

## JOSEPH M. KAHN

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### Professional Experience

- 2003-Present     Stanford University, Department of Electrical Engineering. **Professor:**
- Developed and teach: two core undergraduate courses on Signal Processing and Linear Systems; three graduate courses on Optical Fiber Communications and Digital Communications.
- Research Areas:*
- Data center links: co-packaged optics, low-power analog or digital coherent receivers, advanced direct-detection modulation formats.
  - Frequency comb generators based on resonator-enhanced electro-optic modulation.
  - Ultra-long-haul submarine systems: optimized power-efficient amplification and spatial multiplexing, yielding up to 70% capacity increase.
  - Fiber Kerr nonlinearity mitigation: 2008 paper on digital backpropagation is most highly cited in field.
  - Rate-adaptive coding and modulation, as well as variable-bandwidth superchannel modulation.
  - Multi-mode fibers and spatial multiplexing: in 2005, explained principal modes and demonstrated transmission far beyond traditional bandwidth-distance limit; in 2011, derived statistics of strongly coupled group delays and gains; in 2011 and 2019, derived capacity limits and explained modal diversity and frequency diversity in spatially multiplexed systems with mode-dependent gain.
  - Endoscopic imaging through multi-mode optical fibers, including: schemes for rigid or flexible single-fiber endoscopes; enhancement of resolution and noise tolerance; biomedical applications. In 2013, derived resolution limits for coherent and noncoherent imaging.
  - Atmospheric free-space systems: modal compensation of turbulence; spatial multiplexing; transfer of frequency, time and position; optimal modes for spatial multiplexing in turbulence channels.
- 2012-2022     Stanford University, Department of Electrical Engineering. **Chair of Academic Affairs Committee:**
- Oversaw curricula and courses in the Department, including content, staffing and scheduling.
- 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. StrataLight's 40 Gb/s-per-wavelength long-haul fiber transmission systems were deployed widely by AT&T, Deutsche Telekom, and other top-tier carriers. StrataLight was acquired by Opnext, Inc. in 2009 for about \$170M.
  - In 2002, applied to patent first electronic compensation of fiber Kerr nonlinearity.
  - Developed patent portfolio on modulation methods to improve spectral efficiency and impairment tolerance in DWDM long-haul systems. Oversaw development of 40 Gb/s transceiver subsystems. Oversaw testing and simulation of 40 Gb/s DWDM long-haul systems.
- 1998-2000     University of California, Berkeley, Department of Electrical Engineering and Computer Sciences. **Vice Chairman for Graduate Matters:**
- Restructured funding and recruitment of EE and CS graduate students, achieving substantial increase in yield of top admits.

- 1996-2003 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.  
**Professor:**
- Chaired key committees, including Faculty Search and Graduate Admissions.
  - Developed and taught: core undergraduate course on Signals and Systems; graduate courses on Digital Communications, Applied Electromagnetic Theory, and Quantum Electronics.
- Research Areas:*
- Coherent optical fiber systems: in 1992, demonstrated coherent detection of optical QPSK.
  - Coding and modulation: in 1999, published first work on probabilistic shaping for optical communications.
  - Atmospheric free-space optical communication: 2002 paper is the most highly cited in the field.
  - Indoor free-space optical communications: 1993-97 papers remain the most highly cited in the field as it has shifted from infrared to visible light. Demonstrated 50 Mb/s diffuse link using decision-feedback equalization; characterized and modeled multipath channels. Studied: coded modulation techniques; equalization techniques; multiple-access techniques; transmitting and receiving optics.
  - Free-space communication for distributed sensor networks based on microelectromechanical systems (“smart dust”).
  - Multi-input multi-output wireless systems: effect of correlated fading on channel capacity; design and performance evaluation of space-time codes; optimal power-allocation techniques.
- 1993-1996 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.  
**Associate Professor.**
- 1990-1993 University of California, Berkeley, Department of Electrical Engineering and Computer Sciences.  
**Assistant Professor.**
- 1987-1990 AT&T Bell Laboratories, Lightwave Communications Research Department, Holmdel, New Jersey.  
**Member of Technical Staff:**
- In 1989, demonstrated first successful synchronous (i.e., coherent) detection using semiconductor lasers, achieving record receiver sensitivity.
  - Developed high-stability, narrow-linewidth, tunable external-cavity semiconductor lasers.
  - Developed wideband, low-noise optical phase-lock receivers.
  - Characterized and reworked traveling-wave lithium niobate phase modulators.
- 1982-1987 University of California, Berkeley. **Research Assistant:**
- Studied pure semiconductors using photothermal ionization and deep-level-transient spectroscopies. Findings overturned dynamic shallow impurity center models published previously by thesis advisors.
  - Constructed high-resolution Fourier-transform infrared spectrometer 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**

