

ADDRESS

Department of Physics and the Center for Optical, Molecular and Quantum Science
University of Oregon, Eugene, OR 97403

PROFESSIONAL EXPERIENCE

Knight Professor of Liberal Arts and Sciences, University of Oregon; 2006 – present
Visiting Fellow, JILA, NIST and Univ. of Colorado, 1998 - 1999.
Director, Center for Optical, Molecular and Quantum Science, University of Oregon, Eugene, Oregon;
1997 – 1998; 2002-03.
Visiting Scientist, Norwegian Defense Research Establishment, Kjeller, Norway, 1996.
Professor of Physics, Department of Physics, University of Oregon; 1990 – present
Associate Professor of Physics, Department of Physics, University of Oregon, Eugene, Oregon;
1988 - 1990.
Associate Professor of Optics, The Institute of Optics, University of Rochester, Rochester,
New York; 1983 - 1988.
Assistant Professor of Optics, The Institute of Optics, University of Rochester, Rochester,
New York; 1979 - 1983.
Research Assistant, Joint Institute for Laboratory Astrophysics, University of Colorado and National
Bureau of Standards; 1975 - 1979.

EDUCATION

Ph.D., Chemical Physics, University of Colorado, Boulder, 1979.
B.A., Chemistry and Physics, University of California, Santa Cruz, 1974.

RESEARCH INTERESTS

Quantum optics and optical physics: quantum information; quantum statistics in nonlinear optical
processes; quantum measurement; quantum coherence in complex networks; light coherence and
propagation; lasers.

HONORS AND ACTIVITIES

Fellow, American Physical Society (APS), 1993.
Fellow, Optical Society of America (OSA), 1990.
Knight Professor of Liberal Arts and Sciences, University of Oregon; 2006 – present
University of Oregon 2015 Outstanding Career Award.
Visiting Fellow of JILA, University of Colorado, 1998-1999.
Board of Directors of the Optical Society of America (OSA), Elected term: 2010-2013.
NSF Committee of Visitors (Physics Divisional Review, 2012).
APS journals Outstanding Referee (2013).
Nominating Committee for the APS Division of Laser Science, 2015-2016
CAMOS–Committee on Atomic, Molecular and Optical Science – National Research Council (2001-04)
Chair, Joint Council on Quantum Electronics, 2008 – 2011.
International Council on Quantum Electronics, 2008 – 2011.
Steering Committee, CLEO/QELS Conference, 2007- 2011.
Executive Committee, Division of Laser Science, APS (1995- 1998).

Chair, Distinguished Traveling Lecturers Committee, DLS, APS, 1996-1999.
Co-General Chair, Quantum Electronics & Laser Sciences (QELS) Conference, 2006.
Chair, Frederick Ives Medal Selection Committee, OSA, 2005.
Charles Townes Award Committee (OSA), 1992
Advanced LIGO NSF Annual Review and Site Visits, 2004 and 2009.
Co-Chair, Program Committee, International Quantum Electronics Conference, 2004.
Program Sub-Committee Chair, Quantum Optics, QELS Conference, 2002.
Program Committee, Quantum Information Sciences, CLEO/QELS Conference, 2001.
Program Committee, Ultrafast Dynamics, CLEO/QELS Conference, 2000.
Symposium Organizer, "Ultrafast Quantum Optics," Interdisciplinary Laser Science Conference, 1999.
Program Advisory Committee, International Quantum Electronics Conference, Sydney, Australia, 1996.
Quantum Optics Program Committee for Quantum Electronics & Laser Sciences Conference (QELS), Baltimore, 1995.
Program Advisory Committee, International Meeting on Nonlinear Dynamics in Optical Systems, 1990.
Publications Committee, Division of AMO Physics, APS, 1987-1988.
Program Committee, International Laser Science Conference, 1985-1986.
Program Committee, 1985, OSA Annual Meeting
Co-Chairman of Program Committee for 1985 OSA/NATO Meeting on "Instabilities and Dynamics of Lasers and Nonlinear Optical Systems."
Program Committee Member, Division of AMO Physics, APS, 1983-1985.

EDITORSHIPS

Divisional Associate Editor for Physical Review Letters, 2006 – Jan. 2012.
Board of Editors, J. Modern Optics, 1998 – present.
Topical Editor (Quantum Optics), J. Optical Society of America B, 1989-1995.
Co-Editor, Special Feature Issue of the J. of Modern Optics on "Preparation and Measurement of Quantum States," 1997.

SYNERGISTIC AND EDUCATIONAL ACTIVITIES

Co-founder and Co-Director of the Science Literacy Program at UO (2010 - 2016), funded by the Howard Hughes Medical Institute.
Co-founder and first Director of the Oregon Center for Optics at UO (now the Center for Optical, Molecular and Quantum Science).
Developed new course *Physics Behind the Internet* aimed at non-science university students.
Authored textbook for above course, *The Silicon Web: Physics for the Internet Age* (2009).
Developed new course *Quantum Mechanics for Everyone*, aimed at non-science university students.
Authored textbook for above course, *Quantum Physics: What Everyone Needs to Know* (2009).

Ph.D. STUDENTS GRADUATED (25)

Lynn A. Westling, Ian A. Walmsley, Tod Sizer, Zheng-Wu Li, Ian McMackin, Shi-Jong Kuo, Daniel T. Smithey, Steven E. Hodges, Michael Munroe, Daniel McAlister, Matthew E. Anderson, Chung-Chieh Cheng, Andrew Funk, Ethan L. Blansett, Brian Smith, Wenhai Ji, Guoqiang Cui, Justin Hannigan, Cody Leary, Hayden McGuinness, Roger Smith, Dashiell Vitullo, Erin Mondloch, Kyle Klarup, Dileep Reddy.

