

# Scientific Publications

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August 10, 2018

## Books:

1. S. W. Koch, *Dynamics of First-Order Phase Transitions in Equilibrium and Nonequilibrium Systems*, Springer Lecture Notes in Physics 207, Springer-Verlag, Berlin (1984).
2. H. Haug and S. W. Koch, *Quantum Theory of the Optical and Electronic Properties of Semiconductors*, World Scientific Publ., Singapore (1990); second edition (1993), third edition (1994), fourth edition (2004), fifth edition (2009).
3. N. Peyghambarian, S. W. Koch, and A. Mysyrowicz, *Introduction to Semiconductor Optics*, Prentice Hall, Englewood Cliffs, NJ (1993).
4. L. Banyai and S. W. Koch, *Semiconductor Quantum Dots*, World Scientific Series in Atomic, Molecular and Optical Physics - Vol. 2, World Scientific Publ., Singapore (1993).
5. W. W. Chow, S. W. Koch, and M. Sargent III, *Semiconductor-Laser Physics*, Springer Verlag, Berlin (1994); corrected second printing (1997).
6. W. W. Chow and S. W. Koch, *Semiconductor-Laser Fundamentals: Physics of the Gain Materials*, Springer Verlag, Berlin (1999).
7. T. Meier, P. Thomas, and S. W. Koch, *Coherent Semiconductor Optics: From Basic Concepts to Nanostructure Applications*, Springer Verlag, Berlin (2006).
8. M. Kira und S. W. Koch, *Semiconductor Quantum Optics*, Cambridge University Press (2011).

## Books and Proceedings, Editor:

1. S. W. Koch (Editor), *Microscopic Theory of Semiconductors: Quantum Kinetics, Confinement and Lasers*, World Scientific Publ., Singapore (1995).
2. S. W. Koch (Guest Editor), *Nonlinear Optics and Excitation Kinetics in Semiconductors*, *physica status solidi b* **221**, (2000).
3. S. W. Koch (Translation Editor), *German Translation of: Halliday, Resnick, Walker, *Fundamentals of Physics*, Extended 6th Ed., Wiley-VCH (2003).*

## Publications in Scientific Journals and Books:

1. H. Haug and S. W. Koch, "On the Theory of Laser Action in Dense Exciton Systems", *phys. stat. sol.* **b82**, 531–543 (1977).
2. C. Klingshirn, W. Maier, B. Hönerlage, H. Haug, and S. W. Koch, "Quantitative Investigation of the Recombination Involving Free Particle Scattering Processes in Highly Excited Blend Type II-VI Compounds", *Solid State Electronics* **21**, 1357–1360 (1978).
3. S. W. Koch, H. Haug, G. Schmieder, K. Bohnert, and C. Klingshirn, "Stimulated Intrinsic Recombination Processes in II-VI Compounds", *phys. stat. sol.* **b89**, 431–440 (1978).
4. H. Haug and S. W. Koch, "Electron-Hole Droplet Condensation - A Phase Transition in an Open System", *Physics Lett.* **A69**, 445–447 (1979).
5. S. W. Koch and H. Haug, "Electron-Hole-Plasma Phase Transition in Direct and Indirect Gap Semiconductors", *Physics Lett.* **A74**, 250–252 (1979).
6. S. W. Koch and H. Haug, "Treatment of the Electron-Hole Droplet Nucleation in the Fokker-Planck Approximation", *phys. stat. sol.* **b95**, 155–161 (1979).
7. S. W. Koch, "Comment on the Electron-Hole Droplet Condensation in Direct Gap Semiconductors", *Solid State Comm.* **35**, 419–421 (1980).
8. S. W. Koch, "On the Dynamics of the Plasma Phase Transition in Highly Excited Direct Gap Semiconductors", *phys. stat. sol.* **b103**, 687–695 (1981).
9. S. W. Koch, S. Schmitt-Rink, and H. Haug, "Theory of Optical Nonlinearities in InSb", *phys. stat. sol.* **b106**, 135–140 (1981).
10. H. Haug, S. W. Koch, R. März, and S. Schmitt-Rink, "Optical Nonlinearity and Bistability in Semiconductors due to Biexciton Formation", *J. Luminescence* **24-25**, 621–624 (1981).
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12. K. Bohnert, M. Anselment, G. Kobbe, C. Klingshirn, H. Haug, S. W. Koch, S. Schmitt-Rink, and F. F. Abraham, "Nonequilibrium Properties of the Electron-Hole Plasma in Direct Gap Semiconductors", *Z. Physik* **B42**, 1–11 (1981).
13. S. W. Koch and H. Haug, "Two-Photon Generation of Excitonic Molecules and Optical Bistability", *Phys. Rev. Lett.* **46**, 450–452 (1981).
14. H. Haug and S. W. Koch, "Nonequilibrium Phase Transitions in Highly Excited Semiconductors", *Dynamics of Synergetic Systems*, p. 57, ed. H. Haken, Springer Verlag, Berlin (1980).
15. S. W. Koch, "On the Hydrodynamics of the Electron-Hole Plasma Phase Transition in Highly Excited Semiconductors", *Recent Developments in Condensed Matter Physics*, Vol. 3, p. 249, Plenum Publ., New York (1981).
16. S. W. Koch, R. C. Desai, and F. F. Abraham, "Spinodal Decomposition of a One-Component Fluid: Hydrodynamic Fluctuation Theory and Comparison with Computer Simulation", *Phys. Rev.* **A26**, 1015–1022 (1982).
17. H. Haug, S. W. Koch, R. Neumann, and H. E. Schmidt, "Optical Bistability due to a Two-Photon Absorption Resonance with Fluctuations", *Z. Physik* **B49**, 79–86 (1982).
18. F. F. Abraham, S. W. Koch, and R. C. Desai, "Computer Simulation Dynamics of an Unstable Two-Dimensional Fluid: Time-Dependent Morphology and Scaling", *Phys. Rev. Lett.* **49**, 923–926 (1982).

