

Bibliography

- [1] J. Manz and L. Wöste (eds.), *Femtosecond Chemistry*, VCH-Verlagsgesellschaft, Weinheim, 1995.
- [2] M. Dantus, M. J. Rosker, and A. H. Zewail, *Real-time Femtosecond Probing of "Transition States" in Chemical Reactions*, J. Chem. Phys. **87** (1987), 2395–2397.
- [3] M. J. Rosker, M. Dantus, and A. H. Zewail, *Femtosecond Clocking of the Chemical Bond*, Science **241** (1988), 1200–1202.
- [4] A. M. Weiner, D. E. Leaird, J. S. Patel, and J. R. Wullert, *Programmable Shaping of Femtosecond Optical Pulses by Use of 128-Element Liquid Crystal Phase Modulator*, IEEE J. Quant. Electr. **28** (1992), 908–919.
- [5] R. S. Judson and H. Rabitz, *Teaching Lasers to Control Molecules*, Phys. Rev. Lett. **62** (1992), 1500–1503.
- [6] H. Rabitz and W. Zhu, *Optimal Control of Unimolecular Motion: Design, Implementation, and Inversion*, Acc. Chem. Res. **33** (2000), 572–578.
- [7] R. J. Levis, G. M. Menkir, and H. Rabitz, *Selective Bond Dissociation and Rearrangement with Optimally Tailored, Strong-Field Laser Pulses*, Science **292** (2001), 709–713.
- [8] A. Herrmann, S. Leutwyler, E. Schumacher, and L. Wöste, Chem. Phys. Lett. **52** (1977), 418–425.
- [9] P. F. Moulton, *Spectroscopic and laser characteristics of Ti:Al₂O₃*, J. Opt. Soc. Am. B **3** (1986), 125–133.
- [10] P. M. W. French, *The Generation of Ultrashort Laser Pulses*, Rep. Prog. Phys. **58** (1995), 169–267.
- [11] I. D. Jung, F. X. Krtner, N. Matuschek, D. H. Sutter, F. Morier-Genoud, G. Zhang, U. Keller, V. Scheuer, M. Tilsch, and

- T. Tschudi, *Self-starting 6.5-fs Pulses from a Ti:sapphire Laser*, *Opt. Lett.* **22** (1997), 1009–1011.
- [12] C. Rulliere, *Femtosecond Laser Pulses. Principles and Experiments*, Springer, 1998.
- [13] Spectra Physics, *Ti:sapphire Oscillator*, 1994.
- [14] J.-C. Diels and W. Rudolph, *Ultrashort Laser Pulse Phenomena. Fundamentals, Techniques, and Applications on a Femtosecond Time Scale*, Academic Press, 1996.
- [15] J. Kafka, M. Watts, and J.-W. Pieterse, *Picosecond and Femtosecond Pulse Generation in a Generatively Mode-Locked Ti:Sapphire Laser*, *IEEE J. Quant. Electr.* **28** (1992), 2151–2162.
- [16] P. Maine, D. Strickland, P. Bado, M. Pessot, and G. Mourou, *Generation of Ultrahigh Peak Power Pulses by Chirped Pulse Amplification*, *IEEE J. Quant. Electr.* **24** (1988), 398–403.
- [17] M. Maier, W. Kaiser, and J. A. Giordmaine, *Intense Light Bursts in the Stimulated Raman Effect*, *Phys. Rev. Lett.* **17** (1966), 1275–1277.
- [18] J. Diels, J. Fontaine, I. McMichael, and S. Simoni, *Control and Measurement of Ultrashort Pulse Shapes (in Amplitude and Phase) with Femtosecond Accuracy*, *Appl. Opt.* **24** (1985), 1270–1282.
- [19] C. Lupulescu, *Fragmentation of Homogeneous and Heterogeneous Alkali Metal Clusters*, Master's thesis, Freie Universität Berlin, Universitatea de Vest Timisoara, 1999.
- [20] A. Bartelt, *Steuerung der Wellenpaketdynamik in kleinen Alkalischustern mit optimierten Femtosekundenpulsen*, Ph.D. thesis, Freie Universität Berlin, 2002.
- [21] R. Trebino, K. W. DeLong, D. N. Fittinghoff, J. N. Sweetser, M. 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** (1997), 3277–3295.
- [22] K. W. DeLong, R. Trebino, J. Hunter, and W. White, *Frequency-Resolved Optical Gating with the Use of Second-Harmonic Generation*, *J. Opt. Soc. Am. B* **11** (1994), 2206–2215.
- [23] M. Krenz, *Aufbau eines sub-30 fs Ti:Saphir Oszillators und dessen Erweiterung um ein Multipass-Verstärker-System mit nachgeschalteten TOPAS. Pulscharakterisierung mittels eines eigenkonstruierten Photodioden-Autokorrelators*, Master's thesis, Freie Universität Berlin, April 2001.

