JOSEPH M. KAHN
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Professional Experience

2012-Present Stanford University, Department of Electrical Engineering. **Chair of Academic Affairs Committee:**

- Oversee all undergraduate and graduate courses in the Department, including content, staffing and scheduling.

2003-Present Stanford University, Department of Electrical Engineering. **Professor:**

- Develop and teach graduate courses on Optical Fiber Communications and Digital Communications and undergraduate courses on Signal Processing and Linear Systems.

Research Areas:

- High-capacity single-mode optical fiber systems, including: variable-rate coding and modulation techniques; modulation techniques for high spectral efficiency and impairment tolerance; coherent detection and associated digital signal processing algorithms; digital compensation of fiber nonlinearity.
- High-speed transmission in multi-mode optical fiber, including: principal modes; adaptive spatial filtering; minimizing modal dispersion in single-input, single-output transmission; spatial multiplexing for multi-input, multi-output transmission.
- Endoscopic imaging through multi-mode optical fibers, including: schemes for rigid or flexible single-fiber endoscopes; enhancement of resolution and noise tolerance; biomedical applications.
- Free-space optical communication through atmospheric turbulence, including: modeling spatial and temporal correlation of turbulence-induced fading; efficient transmission techniques, including coding, optimal detection, and spatial diversity detection.
- Free-space optical communication for distributed sensor networks based on microelectromechanical systems, including: modeling and fabrication of corner-cube retroreflectors for passive optical links; detection and multiple-access techniques; demonstration prototypes.
- Air-to-air free-space optical communication, including: fabrication of two-axis beam scanners using microelectromechanical systems; design of efficient link acquisition protocols; demonstration of prototype systems.

2003-2008 StrataLight Communications, Inc., Campbell, CA. **Advisory Board Member and Consultant:**

- Provided strategic technical advice.
- Evaluated new technologies, including digital coherent detection.

2000-2003 StrataLight Communications, Inc., Campbell, CA. **Co-Founder and Chief Scientist:**

- Played key role in securing $22.7M Series A and Series B financing.
- Developed strong patent portfolio on optical modulation techniques to increase spectral efficiency and improve impairment tolerance in DWDM long-haul systems.
- Oversaw development of 40 Gb/s transceiver subsystem for DWDM long-haul systems. Specified and characterized custom high-speed mixed-signal integrated circuits and photonic components.
- Oversaw testing and simulation of 40 Gb/s DWDM long-haul systems using erbium-doped fiber amplifiers, distributed Raman amplifiers and chromatic dispersion compensation.

1998-2000 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.
Vice Chairman for Graduate Matters:

- Restructured funding and recruitment of EECS graduate students, achieving significant increase in yield of top admits.

1996-2003 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.
Professor:

- Developed and taught undergraduate courses, including Signals and Systems, Signals and Systems Laboratory, and graduate courses, including Digital Communications, Applied Electromagnetic Theory, and Quantum Electronics.
- Chaired key committees, including Faculty Recruiting and Graduate Admissions.

Research Areas:

- High-capacity optical fiber systems, including: coherent detection of optical quadriphase-shift keying; electrical crosstalk cancellation in DWDM systems; nonlinear equalization techniques for optimal utilization in subcarrier-multiplexed systems.
- Free-space optical communication through atmospheric turbulence.
- Wireless communication for distributed sensor networks based on microelectromechanical systems ("Smart Dust").
- Covert air-to-air free-space optical communication.
- Indoor free-space optical communication, including: 100 Mb/s quasi-diffuse link using imaging diversity receiver; 50 Mb/s diffuse infrared link using decision-feedback equalization; coded modulation techniques; equalization techniques; characterization and modeling of multipath channels; multiple-access techniques; transmitting and receiving optical components.
- Multi-antenna wireless communication systems, including: effect of correlated fading on channel capacity; design and performance evaluation of space-time codes; optimal power-allocation techniques.

1993-96 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.
Associate Professor.

1990-93 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.
Assistant Professor.

1987-90 AT&T Bell Laboratories, Lightwave Communications Research Department, Holmdel, New Jersey.
Member of Technical Staff:

- Built multi-gigabit-per-second homodyne optical-fiber transmission systems that achieved world-record receiver sensitivities.
- Developed high-stability, narrow-linewidth, tunable external-cavity semiconductor lasers.
- Collaborated in design and construction of wideband, low-noise optical phase-lock receivers.
- Demonstrated phase-noise-tolerant optical phase-locked loop using quantized feedback.
- Experimented with high-speed nonlinear signal processing including an integrate-and-dump circuit.
- Modeled and characterized traveling-wave lithium niobate phase modulators.