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24. S. W. Koch and R. Liebmann, "Comparison of Molecular Dynamics and Monte Carlo Computer Simulations of Spinodal Decomposition", *J. Stat. Phys.* **33**, 31–41 (1983).
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33. R. Neumann, S. W. Koch, H. E. Schmidt, and H. Haug, "Deterministic Chaos and Noise in Optical Bistability", *Z. Physik* **B55**, 155–163 (1984).
34. S. W. Koch, H. E. Schmidt, and H. Haug, "Simulations of the Stochastic Dynamics of Switching for Optical Bistability", *Optical Bistability 2*, p. 205, Plenum Publ., New York (1984).
35. H. Haug and S. W. Koch, "Spatial and Temporal Phase Coexistence in Optical Bistability", *IEEE J. Quantum Electron.* **21**, 1385–1392 (1985).
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**Invited Talks at International Conferences and Workshops (only personally presented talks are listed):**

1. “Numerical Simulation of Spinodal Decomposition in Simple Fluids”, Conference on Kinetics of Phase Change, St. Barbara, CA, USA, March 1 - 5, 1982.
2. “Molecular Dynamics Simulation of Phase Transitions in Physisorbed Noble Gases”, 3rd General Conference of the Condensed Matter Division of the EPS, Lausanne, Switzerland, March 28 - 30, 1983.
3. “Molecular Dynamics Simulations of Phase Transitions in Noble Gas Overlayers”, Solid State Physics Conference, Oxford, UK, December 14 - 16, 1983.
4. “Theory of Resonance Enhanced Optical Nonlinearities and Bistability in Semiconductors” (in German), Spring Meeting of the German Physical Society DPG, Giessen, Fed. Rep. Germany, March 19 - 23, 1984.
5. “Optical Nonlinearities and Instabilities in Semiconductors”, 6th General Conference of the Condensed Matter Division of the EPS, Stockholm, Sweden, March 22 - 25, 1986.
6. “Dynamics and Evolution of Structure During Phase Transitions on Surfaces”, International Meeting on Advances in Phase Transitions and Disorder Phenomena, Amalfi, Italy, June 25 - 27, 1986. Published in: *Advances on Phase Transitions and Disorder Phenomena*, p. 72, eds. G. Busiello, L. DeCesare, F. Mancini, and M. Marinaro, World Scientific Publ., Singapore (1987).
7. “Optical Nonlinearities and Modelling of Nonlinear Optical Devices in GaAs and GaAs Microstructures”, International Workshop on High-Speed Optical Processes and Opto-Electronic Devices Based on Compound Semiconductors, Ann Arbor, MI, USA, May 27 - 29, 1987.
8. “Theory of Coherent Effects in Semiconductors”, 1987 Nonlinear Optics and Lasers Gordon Research Conference, Wolfeboro, NH, USA, July 27 - 31, 1987.
9. “Optical Nonlinearities of Semiconductors”, Topical Meeting on Optical Bistability, Aussois, France, March 23 - 25, 1988.
10. “Theory of Transient Optical Nonlinearities in Semiconductors”, XVI International Quantum Electronics Conference IQEC’88, Tokyo, Japan, July 18 - 21, 1988.
11. “Theory of Transmission Oscillations and Optical Stark Effect in Semiconductors”, International Conference on Optical Nonlinearity and Bistability of Semiconductors, Berlin, GDR, August 22 - 25, 1988.
12. “Femtosecond Dynamics of Semiconductors Nonlinearities: Theory and Experiments”, International Conference on Optical Switching in Low Dimensional Systems, Marbella, Spain, October 6 - 8, 1988. Published in: *Optical Switching in Low-Dimensional Systems*, p. 19, eds. H. Haug and L. Banyai, Plenum Press, New York (1989).
13. “Many-Body Theory of Bulk and Quantum-Well Semiconductor Lasers”, 5th International Symposium on Quantum Optics, Rotorua, New Zealand, February 13 - 17, 1989.
14. “Theory of Optical Nonlinearities in Bulk and Quantum-Well Semiconductor Lasers”, Paper JG4, Conference on Quantum Electronics and Laser Science QELS’89, Baltimore, USA, April 24 - 28, 1989.
15. “Theory of Linear and Nonlinear Optical Properties of Semiconductor Microcrystallites”, Spring Meeting of the Materials Research Society, San Diego, CA, USA, April 24 - 29, 1989.