2020	Electrical Engineering Chair's Award for Outstanding Contributions to Undergraduate Education, Stanford University
2017-18	Teaching Honor Roll, Tau Beta Pi Society, Stanford University
2003-05	Hoover Faculty Scholar, Stanford University
2000-present	Fellow, Institute of Electrical and Electronics Engineers
1991-96	Presidential Young Investigator Award, National Science Foundation
1981-82	Regents Fellowship, University of California
1981-present	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 <i>Journal of Optical Communications and Networking</i> , Associate Editor
1993-2000	IEEE <i>Personal Communications Magazine</i> , Technical Editor
1996	ACM/Baltzer <i>J. of Wireless Networks</i> , Guest Editor, Special Series on Free-Space Optical LANs
1996-99	<i>Intl. J. on Wireless Info. Networks</i> , Guest Editor, Special Series on Wireless Infrared Communication

### **Volunteer Work**

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

1. M. Zhang, B. Buscaino, C. Wang, A. Shams-Ansari, C. Reimer, R. Zhu, J. M. Kahn and M. Loncar, "Optical Frequency Comb Generation in Integrated Lithium Niobate Devices", U.S. Patent Application filed April 30, 2019.
2. J. K. Perin, J. M. Kahn and A. K. Shastri, "DSP-Free Coherent Receiver", U. S. Patent 11,218,224, January 4, 2022.
3. K. J. Boucher Anand, O. Solgaard, J. M. Kahn and C. Jan, "Multimode Fiber for Spatial Scanning", U.S. Patent 9,280,003, March 8, 2016.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. 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.
12. 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.

13. 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.
14. 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.
15. 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.
16. 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.
17. 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.
18. J. M. Kahn and B. L. Kasper, "Optical Homodyne Receiver", U.S. Patent 5,007,106, April 9, 1991.

#### **Books and Book Chapters**

19. A. Belmonte and J. M. Kahn, "Satellite Downlink Coherent Laser Communications", in *Optical Wireless Communications—An Emerging Technology*, M. Uysal, C. Capsoni, Z. Ghassemlooy and A. Boucouvalas, Eds., Springer, 2016.
20. 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.
21. M. B. Shemirani and J. M. Kahn, *Principal Modes in Multimode Fiber: Modeling and Compensation of Dispersion*, VDM Verlag, Saarbrücken, Germany, 2010.
22. 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.
23. 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**

24. E. Liang and J. M. Kahn, "Geometric Shaping for Bandwidth-Constrained Intensity Modulation/Direct Detection Intra-Data Center Interconnects", subm to *J. of Lightwave Technol.*, August 2022.
25. A. Vijay and J. M. Kahn, "Effect of Higher-Order Modal Dispersion in Direct-Detection Mode-Division-Multiplexed Links", subm to *J. of Lightwave Technol.*, May 2022.
26. E. Chen, B. Buscaino and J. M. Kahn, "Phase Noise Analysis of Resonator-Enhanced Electro-Optic Comb-Based Analog Coherent Receivers", *J. of Lightwave Technol.*, vol. 40, no. 21, pp. 7117-7128, November 1, 2022.
27. Y. Hu, M. Yu, B. Buscaino, N. Sinclair, D. Zhu, R. Cheng, A. Shams-Ansari, L. Shao, M. Zhang, J. M. Kahn and M. Loncar, "High-Efficiency and Broadband On-Chip Electro-Optic Frequency Comb Generators", *Nature Photonics*, vol. 16, pp. 679-685, October 2022.
28. E. S. Chou and J. M. Kahn, "Successive Interference Cancellation on Frequency-Selective Channels with Mode-Dependent Gain", *J. of Lightwave Technol.*, vol. 40, no. 12, pp. 3729-3738, June 15, 2022.
29. E. S. Chou, H. Srinivas and J. M. Kahn, "Phase Retrieval-Based Coherent Receivers: Signal Design and Degrees of Freedom", *J. of Lightwave Technol.*, vol. 40, no. 5, pp. 1296-1307, March 1, 2022 (Invited Paper).
30. A. Belmonte and J. M. Kahn, "Optimal Modes for Spatially Multiplexed Free-Space Communication in Atmospheric Turbulence", *Optics Express*, vol. 29, no. 26, pp. 43556-43566, December 20, 2021.
31. H. Srinivas, J. D. Downie, J. Hurley, X. Liang, J. Himmelreich, J. K. Perin, D. A. A. Mello and J. M. Kahn, "Modeling and Experimental Measurement of Power Efficiency for Power-Limited SDM Submarine Transmission Systems", *J. of Lightwave Technol.*, vol. 39, no. 8, pp. 2376-2386, April 15, 2021.