REFEREED PUBLICATIONS

1. "Collisional Redistribution and Saturation of Near-Resonant Scattered Light," J.L. Carlsten, A. Szoke and M.G. Raymer, *Phys. Rev. A* **15**, 1029 (1976).
2. "Simultaneous Observations of Stimulated Raman Scattering and Stimulated Collision-Induced Fluorescence," M.G. Raymer and J.L. Carlsten, *Phys. Rev. Letters* **39**, 1326 (1977).
3. "Comparison of Collisional Redistribution and Emission Line Shapes," M.G. Raymer, J.L. Carlsten and G. Pichler, *J. Phys. B* **12**, L119 (1979).
4. "Theory of Stimulated Raman Scattering with Broadband Lasers," M.G. Raymer, J. Mostowski and J. L. Carlsten, *Phys. Rev. A* **19**, 2304 (1979).
5. "Resonance Fluorescence in a Weak Radiation Field with Arbitrary Spectral Distribution," M.G. Raymer and J. Cooper, *Phys. Rev. A* **20**, 2238 (1979).
6. "The Buildup of Stimulated Raman Scattering from Spontaneous Raman Scattering," J. Mostowski and M.G. Raymer, *Opt. Commun.* **36**, 237 (1981).
7. "Four-Wave Parametric Interactions in a Strongly Driven Two-Level System," R.W. Boyd, M.G. Raymer, P. Narum, and D. Harter, *Phys. Rev. A* **24**, 411 (1981).
8. "Four-Wave Parametric Amplification of Rabi Sidebands in Sodium," D.J. Harter, P. Narum, M.G. Raymer, and R. W. Boyd, *Phys. Rev. Letters* **46**, 1192 (1981).
9. "Stimulated Raman Scattering: Unified Treatment of Spontaneous Initiation and Spatial Propagation," M.G. Raymer and J. Mostowski, *Phys. Rev. A* **24**, 1980 (1981).
10. "Pulse Energy Statistics in Stimulated Raman Scattering," M.G. Raymer, K. Rzazewski, and J. Mostowski, *Optics Letters* **7**, 71 (1982).
11. "Steady-State Quantum Interference in Resonance Fluorescence," D.A. Cardimona, M.G. Raymer, and C.R. Stroud, Jr., *J. Phys. B* **15**, 55 (1982).
12. "Statistics of Stimulated Stokes Pulse Energies in the Steady-State Regime," K. Rzazewski, M. Lewenstein, and M. G. Raymer, *Opt. Commun.* **43**, 451 (1982).
13. "On the Theory of Time-Dependent Intense-Field Collisional Resonance Fluorescence," P.D. Kleiber, J. Cooper, K. Burnett, C. Kunasz, and M.G. Raymer, *Phys. Rev. A* **27**, 291 (1983).
14. "Time-Dependences of Two-, Three-, and Four-Photon Ionization of Atomic Hydrogen in the Ground 12S and Metastable 22S States," C.R. Holt, M.G. Raymer, and W.P. Reinhardt, *Phys. Rev. A* **27**, 2971 (1983).
15. "Observation of Macroscopic Quantum Fluctuations in Stimulated Raman Scattering," I.A. Walmsley and M.G. Raymer, *Phys. Rev. Lett.* **50**, 962 (1983).
16. "Observation of Intensity Fluctuations and Mode Correlations in a Broad-Band CW Dye Laser," L.A. Westling, M.G. Raymer, M.G. Sceats, and D. F. Coker, *Opt. Commun.* **47**, 212 (1983).
17. "Stimulated Raman Scattering of Colored Chaotic Laser Light," M. Trippenbach, K. Rzazewski, and M.G. Raymer, *JOSA B* **1**, 671 (1984).

18. "Single-Shot Spectral Measurements and Mode Correlations in a Pulsed Multimode Dye Laser," L.A. Westling, M.G. Raymer, and J.J. Snyder, *JOSA B* **1**, 150 (1984).
19. "Time-Dependent Semiclassical Theory of Gain-Coupled Distributed Feedback Lasers," I.N. Duling and M.G. Raymer, *IEEE-JQE* **10**, 1202 (1984).
20. "Stabilization of Stokes Pulse Energies in the Nonlinear Regime of Stimulated Raman Scattering," I.A. Walmsley, M.G. Raymer, T. Sizer, I. Duling, and J. Kafka, *Opt. Commun.* **53**, 137 (1985).
21. "Quantum Theory of Stokes Generation with a Multimode Laser," M.G. Raymer and L. A. Westling, *JOSA B* **2**, 1417 (1985).
22. "Quantum Theory of Spatial and Temporal Coherence Properties of Stimulated Raman Scattering," M.G. Raymer, I.A. Walmsley, J. Mostowski, and B. Sobolewska, *Phys. Rev.* **A32**, 332 (1985).
23. "Experimental Study of the Macroscopic Quantum Fluctuations of Partially Coherent Stimulated Raman Scattering," I.A. Walmsley and M.G. Raymer, *Phys. Rev.* **A33**, 382 (1986).
24. "Modification of Atomic Collision Dynamics by Intense Ultrashort Laser Pulses," T. Sizer II and M.G. Raymer, *Phys. Rev. Lett.* **56**, 123 (1986).
25. "Intensity Autocorrelation Measurements and Spontaneous FM Phase Locking in a Multimode Pulsed Dye Laser," L.A. Westling and M.G. Raymer, *JOSA B* **3**, 911 (1986).
26. "Atomic Collisions in the Presence of Intense, Ultrashort Laser Pulses," T. Sizer II and M.G. Raymer, *Phys. Rev.* **A36**, 2643 (1987).
27. "Temporal Smoothing of Multimode Dye-Laser Pulses," Z.W. Li, C. Radzewicz, and M.G. Raymer, *Opt. Lett.* **12**, 416 (1987).
28. "Intensity Correlation Measurements in Stimulated Raman Generation with a Multimode Laser," L.A. Westling and M.G. Raymer, *Phys. Rev.* **A36**, 4835 (1987).
29. "Amplitude-Stabilized Chaotic Light," C. Radzewicz, Z.W. Li, and M.G. Raymer, *Phys. Rev.* **A37**, 2039 (1988).
30. "Phase Cross Correlation in the Coherent Raman Process," Z.W. Li, C. Radzewicz, and M.G. Raymer, *Opt. Lett.* **13**, 491 (1988).
31. "Strong-Field Theory of a Multimode, Standing-Wave Dye Laser," M.G. Raymer, Z. Deng, and M. Beck, *JOSA B* **5**, 1588 (1988).
32. "Instabilities and Chaos in a Multimode, Standing-Wave, CW Dye Laser," I. McMackin, C. Radzewicz, M. Beck, and M.G. Raymer, *Phys. Rev.* **A38**, 820 (1988).
33. "Cancellation of Laser Phase Fluctuations in Stokes, Anti-Stokes Generation," Z.W. Li, C. Radzewicz, and M.G. Raymer, *JOSA B* **5**, 2340 (1988).
34. "Coherent Propagation of Stokes Light in a Collisionally Broadened Three-Level Amplifier," B.J. Herman, J.H. Eberly, M.G. Raymer, *Phys. Rev.* **A39**, 3447 (1989).

