Jonathan P. Dowling, PhD
Horace C. Hearne Professor of Theoretical Physics
Co-Director, Horace C. Hearne Institute for Theoretical Physics

Quantum Science and Technologies Group
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Service: I have served on numerous Department of Defense (DoD) review boards and organizational committees; in particular for the Army Research Office (ARO), the Defense Advanced Projects Research Agency (DARPA), the National Security Agency (NSA), and the Intelligence Advanced Research and Development Activity (ARDA). I organized the first international DoD workshops on photonic band-gap materials (1991), quantum cryptography and computing (1995), and the atom laser (1997). More recently I organized two workshops jointly sponsored by the DoD and NASA on quantum clock synchronization (2001) and quantum imaging and metrology (2003), as well as a DoD and Hearne Institute workshop on linear optical quantum information processing (2006), and a National Science Foundation (NSF) workshop on quantum materials and high-performance computing (2007). I have regularly served as technical advisor and reviewer for the National Academy of Sciences (NAS) and National Research Council (NRC), the DoD, the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and numerous international funding agencies, in the research areas of quantum computing and information processing; quantum optics; nanotechnology; quantum sensors; quantum imaging; coherent quantum electronics; photonic band-gap materials; atomic, molecular, and optical physics; and general relativity. I have also reviewed hundreds of research papers in these fields for professional journals, and I currently serve on the editorial board of the journal, *Concepts of Physics,* and have served on the board of the *Journal of Optics A* and *Physical Review A*. I was appointed Fellow of the Institute of Physics in 1998, of the Optical Society of America in 2005, and of the American Physical Society in 2008. Since 2005 I have served as a Texas Engineering Experiment Station researcher at Texas A&M University and a visiting scientist at the NASA Jet Propulsion Laboratory (JPL), the latter through 2008.

Funding: At the Army I regularly raised about $1M a year in in-house laboratory independent research program funds. While at JPL the budget for my Quantum Computing Technologies group averaged around $2.5M/Yr. I raised these funds from a variety of sources — primarily from the DoD, NASA, and the NSA and ARDA. Since coming to LSU I have been on three grants from the Army Research Office (ARO), the National Reconnaissance Office (NRO), and the Intelligence Advanced Research Projects Agency (IARPA), and Defense Advanced Research Projects Agency (DARPA), and numerous smaller grants, totaling nearly $12M as principal investigator (PI) or Co-PI, with about $3.0M of that coming to LSU.

Research Interests: My principal areas of research are in quantum science and technologies, particularly in quantum computing and quantum information technologies, quantum optics, foundations of quantum mechanics, and photonics. In particular, I am actively working in the areas of optical quantum computing and information processing, cavity quantum electrodynamics, photonic band-gap structures, quantum coherence, atom optics, quantum imaging, and quantum sensors. My recent topics of research are related to quantum technologies, including linear optical quantum information processing, quantum lithography and imaging, quantum gravity gradiometry, and quantum interferometry and metrology.

Research Plan: I will continue my work in theoretical studies of optical approaches to quantum information processing, including: linear optical quantum computing, quantum computing with Bose-Einstein condensates, cavity quantum electrodynamics, as well as theory of ion traps and other approaches to quantum optics related to electromagnetically induced transparency as well as superconducting qubits. I will also continue my research into the development of photonic band-gap materials for optical quantum information, such as for single photon sources and detectors, as well as for cavity QED approaches to interface solid-state and photonic qubits. I will continue my work on the general theory of entangled light and atoms in the context of quantum computation as well as quantum imag-

ing and sensing systems. I will also pursue my work on using photonic band gap materials for spontaneous and thermal emission control.

Teaching Experience and Philosophy: As a graduate student at the University of Colorado, I was a teaching assistant in the mathematics department for two years. After receiving my MS in applied mathematics I was promoted to graduate instructor and for six years taught my own courses in college algebra, calculus I–III, linear algebra, differential equations, and introductory physics courses. I regularly won the annual university-wide graduate instructor teaching award. In 1988–89, I taught introductory physics at Denver Metropolitan Community College and the University of Colorado at Denver, also with very good student evaluations, and since coming to LSU I have taught graduate and undergraduate physics courses with outstanding reviews from the students and commendations from the dean and department chair. I believe in an exciting style of teaching with a good mix of lectures, collaborative student interactions, and demonstrations.

Formal Education:
BS with honors, Physics, University of Texas at Austin (1977).
MS Applied Mathematics, University of Colorado at Boulder (1981).
MS Physics, University of Colorado at Boulder (1984).
PhD Mathematical Physics, University of Colorado at Boulder (1988); Advisor, Asim O. Barut.
Educational Foundations, Policy, and Practice, University of Colorado at Boulder (1989–1990).
NASA Manager Training, Jet Propulsion Laboratory (2000).
NASA Leader Training, Jet Propulsion Laboratory (2002).

Professional Experience

8/04–Present: Horace C. Hearne Jr. Professor of Theoretical Physics & Co-Director of the Hearne Institute of Theoretical Physics, Department of Physics and Astronomy, Louisiana State University (LSU). Along with Jorge Pullin, I am one of the two founding directors of the Hearne Institute for Theoretical Physics at LSU. The Institute carries out research on quantization of gravity, quantum optics effects in gravitational wave interferometers, decoherence due to quantum gravity, non-standard optics due to quantum gravity, quantum computing, quantum imaging, and quantum sensing. Along with Pullin, I supervise the operation of the Institute, which has more than ten associate faculty in the departments of Physics and Astronomy, Math, Electrical Engineering and Computer science, and is supported by the original Hearne endowment, as well as large grants from the National Science Foundation and the Department of Defense. The operating budget of the Institute is about $1M per annum. As supervisor of the Quantum Science and Technologies Group, which reports to the Institute, I am a principal investigator (PI) on a $700K DARPA quantum sensor grant, co-principal-investigator (Co-PI) on a $5M, five-year, ARO, Multi-University Research Initiative (MURI) on Quantum Imaging. I am a Co-PI on a $6M, four-year, Intelligence Advanced Research Projects Activity (IARPA) quantum computing concept maturation grant. I was also co-investigator (Co-I) on a $400K National Reconnaissance Office (NRO) director's innovation initiative grant for 2006. I currently mentor two assistant professors (Drs. Hwang Lee and Georgios Veronis), a member of research staff (Dr. Tae-Woo Lee) and I have been research advisor for eight postdocs, five graduate students, and three undergraduate students since 2004. In 2008 I was elected Fellow of the American Physical Society, and in 2004 Fellow of the Optical Society of America.

01/05–Present: Texas Experimental Engineering Scientist, Texas A&M University, College Station, TX.

01/05–09/08: Visiting Scientist, NASA JPL, Pasadena, CA.

10/00–8/04: Principal Scientist and Group Supervisor, Quantum Computing Technologies Group, NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. Procured over $2M in DoD and NASA funding for JPL in FY02 for quantum technologies. Managed two large DoD grants for quantum technology research in gravity gradiometry and quantum clock synchronization. Organizer of NASA-DoD Workshop on Quantum Dots for Quantum Computing, Japan, 2002; Organizer of NASA-DoD workshop on Quantum Imaging and Metrology, Pasadena, 2002; Co-Organizer of Workshop on Photonic Crystals, Laguna Beach in 2002. Winner of 2002 Lamb Medal for Quantum Optics and Laser Sciences. Semi-Finalist for Discovery Magazine Technology of the Year Award for work in quantum lithography in 2000. Initiator of international collaborative effort between the JPL Quantum Computing Technologies activity and the Australian Center for Quantum Computing Technologies. The NSA funded this collaboration at $1.1M, (FY01–05). Leveraged a total of $3M in NSA funding for four differ-

ent quantum-computing activities at JPL. I was PI on an Office of Naval Research (ONR) grant for quantum optics for $800K for (FY00–05). I was Co-I on multiple grants in quantum technologies in the JPL group. I served on the editorial board of *Physical Review A* and *Journal of Optics B.* My work focused on linear optical approaches to quantum information processing, superconducting quantum computing, and photonic crystal design for thermal emissivity and high-power laser applications. In 2000 I built up and supervised a world-class quantum optics laboratory in my group at JPL. In 2002 I was awarded the Willis E. Lamb Medal for Quantum Optics and Quantum Electronics and the NASA Space Act Award for the development of quantum lithography.

10/99–9/00: Principal Research Scientist, Quantum Computing Technologies Group, NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. During this period I initiated several new research programs, including the quantum optical gyro, quantum interferometric lithography, and an experimental program of atom interferometry for gravity gradiometry from space. I organized a new JPL quantum technologies thrust area, and served on a NASA panel for nanotechnologies. I was promoted to principal scientist in 1999. I developed two new key quantum technologies: quantum lithography and quantum atomic clock synchronization.

10/98–9/99: Research Scientist at the Senior Level, Ultra-Computing and Quantum Computing & Technologies Groups, NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California. During this time I carried out research in quantum interferometry, quantum gravity gradiometry, and quantum information theory. In addition, I developed an entirely new research thrust area at JPL, called quantum technologies.

12/95–9/98: Research Physicist GS-12 & GS-13, Weapons Sciences Directorate, U. S. Army Aviation & Missile Command (AMCOM), Redstone Arsenal, Alabama. I was promoted to a GS-13 in the summer of 1996. During this period, I continued my work on photonic band gap materials and developed a novel matrix transfer method for understanding radiation rates from one-dimensional periodic structures. I also became involved in work on quantum computing and atom lasers, both topics of interest to the DoD. I produced an important paper on the quantum noise limits to the atom laser gyro. I organized an Army-sponsored meeting on atom lasers in Tucson in the spring of 1996. I was also one a member of the DoD Technical Advisory Committee for the multi-million dollar, Multidisciplinary University Research Initiative (MURI) that was awarded by ARO/DARPA in the spring of 1996 to UCLA in photonic crystals. In addition, I was also on the ARO/DARPA Technical Advisory Committee for the broad agency announcement for a MURI in quantum computing. This multi-million dollar MURI was eventually awarded in the summer of 1996 to Caltech. I continued to be a member on the DoD Technical Advisory Committee for these MURI programs. In the spring of 1997, I was on the ARO/DARPA review panel for proposals for the high infrared directional emissivity program, solicited under a DARPA broad agency announcement. In 1997 I received a grant from the ONR for my work on quantum gyroscopes. In 1996 I was awarded the Army Research and Development Achievement Award for Technical Achievement for my work in the area of photonic band-gap research. During this period, my patent on the optical diode was granted, and a new patent for a photonic band gap delay line was filed. I co-authored a review article on atom optics for a book chapter in Advances in Atomic, Molecular, and Optical Physics in 1997. I was also sole editor of the book: Electron Theory and Quantum Electrodynamics — 100 Years Later, Proceedings of NATO Advanced Study Institute held in Edirne, Turkey (Plenum, New York, 1997). I began a research program on using quantum optics and quantum computing techniques to improve interferometry and gyroscopy for an orders of magnitude improvement in laser gyro navigation. In 1996 I was awarded the Army Research, Development, and Engineering Award for my work on the theory of spontaneous emission in photonic crystals.

7/94–12/95, Research Physicist GS-11 & GS-12, Weapons Sciences Directorate, U. S. Army Aviation & Missile Command (AMCOM), Redstone Arsenal, Alabama. I worked in the quantum optics group with Dr. Charles Bowden. My work was a continuation of my research carried out there as a National Research Council (NRC) postdoc and Battelle contractor. I was AMCOM's chief investigator into the area of photonic band-gap materials, and I continued to collaborate with Dr. Bloemer on several AMCOM research experiments in this field. I became an internationally recognized expert on cavity quantum electrodynamics (QED) and photonic band-gap structures, and I regularly advised the ARO in these areas. In addition, I was closely involved with the quantum optics research thrusts of: regular and cavity quantum electrodynamics, near dipole-dipole effects, lasing without inversion, foundations of quantum mechanics, atom optics, atom laser, quantum cryptography, and quantum computing. In July of 1994 I was the first Army researcher to report to the ARO on the recent developments in quantum computing and cryptography, which the ARO then deemed critical emerging new technologies. I worked with the ARO to organize an the first DoD workshop on quantum cryptography and quantum computing in 1995, and I continued to on the DoD Technical Advisory Committee to the ARO, DARPA, and the NSA on funding of these fields; work that in-

volved reviewing proposals and monitoring ARO contracts. I was promoted to a GS-12 in the summer of 1995. I also worked with the ARO to organize a workshop on Army applications for the global positioning system, with special emphasis on the role of Einstein's theory of relativity in limiting satellite-determined location accuracy.

4/94–7/94, Contractor, Battelle Corporation, Research Triangle, North Carolina. I worked for AMCOM as a contractor. Primary task was to model and derive analytical formulas to describe spontaneous emission rates in GaAs/GaAlAs, layered, semiconductor heterostructures. This was in support of the photonic band edge laser and optical diode research experiments. During this period I developed a new method for computing the density of states and atomic emission rates in an arbitrary, layered, dielectric structure. I also provided consulting service to Prof. Marlan O. Scully at Texas A&M University in the area of local field effects in coherent optical media.

10/90–4/94, Research Associate, National Research Council, Weapons Sciences Directorate, U. S. Army Aviation & Missile Command (AMCOM), Redstone Arsenal, Alabama. I was working as a research associate for the National Research Council (NRC), National Academy of Sciences (NAS), under the advisorship of Dr. Charles Bowden at AMCOM. My research project consisted of an in-depth investigation into the properties of photon states of minimum phase uncertainty-states that would be useful in telecommunications and the making of sensitive laser gyroscopes. I also worked on cavity QED, nonlinear optics, a general theory of atomic emission rates in photonic band structures, neutron spin polarizers, and quantum limits to phase sensitivity in atom interferometers. In May of 1991 I gave an introductory lecture on photonic band gaps and photon localization before the Army Research Office (ARO), and based in part on this lecture, the Army labeled this area of quantum optics a critical emerging new technology. I organized a seminal workshop on this subject-held in January of 1992. In addition, I was an editor on a special issue of the Journal of the Optical Society of America on photonic band structures that appeared in February 1993. In 1993 and 1994 my study of photonic band edge effects led to several new opto-electronic device applications. In particular, I was co-inventor of the band edge laser, the nonlinear band edge optical limiter, and the optical diode. I collaborated on two experimental research projects: the band-edge laser and diode that resulted directly from my theoretical work.