16. "Optical Nonlinearities in Bulk and Quantum-Well Semiconductors and Semiconductor Quantum Dots", Fifth Interdisciplinary Laser Science Conference ILS-V, Stanford, CA, USA, August 28 - 31, 1989.
17. "Nonlinear Optical Properties of Quantum Confined Transitions in Semiconductor-Doped Glasses", Glass Meeting of the American Ceramics Society, Buena Vista, Florida, USA, September 17 - 20, 1989.
18. "Coulomb Effects in Semiconductor Quantum Dots", Second International Workshop on Nonlinear Optics and Excitation Kinetics in Semiconductors, Bad Stuer, GDR, November 27 - December 2, 1989.
19. "Optical Nonlinearities in Semiconductors", International Workshop on Space-Time Complexity in Nonlinear Optics, Tucson, AZ, USA, March 12 - 16, 1990.
20. "Coulomb Effects in Quantum Dots", XVII International Quantum Electronics Conference IQEC'90, Anaheim, CA, USA, May 21 - 25, 1990.
21. "Many-Body Coulomb Effects in SCL Media", Aspen Workshop on Physics of Semiconductor Lasers, Aspen, CO, USA, May 28 - June 8, 1990.
22. "Optical Properties of Semiconductor Quantum Dots: Theory", Fall Meeting of the Electrochemical Society, Seattle, WA, USA, October 15 - 19, 1990.
23. "Band Structure Engineering and Spectral Hole Burning in Semiconductor Lasers and Amplifiers", Twenty-First Winter Colloquium on Quantum Electronics, Snowbird, UT, USA, January 6 - 9, 1991.
24. "Semiconductor Laser Physics", ACSM Workshop on Semiconductor Laser Dynamics, Tucson, AZ, USA, March 8 - 9, 1991.
25. "Theory of Electron-Hole Excitations in Semiconductor Quantum Dots", 1991 Metals and Clusters Gordon Research Conference, Wolfeboro, NH, USA, August 5 - 9, 1991.
26. "Coulomb Effects and Nonlinear Optical Properties of Semiconductor Quantum Dots", Fifth International Conference on II-VI Compounds, Tamano, Okayama, Japan, September 8 - 13, 1991.
27. "Biexcitons in Quantum Dots", International Meeting on Optics of Excitons in Confined Systems, Giardini Naxos, Sicily, Italy, September 24 - 27, 1991.
28. "Semiconductor Bloch Equations and their Hydrodynamic Limit", ACMS Workshop on Computational Optics: Its Links with Computational Fluid Dynamics, Tucson, AZ, USA, March 18 - 21, 1992.
29. "Microscopic Theory of Rabi Flopping, Photon Echo, and Resonant Pulse Propagation in Semiconductors", Third International Workshop on Nonlinear Optics and Excitation Kinetics in Semiconductors, NOEKS III, Bonn-Bad Honnef, Germany, May 18 - 21, 1992.
30. "Kinetic Approach to Highly Excited Semiconductors and Semiconductor Lasers", Minisymposium on "The Reemergence of Kinetic Theory in Applications", SIAM 40th Anniversary Meeting, Los Angeles, CA, USA, July 20 - 24, 1992.
31. "Exchange Effects and Multi-Wave Mixing in Quantum-Confined Semiconductors", NATO Advanced Research Workshop Physics of Few-Electron Nanostructures, Noordwijk aan Zee, Netherlands, September 23 - 26, 1992.
32. "Theory of Linear and Nonlinear Optical Properties of Semiconductor Quantum Dots", 182nd Meeting of the Electrochemical Society, Toronto, Canada, October 11 - 16, 1992.

