Prem Kumar's Current Vita

Education

	Ph.D. (1980)	Physics, State University of New York at Buffalo, NY
	M.Sc. (1976)	Physics, Indian Institute of Technology, Kanpur, India
	B.Sc. (1974)	Physics, University of Delhi, Delhi, India

Employment

2005-	Head, Solid State and Photonics Division, Department of Electrical Engineering and Computer Science (EECS), Northwestern University, Evanston, IL 60208-3118
2003-	AT&T (SBC) Professor of Information Technology, EECS Dept., Northwestern Univ.
2002-	Professor, Department of Physics and Astronomy, Northwestern University
2000-	Director, Center for Photonic Communication and Computing, Northwestern University
1994-2005	Leader, Photonic Systems and Technology Group, ECE Dept., Northwestern University
1991-2003	Professor, EECS/ECE Department, Northwestern University, Evanston, IL
1986-1991	Associate Professor, EECS Department, Northwestern University, Evanston, IL

Other Work Experience

1985-1986	Staff Scientist, Lincoln Laboratory, Massachusetts Institute of Technology
1983-1985	(spring terms) Lecturer, Electrical Engineering and Computer Science, MIT
1981-1986	Research Scientist, Research Laboratory of Electronics, MIT
1980-1981	Research Scientist, Center for Laser Studies, University of Southern California

Entrepreneurial Experience

2003–	Founder, NuCrypt LLC, Evanston, IL
2002–2004	Member of Technical Advisory Board, Baird Venture Partners, Chicago, IL
2000–2003	Technical Advisor, Santel Networks, Newark, CA

Fellowships and Awards

Martin E. and Gertrude G. Walder Research Excellence Award, Northwestern University, 2006; International Quantum Communications Award, Tamagawa University, Japan, 2004; *Fellow*, Institute of Electrical and Electronic Engineers (IEEE), 2003; *Fellow*, Institute of Physics (IoP), U.K., 2002; *Fellow*, American Physical Society (APS), 2000; *Fellow*, Optical Society of America (OSA), 1996

Membership of Scientific and Professional Societies

Member, American Association for the Advancement of Science (AAAS); *Member*, Society of Photo-Instrumentation Engineers (SPIE)

Current Research Interests:

Quantum fiber optics—generation and distribution of quantum entanglement over the fiber channel and quantum cryptography over fiber lines; Optical communications—novel optical amplifiers and devices for terabit/s communications; Nonlinear and quantum optics—applications of novel quantum states of light such as squeezed and twin-beams states in precision measurement and imaging systems

Publications: Cumulative over 375 papers, including 1 edited book, 5 patents, 150 journal papers, 40 articles in hard-bound volumes, and 200 conference papers.

Teaching Activities:

Basic electrical engineering and advanced photonics and quantum electronics courses at Northwestern; short courses on quantum parametric amplifiers and quantum information technologies at conferences.

Recent Synergistic Activities: Active at professional societies (OSA, IEEE, APS, SPIE, AAAS) in various roles. General Co-chair, QELS'2008; Program Co-chair, QELS'2006; Science and Engineering Council, OSA, 2003–06; Program Committee, Optical Fiber Communications Conference, 2003-05; Organizing Committee, Int'l Conf. on Quantum Communication, Measurement, and Computing, (Tsukuba City, 2006; Cambridge, 2002; Evanston, 1998, Principal Organizer)

Research Funding: *Over $13 million of cumulative research funding*

1. "Optical-Fiber Sources of Entangled Photon-Pairs," FY06 DNI Post Doctoral Fellowship for Joe Altepeter, National Geospatial-Intelligence Agency, Grant No. HM1582-06-1-2031 (0650-350-CF38), 12/1/2006–11/30/2008, $240,000.
2. "Noiseless Amplification of Analog Optical Signals," (PI with Vladimir Grigoryan as co-PI), Naval Research Laboratory, Grant No. N00173-06-1-G026 (0650-350-CF37), 8/7/2006–8/6/2009, $780,000.
3. "STTR Phase I: Continuous Variable Quantum Encryption using Short Laser Pulses," Air Force Research Laboratory, as a subcontract from NuCrypt LLC, Contract No. FA9550-05-C0106 (0970-350-CF34), 1/1/2006–6/16/2006, $40,000.
4. "DURIP: Quantum Imaging: New Methods and Applications," Army Research Office, as a subcontract from University of Rochester, Grant No W911NF-06-1-0128 (0980-350-CF33), 05/05/06–05/04/07, $86,000.
5. "Application of Slow Light to Information Processing," (co-PI with Selim Shahriar as PI), Defense Advanced Research Projects Agency, subcontract through Hewlett-Packard Company, Agreement dated 9/13/05 on Grant No. FA9550-05-C-0017 (0970-350-CF31), 9/13/2005–2/28/2008, $875,000 (P. Kumar's share $291,667).
6. "Tools for Distributed Quantum Information Processing," National Science Foundation, Grant No. EMT- 0523975 (0830-350-CF30), 9/1/2005–8/31/2008, $250,000.
7. "Instrumentation to Develop Portable Entangled-Photon Sources in the Fiber-Optic Telecom Band," Army Research Office, Grant No. W911NF-05-1-0473 (0650-350-CF29), 08/01/05–07/31/06, $69,000.
8. "Midwest Crossroads Alliances for Graduate Education and the Professoriate (AGEP)," (co-PI), National Science Foundation, as a subcontract from Purdue University, Grant No. 0450373 (0980-360-P230), 06/01/2005–5/31/2006, $3,240.
9. "Compact Pulsed Fiber-based Laser with 390nm Wavelength Output," National Institute of Standards and Technology, Grant No. 60NANB5D1113 (0730-350-CF28), 06/01/2005–7/31/2006, $215,000.
10. "Quantum Imaging: New Methods and Applications," (PI with G. Barbosa as co-PI), FY2005 Multi-disciplinary University Research Initiative, Army Research Office, as a subcontract from University of Rochester, Grant No W911NF-05-1-0197 (0980-350-CF27), 5/1/05–4/30/10, $1,100,000.
11. "Bootstrapping a Quantum Information Technology Industry," (co-PI with Selim Shahriar as PI), Defense Advanced Research Projects Agency, subcontract through Hewlett-Packard Company, Grant No. ALP1110/HR0011-04-3-0040 (0970-350-CF53), 3/18/2005–8/29/2005, $100,000 (P. Kumar's share $33,333).
12. "Multi-Channel Optical 3R Regeneration and Buffering for Networking Applications," National Science Foundation, Grant No. ECS-0401251 (0830-350-CF24), 9/1/2004–8/31/2007, $210,001.
13. "Quantum Optics with a Pulsed Pump Source: Characterization of Fiber-Generated Entanglement with Optical Homodyne Tomography," Office of Naval Research, Grant No. N00014-03-1-0876 (0650-350-CF21), 7/15/03–12/31/03, $62,500.
14. "Quantum Optics with a Q-switched Pump Source," Office of Naval Research, Grant No. N00014-03-1-0179 (0650-350-CF19), 11/1/02–4/30/03, $62,500.

15. "ITR: Twin Photons with Angular Momentum: Extending Entanglement for Quantum Information," (co-PI with G. A. Barbosa as PI), National Science Foundation, Grant No. PHY-0219382 (0830-350-CF17), 8/1/2002–7/31/2005, $417,000.

16. "Ultra-High-Capacity Optical Communications and Networking: Data Processing Modules using High-Nonlinearity Fiber for Advanced Optical Networking," (PI with W.L. Kath as co-PI), National Science Foundation, Grant No. ANI-0123495 (0830-350-CF13), 10/1/2001–9/30/2004, $350,002.

17. "Ultra-secure and Ultra-efficient Quantum Cryptographic Schemes for Optical Systems, Networks, and the Internet," (co-PI with H. Yuen as PI), Defense Advanced Research Projects Agency/U.S. Air Force, Grant No. F30602-01-2-0528 (0650-350-CF12), 6/19/01–6/18/06, $ 5,434,366 (P. Kumar's share $4,242,120).

18. "Nonlinear fiber-optics with picosecond pulses for all-optical WDM/TDM systems," National Science Foundation, REU Supplemental to Grant No. ECS-000241-001 (0830-350-CF10), 6/15/2001–7/31/2003, $6,000.

19. "Photonics Imaging Research Institute," 4/1/01–3/31/04, a three-year Cross-School Initiative funded by the Office of the Provost, Northwestern University, $75,000. Co-PI with two other faculty members (Matt Glucksberg and Jay Walsh) in Biochemical Engineering to develop an interdisciplinary program in Photonic Imaging.

20. "Instrumentation to characterize short-pulse interactions for producing entangled light beams in optical fibers," Department of Defense University Research Instrumentation Program, Army Research Office, Grant No. DAAD 19-01-1-0405 (0650-350-CF09), 4/1/01–3/31/02, $42,500

21. "Nonlinear fiber-optics with picosecond pulses for all-optical WDM/TDM systems," (PI with William L. Kath as co-PI), National Science Foundation, Grant No. ECS-0000241 (0830-350-CF07), 8/1/2000–7/31/2003, $210,000.

22. "MURI Fellow on Quantum Information Technology: Entanglement, Teleportation, and Quantum Memory," Army Research Office, Grant No. DAAD19-00-1-0469 (0650-350-CF05), 9/1/00–8/31/03, $152,000.

23. "Amorphous Computing in a High-Speed Secure Quantum Network via Anonymous Quantum Keys," (co-PI with H. Yuen as PI), Defense Advanced Research Projects Agency/U. S. Air Force, Grant No. F30602-99-1-0554 (0650-350-CF02), 5/18/00–9/30/01, $99,999.

24. "Quantum Information Technology: Entanglement, Teleportation, and Quantum Memory," (PI with H. Yuen as co-PI), FY2000 Multi-disciplinary University Research Initiative, Army Research Office, as a subcontract from MIT, Grant No. DAAD19-00-1-0177 (0980-350-CF01), 5/1/00–4/30/05, $1,400,000 (P. Kumar's share $950,000).

25. "Instrumentation to Measure the Error Performance of Quantum-Limited Optical Bit Processing Devices that Utilize Short-Pulse Parametric Interactions," equipment grant (DURIP'00) from the Air Force Office of Scientific Research, Grant No. F49620-00-1-0270 (0650-350-CF00), 4/1/00–3/31/01, $115,000.

26. "Squeezed-Light Generation by Means of Traveling-Wave $\chi^{(2)}$ Interactions in Lithium-Niobate Waveguides, National Science Foundation, REU Supplement to Grant No. ECS-9821109 (0830-350-F820), 5/1/1999–4/30/2000, $5,000.

27. "Quantum Optics with a Q-switched Pump Source," Office of Naval Research, Grant No. N00014-91-J-1268 (0650-350-F465), 10/1/99–9/30/02, $315,000.

28. "High Detection Efficiency Photon Counters at 1064nm and Their Use in a Novel Quantum Imaging Scheme (Paul Voss)," National Aeronautics and Space Administration Training Grant, NGT5-90 (0720-350-F494), 9/1/1999–8/31/2002, $66,000.

29. "Integrated Devices for Tb/s 1.3 and 1.5 μm WDM/TDM Network Applications," (PI with S.-T. Ho and B. W. Wessels as co-PI's) Advanced Research Projects Agency/U. S. Air Force, Multi-disciplinary University Research Initiative, F49620-96-1-0262 (0650-350-F473, 474, 475), 6/1/99–5/31/01, $1,000,000; P. Kumar's share: $405,000.

30. "Squeezed-Light Generation by Means of Traveling-Wave $\chi^{(2)}$ Interactions in Lithium Niobate Waveguides," National Science Foundation, Grant No. ECS-9821109 (0830-350-F820, 0830-350-CF03), 5/1/99–4/30/2001, $133,334.

31. "Instrumentation to Characterize Cache-Memory Buffers and Regenerators for Optically-Digital Communication and Processing at the Quantum Limit," equipment grant from the Air Force Office of Scientific Research, Grant No. F49620-99-1-0232 (0650-350-F430), 5/1/1999–4/30/2000, $225,000.

32. "Low Latency Nonlinear Loop Mirror," National Security Agency, Contract No. MDA904-98-C-A875 (0650-350-F488), 6/15/98–9/30/99, $300,000.

33. "Fourth International Conference on Quantum Communication, Measurement, and Computing," National Security Agency, Grant No. MDA904-98-1-0543 (0650-350-F487), 4/27/98–4/26/99, $10,000

34. "Squeezed-Light Generation by Means of Traveling-Wave $\chi^{(2)}$ Interactions in Lithium-Niobate Waveguides," National Science Foundation, REU Supplement to Grant No. ECS-9710631 (0830-350-F219), 2/15/98–1/31/99, $5,000.

35. "Fourth International Conference on Quantum Communication, Measurement, and Computing," Office of Naval Research, Grant No. N00014-98-1-0548 (0650-350-F485), 6/1/98–5/31/99, $5,000.

36. "Squeezed-Light Generation by Means of Traveling-Wave $\chi^{(2)}$ Interactions in Lithium-Niobate Waveguides," National Science Foundation, Grant No. ECS-9710631 (0830-350-F219), 2/15/98–1/31/99, $67,700.

37. "Diode-Pumped Q-switched Nd:YAG Laser for Traveling-Wave Quantum Optics Experiments," Office of Naval Research, Grant No. N00014-98-1-0294 (0650-350-F402), 3/2/98–3/1/99, $95,000.

38. "Optically Digital Communication and Processing at the Quantum Limit," Defense Advanced Research Projects Agency/U. S. Air Force, (0650-350-F483), 6/17/97–2/16/97, $70,000.

39. "Quantum Optics with a Q-switched Pump Source," Office of Naval Research, Grant No. N00014-91-J-1268 (0650-350-F465), 10/1/96–9/30/99, $270,000.

40. "Integrated Devices for Tb/s 1.3 and 1.5 μm WDM/TDM Network Applications," (PI with S.-T. Ho and B. W. Wessels as co-PI's) Advanced Research Projects Agency/U. S. Air Force, Multi-disciplinary University Research Initiative, F49620-96-1-0262 (0650-350-F473, 474, 475), 6/1/96–5/31/99, $1,499,998; P. Kumar's share: $608,000.

41. "Devices and Instrumentation for Ultrafast Soliton TDM Systems," Advanced Research Projects Agency/U. S. Air Force, through the Ultrafast Soliton Devices and Instrumentation Consortium between the University of Michigan, Amoco Laser Company, Hewlett Packard Company, and Northwestern University, (0980-350-F213), 8/22/94–8/31/97, $208,955.

42. "Ultra-High Speed Optical Communication and Switching via Novel Quantum Devices," (with S.-T. Ho and H. P. Yuen), Advanced Research Projects Agency/U. S. Air Force (F467, F468, 0650-350-F469), 7/14/94–8/31/96, $1,000,000, P. Kumar's share: $380,000.

43. “Ultra-High Speed Optical Communication and Switching via Novel Quantum Devices,” (with H. P. Yuen and S.-T. Ho), Advanced Research Projects Agency/U. S. Air Force (0650-350-F447, F448, F449), 5/18/92–9/30/94, $1,249,958, P. Kumar’s share: $517,170.

44. “Quantum Optics with a Q-switched Pump Source,” Office of Naval Research, Grant No. N00014-91-J-1268 (0650-350-F465), 10/1/93–9/30/96, $260,000.

45. “Generation of Sub-Poissonian Light from a Parametric Amplifier using an Intensity Feed-Forward Scheme,” Office of Naval Research (0650-350-F464), 9/15/93–8/14/96, $207,374.

46. “Photon Duplication,” REU Supplement, National Science Foundation (0830-350-F683), 1/1/93–12/31/93, $5,000.

47. “Photon Duplication,” (with H. P. Yuen), National Science Foundation (0830-350-F670), 1/1/92–2/31/94, $256,352.

48. “Quantum Optics with a Q-switched Pump Source,” Office of Naval Research (0650-350-F446), 1/1/91–9/30/93, $290,000.

49. “Investigation of Brillouin Scattering in Guided Structures,” University Research Grant Committee, 10/1/89–9/30/90, $4,967.

50. “Fiber-Optic Quantum Communications,” (with H. P. Yuen and M. E. Marhic), P. Kumar’s share: 50%, National Science Foundation, (0830-350-F653) 9/1/87–2/28/91, $546,770.

51. “Fiber-Optic Quantum Communications,” National Science Foundation, REU Supplement, 9/1/89–8/31/90, $8,000.

52. “Fiber-Optic Quantum Communications,” National Science Foundation, REU Supplement, 3/1/88–2/28/89, $3,986.

53. “Research Initiation Funding,” Northwestern University, 9/1/86–8/31/88, $200,000.

54. “Squeezed State Generation via Intracavity Forward Degenerate Four-Wave Mixing,” (co-PI with J. H. Shapiro), National Science Foundation, 7/1/85–12/31/86, $169,000.

55. “Generation, Detection, and Applications of Two-Photon Coherent State Light,” (co-PI with J. H. Shapiro), Maryland Procurement Office, 9/14/84–1/13/87, $525,000.