- [24] 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** (1994), 2152–2154.
- [25] J. Nicholson, F. Omenetto, D. Funk, and A. Taylor, *Evolving FROG: Pulse-Retrieval Algorithm from Frequency-Resolved Optical Gating Measurements by Use of Genetic Algorithms*, *Opt. Lett.* **24** (1998), 490–492.
- [26] K. W. DeLong and R. Trebino, *Improved Ultrashort Pulse-Retrieval Algorithm for Frequency-Resolved Optical Gating*, *J. Opt. Soc. Am. A* **11** (1994), 2429–2437.
- [27] 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 Up-conversion Technique*, *J. Opt. Soc. Am. B* **13** (1996), 1780–1785.
- [28] J. P. Foing, J. P. Likforman, M. Joffre, and A. Migus, *Femtosecond Phase Measurement by Spectrally Resolved Up-conversion-Application to Continuum Compression*, *J. Quant. Electr.* **28** (1992), 2285–2290.
- [29] M. Fettermann, D. Goswami, D. Keusters, W. Yang, J.-K. Rhee, and W. S. Warren, *Ultrafast Pulse Shaping: Amplification and Characterization*, *Opt. Express* **3** (1998), 366–375.
- [30] M. R. Fettermann, J. C. Davis, H.-S. Tan, W. Yang, D. Goswami, J.-K. Rhee, and W. S. Warren, *Fast-frequency-hopping Modulation and Detection Demonstration*, *J. Opt. Soc. Am. B* **18** (2001), 1372–1376.
- [31] S. Linden, H. Giessen, and J. Kuhl, *XFROG - A New Method for Amplitude and Phase Characterization of Weak Ultrashort Pulses*, *Phys. Stat. Sol. B* **206** (1998), 119–124.
- [32] F. L. Pedrotti and L. S. Pedrotti, *Introduction to Optics*, Prentice-Hall International, New Jersey, 1987.
- [33] S. D. Jacobs, K. A. Cerqua, K. L. Marshall, A. Schmid, M. J. Guardalben, and K. J. Skerrett, *Liquid-crystal Laser Optics: Design, Fabrication, and Performance*, *J. Opt. Soc. Am. B* **5** (1998), no. 9, 1962–1978.
- [34] Cambridge Research & Instrumentation, Inc., *SLM-256 Spatial Light Modulator*.

- [35] Cambridge Research & Instrumentation, Inc., *Spatial Light Modulator System*, 2003.
- [36] O. E. Martinez, *3000 Times Grating Compressor with Positive Group Velocity Dispersion: Application to Fiber Compensation in 1.3–1.6 μm Region*, IEEE J. Quant. Elect. **23** (1987), 59–64.
- [37] A. M. Weiner, *Femtosecond Pulse Shaping Using Spatial Light Modulators*, Rev. Sci. Instrum. **71** (2000), 1929–1960.
- [38] A. M. Weiner, J. P. Heritage, and E. M. Kirschner, *High-Resolution Femtosecond Pulse Shaping*, J. Opt. Soc. Am. B **5** (1988), 1563–1572.
- [39] M. Wefers and K. Nelson, *Analysis of Programmable Ultrashort Waveform Generation Using Liquid-Crystal Spatial Light Modulators*, J. Opt. Soc. Am B **12** (1995), 1343–1362.
- [40] S. M. Weber, *Application of Evolution Strategies on Arbitrary Pulse Form Generation, White Light Generation and Isotope Ratio Optimization of K_2* , Master’s thesis, Freie Universität Berlin, 2003.
- [41] Jenoptik Laser, Optik, Systeme GmbH, *SLM-S 640/12 documentation*, 2002.
- [42] C. W. Hillegas, J. X. Tull, D. Goswami, D. Strickland, and W. S. Warren, *Femtosecond Laser-pulse Shaping by Use of Microsecond Radiofrequency Pulses*, Optics Letters **19** (1994), 737–739.
- [43] M. A. Dugan, J. X. Tull, and W. S. Warren, *High-resolution Acousto-optic Shaping of Unamplified and Amplified Femtosecond Laser Pulses*, J. Opt. Soc. Am. B **14** (1997), 2348–2358.
- [44] A. M. Weiner, *Femtosecond Optical Pulse Shaping and Processing*, Progress in Quant. Electr. **19** (1995), 161–237.
- [45] K. F. Kwong, D. Yankelevich, K. C. Chu, J. P. Heritage, and A. Dienes, *400-Hz Mechanical Scanning Optical Delay-Line*, Opt. Lett. **18** (1993), 558–560.
- [46] Erik Zeek, *Pulse Shaping for High-Harmonic Generation*, Ph.D. thesis, University of Michigan, 2000.
- [47] A. M. Weiner, *Femtosecond Optical Pulse Shaping and Processing*, Progress in Quant. Electr. **19** (1995), 161–237.
- [48] A. M. Weiner, J. P. Heritage, and E. M. Kirschner, *High-Resolution Femtosecond Pulse Shaping*, J. Opt. Soc. Am. B **5** (1988), 1563–1572.

