. Stockman	
Properties of Two-Photon Induced Emission from Dendritic Silver Nanoclusters	648
J. M. Gunn, M. Ewald, and M. Dantus	
Ultrafast Dynamics of Polarization induced at Surface Plasmon Resonances in a One Dimensional Metallic Plasmonic Crystal	651
A. S. Vengurlekar, A. V. Gopal, and T. Ishihara	
Landau Damping of Coherent Plasmons	654
M. P. Hasselbeck, D. Seletskiy, L. R. Dawson, and M. Sheik-Bahae	

Part XII Nanostructures

Polarization Dependence of Nanostructure Formation in Transparent Solids	659
P. P. Rajeev, M. Gertsvolf, E. Simova, C. Hnatovsky, R. S. Taylor, D. M. Rayner, and P. B. Corkum	
Time resolved magneto-optical microscopy of individual ferromagnetic dots	662
J.-Y. Bigot, A. Laraoui, J. Venuat, M. Vomir, M. Albrecht, and E. Beaurepaire	

Nonlinear Optical Microscopy of a Single Self-Assembled InGaAs Quantum Dot	665
M. Betz, M. Wesseli, C. Ruppert, S. Trumm, H. J. Krenner, and J. J. Finley	
Microscopic Many-Body Analysis of Ultrafast Photocurrents in Semiconductor Nanostructures	668
T. Meier, Q. T. Vu, H. T. Duc, B. Pasenow, H. Haug, and S. W. Koch	
Intraband Spectroscopy of GaSe Nanoparticles and InSe/GaSe Nanoparticle Heterojunctions	671
D. F. Kelley, H. Tu, and X.-B. Chen	
Observation of the Optical Stark Effect in Semiconducting Carbon Nanotubes	674
D. Song, F. Wang, G. Dukovic, M. Zheng, E. D. Semke, L. E. Brus, and T. F. Heinz	
Nonlinear Optical Approach to Multiexciton Relaxation Dynamics in Quantum Dots	677
V. Huxter and G. D. Scholes	
Memory and Nanostructure Formation in the Intense Field Ionization of Fused Silica	680
P. P. Rajeev, M. Gertszov, V. R. Bhardwaj, E. Simova, C. Hnatovsky, R. S. Taylor, D. M. Rayner, and P. B. Corkum	
Auger Recombination of Excitons in Semiconducting Carbon Nanotubes	683
F. Wang, G. Dukovic, Y. Wu, M. S. Hybertsen, L. E. Brus, and T. F. Heinz	
Probing Exciton Dynamics of Semiconducting Single-Walled Carbon Nanotubes Using Photon Echo Spectroscopy	686
Y.-Z. Ma, M. W. Graham, L. Valkunas, S. M. Bachilo, and G. R. Fleming	
Modeling of the Extreme Nonlinear Optical Response of Semiconductor Nanostructures	689
D. Golde, T. Meier, and S. W. Koch	
Dephasing of Inter-Landau level Raman Coherences in GaAs quantum wells	692
K. M. Dani, I. Cotoros, J. Wang, J. Tignon, D. S. Chemla, E. G. Kavousanaki, and I. E. Perakis	

Real time observation of non-linear coherent phonon dynamics in semiconducting single wall carbon nanotubes	695
C. Manzoni, A. Gambetta, G. Cerullo, G. Lanzani, E. Menna, M. Meneghetti, S. Tretiak, A. Piryatinski, A. Saxena, R. L. Martin, and A. R. Bishop	

Ultrafast Interfacial Carrier Dynamics in UV-Blue Photoluminescing ZnSe Nanoparticles	698
V. V. Matylitsky, M. O. Lenz, J. Wachtveitl, A. Shavel, N. Gaponik, and A. Eychmüller	

Selective measurement of ultrafast exciton spin relaxation in quantum dots	701
J. Kim, C. Y. Wong, and G. D. Scholes	

Part XIII X-Ray Studies

Direct Observation of Electron Dynamics at Surfaces using X-ray Spectroscopy	707
W. Wurth and A. Föhlisch	