Academic Teaching Activities at Northwestern:

CTEC = Course and Teacher Evaluation Council

AY	Qtr	Course #	Course Title	# of Students	CTEC Avg. Instructor (Max 6.0)	CTEC Avg. Course (Max 6.0)	399, 499 units	# of UG Advised	AY Salary Paid
2005/06	S06	ECE-382	Photonic Information Processing	6	4.7	4.7			
	S06	EECS-221	Fundamentals of Circuits	25	4.8	4.0	5	10	11.1%
2004/05	W05	ECE-382	Photonic Information Processing	6	5.2	5.0			
	S05	ECE-221	Fundamentals of Circuits	22	5.4	4.8	1	10	11.1%
2003/04	W04	ECE-382	Photonic Information Processing	5	5.0	5.0			
	S04	ECE-406	Nonlinear Optics	6	3.8	4.0			
	S04	ECE-221	Fundamentals of Circuits	28	5.3	4.9	1	10	11.1%
2002/03	S03	ECE-221	Fundamentals of Circuits	28	5.4	5.0		1	10.9%
	On half-time sabbatical; taught only in the Spring quarter								
2001/02	W02	ECE-382	Photonic Information Processing	11	5.4	5.1	10	4	25%
	S02	ECE-221	Fundamentals of Circuits	20	4.8	4.2			
2000/01	F00	ECE-379	Optics and Information Systems	14	4.4	4.6	10	9	20.0%
	W01	ECE-221	Fundamentals of Circuits	53	4.6	3.9			
	W01	ECE-382	Photonic Information Processing	9	4.6	4.3			
							C99, D99, &		
							E90 units		
1999/00	W00	ECE-379	Optics and Information Systems	10	5.2	4.7	34	10	17.2%
	S00	ECE-221	Fundamentals of Circuits	22	4.7	3.8*			
	Got a course off to teach ECE-221 for the first time					* Taught for the first time			
1998/99	F98	730-D06	Nonlinear Optics	7	5.1		34	15	10%
	W99	730-B42	Circuits II	34	4.9			Freshman	
	S99	730-C79	Optics & Information Systems	16	5.1			Advisor	
1997/98	F97	730-B42	Circuits II	22	5.2		32	12	10%
	F97	730-D06	Nonlinear Optics	9	5.3			Freshman	
	Got a course off to organize QCM'98							Advisor	
1996/97	F96	730-B42	Circuits II	31	4.7		28	6	10%
	F96	730-D06	Nonlinear Optics	8	4.9				
	S97	730-C79	Optics & Information Systems	12	missing				
					(Max 4.0)				
1995/96	F95	727-B42	Circuits II	26	3.2		35	8	10%
	F95	727-D06	Nonlinear Optics	5	3.4				
	Got a course off to serve on the Executive Committee								
1994/95	F94	727-B42	Circuits II	22	2.7		10	9	10%
	F94	727-D06	Nonlinear Optics	10	3.7				
	S95	727-C98	EE Design	5	2.8				

1993/94	W94	727-C83	Lasers and Coherent Optics	9	3.2		21	9	10%
	W94	727-D06	Nonlinear Optics	3	exempt				
	S94	727-C85	Optoelectronics	9	3.0				
1992/93	F92	727-D06	Nonlinear Optics	7	3.7		36	8	10%
	S93	727-C98	EE Design	1	exempt				
	S93	727-C85	Optoelectronics	10	3.3				
1991/92	W92	727-C98	EE Design	4	exempt		25	9	10%
	W92	727-D06	Nonlinear Optics	7	3.6				
	S92	727-A10	Introduction to EECS (15%)*	17	exempt				
	S92	727-C85	Optoelectronics (50%)**	23	missing				
	S92	727-D27	Optical Communications	5	3.8				
		* Co-taught with 6 other faculty							
		** Co-taught with M. Marhic							
1990/91	W91	727-C83	Lasers and Coherent Optics	15	3.6		12	9	6.11%
	S91	727-C85	Optoelectronics (50%)**	16	3.2				
		** Co-taught with M. Marhic							
1989/90	W90	727-C83	Lasers and Coherent Optics	9	3.5		16		0.0%
	W90	727-D06	Nonlinear Optics	7	3.3				
	S90	727-C85	Optoelectronics (50%)**	10	3.0				
		** Co-taught with M. Marhic							
1988/89	F88	727-D06	Nonlinear Optics	15	2.5***		25		10%
	W89	727-C83	Lasers and Coherent Optics	22	3.2				
	W89	727-D27	Optical Communications	18	2.6				
					***Taught course for the first time				
1987/88	W88	727-C83	Lasers and Coherent Optics	18	3.1		33		10%
	S88	727-C85	Optoelectronics	23	3.2				
1986/87	W87	727-C83	Lasers and Coherent Optics	26	2.6		11		1st Year
	S87	727-D27	Optical Communications	9	3.5				faculty

Research Associates:

1. Prof. Geraldo A. Barbosa, Adjunct Professor, EECS Department, Northwestern University.
2. Prof. Vladimir Grigoryan, Research Professor, EECS Department, Northwestern University.
3. Dr. Gregory S. Kanter, Research Associate, Center for Photonic Communication and Computing, EECS Department, Northwestern University.
4. Chun Chan, Research Engineer, Center for Photonic Communication and Computing, EECS Department, Northwestern University.

Postdoctoral Student Supervision:

Name	Ph.D. Date / Institution	Years at NU	Present Position
Dr. Kim Fook Lee	Duke University	Aug. 2004 – Present	Postdoctoral Associate, Northwestern University
Dr. Myunghun Shin	Aug. 2000 / Korea Advanced Institute of Science and Technology (KAIST)	Nov. 2004 – Present	Postdoctoral Associate, Northwestern University
Dr. Sheng Feng	June 2005 / University of Virginia	July 2005 – Present	Postdoctoral Associate, Northwestern University
Dr. Paul Voss	Dec. 2003 / Northwestern University	Jan. 2004 – Dec. 2005	Assistant Professor, ECE Department, Georgia Institute of Technology
Dr. Kahraman G. Köprülü	June 2002 / Bilkent University, Ankara, Turkey	Aug. 2002 – June 2005	Assistant Professor, TOBB Economics and Technology University, Ankara, Turkey
Dr. Xiaoying Li	Dec. 2001 / Institute of Opto-Electronics, Shanxi University, China	Jan. 2002- June 2005	Associate Professor, Tianjin University, Tianjin, P. R. China
Dr. Jay Sharping	June 2003 / Northwestern University	July 2003 – Jan. 2004	Assistant Professor, Univ. of California, Merced, CA
Dr. Jacob Lasri	June 2002 / Technion, Haifa, Israel	Sep. 2002 – Aug. 2004	Precision Photonics Corp., Boulder, CO
Dr. Song Lan	June 2002 / Princeton University	July 2002 – June 2003	Postdoctoral Associate, Case Western University
Dr. Sun-Hyun Youn	1993 / Seoul National University, South Korea	1994 – 1995	Associate Professor, Chonnam National University (CNU), South Korea
Dr. Gregory Kanter	Dec. 2000 /Northwestern University	Jan. 2001 – June 2001; Oct. 2003 – Apr. 2004	Vice President, Product Development, NuCrypt LLC, Evanston, IL
Dr. Sang-Kyung Choi	June 1999 / Northwestern University	2003	Research Scientist, Korea Research Institute for

			Science and Standards, South Korea
Dr. Tae-Gon Noh	1999 / Pohang University of Science and Technology, Pohang, South Korea	1999 – 2000	Electronics and Telecommunications Research Institute (ETRI) South Korea
Dr. Darwin Serkland	Jun. 1996 / Stanford University	1996 – 1998	Research Scientist, Sandia National Lab, Albuquerque, NM
Dr. Ruo-Ding Li	1990 /University of Brussels, Belgium	1992 – 1995	Senior Photonics Architect, Motorola, Inc., Marlboro, MA

Graduate Student Supervision:

I am currently supervising 7 Ph.D. students at various levels of the graduate program. Students not yet in candidacy: Matt Hall (2nd year EECS), Chao-Hsiang Chen (2nd year Physics), Burc Gokden (2nd year EECS), Milja Medic (2nd year Physics).

Ph.D. Theses in Progress:

1. Chuang Liang, thesis title: "Quantum Key Generation with All Fiber Entangled Photon Pairs," expected completion date: June 2007. Committee Members: P. Kumar (chairman), S. Shahriar, and H. P. Yuen.
2. Jun Chen, thesis title: "Quantum Communication and Quantum Computation using Fiber-Based Entangled Sources," expected completion date: December 2006. Committee Members: P. Kumar (chairman), S. Shahriar, and S.-T. Ho.
3. Sarah Dugan (Physics), thesis title: "Quantum Frequency Conversion of Entangled Photon Pairs," expected completion date: December 2006. Committee Members: P. Kumar (chairman), H. Cao (Physics), and S. Shahriar.

Ph.D. Theses Completed:

1. Preetpaul Devgan, thesis title: "High-Speed Signal Processing using Nonlinear Fibers and Optoelectronic Devices," June 2006. Committee Members: P. Kumar (chairman), W. L. Kath (ESAM), and M. R. Phillips.
2. Renyong Tang, thesis title: "Towards Noiseless Amplification for Fiber-Optic Communications: Utilizing Phase-Sensitive Amplification based on Frequency Nondegenerate Four-Wave-Mixing in Silica Fibers," December 2005. Committee Members: P. Kumar (chairman), M. R. Phillips, and W. L. Kath (ESAM).
3. Eric Corndorf, thesis title: "Quantum Cryptography using Coherent States: Randomized Encryption and Key Generation," June 2005. Committee Members: P. Kumar (chairman), H. P. Yuen, and S. M. Shahriar. *Honorable mention in the competition for ECE Department's Best Ph.D. Thesis of the Year Award*.
4. Paul L. Voss, thesis title: "Raman-Induced Performance Limits on Applications of Fiber Parametric Amplifiers," December 2003. P. Kumar (chairman), H. P. Yuen, S. M. Shahriar, and

H. Cao (Physics). *Honorable mention in the competition for ECE Department's Best Ph.D. Thesis of the Year Award*.

5. Jay E. Sharping, thesis title: "Fiber-Based Entangled Photon-Pair Generation," June 2003. Committee Members: P. Kumar (chairman), M. R. Phillips, and S. M. Shahriar. *Co-winner of ECE Department's Best Ph.D. Thesis of the Year Award.*
6. Anjali Agarwal, thesis title: "All-Optical Loadable and Erasable Fiber Storage Buffer Based on Parametric Nonlinearity in Fiber," June 2001. Committee Members: P. Kumar (chairman), A. Sahakian, M. Phillips, and W. L. Kath (ESAM).
7. Yikai Su, thesis title: "Optical Signal Regeneration in High-Speed Fiber-Optic Communication Networks," December 2000. Committee Members: P. Kumar (chairman), A. Sahakian, M. Phillips, and W. L. Kath (ESAM).
8. Gregory Kanter, thesis title: "All Optical Switching and Squeezed Light Generation in Periodically Poled Lithium Niobate Waveguides," December 2000. Committee Members: P. Kumar (chairman), A. Sahakian, M. Plonus, and H. Cao (Physics).
9. Michael Vasilyev, thesis title: "Multimode Optical Tomography of Quantum States," June 1999. Committee Members: P. Kumar (chairman), S.-T. Ho, H. P. Yuen, and W. L. Kath (ESAM).
10. Dmitry Levandovsky, thesis title: "Quantum Noise Suppression in Optical Fibers," June 1999. Committee Members: P. Kumar (chairman), W. L. Kath, A. Taflove, and H. P. Yuen. *Winner of ECE Department's Best Ph.D. Thesis of the Year Award.*
11. Sang-Kyung Choi, thesis title: "Traveling-Wave Optical Parametric Amplifier: Quantum Noise Reduction and Application to Optical Imaging," June 1999. Committee Members: P. Kumar (chairman), H. P. Yuen, and J. Ketterson. Sang-Kyung Choi received Ph.D. in Physics.
12. Glenn D. Bartolini, thesis title: "All-fiber optical storage of picosecond pulse packets using phase-sensitive amplification," June 1998.
13. David O. Caplan, thesis title: "Optical amplification and quantum noise reduction via four-wave mixing in semiconductors," December 1996.
14. Chonghoon Kim, thesis title: "Nonclassical light generation using a traveling-wave optical parametric amplifier," December 1993.
15. B. Matthew Poelker, thesis title: "Stimulated Raman Scattering in Sodium Vapor," June 1992.
16. Jianming Huang, thesis title: "Squeezed Light and Quantum Measurement," December 1991.
17. Orhan B. Aytür, thesis title: "Squeezed Light and Twin Beams Generation with a Q-switched Laser," June 1991.

Ph.D. Theses Co-supervised:

18. Seng-Tiong Ho, thesis title: "Theoretical and Experimental Aspects of Squeezed State Generation in Two-Level Media," MIT, March 1989.
19. Mari W. Maeda, thesis title: "Squeezed Quantum Noise Measurements in Four-Wave Mixing," MIT, February 1987.
20. Roy S. Bondurant, thesis title: "Theoretical and Experimental Aspects of Quantum Noise Reduction and Precision Measurement," MIT, July 1983.

M.S. Theses/Projects Supervised:

21. Adam Altman, June 2004, thesis title: "Spatial Coincidence Patterns of Twin Photons Entangled in Angular Momentum."
22. Ayodeji Coker, June 2002, project title: "Group Velocity Dispersion Measurement in Microstructure Fiber."
23. Xu Du, December 2001, project title: "Evolution of Quantum Noise in Fiber-Optic Four-Wave Mixing."
24. Max Raginski, June 2000, thesis title: "Quantum Noise Control in Fiber-Optic Lines."
25. Paul Voss, June 2000, thesis title: "Measurement of Single-Mode Photon Statistics of Zeros and Ones from an Erbium-Doped Fiber Amplifier."
26. Asrul Fazim Abu Samah, December 1999, project title: "Performance of InGaAs/InP Avalanche Photodiode as 1064 nm Gated-Mode Photon Counter."
27. Yi Sun, December 1999, project title: "Studies of Cuprite 1S Exciton Photoluminescence Under Two-Photon Excitation."
28. Anjali Agarwal, December 1997, project title: "Saturable absorber mode-locked Er/Yb fiber laser."
29. Gregory Kanter, December 1996, thesis title: "Modeling of a Physically Realizable Phase-Sensitive Optical Storage Device."
30. Jerry LaChapelle, June 1996, project title: "Er/Yb Doped Fiber Lasers: Assembly and Operation of Three Practical Devices."
31. Franco Chiappori, December 1995, project title: "Frequency Stabilization of a Mode-Locked Nd:YLF Laser."
32. David R. Gerwe, March 1994, project title: "Degenerate Parametric Amplification in a Quasi-Phase-Matched Lithium Niobate Channel Waveguide."
33. David O. Caplan, December 1992, project title: "Degenerate Four-Wave Mixing in a $\chi^{(3)}$ Nonlinear Medium."
34. Alex Kaz, December 1989, thesis title: "Nd:YAG Laser End Pumped by a Laser Diode Array."
35. Joe Hoke, December 1989, thesis title: "Second-Harmonic Generation in Optical Fibers."
36. Sina Balkir, December 1989, project title: "Second-Harmonic Generation in Planar Dielectric Waveguides."
37. Jianming Huang, June 1989, thesis title: "Photon-Counting Statistics of Multimode Squeezed Light."
38. Dave Hochfelder, June 1989, project title: "Generation and Detection of Squeezed Optical States."
39. Matt Poelker, June 1988, thesis title: "Frequency Correlated Laser Beam Generation in a Three-Level System: Density and Pump Intensity Dependence."
40. Esther Kerbis, June 1988, thesis title: "Optical Phase Conjugation via Degenerate Four-Wave Mixing in Dye-Doped Boric-Acid Glass."
41. M. Madabushi, June 1988, project title: "Generation of Squeezed States of Light Using Forward Four-Wave Mixing in Sodium Vapor."

42. Robert H. Nakata, June 1985, thesis title: "Feedback Stabilization of Optical Interferometers," MIT.

Invited Talks, Lectures, and Panels:

1. Invited Talk, "Towards Noiseless Amplification of Optical Signals," Boeing Satellite Systems, El Segundo, CA, May 24, 2006.
2. Invited Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," National Institute of Standards and Technology (NIST), Boulder, CO, March 24, 2006.
3. Distinguished Seminar, "Safeguarding the Nation's Fiber-optic Infrastructure against Unauthorized Hacking, EECS Distinguished Seminar Series, Northwestern University, Evanston, IL, March 03, 2006.
4. Invited Seminar Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," Physics Department, University of Central Florida, Orlando, FL, February 20, 2006.
5. Invited Lecture 3, "Fiber-optic Quantum Communication and Applications," *Winter College on Quantum and Classical Aspects of Information Optics*, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, February 9, 2006.
6. Invited Lecture 2, "Optical Communication Channels," *Winter College on Quantum and Classical Aspects of Information Optics*, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, February 8, 2006.
7. Invited Lecture 1, "Optical Communications and It's Quantum Limits," *Winter College on Quantum and Classical Aspects of Information Optics*, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, February 8, 2006.
8. Invited Seminar Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," Physics Department, University of Pavia, Italy, February 6, 2006.
9. Invited Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," Optical Science and Engineering Program Seminar, Joint Institute for Laboratory Astrophysics (JILA), University of Colorado, Boulder, CO, January 30, 2006.
10. Invited Speaker on "Quantum Communication and Cryptography with Photons," at the *Coherent Quantum Control* Domain Dinner, Allen Center, Northwestern University, December 05, 2005, organized by the Office of the Provost and the Vice President for Administration and Planning.
11. Invited Seminar Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," National Institute of Information and Communications Technology (NICT), Tokyo, Japan, November 30, 2005.
12. Invited Presenter, "Practical High-Speed Implementations of the AlphaEta (Y-00) Protocol," Tokyo Forum on a New Quantum Cryptography (Symposium on Quantum Cryptography by Optical Communication), Chuo University, Tokyo, Japan; November 28–29, 2005.
13. Presenter, "What's Hot in Quantum Optics," Annual Meeting of the Quantum Electronics Division of the Science and Engineering Council of the Optical Society of America, held during the Frontiers in Optics Annual Meeting of the Optical Society of America, Tucson, AZ, October 16, 2005.
14. Invited Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," at the National Institute of Standards and Technology, Gaithersburg, MD, October 05, 2005.

15. Invited Speaker, "Practical Quantum Communication and Cryptography for WDM Optical Networks," at the Sandia National Laboratories, Albuquerque, NM, August 30, 2005.
16. Speaker on "Quantum Fiber Optics for Future Networks" at the NSF Workshop on "The Future of Optical Communications: Understanding the Choices" held on the campus of the University of California, Santa Barbara, April 12–13, 2005.
17. Invited Speaker, "Quantum Security for Photonics Networks," at the 4th Annual ON*VECTOR International Photonics Workshop sponsored by the NTT Network Innovation Laboratories and hosted by the California Institute for Telecommunications and Information Technology (Calit2) and the NSF-sponsored OptIPuter project at the University of California, San Diego (UCSD), UCSD Faculty Club, February 28 – March 2, 2005.
18. Invited Speaker, "Safeguarding Nation's Fiber-Optic Infrastructure Against Unauthorized Hacking," at the Homeland Security Seminar Series organized by the Office of Strategic Initiatives, Northwestern University, January 13, 2005.
19. Invited Speaker, "'Beam Me Up Scotty,' Fact or Fiction?" at the meeting of the NU Society of Physics Students (SPS), May 27, 2004.
20. Invited Seminar Speaker, "Fiber-Optic Quantum Communications," at the Hewlett Packard Laboratories, Palo Alto, CA, May 19, 2004.
21. Invited Colloquium Speaker, "Fiber-Optic Quantum Communications," ECE Department, Cornell University, Ithaca, N.Y., February 10, 2004.
22. Invited Seminar, "Efficient quantum cryptography with coherent-state light in optical fibers at Gbps rates," Japan Electronic and Information Technology Industries Association (JEITA), Tokyo, Japan, January 15, 2004.
23. Invited Seminar, "Efficient quantum cryptography with coherent-state light in optical fibers at Gbps rates," Draper Laboratory, Cambridge, MA, December 12, 2003.
24. Invited Seminar Speaker, "Fiber-Optic Quantum Communications," Quantum Information Science Seminar (QISS) Series, Physics Department, University of Illinois at Urbana-Champaign, Urbana, IL; November 19, 2003.
25. "Quantum Communications and Nanophotonics," invited presentation at the NU-ANL Nanoscience Workshop, Northwestern University, October 22, 2003.
26. Invited Speaker, "'Beam Me Up Scotty,' Fact or Fiction?" at the Meeting of the IEEE's Fox Valley Subsection, jointly sponsored by the Illinois Institute of Technology's Center for Professional Development (Rice Campus), September 17, 2003.
27. Invited Seminar Speaker, "Efficient quantum cryptography with coherent-state light in optical fibers at Gbps rates," Center for Research and Education in Optics and Lasers (CREOL), School of Optics, University of Central Florida, Orlando, Florida, September 9, 2003.
28. Invited Seminar Speaker, "Fiber-Optic Quantum Communication and Cryptography," Physics Department, Indian Institute of Technology, New Delhi, India, March 11, 2003.
29. Invited Seminar Speaker, "Fiber-Optic Quantum Communication and Cryptography," Department of Physics "A. Volta," University of Pavia, Pavia, Italy, March 6, 2003.
30. Invited Speaker, "'Beam Me Up Scotty,' Fact or Fiction?" Inaugural Slivka Distinguished Lecture, Slivka Residential Hall, Northwestern University, November 30, 2002.
31. Invited Seminar Speaker, "Fiber-Optic Quantum Communication," Tata Institute of Fundamental Research, Mumbai, India, June 18, 2002.