1982-87 University of California, Berkeley, Department of Physics. **Research Assistant:**

- Studied impurities in semiconductors using photoconductive and deep-level-transient spectroscopies.
- Constructed a high-resolution Fourier-transform infrared spectrometer system and related electronic, optical and cryogenic equipment.
- Developed apparatus and process for tritium doping of semiconductors in a plasma.

Education

1986 Ph.D. Physics, University of California, Berkeley
Thesis title: "Hydrogen-Related Acceptor Complexes in Germanium"

Thesis advisors: Professors L.M. Falicov and E.E. Haller

1983 M.A. Physics, University of California, Berkeley

1981 A.B. Physics, University of California, Berkeley

Awards, Honors and Fellowships

2003-05 Hoover Faculty Scholar, Stanford University

2000 Elected Fellow of the Institute of Electrical and Electronics Engineers

1991-96 Presidential Young Investigator Award, National Science Foundation

1981-82 Regents Fellowship, University of California

1981 Phi Beta Kappa

Professional Society Memberships

1987-Present Institute of Electrical and Electronic Engineers (Fellow Grade, Member of Communications Society and Photonics Society)

1983-87 American Physical Society

Professional Service

2009-2014 IEEE/OSA *Journal of Optical Communications and Networking*, Associate Editor

1993-2000 IEEE *Personal Communications Magazine*, Technical Editor

1996 ACM/Baltzer *J. of Wireless Networks,* Guest Editor, Special Series on Free-Space Optical LANs

1996-99 *Intl. J. on Wireless Info. Networks*, Guest Editor, Special Series on Wireless Infrared Communication

Volunteer Work

1987-89 Tutor at Red Bank Middle School, Red Bank, New Jersey

Patents

1. R.-Y. Gu, R. Nasiri Mahalati and J. M. Kahn, "Noise-Compensating Patterns and Image Reconstruction Method for Imaging in Single-Fiber Microscopy", U. S. Provisional Patent application filed April 1, 2014.
2. R. Nasiri Mahalati, R.-Y. Gu and J. M. Kahn, "Single-Fiber Microscopy using Intensity-Pattern Sampling and Optimization-Based Reconstruction", U. S. Patent application filed February 18, 2014.
3. K. J. Boucher Anand, O. Solgaard, J. M. Kahn and C. Jan, "Multimode Fiber for Spatial Scanning", U.S. Patent application filed February 13, 2013.
4. L. Beygi, A. Agrell and J. M. Kahn, "Multi-Dimensional Capacity-Approaching Coded Modulation Scheme for Fiber Optical Communications", U.S. Provisional Patent application filed December 3, 2012.
5. J. M. Kahn, J. P. Wilde and D. J. F. Barros, "Wavelength-Selective Switch and OFDM Transceiver Design for Bandwidth-Scalable Long-Haul Transmission", U.S. Provisional Patent application filed July 6, 2012.
6. J. M. Kahn, M. A. Horowitz, O. Solgaard and S. Fan, "Adaptive Optical Signal Processing with Multimode Waveguides", U. S. Patent 7,844,144, November 30, 2010.
7. J. M. Kahn, S. Fan, M. A. Horowitz and O. Solgaard, "Adaptive Optical Signal Processing with Multimode Waveguides", U. S. Patent 7,509,002, March 24, 2009.
8. J. M. Kahn, S. Fan, M. A. Horowitz and O. Solgaard, "Adaptive Optical Signal Processing with Multimode Waveguides", U. S. Patent 7,327,914, February 5, 2008.
9. K.-P. Ho and J. M. Kahn, "Method and System to Provide Modular Parallel Precoding in Optical Duobinary Transmission Systems", U. S. Patent 7,287,213, October 23, 2007.
10. J. M. Kahn, M. A. Horowitz, E. Alon and V. Stojanovic, "Adaptive Control for Mitigating Interference in a Multimode Transmission Medium", U. S. Patent 7,194,155, March 20, 2007.
11. K.-P. Ho and J. M. Kahn, "Differential Complex Modulation Optical Receiver Having Compensation for Kerr Effect Phase Noise", U.S. Patent 7,162,163, January 9, 2007.
12. K.-P. Ho and J. M. Kahn, "Optical FSK Receiver Having Compensation for Kerr Effect Phase Noise", U.S. Patent

7,133,620, November 7, 2006.