6/89–9/90, Postdoctoral Researcher, Max Planck Institute for Quantum Optics (MPQ), Garching, Germany. Beginning in June of 1989, I began tenure at a 15-month postdoctoral position at the MPQ in Garching, under Prof. Herbert Walther, Director. My immediate research collaborator was Prof. Wolfgang P. Schleich, whom I worked with on the theory of nonclassical states of light, among other projects. I also did collaborative work with Professors G. S. Agarwal, A. O. Barut, M. O. Scully, and J. A. Wheeler while there. Projects that I worked on included: self-field QED, photon states of minimum phase uncertainty, atomic radiation in optical cavities, interference in phase space, and various other topics in quantum optics. This opportunity gave me the possibility to interact with a wide range of other physicists in the international quantum optics community.

1/89–5/89, Assistant Professor, Metropolitan State College (MSC), Denver, Colorado. Based on my stellar teaching ratings from the previous semester, I was promoted for the spring semester of 1989 to a full-time, temporary position as assistant professor at MSC. Duties included teaching undergraduate courses in physics and undergraduate physics laboratories. I also continued my theoretical research into the self-field approach to QED by developing an account of the Unruh effect of an accelerating detector and the related Hawking radiation from a black hole.

6/88-12/88, Part-time Instructor, Metropolitan State College (MSC), Denver, Colorado, and University of Colorado at Boulder. After completion of my PhD in May of l988, I was working part-time as an instructor at the two above-mentioned institutions. During the summer of l988, I was a recitation instructor for a second-semester, calculus-based physics course at CU Boulder. That fall term I was co-teaching and developing an experimental course in quantitative reasoning and math skills at CU Boulder that was eventually adopted into the required undergraduate curriculum. For this course I was awarded a certificate of teaching excellence. During this time, I was also in charge of several laboratory and self-paced sections of physics and astronomy at MSC. During this period, I was also collaborating with Prof. Barut at CU on publications related to my PhD research.

Memberships in Professional and Honorary Societies

1. American Physical Society, Fellow (2008)
2. Institute of Physics, Fellow
3. Optical Society of America, Fellow

Awards

1. Fellow, American Physical Society, 2008.
2. Fellow, Optical Society of America, 2005.
3. NASA Space Act Award, "Quantum Interferometric Lithography," 2002.
4. Willis E. Lamb Medal for Laser Science and Quantum Optics, "For pioneering contributions to quantum electronics and especially the study of spatial coherence effects of multiphoton entangled states (quantum lithography)," 2002.
5. Discover Magazine Technology of the Year Award (semi-finalist), 2000.
6. US Army Research, Development, & Engineering Achievement Award for "Development of mathematical models of electromagnetic wave emission and propagation in photonic band-gap materials," 1996.
7. US Army Award for "Assessment of the relativity community for application of Einstein's General Theory of Relativity for improvement of accuracy in the Global Positioning System," 1995.
8. National Research Council Associateship Awards: 1990–1994.
9. Fulbright Travel Grant Award, 1989.
10. Fellowship Award from the Italian Ministry of Foreign Affairs, 1986.
11. Graduate Instructor Awards for Teaching Excellence, l983 and 1988.
12. Marquis Who's Who in the South and Southwest
13. Marquis Who's Who in Science and Engineering
14. Men of Achievement.
15. International Who's Who.
16. Dictionary of International Biography.
17. Strathmore's Who's Who.

Summary of Significant Achievements

1. Developed computational theory and modeling and design framework for the optimization of quantum sensors. Developed concept for broadband optical delay device based on electromagnetically induced transparency. Developed design for Heisenberg limited charge and magnetic flux sensor based on superconducting elements and cavity quantum electrodynamics. Developed scheme for simulating the expansion of the universe in optical ion traps. Wrote significant review article on the field of linear optical quantum computing. Developed new scheme for quantum computation exploiting vortex states in Bose-Einstein condensates. Invented scheme to exploit the quantum Zeno effect to mitigate photon loss in quantum optical information processors. Developed polarization encoding scheme for fault-tolerant linear optical quantum computation. Designed a photonic crystal device for single photon sources for quantum optical communications.

2. Invented the fields of quantum interferometry, quantum gyroscopy, quantum clock synchronization and quantum lithography, while working in quantum computing technologies group at JPL. Instituted JPL quantum technologies seminar series. Initiated JPL quantum atomic gravity gradiometer program. Developed JPL quantum Internet test-bed facility. Initiated new JPL superconducting quantum computer program. Initiated collaboration between JPL and Australian Center for Quantum Information. Organized NASA-DoD workshop on quantum clock synchronization for space applications (2000). Organized NASA-DoD workshop on quantum dots for quantum computing, Kochi, Japan, (2002). Organizing NASA-DoD workshop on quantum imaging and metrology, Pasadena, 2002.

3. Developed the application of Electron-Nuclear Double Resonance (ENDOR) techniques in quantum computing. Discussed ENDOR resolution as a possible limiting factor in NMR quantum computing techniques. Discovered hat ENDOR and double-ENDOR techniques have sufficient resolution for quantum computing applications.

4. I was an author of an invited review chapter, "Evanescent Light-Wave Atom Mirrors, Resonators, Waveguides, and Traps," in Advances in Atomic, Molecular, and Optical Physics. This work has become a standard reference guide in the field.

5. In the summer of 1995 I alerted the ARO to recent developments in quantum cryptography and quantum computing that could have an important impact on national security. In particular, quantum computers have been shown to be powerful tools for secret code decryption. I helped the ARO organize a workshop in con-

junction with the NSA on the prospects for quantum computing and quantum cryptography (1995). From that meeting, several millions of dollars were allocated by the ARO and the NSA for academic research in quantum computing. I served on the ARO Technical Advisory Committee on quantum information processing from 1995 through 2005.

6. In 1995 I reviewed some recent developments concerning the incorporation of Einstein's theory of relativity in the global positioning system. I organized an Army-sponsored workshop on Army applications of the global positioning system that was held in North Carolina (1995). In particular, I helped advise on the technical content of the symposium, which discussed the relativity limited accuracy of the GPS for missile guidance.

7. Working with Dr. Bowden and Dr. M. O. Scully (Texas A&M), I was a principle investigator into the effects of near dipole-dipole (NDD) interactions in systems that exhibit lasing without inversion (LWI). I demonstrated the NDD-induced super-enhancement of inversionless gain and absorptionless index of refraction, as well as piezophotonic and magnetophotonic switching.

8. I developed a scheme for the utilization of PBG structures for use in a passive Identify Friend or Foe (IFF) device. I developed numerical simulations of the process.

9. I contributed to the theory and development of a photonic band edge optical limiter and optical diode. This work was published in the Journal of Applied Physics, my most cited paper, and a patent on the diode was awarded.

10. I organized an Army-sponsored workshop on the development and applications of photonic band-gap materials (1992), and was co-author on the proceedings. I was technical advisor to the Army in the area of photonic crystals.

11. I became an internationally recognized expert in the emerging new field of photonic band-gap (PBG) materials. I developed a complete analytical theory of atomic and antenna emission rates in PBG structures. I also studied the radiative properties of emitters near the band edge with application to optical computing and energy storage devices. I studied the anomalous index of refraction in these materials and have developed concepts for ultra-light, ultra-compact optical instruments and laser linear accelerator particle beam devices. I have studied the group velocity properties of photonic crystals and developed a true-time delay line. A patent was granted on this device. I developed a novel concept for a photonic band edge optical limiter.

12. I published a series of papers that account for cavity effects on atomic emission rates from a manifestly classical point of view, allowing particularly clear insight into the phenomenon. Applications to improved-gain, low-threshold micro laser operation were developed. I conducted an experiment with an instructor and undergraduate students at the University of Alabama at Huntsville that proves the classical nature of apparatus-dependent atomic emission rates. I am considered an internationally recognized expert in the area of cavity quantum electrodynamics.

13. Co-developer with Professors W. P. Schleich and J. A. Wheeler of a powerful new mathematical method for treating problems in quantum optics. The method, known as interference in phase space, has already proved to be very useful for simplifying calculations in many areas of nonlinear optics. I applied the technique to the study of quantum states of minimal phase noise. Such states have tremendous implications for ultimate quantum limits to the sensitivity to laser gyroscopes.

14. Co-developer with A. O. Barut of a new self-field theory of quantum electrodynamics (QED). Obtained theoretical value for the electron's gyromagnetic ratio in a theory where the electromagnetic field is not second quantized. Applied theory to cavity corrections to atomic emission rates and level shifts. Calculated apparatus-dependent effects on electron gyromagnetic ratio and help to settle controversy of the origin of a systematic error in the ultrahigh precision Penning trap measurements of this ratio. Offered an alternative approach to understanding the Unruh effect and the related Hawking radiation from the self-field approach. Also developed a self-field, two-level atom, model that allows laser action and other nonlinear quantum optical effects to be understood from a self-field point of view.

Consulting and Committee Membership

Regular reviewer of manuscripts for the journals: *Physical Review, Optics Communications, Foundations of Physics, Journal of the Optical Society of America, Journal of the European Optical Society, Journal of Applied Physics, Applied Physics Letters, American Journal of Physics, Nature,* and *Science.* In addition I have been a special issue editor for the *Journal of the Optical Society of America, Foundations of Physics, the Journal of Modern Optics,* and *Superlattice Microstructures*.

- National Academy of Sciences Review Board of the National Institute of Standards and Technology (2008-2009).
- Adviser, US Army War Games, Emerging Technologies, 2008.
- Department Steering Committee (2007–Present).
- Department Awards Committee (2007–Present).
- University Faculty Search Committees (2004–2007).
- Department Business Operations Committee (2007).
- Dean's PhD Representative (2007&2008).
- NSF Panel Reviewer on Quantum Materials and High-Performance Computing (2006–2007).
- Editorial Board, *Concepts of Physics* (2005–Present).
- Visiting Scientist, NASA Jet Propulsion Laboratory (2004–2008).
- Research Advisor, Texas Engineering Experimental Research Station, Texas A&M University (2004–Present).
- Panel on Digitization and Communications Science of the Army Research Laboratory Technical Assessment Board (2004–Present).
- Editorial Board, *Physical Review A* (2000–2004).
- Editorial Board, *The Journal of Optics A* (1998–2004).
- Technical Advisory Committee, DARPA-ARO, MIT MURI Center for Quantum Memory (2000–2005).
- Technical Advisory Committee, DARPA-ARO, Caltech MURI Center for Quantum Networks (2000-2005).
- NSF Panel Review on Quantum Computing and Information (2003–2004).
- Consultant to Sony Pictures on motion picture, *Frozen* (2001).
- Consultant to Steven Spielberg, Dreamworks Studios, on motion picture, *The Time Machine* (2001).
- Technical Advisory Committee, DARPA-ARO, University of Rochester MURI for Center for Quantum Networks (2000–2005).
- Consultant to JPL, on NASA Nanotechnology Initiative (2000).
- Consultant to JPL on NASA Quantum Technology Initiative (2000).
- Consultant to the NRO and ARDA on quantum technology development (1994-2000).
- Technical Advisory Committee, ARO and NSA, for quantum computing & quantum information (1998).
- Consultant to Air Force on proposals and scientific matters related to the field of quantum computing (1998–Present).
- Technical Advisory Committee, DARPA and ARO program on highly controlled infrared directional emissivity (1995).
- Technical Advisory Committee, DARPA and ARO program on photonic band gap MURI (1995).
- Technical Advisory Committee, DARPA and ARO program on quantum computing MURI (1995).
- Consultant to Army on applications of photonic band gap materials to improvement of phase array radar systems (1994).
- Consultant to Army on utilizing photonic band gap material to enhance power output of microwave resonators (1994).
- Consultant to Quantum Visions Corporation, on utilizing microcavity quantum electrodynamic effects to improve flat-screen display technology (1994).
- Consultant to Army on optical methods for measuring tension in wound fiber bobbins used in the fiber optics guided missiles (1994).
- Consultant to Army on an experimental proposal to improve the accuracy of the global positioning system by including special and general relativistic effects (1994).
- Consultant to Physics Department, University of Alabama at Huntsville on experimental cavity QED, pho-

tonic band-gap materials, and sonoluminescence (1993).

Grant Awards and Contract Monitoring and Managing

1. Sandia Laboratories, Quantum Sensors, FY09, $70K, PI.
2. Northrop Grumman Space Technologies, Quantum Sensors, FY08–09, $100K, PI.
3. The Boeing Company, Ghost Imaging, FY08–09, $50K, PI.
4. LSU BOR LINK, FY05–08, $12K.
5. DARPA Quantum Sensors Program, Quantum LIDAR, FY07–09, $750K, PI.
6. FQXI, Quantum Measurement in the Timeless Universe, FY08-10, $200K, PI.
7. NRO Directors Innovation Initiative, Photonic Crystals for Satellite Thermal Control, FY06, $400K, Co-I.
8. ARO-IARPA Quantum Computation Concept Maturation Program, Linear Optical Quantum Computing, FY05-09, $6M, Co-PI.
9. ARO Multi-Disciplinary University Research Initiative, Quantum Imaging, FY05-00, $5M, Co-PI.
10. NRO Directors Innovation Initiative, Improved Solar Cells Using Photonic Crystals, $350K, FY04, PI.
11. NRO Directors Innovation Initiative, Quantum Atomic Magnetometry, $350K, FY02, Co-I.
12. ONR Quantum Optics Program, Experimental Quantum Interferometry, $150K/Y, FY03-05, PI.
13. NSA-ARDA Quantum Computation Program, Theory and Modeling of Linear Optical Quantum Computers, $260K/Y, FY03-05, PI.
14. NASA Intelligent Systems, Quantum Clock Synchronization, $1M, FY01-03, Co-I.
15. DARPA Military Technology Office, Quantum Atomic Gravity Gradiometer, $300K, FY02, Co-I.
16. DARPA Advanced Technology Office, Quantum Clock Synchronization, $500K, FY01-03, Co-I.
17. NASA-JPL Director's Discretionary Funding, Quantum Optical Interferometry, $100K, PI.
18. National Security Agency, Radio-Frequency Single Electron Transistors and Open Mesoscopic Quantum Systems, $600K, FY01-FY03, PI.
19. NASA-JPL Director's Discretionary Funding, Quantum Lithography, $25K, FY01, PI.
20. NASA-JPL Director's Research and Development Fund, Quantum Clock Synchronization, $100K, FY02, PI.
21. NASA-JPL Director's Research and Development Fund, Artificial Life, $100K, FY02, PI.
22. NASA Advanced Concepts, Quantum Lithography, $25K, FY01, PI.
23. NASA Advanced Concepts, Entangled Photon Light Sails, $25K, FY01, PI.
24. NRO Advanced Science and Technology, Quantum Atomic Gravity Gradiometry, $1.1M, FY01, PI.
25. NASA Thinking Systems, Quantum Algorithms, $300K, FY00-02, PI.
26. NASA Revolutionary Computing Technologies and Intelligent Systems, Quantum Algorithms, $600K, FY99-01, PI.
27. NRO and ARDA, Quantum Clock Synchronization, $575K, FY00-01, PI.
28. NRO Director's Innovation Initiative, Coherent Quantum Atomic Gravity Gradiometry for Remote Sensing, $315K, FY00, PI.
29. ONR Quantum Optics Program, Quantum Optical Gyroscopy, $345K, FY99-02, PI.
30. NASA-JPL Director's Research and Development Fund, Quantum Accelerometry, $75K, FY02, PI.
31. NASA-JPL Director's Research and Development Fund, Quantum Interferometry, $75K, FY99, PI.
32. AMCOM In-house Laboratory Independent Research Program, Optically Generated Photonic Band Gap Materials, $100K, FY97, PI.
33. AMCOM In-house Laboratory Independent Research Program, Photonic Band Gap Material Microwave Antenna Noise Filter, $100K, FY96, PI.
34. AMCOM In-house Laboratory Independent Research Program, Photonic Band Edge Optical Diode, $100K, FY95, PI.
35. AMCOM In-house Laboratory Independent Research Program, Photonic Band Edge Laser, $100K, FY94, PI.