32. Invited Lecturer, NATO Advanced Study Institute on Quantum Communication and Information Technologies, Antalya, Turkey, June 3-14, 2002. Presented *a series of three lectures* on "Fiber-Optic Quantum Communication."

33. Invited Speaker, "Quantum Optics, Quantum Communications, and Advanced Photonic Technologies for Optical Networks," informal seminar in the Physics Brown-Bag series, Department of Physics and Astronomy, Northwestern University, Evanston, IL, May 29, 2002.

34. Invited Lecturer, "Technologies for Advanced Optical Networks," presented a guest lecturer in the MITP course: Communications Networks II, ECE Department, Northwestern University, Evanston, IL, March 9, 2002.

35. Invited Seminar Speaker, "Technologies for Advanced Optical Networks," presented at SBC Technology Resources, Inc., Austin, TX, February 19, 2002.

36. Invited Seminar Speaker, "Quantum Communication with Fiber-Optic Devices," Time and Frequency Section, National Physical Laboratory, New Delhi, India, May 21, 2001.

37. Invited Speaker on "Photonic Architecture: From Lightwave Technology to Quantum Internet." *Materials Sciences Domain Dinner,* Northwestern University, April 19, 2001, Allen Center, Evanston Campus, organized by Office of the Provost and the Vice President for Administration and Planning. Program Topic: "The Architecture and Patterning of Natural and Synthetic Materials."

38. Invited Colloquium Speaker, "Quantum Communication with Fiber-Optic Devices," Physics Colloquium, University of Wisconsin, Madison, Wisconsin, January 26, 2001.

39. Invited Fireside Chat on "Quantum Communication, Teleportation, and Quantum Computing," Lindgren Residential College, Northwestern University, January 18, 2001.

40. Invited Seminar Speaker, "Quantum Communication with Fiber-optic Devices," CSMISS & Quantum Technologies Seminar, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, December 12, 2000.

41. "Photonics Communications Technology," speaker at the workshop organized by McCormick School's Industrial Relations Office for Northrop-Grumman, Technological Institute, May 2, 2000.

42. "Have We Exploited Glass Fully Yet?" speaker at the Faculty Seminar organized by the NU Student Chapter of the IEEE, McCormick School of Engineering and Applied Science, Northwestern University, Evanston, IL, February 8, 2000.

43. Invited Seminar Speaker, "Nonlinear Fiber-optics with Picosecond Pulses for All-Optical TDM Systems," EECS/RLE Seminar Series on Optics and Quantum Electronics, MIT, Cambridge, MA, December 1, 1999.

44. Invited Fireside Chat on "Quantum Communication, Teleportation, and Quantum Computing," Shepard Residential College, Northwestern University, November 2, 1999.

45. Invited Guest on *Odyssey*, Chicago Public Radio's (WBEZ 91.5 FM) daily live call-in show (11 AM) on topics of current social, political, cultural, and scientific interests, September 7, 1999. This particular broadcast featured a discussion on "Quantum Computing" moderated by the show's host Gretchen Helfrich. A streaming RealAudio download of the WBEZ's broadcast is available at: http://www.wbez.org/services/ram/od/od-990907.ram. It can be heard on the PC with the RealPlayer Plugin, available freely from www.real.com.

46. Invited Seminar Speaker, "Some Recent Classical and Quantum Applications of Nonlinear Fiber-optics," Lucent Technologies, Photonics Networks Department, Holmdel, NJ, September 3, 1999.

47. Invited Seminar Speaker, "Optical Homodyne Tomography of the Twin-Beam State," Department of Physics, University of Rome "La Sapienza," Rome, Italy, June 25, 1999.

48. Invited Seminar Speaker (presented two back-to-back seminars), "Spatially broadband parametric amplification: quantum-noise correlations and noiseless amplification of images," and "Optical Homodyne Tomography of the Twin-Beam State," European Laboratory for Nonlinear Spectroscopy (LENS), University of Florence, Florence, Italy, June 17, 1999.
49. Invited Seminar Speaker, "Spatially broadband parametric amplification: quantum-noise correlations and noiseless amplification of images," Physics Department, University of Milan, Milan, Italy, June 14, 1999.
50. Invited Seminar Speaker (jointly with H. Yuen), "CRYPTOLOGY: From Quantum to Classical, From Novel to Well-Known," Laboratory for Physical Sciences, College Park, MD, June 9, 1999.
51. Speaker, "Have We Exploited Glass Fully Yet?" Tech Corporate Partners Annual Technology Review, McCormick School of Engineering & Applied Science, Northwestern University, March 23, 1999.
52. Invited Seminar Speaker, "Some Recent Classical and Quantum Applications of Nonlinear Fiber-optics," Gintzon Laboratory seminar series on Current Topics in Optics and Electronics, Stanford University, Stanford, CA, February 22, 1999.
53. Invited Seminar Speaker, "Parametric-Amplification Based Buffers and Regenerators for TB/S Packet-Switched Networks," Joint Information Technology Laboratory/Physics Laboratory Seminar, National Institute of Standards and Technology, Gaithersburg, MD, June 16, 1998.
54. Invited Seminar Speaker, "Parametric Devices for Ultra-High-Speed TDM Systems," Laboratory for Physical Sciences, College Park, MD, November 12, 1997.
55. Invited Seminar Speaker, "Parametric Devices for Ultra-high-speed Systems," Interdisciplinary Seminar in Nonlinear Science, Northwestern University, Friday, October 31, 1997.
56. Invited Seminar Speaker, "Parametric Amplifiers for Optical Networks Applications," Laboratory for Physical Sciences, College Park, MD, February 6, 1997.
57. Invited Presentation, "Ultra-high Speed Optical Communications Technology," Motorola, PCRL, Tempe, AZ, March 29, 1996.
58. Invited Seminar Speaker, "Laser Sources and Amplifiers for 1.5 Micron Fiber-optic Communications," Texscan Corporation, El Paso, TX, January 24, 1996.
59. Invited Seminar Speaker, "Parametric Amplifiers for Soliton Applications," MIT Lincoln Laboratory, Lexington, MA, December 18, 1995.
60. Invited Colloquium Speaker, Indiana University Purdue University in Indianapolis, Department of Physics, Indianapolis, IN, March 30, 1995.
61. Invited Seminar Speaker, Center for Advanced Technology, Indore, India, January 23, 1995.
62. Invited Seminar Speaker, Princeton University, Department of Electrical Engineering and Computer Science, Princeton, NJ, January 11, 1995.
63. Invited Colloquium Speaker, Northwestern University, Department of Physics and Astronomy, Evanston, IL, April 13, 1994.
64. Invited Speaker, Nonlinear Optics / Communications Workshop, Breckenridge, CO, April 11-12, 1994.
65. Invited Seminar Speaker, Purdue University, Department of Electrical and Computer Engineering, West Lafayette, IN, March 16, 1994.

66. Invited Seminar Speaker, University of Southern California, Center for Laser Studies, Los Angeles, CA, January 24, 1994.
67. Invited Seminar Speaker, University of Essen, Physics Department, Essen, Germany, December 3, 1993.
68. Invited Seminar Speaker, Bhabha Atomic Research Center, Theoretical Physics Division, Trombay, India, November 26, 1993.
69. Invited Speaker, International Topical Conference on "Research Trends in Nonlinear and Quantum Optics," La Jolla, CA, November 22-24, 1993.
70. Invited Speaker, Third International Workshop on Squeezed States and Uncertainty Relations, University of Maryland, Baltimore County, Baltimore, MD, August 10-13, 1993.
71. Invited Speaker, Future Trends of Quantum Structures and Device Applications, Northwestern University, June 7-8, 1993, Evanston, IL.
72. Invited Speaker, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 2-7, 1993.
73. Invited Colloquium Speaker, University of Michigan, Department of Electrical Engineering and Computer Science, Ann Arbor, MI, December 5, 1991.
74. Invited Seminar Speaker, Tata Institute of Fundamental Research, Bombay, India, November 20, 1991.
75. Invited Colloquium Speaker, Bhabha Atomic Research Center, Trombay, India, November 18, 1991.
76. Invited participant, XXth Solvay Conference on Physics (Topic: Quantum Optics), November 6-9, 1991, University of Belgium, Brussels, Belgium.
77. Invited Speaker, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 12-17, 1991.
78. Invited Speaker, CEPS Tutorial, March 5-6, 1990.
79. Invited Speaker, International Conference on Quantum Optics, Hyderabad, India, January 5-10, 1991.
80. Invited Speaker, SPIE's International Symposia: OPTCON'90 on Applications in Optical Science and Engineering, Boston, MA, November 4-9, 1990.
81. Invited Speaker, LEOS/IEEE Chicago Chapter meeting, September 27, 1990.
82. Invited lecture, Solid-State group of Chemistry and Materials Science Departments, July 12, 1990.
83. McCormick School Faculty-to-Faculty Seminar, May 15, 1990.
84. Invited Speaker, 5th International Symposium on Quantum Optics, Rotorua, New Zealand, February 10-19, 1989.
85. Invited Speaker, NATO Advanced Research Workshop on Squeezed and Non-Classical Light, Cortina d'Ampazzo, Italy, January 1988.
86. Invited Speaker, 1987 U.S.-Japan Seminar on Quantum Mechanical Aspects of Quantum Electronics, Monterey, CA, July 21-24, 1987.
87. Invited lecture, Amoco Research Center, Naperville, IL, February 17, 1987.
88. Invited lecture, Meeting of the Tech Advisory Council, September 12, 1986.
89. Invited Colloquium speaker, Department of Physics and Astronomy, SUNY at Buffalo, Buffalo, NY, April 17, 1986.

90. Invited Speaker, Workshop on New Trends in Quantum Optics and Electrodynamics, University of Rome, Rome, Italy, September 30 - October 4, 1985.
91. Invited Speaker, Gordon Research Conference on Nonlinear Optics and Lasers, Brewster Academy, NH, July 29 - August 2,1985.
92. Invited Speaker, EECS/RLE Seminar Series on Optics and Quantum Electronics, MIT, Cambridge, MA, May 1, 1985.
93. Invited Colloquium Speaker, Physics Lecture Series, Physics Department, San Jose State University, November 1, 1984.
94. Invited lecture, Thompson CSF, Paris, France, June 14, 1984.
95. Colloquium Speaker, Department of Physics, Worcester Polytechnic Institute, Worcester, MA, September 26, 1983.

Professional Activities:

1. Member, Ad Hoc Committee for strategic review Optics Express, the trend-setting all-electronic journal of the Optical Society of America, 2006–2007.
2. General Co-Chair, 2008 Quantum Electronics and Laser Science (QELS'08) Conference sponsored by the Optical Society of America, the Laser Science Division of the American Physical Society, and the Lasers and Electro-optics Society.
3. Member, NSF Proposal Review Panel: Emerging Models & Tech (EMT) for Quantum Computation (Panel ID: EMTP061021). The Panel met at the NSF in Washington, D.C., on April 20–21, 2006.
4. Member, Organizing Committee, 20th-Anniversary Conference on Quantum Communications (8th International Conference on Quantum Communication, Measurement and Computing – QCM&C'06), 28 November – 3 December 2006, Tsukuba-City, Japan. Organizing Associations: NICT (National Institute of Information and Communication Technology) and the Ministry of Internal Affairs and Communications, Tamagawa University.
5. Member, Technical Program Committee, LEOS Summer Topical on *Quantum Communications in Telecom Networks*, Quebec City, Canada, July 17–19, 2006.
6. Member of Award Committee, Quantum Electronics Award of the Lasers and Electro-Optics Society of the IEEE, February-March, 2006.
7. Member, Nominating Committee, Division of Laser Science of the American Physical Society, July 2005 – June 2006.
8. Program Co-Chair, 2006 Quantum Electronics and Laser Science (QELS'06) Conference sponsored by the Optical Society of America, the Laser Science Division of the American Physical Society, and the Lasers and Electro-optics Society of IEEE, Long Beach, CA, May 21–26, 2006.
9. Member, International Program Committee (IPC) for the IASTED (International Association of Science and Technology Development) International Conference on Optical Communication Systems and Networks, which was held July 19-21, 2005 in Banff, Canada.
10. Member of Award Committee, Quantum Electronics Award of the Lasers and Electro-Optics Society of the IEEE, February-March, 2005.

11. Member, NSF Engineering Research Centers (ERC) Review Panel (Panel ID: ERC05EMO1). The Panel met at the NSF in Washington, D.C., on January 10–11, 2005.
12. Chair, Quantum Optics Technical Group, Quantum Electronics Division of the Science and Engineering Council, Optical Society of America, October 2004–October 2006.
13. Member, Technical Program Committee (Subcommittee EG on Quantum Optics), European Quantum Electronics Conference (EQEC'2005), International Conference Center, Munich, Germany, June 12-17, 2005.
14. Member, International Advisory Committee, 9th International Conference on "Squeezed States and Uncertainty Relations (ICSSUR'2005)," Besançon, France, May 2–6, 2005.
15. Member, Technical Program Committee (Category B – Amplifiers and Lasers: Fiber or Waveguide), Optical Fiber Communications Conference (OFC'2005), Anaheim Convention Center, Anaheim, CA, March 6-11, 2005.
16. Vice Chair, Quantum Optics Technical Group, Quantum Electronics Division of the Science and Engineering Council, Optical Society of America, October 2003–October 2004.
17. Mail Reviewer for National Institutes of Health (NIH) BT R21/R33 Program Meeting, Feb 4-5, 2004.
18. Mail Reviewer for a package of five Unsolicited Proposals for the Atomic, Molecular, Optical, and Plasma Physics (AMOP) program of the NSF.
19. OSA Representative, American Association for the Advancement of Science (AAAS) Section Committee on Physics, August 2003–July 2006.
20. Member, Technical Program Committee (Quantum Optics Subcommittee), International Quantum Electronics Conference (IQEC'2004), Moscone Center West, San Francisco, CA, May 16-21, 2004.
21. Member, QCM Award Committee, Seventh International Conference on Quantum Communication, Measurement, and Computing (QCMC'2004), July 25-29, 2004, University of Strathclyde, Glasgow, Scotland, U.K.
22. Member, Technical Program Committee (Category B – Amplifiers and Lasers: Fiber or Waveguide), Optical Fiber Communications Conference (OFC'2004), Los Angeles Convention Center, Los Angeles, CA, February 22-27, 2004.
23. Member, International Organizing Committee, 8th International Conference on "Squeezed States and Uncertainty Relations (ICSSUR'2003)," Puebla, Mexico, June 9-13, 2003.
24. Member of the Program Committee, SPIE 2003 First International Symposium on Fluctuations and Noise (FaN), La Fonda Hotel, Santa Fe, New Mexico, USA, 1-4 June 2003. Conference Title: "Noise and Fluctuations in Photonics and Quantum Optics," (FN02).
25. Member of the NSF Review Panel to review proposals submitted to the SBIR/STTR Phase I program. Topic: Electronics, Subtopic G: Astronomical Instrumentation. The Panel met at NSF in Washington, D.C. on Tuesday, April 15th, 2003.
26. Member, Technical Program Committee (Category B – Amplifiers and Lasers: Fiber or Waveguide), Optical Fiber Communications Conference (OFC'2003), Georgia World Congress Center, Atlanta, GA, March 23-28, 2003.
27. Invited panelist on the NSF Workshop, "Ultra-High-Capacity Optical Communications and Networking: Challenges in Broadband Optical Access, Materials Processing, and Manufacturing," held at the NSF in Washington, D.C., October 21-22, 2002. The Workshop was a cross-disciplinary event co-sponsored by several NSF Divisions, including: CTS, DMII, and ECS (all from the Engineering Directorate), and ANIR form the CISE Directorate.

28. Member of the Organizing Committee, Sixth International Conference on Quantum Communication, Measurement, and Computing (QCM&C'02), July 22-26, 2002, MIT Campus, Cambridge, MA.
29. Member of the NSF Review Panel to review unsolicited proposals submitted to the Electronics, Photonics and Device Technologies (EPDT) program of the Electrical and Communications systems (ECS) Division of the Engineering Directorate. The Panel met at NSF in Washington, D.C., on May 13-14, 2002.
30. Member of International Organizing Committee, VIIth International Conference on "Squeezed States and Uncertainty Relations," June 1-6, 2001, Boston, MA.
31. Invited Panelist, panel discussion on Quantum Optoelectronics, Convocation for the Fitzpatrick Center for Photonics and Communication Systems, April 16-18, 2001, Duke University.
32. Member of the NSF Review Panel to review proposals submitted to the Electronics, Photonics, and Device Technologies (EPDT) Program of the ECS Division. The Panel met at NSF in Washington, DC, on February 21-23, 2001.
33. Member of the Advisory Committee, Fifth International Conference on "Quantum Communication, Measurement, and Computing," July 3-8, 2000, Capri, Italy.
34. Program Committee Member, 1999 Optical Society of America Annual Meeting, Santa Carla, CA, September 26- October 1, 1999.
35. Member of International Advisory Committee, VIth International Conference on "Squeezed States and Uncertainty Relations," May 24-29, 1999, Naples, Italy.
36. Member of the NSF Review Panel (Panel #2) to review proposals submitted to the Electronics, Photonics, and Device Technologies (EPDT) Program of the ECS Division in the Engineering Directorate. The Panel met at NSF in Washington, D.C., on May 13-14, 1999.
37. *Principal Organizer*, 4th International Conference on Quantum Communication, Measurement, and Computing, held at Northwestern University, Evanston, IL, USA, Aug 22-27, 1998. This was an invitation-only conference, which brought over 125 experts from all over the world to Northwestern.
38. Participant, Optical Society of America Leadership Conference, Washington, D.C., February 5-8, 1998.
39. Guest Editor/Coordinator for a focus issue on "Experiments on the Generation and Application of Novel Quantum States of Light," Optics Express - the new all-electronic multi-media journal of the Optical Society of America.
40. Attended the Optical Society of America Leadership Conference, Washington, D.C., February 6-8, 1997.
41. Member, Program Committee, The 3rd International Conference on Quantum Communication and Measurement, Mt. Fuji-Hakone Land Hotel, Sizuoka Prefecture, Japan, September 25-30, 1996.
42. Attended the Optical Society of America Leadership Conference, Washington, D.C., February 16-18, 1996.
43. Member, Publications Council Committee of the Optical Society of America, January 1, 1996 - December 31, 1998.
44. Advisory Editor, Optics Letters, the Letters journal of the Optical Society of America, August 1, 1995 - June 30, 1998.
45. Editorial Board Member, Journal of the European Optical Society, Part B - Quantum and Semiclassical Optics, January 1, 1995 - December 31, 1998.

