

Bibliography

- [1] G. P. Agrawal. Nonlinear Fiber Optics. Academic Press, San Diego, 3rd edition, 2001.
- [2] C. Altucci, T. Starczwski, E. Mevel, C. Wahlstrom, B. Carre, and A. L'Huillier. Journal of the Optical Society of America B, 13:148, 1996.
- [3] M.V. Ammosov, N.B. Delone, and V.P. Krainov. Tunnel ionization of complex atoms and of atomic ions in an alternating electromagnetic field. Soviet Physics JETP, 64(6):1191, 1986.
- [4] J.A. Armstrong, N. Bloembergen, J. Ducuing, and P.S. Pershan. Interactions between light waves in a nonlinear dielectric. Physical Review A, 127:1918, 1962.
- [5] S. Augst, D.D. Meyerhofer, D. Strickland, and S.L. Chin. Laser ionization of noble gases by coulomb-barrier suppression. JOSA B, 8(4):858–867, 1991.
- [6] S. Augst, D. Strickland, D.D. Meyerhofer, S.L. Chin, and J.H. Eberly. Tunneling ionization of noble gases in a high-intensity laser field. Physical Review Letters, 63(20):2212–2215, 1989.
- [7] S. Backus, R. Bartels, S. Thompson, R. Dollinger, H. C. Kapteyn, and M. M. Murnane. High-efficiency, single-stage 7-khz high-average-power ultrafast laser system. Optics Letters, 26(7):465–467, 2001.
- [8] S. Backus, C. Durfee, M.M. Murnane, and H.C. Kapteyn. High power ultrafast lasers. Review of Scientific Instruments, 69(3):1207–1223, 1998.
- [9] P. Balcou, P. Salieres, A. L'Huillier, and M. Lewenstein. Generalized phase-matching conditions for high harmonics: The role of field-gradient forces. Physical Review A, 55(4):3204–3210, 1997.
- [10] R. A. Bartels, A. Paul, H. Green, H. C. Kapteyn, M. M. Murnane, S. Backus, I. P. Christov, Y. W. Liu, D. Attwood, and C. Jacobsen. Generation of spatially coherent light at extreme ultraviolet wavelengths. Science, 297(5580):376–378, 2002.
- [11] M. Bauer, C. Lei, K. Read, R. Tobey, J. Gland, M. M. Murnane, and H. C. Kapteyn. Direct observation of surface chemistry using ultrafast soft-x- ray pulses. Physical Review Letters, 87(2):025501, 2001.
- [12] J. D. Bierlein, D. B. Laubacher, J. B. Brown, and C. J. van der Poel. Balanced phase matching in segmented ktiopo₄ waveguides. Applied Physics Letters, 56(18):1725–1727, 1990.
- [13] R. W. Boyd. Nonlinear Optics. Academic Press, San Diego, 2nd edition, 2003.

- [14] T. Brabec and F. Krausz. Intense few-cycle laser fields: Frontiers of nonlinear optics. Reviews of Modern Physics, 72(2):545–591, 2000.
- [15] Z. H. Chang, A. Rundquist, H. W. Wang, M. M. Murnane, and H. C. Kapteyn. Generation of coherent soft x-rays at 2.7 nm using high harmonics. Physical Review Letters, 79(16):2967–2970, 1997.
- [16] Z. H. Chang, A. Rundquist, H. W. Wang, M. M. Murnane, and H. C. Kapteyn. Temporal phase control of soft-x-ray harmonic emission. Physical Review A, 58(1):R30–R33, 1998.
- [17] E.A. Chowdhury, C.P.J. Barty, and B.C. Walker. Nonrelativistic ionization of the l-shell states in argon by a relativistic 10^{19} w/cm⁻² laser field. Physical Review A, 63:042712, 2001.
- [18] I. P. Christov. Control of high harmonic and attosecond pulse generation in aperiodic modulated waveguides. Journal of the Optical Society of America B, 18(12):1877–1881, 2001.