13. K.-P. Ho and J. M. Kahn, "Optical Receiver Having Compensation for Kerr Effect Phase Noise", U.S. Patent 7,013,089, March 14, 2006.

14. K.-P. Ho and J. M. Kahn, "Optical Receiver Having Compensation for Kerr Effect Phase Noise", U.S. Patent 6,915,084, July 5, 2005.

15. K.-P. Ho and J. M. Kahn, "Multilevel Optical Signals Optimized for Systems having Signal-Dependent and Signal-Independent Noises, Finite Transmitter Extinction Ratio and Intersymbol Interference", U.S. Patent 6,690,894, February 10, 2004.

16. J. M. Kahn and K.-P. Ho, "Transmission and Reception of Duobinary Multilevel Pulse-Amplitude-Modulated Optical Signals Using Finite-State Machine-Based Encoder", U.S. Patent 6,592,274, July 15, 2003.

17. J. M. Kahn and K.-P. Ho, "Transmission and Reception of Duobinary Multilevel Pulse-Amplitude-Modulated Optical Signals Using Subtraction-Based Encoder", U.S. Patent 6,490,069, December 3, 2002.

18. J. M. Kahn and K.-P. Ho, "Transmission and Reception of Duobinary Multilevel Pulse-Amplitude-Modulated Optical Signals Using Subsequence-Based Encoder", U.S. Patent 6,445,476, September 3, 2002.

19. J. M. Kahn and K.-P. Ho, "Transmission and Reception of Duobinary Multilevel Pulse-Amplitude-Modulated Optical Signals Using Finite-State Machine-Based Encoder", U.S. Patent 6,424,444, July 23, 2002.

20. J. M. Kahn and B. L. Kasper, "Optical Homodyne Receiver", U.S. Patent 5,007,106, April 9, 1991.

Books and Book Chapters

21. A. Belmonte and J. M. Kahn, "Satellite Downlink Coherent Laser Communications", to be published in *Optical Wireless Communications–An Emerging Technology*, M. Uysal, C. Capsoni and Z. Ghassemlooy, Eds., Springer, 2015.

22. K.-P. Ho and J. M. Kahn, "Mode Coupling and its Impact on Spatially Multiplexed Systems", in *Optical Fiber Telecommunications VI B: Systems and Networks*, I. P. Kaminow, T. Li and A. E. Willner, Eds., Elsevier, Amsterdam, 2013.

23. M. B. Shemirani and J. M. Kahn, *Principal Modes in Multimode Fiber: Modeling and Compensation of Dispersion*, VDM Verlag, Saarbrücken, Germany, 2010.

24. E. Ip and J. M. Kahn, "Nonlinear Impairment Compensation using Backpropagation", in *Optical Fibre, New Developments*, C. Lethien, Ed., In-Tech, Vienna Austria, December 2009.

25. X. Zhu and J. M. Kahn, "Communication Techniques and Coding for Atmospheric Turbulence Channels", in *Free-Space Laser Communications: Principles and Advances*, A. K. Majumdar and J. C. Ricklin, Eds., Springer, New York, 2008.

Journal Articles

26. S. Ö. Arık, K.-P. Ho and J. M. Kahn, "Group Delay Management and Multi-Input Multi-Output Signal Processing in Mode-Division Multiplexing Systems", subm. to *J. of Lightwave Technol.*, July 2015 (Invited Paper).

27. N. Zhao, X. Li, G. Li and J. M. Kahn "Capacity Limits of Spatially Multiplexed Free-Space Communication", *Nature Photon.*, vol. 9, pp. 822-826, December 2015.

28. J. K. Perin, M. Sharif and J. M. Kahn, "Modulation Schemes for Single-Laser 100 Gbit/s Links: Multicarrier", *J. of Lightwave Technol.*, vol. 33, no. 24, pp. 5122-5132, December 15, 2015.

29. S. Ö. Arık, K.-P. Ho and J. M. Kahn, "Delay Spread Reduction in Mode-Division Multiplexing: Mode Coupling versus Delay Compensation", *J. of Lightwave Technol.*, vol. 33, no. 21, pp. 4504-4512, November 1, 2015.