46. Topical Editor for Quantum Optics and Spectroscopy, Optics Letters, the Letters journal of the Optical Society of America, July 1, 1992 - July 31, 1995.
47. Chair, Quantum Optics Program Subcommittee, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 21-26, 1995.
48. Member, Program Committee, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 2-7, 1993.
49. Symposium Organizer, Optical Society of America Annual Meeting, San Jose, CA, November 3-8, 1991; Organized the Symposium on Number States and Twin Beams.
50. Member, Program Committee, LEOS/IEEE Chicago Chapter, 1991/92.
51. Member, Program Committee, Quantum Electronics and Laser Science Conference, Baltimore, MD, May 12-17, 1991.
52. Vice Chairman, LEOS/IEEE Chicago Chapter, 1990/91.
53. Member, Program Committee, LEOS/IEEE Chicago Chapter, 1989/90.
54. Member, Review Panel, National Science Foundation, Washington, D.C., June 15-16, 1989.
55. Co-Chairman, MIT Endicott House Workshop on "Squeezed States of Light," October 21, 1985.
56. Reviewer to the following funding agencies: National Science Foundation, U.S. Air Force Office of Scientific Research, U.S. Office of Naval Research.
57. Reviewer to the following journals: Science, Nature, Physical Review Letters, Physical Review A, Optics Letters, Optics Express, Journal of the Optical Society of America B, Optics Communications, Journal of the European Optical Society, Applied Physics B, New Journal of Physics, IEEE Journal of Lightwave Technology, IEEE Journal of Quantum Electronics, IEEE Photonics Technology Letters.

Sessions Chaired at National and International Conferences:

1. International Symposium on Quantum Optics-2006, July 24–27, 2006, Physical Research Laboratory, Ahmedabad, India; Chaired Monday Afternoon session on Quantum Coherence and Applications.
2. IEEE-LEOS 2006 Summer Topical on *Quantum Communications in Telecom Networks*, Quebec City, Canada, July 17–19, 2006; Presided Session TuB3, Quantum Communication System Research I.
3. Frontiers in Optics 2005—the 89th OSA Annual Meeting, Tucson, AZ, October 16–20, 2005; Presided Session FTuCC, Quantum Optics with Neutral Atoms.
4. Quantum Electronics and Laser Science Conference (QELS'2005), Baltimore, MD, May 22–27, 2005; Presided Session QThG, Squeezing and Quantum Control.
5. Frontiers in Optics 2004—the 88th Annual meeting of the Optical Society of America, Rochester, NY, October 10–14, 2004; Presided Session FWE, Quantum Control.
6. Nonlinear Optics: Materials, Fundamentals and Applications (NLO'2004), Waikoloa Beach Marriott, Waikoloa, Hawaii, August 2–6, 2004; Presided Session ThC, Nonlinear Optics in Fibers.
7. Seventh International Conference on Quantum Communication, Measurement, and Computing (QCMC'2004), July 25-29, 2004, University of Strathclyde, Glasgow, Scotland, U.K.; Chaired Session 6.

8. International Quantum Electronics Conference (IQEC'2004), San Francisco, CA, May 16–21, 2004; Chaired Session IMC, Quantum Information I.
9. Optical Fiber Communication Conference 2004 (OFC'04), Los Angeles, CA, February 22–27, 2004; Chaired Session FJ, Amplifier Technology and Instrumentation.
10. ITCom 2003–-SPIE International Symposium on Information Technologies and Communications–-Conference on Semiconductor Optoelectronic Devices for Lightwave Communication (Conference 5248), Orlando, FL, September 8–10, 2003; Chaired Session 2: Quantum Communication Devices II.
11. Conference on Fluctuations and Noise in Photonics and Quantum Optics, SPIE's Symposium on Fluctuations and Noise 2003 (Conference FN03-FN02), Santa Fe, New Mexico, June 1–4, 2003; Chaired Session 5111-4: "Noise in Lasers I."
12. Optical Fiber Communication Conference 2003 (OFC'03), Atlanta, GA, March 23–28, 2003; Chaired Session ThK, Parametric Amplification 1.
13. Optical Society of America Annual Meeting, Orlando, FL, September 29-October 3, 2002; Chaired Session MDD, Quantum Cryptography.
14. Sixth International Conference on Quantum Communication, Measurement, and Computing (QCMC'02), Cambridge, MA, July 22-26, 2002; Chaired Session 15, Entangled Photons II.
15. Optical Society of America Annual Meeting, Santa Carla, CA, September 26-October 1, 1999; Organized and chaired session ThD, Symposium on Quantum State Tomography.
16. "8th International Laser Physics Workshop (LPHYS'99): Modern Trends in Laser Physics," Budapest, Hungary, July 2-6, 1999, a part of World Conference for Science, which was the main UNESCO conference in 1999; Chaired the July 3rd afternoon session.
17. "4th International Conference on Fiber Optics and Photonics (PHOTONICS-98)," New Delhi, India, December 14-18, 1998; Chaired Session WE-1: Semiconductor Lasers-I.
18. "Optical Society of America Annual Meeting," Baltimore, MD, October 4-9, 1998; Chaired Session ThJJ, Symposium on Ultrafast Quantum Optics.
19. "Fourth International Conference on Quantum Communication, Measurement, and Computing," Evanston, IL, August 22-27, 1998; Chaired Session QCM'98 Plenary and the Awards Banquet.
20. "Conference on Lasers and Electro-Optics (CLEO'98), San Francisco, CA, May 3-8, 1998; Chaired Session CThT, Applications of Nonlinear Optics.
21. "The 2nd International Workshop on Quantum Communication and Quantum Optics," Pisa, Italy, June 25-28, 1997; Chaired the June 26th Morning Session.
22. "The 3rd International Workshop on Quantum Communications and Measurement," Mt. Fuji-Hakone Land Hotel, Sizuoka Prefecture, Japan, September 25-30, 1996; Chaired the Banquet and Awards Presentation Session.
23. "Quantum Electronics and Laser Science Conference," Baltimore, Maryland, May 21-26, 1995; Session QTuF, Spatial Quantum Effects.
24. "Quantum Electronics and Laser Science Conference," Baltimore, Maryland, May 21-26, 1995; Session QME, Squeezed Lasers and Photon Statistics.
25. "Third International Workshop on Squeezed States and Uncertainty Relations," University of Maryland Baltimore, Maryland, August 10-13, 1993; Thursday AM, Session 2, Interaction of Light and Matter.

26. "Optical Society of America Annual Meeting," Albuquerque, New Mexico, September 20-25, 1992; Session FNN, Squeezing and Statistics; 1.
27. "Optical Society of America Annual Meeting," San Jose, California, November 3-8, 1991; Session MO, Symposium on Number States and Twin Beams: 1.
28. "Optical Society of America Annual Meeting," San Jose, California, November 3-8, 1991; Organized the Symposium on Number States and Twin Beams.
29. "Quantum Electronics and Laser Science Conference," Baltimore, Maryland, May 12-17, 1991; Session QWB, Quantum Noise in Optical Propagation.
30. "International Conference on Quantum Optics," Hyderabad, India, January 5-10, 1991; After-Tea Session on Wednesday, 9th of January 1991.
31. "Optical Society of America Annual Meeting," Boston, Massachusetts, November 4-9, 1990; Session MC, Symposium on Quantum Measurements with Optical Fields: 1.

Short Courses Taught:

1. "Quantum Information: Technologies and Applications (SC271), to be taught at the 2007 Conference on Lasers and Electro-Optics / Quantum Electronics and Laser Science Conference (CLEO/QELS'07), Baltimore, MD, May 6, 2007.
2. "Quantum Information: Technologies and Applications (SC271), taught at the 2006 Conference on Lasers and Electro-Optics / Quantum Electronics and Laser Science Conference (CLEO/QELS'06), Long Beach, CA, May 22, 2006.
3. "Quantum Properties of Optical Parametric Amplifiers," Short Course taught at the Department of Physics "A. Volta," University of Pavia, Pavia, Italy, June 21-30, 1999.
4. "Quantum Properties of Optical Parametric Amplifiers," Short Course (#6) taught at the 4th International Conference on Fiber Optics and Photonics (PHOTONICS-98) held at IIT/Delhi, New Delhi, India, December 14-18, 1998.
5. "Quantum Properties of Optical Parametric Amplifiers," Short Course (#125) taught at the 1998 International Quantum Electronics Conference (CLEO/IQEC'98), San Francisco, CA, May 3-8, 1998.
6. "Quantum Properties of Optical Parametric Amplifiers," Short Course (#124) taught at the 1997 Quantum Electronics and Laser Science Conference (CLEO/QELS'97), Baltimore, MD, May 18-23, 1997.
7. "Quantum Properties of Optical Parametric Amplifiers," Short Course (#126) taught at the 1996 Quantum Electronics and Laser Science Conference (CLEO/QELS'96) held in Anaheim, CA, June 2-7, 1996.
8. "Quantum Properties of Optical Parametric Amplifiers," Short Course (#120) taught at the 1995 Quantum Electronics and Laser Science Conference (CLEO/QELS'95) held in Baltimore, MD, May 21-26, 1995.
9. "Applications of Lasers and Nonlinear Optics," short course taught as part of the McCormick School's Continuing Professional Development Program, at Northwestern University, June 14-16, 1993.
10. "Applications of Lasers and Nonlinear Optics," short course taught as part of the McCormick School's Continuing Professional Development Program, at Northwestern University, July 13–14, 1992.

11. "Lasers and Nonlinear Optics," short course taught as part of the McCormick School's Continuing Professional Development Program, at Northwestern University, October 14-15, 1991.

Patents:

1. C. Liang, E. Corndorf, G. S. Kanter, and P. Kumar, "Streaming Implementation of AlphaEta Physical Layer Encryption," (NU 25029). Provisional patent application filed 4/13/2005; U.S. and PCT patent application filed 4/13/2006.
2. G. Kanter, P. Kumar, E. Corndorf, and P. L. Voss, "Optical methods for generating true random numbers via quantum and classical noises," (NU 24033) disclosed to NU on 04/05/2004.
3. P. Kumar, E. Corndorf, G. S. Kanter, and C. Liang, "Coherent-States Based Quantum Data-Encryption through Optically-Amplified WDM Communication Networks," (NU 23096). Provisional patent application filed November 5, 2003 (60/517,422); Provisional patent application filed November 10, 2003 (60/518,966); Provisional patent application filed February 20, 2004 (60/546.638); U.S. patent application # 10/982,196, filed November 5, 2004; PCT application # PCT/US04/036911, filed November 5, 2004.
4. J. Lasri, P. Kumar, and P. S. Devgan, "Electro-Absorption-Modulator Based Optoelectronic Oscillator Generating Ultra-Low-Jitter Optical Pulses," (NU 23006 and NU 23059). Provisional patent application # 60/465,599 filed on 4/25/03; Provisional patent application # 60/515,142 filed on 10/28/03; USPTO Application # 10/832,112 filed on 04/26/2004.
5. H. P. Yuen, P. Kumar, and G. A. Barbosa, "Ultra-Secure, Ultra-Efficient Cryptographic Systems," (NU20093). Provisional patent application # 60/414,282 filed on September 27, 2002; USPTO Application # 10/674,241 filed on 09/29/2003.
6. P. Kumar and J. E. Sharping, "Microstructure fiber optical parametric oscillator," (NU22091), USPTO Application # 20040125434, filed on 09/26/2003. U.S. Patent No. 6,958,855; *awarded* on October 25, 2005.
7. P. Kumar, M. Fiorentino, P. L. Voss, and J. E. Sharping, "All-Fiber Photon-Pair Source for Quantum Communications," (NU22004). Provisional patent application # 60/360,485 filed on February 28, 2002; USPTO Application # 10/376,137 filed on 02/28/2003. U.S. Patent No. 6,897,434; *awarded* on May 24, 2005.
8. P. Kumar, D. Serkland, L. Wang, and Y. Su, "Tunable fiber optic parametric oscillator," U.S. Patent No. 6,501,591; *awarded* on December 31, 2002.
9. P. Kumar, D. L. Sipes, D. W. Anthon, W. L. Kath, D. K. Serkland, and T. C. Munks, "High Stability Soliton Source," U.S. Patent No. 6,195,369; *awarded* February 27, 2001.

List of Publications:

Book Published:

- *Quantum Communication, Computing, and Measurement 2*, P. Kumar, G. M. D'Ariano, and O. Hirota, Eds. (Plenum, New York, 2000).

Journal Articles:

1. G. S. Kanter and P. Kumar, "Practical Physical-Layer Encryption: The Marriage of Optical Noise with Traditional Cryptography," submitted to *IEEE Communications Magazine*.
2. C. Liang, K. F. Lee, M. Medic, P. Kumar, and S. W. Nam, "Characterization of fiber-generated entangled photon pairs with superconducting single-photon detectors," submitted to *Applied Physics Letters*.
3. P. S. Devgan, J. Lasri, R. Tang, V. S. Grigoryan, and P. Kumar, "Investigation of C- and L-band soliton pulses from a 40GHz dispersion-managed fiber-optical parametric oscillator," submitted to *Optics Communications*.
4. J. E. Sharping, K. F. Lee, M. A. Foster, A. C. Turner, B. S. Schmidt, M. Lipson, A. L. Gaeta, and P. Kumar, "Generation of correlated photons through parametric scattering in nanoscale silicon waveguides," submitted to *Optics Express*.
5. K. G. Köprülü and P. Kumar, "Quantum analysis of the z-scan technique," to appear in *J. Optical Society of America B*.
6. P. S. Devgan, R. Tang, V. S. Grigoryan, and P. Kumar, "Highly-efficient multichannel wavelength conversion of DPSK signals," to appear in *J. Lightwave Technology*.
7. R. Nair, H. P. Yuen, E. Corndorf, T. Eguchi, and P. Kumar, "Quantum Noise Randomized Ciphers," to appear in *Physical Review A*.
8. H. P. Yuen, R. Nair, E. Corndorf, G. S. Kanter, and P. Kumar, "On the security of αη: response to 'some attacks on quantum-based cryptographic protocols'," *Quantum Information and Computation*, Vol. 6, No. 7, November 1, 2006, pp. 561–582. A preprint is available at http://arxiv.org/abs/quant-ph/0509091.
9. J. Chen, K. F. Lee, J. Chen, and P. Kumar, "Fiber-based telecom-band degenerate-frequency source of entangled photon pairs," *Optics Letters*, Vol. 31, No. 18, September 15, 2006, pp. 2798–2800.
10. C. Liang, K. F. Lee, T. Levin, J. Chen, and P. Kumar, "Ultra stable all-fiber telecom-band entangled photon-pair source for turnkey quantum communication applications," *Optics Express*, Vol. 14, No. 15, July 2006, pp. 6937–6942.
11. K. F. Lee, J. Chen, C. Liang, X. Li, P. L. Voss, and P. Kumar, "Generation of high-purity telecom-band entangled photon pairs in dispersion-shifted fiber," *Optics Letters*, Vol. 31, No. 12, June 15, 2006, pp. 1905–1907.
12. X. Li, C. Liang, K. F. Lee, J. Chen, P. L. Voss, and P. Kumar, "An integrable optical-fiber source of polarization entangled photon-pairs in the telecom band," *Physical Review A*, Vol. 73, Art. No. 052301, 2006, pp. 052301-1–052301-6. A preprint is available: quant-ph/0601087.
13. P. L. Voss, K. G. Köprülü, and P. Kumar, "Raman-noise induced quantum limits for $\chi^{(3)}$ nondegenerate phase-sensitive amplification and quadrature squeezing," *Journal of the Optical Society of America B*, Vol. 23, No. 4, April 2006, pp. 598-610. A pre-print can be found at http://arxiv.org/abs/quant-ph/0410214.
14. P. Devgan, D. Serkland, G. Keeler, K. Geib, and P. Kumar, "An optoelectronic oscillator using an 850nm VCSEL for generating low jitter optical pulses," *IEEE Photonics Technology Letters*, Vol. 18, No. 5, March 2006, pp. 685-687.
15. V. S. Grigoryan, M. Shin, P. Devgan, J. Lasri, and P. Kumar, "SOA-based Regenerative Amplification of Phase Noise Degraded DPSK Signals: Dynamic Analysis and Demonstration," *Journal of Lightwave Technology*, Vol. 24, No. 1, January 2006, pp. 135-142.

16. M. Shin, P. S. Devgan, V. S. Grigoryan, and P. Kumar, "SNR improvement of DPSK signals in a semiconductor optical regenerative amplifier," *Photonics Technology Letters*, Vol. 18, No. 1, January 2006, pp. 49-51.

17. R. Tang, J. Lasri, P. S. Devgan, V. Grigoryan, P. Kumar, and M. Vasilyev, "Gain characteristics of a frequency nondegenerate phase-sensitive fiber-optic parametric amplifier with phase self-stabilized input," *Optics Express*, Vol. 13, No. 26, 2005, pp. 10483-10493.

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19. R. Nair, H. P. Yuen, E. Corndorf, and P. Kumar, "Reply to: 'Reply to: "Comment on: 'How much security does Y-00 protocol provide us?'"". A preprint is available at http://arxiv.org/abs/quant-ph/0509092.

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23. R. Tang, P. Devgan, P. L. Voss, V. S. Grigoryan, and P. Kumar, "In-line frequency-nondegenerate phase-sensitive fiber-optical parametric amplifier," *IEEE Photonics Technology Letters*, Vol. 17, No. 9, September 2005, pp. 1845-1847.

24. A. Agarwal, L. Wang, Y. Su, and P. Kumar, "All-optical loadable and erasable storage buffer based on parametric nonlinearity in fiber," *Journal of Lightwave Technology*, Vol. 23, No. 7, July 2005, pp. 2229-2238.

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26. E. Corndorf, C. Liang, G. S. Kanter, P. Kumar, and H. P. Yuen, "Quantum-noise randomized data-encryption for WDM fiber-optic networks," *Physical Review A*, Vol. 71, No. 6, 062326, June 2005. A pre-print can be found at http://xxx.lanl.gov/abs/quant-ph/0501077.

27. X. Li, P. L. Voss, J. Chen, J. E. Sharping, and P. Kumar, "Storage and long-distance distribution of telecommunications-band polarization entanglement generated in an optical fiber," *Optics Letters*, Vol. 30, No. 10, 2005, pp. 1201-1203.

28. A. R. Altman, K. G. Köprülü, E. Corndorf, P. Kumar, and G. A. Barbosa, "Quantum imaging of nonlocal spatial correlations induced by orbital angular momentum," *Physical Review Letters*, Vol. 94, No. 12, 123601 (2005). A pre-print can be found at http://arxiv.org/abs/quant-ph/0409180.

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37. "Squeezed State Experiments in Resonant Media," invited paper presented at the MIT Endicott House Workshop on Squeezed States of Light, Oct. 21, 1985; also in the Proceedings of the MIT Endicott House Workshop on Squeezed States of Light, J. H. Shapiro and P. Kumar, Eds., MIT, Cambridge, MA (1985), pp. 89-103.

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Conference Papers:

1. P. Kumar, C. Liang, J. Chen and K. F. Lee, "Entanglement Generation with Fiber Nonlinearity for Quantum Communications in the Telecom Band," invited paper to be presented at the Optical Fiber Communications Conference and the National Fiber Optic Engineers Conference (OFC/NFOEC'2006), Anaheim Convention Center, Anaheim, CA, March 25–29, 2007.

2. P. Kumar, "Practical Quantum Communication and Cryptography for WDM Optical Networks," invited paper to be presented at the 8th International Conference on Quantum Communication,

Measurement, and Computing (QCMC06), Tsukuba International Congress Center, Tsukuba, Japan, November 28 – December 3, 2006.