- [19] I. P. Christov, H. C. Kapteyn, and M. M. Murnane. Quasi-phase matching of high-harmonics and attosecond pulses in modulated waveguides. Optics Express, 7(11):362–367, 2000.
- [20] I.P. Christov, M.M. Murnane, and H.C. Kapteyn. Generation and propagation of attosecond x-ray pulses in gaseous media. Physical Review A, 57(4):R2285, 1998.
- [21] E. Constant, D. Garzella, P. Breger, E. Mevel, C. Dorrer, C. Le Blanc, F. Salin, and P. Agostini. Optimizing high harmonic generation in absorbing gases: Model and experiment. Physical Review Letters, 82(8):1668–1671, 1999.
- [22] P. B. Corkum. Plasma perspective on strong field multiphoton ionization. Physical Review Letters, 71(13):1994–1997, 1993.
- [23] D. Descamps, C. Lynga, J. Norin, A. L’Huillier, C. G. Wahlstrom, J. F. Hergott, H. Merdji, P. Salieres, M. Bellini, and T. W. Hansch. Extreme ultraviolet interferometry measurements with high-order harmonics. Optics Letters, 25(2):135–137, 2000.
- [24] M. Drescher, M. Hentschel, R. Kienberger, M. Uiberacker, V. Yakovlev, A. Scrinizi, T. West-erwalbesloh, U. Kleineberg, U. Heinzmann, and F. Krausz. Time-resolved atomic inner-shell spectroscopy. Nature, 419(6909):803–807, 2002.
- [25] C. G. Durfee, A. Rundquist, S. Backus, Z. Chang, C. Herne, H. C. Kapteyn, and M. M. Murnane. Guided-wave phase-matching of ultrashort-pulse light. Journal of Nonlinear Optical Physics & Materials, 8(2):211–234, 1999.
- [26] C. G. Durfee, A. R. Rundquist, S. Backus, C. Herne, M. M. Murnane, and H. C. Kapteyn. Phase matching of high-order harmonics in hollow waveguides. Physical Review Letters, 83(11):2187–2190, 1999.
- [27] M. M. Fejer, G. A. Magel, D. H. Jundt, and R. L. Byer. Quasi-phase-matched 2nd harmonic-generation - tuning and tolerances. IEEE Journal of Quantum Electronics, 28(11):2631–2654, 1992.
- [28] M. Ferray, A. L’Huillier, X. F. Li, L. A. Lompr, G. Mainfray, and C. Manus. Multiple-harmonic conversion of 1064 nm radiation in rare gasses. Journal of Physics B, 21:L31, 1987.
- [29] M. B. Gaarde, F. Salin, Ph. Balcou, K. J. Schafer, K. C. Kulander, and A. L’Huillier. Spatiotemporal separation of high harmonic radiation into two quantum path components. Physical Review A, 59(2):1367–1373, 1999.

- [30] E. A. Gibson, A. Paul, N. Wagner, R. Tobey, S. Backus, I. P. Christov, M. M. Murnane, and H. C. Kapteyn. High-order harmonic generation up to 250 eV from highly ionized argon. Physical Review Letters, 92(3):033001, 2004.
- [31] E. A. Gibson, A. Paul, N. Wagner, R. Tobey, D. Gaudiosi, S. Backus, I. P. Christov, A. Aquila, E. M. Gullikson, D. T. Attwood, M. M. Murnane, and H. C. Kapteyn. Coherent soft x-ray generation in the water window with quasi-phase matching. Science, 302(5642):95–98, 2003.
- [32] T. E. Glover, R. W. Schoenlein, A. H. Chin, and C. V. Shank. Observation of laser assisted photoelectric effect and femtosecond high order harmonic radiation. Physical Review Letters, 76(14):2468–2471, 1996.
- [33] R. Haight and D. R. Peale. Tunable photoemission with harmonics from subpicosecond lasers. Review of Scientific Instruments, 65(6):1853–1857, 1994.