- [49] F. H. Kühling, *Ultrakurzzeit-Spektroskopie an kleinen Alkaliclustern*, Ph.D. thesis, Freie Universität Berlin, 1993.
- [50] B. Baptist, *Ultrakurzzeit-Spektroskopie heterogener dreiatomige Alkalicluster*, Freie Universität Berlin, 1999.
- [51] A. Persky, E. F. Greene, and A. Kuppermann, *Formation of Positive and Negative Ions on Rhenium, Oxygenated Tungsten, Hafnium, Lanthanum Hexaboride, and Thoriated Tungsten Surfaces*, J. Chem. Phys. **49** (1968), 2347–2357.
- [52] H. Pauly, *Atom, Molecule, and Cluster Beams*, vol. I and II, Springer, 2000.
- [53] S. Rutz, *Femtosekundenspektroskopie zur Wellenpaketdynamik in Alkalidimeren und -trimeren*, Ph.D. thesis, Freie Universität Berlin, 1996.
- [54] J. Blanc, *Spectroscopy of Small Metal Clusters and the Application to Laser Machining*, Ph.D. thesis, Freie Universität Berlin, 1992.
- [55] G. Delacrétaz and L. Wöste, *Vibrationally Resolved Spectroscopy of Sodium Clusters*, Surf. Sci. **156** (1985), 770–776.
- [56] C. Huang, M. Asaki, S. Backus, H. Nathel, M. M. Murnane, and H. C. Kapteyn, *17 Femtosecond Pulses from a Self-Modelocked Ti:Sapphire Laser*, Opt. Lett. **17** (1992), 1289–1291.
- [57] Spectra Physics, *Millennia X, User's Manual*, 1998.
- [58] NY U.S.A. Quantronix, Smithtown, *Quantronix 4800, preliminary manual*, 1993.
- [59] P. Rosendo-Francisco, *Analyse und Steuerung photoinduzierter Molekulardynamik in kleine Clustern und Molekülen*, Ph.D. thesis, Freie Universität Berlin, 2000.
- [60] Coherent, *Verdi V, User's Manual*, 2001.
- [61] KL Laboratories, *Kapteyn, User's Manual*, 2000.
- [62] Quantronix, *Odin, User's Manual*, 2000.
- [63] Light Conversion, *TOPAS – Travelling-wave Optical Parametric Amplifier of Superfluorescence, User's Manual*, Vilnius, Lituania.
- [64] P. Wetzels, *Fragmentation heteronuklearer Cluster und Schritte zu Pump&Control*, Master's thesis, Freie Universität Berlin, 1998.
- [65] F. Schwabl, *Quantenmechanik*, Springer Verlag, Berlin Heidelberg New York, 2002.

- [66] D. J. Tannor, *Interaction of Light with Matter: A Coherent Perspective*, Encyclopedia of Chemical Physics and Physical Chemistry (J. H. Moore and N. D. Spencer, eds.), I. P., Philadelphia, 2000.
- [67] G. Herzberg, *Molecular Spectra and Molecular Structure: I. Spectra of Diatomic Molecules*, Robert E. Krieger Publishing Company, Malabar, Florida, 1989.
- [68] M. J. Rosker, M. Dantus, and A. H. Zewail, *Femtosecond Real Time Probing of Reactions: I. The Technique*, J. Chem. Phys. **89** (1998), 6113–6127.
- [69] J. H. Glowia, R. E. Walkup, D. R. Grass, M. Kaschke, J. A. Misewich, and P. P. Sorokin, *Femtosecond Chemistry*, ch. Femtosecond Broadband Absorption Spectroscopy of Fragments Formed in the Photodissociation of Gas-Phase Molecules, pp. 131–166, VCH-Verlagsgesellschaft, Weinheim, 1995.
- [70] Y. Chen, L. Hunziker, P. Ludowise, and M. Morgen, *Femtosecond Transient Stimulated Emission Pumping Studies of Ozone Visible Photodissociation*, J. Chem. Phys. **97** (1992), 2149–2152.
- [71] M. Dantus, M. H. M. Janssen, and A. H. Zewail, *Femtosecond Probing of Molecular Dynamics by Mass-Spectrometry in a Molecular Beam*, Chem. Phys. Lett. **181** (1991), 281–287.
- [72] L. Wöste, *Laser Spectroscopy of Metal Clusters*, Zeitschrift für Physikalische Chemie **196** (1996), 1–41.
- [73] S. Wolf, G. Sommerer, S. Rutz, E. Schreiber, T. Leisner, and L. Wöste, *Spectroscopy of Size-Selected Neutral Clusters: Femtosecond Evolution of Neutral Silver Trimers*, Phys. Rev. Lett. **74** (1995), 4177–4180.
- [74] J. Heufelder, H. Ruppe, S. Rutz, E. Schreiber, and L. Wöste, *Fractional Revivals of Vibrational Wave Packets in the NaK $A^1\Sigma^+$ State*, Chem. Phys. Lett. **269** (1997), 1–8.
- [75] Š. Vajda, A. Bartelt, C. Lupulescu, and L. Wöste, *Progress in Experimental and Theoretical Studies of Clusters (Advanced Series in Physical Chemistry)*, no. ISBN-981-02-3893-2, World Scientific Publishing, Singapore, 2003.
- [76] S. Rutz, R. de Vivie-Riedle, and E. Schreiber, *Femtosecond Wavepacket Propagation in Spin-orbit-coupled Electronic States of $^{39,39}K_2$ and $^{39,41}K_2$* , Phys. Rev. A **54** (1996), 306–313.