3. C. Liang, K. F. Lee, J. Chen, and P. Kumar, "High Purity Fiber-based Entangled Photon Sources," to be presented at the 8th International Conference on Quantum Communication, Measurement, and Computing (QCMC06), Tsukuba International Congress Center, Tsukuba, Japan, November 28 – December 3, 2006.
4. X. Li, J. Chen, K. F. Lee, P. L. Voss, and P. Kumar, "Spectrum correlation of entangled photon-pairs generated in optical fiber," to be presented at the 8th International Conference on Quantum Communication, Measurement, and Computing (QCMC06), Tsukuba International Congress Center, Tsukuba, Japan, November 28 – December 3, 2006.
5. C. Liang, K. F. Lee, T. Levin, J. Chen, and P. Kumar, "Ultra Stable All-Fiber Telecom-Band Entangled Photon-Pair Source for Turnkey Quantum Communication Applications," to be presented at Frontiers in Optics—the 90th OSA Annual Meeting, Rochester, NY, October 8–12, 2006; paper FThI3. See FiO'2006 Technical Digest (Optical Society of America, Washington, D.C. 2006).
6. J. Chen, K. F. Lee, C. Liang, and P. Kumar, "Generation of Cross-Polarized Degenerate Photon Pairs in Dispersion-Shifted Fiber," to be presented at Frontiers in Optics—the 90th OSA Annual Meeting, Rochester, NY, October 8–12, 2006; paper FTuR4. See FiO'2006 Technical Digest (Optical Society of America, Washington, D.C. 2006).
7. K. F. Lee, J. E. Sharping, M. A. Foster, A. C. Turner, M. Lipson, A. L. Gaeta, and P. Kumar, "Generation of correlated photons in a silicon chip," postdeadline paper presented at the 2006 European Conference on Optical Communications (ECOC'06), Cannes, France, September 24–28, 2006; paper Th4.5.3.
8. P. Kumar, "Optical Parametric Process in Fibre: Fundamentals and Applications," invited tutorial (60-minute talk) presented at the 2006 European Conference on Optical Communications (ECOC'06), Cannes, France, September 24–28, 2006; paper We 2.2.2.
9. S. Feng, C.-H. Chen, G. A. Barbosa, and P. Kumar, "Violation of Orbital Angular Momentum Conservation in Type-I Spontaneous Parametric Down-Conversion," invited paper presented at the SPIE 2006 Annual Meeting: Conference on Quantum Communications and Quantum Imaging IV (Conference 6305), San Diego, CA, August 13–14, 2006; paper 6305-35.
10. P. Kumar, "Fiber-optic quantum communications," inaugural talk presented at the International Symposium on Quantum Optics-2006, Physical Research Laboratory, Ahmedabad, India, July 24–27, 2006.
11. P. Kumar, "Practical Quantum Communications for Telecom Networks," invited paper presented at the IEEE-LEOS 2006 Summer Topical on *Quantum Communications in Telecom Networks*, Quebec City, Canada, July 17–19, 2006; paper WB1.2.
12. J. Chen, K. F. Lee, C. Liang, and P. Kumar, "Fiber-based Degenerate Correlated-Photon Source in the Telecom Band," presented at the IEEE-LEOS 2006 Summer Topical on *Quantum Communications in Telecom Networks*, Quebec City, Canada, July 17–19, 2006; paper TuB2.3.
13. P. Kumar, "Phase-sensitive parametric amplifiers," invited paper presented at the Optical Amplifiers and Their Applications (OAA'06) Conference, Whistler, BC, Canada, June 25-28, 2006; paper OWC1.
14. G. S. Kanter and P. Kumar, "Quantum-noise randomized data encryption for secure free-space optical communications," invited paper presented at the SPIE's 2nd Great Lakes Photonics Symposium, Conference on Quantum Optics, Advance Spectroscopy, and Terahertz Technology (Conference GL110), Dayton Convention Center, Dayton, OH, June 12–16, 2006; paper GL110-02.

15. S. Feng, C.-H. Chen, G. A. Barbosa, and P. Kumar, "Role of pump-beam orbital angular momentum in type-II parametric down-conversion," presented at the Quantum Electronics and Laser Science Conference (QELS'2006), Long Beach, CA, May 21–26, 2006; paper QWB3. See QELS'2006 Technical Digest (Optical Society of America, Washington, D.C. 2006).

16. K. F. Lee, J. Chen, C. Liang, X. Li, P. L. Voss, and P. Kumar, "Generation of High Purity Telecom-Band Entangled Photon-Pairs in Dispersion-Shifted Fiber," presented at the Quantum Electronics and Laser Science Conference (QELS'2006), Long Beach, CA, May 21–26, 2006; paper JTuA2. See QELS'2006 Technical Digest (Optical Society of America, Washington, D.C. 2006).

17. R. Tang, M. Shin, P. Devgan, V. S. Grigoryan, M. Vasilyev, and P. Kumar, "Toward in-line phase-sensitive fiber-parametric amplification of multichannel signals," presented at the Conference on Lasers and Electro-Optics (CLEO'2006), Long Beach, CA, May 21–26, 2006; paper JThC81. See CLEO'2006 Technical Digest (Optical Society of America, Washington, D.C. 2006).

18. C. Liang, K. F. Lee, J. Chen, and P. Kumar, "Distribution of Fiber-Generated Polarization Entangled Photon-Pairs over 100 km of Standard Fiber in OC-192 WDM Environment," *postdeadline paper* presented at the Optical Fiber Communications Conference and the National Fiber Optic Engineers Conference (OFC/NFOEC'2006), Anaheim Convention Center, Anaheim, CA, March 5–10, 2006; paper PDP35.

19. M. Shin, P. S. Devgan, V. S. Grigoryan, P. Kumar, Y.-D. Chung, and J. Kim, "Low phase-noise 40GHz optical pulses from a self-starting electroabsorption-modulator-based optoelectronic oscillator," presented at the Optical Fiber Communications Conference and the National Fiber Optic Engineers Conference (OFC/NFOEC'2006), Anaheim Convention Center, Anaheim, CA, March 5–10, 2006; paper OFB1.

20. M. Vasilyev and P. Kumar, "Metal nanoaperture with efficient coupling to a Gaussian mode," submitted to the JSPS–UNT Joint Symposium on Nanoscale Materials for Optoelectronics and Biotechnology, sponsored by the Japan Society for Promotion of Sciences and the University of North Texas, Denton, Texas, February 2-3, 2006.

21. T. Banwell, P. Toliver, J. C. Young, J. Hodge, M. Rauch, M. S. Goodman, G. Kanter, E. Corndorf, V. Grigoryan, C. Liang, and P. Kumar, "High Data Rate Quantum Noise Limited Encryption over Long Distances," presented at the Military Communication Conference (MILCOM'2005), Atlantic City, NJ, October 17–20, 2005. MILCOM is sponsored by the IEEE Communications Society, the Armed Forces Communications and Electronics Association (AFCEA) and is hosted by the Science Applications International Corporation (SAIC).

22. K. F. Lee, J. Chen, C. Liang, X. Li, P. L. Voss, and P. Kumar, "High-purity telecom-band entangled photon-pairs via four-wave mixing in dispersion-shifted fiber," *postdeadline paper* presented at the Frontiers in Optics 2005—the 89th OSA Annual Meeting, Tucson, AZ, October 16–20, 2005; paper PDP-A4. See FiO'2005 Technical Digest, Post-Conference Edition (Optical Society of America, Washington, D.C. 2005).

23. R. G. Beausoleil, A. Briggs, M. Jones, P. Kumar, W. J. Munro, C. M. Santori, S. M. Shahriar, S. M. Spillane, T. P. Spiller, I. A. Walmsley, "Classical and Quantum Information Processing Using EIT," invited paper presented at Frontiers in Optics 2005—the 89th OSA Annual Meeting, Tucson, AZ, October 16–20, 2005; paper LWH2. See FiO'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

24. X. Li, J. Chen, P. L. Voss, K. F. Lee, J. E. Sharping, and P. Kumar, "Fiber based entangled photon-pair source," invited paper presented at the 13th International Conference on Advanced Laser Technologies, Tianjin, China, September 3–6, 2005.

25. C. Liang, P. L. Voss, E. Corndorf, G. S. Kanter, K. F. Lee, J. Chen, X. Li, and P. Kumar, "Single-Photon Detector for High-Speed Quantum Communication Applications in the Fiber-optic Telecom Band," invited paper presented at the SPIE 2005 Annual Meeting: Conference on Quantum Communications and Quantum Imaging III (Conference 5893), San Diego, CA, July 31–August 4, 2005; paper 5893-40.

26. P. Kumar, P. L. Voss, X. Li, K. F. Lee, J. Chen, C. Liang, P. Devgan, R. Tang, and V. S. Grigoryan, "Parametric processes in fibers for quantum and classical communications applications," invited paper presented at the International Conference on Quantum Electronics 2005 and the Pacific Rim Conference on Lasers and Electro-Optics 2005 (IQEC/CLEO-PR'05), Toshi Center Kaikan, Tokyo, Japan, July 11-15, 2005; paper CFJ3-1-INV. See IQEC/CLEO-PR'2005 Technical Digest (IEEE Lasers and Electro-Optics Society, Piscataway, N.J. 2005), pp. 1675-1676.

27. P. Kumar, K. F. Lee, J. Chen, X. Li, and P. L. Voss, "Quantum Information Processing with Optical Fibers," invited paper presented at the Quantum Electronics and Laser Science Conference (QELS'2005), Baltimore, MD, May 22–27, 2005; paper QTuJ1. See QELS'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

28. S. W. Dugan, X. Li, P. L. Voss, and P. Kumar, "Frequency up-conversion at the single-photon level in a PPLN waveguide," presented at the Quantum Electronics and Laser Science Conference (QELS'2005), Baltimore, MD, May 22–27, 2005; paper QThJ2. See QELS'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

29. X. Li, P. L. Voss, J. Chen, K. F. Lee, and P. Kumar, "Measurement of co- and cross-polarized Raman spectra in silica fiber for small detunings," presented at the Conference on Lasers and Electro-Optics (CLEO'2005), Baltimore, MD, May 22–27, 2005; paper CThB6. See QELS'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

30. P. Devgan, R. Tang, V. S. Grigoryan, and P. Kumar, "Multichannel wavelength conversion of DPSK signals using four-wave mixing in highly-nonlinear fiber without cross-gain-modulation penalty," invited paper presented at the Conference on Lasers and Electro-Optics (CLEO'2005), Baltimore, MD, May 22–27, 2005; paper CMQ3. See CLEO'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

31. K. G. Köprülü, G. A. Barbosa, and P. Kumar, "Quantum imaging of nonlocal spatial correlations in parametric down-conversion induced by the pump-beam profile," presented at the Quantum Electronics and Laser Science Conference (QELS'2005), Baltimore, MD, May 22–27, 2005; paper QTuA4. See QELS'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

32. G. S. Kanter, E. Corndorf, V. Grigoryan, C. Liang, and P. Kumar, "Exploiting quantum and classical noise for securing high-speed optical communication networks," invited paper presented at the Conference on Fluctuations and Noise in Photonics and Quantum Optics III, SPIE Third International Symposium on Fluctuations and Noise 2005 (Conference FN05-FN102), Austin, TX, May 23–26 2005; paper FN05-5842-11.

33. P. Kumar, K. F. Lee, J. Chen, X. Li, and P. L. Voss, "Quantum information processing with optical fibers," invited paper presented at the 9th International Conference on Squeezed States and Uncertainty Relations (ICSSUR'05), Besançon, France, May 2–6, 2005; paper I-37.

34. M. Vasilyev and P. Kumar, "Efficient coupling between Gaussian cavity mode and metal nanoaperture," presented at the OSA Topical Meeting on Nanophotonics for Information Systems, (NPIS'05), San Diego, CA, April 13–15, 2005; paper NWB4. See NPIS'2005 Technical Digest (Optical Society of America, Washington, D.C. 2005).

35. P. S. Devgan, M. Shin, V. S. Grigoryan, J. Lasri, and P. Kumar, "SOA-based regenerative amplification of phase noise degraded DPSK signals," *postdeadline paper* presented at the Optical

Fiber Communications Conference (OFC'2005), Anaheim Convention Center, Anaheim, CA, March 6–11, 2005; paper PDP34.

36. R. Tang, P. Devgan, J. Lasri, V. Grigoryan, and P. Kumar, "Experimental investigation of a frequency-nondegenerate phase-sensitive optical parametric amplifier," presented at the Optical Fiber Communications Conference (OFC'2005), Anaheim Convention Center, Anaheim, CA, March 6–11, 2005; paper OWN6.
37. M. Vasilyev, E. Vasilyeva, and P. Kumar, "Efficient coupling between metal nanoaperture and a macroscopic cavity," presented at the Strategic Partnership for Research in Nanotechnology (SPRING) Annual Scientific Meeting, UT Dallas, Richardson, TX, November 11–13.
38. P. Kumar, X. Li, J. Chen, and P. L. Voss, "Telecom-Band Entanglement Generation and Distribution in Standard Fibers," invited paper presented at the conference on Quantum Optics and Applications in Computing and Communications, Beijing, China, November 8–12, 2004 as part of Photonics Asia.
39. P. L. Voss, R. Tang, J. Lasri, P. Devgan, and P. Kumar, "Noise limits in fiber optical parametric amplification and wavelength conversion," invited paper presented at the SPIE International Symposium on Information Technologies and Communications (ITCom 2004)—Conference on Active and Passive Optical Components for WDM Communications IV (Conference 5595), Pennsylvania Convention Center, Philadelphia, Pennsylvania, October 25–28, 2004; paper 5595-05.
40. G. C. Cardoso, G. S. Pati, V. Gopal, A. Heifetz, M. S. Shahriar, and P. Kumar, "Single-photon Raman gain for single-photon detection," presented at the Frontiers in Optics—Annual meeting of the Optical Society of America, Rochester, NY, October 10–14, 2004; paper LMC4.
41. P. Kumar, E. Corndorf, C. Liang, G. S. Kanter, and V. S. Grigoryan, "Quantum communications: A practical perspective," invited paper presented at the Frontiers in Optics—Annual meeting of the Optical Society of America, Rochester, NY, October 10–14, 2004; paper FMR3.
42. P. Devgan, J. Lasri, V. S. Grigoryan, W. L. Kath and P. Kumar, "10-GHz regeneratively mode-locked fiber optical parametric oscillator with timing jitter suppression," presented at the Frontiers in Optics––Annual meeting of the Optical Society of America, Rochester, NY, October 10–14, 2004; paper FWS3.
43. A. R. Altman, K. G. Köprülü, E. Corndorf, P. Kumar, and G. A. Barbosa, "Entanglement induced spatial splitting of light," invited paper presented at the 1st International Workshop (a European Science Foundation Exploratory Workshop) on *Imaging at the Limits*, Institut D' Études Scientifiques De Cargèse (IESC), Cargèse, (Corsica, France), September 6–11, 2004.
44. V. S. Grigoryan, G. S. Kanter, E. Corndorf, and P. Kumar, "Long-Haul 10Gb/s Encrypted Data Transmission Protected by Quantum Noise," presented at the 30th European Conference on Optical Communication (ECOC'04), Stockholm, Sweden, September 5–9, 2004; paper We4.P.121.
45. P. Devgan, J. Lasri, R. Tang, V. S. Grigoryan, and P. Kumar, "40GHz Soliton-Pulse Fiber-Optical Parametric Oscillator for Simultaneous Use in the C- and L-Bands," presented at the 30th European Conference on Optical Communication (ECOC'04), Stockholm, Sweden, September 5–9, 2004; paper Tu3.3.3.
46. P. Kumar, "Long-distance distribution of fiber-generated entanglement," invited paper presented at the 2nd Feynman Festival, University of Maryland, College Park, MD, August 20–25, 2004.
47. A. R. Altman, K. G. Köprülü, E. Corndorf, P. Kumar, and G. A. Barbosa, "Quantum imaging of nonlocal spatial correlations induced by orbital angular momentum," postdeadline paper presented at the conference on Nonlinear Optics: Materials, Fundamentals and Applications, Waikoloa Beach Marriott, Waikoloa, Hawaii, August 2-6, 2004; paper PD4.

48. P. Kumar, "Telecom-Band Entanglement Generation, Storage, and Long-Distances Distribution," invited paper presented at the conference on Nonlinear Optics: Materials, Fundamentals and Applications, Waikoloa Beach Marriott, Waikoloa, Hawaii, August 2-6, 2004; paper FA1.

49. J. Chen, X. Li, and P. Kumar, "Quantum Theory for Two-Photon-State Generation by Means of Four-Wave Mixing in Optical Fiber," invited paper presented at the SPIE 2004 Annual Meeting: Conference on Quantum Communications and Quantum Imaging II (Conference 5551), Denver, CO, August 2–6, 2004; paper 5551-21.

50. P. Kumar, "Practical Quantum Communication and Cryptography for WDM Optical Networks," QCM Award Paper presented at the 7th International Conference on Quantum Communication, Measurement, and Computing (QCM&C'04), University of Strathclyde, Glasgow, Scotland, U.K., July 25–29, 2004.

51. P. Kumar, R. Tang, and P. Voss, "Quantum limits of optical amplification," invited paper presented at the 2004 Optical Amplifiers and Their Applications conference (OAA'2004), San Francisco, CA, June 27–30, 2004; paper OTuA4.

52. P. Kumar, X. Li, P. Voss, J. Chen, S. Dugan, "Fiber-optic quantum communication," invited paper presented at the 1st Great Lakes Photonics Symposium, Conference on Quantum Optics and Advanced Spectroscopy, Cleveland, OH, June 8–9, 2004.

53. E. Corndorf, G. S. Kanter, C. Liang, and P. Kumar, "Quantum-noise protected data encryption for WDM networks," postdeadline paper presented at the Conference on Lasers and Electro-Optics (CLEO'2004), San Francisco, CA, May 16–21, 2004; paper CPDD8.

54. J. Lasri, P. Devgan, V. S. Grigoryan, and P. Kumar, "Multiwavelength NRZ-to-RZ conversion with timing-jitter suppression," presented at the Conference on Lasers and Electro-Optics (CLEO'2004), San Francisco, CA, May 16–21, 2004; paper CFG2. See CLEO'2004 Technical Digest (Optical Society of America, Washington, D.C. 2004).

55. E. Corndorf, C. Liang, and P. Kumar, "Data Encryption over Inline-Amplified 100km-Long WDM Link using Coherent-State Quantum Cryptography," presented at the Conference on Quantum Information and Computation (OR18) (Conference 5436)—Part of SPIE's International Symposium on Defense and Security, Gaylord Palms Resort and Convention Center, Orlando, FL, 12–16 April 2004; paper 5436-03.

56. P. L. Voss and P. Kumar, "Raman-effect induced noise-figure limit for $\chi^{(3)}$ parametric amplifiers and wavelength converters," presented at the Optical Fiber Communications Conference (OFC'2004), Los Angeles Convention Center, Los Angeles, CA, February 22–27, 2004; paper TuK4.

57. P. Voss, X. Li, R. Tang, J. Sharping, and P. Kumar, "Raman-induced limits on applications of fiber parametric amplifiers," presented at the 34th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, January 4–8, 2004.