30. R. Y. Gu, R. Nasiri Mahalati and J. M. Kahn "Design of Flexible Multi-Mode Fiber Endoscope", *Optics Express*, vol. 23, no. 21, pp. 26905-26918, October 19, 2015.

31. M. Sharif, J. K. Perin and J. M. Kahn, "Modulation Schemes for Single-Laser 100 Gbit/s Links: Single-Carrier", *J. of Lightwave Technol.*, vol. 33, no. 20, pp. 4268-4277, October 15, 2015.

32. D. Askarov and J. M. Kahn, "Long-Period Fiber Gratings for Mode Coupling in Mode-Division-Multiplexing Systems", *J. of Lightwave Technol*., vol. 33, no. 19, pp. 4032-4038, October 1, 2015.

33. I. Gasulla and J. M. Kahn, "Performance of Direct-Detection Mode-Group-Division Multiplexing using Fused Fiber Couplers", *J. of Lightwave Technol*., vol. 33, no. 9, pp. 1748-1760, May 1, 2015.

34. S. Ö. Arık and J. M. Kahn, "Spectral and Spatial Aggregation for High-Throughput Data Transmission and Networking", *SPIE Newsroom*, 10.1117/2.1201501.005757, February 2015 (Invited Paper).

35. S. Ö. Arık, K.-P. Ho and J. M. Kahn, "Optical Network Scaling: Roles of Spectral and Spatial Aggregation", *Optics Express*, vol. 22, no. 24, pp. 29868-29887, November 21, 2014 (Invited Paper).

36. D. Askarov, B. Szafraniec, D. M. Baney and J. M. Kahn, "Frequency-Derivative Measurement Technique for Dispersive Effects in Single-Mode Fiber Systems", *J. of Lightwave Technol*., vol. 32, no. 22, pp. 3854-3861, November 15, 2014.

37. K.-P. Ho, J. M. Kahn and J. P. Wilde, "Wavelength-Selective Switches for Mode-Division Multiplexing: Scaling and Performance Analysis", *J. of Lightwave Technol*., vol. 32, no. 22, pp. 3724-3735, November 15, 2014.

38. R. Y. Gu, R. Nasiri Mahalati and J. M. Kahn, "Noise-Reduction Algorithms for Optimization-Based Imaging through Multi-Mode Fiber", *Optics Express*, vol. 22, no. 12, pp. 15118-15132, June 12, 2014.

39. R. Nasiri Mahalati, D. Askarov and J. M. Kahn, "Adaptive Modal Gain Equalization Techniques in Multi-Mode Erbium-Doped Fiber Amplifiers", *J.of Lightwave Technol.*, vol. 32, no. 11, pp. 2133-2143, June 1, 2014.

40. S. Ö. Arık and J. M. Kahn, "Diversity-Multiplexing Tradeoff in Mode-Division Multiplexing", *Optics Lett.*, vol. 39, pp. 3258-3261, June 1, 2014.

41. M. Sharif and J. M. Kahn, "Variable-Bandwidth Superchannels Using Synchronized Colorless Transceivers", *J. of Lightwave Technol*., vol. 32, no. 10, pp. 1921-1929, May 15, 2014.

42. S. Ö. Arık, D. Askarov and J. M. Kahn, "Adaptive Frequency-Domain Equalization in Mode-Division Multiplexing Systems", *J.of Lightwave Technol*., vol. 32, no. 10, pp. 1841-1852, May 15, 2014.

43. S. Ö. Arık, J. M. Kahn and K.-P. Ho, "MIMO Signal Processing for Mode-Division Multiplexing", *IEEE Signal Processing Magazine*, vol. 31, no. 2, pp. 25-34, March 2014 (Invited Paper).

44. L. Beygi, E. Agrell, J. M. Kahn, and M. Karlsson, "Coded Modulation for Fiber-Optic Networks", *IEEE Signal Processing Magazine* vol. 31, no. 2, pp. 93-103, March 2014.

45. K.-P. Ho and J. M. Kahn, "Linear Propagation Effects in Mode-Division Multiplexing Systems", *J. of Lightwave Technol.*, vol. 32, no. 4, pp. 614-628, February 15, 2014 (Invited Paper).