- [77] I. S. Averbukh and N. F. Perelman, *Fractional Revivals: Universality in the Long-Term Evolution of Quantum Wavepackets Beyond the Corresponding Principle Dynamics*, Phys. Lett. A **139** (1989), 449.
- [78] M. J. J. Vrakking, D. M. Villeneuve, and A. Stolow, *Observation of Fractional Revivals of a Molecular Wave Packet*, Phys. Rev. A **54** (1996), R37–R40.
- [79] S. Rutz and E. Schreiber, *Fractional Revivals of Wave Packets in the $A^1\Sigma_u^+$ State of K_2 . A Comparison of Two Different Pump and Probe Cycles by Spectrograms*, Chem. Phys. Lett. **269** (1997), 9–16.
- [80] R. de Vivie-Riedle, B. Reischl, S. Rutz, and E. Schreiber, *Femtosecond Study of Multiphoton Ionization Process in K_2 at Moderate Laser Intensities*, J. Phys. Chem. **99** (1995), 16829–16834.
- [81] A. J. Ross, P. Crozet, C. Effantin, J. d’Incan, and R. F. Barrow, *Interactions Between the $A(1)^1\Sigma_u^+$ and $b(1)^3\pi_u$ States of K_2* , J. Phys. B **20** (1987), 6225–6231.
- [82] G. Jong, H. Wang, C.-C. Tsai, W. C. Stwalley, and A. M. Lyrra, *The Study of the $^{39}K_2$ Rydberg $^1\Delta_g$ States by CW Optical-Optical Double-Resonance Spectroscopy*, J. Mol. Spectr. **154** (1992), 324–344.
- [83] M. Weissbluth, *Atoms and Molecules*, Academic Press, New York, 1978.
- [84] G. Delacrétaz, E. Grant, R. Whetten, L. Woeste, and J. Zwanziger, *Fractional Quantization of Molecular Pseudorotation in Na_3* , Phys. Rev. Lett. **56** (1986), 2598–2601.
- [85] U. Gaubatz, P. Rudecki, S. Schiemann, and K. Bergmann, *Population Transfer between Molecular Vibrating Levels by Stimulated Raman Scattering with Partially Overlapping Laser Fields: A New Concept and Experimental Results*, J. Chem. Phys. **92** (1990), 5363–5376.
- [86] T. Halfmann, L. P. Yatsenko, M. Shapiro, B. W. Shore, and K. Bergmann, *Population Trapping and Laser-induced Continuum Structure in Helium: Experiment and Theory*, Phys. Rev. A **58** (1998), R46.
- [87] T. Halfmann and K. Bergmann, *Coherent Population Transfer and Dark Resonances in SO_2* , J. Chem. Phys. **104** (1996), 7068–7072.
- [88] D. J. Tannor and S. A. Rice, *Control of Selectivity of Chemical Reaction via Control of Wavepacket Evolution*, J. Chem. Phys. **83** (1985), 5013–5018.