35. "Temporal Quantum Fluctuations in Stimulated Raman Scattering: Coherent-Modes Description," M.G. Raymer, Z.W. Li, and I.A. Walmsley, *Phys. Rev. Lett.* **63**, 1586 (1989).
36. "Transition from Quantum-Noise-Driven to Deterministic Dynamics in a Multimode Laser," M. Beck, I. McMackin, and M.G. Raymer, *Phys. Rev.* **A40**, 2410 (1989).
37. "Influence of Collisional Dephasing on Superfluorescence," J.J. Maki, M.S. Malcuit, M.G. Raymer, R.W. Boyd, and P.D. Drummond, *Phys. Rev.* **A40**, 5135 (1989).
38. "Delay-Time Statistics of Cooperative Emission in the Presence of Homogeneous Line Broadening," K. Rzazewski, M.G. Raymer, and R.W. Boyd, *Phys. Rev.* **A39**, 5785 (1989).
39. "Spatial Interference of Macroscopic Light Fields from Independent Raman Sources," S.J. Kuo, D.T. Smithey, and M.G. Raymer, *Phys. Rev. A (Rapid Commun.)* **43**, 4083 (1991).
40. "Beam-Pointing Fluctuations in Gain-Guided Amplifiers," S.J. Kuo, D.T. Smithey, and M.G. Raymer, *Phys. Rev. Lett.* **66**, 2605 (1991).
41. "Quantum Theory of Propagation of Non-Classical Radiation in a Near-Resonant Medium," P.D. Drummond and M.G. Raymer, *Phys. Rev.* **A44**, 2072 (1991).
42. "Near Quantum Limited Phase Memory in a Raman Amplifier," D.T. Smithey, M. Belsley, K. Wedding, and M.G. Raymer, *Phys. Rev. Lett.* **67**, 2446 (1991).
43. "Limits to Wide-Band, Pulsed Squeezing in a Traveling-Wave, Parametric Amplifier with Group-Velocity Dispersion," M.G. Raymer, P.D. Drummond and S.J. Carter, *Opt. Lett.* **16**, 1189 (1991).
44. "Beam Pointing Fluctuations in a Gain-Guided Raman Generator," S.J. Kuo, D.T. Smithey, and M.G. Raymer, *Phys. Rev.* **A45**, 2031 (1992).
45. "Information and Complementarity in a Proposed Which-Path Experiment Using Photons," M.G. Raymer and S. Yang, *J. Mod. Optics*, **39** 1221(1992).
46. "Sub-shot-noise correlation of total photon number using macroscopic twin pulses of light," D. T. Smithey, M. Beck, M. Belsley, and M. G. Raymer, *Phys. Rev. Lett.* **69**, 2650 (1992).
47. "Turn-on transient statistics and dynamics in a multimode, short-cavity laser," S. E. Hodges, M. Munroe, D. Adkison, W. Gadowski, and M. G. Raymer, *Opt. Lett.* **17**, 931 (1992).
48. "Twin photon beams resulting from interference of independent broadband squeezed vacua," M. Belsley, D. T. Smithey, M. G. Raymer, and J. Mostowski, *Phys. Rev. A*, **46**, 414 (1992).
49. "Measurement of the Wigner distribution and the density matrix of a light mode using optical homodyne tomography: application to squeezed states and the vacuum," D. T. Smithey, M. Beck, M. G. Raymer and A. Faridani, *Phys. Rev. Lett.* **70**, 1244 (1993).
50. "Experimental determination of quantum phase distributions using optical homodyne tomography," M. Beck, D. T. Smithey, and M. G. Raymer, *Phys. Rev. A* **48**, R890, (1993).
51. "Complete experimental characterization of the quantum state of a light mode via the Wigner function and the density matrix: application to quantum phase distributions of vacuum and squeezed-