33. "Microscopic Theory of Semiconductor Microlasers", March Meeting of the APS, Seattle, Washington, USA, March 22 - 26, 1993.
34. "Optical Properties of Quantum Wells, Wires and Dots", Institute of Physics Annual Conference, Brighton, UK, April 19 - 22, 1993.
35. "Optical Nonlinearities in Quantum Confined Semiconductors", Workshop on Optical Properties of Mesoscopic Semiconductor Structures, Snowbird, UT, USA, April 20 - 23, 1993.
36. "Coherence and Intra-Band Interaction in D-Dimensional Semiconductors", Workshop Semiconductor Optics, Marburg, Germany, May 14 - 18, 1993.
37. "Many-Body Theory of Coherent Optical Effects in Semiconductors", Nato Advanced Research Workshop on Coherent Optical Interactions in Semiconductors, Cambridge, UK, August 11 - 14, 1993.
38. "Semiconductor Laser Physics: Mathematical Challenges", Nonlinear Optics Workshop, Arizona Center for Mathematical Sciences, Tucson, AZ, USA, September 9 - 11, 1993.
39. "Femtosecond Coherent Effects in Semiconductors", ILS/OSA Meeting, Toronto, Canada, 1993.
40. "Nonequilibrium Many-Body Effects in Semiconductor Microlasers", (in German), Spring Meeting of the German Physical Society, Münster, Germany, March 21 - 25, 1994.
41. "Semiconductor Bloch Equations", and "Coherent Phenomena in Semiconductors Based on Maxwell-Semiconductor Bloch Equations", Minisymposium on Dynamical Effects in Quantum Optics, Helsinki, Finland, April 6 - 8, 1994.
42. "Nonlinear Optical Properties of Bulk, Quantum-Well, Quantum-Wire, and Quantum-Dot Semiconductors", SIAM Conference on Emerging Issues in Mathematics and Computation from the Materials Sciences, Pittsburgh, PA, USA, April 18 - 20, 1994.
43. "Coherent Interactions and Femtosecond Pulse Propagation in Semiconductors", IQEC '94, Anaheim, CA, USA, May 1994.
44. "Theory of Semiconductor Optical Nonlinearities and Semiconductor Lasers", Training School on Nonlinear Optics and Optical Design, Institute for Advanced Studies in Basic Sciences, Zanjan, Iran, May 22 - June 10, 1994.
45. "Microscopic Modelling of the Nonlinear Optical Response of Semiconductors", Nonlinear Optics and Guided Waves Study Center, Edinburgh, UK, August 1 - 20, 1994.
46. "Microscopic Modelling of Semiconductor Lasers and Amplifiers", International Workshop, Cork, Ireland, August 22 - 26, 1994.
47. "Theory of Semiconductor Microlasers", Conference on Lasers and Electro- Optics CLEO Europe '94, Amsterdam, Netherlands, August 28 - September 2, 1994.
48. "Mikroskopische Theorie kohärenter optischer Effekte in Halbleitern", ÖPG Tagung, Innsbruck, Austria, September 20, 1994.
49. "Ultrafast and Coherent Effects in Semiconductors", European Research Conference on Quantum Optics, Davos, Switzerland, September 24 - 29, 1994.
50. "Coherent Phenomena in Semiconductors", Workshop on Nonequilibrium Physics at Short Time Scales, Rostock, Germany, January 11 - 14, 1995.
51. "Microscopic Theory of Semiconductor Microcavities and Microcavity Lasers", Quantum Optoelectronics Topical Meeting, Dana Point, CA, USA, March 15 - 17, 1995.

52. “Dynamical Effects in Semiconductors and Semiconductor Heterostructures”, Symposium on Dynamics of Simple Quantum Systems, Sondbjerg, Denmark, May 11 - 16, 1995.
53. “Theory of Semiconductor Micro-, Nano- and Heterostructures”, series of four invited lectures at NATO ASI “Frontiers in Nanoscale Science of Micron/Submicron Devices”, Kiev, Ukraine, August 16 - 27, 1995.
54. “Theory of Semiconductor Microcavity Laser Dynamics”, Italian- German Symposium on Light-Emitting Nanostructures, Villa Vigoni, Menaggio, Italy, September 25 - 26, 1995.
55. “Ultrafast Dynamics and Carrier Scattering Effects in a High-Density Electron-Hole Plasma”, AFOSR/ACMS Nonlinear Optics Workshop, Tucson, AZ, USA, October 1 - 3, 1995.
56. “Origins and Mechanisms of Semiconductor Nonlinearities”, IMA Tutorial: Nonlinear Optical Materials, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, USA, February 28 - March 1, 1996.
57. “Resonant Optical Nonlinearities in Semiconductors”, IMA Workshop: Nonlinear Optical Materials, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, USA, March 4 - 8, 1996.
58. “Physics of Optically Excited Semiconductors and Semiconductor Heterostructures”, plenary lecture, 1996 Quantum Electronics Day of the FOM Atomic Physics and Quantum Electronics Group, Nijmegen, Netherlands, May 3, 1996.
59. “Quantum Optics of Semiconductor Microcavities”, IQEC '96, Sydney, Australia, July 16 - 18, 1996.
60. “Microscopic Theory of Optically Excited Semiconductor Quantum Wells and Superlattices” and “Light Propagation Effects in Semiconductor Heterostructures”, Research Workshop on Condensed Matter Physics, ICTP, Trieste, Italy, July 29 - August 2, 1996.
61. “Carrier Correlation Effects in Semiconductor Gain Media: Solution of the Laser Lineshape Problem”, AFOSR/ACMS Nonlinear Optics Workshop, Tucson, AZ, USA, October 10 - 12, 1996.
62. “Physics of Semiconductor Microcavities and Microcavity Lasers”, plenary talk, SPIE International Symposium: Optoelectronics '97, San Jose, CA, USA, February 8 - 14, 1997.
63. “Multi-Band Bloch Equations and Gain Mechanisms”, Japanese-German Seminar on II-VI Semiconductors, Bremen, Germany, March 23 - 27, 1997.
64. “Microscopic Gain Theory for Group III-Nitrides”, E-MRS Symposium on Group III-Nitrides, Strasbourg, France, June 16 - 20, 1997.
65. “Gain/Absorption in Semiconductors”, International Workshop on “Fundamentals of Modelling of Lasers and Ultra Short Pulse Interactions”, Cork, Ireland, July 21 - 25, 1997.
66. “Optical Excitations in Semiconductor Microcavities”, 1997 Nonlinear Optics and Lasers Gordon Research Conference, New London, NH, USA, July 27 - 31, 1997.
67. “Dynamics of Radiatively Coupled Quantum Wells”, 7th International Conference on Hopping and Related Phenomena, Rackeve, Hungary, August 19 - 22, 1997.
68. “Modelling the Optical Response of Semiconductors”, 1997 AFOSR Workshop on Nonlinear Optics, Tucson, AZ, USA, September 24 - 26, 1997.
69. “Quantum Theory of Exciton Microcavity Luminescence”, Italian-German International Symposium on Microcavities - Quantum Electrodynamics and Devices, Lovenjo di Menaggio, Italy, April 5 - 8 1998.