Carrier Dependent Stability of a Semiconductor Lattice Measured with Femtosecond X-ray Diffraction	710
K. J. Gaffney, P. B. Hillyard, A. M. Lindenberg, S. Engemann, A. Deb, and D. A. Meyer	

Probing strain propagation in nanolayered perovskites by diffraction of femtosecond x-rays	713
C. v. Korff Schmising, M. Bargheer, M. Kiel, N. Zhavoronkov, M. Woerner, T. Elsaesser, I. Vrejoiu, D. Hesse, and M. Alexe	

Lattice Motions from THz phonon polaritons measured with Femtosecond X-ray Diffraction	716
A. Cavalleri, S. Wall, M. Rini, C. Simpson, N. Dean, M. Khalil, E. R. Statz, D. W. Ward, K. A. Nelson, and R. W. Schoenlein	

Ultrafast XAFS of transition metal complexes	719
T. Lee, C. Reich, C. M. Laperle, X. Li, M. Grant, C. G. Rose-Petruck, and F. Benesch-Lee	

Picosecond X-ray Absorption Spectroscopy of Photochemical Transient Species in Solution	722
M. Khalil, M. A. Marcus, A. L. Smeigh, J. K. McCusker, H. H. W. Chong, and R. W. Schoenlein	

Femtosecond X-Ray Diffraction on DIABN Single Crystals	725
M. Braun, C. Root, T. E. Schrader, P. Gilch, W. Zinth, M. Bargheer, C. v. Korff Schmising, M. Kiel, N. Zhavoronkov, M. Woerner, and T. Elsaesser	
Imaging Plume Dynamics with Ultrafast Hard X-Rays	728
F. Shan, R. Porter, N. Cheng, D. J. Masiel, and T. Guo	
Ultrafast X-Ray Diffraction and Optical Reflection Measurements of Coherent Optical Phonons of CdTe	731
K. G. Nakamura, Y. Hironaka, J. Irisawa, K. Kondo, K. Ishioka, and M. Kitajima	
DNA Strand Breaks by a Laser-Driven Electron X-rays Source (LEXS)	734
F. Shan, J. D. Carter, and T. Guo	
High intensity XUV-FEL interaction with solids: first experimental results	737
K. Sokolowski-Tinten, N. Stojanovic, D. von der Linde, U. Zastra, F. Perner, E. Förster, R. Sobierajski, R. Nietubyc, M. Jurek, J. Krzywinski, J. B. Pelko, L. Juha, V. Hajkova, J. Cihelka, A. Velyhan, J. Kuba, J. Chalupský, T. Tschentscher, S. Toleikis, S. Düsterer, H. Redlin, S. P. Hau-Riege, R. A. London, R. M. Bionta, H. Chapman, R. W. Lee, M. Bergh, K. Caleman, and J. Hajdu	
<hr/>	
Part XIV Ultrafast Electron Studies	
<hr/>	
A Nanometer-Sized Femtosecond Electron Source at 80 MHz Repetition Rate	743
C. Ropers, D. R. Solli, C. Peter Schulz, C. Lienau, and T. Elsaesser	
A spatially and temporally localized sub-laser-cycle electron source	746
P. Hommelhoff, C. Kealhofer, and M. A. Kasevich	
Time-Resolved Photoemission of an Insulator-Metal Transition . . .	749
L. Perfetti, P. A. Loukakos, M. Lisowski, U. Bovensiepen, and M. Wolf	
Electronic Thermal Expansion and the Coherent Acoustic Phonons Generation	752
X. Wang, S. Nie, H. Park, R. Clinite, and J. Cao	

Femtosecond Electron Diffraction Study on the Melting Dynamics of Gold	755
R. Ernstorfer, M. Harb, T. Dartigalongue, C. T. Hebeisen, R. E. Jordan, L. Zhu, and R. J. D. Miller	
Characterization of ultrashort electron pulses	758
C. T. Hebeisen, R. Ernstorfer, M. Harb, T. Dartigalongue, R. E. Jordan, L. Zhu, and R. J. D. Miller	