58. M. S. Arnold, J. E. Sharping, P. Kumar, S. I Stupp, and M. C. Hersam, "Stimulated Emission of Infrared Radiation in Isolated Single-Walled Carbon Nanotubes," presented at the 2003 Materials Research Society (MRS) Fall Meeting, Boston, MA, December 1–5, 2003; paper N16.5.

59. E. Corndorf, C. Liang, and P. Kumar, "Quantum-noise protected high-speed data encryption in the telecom band of standard optical fiber," postdeadline paper presented at the 2003 Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'03), Tucson, Arizona, October 26–30, 2003; paper PD1-3. See proceedings of the 2003 IEEE LEOS Annual Meeting, post-conference edition.

60. P. Kumar, J. Lasri, P. Devgan, and R. Tang, "Fiber Nonlinearity Based Devices for Advanced Fiber-Optic Communication and Signal Processing," invited paper presented at the 2003 Annual Meeting of

the IEEE Lasers and Electro-Optics Society (LEOS'03), Tucson, Arizona, October 26–30, 2003; paper MK1. See proceedings of the 2003 IEEE LEOS Annual Meeting, Vol. 1 pp. 103-104.

61. P. Devgan, J. Lasri, R. Tang, and P. Kumar, "Ultra-low-jitter multiwavelength synchronized optical pulse source for C, L, and U bands," presented at the 2003 Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'03), Tucson, Arizona, October 26–30, 2003; paper WA3. See proceedings of the 2003 IEEE LEOS Annual Meeting, Vol. 2, pp. 473–474.
62. J. Lasri, P. Devgan, R. Tang, and P. Kumar, "Ultra-Low Timing Jitter 40Gb/s Clock Recovery Using a Novel Electroabsorption-Modulator-Based Self-Starting Optoelectronic Oscillator," presented at the 2003 Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'03), Tucson, Arizona, October 26–30, 2003; paper TuY6. See proceedings of the 2003 IEEE LEOS Annual Meeting, Vol. 1, pp. 390–391.
63. X. Li, P. Voss, J. E. Sharping, J. Chen, and P. Kumar, "Generation and distribution of quantum entanglement in the telecom band with standard optical fiber," presented at the 2003 Optical Society of America Annual Meeting, Tucson, AZ, October 5–9, 2003; paper WAA4. See the *Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 2003).
64. J. E. Sharping, P. Kumar, M. S. Arnold, M. C. Hersam, and S. I Stupp, "Stimulated emission in single-walled carbon nanotubes," presented at the 2003 Optical Society of America Annual Meeting, Tucson, AZ, October 5–9, 2003; paper MV10. See the *Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 2003).
65. P. L. Voss, K. G. Köprülü, S.-K. Choi, S. Dugan, and P. Kumar, "Room temperature high speed InGaAs/InP avalanche photodiode single photon counters," presented at the 2003 Optical Society of America Annual Meeting, Tucson, AZ, October 5–9, 2003; paper WAA1. See the *Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 2003).
66. J. H. Shapiro, F. N. C. Wong, P. Kumar, and S. M. Shahriar, "Progress toward long-distance, high-fidelity quantum communication," invited paper presented at the 2003 Optical Society of America Annual Meeting, Tucson, AZ, October 5–9, 2003; paper ThKK3. See the *Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 2003).
67. P. Kumar, X. Li, P. L. Voss, J. E. Sharping, and J. Chen, "Devices for Optical Fiber Quantum Communications," invited paper presented at ITCom 2003—SPIE International Symposium on Information Technologies and Communications—Conference on Semiconductor Optoelectronic Devices for Lightwave Communication (Conference 5248), September 8–10, 2003, Orlando, FL; paper 5248-01.
68. M. S. Arnold, J. E. Sharping, S. I. Stupp, P. Kumar, and M. C. Hersam, "Stimulated Emission and Optical Gain in Single-Walled Carbon Nanotubes," presented at the 3rd IEEE Conference on Nanotechnology (IEEE-Nano' 2003), August 12–14, 2003, San Francisco, CA; paper WG5.
69. P. Kumar, E. Corndorf, C. Liang, G. Barbosa, and H. Yuen, "Efficient quantum cryptography with coherent-state light in optical fibers at Gbps rates," invited paper presented at the SPIE 2003 Annual Meeting: Conference on Quantum Communications and Quantum Imaging (Conference 5161), August 3–8, 2003, San Diego, CA; paper 5161-45.
70. P. Kumar, "Fiber-Optic Quantum Communication," invited paper presented at the 8th International Conference on Squeezed States and Uncertainty Relations (ICSSUR'2003), Puebla, Mexico, June 9–13, 2003.
71. P. Kumar, "Towards noiseless amplification of optical signals," invited paper presented at the Conference on Lasers and Electro-Optics (CLEO'2003), Baltimore, MD, June 1–6, 2003; paper CThD3. See CLEO'2003 Technical Digest (Optical Society of America, Washington, D.C. 2003).

72. X. Li, P. Voss, J E. Sharping, and P. Kumar, "Violation of Bell's inequality near 1550 nm using an all-fiber source of polarization-entangled photon pairs," presented at the Quantum Electronics and Laser Science Conference (QELS'2003), Baltimore, MD, June 1–6, 2003; paper QTuB4. See QELS'03 Technical Digest (Optical Society of America, Washington, D.C. 2003).

73. J. Lasri, P. Devgan, R. Tang, J. E. Sharping, and P. Kumar, "A 10-GHz Rate Microstructure-Fiber Based Widely-Tunable Optical Parametric Oscillator in the Telecom Band," presented at the Conference on Lasers Science Conference (CLEO'2003), Baltimore, MD, June 1–6, 2003; paper CWA66. See CLEO'03 Technical Digest (Optical Society of America, Washington, D.C. 2003).

74. P. Kumar, "Quantum noise in microstructure-fiber optical parametric amplifiers," invited paper presented at the Conference on Fluctuations and Noise in Photonics and Quantum Optics, SPIE's Symposium on Fluctuations and Noise 2003 (Conference FN03-FN02), Santa Fe, New Mexico, June 1-4, 2003; paper 5111-23.

75. G. A. Barbosa, E. Corndorf, C. Liang, P. Kumar, and H. P. Yuen, "Quantum noise of light as a natural encryption mechanism," presented at the Conference on Fluctuations and Noise in Photonics and Quantum Optics, SPIE's Symposium on Fluctuations and Noise 2003 (Conference FN03-FN02), Santa Fe, New Mexico, June 1-4, 2003; paper 5111-17.

76. P. Kumar, "AlphaEta ($\alpha\eta$): Ultra-Secure and Ultra-Efficient Quantum Cryptographic Schemes for Optical Systems, Networks, and the Internet," invited paper presented at the *Army Quantum Cryptography Testbed Transitions Workshop*, Army Research Laboratory, Adelphi, MD, April 28, 2003.

77. P. Voss and P. Kumar, "Room temperature IR InGaAs/InP APD photon counters for quantum optics experiments," invited paper presented at the Workshop on *Single Photon: Detectors, Applications, and Measurement Methods*, held at the National Institute of Standards and Technology (NIST), Gaithersburg, MD, March 31 – April 1, 2003. The workshop was sponsored by NIST and ARDA.

78. R. Tang, P. Devgan, J. E. Sharping, P. Voss, J. Lasri, and P. Kumar, "Microstructure-fiber based optical parametric amplifier in the 1550nm telecom band," presented at the 2003 Optical Fiber Communications Conference (OFC'03), Atlanta, GA, March 23–28, 2003; paper ThT2. See pp. 562–563 of the *OFC'2003 Technical Digest* (Optical Society of America, Washington, D.C. 2003).

79. P. Kumar, "Fiber-Optic Quantum Communication and Cryptography," invited paper presented at the 3rd Annual Meeting of the Project QUANTIM, held at Villa Cipressi, Varenna, Italy, March 5–8, 2003.

80. J E. Sharping, P. Devgan, R. Tang, P. Voss, J. Lasri, and P. Kumar, "Highly Nonlinear Microstructure Fibers: Characterization and Applications," poster paper presented at the *PTAP Specialty Optical Fiber Workshop*, held at Boston University Photonics Center, Boston, MA, February 25, 2003. The Workshop was sponsored by the Photonics Technology Access Program (PTAP), which has been established by the NSF and DARPA in conjunction with the Optoelectronic Industry Development Association (OIDA).

81. P. Kumar, "Efficient quantum cryptography with coherent-state light in optical fibers at Gbps rates," invited paper presented at the *2nd Workshop on Quantum Cryptographic Applications* held at MITRE Corporation, McLean, VA, February 11–12, 2003. The Workshop was sponsored by NSA, NRO, and ARDA.

82. P. Kumar, "Spatially Broadband Parametric Amplification: Quantum-Noise Correlations and Noiseless Amplification of Images," invited paper presented at the *NASA-DoD Workshop on Quantum Imaging and Metrology* held in Pasadena, CA, November 14–15, 2002. The Workshop was sponsored by NASA, ARO, NSA, ARDA, and ONR.

83. E. Corndorf, Chuang Liang, G. A. Barbosa, and P. Kumar, "Secure and efficient quantum cryptography with coherent-state light," presented at the 2002 Optical Society of America Annual Meeting, Orlando, FL, September 29–October 4, 2002; paper MDD4. See p. 67 of the *2002 Annual Meeting Program Digest*, (Optical Society of America, Washington, D.C. 2002).

84. X. Li, M. Fiorentino, P. L. Voss, J. E. Sharping, G. A. Barbosa, and P. Kumar, "All-fiber photon-pair source for quantum communications," presented at the 2002 Optical Society of America Annual Meeting, Orlando, FL, September 29–October 4, 2002; paper ThG1. See p. 123 of the *2002 Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 2002).

85. X. Li, P. L. Voss, J. E. Sharping, M. Fiorentino, and P. Kumar, "An all-fiber source of polarization-entangled photon pairs in the 1550 nm telecom band," presented as a *postdeadline paper* at the Conference on Nonlinear Optics (NLO'2002) Maui, Hawaii, July 29–August 2, 2002.

86. P. Kumar, M. Fiorentino, J. E. Sharping, and P. L. Voss, "Fiber-optic sources for quantum communication," presented at the Conference on Nonlinear Optics (NLO'2002) Maui, Hawaii, July 29–August 2, 2002. See *Trends in Optics and Photonics (TOPS),* Vol. 79, Nonlinear Optics, OSA Technical Digest, Post-conference Edition, (Optical Society of America, Washington, D.C. 2002), pp. 28–30.

87. G. A. Barbosa, E. Corndorf, P. Kumar, H. P. Yuen, G. M. D'Ariano, M. G. A. Paris, and P. Perinotti, "Secure communication using coherent states," presented at the 6th International Conference on Quantum Communication, Measurement, and Computing (QCM&C'02) held at the MIT Campus, Cambridge, MA, July 22–26, 2002.

88. P. Kumar, "Fiber-Optic Sources of Quantum Entanglement," invited paper presented at the 6th International Conference on Quantum Communication, Measurement, and Computing (QCM&C'02) held at the MIT Campus, Cambridge, MA, July 22–26, 2002.

89. P. Voss, R. Tang, and P. Kumar, "Measurement of the Photon Statistics of a Fiber Optical Parametric Amplifier," presented at the Optical Amplifiers and Their Applications Topical Meeting, Vancouver, Canada, July 14–17, 2002; see Optical Amplifiers and Their Applications Technical Digest, (Optical Society of America, Washington, D.C., 2002), paper OMD3.

90. P. Kumar, "Quantum cryptography in free space with coherent-state light," invited paper presented at the Free-Space Laser Communication and Laser Imaging II, SPIE's International Symposium on Optical Science and Technology (Conference 4821), July 7–11, 2002, Washington State Convention Center, Seattle, WA, paper 4821–50.

91. M. Fiorentino, P.L. Voss, X. Li, J. E. Sharping, G.A. Barbosa, and P. Kumar, "All-fiber photon-pair source for quantum communications," presented as a *postdeadline paper* at the 2002 Quantum Electronics and Laser Science Conference (QELS'02), Long Beach, CA, May 19–24, 2002; paper QPD4. See QELS'02 Post Conference Technical Digest (Optical Society of America, Washington, D.C., 2002).

92. G. A. Barbosa, E. Corndorf, and P. Kumar, "Quantum cryptography with coherent-state light: Demonstration of a secure data encryption scheme operating at 100kb/s," presented at the 2002 Quantum Electronics and Laser Science Conference (QELS'02), Long Beach, CA, May 19–24, 2002; paper QThD3. See QELS'02 Post Conference Technical Digest (Optical Society of America, Washington, D.C., 2002), pp. 189–190.

93. J. E. Sharping, M. Fiorentino, P. Kumar, and R. S. Windeler "A microstructure-fiber based optical parametric oscillator," presented at the Conference on Lasers and Electro-Optics (CLEO'2002), Long Beach, CA, may 19–24, 2002; paper CtuB2. See CLEO'02 Technical Digest (Optical Society of America, Washington, D.C., 2002), pp. 141–142.

94. M. Fiorentino, J. E. Sharping, P. Kumar, and R. S. Windeler "Quantum solitons in microstructure fibers," presented at the IV Conference on Quantum Interferometry, ICTP, Trieste, Italy, March 11–15, 2002.

95. P. Voss, and P. Kumar, "Experimental Realization of 'Universal Homodyne Tomography' with a Single Local Oscillator" invited paper presented at the 32nd Winter Colloquium on The Physics of Quantum Electronics, Snowbird, Utah, January 6–10, 2002.

96. P. Kumar, "Fiber-optic quantum communications," invited paper presented at the 32nd Winter Colloquium on The Physics of Quantum Electronics, Snowbird, Utah, January 6–10, 2002.

97. J. E. Sharping, M Fiorentino, P. Kumar, and R. S. Windeler "Experimental nonlinear optics in microstructure fiber," presented at the 14th Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'01), San Diego, CA, November 12-15, 2001, paper WV3. See pp. 572-573 of the *LEOS'01 Conference Proceedings*, (IEEE, Piscataway, N.J., 2001).

98. M. Fiorentino, P. Voss, J. E. Sharping and P. Kumar, "Fourth-order quantum interference at 1550 nm," presented at the 2001 Optical Society of America Annual Meeting, Long Beach, CA, October 14-19, 2001, paper ThF2. See p. 102 of the *2001 Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C., 2001).

99. J. E. Sharping, M. Fiorentino, P. Kumar, and R. S. Windeler, "Nonlinear fiber optics in microstructure fiber," presented at the 2001 Optical Society of America Annual Meeting, Long Beach, CA, October 14-19, 2001, paper ThF2. See p. 102 of the *2001 Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C., 2001).

100. P. Kumar, "Fiber generated quantum correlations for quantum-optical communications," invited paper presented at the Eighth Rochester Conference on Coherence and Quantum Optics, June 13-16, 2001, Campus of the University of Rochester, Rochester, N.Y. See *Coherence and Quantum Optics VIII*, Edited by N. P. Bigelow, J. H. Eberly, C. R. Stroud, and I. A. Walmsley, (Kluwer, New York, 2003), p. 185.

101. M. Fiorentino, J. E. Sharping, P. Kumar, A. Porzio, and R. S. Windeler, "Soliton squeezing n a microstructure fiber," invited paper presented at the 7th International Conference on Squeezed States and Uncertainty Relations (ICSSUR'2001), June 4-8, 2001, Boston, MA; see Conference Proceedings edited by D. Han, Y. S. Kim, B. E. A. Saleh, A. V. Sergienko, and M. C. Teich (Online Publication), http://www.wam.umd.edu/ys/boston.html.

102. P. Kumar, "Quantum communication with fiber-optic devices," invited paper presented at the 2001 Quantum Electronics and Laser Science Conference (QELS'2001), Baltimore, MD, May 6-11, 2001; paper QThA2. See QELS'01 Technical Digest (Optical Society of America, Washington, D.C. 2001) p. 171.

103. H. Cao, Y. Ling, J. Y. Xu, C. Q. Cao, and P. Kumar, "Generation of coherent light from a disordered medium," presented at the 2001 Quantum Electronics and Laser Science Conference (QELS'2001) Baltimore, MD, May 6-11, 2001; paper QWG6. See QELS'01 Technical Digest (Optical Society of America, Washington, D.C. 2001), p. 170.

104. J. E. Sharping, A. Coker, M. Fiorentino, P. Kumar, and R. S. Windeler, "Four-Wave Mixing in Microstructure Fiber," presented to the 2001 Conference on Lasers and Electro-Optics (CLEO'2001), Baltimore, MD, May 6-11, 2001; paper CThQ2. See CLEO '01 Technical Digest (Optical Society of America, Washington, D.C. 2001), p. 508.

105. M. Fiorentino, J. E. Sharping, P. Voss, P. Kumar, D. Levandovsky, and M. Vasilyev, "Soliton squeezing in asymmetric and symmetric fiber Mach-Zehnder nonlinear interferometers," presented to the 2001 Quantum Electronics and Laser Science Conference (QELS'2001), Baltimore, MD, May 6-

11, 2001; paper QMC7. See QELS'01 Technical Digest (Optical Society of America, Washington, D.C. 2001), pp. xx-xx.

106. A. Agarwal, L. Wang, Y. Su, and P. Kumar, "All-optical erasable storage buyer based on parametric nonlinearity in fiber," presented at the 2001 Optical Fiber Communications Conference (OFC'01), Anaheim, CA, March 17-22, 2001; paper ThH5.

107. P. Voss, Y. Su, and P. Kumar, "Photon statistics of a single mode of spontaneous Raman scattering in a distributed Raman amplifier," presented at the 2001 Optical Fiber Communications Conference (OFC'01), Anaheim, CA, March 17-22, 2001; paper WDD23.

108. Y. Su, L. Wang, A. Agarwal, and P. Kumar, "Simultaneous 3R regeneration and wavelength conversion using a fiber-parametric limiting amplifier," presented at the 2001 Optical Fiber Communications Conference (OFC'01), Anaheim, CA, March 17-22, 2001; paper MG4.

109. G. A. Barbosa and P. Kumar, "Efficient Quantum Cryptography: Experiment," invited paper presented at the DARPA Quantum Information Science and Technology (QuIST) Workshop, October 23-24, 2000, Greenbelt, MD; paper 2.16.

110. M. Fiorentino, J. E. Sharping, D. Levandovsky, M. Vasilyev, and P. Kumar, "Soliton squeezing in a Mach-Zehnder fiber interferometer," presented as a post-deadline paper at the 2000 Optical Society of America Annual Meeting, Providence, RI, October 22-26, Paper PD5.

111. J. E. Sharping, M. Fiorentino, and P. Kumar, "Observation of twin-beams type quantum correlations in optical fiber," presented at the 2000 Optical Society of America Annual Meeting, Providence, RI, October 22-26, Paper WM2. See p. 99 of the *2000 Annual Meeting Program Digest*, (Optical Society of America, Washington, D.C. 2000).

112. T.-G. Noh, P. Voss, M. Vasilyev, P. Kumar, and G. M. D'Ariano, "Universal homodyne tomography: Experimental realization applied to the twin-beam quantum state," presented at the 2000 Optical Society of America Annual Meeting, Providence, RI, October 22-26, Paper MH7. See p. 58 of the *2000 Annual Meeting Program Digest*, (Optical Society of America, Washington, D.C. 2000).