- vacuum states," D. T Smithey, M. Beck, J. Cooper, M. G. Raymer, and A. Faridani, *Physica Scripta*, **T48**, 35 (1993).
52. "Experimental determination of number-phase uncertainty relations," M. Beck, D. T Smithey, J. Cooper, and M. G. Raymer, *Opt. Lett.*, **18**, 1259 (1993).
53. "Compound-cavity laser modes for arbitrary interface reflectivity," S. E. Hodges, M. Munroe, J. Cooper, and M. G. Raymer, *Opt. Lett.* **18**, 1481 (1993).
54. "Observation of extreme sensitivity to induced molecular coherence in stimulated Raman scattering," M. Belsley, D.T. Smithey, K. Wedding, and M.G. Raymer, *Phys. Rev. A* **48**, 1514 (1993).
55. "Measurement of number-phase uncertainty relations of optical fields," D. T Smithey, M. Beck, J. Cooper, and M. G. Raymer, *Phys. Rev.A*, **48**, 3159 (1993).
56. "Many-port homodyne detection of optical phase," M. G. Raymer, J. Cooper, and M. Beck, *Phys. Rev.A*, **48**, 4617 (1993).
57. "Chronocyclic tomography for measuring amplitude and phase structure of optical pulses," M. Beck, M. G. Raymer, I. A. Walmsley and V. Wong, *Opt. Lett.* **18**, 2041 (1993).
58. "Total intensity modulation and mode hopping in a coupled-cavity laser as a result of external-cavity length variations," M. Munroe, S. E. Hodges, J. Cooper, and M. G. Raymer, *Opt. Lett.* **19**, 105 (1993).
59. "Observation of Kastler ring emission from a short-cavity laser," S. E. Hodges, W. Gadomski, and M. G. Raymer, *Appl. Opt.* **32**, 5930 (1993).
60. "Complex wave-field reconstruction using phase-space tomography," M. G. Raymer, M. Beck and D. McAlister, *Phys. Rev. Lett.* **72**, 1137 (1994).
61. "Uncertainty principle for joint measurement of noncommuting variables," M. G. Raymer, *Am. J. Phys.* **62**, 986 (1994).
62. "Demonstration of Boundary Conditions on Sound Impulse Reflections in Pipes," M. G. Raymer and S. Micklavzina, *The Physics Teacher*, **33**, 183 (1995).
63. "Quadrature Squeezing with Ultrashort Pulses in Nonlinear Optical Waveguides," M. E. Anderson, M. Beck, M. G. Raymer, and J. D. Bierlein, *Opt. Lett.* **20**, 620 (1995).
64. "Optical phase retrieval by phase-space tomography and fractional-order Fourier transforms," D. McAlister, M. Beck, L. Clarke, A. Mayer and M. G. Raymer, *Opt. Lett.* **20**, 1181 (1995).
65. "Quantum superpositions of classically distinguishable states of a molecule," I. A. Walmsley and M. G. Raymer, *Phys. Rev. A*, **52**, 681 (1995).
66. "Photon number statistics from phase-averaged quadrature field distribution: theory and ultrafast measurement," M. Munroe, D. Boggavarapu, M. E. Anderson and M. G. Raymer, *Phys. Rev. A, Rapid Commun.* **52**, R924 (1995).
67. "Ultrashort pulsed squeezing by optical parametric amplification," M. J. Werner, M. G. Raymer, M. Beck and P. D. Drummond, *Phys. Rev. A* **52**, 4202 (1995).

68. "Ultrafast measurement of optical-field statistics by dc-balanced homodyne detection," M. G. Raymer, J. Cooper, H. J. Carmichael, M. Beck, and D. T. Smithey, *JOSA B* **12**, 1801 (1995).
69. "Sampling of photon statistics and density matrix using homodyne detection," U. Leonhardt, M. Munroe, T. Kiss, Th. Richter, and M. G. Raymer, *Opt. Commun.*, **127**, 144, (1996); erratum: **137**, 445, (1997).
70. "Observation of moving wave packets reveals their quantum state," U. Leonhardt and M. G. Raymer, *Phys. Rev. Lett.*, **76**, 1985, (1996).
71. "Two-mode quantum-optical state measurement: Sampling the joint density matrix," M. G. Raymer, D. F. McAlister and U. Leonhardt, *Phys. Rev. A*, **54**, 2397, (1996).
72. "Turn-on transient dynamics in a multimode, compound-cavity laser," S. E. Hodges, M. Munroe, W. Gadomski, J. Cooper, and M. G. Raymer, *J. Opt. Soc. Am.* **B 14**, 180 (1997).
73. "Multimode laser model with coupled cavities and quantum noise," S. E. Hodges, M. Munroe, J. Cooper, and M. G. Raymer, *J. Opt. Soc. Am.* **B 14**, 191 (1997).
74. "Ultrafast photon-number correlations from dual-pulse, phase-averaged homodyne detection," D. F. McAlister and M. G. Raymer, *Phys. Rev. A*, **55**, R1609, (1997).
75. "Correlation and joint density matrix of two spatial-temporal modes from balanced-homodyne sampling," D. F. McAlister and M. G. Raymer, *J. Mod. Opt.* **44**, 2359, (1997).
76. "Pulsed squeezed light generation in chi-two nonlinear waveguides," M. A. Anderson, D. F. McAlister, M. G. Raymer, and M. C. Gupta, *J. Opt. Soc. Am.* **B 14**, 3180 (1997).
77. "Whittaker-Shannon sampling theorem for experimental reconstruction of free-space wave packets," M. G. Raymer, *J. Mod. Opt.* **44**, 2565 (1997).
78. "Measuring the quantum mechanical wave function," M. G. Raymer, *Contemp. Physics* **38**, 343 (1997).
79. "Spectral broadening of stochastic light intensity-smoothed by a saturated semiconductor optical amplifier," M. J. Munroe, J. Cooper, and M. G. Raymer, *J. Quant. Electron.* **34**, 548 (1998).
80. "Long-range saturation of spatial decoherence in wave-field transport in multiple-scattering media," C.-C. Cheng and M. G. Raymer, *Phys. Rev. Lett.* **82**, 4807 (1999).
81. "Quantum-state tomography of two-mode light using generalized rotations in phase space," M. G. Raymer and A. Funk, *Phys. Rev. A* **61**, 015801 (1999).
82. "Measuring the quantum polarization state of light," M. G. Raymer, A. C. Funk, and D. F. McAlister, in *Quantum Communication, Computing and Measurement 2*, Ed. by P. Kumar, G. M. D'Ariano, and O. Hirota (Kluwer Academic/Plenum, New York, 2000), p. 147-155.
83. "A variable lateral shearing Sagnac interferometer with high numerical aperture for measuring the complex spatial coherence function of light," Chung-Chieh Cheng, M. G. Raymer, and H. Heier, *J. Mod. Opt.*, **47**, 1237 (2000).