Teaching, Advising, Mentoring

Recent Courses Taught (Student Evaluation on Overall Instructor Rating as a Percentile)
PHYS2101, Undergraduate Electricity and Magnetism for Engineers, Spring 2009.
PHYS4112, Undergraduate Intermediate Mathematical Methods, Fall 2008.
PHYS7354, Graduate Atomic and Optical Physics II, Spring 2008 (100%)

PHYS7353, Graduate Atomic and Optical Physics I, Fall 2007 (100%)
PHYS2102, Undergraduate Electricity and Magnetism for Engineers, Spring 2007 (92%)
PHYS7241, Graduate Quantum Mechanics I, Fall 2006 (98%)
PHYS7242, Graduate Quantum Mechanics II, Spring 2006 (96%)
PHYS7241, Graduate Quantum Mechanics I, Fall 2005 (94%)
PHYS7242, Graduate Quantum Mechanics II, Spring 2005 (92%)

Postdocs Past and Present (Current Position)
2008–Present: Petr Anisimov
2005–Present: Christoph Wildfeuer
2005–Present: Sulakshana Thanvanthri
2005–2008: Hugo Cable (Postdoc, National University of Singapore)
2005–2006: Kurt Jacobs (Assistant Professor, University of Massachusetts)
2005–2007: Gabriel Durkin (Research Scientist, NASA Ames Research Center)
2004–2007: Kishore Kapale (Assistant Professor, Western Illinois University)
2004–2006: M. Ali Can (Assistant Professor, Bilkent University)
2003–2007: Lucia Florescu (Postdoc, University of Pennsylvania)
2003–2007: Marian Florescu (Postdoc, Princeton University)
2001–2003: Robert Gingrich (Vice President, PIMCO)
2000–2002: Pieter Kok (Assistant Professor, University of Sheffield)
1999–2001: Hwang Lee (Assistant Professor, LSU)

Graduate Students Past and Present (Degree and Graduation Date and Current Position)
2008-Present: Kebei Jiang
2008-Present: Christopher Richardson
2006–Present: Sean Huver (PhD 2009)
2006–Present: William Plick
2006–Present: Ryan Glasser (PhD 2009)
2005–2008: Stephan Olson (PhD 2008, Postdoc, University of Queensland)
2005–Present: Argenis DaSilva (PhD 2009)
2005–2007: Muxin Han (MS 2007, PhD student, University of Potsdam)
2005–2007: Ganesh Selvaraj (MS 2007, Public High School Teacher, Louisiana)
2005–2007: Zhanghan Wu (MS 2007, PhD student, Virginia Tech)
2005–2006: Guohui Deng (MS 2007, Server Software Developer, Harris Corporation)

Undergraduate Students:
2007–Present: Daniel Lum
2007–Present: Christopher Granier
2007–2008: Gretchen Raterman
2008–Present: Kyle Volkman
2005–2008: Nicholas VanMeter (Graduate Student at Harvard with Mikhail Lukin)
2005: Frank Henchy
2001–2002: Andrew Stimpson (Graduate Student at Stony Brook, NY)
2001–2002: Lin Song
2001–2002: Matt Stowe (Graduate Student at University of Colorado with Jun Ye)
1999: Ageti Boto (Graduate Student, The Johns Hopkins University School of Medicine)
1998: Christopher Cornelius
1997: Rachel Flynn
1996: Jon Bendickson (Senior Engineer, Dynetics, Inc., Huntsville, Alabama)

Technical Conferences and Workshops Organized

1. Symposium on the Computational and Experimental Aspects of Electromagnetic Metamaterials, International Conference on the Computational and Experimental Engineering and Sciences, Honolulu, Hawaii, 17–22 March 2008.
2. Session on Quantum Sensors, Physics of Quantum Electronics, Snowbird, Utah, 6–11 January 2008.

3. LSU-NSF Workshop on Quantum Materials and High-Performance Computing (QMHP), Arlington, Virginia, 16–17 April 2007.
4. International Focus Workshop on Linear Optical Quantum Information Processing (LOQuIP), Baton Rouge, Louisiana, 9–12 April 2006.
5. Focus Sessions, Topical Group on Quantum Information, 2006 American Physical Society March Meeting, March 13–17, 2006; Baltimore, MD.
6. Special Session on Optical Approaches to Quantum Information Processing, Optical Society of America Annual Meeting, Tucson, Arizona, 9 October 2003.
7. International Workshop on Quantum Dots for Quantum Computing, University of Notre Dame, Indiana, 6–9 August 2003.
8. NASA-DoD Workshop on Quantum Imaging and Metrology, Pasadena, California, 13-15 November 2002.
9. International Workshop on Photonic and Electromagnetic Crystal Structures, University of California, Los Angeles, 28–31 October 2002.
10. Progress in Electromagnetics Research Symposium, Boston, Massachusetts, 24–28 June 2002.
11. Workshop on Quantum Information Processing at the Winter International Symposium on Information and Communications Technologies, Cancun, Mexico, 5–9 January, 2004,
12. Southwest Quantum Information and Technology Network Fourth Annual Meeting, Boulder, Colorado, 8–10 March 2002.
13. International Workshop on Quantum Dots for Quantum Computing, Kochi, Japan, 26–28 January 2002.
14. 7th International Conference on Squeezed States and Uncertainty Relations, Boston, Massachusetts, 4–8 June 2001.
15. Southwest Quantum Information and Technology Network Annual Meeting, Pasadena, California, 2–4 March 2001.
16. NASA-DoD Workshop on Quantum Information and Synchronization For Space Applications (QuICSSA), Glendale, California, 25-26 September 2000.
17. Session on Quantum Computing, Winter Workshop on Quantum Electronics, Snowbird, Utah, 8–12 January 2001.
18. Session on Photonic Crystals, Progress in Electromagnetics Research Symposium, Boston, Massachusetts, 7–14 July 2000.
19. Session on Quantum Gyroscopes, Winter Workshop on Quantum Electronics, Snowbird, Utah, 10-14 January 2000.
20. Workshop on Electromagnetic Crystal Structures, Design, Synthesis, and Applications, Laguna Beach, California, 6–8 January 1999.
21. Army Research Office Workshop on Atom Lasers, Tucson, Arizona, 23–24 January 1997.
22. Army Research Office Workshop on Quantum Computing and Cryptography, Tucson, Arizona, 15–16 February 1995.
23. NATO Advance Study Institute on Electron Theory and Quantum Electrodynamics — 100 Years Later, Edirne, Turkey, 5–16 September 1994.
24. ARO Workshop on the Development and Applications of Photonic Band Structures, Park City, Utah, 28–30 January 1992.

Publications: I have over 150 publications in quantum optics, quantum computing and information, quantum science and technologies, laser physics, and mathematical physics. These publications have been cited over 4,000 times, with an average of 35 citations per paper, and with a h-index of 32. Over 10 of these publications have been cited over 100 times each.

1. Hugo Cable, Reeta Vyas, Surendra Singh, Jonathan P. Dowling, A non-degenerate optical parametric oscillator as a high-flux source for quantum lithography, arXiv:0903.4268 (submitted to Physical Review A).
2. Dmitry B. Uskov, Lev Kaplan, A. Matthew Smith, Sean D. Huver, Jonathan P. Dowling, Maximal Success Probabilities of Linear-Optical Quantum Gates, arXiv:0810.4372 (Physical Review A, in press).
3. Huver SD, Wildfeuer CF, Dowling JP, Entangled Fock States for Robust Quantum Optical Sensors, Physical Review A 78, 063828 (2008).
4. Olson SJ, Dowling JP, Probability, Unitarity, and Realism in Generally Covariant Quantum Information, arXiv:0708.3535.