70. “Elektronisch und optisch gekoppelte Übergitter”, Hermann von Helmholtz-Symposium, Physikalisch Technische Bundesanstalt, Braunschweig, Germany, June 26, 1998.
71. “Basics of Heterostructure Physics and Optics” and “Light-Matter Interaction in Confined Optical Systems”, 6 lectures at the Summerschoold on QED Phenomena and Applications of Microcavities and Photonic Crystals, Cargese, France, August 3 - 15, 1998.
72. “Light-Exciton Coupling Effects in Semiconductor Microcavities and Heterostructures”, Nonlinear Optics '98, Princeville, Kauai, Hawaii, USA, August 10 - 14, 1998.
73. “Microscopic Theory of Spontaneous Emission in Semiconductor Quantum Wells”, 1998 Workshop on Nonlinear Optics, Tucson, AZ, USA, September 24 - 26, 1998.
74. “Light-Matter Interaction in Semiconductor Microcavities”, 1998 OSA Annual Meeting, Baltimore, USA, October 4 - 9, 1998.
75. “Theory of Coherent Effects in Semiconductors”, 12th International Conference on Dynamical Processes in Excited States of Solids, DPC'99, Humacao, Puerto Rico, May 23 - 27, 1999.
76. “Microscopic Theory of the Optical Properties of Semiconductors”, lectures, International Semiconductor Laser School, University College, Cork, Ireland, July 25 - 30, 1999.
77. “Recent Advances in Many-Body Effects in Confined Systems”, OECS-VI (Optics of Excitons in Confined Systems), Ascona, Switzerland, August 30 - September 2, 1999.
78. “Quantum Optics of Semiconductor Quantum Wells and Microcavities”, Academy Colloquium Quantum Optics of Small Structures, Amsterdam, Netherlands, September 23 - 24, 1999.
79. “Quantum Theory of Coherent and Incoherent Semiconductor Light Emission”, EURESCO Conference on Quantum Optics, Mallorca, Spain, October 2 - 7, 1999.
80. “Quantum Effects in Excitonic Systems”, NSF Workshop on Quantum Information Science, Arlington, VA, USA, October 28 - 29, 1999.
81. “Optical Nonlinearities in Semiconductors”, plenary talk, International Symposium on Photonics and Applications, Singapore, November 29 - December 3, 1999.
82. “Coherent Effects in Semiconductor Light Emission”, SPIE International Symposium: Optoelectronics 2000, San Jose, CA, USA, January 22 - 28, 2000.
83. “Microscopic Theory of Dephasing in Semiconductors”, DPG Frühjahrstagung, Regensburg, Germany, March 27 - 31, 2000.
84. “Correlation Effects in the Optical Properties of Semiconductors”, CLEO/QELS, San Francisco, CA, USA, May 7 - 12, 2000.
85. “Kohärente Effekte in der spontanen Emission von Halbleitern”, DPG Workshop Quantentransport, Schloss Reinsburg, Germany, June 26 - 28, 2000.
86. “Microscopic Theory of the Optical Properties of Mesoscopic Semiconductor Systems”, lectures, Summer School on Mesoscopic Physics Between Photonic and Electronic Systems, Wittenberg, Germany, July 17 - 27, 2000.
87. “Gain and Spontaneous Emission in Semiconductor Systems”, Workshop on Nonlinear Optics, Tucson, AZ, USA, September 21 - 23, 2000.
88. “Theory of the Optical Properties of Semiconductor Nanostructures”, International Workshop on Nanostructures in Photovoltaics, Dresden, Germany, July 28 - August 4, 2001.