84. "Propagation of Transverse Optical Coherence in Random Multiple-Scattering Media," Chung-Chieh Cheng and M. G. Raymer, 62, 023811, Phys. Rev. A, 62, 023811 (2000).
85. "Ultrafast Polarization Dynamics and Noise in Pulsed Vertical-Cavity Surface-Emitting Lasers," E. L. Blansett, M. G. Raymer, G. Khitrova, H. M. Gibbs, D. K. Serkland, A. A. Allerman, K. M. Geib Optics Express, **9**, 312–318 (2001).
86. "Quantum key distribution using non-classical photon number correlations in macroscopic light pulses," A.C. Funk and M.G. Raymer, Phys. Rev. A., **65**, 042307 (2002).
87. "Quantum cryptography with macroscopic non-classical light," M.G. Raymer and A.C. Funk, Acta Physica Polonica A, **101**, 437 (2002).
88. "Theory of optical near-resonant cone emission in atomic vapor," B. D. Paul, J. Cooper, A. Gallagher, and M. G. Raymer, Phys. Rev. A **66**, 063816 (2002).
89. "Separability criterion for separate quantum systems," M. G. Raymer, A. Funk, B. C. Sanders, H. de Guise, Phys. Rev. A **67**, 052104 (2003).
90. "Linear Optical Sampling," C. Dorrer, D.C. Kilper, H.R. Stuart, G. Raybon and M. G. Raymer (IEEE Photonics Technology Letters, **15**, 1746, 2003).
91. "Quantum state entanglement and readout of collective atomic-ensemble modes and optical wavepackets by stimulated Raman scattering," M. G. Raymer, J. Mod. Optics, **51**, 1739–1759 (2004).
92. "Quantum noise properties of parametric amplifiers driven by two pump waves," Colin J. McKinstrie, S. Radic, M. G. Raymer," Optics Express, **12**, 5037-5066 (2004).
93. "Generation of pure-state single-photon wavepackets by conditional preparation based on spontaneous parametric downconversion," A. B. U'Ren, C. Silberhorn, K. Banaszek, I. A. Walmsley, R. Erdmann, W. P. Grice, and M.G. Raymer, Laser Physics, **15**, 146 (2005).
94. "Picosecond Polarization Dynamics and Noise in Pulsed Vertical-Cavity Surface-Emitting Lasers," E. L. Blansett, M. G. Raymer, G. Cui, G. Khitrova, H. M. Gibbs, D. K. Serkland, A. A. Allerman, and K. M. Geib, IEEE J. Quant. Electron. **41**, 287-301 (2005).
95. "Quantum noise properties of parametric processes," C. J. McKinstrie, M. Yu, M. G. Raymer and S. Radic, Opt. Express **13**, 4986-5012 (2005).
96. "Pure-state, single-photon wave-packet generation by parametric down conversion in a distributed microcavity," M. G. Raymer, Jaewoo Noh, K. Banaszek, I.A. Walmsley, Phys. Rev. A **72**, 023825 (2005). quant-ph/0504062
97. "Translation of quantum states by four-wave mixing in fibers," C. J. McKinstrie, J. D. Harvey, S. Radic and M. G. Raymer, Opt. Express **13**, 9131-9142 (2005).
98. "Quantum efficiency of single-photon sources in the cavity-QED strong-coupling regime," Guoqiang Cui and M. G. Raymer, Opt. Express, **13**, 9660-9665 (2005). quant-ph/0511049
99. "The Maxwell wave function of the photon," M. G. Raymer and Brian J. Smith, Proceedings of SPIE Volume 5866: The Nature of Light: What Is a Photon?, C. Roychoudhuri, K. Creath, Editors, pp. 293-297 (2005).

100. "Measurement of the transverse spatial quantum state of light at the single-photon level," Brian J. Smith, Bryan Killett, M.G. Raymer, K. Banaszek, I.A. Walmsley, *Opt. Lett.* **30**, 3365-3367 (2005). quant-ph/0507142
101. "Quantum mechanics of phase-sensitive amplification in a fiber," C. J. McKinstrie, M. G. Raymer, S. Radic and M. V. Vasilyev, *Opt. Commun.* **257**, 146-163 (2006).
102. "Emission spectra and quantum efficiency of single-photon sources in the cavity-QED strong-coupling regime," Guoqiang Cui and M. G. Raymer, *Phys. Rev. A*, **73**, 053807 (2006).
103. "A hemispherical, high-solid-angle optical micro-cavity for cavity-QED studies," Guoqiang Cui, J. M. Hannigan, R. Loeckenhoff, F. M. Matinaga, M. G. Raymer, S. Bhongale, M. Holland, S. Mosor, S. Chatterjee, H. M. Gibbs, G. Khitrova, *Opt. Express*, **14**, 2289 (2006).
104. "Pairwise entanglement and readout of atomic-ensemble and optical wave-packet modes in traveling-wave Raman interactions," Wojciech Wasilewski and M.G. Raymer, *Phys. Rev. A*, **73**, 063816 (2006). quant-ph/0512157
105. "Four-wave mixing cascades near the zero-dispersion frequency," C. J. McKinstrie and M. G. Raymer, *Opt. Express* **14**, 9600 (2006).
106. "Two-photon wave mechanics," Brian J. Smith and M. G. Raymer, *Phys. Rev. A*, **74**, 062104 (2006). quant-ph/0605149
107. "Efficient picosecond pulse shaping by programmable Bragg gratings," Chunbai Wu and M. G. Raymer, *IEEE Journal of Quantum Electronics*, **42**, 873-884 (2006).
108. "Slow light propagation in a linear-response three-level atomic vapor," Wenhai Ji, Chunbai Wu, M. G. Raymer, *JOSAB* **24**, 629-635 (2006). quant-ph/ 0603145
109. "Mapping broadband single-photon wavepackets into an atomic memory," J. Nunn, I. A. Walmsley, M. G. Raymer, K. Surmacz, F. C. Waldermann, Z. Wang, and D. Jaksch, *Phys. Rev. A*, **75**, 011401R (2007). quant-ph/0605149
110. "Unimpaired phase-sensitive amplification by vector four-wave mixing near the zero-dispersion frequency," C. J. McKinstrie, S. Radic, M. G. Raymer, L. Schenato, *Opt. Express*, **15**, 2178-2189 (2007).
111. "Mesoscopic entanglement of atomic ensembles through non-resonant stimulated Raman scattering," Wenhai Ji, Chunbai Wu, S. J. van Enk, M. G. Raymer, *Phys. Rev. A* **75**, 052305 (2007); quant-ph/0612057
112. "Photon wave functions, wave-packet quantization of light, and coherence theory," Brian J. Smith and M. G. Raymer, *New J. Phys.* **9**, 414 (2007)
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“Toward quantum information processing using quantum dots in optical microcavities,” Oxford University, Nov. 2002