- [89] D. J. Tannor, R. Kosloff, and S. A. Rice, *Coherent Pulse Sequence Induced Control of Selectivity of Reactions: Exact Quantum Mechanical Calculations*, J. Chem. Phys. **85** (1986), 5805–5820.
- [90] P. Ehrenfest, Z. Phys. **45** (1927), 455.
- [91] E. D. Potter, J. L. Herek, S. Pedersen, Q. Liu, and A. H. Zewail, *Femtosecond Laser Control of a Chemical Reaction*, Nature **355** (1992), 66–68.
- [92] T. Baumert, J. Helbig, and G. Gerber, *Coherent Control with Femtosecond Laser Pulses*, Adv. Chem. Phys. **101** (1997), 47.
- [93] Stuart A. Rice and Meishan Zhao, *Optical Control of Molecular Dynamics*, John Wiley&Sons, Inc., New York, 2000.
- [94] N. F. Scherer, R. J. Carlson, A. Matro, M. Du, A. J. Ruggiero, V. Romero-Rochin, J. A. Cina, G. R. Fleming, and S. A. Rice, *Fluorescence-detected Wavepacket Interferometry: Time Resolved Molecular-Spectroscopy with Sequences of Femtosecond Phase-Locked Pulses*, J. Chem. Phys. **95** (1991), 1487–1511.
- [95] M. Shapiro and P. Brumer, *Laser Control of Product Quantum State Population in Unimolecular Reactions*, J. Chem. Phys. **84** (1986), 4103–4104.
- [96] P. Brumer and M. Shapiro, *Control of Unimolecular Reactions Using Coherent Light*, Chem. Phys. Lett. **126** (1986), 541–564.
- [97] L. Zhu, K. Suto, J. A. Fiss, R. Wada, T. Seideman, and R. J. Gordon, *Effect of Resonances on the Coherent Control of the Photoionization and Photodissociation of HI and DI*, Phys. Rev. Lett. **79** (1997), 4108–4111.
- [98] L. Zhu, K. Suto, J. A. Fiss, R. Wada, T. Seideman, and R. J. Gordon, *Mechanism of Coherent Control of the Photoionization and Photodissociation of HI and DI*, Chem. Phys. **233** (1998), 335–341.
- [99] V. D. Kleinmann, L. Zhu, X. Li, and R. J. Gordon, *Coherent Control of the Photoionization of H₂S*, J. Chem. Phys. **102** (1995), 5863–5866.
- [100] A. P. Perice, M. A. Dahleh, and H. Rabitz, *Optimal Control of Quantum-Mechanical Systems: Existence, Numerical Approximation, and Applications*, Phys. Rev. A **37** (1988), 4950–4967.
- [101] R. Kosloff, S. A. Rice, P. Gaspard, S. Tersigni, and D. J. Tannor, *Wavepacket Dancing: Achieving Chemical Selectivity by Shaping Light-Pulses*, Chem. Phys. **139** (1989), 201–220.

- [102] P. Gross, D. Neubauer, and H. Rabitz, *Optimal Control of Unimolecular Reactions in the Collisional Regime*, J. Chem. Phys. **94** (1991), 1158–1166.
- [103] J. Manz, K. Sundermann, and R. DeVivie-Riedle, *Quantum Optimal Control Strategies for Photoisomerization Via Electronically Excited States*, Chem. Phys. Lett. **190** (1998), 415–422.
- [104] S. P. Shah and S. A. Rice, *Controlling Quantum Wavepacket Motion in Reduced-Dimensional Spaces: Reaction Path Analysis in Optimal Control of HCN Isomerization*, Faraday Discuss. **113** (1999), 319–331.
- [105] R. Mitrić, M. Hartmann, J. Pittner, and V. Bonačić-Koutecký, *New Strategy for Optimal Control of Femtosecond Pump-Dump Process*, J. Phys. Chem. A **106** (2002), 10477–10481.
- [106] W. Zhu, J. Botina, and H. Rabitz, *Rapidly Convergent Iteration Methods for Quantum Optimal Control of Population*, J. Chem. Phys. **108** (1998), 1953–1963.
- [107] C. J. Bardeen, V.V. Yakovlev, K. R. Wilson, S. D Carpenter, P. M. Weber, and W. S. Warren, *Feedback Quantum Control of Molecular Electronic Population Transfer*, Chem. Phys. Lett. **280** (1997), 151–158.
- [108] A. Assion, T. Baumert, M. Bergt, T. Brixner, B. Kiefer, V. Seyfried, M. Strehle, and G. Gerber, *Control of Chemical Reactions by Feedback-Optimized Phase-Shaped Femtosecond Laser Pulses*, Science **282** (1998), 919–922.
- [109] Š. Vajda, A. Bartelt, C. Kaposta, T. Leisner, C. Lupulescu, S. Minemoto, P. Rosendo-Francisco, and L. Wöste, *Feedback Optimization of Shaped Femtosecond Laser Pulses for Controlling the Wavepacket Dynamics and Reactivity of Mixed Alkali Clusters*, Chem. Phys. **267** (2001), 231–239.
- [110] H. Kawashima, M. M. Wefers, and K. A. Nelson, *Femtosecond Pulse Shaping, Multiple-Pulse Spectroscopy, and Optical Control*, Annu. Rev. Phys. Chem. **46** (1995), 627–656.
- [111] R. Bartels, S. Backus, E. Zeek, L. Misoguti, G. Vdovin, I. P. Christov, M. M. Murnane, and H. C. Kapteyn, *Shaped-Pulse Optimization of Coherent Emission of High-Harmonic Soft X-Rays*, Nature **406** (2000), 164–166.
- [112] I. Rechenberg, *Evolutionsstrategie*, Friedrich Frommann Verlag, Stuttgart, 1973.