5. Wildfeuer CF, Dowling JP, Strong Violations of Bell-type Inequalities for Werner States, Physical Review A 78, 032113 (2008).
6. Wu ZH, Huver SD, Uskov D, Lee H, Dowling JP, Optimizing Optical Quantum Logic Gates using Genetic Algorithms, arXiv:0708.1498 (Physical Review A, in press).
7. Han M, Olson SJ, Dowling JP, Generating Entangled Photons from the Vacuum by Accelerated Measurements: Quantum Information Theory Meets the Unruh-Davies Effect, Physical Review A 78, 022302 (2008).
8. Glasser RT, Cable H, Dowling JP, et al, Entanglement-seeded, dual, optical parametric amplification: Applications to quantum imaging and metrology, Physical Review A 78, 012339 (2008).
9. Dowling JP, Quantum Optical Metrology — The Lowdown On High-N00N States, Contemporary Physics 49 (2): 125-143 (2008).
10. Thanvanthri S, Kapale KT, Dowling, JP, Arbitrary Coherent Superpositions of Quantized Vortices In Bose-Einstein Condensates Via Orbital Angular Momentum of Light, Physical Review A, 77 (5): Art. No. 053825 Part B MAY 2008.
11. Wilde MM, Brun TA, Dowling JP, et al., Coherent communication with linear optics, Physical Review A, 77 (2): Art. No. 022321 FEB 2008.
12. Sciarrino F, Vitelli C, De Martini F, et al., Experimental Sub-Rayleigh Resolution by an Unseeded High-Gain Optical Parametric Amplifier for Quantum Lithography, Physical Review A, 77 (1): Art. No. 012324 JAN 2008
13. Mark M. Wilde, Todd A. Brun, Jonathan P. Dowling, Hwang Lee, Coherent Communication with Linear Optics, Physical Review A 77, 022321 (2008)
14. VanMeter NM, Lougovski P, Uskov DB, et al., General linear-optical quantum state generation scheme: Applications to maximally path-entangled states, Physical Review A, 76 (6): Art. No. 063808 DEC 2007.
15. Wildfeuer, CF; Lund, AP; Dowling, JP, Strong violations of Bell-type inequalities for path-entangled number states, Physical Review A, 76 (5): Art. No. 052101 NOV 2007.
16. Dowling, JP, Quantum optics - Kittens catch phase, Nature, 450 (7168): 362-363 NOV 15 2007
17. Cable, H; Dowling, JP, Efficient generation of large number-path entanglement using only linear optics and feed-forward, Physical Review Letters, 99 (16): Art. No. 163604 OCT 19 2007
18. Florescu, M; Lee, H; Puscasu, I; et al., Improving solar cell efficiency using photonic band-gap materials, Solar Energy Materials and Solar Cells, 91 (17): 1599-1610 OCT 15 2007
19. Kapale, KT; Dowling, JP, Bootstrapping approach for generating maximally path-entangled photon states, Physical Review Letters, 99 (5): Art. No. 053602 AUG 3 2007.
20. Wilde, MM; Spedalieri, F; Dowling, JP; et al., Alternate scheme for optical cluster-state generation without number-resolving photon detectors, International Journal of Quantum Information, 5 (4): 617-626 AUG 2007.
21. Durkin, GA; Dowling, JP, Local and global distinguishability in quantum interferometry, Physical Review Letters, 99 (7): Art. No. 070801 AUG 17 2007.
22. Florescu, M; Busch, K; Dowling, JP, Thermal radiation in photonic crystals, Physical Review B, 75 (20): Art. No. 201101 MAY 2007.
23. Agarwal, GS; Chan, KW; Boyd, RW; et al., Quantum states of light produced by a high-gain optical parametric amplifier for use in quantum lithography, Journal Of The Optical Society Of America B-Optical Physics, 24 (2): 270-274 FEB 2007
24. Pieter Kok, W.J. Munro, Kae Nemoto, T.C. Ralph, Jonathan P. Dowling, G.J. Milburn, Review article: Linear optical quantum computing, Reviews of Modern Physics 79 (24 JAN 2007) 135–174.
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27. Colin P. Williams, Pieter Kok, Hwang Lee, Jonathan P. Dowling, "Quantum lithography: A non-computing application of quantum information," Informatik Forsch. Entw. (2006) 21: 73–82.
28. Florescu M, Scheel S, Lee H, Knight PL, Dowling JP, Nonlinear tuning of 3D photonic band-gap structures for single-photon on demand sources, Physica E-Low-Dimensional Systems & Nanostructures 32 (1-2): 484-487 MAY 2006.
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37. "Ion Trap Simulations of Quantum Fields in an Expanding Universe," Paul M. Alsing, Jonathan P. Dowling, Gerard J. Milburn, Physical Review Letters 94 (10 June 2005) 220401.
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39. Florescu M, Lee H, Stimpson AJ, and Dowling JP, Thermal emission and absorption of radiation in finite inverted-opal photonic crystals, Physical Review A 72 (3): Art. No. 033821 SEP 2005.
40. "Quantum Interferometric Sensors," Leo D. Domenico, Hwang Lee, Pieter Kok, and Jonathan P. Dowling, Concepts of Physics 2 (2005) 225.
41. Asim Orhan Barut Memorial Issue, Jonathan P. Dowling, Ed., Concepts of Physics, Volume II (2005), Number 3–4.
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43. "Quantum Lithography, Entanglement and Heisenberg-limited parameter estimation," Pieter Kok, Samuel L. Braunstein, and Jonathan P. Dowling, Journal of Optics B, 6 (8): S811-S815 Sp. Iss. SI AUG 2004.
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46. Special Issue on Single-Photon: Detectors, Applications, and Measurement Methods, Proceedings of the NIST-ARDA Workshop on Single-photon: Detectors, Applications and Measurement Methods, NIST, Gaithersburg, MD, 31 March-1 April 2003, Edited by Alan Migdall and Jonathan Dowling, Journal of Modern Optics 51 (9-10) (15 June - 10 July 2004).
47. "Quantum Interferometric Sensors," Leo D. Domenico, Hwang Lee, Pieter Kok, and Jonathan P. Dowling, Organic Photonic Materials and Devices VI, Edited by James G. Grote and, Toshikuni Kaino, Proceedings of the SPIE, Volume 5359, pp. 169-176 (2004).
48. "Towards Photostatistics from Number Resolving Photodetectors," Hwang Lee, Ulvi H. Yurtsever, Pieter Kok, George M. Hockney, Christoph Adami, Samuel L. Braunstein, and Jonathan P. Dowling, Journal of Modern Optics, 51 (9-10): 1517-1528 JUN-JUL 2004.
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53. "Quantum Technology: The Second Quantum Revolution, Jonathan P. Dowling and Gerald J. Milburn, Philosophical Transactions of the Royal Society of London A, 361 (15 August 2003) 1655-1674 (invited).
54. "Interferometry with Entangled Atoms," Ulvi Yurtsever, Dmitry V. Strekalov, and Jonathan P. Dowling, European Physical Journal D 22 (01 March 2003) 365-371.
55. "Optical communication noise rejection using correlated photons," Deborah J. Jackson, George M. Hockney, and Jonathan P. Dowling, Journal of Modern Optics 49 (November-December 2002), 2383-2388.
56. "Special Issue On Quantum Dots For Quantum Computing," Hideaki Matsueda and Jonathan P. Dowling, editors, Superlattice Microstructures 31 (2-4): 73-74 (February-April 2002), editor, book.
57. "Suitability Versus Fidelity for Rating Single-Photon Guns," George M. Hockney, Pieter Kok, and Jonathan P. Dowling, Physical Review A 67 (01 March 2003) 032306 (1-4).
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61. "Two-Photon Processes In Faint Biphoton Fields," Dmitry V. Strekalov, Matthew C. Stowe, Maria V. Chekhova, Jonathan P. Dowling, Journal of Modern Optics 49, Special issue (November-December, 2002) 2349-2346 (invited).
62. "Single-Photon Quantum Nondemolition Detectors Constructed with Linear Optics and Projective Measurements," Pieter Kok, Hwang Lee, Jonathan P. Dowling, Physical Review A 66, (01 December 2002) 063814.
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64. "Creation of Large Photon-Number Path Entanglement Conditioned on Photodetection," Pieter Kok, Hwang Lee, Jonathan P. Dowling, Physical Review A 65 (01 May 2002) 052104.
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66. "Quantum Lithography," Pieter Kok, Samuel L. Braunstein, and Jonathan P. Dowling, Optics & Photonics News (September 2002) 24-27 (un-refereed).
67. "Quantum Computation-The Ultimate Frontier", Chris Adami and Jonathan P. Dowling, Proc. AMOS 2001 Technical Conf. Sept. 10-14, Wailea, Maui, Hawaii, P. Kervin, L. Bragg, and S. Ryan, Eds. (Maui, 2002), un-refereed.
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70. "Two-Photon Interferometry for High-Resolution Imaging," Dmitry V. Strekalov and Jonathan P. Dowling, Journal of Modern Optics 49 (10 March 2002) 519-527.
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72. "Quantum Interferometric Optical Lithography: Towards Arbitrary Two-Dimensional Patterns," Pieter Kok, Agedi N. Boto, Daniel S. Abrams, Colin P. Williams, Samuel L. Braunstein, and Jonathan P. Dowling, Physical Review A 63, (09 May 2001) 063407.
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74. "Quantum Interferometric Optical Lithography: Exploiting Entanglement to Beat the Diffraction Limit," Agedi N. Boto, Daniel S. Abrams, Colin P. Williams, and Jonathan P. Dowling, Physical Review Letters 85 (25 September 2000) 2733-2736 .
75. "Quantum Computing Using Electron-Nuclear Double Resonances," Charles M. Bowden, Jonathan P. Dowling, and Steven P. Hotaling, Lecture Notes in Computer Science 1509, (Quantum Computing and Quantum Communications, Springer-Verlag, Heidelberg, 1999) 365-372.
76. "Maxwell Duality, Lorentz Invariance, and Topological Phase," Jonathan P. Dowling, Colin P. Williams, and James D. Franson, Physical Review Letters 83 (27 September 1999), 2486-2489.
77. "Dipole Emission in Finite Photonic Band-Gap Structures: An Exactly Solvable One-Dimensional Model," Jonathan P. Dowling, IEEE Journal of Lightwave Technology 17, (Special Section on Electromagnetic Crystal Structures, Design, Synthesis, & Applications, November, 1999) 2142-2151 (invited).
78. "Mirror on the Wall: You're Omnidirectional After All?" Jonathan P. Dowling, Science 282, (04 December 1998) 1841-1842 (invited).
79. "Modification of Planck Blackbody Radiation with Photonic Band-Gap Materials," Christopher M. Cornelius & Jonathan P. Dowling, Physical Review A 59 (1 June 1999) 4736-4746.
80. Special Issue of Foundations of Physics in Memory of A. O. Barut, edited by Jonathan P. Dowling and Marlan O. Scully Foundations of Physics 28 (1 March-1 May 1998), (invited, guest editor, book).
81. "Parity, Time-Reversal, and Group Delay for Inhomogeneous Dielectric Slabs: Application to Pulse Propagation in Finite, One-Dimensional, Photonic Band-Gap Structures," Jonathan P. Dowling, IEE Proceedings-Optoelectronics, Special issue on Photonic Crystals and Microstructures, 145, (December 1998) pp. 420-435.
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84. "Spontaneous Emission and Nonlinear Effects in Photonic Band Gap Materials," Ishella S. Fogel, Jon M. Bendickson, Michael D. Tocci, Mark J. Bloemer, Michael Scalora, Charles M. Bowden, and Jonathan P. Dowling, Materials for Nonlinear Optics, special issue of the Journal of the European Optical Society A: Pure & Applied Optics 7 (1998) 393-407.
85. "Correlated Input-Port, Matter-Wave Interferometer: Quantum Noise Limits to the Atom Laser Gyroscope," Jonathan P. Dowling, Physical Review A 57 (1 June 1998) 4736-4746.
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87. "Pulsed Second-Harmonic Generation in Nonlinear, One-Dimensional, Periodic Structures," Michael Scalora, Mark J. Bloemer, Aaron S. Manka, Jonathan P. Dowling, Charles M. Bowden, R. Viswanathan, and Joseph W. Haus, Physical Review A 56 (October 1997) 3166-3174.
88. "Quantum Computing Using Electron-Nuclear Double Resonances," Charles M. Bowden, Jonathan P. Dowling, and Steven P. Hotaling, in the Proceedings of the SPIE AeroSense 1997 meeting: Conference on Photonic Quantum Computing, Orlando, Florida, 20-25 April 1997, edited by S. P. Hotaling and A. R. Pirich, (SPIE Proceedings 3076, Bellingham, 1997) pp. 173-182 (invited, un-refereed, co-author).
89. "Hollow-Fiber, Evanescent Light-Wave, Atom-Bottle Trap," Jonathan P. Dowling, in the Proceedings of the SPIE Photonics West meeting: Conference on Atom Optics, held in San Jose, California, 8-14 February 1997, edited by M. G. Prentiss and W. D. Phillips, (SPIE Proceedings 2995, Bellingham, 1997) pp. 126-137 (invited).
90. "The Classical Lamb Shift: Why Jackson is Wrong!" Jonathan P. Dowling, in the Proceedings of the NATO Advanced Study Institute: Electron Theory and Quantum Electrodynamics-100 Years Later, held in Edirne, Turkey, 5-16 September, 1994, edited by Jonathan P. Dowling (Plenum, New York, 1997) pp. 307-312 (invited).
91. "Asim Barut: A Personal Tribute," Jonathan P. Dowling, Foundations of Physics 28, (March, 1998) 357-359.

92. Electron Theory and Quantum Electrodynamics-100 Years Later, Proceedings of NATO Advanced Study Institute held in Edirne, Turkey, 5-16 September, 1994, edited by Jonathan P. Dowling (Plenum, New York, 1997) pp. 1-338 (invited, book).
93. "Evanescent Light -Wave Atom Mirrors, Resonators, Waveguides, and Traps," Jonathan P. Dowling and Julio Gea-Banacloche, Advances in Atomic, Molecular, and Optical Physics, Vol. 36, edited by B. Bederson and H. Walther (Academic Press HBJ, Boston, 1996) 1-94 (invited, book).
94. "Piezophotonic and Magnetophotonic Switching in a Coherently Prepared Medium," Aaron S. Manka, Charles M. Bowden, Jonathan P. Dowling, Michael Fleischhauer, Ningjun Wang, and Herschel Rabitz, Laser Physics 6 (January 1996) 184-188 (invited).
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98. "Ultrashort Pulse Propagation at the Photonic Band Edge: Large Tunable Group Delay with Minimal Distortion and Loss," Michael Scalora, Rachel J. Flynn, Senter B. Reinhardt, Richard L. Fork, Michael D. Tocci, Mark J. Bloemer, Charles M. Bowden, Heather S. Ledbetter, Jon M. Bendickson, Jonathan P. Dowling, and Richard P. Leavitt, Physical Review E 54 (1 August 1996) R1078-R1081.
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109. "Dipole Emission Rates in One-Dimensional Photonic Band-Gap Materials," Michael Scalora, Jonathan P. Dowling, Charles M. Bowden, and J. W. Haus, invited paper for Fundamental Systems in Quantum Optics, edited by W. P. Schleich and G. Rempe, special issue of Applied Physics B 60 (January 1995) S57-S61.

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116. "The Photonic Band Edge Laser: a New Approach to Gain Enhancement," Jonathan P. Dowling, Michael Scalora, Mark J. Bloemer, and Charles M. Bowden, Journal of Applied Physics 75 (May 1994) 1896-1899.
117. "Photonic Band Calculations for Woodpile Structures," H. S. Sözüer and Jonathan P. Dowling, in Principles and Applications of Photonic Bandgap Structures, edited by J. W. Haus and G. Kurizki, special issue of Journal of Modern Optics 41 (February 1994) 231-239 (invited).
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119. "Quantum Noise Limits to Matter-Wave Interferometry," M. O. Scully and J. P. Dowling, in the Proceedings of the Third Workshop: Squeezed States and Uncertainty Relations, held at University of Maryland in Baltimore County, Baltimore, Maryland, 10-13 August 1993, edited by M. H. Rubin and Y. Shih (NASA Conference Publication 3270, Goddard Spaceflight Center, 1994) pp. 475-484 (invited).
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122. "Totally Phased," Jonathan P. Dowling, New Scientist 137 (13 March 1993) 55.
123. "Near Dipole-Dipole Effects in Lasing Without Inversion: an Enhancement of Gain and Absorptionless Index of Refraction," Jonathan P. Dowling and Charles M. Bowden, Physical Review Letters 70 (8 March 1993) 1421-1424.
124. Development and Applications of Materials Exhibiting Photonic Band Gaps, edited by Charles M. Bowden, Jonathan P. Dowling, and Henry O. Everitt, special issue of the Journal of the Optical Society of America B 10 (February 1993) 279-413 (co-editor, book).
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130. "Atomic Emission Rates in Inhomogeneous Isotropic Media with Applications to Photonic Band Structures," Jonathan P. Dowling and Charles M. Bowden, Physical Review A 46 (1 July 1992) 612-622.
131. "Sonic Band Structure in Fluids Exhibiting Periodic Density Variations," Jonathan P. Dowling, Journal of the Acoustical Society of America 91 (May 1992) 2539-2543.
132. "Coulomb Scattering Near Mirrors: Quantum Corrections to the Rutherford Formula," Physical Review A 45 (1 March 1992) 3121-3125.
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139. "Exponential Decrease in Phase Uncertainty," Wolfgang P. Schleich, Jonathan P. Dowling, and Ricardo J. Horowicz, Physical Review A 44 (1 September 1991) 3365-3368.
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141. "Radiation Pattern of a Classical Dipole in a Cavity," Jonathan P. Dowling, Marlan O. Scully, and Francesco DeMartini, Optics Communications, 82 (1 May 1991) 415-419.
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145. "Quantum Electrodynamics Based on Self-Fields: the Two-Level Atom," A. O. Barut and Jonathan P. Dowling, Physical Review A 41 (1 March 1990) 2284-2294.
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147. "Quantum Electrodynamics Based on Self-Fields: on the Origin of Thermal Radiation Detected by an Accelerating Observer," A. O. Barut and Jonathan P. Dowling, Physical Review A 41 (1 March 1990) 2277-2283.
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152. "Quartz Report," Jonathan P. Dowling, Omni 10 (January 1988) 118.
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154. "Quantum Electrodynamics Based on Self-Energy Without Second Quantization: the Lamb Shift and Long-Range Casimir-Polder Van Der Waals Forces Near Boundaries," A. O. Barut and Jonathan P. Dowling, Physical Review A 36 (15 September 1987) 2550-2556.
155. "Quantum Electrodynamics Based on Self-Energy: Spontaneous Emission In Cavities," A. O. Barut and Jonathan P. Dowling, Physical Review A 36 (15 July 1987) 649-654.
156. "Fermat's Last Theorem," Jonathan P. Dowling, Mathematics Magazine 59 (April 1986) 76.

Patents

1. "Photonic crystal architectures for frequency and angle selective thermal emitters, "Marian Florescu, Hwang Lee, and Jonathan P. Dowling, US Application No. 61030610, 28 February 2009.
2. "Lithography Using Quantum Entangled Particles," Colin Williams, Jonathan P. Dowling, and Giovanni della Rossa, US Patent No. 6630290, issued 07 October 2003.
3. "Lithography Using Quantum Entangled Particles," C. P. Williams and J. P. Dowling, US Patent No. 6583881, issued 24 June 2003.
4. "Optical Switch that Utilizes One-Dimensional, Nonlinear, Multilayer Dielectric Stacks", Michael Scalora, Jonathan P. Dowling, C. M. Bowden, Mark J. Bloemer, and Michael D. Tocci, US Patent No. 5 740 287, issued 14 April 1998.
5. "Photonic Band Edge Optical Diode," Michael Scalora, Jonathan P. Dowling, Mark J. Bloemer, and Charles M. Bowden, US Patent No. 5 559 825, issued 24 September 1996.
6. "Photonic band-gap apparatus and method for delaying photonic signals," Jonathan P. Dowling, Michael Scalora, Mark J. Bloemer, Charles M. Bowden, Rachel J. Flynn, Richard L. Fork, Senter B. Reinhardt, Michael D. Tocci, US Patent No. 5 751 466, issued 12 May 1998.
7. "Lithography Using Quantum Entangled Particles," Colin Williams and Jonathan P. Dowling, US Patent No. 6252665, issued 26 June 2001.
8. "Lithography System Using Quantum Entangled Photons," Colin Williams, Jonathan P. Dowling, and Giovanni Della Rossa, US Patent No. 6480283, issued 12 November 2002.
9. "Photonic Band Gap Dual-Spectrum Sensor," M. J. Bloemer, M. Scalora, J. P. Dowling, C. M. Bowden, and W. C. Pittman, US Patent No. 6392782, issued 21 May 2002.