“Toward single-photon wave-packet engineering using nonlinear optical downconversion,” Physics Colloquium, Oregon state University, Nov. 2002

“Toward the Generation of Perfectly Correlated Photon Pairs by Cavity-Modified Spontaneous Down Conversion,” Seminar, University of Southampton, Nov. 2002

"Toward quantum information processing using semiconductor quantum dots in the strong cavity-QED coupling regime," Meeting of the Southwest Quantum Information and Technology (SQuInT) Network, Santa Fe, Feb. 2003

“Single-photon wave-packet engineering using nonlinear optical down conversion,” Oregon State University (Feb., 2003)

“Toward quantum information processing using quantum dots in optical microcavities,” Workshop on Quantum Optics in semiconductors, Bremen, Germany, June 2003

“Toward single-photon wave-packet engineering using nonlinear optical downconversion,” Physics Seminar, University of Rostock, Germany, June 2003

“Entanglement of a wave-packet optical mode and a collective atomic-ensemble mode by stimulated Raman scattering,” Quantum Challenges Meeting, Falenty, Poland (Sep., 2003)

“Toward cavity-QED strong coupling of a semiconductor quantum dot to an external optical microcavity,” Symposium on quantum optics and cavity QED in semiconductor microcavities,” Laser Science Annual Meeting Tucson, Arizona, Oct. 2003.

“Quantum Optical Measurement,” 3-Lecture series at the X Jorge André Swieca School of Quantum and Nonlinear Optics, Belo Horizonte, Brazil (Feb. 2004).

“Locality, Realism, and the Quantum World,” etc, Univ. Oregon Undergraduate Physics Seminar (Apr., 2004)

“Quantum Optical State Measurement and Ultrafast Statistical Sampling,” Lecture series at the Niels Bohr Summer Institute in Quantum Optics, Copenhagen, Denmark, (Aug. 2004).

“The photon wave function and its measurement,” Physics Seminar, Aarhus University, Aarhus, Denmark, (Aug., 2004)

“All Optics is Quantum Optics,” The Institute of Optics' 75th Anniversary Celebration, Rochester, NY (Oct. 2004).

“The Photon Wave Function and its Measurement,” Reed College Physics Department, Portland, OR (Nov. 2004).

“Pure-state, single-photon wave-packet generation by parametric down conversion in a distributed microcavity,” Quantum Optics II, Cozumel, Mexico, (Dec. 2004)

“Engineered Pure-State Single-Photon Wave-Packets,” Meeting of the Southwest Quantum Information and Technology (SQuInT) Network (Tucson, Feb. 2005).

“The Nature of the Photon: Particle and Wave Mechanics,” The Jan Minkowski Memorial Lecture, Johns Hopkins University, Baltimore, 2005.

“Spatial Quantum State Tomography for Photons,” Quantum Optics VI, Krynica, Poland (June, 2005).

“The Maxwell wave function of the photon,” SPIE Conference, Optics and Photonics, Conference number 5866, The Nature of Light: What is a Photon? (San Diego, Aug. 2005)

“Secure Quantum Key Distribution using Squeezed Macroscopic Light Pulses,” SPIE Conference, Optics and Photonics, Conference number 5893, Quantum Communications and Quantum Imaging III (San Diego, Aug. 2005)

“Entanglement of an optical wave-packet mode and a collective atomic-ensemble mode by stimulated Raman scattering,” Quantum Information Processing I R C Seminar, Oxford University (Oct. 2005).

“Entanglement of an optical wave-packet mode and a collective atomic-ensemble mode by stimulated Raman scattering,” Quantum Optics and Laser Science Seminar, Imperial College, London (Oct. 2005).

“Entanglement of an optical wave-packet mode and a collective atomic-ensemble mode by stimulated Raman scattering,” Max Planck Research Group Seminar, Erlangen University (Oct. 2005).

“The bit and the quantum,” Keynote Lecture at the Murdock Trust Partners in Science Conference, for high-school science teachers and their university research mentors, San Diego, (Jan. 2006).

“Photon Wave Mechanics,” 2006 International Workshop on Linear Optical Quantum Information Processing (LoQuIP), Baton Rouge (Apr. 2006)

“Photon Wave Mechanics: How to Think and Teach About Photons,” Physics Dept. Colloquium, Univ. of New Mexico (Sep. 2006)

“Entanglement of optical wave-packet modes and collective atomic-ensembles by stimulated Raman scattering,” Center for Advanced Studies, Univ. of New Mexico (Sep. 2006).

“Controlled photon generation in structured nonlinear optical materials,” Frontiers in Optics, OSA Annual Meeting, Rochester, (October, 2006)

“Entanglement of mesoscopic optical wave-packets and collective atomic ensembles by stimulated Raman scattering,” Meeting of the Southwest Quantum Information and Technology (SQuInT) Network (Pasadena, Feb. 2007).