89. "Coherence, Luminescence, Excitons - and all that ...", Alaska Meeting on Fundamental Optical Processes in Semiconductors, Girdwood, Alaska, USA, August 5 - 10, 2001.
90. "Microscopic Theory of the Optical Properties of Semiconductors", lectures, International Semiconductor Laser School, University College, Cork, Ireland, August 30 - September 5, 2001.
91. "Microscopic Theory of Gain and Spontaneous Emission in Semiconductor Laser Structures", International Workshop on Ultrafast Nonlinear Optics and Semiconductor Lasers, Cork, Ireland, September 5 - 8, 2001.
92. "Optics of Semiconductor Photonic Crystal Systems", Workshop on Nonlinear Optics, Tucson, AZ, USA, September 27 - 29, 2001.
93. "Microscopic Theory of Luminescence and Gain in Semiconductors", SPIE International Symposium: Optoelectronics 2002, San Jose, CA, USA, January 20 - 25, 2002.
94. "Quantum Optical Effects in Semiconductors", (in German), Spring Meeting of the German Physical Society, Regensburg, Germany, March 11 - 15, 2002.
95. "Microscopic Theory of Gain and Spontaneous Emission in GaInNAs Laser Material", E-MRS 2002 Spring Meeting, Strasbourg, France, June 18 - 21, 2002.
96. "Semiconductor Bloch Equations and More ...", series of 4 lectures at the Scuola Internazionale di Fisica "Enrico Fermi", Varenna, Italy, June 25 - July 5, 2002.
97. "Microscopic Modelling of Gain and Luminescence in Semiconductors", 2nd International Conference on Numerical Simulation of Semiconductor Optoelectronic Devices NUSOD-02, Zürich, Switzerland, September 25 - 27, 2002.
98. "Microscopic Modelling of Semiconductor Optical Materials", 2003 Photonics Initiative Workshop, Tucson, AZ, USA, January 22 - 23, 2003.
99. "Exciton Ionization in Semiconductors", 7th International Workshop on Nonlinear Optics and Excitation Kinetics in Semiconductors NOEKS 7, Karlsruhe, Germany, February 24 - 28, 2003.
100. "Excitonic and Quantum Optical Correlations in Semiconductor Nanostructures", International Workshop on Off-Shell Effects in Quantum Transport, Dresden, Germany, May 5 - 16, 2003.
101. "QED Theory of Semiconductors", Laser Science XIX, Tucson, AZ, USA, October 5 - 9, 2003.
102. "Coherent Semiconductor Optics", 42. Universitätswochen für Theoretische Physik "Quantum Coherence in Matter", Schladming, Austria, February 28 - March 6, 2004.
103. "Terahertz Absorption and Gain in Optically Excited Semiconductors", 2nd Workshop on Semiconductor Quantum Optics, Cliff-Hotel Sellin/Rügen, Germany, March 14 - 17, 2004.
104. "Equilibrium and Nonequilibrium Gain and Luminescence in Semiconductor Laser Structures", Conference on Emerging Technologies in Optical Sciences, Cork, Ireland, July 26 - 29, 2004.
105. "Many-Body Theory of Terahertz Absorption and Gain in Optically Excited Semiconductors", Colorado Meeting on Fundamental Optical Processes in Semiconductors, Estes Park, CO, USA, August 8 - 13, 2004.
106. "Microscopic Theory of Semiconductor Laser Gain Media", lecture series, International Summer School on Physics of Semiconductor Lasers, Gregynog Hall, Newtown/Wales, UK, August 16 - 25, 2004.