- [113] H. Schwefel, *Numerische Optimierung von Computer-Modellen mittels Evolutionsstrategien*, Birkaeuser Verlag, Basel, 1977.
- [114] T. Feurer, *Feedback-Controlled Optimization of Soft X-Ray Radiation from Femtosecond Laser-Produced Plasmas*, *Appl. Phys. B* **68** (1999), 55–60.
- [115] J. M. Geremia, W. Zhu, and H. J. Rabitz, *Incorporating Physical Implementation Concerns into Closed Loop Quantum Control Experiments*, *J. Chem. Phys.* **113** (2000), 10841–10848.
- [116] P. Gross, D. Neuhauser, and H. Rabitz, *Optimal Control of Curve-Crossing Systems*, *J. Chem. Phys.* **96** (1992), 2834–2845.
- [117] T. Hornung, R. Meier, and M. Motzkus, *Optimal Control of Molecular States in a Learning Loop with a Parametrization in Frequency and Time Domain*, *Chem. Phys. Lett.* **326** (2000), 445–453.
- [118] A. Bartelt, A. Lindinger, C. Lupulescu, Š. Vajda, and L. Wöste, *One Parameter fs-Pulse Form Control on NaK and Na₂K*, *Phys. Chem. Chem. Phys.* **5** (2003), 3610–3615.
- [119] A. F. Berndt and R. E. Marsh, *The Crystal Structure of Cyclopentadienyl Manganese Tricarbonyl, C₅H₅Mn(CO)₃*, *Acta Cryst.* **16** (1963), 118–123.
- [120] L. González, *priv. commun.*
- [121] J. Full, *Ultrafast Photodissociation Dynamics of η^5 -CpMn(CO)₃ (Cymantrene): Theory for Analysis and Control*, Ph.D. thesis, Freie Universität Berlin, 2002.
- [122] S. A. Trushin, W. Fuss, and W.E. Schmid, *Conical Intersections, Pseudorotation and Coherent Oscillations in Ultrafast Photodissociation of group-6 Metal Hexacarbonyls*, *Chem. Phys.* **259** (2000), 313–330.
- [123] S. A. Trushin, W. Fuss, K. L. Kompa, and W. E. Schmid, *Femtosecond Dynamics of Fe(CO)₅ Photodissociation at 267 nm Studied by Transient Ionization*, *J. Phys. Chem. A* **104** (2000), 1997–2006.
- [124] W. Fuss, W. E. Schmid, and S. A. Trushin, *Time-resolved Dissociative Intense-Laser Field Ionization for Probing Dynamics: Femtosecond Photochemical Ring Opening of 1,3-cyclohexadiene*, *J. Chem. Phys.* **112** (2000), 8347–8362.
- [125] S. K. Kim, S. Petersen, and A. H. Zewail, *Femtochemistry of Organometallics: Dynamics of Metal–Metal and Metal–Ligand Cleavage in M₂(CO)₁₀*, *Chem. Phys. Lett.* **233** (1995), 500.

- [126] L. Bañarez, T. Baumert, M. Bergt, B. Kiefer, and G. Gerber, *Femtosecond Time-Resolved Photodissociation Dynamics of Fe(CO)₅ in the Gas Phase*, Chem. Phys. Lett. **267** (1997), 141–148.
- [127] C. Daniel, J. Full, L. González, C. Kaposta, M. Krenz, C. Lupulescu, J. Manz, S. Minemoto, M. Oppel, P. Rosendo-Francisco, Š. Vajda, and L. Wöste, *Analysis and Control of Laser Induced Fragmentation Processes in CpMn(CO)₃*, Chem. Phys. **267** (2001), 247–260.
- [128] Š. Vajda, P. Rosendo-Francisco, C. Kaposta, M. Krenz, C. Lupulescu, and L. Wöste, *Analysis and Control of Ultrafast Photodissociation Processes in Organometallic Molecules*, Eur. Phys. J. D **16** (2001), 161–164.
- [129] C. Lupulescu, P. Rosendo-Francisco, Š. Vajda, and L. Wöste, *Analysis and Feedback-Control of Ultrafast Fragmentation Processes in CpMn(CO)₃*, Femtochemistry and Femtobiology – Ultrafast Dynamics in Molecular Science (A. Douhal and J. Santamaria, eds.), World Scientific Publishing, Singapore, 2002, pp. 390–398.
- [130] C. Lupulescu, Š. Vajda, A. Lindinger, A. Merli, and L. Wöste, *Femtosecond Investigations on the Ultrafast Photo-Dissociation Dynamics of CpMn(CO)₃⁺ and its Fragment Ions*, Phys. Chem. Chem. Phys. (2004), 3420–3425.
- [131] S. A. Trushin, W. Fuss, and W. E. Schmid, *Dissociative Ionization at High Laser Intensities: Importance of Resonances and Relaxation or Fragmentation*, J. Chem. Phys. (2003), submitted.
- [132] S. A. Trushin, W. Fuss, W. E. Schmid, and K. L. Kompa, *Femtosecond Dynamics and Vibrational Coherence in Gas-Phase Ultraviolet Photodecomposition of Cr(CO)₆*, J. Phys. Chem. A **102** (1998), 4129–4137.
- [133] C. Daniel, J. Full, L. González, C. Lupulescu, J. Manz, A. Merli, Š. Vajda, and L. Wöste, *Deciphering the Reaction Dynamics Underlying Optimal Control Laser Fields*, Science **299** (2003), 536–539.
- [134] C. Lupulescu, A. Lindinger, A. Merli, M. Plewicky, and L. Wöste, *Free Phase Optimization of CpMn(CO)₂⁺ as a Fragment of CpMn(CO)₃ By Means of Shaped Femtosecond Laser Pulses*, Ultrafast Molecular Events in Chemistry and Biology: Proceedings of the 6th Int. Conf. on Femtochemistry, Paris, France, 6-10 July 2003, to be published (M. Martin and J. T. Hynes, eds.), World Scientific Publishing, Singapore, 2004, pp. 123–126.