113. G. S. Kanter, M. Fiorentino, D. K. Serkland, P. Kumar, K. R. Parameswaran, and M. M. Fejer, "Quantum-noise squeezing in periodically-poled lithium-niobate waveguides: Detection by use of a spatio-temporally matched local oscillator," presented at the 2000 Optical Society of America Annual Meeting, Providence, RI, October 22-26, Paper WM3. See p. 99 of the *2000 Annual Meeting Program Digest*, (Optical Society of America, Washington, D.C. 2000).

114. P. Kumar, "Quantum fiber-optics: Some recent experimental and theoretical developments," invited paper presented at the Nonlinear Optics: Materials, Fundamentals and Applications Topical Meeting (NLO'2000) held in Kauai-Lihue, HI, August 7-11, 2000; paper ThA6. See NLO'2000 pages 319–320.

115. P. Kumar, "Advances in Quantum Optics with use of a Q-switched and Mode-Locked Pump Laser," invited paper presented at the "Townes Festival: Festive Workshop on Quantum Optics," commemorating the achievements of Prof. Charles Townes, Nobel Laureates and inventor of the maser, held at Jackson Hole Resort, Teton Village, WY, July 30-August 4, 2000.

116. P. Kumar, "Homodyne tomography of the twin-beam quantum state," invited paper presented at the 5th International Conference on Quantum Communication, Measurement, and Computing (QCM&C'00) held in Capri, Italy, July 3-8, 2000.

117. P. Kumar, "MIT/NU Collaboration on Quantum Information Technology: Entanglement, Teleportation, and Quantum Memory," invited paper presented at the kickoff meeting of the Quantum Communication and Quantum Memory (QCQM) Initiative held at CECOM, Ft. Monmouth, NJ, June 13-14, 2000.

118. P. Kumar, "Integrated Devices for Terabit per Second 1.3 and 1.5 Micron WDM/TDM Network Applications," invited paper presented at the AFOSR Contractors and Grantees Workshop held at SRI, Menlo Park, CA, May 25-26, 2000.

119. L. Wang, Y. Su, A. Agarwal, and P. Kumar, "An all-optical picosecond-pulse packet buffer based on four-wave mixing loading and intracavity soliton control," *postdeadline paper* presented at the 2000 Conference on Lasers and Electro-Optics (CLEO'2000) held in San Francisco, CA, May 7-12, 2000. See CLEO'2000 Postdeadline Technical Digest (Optical Society of America, Washington, D.C. 2000), paper CPD20.

120. L. Wang, Y. Su, A. Agarwal, and P. Kumar, "All-optical laser synchronization and clock recovery based on dynamic parametric gain modulation," presented at the 2000 Optical Fiber Communications Conference (OFC'00), Baltimore, MD, March 5-10, 2000; paper ThP6. See OFC'00 Technical Digest for Thursday, March 9, 2000, (Optical Society of America, Washington, D.C. 2000), pp. 235-237.

121. A. Agarwal, L. Wang, Y. Su, and P. Kumar, "All-optical storage of picosecond pulse packets using wavelength-induced XPM and parametric amplification," presented at the 2000 Optical Fiber Communications Conference (OFC'00), Baltimore, MD, March 5-10, 2000; paper TuN3. See OFC'00 Technical Digest for Tuesday, March 7, 2000, (Optical Society of America, Washington, D.C. 2000), pp. 216-218.

122. P. Kumar, "Quantum correlations in parametric amplification: their measurement for testing the state reduction rule of quantum mechanics," invited paper presented at the *Winter Institute on Foundations of Quantum Theory and Quantum Optics* at the S. N. Bose National Centre For Basic Sciences, Calcutta, India, January 1-13, 2000.

123. L. Wang, Y. Su, A. Agarwal, and P. Kumar, "Two-Wavelength Fiber-Optic Parametric Oscillator," presented at the 12th Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'99), San Francisco, CA, November 9-11, 1999, Paper MJ5. See pp. 88-89 of the *LEOS'99 Conference Proceedings,* (IEEE, Piscataway, N.J., 1999).

124. P. Voss, M. Vasilyev, D. Levandovsky, T.-G. Noh, and P. Kumar, "Photon statistics of a single mode of amplified spontaneous emission noise in an erbium-doped fiber amplifier," presented at the 12th Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'99), San Francisco, CA, November 9-11, 1999, Paper ThJ3. See pp. 736-737 of the *LEOS'99 Conference Proceedings,* (IEEE, Piscataway, N.J., 1999).

125. Y. Su, L. Wang, and P. Kumar, "Wavelength Tunable All-Optical Clock Recover Using a Fiber Parametric Oscillator," presented at the 12th Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS'99), San Francisco, CA, November 9-11, 1999, Paper TuZ6. See pp. 351-352 of the *LEOS'99 Conference Proceedings*, (IEEE, Piscataway, N.J., 1999).

126. M. Vasilyev, S.-K. Choi, and P. Kumar, "Optical homodyne tomography of parametric twin beams," invited paper presented at the 1999 Optical Society of America Annual Meeting, Santa Clara, CA, September 26-October 1, Paper ThD4. See pp. 132 of the *1999 Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 1999).

127. P. Voss, T.-G. Noh, M. Vasilyev, D. Levandovsky, and P. Kumar, "A Novel Application of Optical Homodyne Tomography: Measuring the Photon Statistics of Amplified Spontaneous Emission in an Erbium-Doped Fiber Amplifier," presented at the 1999 Optical Society of America Annual Meeting, Santa Clara, CA, September 26-October 1, Paper ThD3. See pp. 132 of the *1999 Annual Meeting Program Digest,* (Optical Society of America, Washington, D.C. 1999).

128. P. Kumar, S.-K. Choi, and M. Vasilyev, "Spatially broadband parametric amplification: quantum-noise correlations and noiseless optical amplification of images," invited paper presented at the 8th International Laser Physics Workshop (LPHYS'99), Budapest, Hungary, July 2-6, 1999. The

Workshop was a part of World Conference for Science, which was the main UNESCO conference in 1999.

129. P. Kumar, M. Vasilyev, D. Levandovsky, and S.-K. Choi, "Quantum optics with short pulses: some recent experimental and theoretical developments," invited paper presented at the 6th International Conference on Squeezed States and Uncertainty Relations (ICSSUR'99), Centro Universitario di Monte Sant'Angelo, Universita "Frederico II," Napoli, Italy, 24-29 May 1999.

130. D. Levandovsky, M. Vasilyev, and P. Kumar, "Bright sub-Poissonian light from a GAWBS-compensated nonlinear-fiber Sagnac interferometer," presented at the 1999 Quantum Electronics and Laser Science Conference, QELS'99, Baltimore, MD, May 23-28, 1999; paper QTuG14. See QELS'99 Technical Digest, OSA Technical Digest Series, (Optical Society of America, Washington, D.C. 1999), pp. 70-71.

131. D. K. Serkland and P. Kumar, "Tunable Pulsed Fiber-Optic Parametric Oscillator," presented at the 1999 Optical Fiber Communications Conference (OFC'99), San Diego, CA, February 21-26, 1999; paper TuB4. See OFC'99 Technical Digest for Tuesday, February 23, 1999, (Optical Society of America, Washington, D.C. 1999), pp. 13-15.

132. P. Kumar, "Spatially broadband parametric amplification: quantum-noise correlations and noiseless amplification of images," invited paper presented at the Workshop on *Fundamental Issues in Image Formation, Detection, and Processing* held at the University of New Mexico, Albuquerque, NM, February 6-7, 1999. The workshop was sponsored by the Center for Advanced Studies at the University of New Mexico and the Albuquerque High Performance Computing Center.

133. P. Kumar, "Parametric-Amplification based Storage Buffers and Regenerators for Tb/s Packet-Switched Networks," invited paper presented at the 4th International Conference on Fiber Optics and Photonics (PHOTONICS-98) held at IIT/Delhi, New Delhi, India, December 14-18, 1998.

134. G. Kanter and P. Kumar, "A push-pull nonlinear Sagnac interferometer based on internally-seeded cascaded nonlinearity," presented at the 1998 Optical Society of America Annual Meeting, Baltimore, MD, October 4-9. See Supplement to *Optics and Photonics News,* Vol. 9, No. 8, August 1998, pp. 119, Paper ThB6.

135. M. Vasilyev, S.-K. Choi, P. Kumar, and G. M. D'Ariano, "Measurement of the joint photon-number distribution of a two-mode quantum state by means of optical homodyne tomography," presented at the 1998 Optical Society of America Annual Meeting, Baltimore, MD, October 4-9. See Supplement to *Optics and Photonics News,* Vol.9, No. 8, August 1998, pp. 149, Paper ThZZ3.

136. P. Kumar, "Squeezed-light generation by means of the traveling-wave $\chi^{(2)}$ interaction using picosecond pulses," invited paper presented at the 1998 Optical Society of America Annual Meeting, Baltimore, MD, October 4-9. See Supplement to *Optics and Photonics News,* Vol. 9, No. 8, August 1998, pp. 149, Paper ThZZ1.

137. "Measurement of the joint photon-number distribution of a twin-beam state," (with M. Vasilyev, S.-K. Choi, and G. M. D'Ariano) presented at the 4th International Conference on Quantum Communication, Measurement, and Computing (QCM'98), Northwestern University, Evanston, IL, August 22-27, 1998.

138. "Optimum noise filtering of quantum solitons," (with D. Levandovsky and M. Vasilyev) presented at the 4th International Conference on Quantum Communication, Measurement, and Computing (QCM'98), Northwestern University, Evanston, IL, August 22-27, 1998.

139. "Noiseless image amplification by a phase-sensitive parametric amplifier," (with S.-K. Choi and M. Vasilyev) presented at the 4th International Conference on Quantum Communication, Measurement, and Computing (QCM'98), Northwestern University, Evanston, IL, August 22-27, 1998.

140. "All-optical storage of a picosecond-pulse packet using parametric amplification: phase-insensitive loading," (with G. D. Bartolini and D. K. Serkland), presented at the Optical Amplifiers and Their Applications Topical Meeting, Vail, CO, July 27-29, 1998, paper TuD11. See Optical Amplifiers and Their Applications Technical Digest, (Optical Society of America, Washington, D.C., 1998), pp. 159-162.

141. "Noiseless image amplification by a phase-sensitive parametric amplifier," (with S.-K. Choi and M. Vasilyev), presented at the Conference on Lasers and Electro-optics, CLEO'98, San Francisco, CA, May 3-8, 1998; Paper CThY1. See CLEO'98 Technical Digest, OSA Technical Digest Series, Vol. 6, (Optical Society of America, Washington, D.C. 1998), pp. 470-471.

142. "Optimum Noise Filtering of Quantum Solitons," with D. Levandovsky and M. Vasilyev), presented at the International Quantum Electronics Conference, IQEC'98, San Francisco, CA, May 3-8, 1998; Paper QWG5. See IQEC'98 Technical Digest, OSA Technical Digest Series, Vol.7, (Optical Society of America, Washington, D.C. 1998), pp. 131-132.

143. "Pulsed optical parametric oscillator based on the fiber Kerr nonlinearity," (with D. K. Serkland and G. D. Bartolini), presented at the Conference on Lasers and Electro-optics, CLEO'98, San Francisco, CA, May 3-8, 1998; Paper CTuJ6. See CLEO'98 Technical Digest, OSA Technical Digest Series, Vol. 6, (Optical Society of America, Washington, D.C. 1998), p. 109.

144. "All-optical storage of a picosecond-pulse packet using parametric amplification: demonstration of single-shot loading," (with G. D. Bartolini and D. K. Serkland), presented at the 1998 Optical Fiber Communications Conference (OFC'98), San Jose, CA, February 22-27, 1998; paper WM22. See OFC'98 Technical Digest, OSA Technical Digest Series, Vol. 2, (Optical Society of America, Washington, D.C. 1998), pp. 201-202.

145. "Parametric devices for ultra-high-speed TDM systems," invited paper presented at the National Laser Symposium, Physical Research Laboratory, Ahmedabad, India, December 10-12, 1997.

146. "Quantum noise in parametric image amplification," invited paper presented at the 1997 Optical Society of America Annual Meeting, Long Beach, CA, October 12-17. See Supplement to *Optics and Photonics News,* Vol. 8, No. 8, August 1997, pp. 113, Paper TuGGG7.

147. "Linearized quantum-fluctuation theory of spectrally filtered optical solitons," (with A. Mecozzi), presented at the 1997 Optical Society of America Annual Meeting, Long Beach, CA, October 12-17. See Supplement to *Optics and Photonics News,* Vol. 8, No. 8, August 1997, pp. 142, Paper ThD2.

148. "Pulsed response of a fiber-optic phase-sensitive parametric amplifier," (with G. Kanter and W. L. Kath), presented at the 1997 Optical Society of America Annual Meeting, Long Beach, CA, October 12-17. See Supplement to *Optics and Photonics News,* Vol. 8, No. 8, August 1997, pp. 112, Paper TuCCC5.

149. "All-optical storage of a picosecond-pulse packet using parametric amplification," (with G. D. Bartolini, D. K. Serkland, and W. L. Kath), presented at the Optical Amplifiers and Their Applications Topical Meeting, Victoria, Canada, July 21-23, 1997, paper WC6. See Optical Amplifiers and Their Applications Technical Digest, (Optical Society of America, Washington, D.C., 1997), pp. 247-250.

150. "Guided-Wave Quantum Optics," invited paper presented at the IInd Workshop on *Quantum Optics and Quantum Computation,* Scuola Normale Superiore, Pisa, Italy, June 25-28, 1997.

151. "Theory of sub-Poissonian optical solitons," (with A. Mecozzi), presented at the 1997 Quantum Electronics and Laser Science Conference, QELS'97, Baltimore, MD, May 18-23, 1997. See QELS'97 Technical Digest, OSA Technical Digest Series, Vol. 12, (Optical Society of America, Washington, D.C. 1997), pp. 93-94.

152. "Observation of Quantum Noise Correlations in Parametric Image Amplification," (with S.-K. Choi and M. L. Marable), presented at the 1997 Quantum Electronics and Laser Science Conference, QELS'97, Baltimore, MD, May 18-23, 1997. See QELS'97 Technical Digest, OSA Technical Digest Series, Vol. 12, (Optical Society of America, Washington, D.C. 1997), pp. 94-95.

153. "Self-homodyne tomography: measurement of the photon statistics of parametric fluorescence," (with M. V. Vasilyev, M. L. Marable, S.-K. Choi, and G. M. D'Ariano), presented at the 1997 Quantum Electronics and Laser Science Conference, QELS'97, Baltimore, MD, May 18-23, 1997. See QELS'97 Technical Digest, OSA Technical Digest Series, Vol. 12, (Optical Society of America, Washington, D.C. 1997), pp. 95-96.

154. "A Highly-Stable 59 GHz Soliton Source at 1550 nm," (with D. K. Serkland, G. D. Bartolini, W. L. Kath, D. W. Anthon, and D. L. Sipes), presented at the 1997 Spring Topical Meeting on Ultrafast Electronics and Optoelectronics, March 17-19, 1997, Incline Village, NV. See *Ultrafast Electronics and Optoelectronics,* Technical Digest, (Optical Society of America, Washington, D.C. 1997), pp. 69-71.

155. "Rate Doubling of a Highly-Stable Soliton Source," (with D. K. Serkland, G. D. Bartolini, W. L. Kath, and A. V. Sahakian), presented at the 1997 Optical Fiber Communications Conference (OFC'97), Dallas, TX, February 16-21, paper ThL5. See OFC'97 Technical Digest, Vol. 6, (Optical Society of America, Washington, D.C. 1997), pp. 292-293.

156. "Observation of Quantum Noise Correlations in Parametric Image Amplification," (with M. L. Marable and S.-K. Choi), *postdeadline paper* presented at the 1996 Optical Society of America Annual Meeting, Rochester, NY, October 20-24. Paper PD23.

157. "Evaluation of dynamic semiconductor nonlinearities by continuous time-resolved Z-Scan (CWZ-scan)," (with D. O. Caplan), presented at the 1996 Optical Society of America Annual Meeting, Rochester, NY, October 20-24. See Supplement to *Optics and Photonics News,* Vol. 7, No. 8, July 1996, pp. 176, Paper ThDD6.

158. "Sub-Poissonian light generation in a nonlinear fiber Sagnac interferometer," (with D. Levandovsky and M. V. Vasilyev), presented at the 1996 Optical Society of America Annual Meeting, Rochester, NY, October 20-24. See Supplement to *Optics and Photonics News,* Vol. 7, No. 8, July 1996, pp. 148, Paper WGG8.

159. "Experiments on soliton pulse storage using phase-sensitive amplification," (with G. D. Bartolini, D. K. Serkland, and W. L. Kath), presented at the 1996 Optical Society of America Annual Meeting, Rochester, NY, October 20-24. See Supplement to *Optics and Photonics News,* Vol. 7, No. 8, July 1996, pp. 76, Paper MP3.

160. "Squeezing by means of traveling-wave second-harmonic generation in a quasi-phasematched lithium niobate waveguide," (with D. K. Serkland, M. A. Arbore, and M. M. Fejer), presented at the 1996 Optical Society of America Annual Meeting, Rochester, NY, October 20-24. See Supplement to *Optics and Photonics News,* Vol. 7, No. 8, July 1996, pp. 182, Paper ThNN7.

161. "Quantum Properties of the Traveling-Wave $\chi^{(2)}$ Process: Theory, Experiments, and Applications," invited paper presented at the 3rd International Conference on Quantum Communication & Measurement (QCM'96) held at Mt. Fuji-Hakone Land, Shizuoka Prefecture, Japan, September 25-30, 1996.

162. "Amplitude squeezing of the fundamental field by means of traveling-wave second-harmonic generation in a quasi-phasematched $LiNbO_3$ waveguide," (with D. K. Serkland, M. A. Arbore, and M. M. Fejer), invited paper presented at the 3rd International Conference on Quantum Communication & Measurement (QCM'96) held at Mt. Fuji-Hakone Land, Shizuoka Prefecture, Japan, September 25-30, 1996.

163. "Technique for measuring time-dependent optical nonlinearities using continuous time-resolved Z-scan," (with D. O. Caplan and G. Kanter), presented at the 1996 Conference on Lasers and Electro-optics, CLEO'96, Anaheim, CA, June 2-7, 1996. See Conference on Lasers and Electro-optics, 1996 Technical Digest Series, Vol. 9 (Optical Society of America, Washington, D.C. 1996), pp. 14-15.

164. "Spatio-temporally Broadband Optical Parametric Amplifiers for Free-Space Interconnects," invited paper presented at the *Workshop on Multiple Wavelengths in Free-Space Optical Interconnects* held at the Austing House, Taos, NM, February 4-7, 1996.

165. "Intensity noise correlation in phase conjugation using a double Raman system," (with M. S. Shahriar and P. R. Hemmer), presented at the 1995 Optical Society of America Annual Meeting, Portland, OR, September 10-15. See Supplement to *Optics and Photonics News,* Vol. 6, No. 7, July 1995, pp. 182, Paper FN2.

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167. "Optical phase conjugation in the double Raman system," (with P. R. Hemmer, M. S. Shahriar, and M. Cronin-Golomb), presented at the VIIth Rochester conference on *Coherence and Quantum Optics,* June 7-10, 1995.