- [34] M. Hentschel, R. Kienberger, Ch. Spielmann, G. A. Reider, N. Milosevic, T. Brabec, P. Corkum, U. Heinzmann, M. Drescher, and F. Krausz. Attosecond metrology. Nature, 414(6863):509–513, 2001.
- [35] Michael C. Hettrick. In-focus monochromator: Theory and experiment of a new grazing incidence mounting. Applied Optics, 29:4531–4535, 1990.
- [36] John David Jackson. Classical Electrodynamics, 3rd Edition. John Wiley & Sons, Inc., New York, 1999.
- [37] J. Javanainen, J.H. Eberly, and Q. Su. Numerical simulations of multiphoton ionization and above-threshold electron spectra. Physical Review A, 38:3430, 1988.
- [38] M. Jurvansuu, A. Kivimaki, and S. Aksela. Inherent lifetime widths of Ar $2p^{-1}$, Kr $3d^{-1}$, Xe $3d^{-1}$, and Xe $4d^{-1}$ states. Physical Review A, 64:012502–7, 2001.
- [39] H. C. Kapteyn, L. B. D. Silva, and R. W. Falcone. Short-wavelength lasers. Proceedings of the IEEE, 80(3):342, 1992.
- [40] R. Kienberger, E. Goulielmakis, M. Uiberacker, A. Baltuska, V. Yakovlev, F. Bammer, A. Scrinzi, T. Westerwalbesloh, U. Kleineberg, U. Heinzmann, M. Drescher, and F. Krausz. Atomic transient recorder. Nature, 427(6977):817–821, 2004.
- [41] V.P. Krainov. Ionization rates and energy and angular distributions at the barrier-suppression ionization of complex atoms and atomic ions. Journal of the Optical Society of America B, 14(2):425, 1997.
- [42] J. L. Krause, K. J. Schafer, and K. C. Kulander. High-order harmonic generation from atoms and ions in the high intensity regime. Physical Review Letters, 68(24):3535, 1992.
- [43] P. Kruit and F. H. Read. Magnetic field paralleliser for 2π electron-spectrometer and electron-image magnifier. Journal of Physics E - Scientific Instruments, 16(4):313–324, 1983.
- [44] K. C. Kulander, K. J. Schafer, and J. L. Krause. Dynamics of short-pulse excitation, ionization and harmonic conversion. In Super-intense laser-atom physics, 316, pages 95–110. NATO Advanced Science Institutes, 1993.
- [45] L. D. Landau, E. M. Lifshitz, and L. P. Pitaevskii. Electrodynamics of Continuous Media, 2nd Edition. Reed Educational and Professional Publishing Ltd, Oxford, 1984.
- [46] M. Lewenstein, Ph. Balcou, M. Y. Ivanov, and P.B. Corkum. Theory of high-harmonic generation of low-frequency laser fields. Physical Review A, 49(3):2117–2132, 1993.

- [47] M. Lewenstein, P. Salieres, and A. L’Huillier. Phase of the atomic polarization in high-order harmonic generation. Physical Review A, 52(6):4747–4754, 1995.
- [48] A. L’Huillier, M. Lewenstein, P. Salieres, P. Balcou, M. Y. Ivanov, J. Larsson, and C. G. Wahlstrom. High-order harmonic-generation cutoff. Physical Review A, 48(5):R3433–R3436, 1993.
- [49] A. R. Libertun, X. Zhang, A. Paul, E. Gagnon, T. Popmintchev, S. Backus, M. M. Murnane, H. C. Kapteyn, and I. P. Christov. Design of fully spatially coherent extreme-ultraviolet light sources. Applied Physics Letters, 84(19):3903–3905, 2004.
- [50] E.A.J. Marcatili and R.A. Schmelzter. Hollow metallic and dielectric waveguides for long distance optical transmission and lasers. Bell System Technical Journal, 43:1783, 1964.