- [135] H. Haberland (ed.), *Clusters of Atoms and Molecules*, vol. 1, Springer-Verlag, 1994.
- [136] M. Hartmann, J. Pittner, and V. Bonačić-Koutecký, *Ab initio Adiabatic Dynamics Involving Excited States Combined with Wigner Distribution Approach to Ultrafast Spectroscopy Illustrated on Alkali Halide Clusters*, *J. Chem. Phys.* **114** (2001), 2106–2122.
- [137] M. Hartmann, J. Pittner, and V. Bonačić-Koutecký, *Ab initio Nonadiabatic Dynamics Involving Conical Intersections Combined with Wigner Distribution Approach to Ultrafast Spectroscopy Illustrated on Na_3F_2 Cluster*, *J. Chem. Phys.* **114** (2001), 2123–2136.
- [138] C. R. Pollack, *Encyclopedia of Lasers and Optical Technology*, Academic Press, San Diego, California, 1991.
- [139] Z.-L. Cai, G. Hirsch, and R. J. Buencker, *Ab initio Study of Electronic Spectrum of Na_2F* , *Chem. Phys.* **207** (1996), 43.
- [140] G. Durand, F. Spiegelmann, Ph. Poncharal, P. Labastie, J.-M. L’Hermite, and M. Sence, *One-electron Pseudopotential Study of $\text{Na}_n\text{F}_{n-1}$ Clusters*, *J. Chem. Phys.* **110** (1999), 7884–7892.
- [141] Ph. Poncharal, J.-M. L’Hermite, and P. Labastie, *Spectroscopy of Non-Stoichiometric Sodium-Fluoride Clusters $\text{Na}_n\text{F}_{n-1}$; Infrared Spectral Signature and Classification*, *Z. Phys. D* **40** (1997), 10–12.
- [142] P. Labastie, J.-M. L’Hermite, Ph. Poncharal, and M. Sence, *Two-photon Ionization of Alkali-halide Clusters Spectroscopy of Excess-electron Excited States*, *J. Chem. Phys.* **103** (1995), 6362–6367.
- [143] D. T. Vituccio, R. F. W. Herrmann, O. Golonzka, and W. E. Ernst, *New Measurements of Appearance Potentials and Optical Absorption of Na_2F and Na_3O* , *J. Chem. Phys.* **106** (1997), 3865–3869.
- [144] Š. Vajda, C. Lupulescu, A. Merli, F. Budzyn, L. Wöste, M. Hartmann, J. Pittner, and V. Bonačić-Koutecký, *Observation and Theoretical Description of Periodic Geometric Rearrangement in Electronically Excited Non-stoichiometric Sodium-fluoride Clusters*, *Phys. Rev. Lett.* **89** (2002), 213404.
- [145] C. Lupulescu, Š. Vajda, A. Lindinger, A. Merli, and L. Wöste, *Femtosecond Pump-Probe Experiments on Non-Stoichiometric Sodium-Fluoride Clusters. I. First Direct Observation of Periodical Structural Changes in Na_2F* , *Eur. Phys. J. D* **24** (2003), 173–176.
- [146] M.-C. Heitz, G. Durand, F. Spiegelmann, and C. Meier, *Time-resolved Photoelectron Spectra as Probe of Excited State Dynamics: A Full*