168. "Optical phase conjugation with gain in a bulk semiconductor," with D. O. Caplan), presented at OEM/CHICAGO'95, May 18-19, symposium on Optoelectronic and Related Technologies: Nonlinear Devices & effects, sponsored by the SPIE and the Optical Society of Chicago, paper 147.

169. "Periodic conjugation of optical solitons," (with C. G. Goedde and W. L. Kath), presented at the OSA Topical Meeting on Nonlinear Guided Waves and Their Applications held at Dana Point, CA, February 23-25, 1995. See the 1995 OSA Technical Digest Series, Vol. 6, (Optical Society of America, Washington, D.C. 1995), pp. 136-138.

170. "Long-term storage of a soliton bit stream using phase-sensitive amplification," (with A. Mecozzi, W. L. Kath, and C. G. Goedde), presented at the OSA Topical Meeting on Nonlinear Guided Waves and Their Applications held at Dana Point, CA, February 23-25, 1995. See the 1995 OSA Technical Digest Series, Vol. 6, (Optical Society of America, Washington, D.C. 1995), pp. 97-99.

171. "Periodic conjugation of optical solitons," (with C. G. Goedde and W. L. Kath), presented at the Conference on Ultrafast Transmission Systems in Optical Fibres held at Miramare, Trieste, Italy, February 13-17, 1995.

172. "Quantum-noise reduction by means of the traveling-wave $\chi^{(2)}$ process," invited paper presented at the *Workshop EC Network: Non-Classical Light*, held at Corvara, Italy, January 28–February 4, 1995.

173. "Squeezing via traveling-wave SHG," (with R.-D. Li), presented at the *Workshop EC Network: Non-Classical Light*, held at Corvara, Italy, January 28-February 4, 1995.

174. "Parametric Devices for Soliton Applications," invited paper presented at the Workshop on Solitons for Switched Optical Communications: "The Prospect of Switched Soliton Networks," held at the Henderson House, Waltham, MA, December 9, 1994. The Workshop was organized by ARPA and the MIT Lincoln Laboratory. Its objective was to assess the utility of solitons in optical communication and devise a strategy to move soliton research from laboratory curiosity to realistic field trials.

175. "Applications of parametric amplifiers in optical soliton systems," (with C. G. Goedde, W. L. Kath, and A. Mecozzi), invited paper presented at the *Nonlinear Optics Workshop, 1994*, held at the University of Arizona, October 9-11, 1994.

176. "Optical phase conjugation via gain without inversion in the double Λ system," (with P. R. Hemmer, J. Donoghue, M. S. Shahriar, and M. Cronin-Golomb), presented at the 1994 Optical Society of America Annual Meeting, Dallas, TX, October 2-7. See Supplement to *Optics and Photonics News,* Vol. 5, No. 8, August 1994, pp. 184.

177. "Degenerate four-wave mixing noise measurements in semiconductors," (with D. Caplan), presented at the 1994 Optical Society of America Annual Meeting, Dallas, TX, October 2-7. See Supplement to *Optics and Photonics News,* Vol. 5, No. 8, August 1994, pp. 126.

178. "Sub-Poissonian light generation by parametric deamplification," (with R.-D. Li, S.-K. Choi, and C. Kim), presented at the 1994 Optical Society of America Annual Meeting, Dallas, TX, October 2-7. Supplement to *Optics and Photonics News,* Vol. 5, No. 8, August 1994, pp. 119.

179. "Generation of sub-Poissonian pulses of light," (with R.-D. Li, S.-K. Choi, C. Kim, and P. Kumar) *postdeadline paper* presented at the 1994 International Quantum Electronics Conference, Anaheim, CA, May 8-13, 1994. See 1994 Technical Digest Series, Vol. 9, (Optical Society of America, Washington, D.C. 1994), pp. QPD18-QPD23.

180. "Squeezing via nonlinear phase shifts from a cascaded second-order nonlinearity," (with R.-D. Li) presented at the 1994 International Quantum Electronics Conference, Anaheim, CA, May 8-13, 1994. See 1994 Technical Digest Series, Vol. 9, (Optical Society of America, Washington, D.C. 1994), pp. 85-86.

181. "1.5 μm phase-sensitive amplifier for high-speed communications," (with G. Bartolini, R. D. Li, W. Riha, and K. V. Reddy), presented at the 1994 Optical Fiber Communications Conference (OFC'94), held in San Jose, CA, February 20-25. See OFC'94 Technical Digest, Vol. 4, (Optical Society of America, Washington, D.C., 1994), pp. 202-203.

182. "Optical pulse shaping using phase-sensitive amplification," (with W. L. Kath and J. E. Oleksy), presented at the 1994 Integrated Photonics Research Conference (IPR'94), held in San Francisco, CA, February 17-19. See IPR'94 Technical Digest, Vol. 3, (Optical Society of America, Washington, D.C. 1994), pp. 319-321.

183. "Phase-sensitive optical amplifiers," (with W. L. Kath and R.-D. Li), invited paper presented at the 1994 Integrated Photonics Research Conference (IPR'94), held in San Francisco, CA, February 17-19. See IPR'94 Technical Digest, Vol. 3, (Optical Society of America, Washington, D.C. 1994), pp. 316-318.

184. "Communication with quantum-optic devices," presented at SPIE's international symposium, OE/LASE'94, on Technologies for Optical Fiber Communications: Optical Amplifiers for High-Speed Applications, Los Angeles, CA, 22-29 January 1994, paper 2149-07.

185. "Spatial effects in traveling-wave squeezed-state generation and detection," (with C. Kim and R. D. Li), presented at the 1993 Optical Society of America Annual Meeting, Toronto, Canada, October 3-8. See OSA Annual Meeting, 1993 Technical Digest Series, Vol. 16, (Optical Society of America, Washington, D.C. 1993), pp. 143.

186. "Dispersion compensation with phase-sensitive amplifiers," (with R.-D. Li, W. L. Kath, and J. N. Kutz), to be presented at the 1993 Optical Society of America Annual Meeting, to be held in Toronto, Canada, October 3-8. See OSA Annual Meeting, 1993 Technical Digest Series, Vol. 16, (Optical Society of America, Washington, D.C. 1993), pp. 100.

187. "Sub-shot-noise microscopy with squeezed light," (with M. I. Kolobov), presented at the 1993 Optical Society of America Annual Meeting, Toronto, Canada, October 3-8. See OSA Annual Meeting, 1993 Technical Digest Series, Vol. 16, (Optical Society of America, Washington, D.C. 1993), pp. 142.

188. "Role of Matched Local Oscillators in the Detection of Quadrature-Squeezed Light Generated by Means of Traveling-wave Optical Parametric Amplification," (with C. Kim and R.-D. Li), presented at the Third International Workshop on Squeezed States and Uncertainty Relations, held at the University of Maryland, Baltimore County, Baltimore, MD, August 10-13, 1993.

189. "Dispersion compensation with phase-sensitive optical amplifiers," (with Ruo-Ding Li and William L. Kath), presented at the 1993 Gordon Research Conference on Nonlinear Optics and Lasers, Wolfeboro, NH, August 2-6, 1993.

190. "Long-Distance Pulse Propagation in Nonlinear Optical Fibers using Periodically-Spaced Parametric Amplifiers," (with J. N. Kutz, W. L. Kath, and R.-D. Li), presented at the 1993 Annual Meeting of the Society for Industrial and Applied Mathematics (SIAM), July 12-16, 1993, Philadelphia, PA.

191. "Communication with quantum-optic devices," presented at the Workshop on *Future Trends of Quantum Structures and Device Applications* held at Northwestern University, June 7-8, 1993, Evanston, Illinois.

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193. "Spatial Effects in Traveling-Wave Squeezed-State Generation: Detection using a Self-Generated Matched Local-Oscillator," (with C. Kim and R.-D. Li), invited paper presented at the Quantum Electronics and Laser Science Conference, Baltimore, MD, May 2-7, 1993. See Conference on Quantum Electronics and Laser Science, 1993 Technical Digest Series, Vol. 12, (Optical Society of America, Washington, D.C. 1993), pp. 214.

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195. "Equivalence of twin beams and squeezed states in a nondegenerate optical parametric amplifier," (with C. Kim) presented at the 1992 Optical Society of America Annual Meeting, held in Albuquerque, NM, September 20-25. See OSA Annual Meeting, 1992 Technical Digest Series, Vol. 23, (Optical Society of America, Washington, D.C. 1992), pp. 193.

196. "Diode-laser pumped Raman-shifted oscillation in cesium vapor," (with M. Poelker and P. R. Hemmer) presented at the 1992 Optical Society of America Annual Meeting held in Albuquerque, NM, September 20-25. See OSA Annual Meeting, 1992 Technical Digest Series, Vol. 23, (Optical Society of America, Washington, D.C. 1992), pp. 128.

197. "Raman gain in a Λ three-level system with closely spaced ground states," (with M. Shahriar, P. Hemmer, J. Donoghue, and M. Cronin-Golomb) presented at the 1992 Optical Society of America Annual Meeting, held in Albuquerque, NM, September 20-25. See OSA Annual Meeting, 1992 Technical Digest Series, Vol. 23, (Optical Society of America, Washington, D.C. 1992), pp. 127.

198. "Observation of Quantum Frequency Conversion," (with J. Huang) presented at the XVIII International Quantum Electronics Conference, Vienna, Austria, June 14-19, 1992. See 1992 Technical Digest Series, Vol. 9, (Optical Society of America, Washington, D.C. 1992), pp. 530-531.

199. "Observation of Quantum Frequency Conversion," (with J. Huang) *postdeadline paper* presented at the Optical Society of America Annual Meeting, 1991, held in San Jose, CA, November 3-8. See

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200. "Tunable squeezed-light generation from twin beams using an optical-phase feed-forward scheme: A broadband calculation," (with C. Kim) presented at the Optical Society of America Annual Meeting, 1991, held in San Jose, CA, November 3-8. See OSA Annual Meeting, 1991 Technical Digest Series, Vol. 17, (Optical Society of America, Washington, D.C. 1991), pp. 29.

201. "Quantum Frequency Conversion: Experimental Evidence," (with J. Huang), presented at the 1991 Gordon Conference on Nonlinear Optics and Lasers, Wolfeboro, NH, July 22-26, 1991.

202. "Quantum-Noise Measurement in Difference Frequency Generation," (with J. Huang), *postdeadline paper* presented at the Quantum Electronics and Laser Science Conference, Baltimore, MD, May 12-17, 1991. See Conference on Quantum Electronics and Laser Science, 1991 Technical Digest Series, Vol. 11, (Optical Society of America, Washington, D.C. 1991), pp. 311.

203. "Precision Measurements with Twin Beams of Light," invited paper presented at the Quantum Electronics and Laser Science Conference, Baltimore, MD, May 12-17, 1991. See Conference on Quantum Electronics and Laser Science, 1991 Technical Digest Series, Vol. 11, (Optical Society of America, Washington, D.C. 1991), pp. 180.

204. "Quantum Optics with Q-switched Sources," invited paper presented at the International Conference on Quantum Optics, Hyderabad, India, Jan. 5-10, 1991.

205. "Photon-Noise Reduction Experiments with a Q-switched Nd:YAG Laser," (with J. Huang and O. Aytür), invited paper presented at OE/BOSTON'90, November 5-9, symposium on Laser Noise, Conference 1376, sponsored by the SPIE.

206. "Quantum Frequency Conversion," presented at the Optical Society of America Annual Meeting, 1990, held in Boston, MA, November 5-9. See OSA Annual Meeting, 1990 Technical Digest Series, Vol. 15, (Optical Society of America, Washington, D.C. 1990), pp. 265.

207. "Sub-Shot Noise Measurements with Pulsed Twin Beams of Light," (with J. Huang and O. Aytür), presented at the Optical Society of America Annual Meeting, 1990, held in Boston, MA, November 5-9. See OSA Annual Meeting, 1990 Technical Digest Series, Vol. 15, (Optical Society of America, Washington, D.C. 1990), pp. 4.

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209. "Pulsed Twin Beams of Light," (with O. Aytür), *postdeadline paper* presented at the XVII International Quantum Electronics Conference held in Anaheim, CA, May 21-25, 1990. See International Conference on Quantum Electronics, Technical Digest Series 1990, Vol. 8, (Optical Society of America, Washington, D.C. 1990), pp. 393-394.

210. "Pulsed Squeezed Light with an Incoherent Pump: Theoretical Analysis," (with J. Huang and O. Aytür), presented at the XVII International Quantum Electronics Conference held in Anaheim, CA, May 21-25, 1990. See International Conference on Quantum Electronics, Technical Digest Series 1990, Vol. 8, (Optical Society of America, Washington, D.C. 1990), pp. 44.

211. "Atomic Decay Rates in a Dielectric Medium: a Test of the Standard QED Hamiltonian," (with S.-T. Ho), presented at the XVII International Quantum Electronics Conference held in Anaheim, CA, May 21-25, 1990. See International Conference on Quantum Electronics, Technical Digest Series 1990, Vol. 8, (Optical Society of America, Washington, D.C. 1990), pp. 24.

212. "Partially-Coherent Squeezed Light: Generation and Detection," (with O. Aytür), presented at the Optical Society of America Annual Meeting, 1989, held in Orlando, FL, October 15-20. See OSA Annual Meeting, 1989 Technical Digest Series, Vol. 18, (Optical Society of America, Washington, D.C. 1989), pp. 206-207.

213. "Generation of Partially Coherent Squeezed Light," (with O. Aytür and J. Huang), *postdeadline paper* presented at the Quantum Electronics and Laser Science Conference, Baltimore, MD, April 24-28, 1989. See Conference on Quantum Electronics and Laser Science, 1989 Technical Digest Series, Vol. 12, (Optical Society of America, Washington, D.C. 1989), pp. 256-257.

214. "Quantum Treatment of Field Propagation in an Atomic Medium," (with S.-T. Ho), presented at the Quantum Electronics and Laser Science Conference, Baltimore, MD, April 24-28, 1989. See Conference on Quantum Electronics and Laser Science, 1989 Technical Digest Series, Vol. 12, (Optical Society of America, Washington, D.C. 1989), pp. 212.

215. "Photon Counting Statistics of Multimode Squeezed Light," (with J. Huang), presented at the fourth International Laser Science Conference, Atlanta, GA, October 2-6, 1988. See Bulletin of the American Physical Society, Vol. 33, 1988, pp. 1671.

216. "Single-Beam Squeezing in a Doppler Broadened Medium," (with S.-T. Ho, N. C. Wong, and J. H. Shapiro), presented at the Optical Society of America Annual Meeting, 1988, held in Santa Clara, CA, October 31-November 4. See OSA Annual Meeting, 1988 Technical Digest Series, Vol. 11, (Optical Society of America, Washington, D.C. 1988), pp. 84.

217. "Frequency Correlated Laser Beam Generation in Sodium Vapor: Sodium-Density and Pump-Intensity Dependence," (with B. Matthew Poelker), presented at the Optical Society of America Annual Meeting, 1988, held in Santa Clara, CA, October 31-November 4. See OSA Annual Meeting, 1988 Technical Digest Series, Vol. 11, (Optical Society of America, Washington, D.C. 1988), pp. 92.

218. "Measured Spatial Mode Matching Efficiencies for Heterodyned GaAlAs Semiconductor Lasers," (with K. A. Winick), presented at the Optical Society of America Annual Meeting, Rochester, 1987. See Journal of Optical Society of America A, Vol. 4, 1987, pp. P59.

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220. "Squeezed State Experiments in Sodium Vapor," (with M. W. Maeda and J. H. Shapiro), presented at Optical Society of America Annual Meeting 1986. See Journal of Optical Society of America A, Vol. 3, 1986, pp. P37.

221. "Observation of Squeezed Noise Produced by Forward Four-Wave Mixing in Sodium Vapor," (with M. W. Maeda and J. H. Shapiro), presented at the XIV Int'l Quantum Electronics Conference, San Francisco, CA, 1986. See Journal of Optical Society of America B, Vol. 3, No. 8, part 2, 1986, pp. P238.

222. "Theory of Light Detection in the Presence of Feedback," (with J. H. Shapiro, M. C. Teich, B.E.A. Saleh, and G. Saplakoglu), presented at the XIV Int'l Quantum Electronics Conference, San Francisco, CA, 1986. See Journal of Optical Society of America B, Vol. 3, No. 8, part 2, 1986, pp. P66.

223. "Quantum Theory of Nondegenerate Multiwave Mixing," (with S.-T. Ho and J. H. Shapiro), presented at the XIV Int'l Quantum Electronics Conference, San Francisco, CA, 1986. See Journal of Optical Society of America B, Vol. 3, No. 8, part 2, 1986, pp. P64.

224. “Observation of Phase-sensitive Noise in Sodium Vapor,” (with M. W. Maeda and J. H. Shapiro), presented at Optical Society of America Annual Meeting 1985. See Journal of Optical Society of America A, Vol. 2, 1985, pp. P93.

225. “Generation of Frequency Correlated Laser Beams via Optical Means,” (with S.-T. Ho), presented at Optical Society of America Annual Meeting 1985. See Journal of Optical Society of America A, Vol. 2, 1985, pp. P18.

226. “Photodetection of Squeezed States,” (with J. H. Shapiro), invited paper presented at the workshop on New Trends in Quantum Optics and Electrodynamics, Sept. 30-Oct. 4, 1985, University of Rome, Rome, Italy.

227. “Generation of Squeezed States by Degenerate Four-Wave Mixing,” invited paper presented at the 1985 Gordon Conference on Nonlinear Optics and Lasers, July 29-Aug. 2, 1985, Brewster Academy, NH.

228. “Observation of Parametric Oscillation Near the Sodium D2 Line,” (with J. H. Shapiro), presented at Optical Society of America Annual Meeting 1984. See Journal of Optical Society of America A, Vol. 1, 1984, pp. 1232.

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23. "Securing Internet Communication with Light," an interview with Burke Patten on Northwestern University Newsfeed, December 9, 2002. NU Newsfeed is a free service designed primarily for radio stations and features Northwestern's faculty addressing top news stories. Reports can be listened to with RealPlayer or downloaded to one's computer as MP3 sound files. The audio is at http://www.northwestern.edu/univ-relations/broadcast/dec_2002/kumar.ram and the text is at http://www.northwestern.edu/univ-relations/broadcast/dec_2002/kumar.html.

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33. "First four-wave mixing in a microstructure fiber is observed," by Laser Focus World Staff, *Laser Focus World,* September 2001; see http://lfw.pennnet.com/Articles/Article_Display.cfm?Section=Archives&Subsection=Display&ARTICLE_ID=119684.

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35. Invited Guest on *Odyssey*, *Chicago Public Radio's* (WBEZ, 91.5 FM) daily live call-in show (11AM) on topics of current, political, cultural, and scientific interests, September 7, 1999. This particular broadcast featured a discussion on "Quantum Computing" moderated by show's host Gretchen Helfrich. A streaming RealAudio download of the WBEZ's broadcast is available at: http://www.wbez.org/services/ram/od/od-990907.ram.

36. "Gain without Pain," by David Ehrenstein, *Physical Review Focus,* September 6, 1999; see http://focus.aps.org/story/v4/st12#author.

37. "Viability of quantum computing needs a quantum leap," by Jon Van, *Chicago Tribune,* August 30, 1998; Jon Van covers science and technology for the Tribune.