Presentations at Technical Conferences and Workshops

1. "Quantum Computing, Metrology, and Sensing" Jonathan P. Dowling, SPIE Photonics West: Quantum Electronics Metrology, 25–30 January 2009, San Jose, California (invited).
2. "Quantum Technologies — The Second Quantum Revolution," Jonathan P. Dowling, US Army Emerging Technologies Seminar, 6–9 October 2008, McLean, Virginia (invited).
3. "Quantum Technologies — The Second Quantum Revolution," Jonathan P. Dowling, US Army Future Technology Seminar, 19–21 August 2008, Portsmouth, Virginia (invited).
4. "Linear Optical Quantum Computing, Imaging, and Sensing," Jonathan P. Dowling, Asia Pacific Conference on Quantum Information Science, 2–5 July 2008, Cairns, Australia (invited).
5. "What's New with N00N States?" Jonathan P. Dowling, SPIE Photonics West: Quantum Electronics Metrology, 19–24 January 2008, San Jose, California (invited).
6. "Quantum Sensors: The Lowdown on High-N00N", Jonathan P. Dowling, 38th Winter Colloquium on The Physics of Quantum Electronics, 6–10 January 2008, Snowbird, Utah (plenary).
7. "Designer Optical Nonlinearities at the Few-Photon Level: Putting Projective Measurements To Work," Jonathan P. Dowling, Frontiers of Nonlinear Optics, 3–9 July 2007, Nizhny Novgorod, Russia (invited).
8. "Optical Quantum Imaging, Computing, and Metrology: What's New With N00N States?" Jonathan P. Dowling, APS Division of Atomic, Optical, and Molecular Physics Annual Meeting, 5–9 June 2007, Calgary, Canada (invited).

9. "Quantum Sensors," Jonathan P. Dowling, SPIE Fluctuations and Noise, 20–24 May 2007, Florence, Italy (invited).
10. "Photonic Crystals for Thermal Emission Control," Marian Florescu and Jonathan P. Dowling, LSU-NSF Workshop on Quantum Materials and High-Performance Computing, 16–17 April 2007, Arlington, Virginia
11. "Optical Quantum Computing," Jonathan P. Dowling, Winter Colloquium on The Physics of Quantum Electronics, 2–6 January 2007, Snowbird, UT (invited).
12. "Linear optical quantum computing, imaging, and metrology," Jonathan P. Dowling, International Conference on Quantum Communication, Measurement, and Computing, 28 November – 3 December, Tokyo, Japan.
13. "Quantum Imaging and Precision Measurements with N00N States," Jonathan P. Dowling, Optical Society of America Annual Meeting, 8–12 October 2006, Rochester, NY (invited).
14. "Linear Optical Quantum Computing, Imaging, and Metrology," Jonathan P. Dowling, LPHYS-06, 24–28 July 2006, Lausanne, Switzerland (invited).
15. High-fidelity linear optical quantum computing with polarization encoding, Federico Spedalieri, Hwang Lee, and Jonathan P. Dowling, 2006 American Physical Society March Meeting, 13–17 March 2006; Baltimore, MD.
16. Single Photon Source Using Chiral Nematic Liquid Crystal, Ganesh Selvraj, Anand Jha, Pavel Lougovski, Robert Boyd, Jonathan Dowling, 2006 American Physical Society March Meeting, 13–17 March 2006; Baltimore, MD.
17. How to construct a Universal Linear Optical State Generator? Pavel Lougovski, Hwang Lee, Jonathan Dowling, 2006 American Physical Society March Meeting, 13–17 March 2006; Baltimore, MD.
18. The Vortex Phase Qubit, Kishore Kapale and Jonathan Dowling, 2006 American Physical Society March Meeting, 13–17 March 2006; Baltimore, MD.
19. "Linear Optical Quantum Information Processing, Metrology, and Imaging," Jonathan Dowling, Southwest Quantum Information and Technology Annual Workshop, February 17–19, 2006, Albuquerque, New Mexico.
20. Linear Optical Quantum Computing, Imaging, and Metrology, Jonathan Dowling, International Conference On Quantum Optics, 16 – 20 December 2005, Hong Kong, China (invited).
21. Linear Optical Quantum Computing, Imaging, and Metrology, Jonathan Dowling, Wilhelm und Else Heraeus-Seminar: The Photon: Generation, Detection, and Application, 6–9 November 2005, Köln, Germany (invited).
22. Towards a Universal Optical N00N State Generating Machine, Pavel Lougovski, Federico Spedalieri, Hwang Lee, Jonathan P. Dowling, Optical Society of America Annual Meeting, 16–20 October 2005, Tucson, AZ.
23. Optically Controlled Delays for Broadband Pulses, M. Suhail Zubairy, Qingqing Sun, Yuri V. Rostovtsev, Jonathan P. Dowling, Marlan O. Scully; Optical Society of America Annual Meeting, 16–20 October 2005, Tucson, AZ.
24. Heisenberg Limited Interferometry with Neutral Atoms, Kishor T. Kapale, Jonathan P. Dowling, Optical Society of America Annual Meeting, 16–20 October 2005, Tucson, AZ.
25. On the Emission and Absorption of Thermal Radiation in Photonic Crystals, Marian Florescu, Hwang Lee, Jonathan P. Dowling; Optical Society of America Annual Meeting, 16–20 October 2005, Tucson, AZ.
26. Linear Optical Quantum Computing with Polarization Encoding, Federico M. Spedalieri1, Hwang Lee, Jonathan P. Dowling, Optical Society of America Annual Meeting, 16–20 October 2005, Tucson, AZ.
27. Vortex Phase Qubit: Superpositions of Counter-Rotating Phase Structures in BEC through Optical Angular Momentum Beams, Kishor T. Kapale, Jonathan P. Dowling, Optical Society of America Annual Meeting, 16–20 October 2005, Tucson, AZ.
28. Single Photon Quantum Computing, Metrology and Imaging, Pieter Kok, Hwang Lee, Pavel Lougovski, and Jonathan P. Dowling, Single Photon Detector Workshop, 24–26 October 2005, National Physical Laboratory, London, UK (invited).
29. "Mathematical Theory of Thermal Emission Control with Photonic Crystals," Jonathan Dowling, Marian Florescu, Hwang Lee, American Mathematical Society and Society for Industrial and Applied Mathematics to organize a Joint Summer Research Conference on Mathematical Modeling of Novel Optical Materials and Devices, June 12–17 2005 (invited).

30. "Linear Optical Quantum Information Processing, Metrology, and Imaging," Quantum Physics of Nature and European Union Quantum Information Processing and Communication Workshops, Vienna, Austria, 22-26 May 2005.
31. "Linear Optical Quantum Information Processing, Metrology, and Imaging," American Physical Society Annual Meeting, Los Angeles, California, 20-25 March 2005.
32. "Linear Optical Quantum Information Processing, Metrology, and Imaging," Centre for Quantum Computing Annual Workshop, Avoca Beach, Australia, 8-11 February 2005 (invited).
33. "Linear Optical Quantum Information Processing, Metrology, and Imaging," Physics of Quantum Electronics, Snowbird, Utah, 2-16 January 2005 (invited).
34. "Linear Optics for Quantum Information Processing: Error Correction", International Workshop On Quantum Informatics, Hong Kong Baptist University, Kowloon Tong, Hong Kong 16-18 December 2004 (invited).
35. "Schrödinger's Rainbow: The Renaissance in Quantum Optical Interferometry," International Workshop On Quantum Informatics, Hong Kong Baptist University, Kowloon Tong, Hong Kong 16-18 December 2004 (invited).
36. "Linear Optical Quantum Information Processing, Metrology, and Imaging," International Workshop On Quantum Informatics, Hong Kong Baptist University, Kowloon Tong, Hong Kong 16-18 December 2004 (invited).
37. "Linear Optical Quantum Information Processing, Metrology, and Imaging," Tutorial, Optical Society of American Annual Meeting, Rochester, New York, 10-14 October 2004 (invited).
38. "Quantum Lithography: From Quantum Computing towards Quantum Imaging," First International Conference on Imaging at the Limits, IESC, Cargese (Corsica, France) 6-11 September 2004 (invited).
39. "Modeling Linear Optical Quantum Computers," DoD Quantum Computing Program Review, 16-20 August 2004, Orlando, Florida.
40. "Introduction To Linear Optical Quantum Information Processing And Metrology," Quantum Optics and Advanced Spectroscopy Conference of the Great Lakes Photonics Symposium, 8-9 June 2004, Cleveland, Ohio (invited).
41. "All Linear Optical Quantum Memories and Repeaters," APS Division of Atomic, Molecular, and Optical Physics Annual Meeting, Tucson, Arizona, 26-29 May 2004.
42. "Thermal Emissivity Control with Photonic Band-Gap Materials," Conference On Heat Sources and Thermal Management For The Microscale, Chicago, Illinois, 17-19 May 2004 (invited).
43. "All Linear Optical Quantum Memories and Repeaters," Workshop on Advances in Foundations of Quantum Mechanics and Quantum Information with Atoms and Photons, Turin, Italy, 26-28 April 2004 (invited).
44. "Linear Optical Quantum Memories and Repeaters or Effective Photon Nonlinearities by Conditional Linear-Optical Measurements," Southwest Quantum Information Network Workshop, San Diego, California, 20-22 February 2004.
45. "All Linear Optical Quantum Memories and Repeaters," DARPA Focused Quantum Systems (FoQuS) Workshop, Falls Church, Virginia, 28-29 January 2004 (invited).
46. "Long Distance Quantum Communication Using Quantum Error Correction," Winter International Symposium on Information and Communication Technologies, Cancun, Mexico, 5-8 January 2004 (invited).
47. "Linear Optical Quantum Memory," Solid-State Quantum Information Processing Conference, Amsterdam, the Netherlands, 15-18 December 2003.
48. "Linear Optical Quantum Repeaters and Memories: Few Qubits Suffice!" Focus Meeting on Few-Qubit Applications of Quantum Information Processing, Budmerice, Slovakia, 11-14 December 2003 (invited).
49. "Linear Optical Quantum Memory," Quantum Information Sciences and Technologies Program Review, Ft. Lauderdale, Florida, 12-14 November 2003.
50. "Suitability vs. fidelity: Toward better measures of goodness for single-photon guns," Optical Society of America Annual Meeting, Tucson, Arizona, 6-10 October 2003.
51. "Intensity control of high-power dielectric waveguide lasers using photonic band gap evanescent field coupling," Optical Society of America Annual Meeting, Tucson, Arizona, 6-10 October 2003.
52. "Entanglement enhanced two-photon absorption," Optical Society of America Annual Meeting, Tucson, Arizona, 6-10 October 2003.

53. "High quantum efficiency photodetectors for quantum instruments," Optical Society of America Annual Meeting, Tucson, Arizona, 6-10 October 2003.
54. "Linear optical quantum memory," Optical Society of America Annual Meeting, Tucson, Arizona, 6-10 October 2003.
55. "Number-resolving photon and non-photon detectors," Optical Society of America Annual Meeting, Tucson, Arizona, 6-10 October 2003.
56. "Modeling Linear Optical Quantum Computers," DoD Annual Quantum Computing Program Review, Nashville, Tennessee, 18-22 August 2003.
57. "Quantum Technologies: The Second Quantum Revolution," invited keynote lecture, International Workshop on Quantum Dots for Quantum Computing, University of Notre Dame, 7-9 August 2003.
58. "To Scale or Not To Scale: What is the Question?" Theory in Quantum Computing Workshop, Harper's Ferry, Virginia, 9-10 June 2003 (invited).
59. "Quantum Noise Limits to Atom-Interferometric Inertial Sensors," Ultracold Atom Precision Inertial Navigation Systems Workshop, Arlington, Virginia, 27 May 2003 (invited).
60. "Two-Photon Processes in a Faint Biphoton Field," Quantum Electronics and Laser Sciences Conference, Long Beach, California, 19-24 May 2002.
61. "Quantum Technologies-The Second Quantum Revolution," Detectors, Applications, and Methods Single Photon Workshop, Gaithersberg, Maryland, 31 March - 1 April 2003 (invited).
62. "Quantum Limit Sensitivity of Coherent Dark-State Magnetometers," Quantum Electronics and Laser Sciences Conference, Long Beach, California, 19-24 May 2002
63. "Overview of Atomic Ensembles for Quantum Computation," New International Gordon Research Conference On Quantum Information Science, Ventura, California, 23-28 March 2003 (invited).
64. "Thermal Emissivity of 3D Photonic Band-Gap Materials," Quantum Electronics and Laser Sciences Conference, Long Beach, California, 19-24 May 2002
65. "Practical Quantum Repeaters with Linear Optics and Double-Photon Guns," Second Workshop on Quantum Cryptographic Applications, McLean, Virginia, 11-12 February 2003.
66. "From Quantum Computing to Quantum Gyroscopes," Office of Naval Research Program Review, Arlington, Virginia, 29 April-3 May, 2002.
67. "Linear Optics and Projective Measurements for Fun and Profit," Southwest Quantum Information and Technology Network Fifth Annual Meeting, Santa Fe, New Mexico, 6-9 February 2003.
68. "Linear Optics and Projective Measurements for Fun and Profit," Workshop on Decoherence in Quantum Information Processing, Durham, UK, 10-14 April 2002 (invited).
69. "Thermal Emissivity in Photonic Band-Gap Materials," Topical Meeting on Optical Photonic Bandgap Research, San Diego, California, 22-23 January 2003.
70. "Quantum logic gates based on Coulomb blockade devices," Southwest Quantum Information and Technology Network Fourth Annual Meeting, Boulder, Colorado, 8-10 March 2002.
71. "Linear Optics and Projective Measurements for Fun and Profit," U.S.-Australia workshop on Solid State and Optical Approaches to Quantum Information Science, Sydney, Australia, 7-12 January 2003.
72. " Quantum Trajectory Methods for Simulating Solid-State Qubit Systems," International Workshop on Quantum Dots for Quantum Computing, Kochi, Japan, 26-28 January, 2002 (invited).
73. "Quantum Metrology," Complexity in Optics, Leiden, The Netherlands, 29 November 2002.
74. "Two-Photon Processes in Faint Bi-Photon Fields," NASA-DoD Workshop on Quantum Imaging and Metrology, Pasadena, California, 13-15 November 2002.
75. "Quantum Metrology," 32nd Winter Colloquium on The Physics of Quantum Electronics, Snowbird, Utah, 6-10 January, 2002 (invited, plenary lecture).
76. "Quantum Entanglement and Nonlocality in Optical Implementations of Quantum Computation," Optical Society of American Annual Meeting, Long Beach, California, 14-18 October 2001.
77. "Thermal Emissivity of Three-Dimensional Photonic Band-Gap Materials," International Workshop on Photonic and Electromagnetic Crystal Structures, Los Angeles, California, 28-31 October 2002.
78. "Quantum Optical Imaging and Lithography," Optical Society of American Annual Meeting, Long Beach, California, 14-18 October 2001.
79. "Linear Optics and Projective Measurements for Fun and Profit," Models for Quantum Computing, University of California, Los Angeles, 21-23 October 2002.
80. "Thermal Emissivity of 3D photonic band-gap structures," Optical Society of American Annual Meeting, Long Beach, California, 14-18 October 2001.