46. L. Beygi, E. Agrell, J. M. Kahn, and M. Karlsson, "Rate-Adaptive Coded Modulation for Fiber-Optic Communications", *J.of Lightwave Technol*., vol. 32, no. 2, pp. 333-343, January 15, 2014.

47. D. A. A. Mello, A. N. Barreto, T. C. Lima, T. F. Portela, L. Beygi and J. M. Kahn, "Optical Networking with Variable-Code-Rate Transceivers", *J. of Lightwave Technol*., vol. 32, no. 2, pp. 257-266, January 15, 2014.

48. S. Ö. Arık and J. M. Kahn, "Coupled-Core Multi-Core Fibers for Spatial Multiplexing", *IEEE Photon. Technol. Lett*., vol. 25, no. 21, pp. 2054-2057, November 1, 2013.

49. E. Ip and J. M. Kahn, "The Time-Reversed Twin", *Nature Photonics* vol. 7, pp. 507-508, July 2013 (Invited Paper).

50. A. Belmonte and J. M. Kahn, "Sequential Optimization of Adaptive Arrays in Coherent Laser Communications", *J. of Lightwave Technol*., vol. 31, no. 9, pp. 1383-1387, May 1, 2013.

51. S. Ö. Arık, D. Askarov and J. M. Kahn, "Effect of Mode Coupling on Signal Processing Complexity in Mode-Division Multiplexing", *J. of Lightwave Technol*., vol. 31, no. 3, pp. 423-431, February 1, 2013.

52. R. Nasiri Mahalati, R. Y. Gu and J. M. Kahn, "Resolution Limits for Imaging through Multi-Mode Fiber", *Optics Express*, vol. 21, no. 1, pp. 1656-1668, January 14, 2013. Featured in OSA *Spotlight on Optics*, March 2013.

53. D. Askarov and J. M. Kahn, "Design of Transmission Fibers and Doped Fiber Amplifiers for Mode-Division

Multiplexing", *IEEE Photon. Technol. Lett.*, vol. 24, no. 21, pp. 1945-1948, November 1, 2012.

54. K.-P. Ho and J. M. Kahn, "Delay-Spread Distribution for Multimode Fiber with Strong Mode Coupling", *IEEE Photon. Technol. Lett.*, vol. 24, no. 21, pp. 1906-1909, November 1, 2012.

55. G.-H. Gho and J. M. Kahn, "Rate-Adaptive Modulation and Low-Density Parity-Check Coding for Optical Fiber Transmission Systems", *J. Optical Commun. Netw.*, vol. 4, no. 10, pp. 760-768, October 2012.

56. D. J. F. Barros, J. M. Kahn, J. P. Wilde and T. Abou Zeid, "Bandwidth-Scalable Long-Haul Transmission using Synchronized Colorless Transceivers and Efficient Wavelength-Selective Switches", *J. of Lightwave Technol.*, vol. 30, no. 16, pp. 2646-2660, August 15, 2012.

57. R. Nasiri Mahalati, D. Askarov, J. P. Wilde and J. M. Kahn, "Adaptive Control of Input Field to Achieve Desired Output Intensity Profile in Multimode Fiber with Random Mode Coupling", *Optics Express*, vol. 20, no. 13, pp. 14321-14337, June 18, 2012.

58. G.-H. Gho and J. M. Kahn, "Rate-Adaptive Modulation and Coding for Optical Fiber Transmission Systems", *J. of Lightwave Technol.*, vol. 30, no. 12, pp. 1818-1828, June 15, 2012.

59. D. J. F. Barros, S. K. Wilson and J. M. Kahn, "Comparison of Orthogonal Frequency-Division Multiplexing and Pulse-Amplitude Modulation in Indoor Optical Wireless Links", *IEEE Trans. on Commun.*, vol. 60, no. 1, pp. 153-163, January 2012.

60. R. Nasiri Mahalati and J. M. Kahn, "Effect of Fog on Free-Space Optical Links Employing Imaging Receivers", *Optics Express*, vol. 20, no. 2, pp. 1649–1661, January 11, 2012.

61. K.-P. Ho and J. M. Kahn, "Frequency Diversity in Mode-Division Multiplexing Systems", *J. of Lightwave Technol.*, vol. 29, no. 24, pp. 3719-3726, December 15, 2011.