“Photon Wave Mechanics,” UC Berkeley (April 2007)

“Photon orbital angular momentum and spin-orbit coupling for quantum information,” Meeting of the Quantum Information Processing IRC (Oxford University, UK, June, 2007)

“Photon Wave Mechanics: Thinking and Teaching about Photons,” Bath University UK (June 2007)

“Photon Wave Mechanics and the Wolf Equations of Classical Coherence Theory,” Conference on Coherence and Quantum Optics (Rochester, June 2007)

“Carlos Stroud and the Spectrum of Resonance Fluorescence,” Carlos Stroud Fest (Rochester, June, 2007)

“Photon Wave Mechanics: Thinking and Teaching about Photons,” Western Washington University (Nov. 2007)

“The Bit and the Quantum,” UO & COCC Friday Distinguished Lecture Series, Central Oregon Community College (Bend, Oregon, May 2008).

“Single-Photon Spin-Orbit Interaction in Optical Fiber,” LPHYS, Trondheim, Norway (June 2008)

“Photon Wave Mechanics and Spin-Orbit Interaction in Single Photons,” PRACQSYS - Principles and Applications of Control in Quantum Systems, University of Oregon (Aug. 2008).

“Photon Wave Mechanics and Spin-Orbit Interaction in Single Photons,” Physics Colloquium, University of Virginia (Sep. 2008).

“Spin and Orbital Rotation of Electrons and Photons via Spin-Orbit Interaction,” Quantum Optics VII, Zakopane, Poland, June 2009.

“Stimulated Raman Scattering Revisited,” Quantum Challenges III, Zakopane, Poland, June 2009.

“Living in a Quantum World,” (joint with Steven van Enk) Science Pub Talk, Sponsored by Oregon Museum of Science and Industry, at Cosmic Pizza, Eugene, Oregon (Jan., 2010)

“Frequency Translation of Single-Photon States by Four-Wave Mixing in Photonic Crystal Fiber,” Applied Physics Seminar, Ginzton Laboratory, Stanford University (Jan. 2010).

“Quantum Optical Frequency Comb by Stimulated Raman Scattering,” JILA, University of Colorado, Boulder, (Apr. 2010)

“Frequency Translation of Single-Photon States by Four-Wave Mixing in Photonic Crystal Fiber,” Seminar, Institute for Molecular Science, Okazaki, Japan (Sep. 2010).

“Nonlinear Quantum Optics in Solid-Core and Hollow-Core Photonic Crystal Fiber,” Workshop on Next-Generation Optical Fiber Technology, Cocoa Beach, FL (Oct. 2010)

“Optical Parametric Processes in Quantum Information Technology,” Alcatel-Lucent Bell Laboratories, Crawford Hill, NJ (Oct. 2010)

“Frequency Translation of Quantum States of Light by Four-Wave Mixing in Optical Fiber,”

International Workshop on High Dimensional Entanglement Como, Italy (June 2011)

“Frequency Translation of Quantum States of Light by Four-Wave Mixing in Optical Fiber,” IEEE Summer Topical Meeting on “Entanglement Distribution in Quantum Communication and Beyond,” Montreal, Canada (July 2011)

“A Science Literacy Teaching Program Across Physics, Biology, Chemistry, and Geology,” Physics Department Colloquium, Oregon State University (Jan. 2011)

“Quantum Optical Pulse Shaping, Routing, and Frequency Translation by Four-Wave Mixing in Optical Fiber,” Southwestern Quantum Information and Technology Annual Workshop (SQuInT), Albuquerque, NM (February 2012)

“Coherent Triplet-Phonon Generation by Dual-Pumped Multiwave Raman Scattering, Seminar, Oxford University (April, 2013)

“Quantum Frequency Conversion of States of Light,” Quantum Optics VIII, Jachranka, Poland (June 2013)

“Quantum Frequency Conversion and Temporal-Mode Multiplexing of States of Light,” Conference on Quantum Information and Quantum Control V, Fields Institute, Toronto, Canada (August 2013)

“Quantum Frequency Conversion of States of Light,” Materials and Optics Symposium, University of Oregon (Sep. 2013)

“Entangled Photon Pairs and Ultrafast Probing of Molecules,” Physical Chemistry Seminar, University of Oregon (Oct. 2013)

“Whence Quantum Mechanics?” Workshop on Quantum Physics and the Nature of Reality, Traunkirchen, Austria (Nov. 2013)

“Spectrally Entangled Photon Pairs for Ultrafast Probing of Molecular Coherence,” Southwestern Quantum Information and Technology Annual Workshop (SQuInT), Santa Fe, NM (Feb. 2014)

“Ultrafast 2D Fluorescence Spectroscopy using Spectrally Entangled Photon Pairs,” International Coherent Multidimensional Spectroscopy Meeting, Eugene Oregon (July 2014)

“Ultrafast 2D Fluorescence Spectroscopy using Spectrally Entangled Photon Pairs,” Workshop on Nonlinear Spectroscopy Meets Quantum Optics, Freiburg, Germany (Oct. 2014)

“Teaching and Learning Science Literacy,” Science Educator’s Day (EDAY), talk for High-school teachers, at Frontiers in Optics (OSA), (Oct. 2014)

“Ultrafast 2D Fluorescence Spectroscopy using Spectrally Entangled Photon Pairs,” Physics of Quantum Electronics (PQE), Snowbird, Utah (Jan. 2015)

“Ultrafast 2D Fluorescence Spectroscopy using Spectrally Entangled Photon Pairs,” March Meeting of the APS, San Antonio (Mar. 2015)

“Tutorial on Quantum Nonlinear Optics, Parts, 1, 2, and 3,” Summer School on Quantum and Nonlinear Optics (QNLO Sørup Herregaard, Denmark, June 2015)