81. "Noise Rejection Using Classical Short-Pulse Sources and Two-Photon Sensitive Detection," Optical Society of America Annual Meeting, Orlando, Florida, 30 August - 4 September 2002.
82. "Network Applications for Quantum Bit," Optical Society of American Annual Meeting, Long Beach, California, 14-18 October 2001.
83. "Single-Photon QND Devices and Quantum Repeaters with Linear Optics and Projective Measurements," Optical Society of America Annual Meeting, Orlando, Florida, 30 August - 4 September 2002.
84. "Cold Atom Techniques Applied to Ultra-Sensitive Magnetometers," Optical Society of American Annual Meeting, Long Beach, California, 14-18 October 2001.
85. "Generation of Desired Quantum Correlations for Quantum Lithography and Heisenberg-Limited Interferometry," Optical Society of America Annual Meeting, Orlando, Florida, 30 August - 4 September 2002.
86. "Quantum Clock Synchronization," DoD Quantum Computing Program Review, Baltimore, Maryland, 28-31 August 2001.
87. "Two-Photon Processes in Biphoton Fields," Optical Society of America Annual Meeting, Orlando, Florida, 30 August - 4 September 2002.
88. "Quantum Trajectory Simulations of Radio-Frequency Transistors," DoD Quantum Computing Program Review, Baltimore, Maryland, 28-31 August 2001.
89. "Quantum Optical Metrology," Optical Society of America Annual Meeting, Orlando, Florida, 30 August - 4 September 2002.
90. "Quantum Lithography," The 2001 Workshop on Laser Physics and Quantum Optics, 30 July-3 August, 2001, Jackson Hole, Wyoming (invited).
91. "Quantum Networks," NRO-NSA Workshop on Practical Applications of Quantum Cryptography, McLean, Virginia, 30-31 July 2001 (invited).
92. "Theory and Modeling of Radio-Frequency Single Electron Transistors and Linear Optical Quantum Computers," DoD Quantum Computing Program Review, Nashville, Tennessee, 19-23 August 2002.
93. "Quantum Lithography," International Conference on Quantum Information, 10-13 June 2001 (invited).
94. "Linear Optics and Projective Measurements for Fun and Profit," Sixth International Conference on Quantum Communication, Measurement, and Computing, 22-26 July 2002, Boston, MA.
95. "Initiatives in Quantum Metrology," Eighth Rochester Conference on Coherence and Quantum Optics, 13-16 June 2001 (invited).
96. "Two-Photon Processes in Biphoton Fields," Quantum Electronics and Laser Sciences Conference, Long Beach, California, 19-24 May 2002.
97. "Quantum Lithography," Seventh International Conference on Squeezed States and Uncertainty Relations, Boston, Massachusetts, 4-8 June 2001 (invited).
98. "Thermal Emissivity of 3D Photonic Band-Gap Materials," Quantum Electronics and Laser Sciences Conference, Long Beach, California, 19-24 May 2002.
99. "Experimental Single-Cooper-Pair-Based Quantum Computing at JPL," Southwest Quantum Information and Technology (SQuInT) Network Annual Meeting, California Institute of Technology, Pasadena, California, 2-4 March 2001 (invited).
100. "Quantum Limit Sensitivity Of Coherent Dark-State Magnetometers," Quantum Electronics and Laser Sciences Conference, Long Beach, California, 19-24 May 2002.
101. "Quantum Clock Synchronization Based on Shared Prior Entanglement," Quantum Information Theory Workshop, Gold Coast, Australia, 21-25 January 2001.
102. "From Quantum Computing to Quantum Gyroscopes," Office of Naval Research Program Review, Arlington, Virginia, 29 April-3 May, 2002.
103. "Universal Quantum Gates for Single Cooper Pair Box Based Quantum Computing," International Conference on the Experimental Implementation of Quantum Computing, Sydney, Australia, 16-19 January 2001.
104. "Quantum Key Distribution for SATCOM at JPL," DoD Quantum Information Science Meeting, MITRE Corp., Reston, Virginia, 18 December 2000.
105. "Quantum Interferometric Optical Lithography," Optical Society of America Annual Meeting, Providencetown, Rhode Island, 22-26 October 2000.
106. "Quantum Clock Synchronization Based on Shared Prior Entanglement," Optical Society of America Annual Meeting, Providencetown, Rhode Island, 22-26 October 2000.

107. "Secure Communications on the Quantum-Electronic Battlefield," DARPA Quantum Information Science and Technology Workshop, Greenbelt, Maryland, 23-24 October 2000.
108. "Quantum Atomic Clock Synchronization," ARDA Quantum Computing Symposium, 28 August 2000.
109. "Implementing an Arbitrary One-Qubit Gate with the Single Cooper Pair Box Approach: Specific Calculations," Progress in Electromagnetics Research Symposium, Boston, Massachusetts, 5-14 July 2000.
110. "Quantum Interferometric Optical Lithography," Fifth International Conference on Quantum Communication Measurement & Computing, Capri, Italy, 3-8 July 2000.
111. "Quantum Atomic Clock Synchronization," DoD Quantum Communication and Quantum Memory Initiative, Ft. Monmouth, New Jersey, 13-14 June 2000.
112. "Quantum Interferometric Lithography," Southwest Quantum Information and Technology Network Annual Meeting, Albuquerque, New Mexico, 19-21 May 2000.
113. "Quantum Interferometric Lithography," Quantum Electronics and Laser Sciences Conference, San Francisco, California, 7-12 May 2000.
114. "Modification of Planck Blackbody Radiation by Photonic Band Gap Structures," Quantum Electronics and Laser Sciences Conference, San Francisco, California, 7-12 May 2000.
115. "Quantum Lithography," Workshop on Quantum Electronics, Snowbird, Utah, 10-12 January 2000.
116. "Maxwell duality, Lorentz invariance, and topological phase," Optical Society of America Annual Meeting, Santa Clara, California, 26-30 September 1999.
117. "Two-slit Diffraction, Entanglement, and Nonlocality," J. P. Dowling & C. P. Williams, Southwest Quantum Information Network Annual Meeting, Albuquerque, New Mexico, 30 April - 2 May 1999.
118. "Quantum Interferometry," Workshop on Fundamental Problems in Quantum Mechanics, Baltimore, Maryland, 9-13 August 1999.
119. "Maxwell Duality, Lorentz Invariance, and Topological Phase," Workshop on Quantum Optics, Jackson Hole, Wyoming, 26-30 July 1999.
120. "From Quantum Computing to Quantum Gyroscopes," J. P. Dowling, Nuclear Magnetic Resonance and Quantum Computation, 22-24 February 1999, Cambridge, Massachusetts.
121. "Quantum Interferometry," J. P. Dowling Sixth International Conference on Squeezed States and Uncertainty Relations, Naples, Italy, 24-29 May 1999.
122. "Quantum Algorithms," J. P. Dowling, paper XS4, Conference on Enabling Technologies for Petaflops Computing, 15-19 February 1999, Santa Barbara, California.
123. "From Quantum Computing to Quantum Gyroscopes," J. P. Dowling, Algorithms in Quantum Information Processing, 18-22 January 1999, Chicago, Illinois.
124. "Modifications to Blackbody Radiation in Photonic Band-Gap Structures," C. M. Cornelius & J. P. Dowling, Workshop on Electromagnetic Crystal Structures, Design, Synthesis, and Applications, 6-8 January 1999, Laguna Beach, California.
125. "Parity, Time Reversal, and Group Delay: Pulse Propagation in One-Dimensional Photonic Band-Gap Structures," J. P. Dowling, paper ThJJ4, Optical Society of America Annual Meeting, 4-9 October 1998, Baltimore, Maryland.
126. "Modifications to Blackbody Radiation in Photonic Band-Gap Structures," C. M. Cornelius & J. P. Dowling, paper MG6, Optical Society of America Annual Meeting, 4-9 October 1998, Baltimore, Maryland.
127. "Correlated Input-Port, Matter-Wave Interferometer: Quantum Noise Limits to the Atom Laser Gyroscope, J. P. Dowling, International Conference on Atomic Physics, 3-7 August, 1998, Windsor, Ontario.
128. "One-Dimensional, Thin-Film, Photonic Band-Gap Materials for IR Emissivity Control, J. P. Dowling, M. J. Bloemer, M. D. Tocci, M. Scalora, C. M. Bowden, paper A-P6, Army Science Conference, 15-17 June 1998, Norfolk, Virginia.
129. "Correlated Input-Port, Matter-Wave Interferometer: Quantum-Noise Limits to the Atom Laser Gyroscope," J. P. Dowling, paper BO-2, Army Science Conference, 15-17 June 1998, Norfolk, Virginia. (Paper won "best in session" award.)
130. "Modifications to Blackbody Radiation in a One-Dimensional Photonic Bandgap Structure," J. P. Dowling, M. J. Bloemer, M. D. Tocci, M. Scalora, C. M. Bowden, paper QTuJ3, International Quantum Electronics Conference, 3-8 May 1998, San Francisco, California.

131. "From Quantum Computers to Quantum Gyroscopes," J. P. Dowling, NASA International Conference on Quantum Computing & Quantum Communications, 17-20 February 1998, Palm Springs, California.
132. "Quantum Noise Limits to the Atom Laser Gyroscope," J. P. Dowling, Winter Colloquium on Quantum Electronics, 13-16 January 1997, Snowbird, Utah (invited).
133. "One-Dimensional, Thin-Film, Photonic Band-Gap Materials for Infrared Emissivity Control," J. P. Dowling, M J. Bloemer, M Scalora, C M. Bowden, Meeting of the IRIS Specialty Group on Camouflage, Concealment, and Deception, 28-30 October, 1997, Monterey, California.
134. "Quantum Noise Limits to the Atom Laser Gyroscope," J. P. Dowling, Taos Summer School on Quantum Optics, 15-17 August, 1997, Taos, New Mexico.
135. "Quantum Noise Limits to the Atom Laser Gyroscope," J. P. Dowling, European Research Conference on Bose-Einstein Condensation, 12-17 July 1997, Castelvecchio Pascoli, Italy.
136. "Analytic Expressions for Spontaneous Emission Rates in Finite, One-Dimensional, Photonic Band-Gap Structures," J. P. Dowling, I. Fogel, M. Scalora, Paper ThMM4, Optical Society of America Annual Meeting, 12-17 October 1997, Long Beach, California.
137. "Quantum Noise Limits to the Atom-Laser Gyro," J. P. Dowling, Paper TuLL6, Optical Society of America Annual Meeting, 12-17 October 1997, Long Beach, California.
138. "Spontaneous Emission and Nonlinear Effects in Photonic Band-Gap Materials," I. S. Fogel, J. M. Bendickson, M. D. Tocci, M J. Bloemer, M Scalora, C M. Bowden, and J P. Dowling, 11th European Optical Society Meeting on Materials for Nonlinear Optics, 8-12 July 1997, Capri, Italy (invited).
139. "Quantum Computing Using Laser Pulse Induced Electronic Excitation Control of Electron-Nuclear Double Resonances," C. M. Bowden, J. P. Dowling, S. D. Pethel, and Steven P. Hotaling, Paper MLL4, Optical Society of America Annual Meeting, 12-17 October 1997, Long Beach, California.
140. "ENDOR Process: an Approach to Quantum Computation," C. M. Bowden, J. P. Dowling, T. Cole and S. P. Hotaling, SPIE AeroSense 1997 meeting: Conference on Photonic Quantum Computing, Orlando, Florida, 20-25 April 1997 (invited).
141. "Hollow-Fiber, Evanescent Light-Wave, Atom-Bottle Trap," J. P. Dowling, Paper QWD15, Technical Digest, Vol. 12, Quantum Electronics and Laser Science Conference, 18-23 May 1997, Baltimore, Maryland.
142. "Exact Analytic Expressions for Spontaneous Emission in Finite, One-Dimensional, Photonic Band-Gap Structures," J. P. Dowling, I. Skinner, and M. Scalora, Winter Colloquium on Quantum Electronics, 13-16 January 1997, Snowbird, Utah (invited).
143. "Analytic Expressions for the Electromagnetic Mode Density in Finite, One-Dimensional, Photonic Band-Gap Structures," J. P. Dowling, J. M. Bendickson, M. Scalora, Paper ThXX8, Optical Society of America Annual Meeting, 20-24 October 1996, Rochester, New York.
144. "Ultrashort Pulse Propagation at the Photonic Band Edge: Large Tunable Delay and Minimal Scattering Losses," M. Scalora, J. P. Dowling, M. D. Tocci, M. J. Bloemer, C. M. Bowden, J. M. Bendickson, H. S. Ledbetter, R. J. Flynn, and S. B. Reinhardt, Paper MS4, Optical Society of America Annual Meeting, 20-24 October, 1996, Rochester, New York.
145. "Hollow-Fiber, Evanescent Light-Wave, Atom-Bottle Trap," J. P. Dowling, Paper MGG2, Optical Society of America Annual Meeting, 20-24 October 1996, Rochester, New York.
146. "Photonic Band-Edge Effects," J. P. Dowling, M. Scalora, M. D. Tocci, M. J. Bloemer, C. M. Bowden, European Research Conference on Quantum Optics, 21-26 September, 1996, Castelvecchio Pascoli, Italy.
147. "The Classical Lamb Shift," J. P. Dowling, Workshop In Celebration of the 50th Anniversary of the Discovery of the Lamb Shift, 18-22 August 1996, Bellingham, Washington (invited).
148. "Microwave and Millimeter Wave Applications of Photonic Band-Gap Materials," J. P. Dowling, M. Scalora, M. J. Bloemer, M. D. Tocci, and C. M. Bowden, 20th Army Science Conference, Science and Technology for Force XXI, 25-27 June 1996, Norfolk, Virginia.
149. "Photonic Band-Gap Materials," J. P. Dowling, M. J. Bloemer, M. D. Tocci, and M. Scalora, and C. M. Bowden, AMCOM / Alabama A&M Joint Workshop on Nonlinear Optics, 1-2 May 1996, Normal, Alabama (invited).
150. "Solutions of Maxwell's Wave Equations for 3D, 2D, and 1D Periodic Dielectric Structures and Applications to Photonic Band-Gap Materials, "C. M. Bowden, J. P. Dowling, M. Scalora, A. S. Manka, M. J. Bloemer, and M. Tocci, VI International Conference on Nonlinear Hyperbolic Problems, 15-19 June 1996, Hong Kong.