- [51] A. McPherson, G. Gibson, H. Jara, U. Johann, T. S. Luk, I. A. McIntyre, K. Boyer, and C. K. Rhodes. Studies of multiphoton production of vacuum-ultraviolet radiation in the rare gases. Journal of the Optical Society of America B, 4:595–601, 1987.
- [52] J. H. Moore, C. C. Davis, and M. A. Coplan. Building scientific apparatus : a practical guide to design and construction, 2nd edition. Addison-Wesley, Redwood City, CA, 1989.
- [53] B. Nikolaus and D. Grishkowsky. 12x pulse compression using optical fibers. Applied Physics Letters, 42(1):1–2, 1983.
- [54] M. Nisoli, S. De Silvestri, and O. Svelto. Generation of high energy 10 fs pulses by a new pulse compression technique. Applied Physics Letters, 68(20):2793–2795, 1996.
- [55] L. Nugent-Glandorf, M. Scheer, D. A. Samuels, A. M. Mulhisen, E. R. Grant, X. M. Yang, V. M. Bierbaum, and S. R. Leone. Ultrafast time-resolved soft x-ray photoelectron spectroscopy of dissociating br-2. Physical Review Letters, 87(19):193002, 2001.
- [56] A. Paul, R. A. Bartels, R. Tobey, H. Green, S. Weiman, I. P. Christov, M. M. Murnane, H. C. Kapteyn, and S. Backus. Quasi-phase-matched generation of coherent extreme-ultraviolet light. Nature, 421(6918):51–54, 2003.
- [57] P. M. Paul, E. S. Toma, P. Breger, G. Mullot, F. Auge, Ph. Balcou, H. G. Muller, and P. Agostini. Observation of a train of attosecond pulses from high harmonic generation. Science, 292(5522):1689–1692, 2001.
- [58] J. Peatross, M. V. Fedorov, and K. C. Kulander. Intensity-dependent phase-matching effects in harmonic generation. Journal of the Optical Society of America B, 12(5):863–870, 1995.
- [59] S.C. Rae. Ionization-induced defocusing of intense laser pulses in high-pressure gases. Optics Communications, 97:25–28, 1993.
- [60] J. J. Rocca, C. H. Moreno, M. C. Marconi, and K. Kanizay. Soft-x-ray laser interferometry of a plasma with a tabletop laser and a lloyd’s mirror. Optics Letters, 24:420–422, 1999.
- [61] A. Rundquist. Phase-matched generation of coherent, ultrafast x-rays using high harmonics. Ph.d., Washington State University, 1998.
- [62] A. Rundquist, C.G. Durfee III, S. Backus, C. Herne, Z. Chang, M.M. Murnane, and H.C. Kapteyn. Phase-matched generation of coherent soft x-rays. Science, 280(5368):1412–1415, 1998.
- [63] P. Salieres, T. Ditmire, M. Perry, A. L’Huillier, and M. Lewenstein. Angular distributions of high-order harmonics generated by a femtosecond laser. Journal of Physics B, 29(20):4771–4786, 1996.

- [64] J. M. Schins, P. Breger, P. Agostini, R. C. Constantinescu, H. G. Muller, A. Bouhal, G. Grillon, A. Antonetti, and A. Mysyrowicz. Cross-correlation measurements of femtosecond extreme-ultraviolet high-order harmonics. Journal of the Optical Society of America B, 13(1):197–200, 1996.
- [65] M. Schnrer, Z. Cheng, M. Hentschel, G. Tempea, P. Klmn, T. Brabec, and F. Krausz. Absorption-limited generation of coherent ultrashort soft-x-ray pulses. Physical Review Letters, 83(4):722–725, 1999.
- [66] A. Scrinzi, M. Geissler, and T. Brabec. Ionization above the coulomb barrier. Physical Review Letters, 83(4):706–709, 1999.
- [67] E. Seres, J. Seres, F. Krausz, and C. Spielmann. Generation of coherent soft-x-ray radiation extending far beyond the titanium l edge. Physical Review Letters, 92(16):163002, 2004.