Part XV THz

A compact radially polarized THz source based on velocity-mismatched optical rectification	763
G. Chang, C. J. Divin, C.-H. Liu, S. L. Williamson, A. Galvanauskas, and T. B. Norris	
Carrier Dynamics in ZnO Nanowires and Films Measured by Time-Resolved THz Spectroscopy	766
J. B. Baxter and C. A. Schmuttenmaer	
Stimulated Terahertz Emission from Excitons in Cu₂O	769
R. A. Kaindl, R. Huber, B. A. Schmid, Y. R. Shen, and D. S. Chemla	
Terahertz nonlinear response in lithium niobate	772
T. Hornung, K.-L. Yeh, and K. A. Nelson	
Spatio-Temporal Properties of Single-Cycle THz Pulses Generated by Relativistic Electron Beams in a Laser-Plasma Accelerator	775
C. Toth, J. van Tilborg, C. B. Schroeder, C. G. R. Geddes, E. Esarey, and W. Leemans	
Terahertz Emission from Nano-structured Metal Surfaces	778
G. H. Welsh, N. T. Hunt, and K. Wynne	
High Power Compact THz system based on ultrafast Yb-doped parabolic fiber amplifier	781
G. Chang, C. J. Divin, C.-H. Liu, A. Galvanauskas, T. B. Norris, and S. L. Williamson	
Phonon-Polariton Excitation in Ferroelectric Slab Waveguides and Photonic Crystals	784
E. R. Stutz, D. W. Ward, and K. A. Nelson	

Using of 2D PPLN Crystal for Surface-Emitted THz-Wave Generation by Optical Rectification of Laser Pulses	787
Y. H. Avetisyan, K. Khachatryan, and H. Ito	
Dynamical Properties of Terahertz Radiation from Coherent Longitudinal Optical Phonons Confined in a GaAs/AlAs Multiple Quantum Well	790
K. Mizoguchi, M. Nakayama, S. Saito, A. Syouji, and K. Sakai	
Characterization of Magnetization Dynamics using Terahertz Emission Spectroscopy	793
J. M. Schleicher, S. M. Harrel, C. A. Schmuttenmaer, E. Beaurepaire, and J.-Y. Bigot	
Single-shot, High-resolution, THz Field Reconstruction using Phase-retrieval	796
B. Yellampalle, K. Kim, R. D. Averitt, G. Rodriguez, J. H. Glowina, and A. J. Taylor	
Nonlinear THz Spectroscopy of n-Type GaAs	799
P. Gaal, K. Reimann, M. Woerner, T. Elsaesser, R. Hey, and K. H. Ploog	
Terahertz amplification in high-dielectric materials	802
K.-L. Yeh, T. Hornung, J. C. Vaughan, and K. A. Nelson	

Part XVI Imaging and Microscopy

Tissue imaging with shaped femtosecond laser pulses	807
W. S. Warren, D. Fu, T. Ye, H. Liu, and M. C. Fischer	
Selective Two-Photon Imaging of a Biological Sample	810
L. Schelhas, J. C. Shane, and M. Dantus	
Time-resolved Single-beam CARS with Shaped Supercontinuum from a Photonic Crystal Fiber	813
B. von Vacano, W. Wohlleben, and M. Motzkus	
Optical Coherence Microscopy and Cellular Imaging	816
A. Aguirre and J. Fujimoto	
Novel applications of broadband excitation to multiphoton microscopy	819
J. P. Ogilvie, D. Débarre, M. Gui, J. Skodack, X. Solinas, J.-L. Martin, A. Alexandrou, E. Beaurepaire, and M. Joffre	

In-vivo multi-nonlinear optical imaging of a living cell using a single femtosecond Ti:Sapphire oscillator	822
H. Kano and H. Hamaguchi	
Optically Active Sum Frequency Generation Microscopy for Cellular Imaging	825
K. Zhang, N. Ji, Y. R. Shen, and H. Yang	
Two-photon Bio-imaging with a Mode-locked Semiconductor Laser	828
H. Guo, K. Sato, K. Takashima, and H. Yokoyama	
Author Index	831