107. “Microscopic Modelling of Equilibrium and Nonequilibrium Gain in Optically Pumped Semiconductor Lasers”, 4th International Conference on Numerical Simulation of Optoelectronic Devices, UC Santa Barbara, CA, USA, August 24 - 26, 2004.
108. “Equilibrium and Nonequilibrium Gain in Semiconductor Laser Structures”, AFOSR Workshop in Nonlinear Optics, Tucson, AZ, USA, September 9 - 10, 2004.
109. “Halbleiter Quantenoptik” und “THz-Spektroskopie in Halbleitern”, WE-Heraeus-Ferienkurs für Physik, *Korrelierte Materie im Strahlungsfeld: Von der Femtosekundenspektroskopie zum Freie-Elektronen-Laser*, Rostock, Germany, October 4 - 15, 2004.
110. “Optics and Quantum Optics with Semiconductor Nanostructures”, Spring School in Nonlinear and Multiscale Photonics, Tucson, AZ, USA, April 1-3, 2005.
111. “Physics and Simulation of Semiconductor Lasers”, CLEO/QELS, Baltimore, USA, May 23 - 27, 2005.
112. “Microscopic Theory of Semiconductors”, lecture series, International Institute for Advanced Studies, Peking, China, August 3 - 10, 2005.
113. “Optical Properties of Semiconductor Quantum Wells”, 5th International Conference on Numerical Simulation of Optoelectronic Devices, Berlin, Germany, September 19 - 22, 2005.
114. “Microscopic Theory of Exciton Formation, Absorption, and Luminescence in ZnO Nanostructures”, DPG Workshop on ZnO, Bad Honnef, Germany, June 18 - 20, 2006.
115. “Strong Coupling Effects in Semiconductors: Theory”, 377th WE-Heraeus Seminar on Strong Coupling of Light and Matter, Bad Honnef, Germany, September 13 - 16, 2006.
116. “Generation of THz Radiation with Semiconductor Heterostructures”, AFOSR Nonlinear Optics Workshop, Tucson, AZ, USA, October 17 - 18, 2006.
117. “Optics and Quantum Optics in Semiconductor Nanostructures”, tutorial lecture at Spring School “Nano and Giga Challenges in Electronics and Photonics: “From Atoms to Materials to Devices to System Architecture” Phoenix, AZ, USA, March 12 - 16, 2007.
118. “Generation of Terahertz Radiation with Semiconductor Heterostructures”, Symposium “Nano and Giga Challenges in Electronics and Photonics: “From Atoms to Materials to Devices to System Architecture”, in Phoenix, AZ, USA, March 12 - 16, 2007.
119. “Interaction of Terahertz Radiation with Semiconductor Nanostructures: Microscopic Theory”, DPG Spring Meeting, Regensburg, Germany, March 26 - 30, 2007.
120. “Quantum Optics, Excitons, and Degenerate State Generation in Semiconductor Nanostructures”, 7th International Conference on Physics of Light-Matter Coupling in Nanostructures, Havana, Cuba, April 12 - 17, 2007.
121. “Many-Body Effects in the THz-Spectroscopy of Semiconductors”, International Conference on Fundamental Optical Processes in Semiconductors FOPS 2007, Big Sky, MT, USA, July 23 - 27, 2007.
122. “Physics of Semiconductor Micro-Lasers: An Introduction” and “Semiconductors and THz Radiation”, International WE-Heraeus Summerschool “Photonics Design”, Rauischholzhausen, Germany, September 10 - 14, 2007.
123. “Spontaneous Emission in Quantum Wells and Heterostructures”, AFOSR Nonlinear Optics Workshop, Tucson, AZ, USA, September 25 - 26, 2007.

124. "Dynamical THz Response of Semiconductors under Ultrafast Optical Excitation", Ultrafast Phenomena in Semiconductors and Nanostructure Materials XII, San Jose, CA, USA, January 20 - 23, 2008.
125. "Microscopic Theory of Gain and Losses in Semiconductor Lasers", Advanced Semiconductor Materials Workshop, Tucson, AZ, USA, February 2 - 21, 2008.
126. "Microscopic Theory of the Optical Properties of Semiconductor Nanostructures", International Workshop on Optical Properties of Coupled Semiconductor and Metallic Nanoparticles, Dresden, July 21 - 25, 2008.
127. "Microscopic Modelling of Long-Wavelength Laser Materials and VECSELS", 9th International Conference on Mid-Infrared Optoelectronics: Materials and Devices, Freiburg, Germany, September 7 - 11, 2008.
128. "Excitonic and Quantum Optical Correlations in Semiconductor Nanostructures", International Workshop on Nonequilibrium Nanostructures, Dresden, December 1 - 6, 2008.
129. "Microscopic Modelling of Coupled Semiconductor - Metal Nanostructures", The 1st European Topical Meeting on Nanophotonics and Metamaterials, Seefeld/Tirol, Austria, January 5 - 8, 2009.
130. "Nonlinear Terahertz Spectroscopy of Semiconductors", CLEO/IQEC Baltimore, MD, May 31 - June 5, 2009.
131. "Microscopic Modelling and Experimental Results on VECSELS for Optical and THz Applications", CLEO/Europe-EQEC 2009, Munich, June 14 - 19, 2009.
132. "Interaction of THz Radiation with Many-Body Systems", IEEE Photonics Winter Topicals Meeting, Mallorca/Spain, January 11 - 13, 2010.
133. "Ultrafast Terahertz Response of Optically Excited Semiconductors", SPIE Photonics West Conference, San Francisco, CA, USA, January 23 - 28, 2010.
134. "Quantum Design and Experimental Realization of High-Power VECSELS", SPIE Photonics West Conference, San Francisco, CA, USA, January 23 - 28, 2010.
135. "Quantum-Optical Semiconductor Spectroscopy", Heraeus Seminar on "Mixed States of Light and Matter", Bad Honnef, Germany, February 7 - 10, 2010.
136. "Interaction of Terahertz Radiation with Semiconductors", 10th International Workshop on Nonlinear Optics and Excitation Kinetics in Semiconductors NOEKS 10, Paderborn, Germany, August 16 - 19, 2010.
137. "Microscopic Simulation of Semiconductor Laser Devices", plenary talk, Fourth International Conference on Optical, Optoelectronic and Photonic Materials and Applications, Budapest, Hungary, August 15 - 20, 2010.
138. "Systematic Many-Body Cluster Expansion Approach to Semiconductor Modelling", Nonlinear Optics Workshop, Nativo Lodge, Albuquerque, NM, USA, September 21 - 23, 2010.
139. "Quantum Design and Nonequilibrium Effects in VECSELS", SPIE Photonics West Conference, San Francisco, CA, USA, January 23 - 28, 2011.
140. "Microscopic Theory of Plasma Formation/Coupling to Light Fields", 4 lectures at School on Theory and Mathematical Modeling of Ultrashort Pulse Propagation, Tucson, AZ, USA, March 20 - 22, 2011.
141. "Excitonic Effects in Semiconductors and Graphene", FOPS Fundamental Optical Processes in Semiconductors, Lake Junaluska, North Carolina, USA, August 1 - 5, 2011.