- [68] B. Shan and Z. H. Chang. Dramatic extension of the high-order harmonic cutoff by using a long-wavelength driving field. Physical Review A, 65(1):1804, 2002.
- [69] P.L. Shkolnikov, A. Lago, and A.E. Kaplan. Optimal quasi-phase-matching for high-order harmonic generation in gases and plasmas. Physical Review A, 50(6):R4461, 1994.
- [70] C. Spielmann, N. H. Burnett, S. Sartania, R. Koppitsch, M. Schnrer, C. Kan, M. Lenzner, P. Wobrauschek, and F. Krausz. Generation of coherent x-rays in the water window using 5-femtosecond laser pulses. Science, 278:661–664, 1997.
- [71] C. Spielmann, N. H. Burnett, S. Sartania, R. Koppitsch, M. Schnrer, C. Kan, M. Lenzner, P. Wobrauschek, and F. Krausz. Near-keV coherent x-ray generation with sub-10-fs lasers. IEEE Journal of Selected Topics in Quantum Electronics, 4:249–265, 1998.
- [72] G. Tempea and T. Brabec. Nonlinear source for the generation of high-energy few-cycle optical pulses. Optics Letters, 23(16):1286–1288, 1998.
- [73] W. J. Tomlinson, R. H. Stolen, and C. V. Shank. Compression of optical pulses chirped by self-phase modulation in fibers. Journal of the Optical Society of America B, 1(2):139, 1984.
- [74] R. Trebino. Frequency-resolved optical gating: the measurement of ultrashort laser pulses. Kluwer Academic, Boston, 2000.
- [75] T. Tsuboi, E. Y. Xu, Y. K. Bae, and K. T. Gillen. Magnetic bottle electron spectrometer using permanent magnets. Review of Scientific Instruments, 59(8):1357–1362, 1988.
- [76] J. H. Underwood and E. M. Gullikson. High-resolution, high-flux, user friendly vls beamline at the als for the 501300 eV energy region. Journal of Electron Spectroscopy and Related Phenomena, 92:265–272, 1998.
- [77] S. L. Voronov, I. Kohl, J. B. Madsen, J. Simmons, N. Terry, J. Titensor, Q. Wang, and J. Peatross. Control of laser high-harmonic generation with counterpropagating light. Physical Review Letters, 8713(13):3902, 2001.
- [78] N. L. Wagner, E. A. Gibson, T. Popmintchev, I. P. Christov, M. M. Murnane, and H. C. Kapteyn. Self-compression of ultrashort pulses through ionization-induced spatio-temporal reshaping. Physical Review Letters, to be published 2004.
- [79] C.G. Wahlstrom, S. Borgstrom, J. Larsson, and S.G. Pettersson. High-order harmonic generation in laser-produced ions using a near-infrared laser. Physical Review A, 51:585, 1995.

- [80] C.G. Wahlstrom, J. Larsson, A. Persson, T. Starczewski, S. Svanberg, P. Salieres, Ph. Balcou, and A. L'Huillier. High-order harmonic generation in rare gases with an intense short-pulse laser. Phys. Rev. A, 48:4709–4720, 1993.
- [81] B. Walker, B. Sheehy, L.F. DiMauro, P. Agostini, K.J. Schafer, and K.C. Kulander. Precision measurement of strong field double ionization of helium. Physical Review Letters, 73(9):1227–1230, 1994.
- [82] K. Yamane, Z. Zhang, K. Oka, R. Morita, M. Yamashita, and A. Suguro. Optical pulse compression to 3.4fs in the monocycle region by feedback phase compensation. Optics Letters, 28(22):2258–2260, 2003.
- [83] J. Zhou, J. Peatross, M.M. Murnane, H.C. Kapteyn, and I.P. Christov. Enhanced high harmonic generation using 25 femtosecond laser pulses. Physical Review Letters, 76(5):752–755, 1996.