62. K.-P. Ho and J. M. Kahn, "Statistics of Group Delays in Multimode Fiber with Strong Mode Coupling", *J. of Lightwave Technol.*, vol. 29, no. 21, pp. 3119-3128, November 1, 2011.

63. A. Belmonte and J. M. Kahn, "Field Conjugation Adaptive Arrays in Free-Space Coherent Laser Communications", *J. Optical Commun. Netw.*, vol. 3, no. 11, pp. 830-838, November 2011.

64. K.-P. Ho and J. M. Kahn, "Mode-Dependent Loss and Gain: Statistics and Effect on Mode-Division Multiplexing", *Optics Express*, vol. 19, no. 17, pp. 16612-16635, August 15, 2011 (Invited Paper).

65. D. J. F. Barros and J. M. Kahn, "Comparison of Orthogonal Frequency-Division Multiplexing and On-Off Keying in Direct-Detection Multimode Fiber Links", *J. of Lightwave Technol.*, vol. 29, no. 15, pp. 2299-2309, August 1, 2011.

66. Y. Huo, S. Sandhu, J. Pan, N. Stuhrmann, M. L. Povinelli, J. M. Kahn, J. S. Harris, M. M. Fejer and S. Fan, "Experimental Demonstration of Two Methods for Controlling the Group Delay in a System with Photonic-Crystal Resonators Coupled to a Waveguide", *Optics Lett.*, vol. 36, no 8, pp. 1482-1484, April 15, 2011.

67. G.-H. Gho, L. Klak and J. M. Kahn, "Rate-Adaptive Coding for Optical Fiber Transmission Systems", *J. of Lightwave Technol.*, vol. 29, no. 2, pp. 222-233, January 15, 2011.

68. M. B. Shemirani, J. P. Wilde and J. M. Kahn, "Adaptive Compensation of Multimode Fiber Dispersion by Control of Launched Amplitude, Phase, and Polarization", *J. of Lightwave Technol.*, vol. 28, no. 18, pp. 2627-2639, September 15, 2010.

69. M. B. Shemirani and J. M. Kahn, "Compensation of Multimode Fiber Dispersion by Optimization of Launched Amplitude, Phase, and Polarization", *J. of Lightwave Technol.*, vol. 28, no. 14, pp. 2084-2095, July 15, 2010.

70. D. J. F. Barros and J. M. Kahn, "Comparison of Orthogonal Frequency-Division Multiplexing and On-Off Keying in Amplified Direct-Detection Single-Mode Fiber Systems", *J. of Lightwave Technol.*, vol. 28, no. 12, pp. 1811-1820, June 15, 2010.

71. C. Belthangady, C.-S. Chuu, I. A. Yu, G. Y. Yin, J. M. Kahn and S. E. Harris, "Hiding Single Photons With Spread Spectrum Technology", *Phys. Rev. Lett.*, vol. 104, 223601, June 4, 2010.

72. A. Belmonte and J. M. Kahn, "Efficiency of Complex Modulation Methods in Coherent Free-Space Optical

Links", *Optics Express*, vol. 18, no. 4, pp. 3928-3937, February 15, 2010.

73. E. Ip and J. M. Kahn, "Fiber Impairment Compensation using Coherent Detection and Digital Signal Processing", *J. of Lightwave Technol*., vol. 28, no. 4, pp. 502-519, February 15, 2010 (Invited Paper).

74. R. A. Panicker, A. P. T. Lau, J. P. Wilde and J. M. Kahn, "Experimental Comparison of Adaptive Optics Algorithms in 10-Gb/s Multimode Fiber Transmission", *J. of Lightwave Technol*., vol. 27, no. 24, pp. 5783-5789, December 15, 2009.

75. R. A. Panicker and J. M. Kahn, "Algorithms for Compensation of Multimode Fiber Dispersion Using Adaptive Optics", *J. of Lightwave Technol*., vol. 27, no. 24, pp. 5790-5799, December 15, 2009.

76. M. B. Shemirani and J. M. Kahn, "Higher-Order Modal Dispersion in Graded-Index Multimode Fiber", *J. of Lightwave Technol*., vol. 27, no. 23, pp. 5461-5468, December 1, 2009.

77. A. Belmonte and J. M. Kahn, "Capacity of Coherent Free-Space Optical Links using Diversity Combining Techniques", *Optics Express*, vol. 17, no. 15, pp. 12601-12611, July 10, 2009.