“Photon Temporal Modes as a Complete Framework for Quantum Information Science,” Forsvarets forskningsinstitutt (Norwegian Defence Research Establishment) Kjeller, Norway (10 Aug 2015)

“Photon Temporal Modes: Encoding Quantum Information using Frequency Conversion Techniques,” Physics Departmental Colloquium (Montana State University, 21 Apr 2016)

“Encoding Quantum Information Using the Colors and Shapes of Photons,” Physics Departmental Colloquium (Pacific University, 2 Dec 2016)

“Encoding Quantum Information in the Colors and Shapes of Single Photons,” Physics Departmental Colloquium (San Diego State University, 17 March, 2017)

“Photon Orthogonal Temporal Modes as a Complete Quantum Information Framework,” IEEE Photonics Society Summer Topicals Meeting Series (San Juan, Puerto Rico, 10 July, 2017)

“Multiplexing and Demultiplexing Quantum Information in Temporal Modes of Single Photons,” Quantum Optics IX Conference (Sopot, Poland, Sep. 2017)

“Multiplexing and Demultiplexing Quantum Information in Temporal Modes of Single Photons,” Keynote talk at workshop, “The Quantum Internet; Charting the Critical Path” (Toronto, Canada, June. 2018)

“High-Efficiency Multiplexing and Demultiplexing of Quantum Information in Temporal Modes of Single Photons,” Qucumber Workshop, Oxford, UK, June 2018

“High-Efficiency Multiplexing of Quantum Information in Optical Temporal Modes,” Frontiers in Optics, Wash. DC, Sep 2018

RECENT CONFERENCE CONTRIBUTIONS

“Single-photon wave-packet engineering using nonlinear optical downconversion,” M. G. Raymer, Brian Smith, Jaewoo Noh, I.A. Walmsley, K. Banaszek, Paper WF3, *Frontiers in Optics/Laser Science XIX Conference*, Tucson, Arizona, USA, (Optical Society of America, Washington, DC, 2003).

“Quantum cryptography key distribution using two-mode squeezed optical pulses,” 2004 Frontiers in Optics/Laser Science Meeting in Rochester, New York (Oct. 2004).

“Quantum cryptography key distribution using macroscopic non-classical optical pulses,” International Quantum Electronics Conference, San Francisco (May, 2004). ITuJ4

“Phase-sensitive amplification produced by degenerate four-wave mixing in a fiber,” C. J. McKinstrie, S. Radic, M. G. Raymer and M. V. Vasilyev, CLEO 2005 Baltimore.

“Pair-Wise Entanglement and Readout of Atomic-Ensemble and Optical Wave-Packet Modes in Traveling-Wave Raman Interactions,” Quantum Electronics and Laser Science, Long Beach (May 2006).

B. J. Smith and M. G. Raymer, “Photon wave mechanics,” presented at Quantum Electronics and Laser Science (QELS) Conference, Long Beach, CA, 23-25 May 2006, paper QThD4.

B. J. Smith and M. G. Raymer, “Photon wave mechanics,” presented at Southwestern Quantum

Information and Technology (SQuInT) Annual Workshop, Albuquerque, NM, 17-19 February 2006.

“Cluster State LOQC with Entangled Spatial Modes,” C. C. Leary and M. G. Raymer, in “Coherence and Quantum Optics IX,” eds. N. P. Bigelow, J.H. Eberly, and C.R. Stroud (Optical Society of America) pg.549 (2008).

C. C. Leary and M. G. Raymer, “Single-photon spin-orbit coupling and LOQC,” in Quantum Electronics and Laser Science Conference (QELS), San Jose, CA, May 4-9, 2008.

“Simple Gas Cell used to Fill Hollow-Core Optical Fiber With High-Pressure Gas for Optical Comb Generation by Raman Scattering,” Cade Gledhill, Erin Mondloch, Chunbai Wu, Michael G. Raymer, APS/OSA Symposium on Undergraduate Research (2008, Rochester, NY).

“Creation of Pure-State Photon Pairs and Single Photon Wavelength Translation in Photonic Crystal Fibers,” Hayden McGuinness and M. G. Raymer, Southwest Quantum Information and Technology Network (Squint) Eleventh Annual Meeting, February 2009, Seattle, Washington

“1-D Parity Mode Sorter,” Zachary Bond, Cody Leary, Michael Raymer, APS/OSA Symposium on Undergraduate Research (2009, San Jose, Calif.)

“Spontaneous Phase Anti-correlations in Raman Optical Frequency Comb Generation,” Chunbai Wu, Erin Mondloch, M. G. Raymer, Y.Y. Wang, F. Couny and F. Benabid, in Quantum Electronics and Laser Science Conference, OSA Technical Digest (CD) (Optical Society of America, 2010), paper QTuA5.

“Creation and Translation of Single Photon States in Photonic Crystal Fiber,” Hayden McGuinness and M. G. Raymer, Southwest Quantum Information and Technology Network (Squint) 12th Annual Meeting, February 2010, Santa Fe.

“Frequency Translation of Single-Photon States by Four-Wave Mixing in a Photonic Crystal Fiber,” H.J. McGuinness, M.G. Raymer, C.J. Mckinstrie and S. Radic, QELS (2010, San Jose, Calif.)

“Spontaneous Phase Correlations in Raman Optical Frequency Comb Generation,” Chunbai Wu, Erin Mondloch, M. G. Raymer, Y.Y. Wang, F. Couny and F. Benabid (FiO, Rochester, NY, 2010)

“Frequency Translation of Single-Photon States by Four-Wave Mixing in a Photonic Crystal Fiber,” H.J. McGuinness, M.G. Raymer, C.J. Mckinstrie, and S. Radic (FiO, Rochester, NY, 2010)

“Quantum Key Distribution Using an Eight-Port Interferometer,” Daniel Mulkey, Sven Aeschlimann, M.G. Raymer, and Jaewoo Noh, APS/OSA Symposium on Undergraduate Research (2012, Rochester NY)