- Quantum Study of the Na₂F Cluster*, J. Chem. Phys. **118** (2003), 1282–1291.
- [147] H. Blume, T. Bader, and F. Luty, *Bi-directional Holographic Information Storage Based on the Optical Reorientation of F_A Centers in KCl:Na**, Opt. Commun. **12** (1974), 147–151.
- [148] V. Bonačić-Koutecký, M. Hartmann, and J. Pittner, *Theoretical Exploration of Ultrafast Spectroscopy of Small Clusters*, Eur. Phys. J. D **16** (2001), 133–138.
- [149] Š. Vajda, C. Lupulescu, A. Bartelt, P. Rosendo-Francisco, and L. Wöste, *Controlling the Vibration and Dissociation Dynamics in Triatomic Alkaline Clusters*, in *Femtochemistry and Femtobiology – Ultrafast Dynamics in Molecular Science*, ed. A. Douhal and J. Santamaria, World Scientific Publishing, Singapore, 2002, pp. 472–480.
- [150] S. Magnier, M. Aubert-Frécon, and Ph. Millié, *Potential Energies, Permanent and Transition Dipole Moments for Numerous Electronic Excited States of NaK*, J. Molec. Spec. **200** (2000), 96–103.
- [151] R. S. Mulliken, *Role of Kinetic Energy in the Franck-Condon Principle*, J. Chem. Phys. **55** (1971), 309–314.
- [152] L.-E. Berg, M. Beutter, and T. Hansson, *Femtosecond Laser Spectroscopy on the Vibrational Wavepacket Dynamics of the A¹Σ⁺ State of NaK*, Chem. Phys. Lett. **253** (1996), 327.
- [153] B. Schäfer-Bung, R. Mitrić, V. Bonačić-Koutecký, A. Bartelt, C. Lupulescu, A. Lindinger, Š. Vajda, S. M. Weber, and L. Wöste, *Optimal Control of Ionization Process in NaK: Comparison between Theory and Experiment*, J. Phys. Chem. A **108** (2004), 4175–4179.
- [154] V. Bonačić-Koutecký and B. Schäfer-Bung, *priv. commun.*, 2003.
- [155] C. Lupulescu, A. Lindinger, M. Plewicki, A. Merli, S. M. Weber, and L. Wöste, *Frequency Dependent Optimization of the Ionization Process in NaK by Means of fs-pulses*, Chem. Phys. **296** (2003), 63–69.
- [156] T. Baumert, M. Grosser, R. Thalweiser, and G. Gerber, *Femtosecond Time-resolved Molecular Multiphoton Ionization: The Na₂ System*, Phys. Rev. Lett. **67** (1991), 3753–3756.
- [157] A. Bartelt, A. Lindinger, C. Lupulescu, Š. Vajda, and L. Wöste, *Optimal Control of Multi-photon Dissociation and Ionization Processes in Small Na_mK_n Clusters*, Phys. Chem. Chem. Phys. **6** (2004), 1679–1686.

- [158] H. London, *Separation of Isotopes*, George Newnes Limited, London, 1961.
- [159] P. T. Greenland, *Contemp. Phys* **30** (1990), 405.
- [160] W. H. King, *Isotope Shifts in Atomic Spectra*, Plenum, New York, 1984.
- [161] I. S. Averbukh, M. J. J. Vrakking, D. M. Villeneuve, and A. Stolow, *Wave Packet Isotope Separation*, *Phys. Rev. Lett.* **77** (1996), 3518–3521.
- [162] A. Lindinger, C. Lupulescu, M. Plewicky, F. Vetter, A. Merli, S. M. Weber, and L. Wöste, *Isotope Selective Ionization by Optimal Control Using Shaped fs-Laser Pulses*, *Phys. Rev. Lett.* **93** (2004), 033001.
- [163] A. Lindinger, F. Vetter, C. Lupulescu, M. Plewicky, S. M. Weber, A. Merli, and L. Wöste, *Selective Ionization via Different Electronic Pathways by Optimal Control Demonstrated for $^{23}\text{Na}^{39}\text{K}/^{23}\text{Na}^{41}\text{K}$* , (2004), submitted.
- [164] A. Lindinger, C. Lupulescu, and L. Wöste, *Verfahren und Vorrichtung zur Trennung von Molekülen mit unterschiedlichen Anregungsspektren*, Patent pending (2003).
- [165] Ludger Wöste, *Massenselektive Laserspektroskopie an Metallclustern in überschall-Molekularstrahlen*, Ph.D. thesis, Universität Bern, Juris Druck + Verlag Zürich, 1978.
- [166] F. Vetter, *priv. commun.*, 2003.
- [167] M. Leibscher and I. S. Averbukh, *Optimal Control of Wave-Packet Isotope Separation*, *Phys. Rev. A* **63** (2001), 043407.
- [168] J. W. Nicholson, J. Jasapara, W. Rudolph, F. G. Omenetto, and A. J. Taylor, *Full-field Characterization of Femtosecond Pulses by Spectrum and Cross-correlation Measurements*, *Opt. Lett.* **24** (1999), 1774–1776.