142. "Interaction of Terahertz Radiation with Semiconductor Many-Body Systems", plenary talk, International Conference on Infrared, Millimeter, and Terahertz Waves, Houston, TX, USA, October 2-7, 2011.
143. "VECSELs: Non-Equilibrium Effects and THz Emission", SPIE Photonics West Conference, San Francisco, CA, USA, January 21 - 26, 2012.
144. "Non-Equilibrium Plasma Theory: Many-Body Effects and Coupling to Light Fields", 4 lectures at School on Ultrafast Physics of Light-Matter Coupling, Tucson, AZ, USA, March 18 - 20, 2012.
145. "Microscopic Theory of Plasma Formation", Semiannual Spring Workshop, Mathematical Modeling and Experimental Verification of Ultrashort Nonlinear Light-Matter Coupling associated with Filamentation in Transparent Media, Tucson, AZ, USA, March 21, 2012.
146. "Light-Matter Coupling and Many-Body Effects in Semiconductor Based Nanostructures", International School of Nanophotonics and Photovoltaics, Phuket, Thailand, March 30 - April 5, 2012.
147. "From Ionized Atoms to a Collective Plasma State: A Microscopic Approach", Nonlinear Optics Workshop, Albuquerque, NM, September 18 - 19, 2012.
148. "Many-Body Dynamics of Plasma Formation after Optical Ionization", 4th International Symposium on Filamentation (COFIL 2012), Tucson, AZ, October 8 - 12, 2012.
149. "From Optical Bistability to Quantum Excitation Shelving", Hyatt M. Gibbs Scientific Symposium, Tucson, AZ, March 11, 2013.
150. "On the Physics And Applications of VECSELs", Semiconductor and Integrated Optoelectronics SIOE '13, Cardiff, Wales, April 9 - 11, 2013.
151. "Nonequilibrium Physics in Semiconductor Microlasers", FOPS Fundamental Optical Processes in Semiconductors, Kodiak, Alaska, USA, August 12 - 16, 2013.
152. "Nonequilibrium Effects in Semiconductor Lasers", Nonlinear Optics Workshop, Arlington, VA, USA, September 4 - 5, 2013.
153. "Quantum Design of Semiconductors for Optimized Light-Matter Coupling", Summer School on Strategies for Solar Energy and Basic Sciences Research, January 25 - 31, 2014 Santiago, Chile
154. "Nonequilibrium Effects in VECSELs", SPIE Photonics West Conference, San Francisco, CA, USA, February 1 - 6, 2014.
155. "Ultrafast Light Coupling to Nonequilibrium Carriers in Extended Semiconductor Media", Theoretical Nonlinear Optics 2014, Arlington, VA, USA, September 24-25, 2014.
156. "Semiconductor Physics at Optical Sciences", Symposium on the 50th Anniversary of Optical Sciences, Tucson, AZ, Oct. 19, 2014.
157. "Fully Microscopic Studies of Strong-Field Atom Ionization", Frontiers in Optics/Laser Science 2014 (FiO/LS), Tucson, AZ, USA, Oct. 19 - 23, 2014.
158. "High-Harmonic Generation in Atoms and Solids", FOPS Fundamental Optical Processes in Semiconductors, Breckenridge, CO, USA, August 3 - 7, 2015.
159. "Light-Matter Interaction in Solar-Cell Semiconductor Materials", 8 Lectures at The International School of Fundamental Principles of Solar Energy (FUPSE 2015), Santiago, Chile, August 16 - 23, 2015.

160. "Microscopic Modeling of Light-Matter Interaction in the Strong Field Regime", Theoretical Nonlinear Optics 2015, Arlington, VA, USA, October 7-8, 2015.
161. "Very Strong Field Induced High-Harmonic Generation in Semiconductors and Atoms", SPIE Photonics West Conference, San Francisco, CA, USA, February 13 - 18, 2016.
162. "Microscopic Modeling of the Structure and Opto-Electronic Properties of Dilute Bismides", 7th International Workshop on Bismuth-Containing Semiconductors, Shanghai/China, July 24 - 27, 2016.