151. "Factoring Integers with Young's N Slit Interferometer: Classical-Analog Versus Quantum Digital Computers," J. F. Clauser and J. P. Dowling, Technical Digest, Vol. 17, Quantum Electronics and Laser Science Conference, 2-7 June 1996, Anaheim, California.
152. "Ultrashort Pulse Propagation in One-Dimensional Photonic Band-Gap Structures: Low Momentum States and Shape Invariance," M. Scalora, R. L. Fork, M. J. Bloemer, M. D. Tocci, C. M. Bowden, J. M. Bendickson, and J. P. Dowling, Technical Digest, Vol. 17, Quantum Electronics and Laser Science Conference, 2-7 June 1996, Anaheim, California.
153. "Analytic Expressions for the Electromagnetic Mode Density in Finite, One-Dimensional, Photonic Band-Gap Structures," J. M. Bendickson, J. P. Dowling and M. Scalora, Paper QThF, Technical Digest, Vol. 17, Quantum Electronics and Laser Science Conference, 2-7 June 1996, Anaheim, California.
154. "Ultrashort pulse propagation at the photonic band edge: large tunable group delay with minimal distortion and loss," R. L. Fork, M. Scalora, R. Flynn, S. Reinhart, J. P. Dowling, M. J. Bloemer, M. D. Tocci, C. M. Bowden, and R. P. Leavitt, American Physical Society Annual Meeting, 18-22 March 1996, St. Louis, Missouri.
155. "Effect of the Photonic Band Edge on Spontaneous Emission from Multilayer Semiconductor Devices," M. J. Bloemer, M. D. Tocci, J. P. Dowling, C. M. Bowden, and M. Scalora, ARO-Sponsored Canada-US Workshop on Frontiers of Quantum Electronics, 29 February-1 March, 1996, Toronto, Canada (invited).
156. "Ultrashort Pulse Propagation at the Photonic Band Edge: Large Tunable Group Delay with Minimal Distortion and Loss," M. Scalora, R. L. Fork, M. D. Tocci, M. J. Bloemer, C. M. Bowden, H. S. Ledbetter, J. M. Bendickson, J. P. Dowling, and R. P. Leavitt, 26th Winter Colloquium on Quantum Electronics, 6-11 January 1996, Snowbird, Utah (invited).
157. "Optically Generated Photonic Band Gaps," A. S. Manka, M. Scalora, J. P. Dowling, C. M. Bowden, and G. Kurizki, 26th Winter Colloquium on Quantum Electronics, 6-11 January 1996, Snowbird, Utah (invited).
158. "Local Field Effects in Induced Quantum Coherence," C. M. Bowden, A. S. Manka, J. P. Dowling, M. Fleischhauer, H. Rabitz, and N. Wang, LASERS '95, 4-8 December 1995, Charleston, South Carolina (invited).
159. "Impulses, Traveling and Standing Waves in Synchronous Sonoluminescence," F. B. Seeley and J. P. Dowling, Acoustical Society of America Annual Meeting, 27 November-1 December 1995 St. Louis, Missouri.
160. "Local field effects in stimulated Raman scattering," M. Scalora, A. S. Manka, J. P. Dowling, and C. M. Bowden, Paper FF7, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
161. "Factorization of integers with Young's N-slit interferometer," J. F. Clauser and J. P. Dowling, Paper FC1, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
162. "Spontaneous emission alteration at the photonic band edge of multi-layer semiconductor structures," M. D. Tocci, M. J. Bloemer, M. Scalora, J. P. Dowling, and C. M. Bowden, Paper ThII5, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
163. "Pulsed second-harmonic generation in photonic band-gap structures," M. Scalora, J. P. Dowling, M. J. Bloemer, M. Tocci, C. M. Bowden and J. W. Haus, Paper ThII3, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
164. "Optically generated photonic band gaps," A. S. Manka, M. Scalora, J. P. Dowling, G. Kurizki, and C. M. Bowden, Paper ThII4, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
165. "Nonlinear 1-D photonic band gap device with unidirectional transmittance," M. Bloemer, M. D. Tocci, M. Scalora, J. P. Dowling and C. M. Bowden, Paper ThII2, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
166. "Effective index of refraction theory for photonic band gap materials," J. P. Dowling and M. Scalora, Paper ThII1, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
167. "Practical realization of the Wilkens-Röntgen topological phase in an atomic system," J. P. Dowling, Paper WVV26, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.

168. "Enhancement of c3 in piezophotonic switching," A. S. Manka, M. Fleischhauer, M. Scalora, J. P. Dowling, and C. M. Bowden, Paper TuV4, Optical Society of America Annual Meeting, 10-15 September 1995, Portland, Oregon.
169. "Spontaneous emission rates and nonlinear effects in photonic band-gap materials," (Invited Talk) NATO Advanced Research Workshop: Quantum Optics in Wavelength-Scale Structures, 26 August - 2 September 1995, Cargese, Corsica (France).
170. "Photonic Bandgap Edge Effects," J. P. Dowling, M. J. Bloemer, C. M. Bowden, M. Scalora, and M. D. Tocci, Seventh Rochester Conference on Coherence and Quantum Optics, 7-10 June 1995, Rochester, New York.
171. "Thermodynamic Dicke Phase Transitions in Atom Traps," C. M. Bowden and J. P. Dowling, Paper QWF3, Technical Digest, Vol. 16, Quantum Electronics and Laser Science Conference, 22-26 May 1995, Baltimore, Maryland.
172. "Alteration of Spontaneous Emission Rate in GaAs/AlGaAs/AlAs Multilayer Structures," M. D. Tocci, M. J. Bloemer, M. Scalora, J. P. Dowling and C. M. Bowden, Paper QThE3, Technical Digest, Vol. 16, Quantum Electronics and Laser Science Conference, 22-26 May 1995, Baltimore, Maryland.
173. "Pulse Propagation Near Highly Reflective Surfaces: Applications to Photonic Bandgap Structures," M. Scalora, J. P. Dowling, A. S. Manka, and C. M. Bowden, Paper QWH3, Technical Digest, Vol. 16, Quantum Electronics and Laser Science Conference, 22-26 May 1995, Baltimore, Maryland.
174. "Modifications to the Planck blackbody radiation Formula in a Microcavity: Thermal Corrections to the Cavity-Induced Lamb Shift," J. P. Dowling and A. O. Barut, Paper QTuG19, Technical Digest, Vol. 16, Quantum Electronics and Laser Science Conference, 22-26 May 1995, Baltimore, Maryland.
175. "Modifications to the Planck Blackbody Radiation Formula in a Microcavity," J. P. Dowling, 25th Winter Colloquium on Quantum Electronics, 3-6 January 1995, Snowbird, Utah (invited).
176. "Local Field Effects in Nonlinear and Quantum Optics: Recent Developments," J. P. Dowling, and C. M. Bowden, LASERS '94, 12-16 December 1994, Quebec City, Canada (invited).
177. "Pulse Propagation in a Medium of Four-Level Atoms," A. S. Manka, M. Scalora, J. P. Dowling, and C. M. Bowden, Optical Society of America Annual Meeting, 2-7 October 1994, Dallas, Texas.
178. "Electromagnetic Pulse Propagation Near Highly-Reflective Surfaces," M. Scalora, J. P. Dowling, A. S. Manka, and J. W. Haus, Optical Society of America Annual Meeting, 2-7 October 1994, Dallas, Texas.
179. "Nonlinear Optical Diode in GaAs/AlGaAs Multilayer Structures," M. Tocci, M. J. Bloemer, M. Scalora, J. P. Dowling and C. M. Bowden, Optical Society of America Annual Meeting, 2-7 October 1994, Dallas, Texas.
180. "Optical Limiting and Switching in Nonlinear Photonic Bandgap Materials," M. Scalora, J. P. Dowling, C. M. Bowden, and M. J. Bloemer, Optical Society of America Annual Meeting, 2-7 October 1994, Dallas, Texas.
181. "The Analog of Paramagnetic Phase Transitions in Atom Traps," J. P. Dowling and C. M. Bowden, Optical Society of America Annual Meeting, 2-7 October 1994, Dallas, Texas.
182. "Modifications to the Planck Blackbody Radiation Formula in a Microcavity," J. P. Dowling and A. O. Barut, Optical Society of America Annual Meeting, 2-7 October 1994, Dallas, Texas.
183. "Spontaneous Emission In Cavities: How Much More Classical Can You Get?" J. P. Dowling, NATO Advance Study Institute on Electron Theory and Quantum Electrodynamics, 5-16 September 1994, Edirne, Turkey (invited).
184. "Quantum Atomic Dots," J. P. Dowling and J. Gea-Banacloche, Third Crested Butte Workshop on Quantum Coherence and Interference, 8-11 August 1994, Crested Butte, Colorado (invited).
185. "Local Field Effects in Quantum Optics: A Historical Perspective," J. P. Dowling and C. M. Bowden, Third Crested Butte Workshop on Quantum Coherence and Interference, 8-11 August 1994, Crested Butte, Colorado (invited).
186. "Propagation Effects in Lasing Without Inversion," A. S. Manka, J. P. Dowling, and C. M. Bowden, Third Crested Butte Workshop on Quantum Coherence and Interference, 8-11 August 1994, Crested Butte, Colorado (invited).
187. "Local Field Effects in Lasing Without Inversion," C. M. Bowden, J. P. Dowling, and A. Manka, Third Crested Butte Workshop on Quantum Coherence and Interference, 8-11 August 1994, Crested Butte, Colorado (invited).
188. "Quantum Atomic Dots," J. P. Dowling and J. Gea-Banacloche, XIV International Conference on Atomic Physics, 31 July-5 August 1994, Boulder, Colorado.

189. "Photonic Band Edge Optical Diode," M. Scalora, J. P. Dowling and C. M. Bowden, XXI International Quantum Electronics Conference, 8-13 May 1994, Anaheim, California.
190. "Atomic Quantum Dots," J. P. Dowling and J. Gea-Banacloche, XXI International Quantum Electronics Conference, 8-13 May 1994, Anaheim, California.
191. "Compton Scattering Near Mirrors: Applications To Improved Free-Electron Lasers," J. P. Dowling, XXI International Quantum Electronics Conference, 8-13 May 1994, Anaheim, California.
192. "Local-Field Effects In A Coherently Prepared Medium Of Three-Level Atoms," A. S. Manka, J. P. Dowling, C. M. Bowden, M. Fleischhauer, XXI International Quantum Electronics Conference, 8-13 May 1994, Anaheim, California.
193. "Quantum Atomic Dots," J. P. Dowling, and J. Gea-Banacloche, U. S. Army Aviation & Missile Command-University of Rochester Army Research Office University Research Initiative (ARO-URI) Workshop, 22-25 March 1994, Huntsville, Alabama (invited).
194. "Anomalous Index of Refraction In Photonic Bandgap Materials," J. P. Dowling, and C. M. Bowden, U. S. Army Aviation & Missile Command-University of Rochester Army Research Office University Research Initiative (ARO-URI) Workshop, 22-25 March 1994, Huntsville, Alabama (invited).
195. "The Photonic Band Edge Laser: A New Approach to Gain Enhancement," J. P. Dowling, M. Scalora, M. J. Bloemer, and C. M. Bowden, U. S. Army Aviation & Missile Command-University of Rochester Army Research Office University Research Initiative (ARO-URI) Workshop, 22-25 March 1994, Huntsville, Alabama (invited).
196. "Piezophotonic Switching from Local Field Effects in Lasing Without Inversion," A. S. Manka, J. P. Dowling, and C. M. Bowden, 24th Winter Colloquium on Quantum Electronics, 4-8 January 1994, Snowbird, Utah (invited).
197. "Photonic Bandgap Edge Effects," J. P. Dowling, M. Scalora, M. J. Bloemer, and C. M. Bowden, 24th Winter Colloquium on Quantum Electronics, 4-8 January 1994, Snowbird, Utah (invited).
198. "Quantum Atomic Dots: A New Approach To Gravimetry," J. P. Dowling and J. Gea-Banacloche, Optical Society of America Annual Meeting, 3-8 October 1993, Toronto, Canada.
199. "Quantum Noise Limits To Matter-Wave Interferometry," J. P. Dowling and M. O. Scully, Optical Society of America Annual Meeting, 3-8 October 1993, Toronto, Canada.
200. "Local Field Effects In Lasing Without Inversion: An Enhancement Of Gain And Absorptionless Index Of Refraction," A. Manka, J. P. Dowling and C. M. Bowden, Optical Society of America Annual Meeting, 3-8 October 1993, Toronto, Canada.
201. "Anomalous Index Of Refraction In Photonic Bandgap Materials," J. P. Dowling and C. M. Bowden, Ninth Interdisciplinary Laser Science Conference, 3-8 October 1993, Toronto, Canada.
202. "Enhancement Of Gain In A Vertical Cavity Laser: The Photonic Bandgap Approach," J. P. Dowling, M. Scalora, M. J. Bloemer, and C. M. Bowden, Ninth Interdisciplinary Laser Science Conference, 3-8 October 1993, Toronto, Canada.
203. "Quantum Noise Limits To Matter-Wave Interferometry," J. P. Dowling and M. O. Scully, Third International Workshop on Squeezed States and Uncertainty Relations, 10-13 August 1993, University of Maryland Baltimore County, Baltimore, Maryland (invited).
204. "Local Field Enhancement of Lasing Without Inversion II: The Power Broadened Limit," J. P. Dowling, C. M. Bowden, and A. Manka, Second Crested Butte Workshop on Atomic Coherence and Interference, 26-30 July 1993, Crested Butte, Colorado (invited).
205. "Local Field Enhancement of Lasing Without Inversion I: The Low Field Limit," C. M. Bowden, J. P. Dowling, and A. Manka, Second Crested Butte Workshop on Atomic Coherence and Interference, 26-30 July 1993, Crested Butte, Colorado (invited).
206. "Something For Nothing? You Bet! Local Field Enhancement Of Lasing Without Inversion," J. P. Dowling, SymposiUlm on Quantum Optics, 19-21 July 1993, Ulm, Germany (invited).
207. "Atomic Emission Rates in Photonic Bandgap Materials", U. S. Army Aviation & Missile Command-University of Rochester Army Research Office-University Research Initiative (ARO-URI) Workshop, Center for Applied Optics, Huntsville, Alabama, 10-11 June 1993 (invited).
208. "Compton Scattering Near Mirrors: Improving Free Electron Laser Gain Through Cavity Quantum Electrodynamical Effects?" J. P. Dowling, Workshop on New Theoretical Methods in Quantum Optics, 30 June - 2 July, 1993, Boulder, Colorado (invited).
209. "Local Field Enhancement of Lasing Without Inversion," J. P. Dowling and C. M. Bowden, Quantum Electronics and Laser Science Conference, 2-7 May 1993, Baltimore, Maryland.