78. E. Ip and J. M. Kahn, "Addendum to: Feedforward Carrier Recovery for Coherent Optical Communications", *J. of Lightwave Technol*., vol. 27, no. 13, pp. 2552-2553, July 1, 2009.

79. D. J. F. Barros and J. M. Kahn, "Optical Modulator Optimization for Orthogonal Frequency-Division Multiplexing", *J. of Lightwave Technol*., vol. 27, no. 13, pp. 2370-2378, July 1, 2009.

80. M. B. Shemirani, W. Mao, R. A Panicker and J. M. Kahn, "Principal Modes in Graded-Index Multimode Fiber in Presence of Spatial- and Polarization-Mode Coupling", *J. of Lightwave Technol*., vol. 27, no. 10, pp. 1248-1261, May 15, 2009. Also see errata: *J. of Lightwave Technol*., vol. 29, no. 12, p. 1900, June 15, 2011.

81. A. Belmonte and J. M. Kahn, "Capacity of Coherent Free-Space Optical Links using Atmospheric Compensation Techniques", *Optics Express*, vol. 17, no. 4, pp. 2763-2773, February 16, 2009.

82. E. Ip and J. M. Kahn, "Compensation of Dispersion and Nonlinear Effects using Digital Backpropagation", *J. of Lightwave Technol*., vol. 26, no. 20, pp. 3416-3425, October 15, 2008.

83. A. Belmonte and J. M. Kahn, "Performance of Synchronous Receivers using Atmospheric Compensation Techniques", *Optics Express*, vol. 16, no. 18, pp. 14151-14162, August 26, 2008.

84. D. J. F. Barros and J. M. Kahn, "Optimized Dispersion Compensation Using Orthogonal Frequency-Division Multiplexing", *J. of Lightwave Technol*., vol. 26, no. 16, pp. 2889-2898, August 15, 2008.

85. A. P. T. Lau, S. Rabbani and J. M. Kahn, "On the Statistics of Intra-Channel Four-Wave Mixing in Phase-Modulated Optical Communication Systems", *J. of Lightwave Technology*, vol. 26, no. 14, pp. 2128-2135, July 15, 2008.

86. W. Mao and J. M. Kahn, "Lattice Codes for Amplified Direct-Detection Optical Systems", *IEEE Trans. on Commun*., vol. 56, no. 7, pp. 1137-1145, July 2008.

87. R. A. Panicker, J. M. Kahn and S. P. Boyd, "Compensation of Multimode Fiber Dispersion using Adaptive Optics via Convex Optimization", *J. of Lightwave Technol.*, vol. 26, no. 10, pp. 1295-1303, May 2008.

88. E. Ip, A. P. T. Lau, D. J. F. Barros and J. M. Kahn, "Coherent Detection in Optical Fiber Systems", *Optics Express*, vol. 16, no. 2, pp. 753-791, January 21, 2008 (Invited Paper). Also see errata: *Optics Express*, vol. 16, no. 26, p. 21943, December 22, 2008.

89. A. P. T. Lau and J. M. Kahn, "Signal Design and Detection in Presence of Nonlinear Phase Noise", *J. of Lightwave Technol*., vol. 25, no. 10, pp. 3008-3016, October 2007.

90. E. Ip and J. M. Kahn, "Feedforward Carrier Recovery for Coherent Optical Communications", *J. of Lightwave Technol*., vol. 25, no. 9, pp. 2675-2692, September 2007.

91. E. Ip and J. M. Kahn, "Digital Equalization of Chromatic Dispersion and Polarization Mode Dispersion", *J. of Lightwave Technol*., vol. 25, no. 8, pp. 2033-2043, August 2007.

92. R. A. Panicker, J. P. Wilde, J. M. Kahn, D. F. Welch and I. Lyubomirsky, "10 × 10 Gb/s DWDM Transmission

Through 2.2 km Multimode Fiber Using Adaptive Optics“, *IEEE Photon. Technol. Lett*. vol. 19, no. 15, pp. 1154-1156, August 1, 2007.

93. A. P. T. Lau and J. M. Kahn, “Power Profile Optimization in Phase-Modulated Systems in Presence of Nonlinear Phase Noise”, *IEEE Photon. Technol. Lett*., vol. 18, no. 23, pp. 2514-2516, December 1, 2006.

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