210. "Beat Radiation from Dipoles Near a Photonic Band Edge," J. P. Dowling and C. M. Bowden, Quantum Electronics and Laser Science Conference, 2-7 May 1993, Baltimore, Maryland.
211. "Wigner Distribution for Dicke, Coherent, and Squeezed Atomic States," J. P. Dowling, G. S. Agarwal, and W. P. Schleich, Quantum Electronics and Laser Science Conference, 2-7 May 1993, Baltimore, Maryland.
212. "Atomic Emission Rates in Photonic Bandgap Materials", U. S. Army Aviation & Missile Command / University of Rochester, Army Research Office - University Research Initiative (ARO - URI) Workshop, Center for Applied Optics, Huntsville, Alabama, 19 March 1993 (invited).
213. "Photonic Bandgap Materials", U. S. Army Aviation & Missile Command / Center for Molecular and Atomic Studies at Surfaces (CMASS) Workshop, Vanderbilt University, Department of Physics and Astronomy, 19 February 1993 (invited).
214. "Quantum Limits to Matter Wave Interferometry," M. O. Scully and J. P. Dowling, 23rd Winter Colloquium on Quantum Electronics, 5-9 January 1993, Snowbird, Utah (invited).
215. "Atomic Emission Rates in Photonic Band Structures," J. P. Dowling and C. M. Bowden, Optical Society of America Annual Meeting, 20-25 September 1992, Albuquerque, New Mexico.
216. "Near Dipole-Dipole Effects in a Dense Media of Two-Level Atoms," J. P. Dowling and C. M. Bowden, Optical Society of America Annual Meeting, 20-25 September 1992, Albuquerque, New Mexico.
217. "Local Field Corrections to Lasing Without Inversion," C. M. Bowden and J. P. Dowling, Workshop On Atomic Coherence and Interference in Quantum Optics, 14-18 September 1992, Crested Butte, Colorado (invited).
218. "Quantum Limits to Matter Wave Interferometry," M. O. Scully and J. P. Dowling, Workshop On Atomic Coherence and Interference in Quantum Optics, 14-18 September 1992, Crested Butte, Colorado (invited).
219. "Beat Radiation from Dipoles Near a Photonic Band Edge," J. P. Dowling and C. M. Bowden, International Research Workshop of Quantum Optics, Weizmann Institute of Science, 22-26 June 1992, Rehovot, Israel (invited).
220. "Atomic Radiation Rates in Photonic Band Structures," J. P. Dowling and C. M. Bowden, XVIII International Quantum Electronics Conference, 14-19 June 1992, Vienna, Austria.
221. "Rutherford Scattering Near Mirrors: The Kapitza-Dirac Effect with Virtual Photons," J. P. Dowling, Workshop on Optics and Interferometry with Atoms, 8-12 June 1992, Konstanz, Germany (invited).
222. "Wigner Functions for Nonclassical States of a Collection of Two-Level Atoms," G. S. Agarwal, J. P. Dowling, and W. P. Schleich, Second International Workshop on Squeezed States and Uncertainty Relations, 25-30 May 1992, Moscow, Russia (invited).
223. "A Simple Scalar Model of Atomic Radiation Rates in Photonic Band Structures," J. P. Dowling and C. M. Bowden, Quantum Electronics and Laser Science Conference, 10-15 May 1992, Anaheim, California.
224. "Atomic Emission Rates in Inhomogeneous Media with Applications to Photonic Band Structures," J. P. Dowling and C. M. Bowden, Workshop on the Development and Applications of Photonic Band Structures, 28-30 January 1992, Park City, Utah (invited).
225. "Classical versus Quantum Effects in Cavity QED," J. P. Dowling, Santa Fe Meeting on the Foundation of Quantum Mechanics, 27-31 May 1991, Santa Fe, New Mexico (invited).
226. "Classical Dipole Radiation in Cavities," J. P. Dowling and M. O. Scully, Quantum Electronics and Laser Science Conference, 12-17 May 1991, Baltimore, Maryland.
227. "A Gaussian Measure of Quantum Phase Noise," W. P. Schleich, J. P. Dowling, and R. J. Horowicz, Workshop on Squeezed States and Uncertainty Relations, 28-30 March 1991, College Park, Maryland (invited).
228. "Cavity QED and Classical Antenna Theory," J. P. Dowling, M. O. Scully, and F. DeMartini, NATO Advance Research Workshop on Quantum Measurements in Optics, 21-25 January 1991, Cortina D'Ampezzo, Italy (invited).
229. "Quantum States of Minimum Phase Uncertainty," W. P. Schleich, J. P. Dowling and R. J. Horowicz, Meeting of the German Physical Society, 14-18 May 1990, Munich, Germany.
230. "QED Based on Self-Fields: Cavity Effects," J. P. Dowling, NATO Advance Study Institute on New Frontiers in Quantum Electrodynamics and Quantum Optics, 14-26 August 1989, Istanbul, Turkey (invited).

Other Presentations (Invited)

1. ARO Quantum Imaging MURI Program Review, "Quantum Lithography," 16–18 November 2008, University of Maryland, Baltimore.
2. DARPA Quantum Sensor Program Review, "Quantum Sensor Optimization," 26–29 August, Hilton Head, North Carolina.
3. NASA Ames Research Center Director's Distinguished Lecture Series, "Quantum Sensing," 23 July 2008, San Jose, California.
4. Northrop Grumman Space Technologies Seminar, "Quantum Technologies," 17 July 2008, Redondo Beach, California.
5. ARO Quantum Imaging MURI Program Review, "Quantum Lithography," 20–21 May 2008, University of Rochester, New York.
6. DARPA Quantum Sensor Program Review, "Quantum LIDAR — Remote Sensing at the Ultimate Limits," 5–6 March 2008, Park City, Utah.
7. ARO-IARPA Quantum Computing Program Review, "Linear Optical Quantum Computing Theory," 31 January 2008, University of Maryland, Baltimore.
8. Physics Colloquium, "Schrödinger's Rainbow," 11 October 2007, University of California, San Diego.
9. Solid-State Seminar, "Quantum Technologies," 10 October 2007, University of California, San Diego.
10. ARO MURI Program Review, "Quantum Imaging Theory," 1 October 2007, Boston, Massachusetts.
11. DARPA Quantum Sensors Meeting, "Quantum LIDAR," 2 August 2007, Pasadena, California.
12. Physics Department Colloquium, "Quantum Technologies," 25 April 2007, Tulane University, New Orleans, Louisiana.
13. NRO DII Program Review, "Photonic Crystals for Thermal Satellite Control," 2 March 2007, Chantilly, Virginia.
14. ARO MURI Quantum Imaging Program Review, "Quantum Lithography," 23–24 October, Ft. Belvoir, MD.
15. Director's Colloquium, "The Second Quantum Revolution," 18 September 2006, NASA Ames Research Center, Moffett Field, CA.
16. DTO Quantum Computing Program Review, "Linear Optical Quantum Sources, Processors, and Detectors," 22–26 August 2005, Tampa, FL.
17. ARO MURI Program Kick-Off, "Quantum Lithography," 9–10 June 2005, Rochester, NY.
18. DTO QCCM Program Kick-Off, "Linear Optical Quantum Sources, Processors, and Detectors," 4–6 July 2005, Champlain, Illinois.
19. NRO DII Program Review, "Improved Solar Cells Using Photonic Crystals," Chantilly, Maryland, 30 March 2005.
20. Beijing Normal University Quantum Optics Seminar, "Schrödinger's Rainbow: The Renaissance in Quantum Optical Interferometry," 20 December 2004.
21. Texas A&M Physics Colloquium, "Schrödinger's Rainbow: The Renaissance in Quantum Optical Interferometry," 28 October 2004.
22. University of Leeds Physics Colloquium, "Schrödinger's Rainbow: The Renaissance in Quantum Optical Interferometry," 15 January 2004.
23. Louisiana State University Physics Colloquium, "Schrödinger's Rainbow: The Renaissance in Quantum Optical Interferometry," 28 April 2003.
24. JPL All-Lab Lecture, "Schrödinger's Rainbow: The Renaissance in Quantum Optical Interferometry," 8 April 2003.
25. NRO Program Review, "Quantum Atomic Magnetometers," 20 February 2003.
26. DARPA Program Review, "Gravity Gradiometry for Underground Structure Detection," 17 December 2002.
27. University of Vienna Physics Seminar, "Quantum Metrology," 25 November 2002.
28. University of Toronto Physics Colloquium, "Entanglement Enhanced Quantum Metrology with Linear Optics and Projective Measurements," 20 September 2002.
29. JPL Technical Presentation to Chief Scientist, "Quantum Interferometry," 18 January 2002.
30. JPL Sec. 367 Brown-Bag Seminar, "Proposing to the DoD," 17 June 2002.
31. Caltech, Institute for Quantum Information Seminar, "Linear Optics and Projective Measurements for Fun and Profit," 4 June 2002.
32. NRO Program Review, "Quantum Atomic Matter-Wave Gyroscope," 12 February 2002.
33. NRO Program Review, "Quantum Clock Synchronization," 11 December 2001.
34. UC Riverside Physics Colloquium, "Quantum Interferometry," 26 October 2001.

35. JPL Information Technology Leadership Council, "Introduction to Quantum Computing," 14 August 2001.
36. JPL Winter RCT Science and Technology Seminar, "Quantum Interferometry," JPL, 16 May 2001.
37. "Quantum Atomic Gravity Gradiometry at JPL," National Reconnaissance Office, 26 March 2001.
38. "Quantum Interferometry," University of Toronto, Quantum Information Colloquium, 28 March 2001.
39. "Quantum Interferometry," Georgia Tech, Physics Colloquium, 23 February 2000.
40. "From Quantum Computing to Quantum Gyroscopes," CalTech/Jet Propulsion Labs, Special Physics Seminar, 1998 (invited).
41. "Atom Laser Gyroscopes," Ohio State University, Physics Seminar, 1998.
42. "Analog vs. Digital Quantum Computing," UCLA, Physics Seminar, 1996.
43. "Atomic Emission Rates in Photonic Bandgap Materials," SAIC Corporation, Physics Seminar, 1995.
44. "Atomic Emission Rates in Microcavities," University of Georgia, Athens, Physics Seminar, 1994.
45. "Photonic Bandgap Materials," University of Maryland, Baltimore County Campus, Physics Seminar, 1994.
46. "Photonic Bandgap Materials," University of Maryland, Baltimore County Campus, Physics Seminar, 1994.
47. "History and Development of Local Field Effects in Quantum Optics," Texas A&M University, Physics Seminar, 1994.
48. "Applications of Photonic Bandgap Materials," California State University at Fullerton, Physics Seminar, 1994.
49. "Photonic Bandgap Materials," Mississippi State University, Physics Seminar, 1994.
50. "Photonic Bandgap Materials," Sandia National Laboratories, seminar, 1993.
51. "How to Bounce Light off Light Without Really Trying," University of Alabama at Huntsville, Society of Physics Students Seminar, 1993.
52. "Atomic Emission Rates in Photonic Band Gap Materials," Rensselaer Polytechnic Institute, Physics Colloquium, 1993.
53. "An Introduction to Photonic Bandgap Materials," University of Arkansas at Fayetteville, Physics Colloquium, 1993.
54. "Atomic Emission Rates in Photonic Band Gap Materials," U. S. Army Military School at West Point, Photonics Center Seminar, 1993.
55. "An Introduction to Photonic Band Gap Materials," University of Alabama at Huntsville, Physics Colloquium, 1992.
56. "An Introduction to QED in Photonic Band Gap Materials," University of Ulm, Germany, Physics Seminar, 1992.
57. "Coulomb Scattering Near Mirrors," University of Wyoming at Laramie, Mathematical Physics Seminar, 1991.
58. "Atomic Emission Rates in Photonic Band Gap Materials," University of Colorado at Boulder, Mathematical Physics Seminar, 1991.
59. "QED Based on Self-Fields: Cavity Effects", University of Alabama in Huntsville, Physics Department Colloquium, 1990.
60. "Do Black Holes Really Radiate?" University of Colorado at Denver, Natural Philosophy Colloquium, 1989.
61. "Fractional Derivatives," University of Colorado at Boulder, Mathematics Colloquium, 1988.
62. "QED Based on Self-Fields: Cavity Effects", University of Colorado at Boulder Mathematical Physics Seminar, Physics Department Colloquium, 1988.
63. "QED Based on Self-Fields: Apparatus Contributions to g-2," University of Colorado at Boulder, Mathematical Physics Seminar, 1988.
64. "The Mathematics of the Casimir Effect," University of Colorado at Boulder, Mathematics Colloquium, 1987.
65. "The Casimir Effect," University of Colorado at Boulder, Mathematical Physics Seminar, 1986.
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3. LSU Research, "Metamorphosis: Making the change from laboratory to institute," Spring 2005.
4. Science News, "Spooky Timing," 25 September 2004.
5. United Press International, "Super Photons Could Make Better CD Players," 12 May 2004.
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8. TRN News, "Simple Optics Make Quantum Relay," 12 February 2004.
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10. TRN News, "Fiber Loop Makes Quantum Memory," April 2003.
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23. SlashDot article on Quantum Lithography, September 2000.
24. Science Now article on Quantum Lithography, September 2000.
25. Science Daily article on Quantum Lithography, September 2000.
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34. Bangor Mail article on Quantum Lithography, September 2000.
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36. NASA-JPL press release on Quantum Lithography, September 2000.
37. Electronic Times article on Quantum Lithography, November 2000.
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41. Physics News Update article on Quantum Lithography, September 2000.
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Revised: 01 APR 09