32. B. Buscaino, E. Chen, J. W. Stewart, T. Pham and J. M. Kahn, "External vs. Integrated Light Sources for Intra-Data Center Co-Packaged Optical Interfaces", *J. of Lightwave Technol.*, vol. 39, no. 7, pp. 1984-1996, April 1, 2021.
33. J. K. Perin, A. Shastri and J. M. Kahn, "Coherent Data Center Links", *J. of Lightwave Technol.*, vol. 39, no. 3, pp. 730-741, February 1, 2021 (Invited Paper).
34. K. Choutagunta and J. M. Kahn, "Designing High-Performance Multimode Fibers Using Refractive Index Optimization", *J. of Lightwave Technol.*, vol. 39, no. 1, pp. 233-242, January 1, 2021.
35. E. S. Chou and J. M. Kahn, "Adaptive Coding and Modulation for Robust Optical Access Networks", *J. of Lightwave Technol.*, vol. 38, no. 8, pp. 2242-2252, April 15, 2020.
36. M. T. Taylor, A. Belmonte, L. Hollberg and J. M. Kahn, "Effect of Atmospheric Turbulence on Timing Instability for Partially Reciprocal Two-Way Optical Time Transfer Links", *Phys. Rev. A*, vol. 101, 033843, March 30, 2020.
37. B. Buscaino, M. Zhang, M. Loncar and J. M. Kahn, "Design of Efficient Resonator-Enhanced Electro-Optic Frequency Comb Generators", *J. of Lightwave Technol.*, vol. 38, no. 6, pp. 1400-1413, March 15, 2020.
38. K. Choutagunta, I. Roberts, D. A. B. Miller and J. M. Kahn, "Adapting Mach-Zehnder Mesh Equalizers in Direct-Detection Mode-Division-Multiplexed Links", *J. of Lightwave Technol.*, vol. 38, no. 4, pp. 723-735, February 15, 2020.
39. D. A. A. Mello, K. Choutagunta, H. Srinivas and J. M. Kahn, "Impact of Polarization- and Mode-Dependent Gain on the Capacity of Ultra-Long-Haul Systems", *J. of Lightwave Technol.*, vol. 38, no. 2, pp. 303-318, January 15, 2020 (Invited Paper).
40. B. Buscaino, B. D. Taylor and J. M. Kahn, "Multi-Tb/s-per-Fiber Coherent Co-packaged Optical Interfaces for Data Center Switches", *J. of Lightwave Technol.*, vol. 37, no. 13, pp. 3401-3412, July 1, 2019.
41. J. K. Perin, J. M. Kahn, J. D. Downie, J. Hurley and K. Bennett, "Importance of Amplifier Physics in Maximizing the Capacity of Submarine Links", *J. of Lightwave Technol.*, vol. 37, pp. 2076-2085, May 1, 2019.
42. M. Zhang, B. Buscaino, C. Wang, A. Shams-Ansari, C. Reimer, R. Zhu, J. M. Kahn and M. Loncar, "Broadband Electro-Optic Frequency Comb Generator in an Integrated Microring Resonator", *Nature*, vol. 568, pp. 373-377, April 18, 2019.
43. K. Choutagunta, I. Roberts and J. M. Kahn, "Efficient Quantification and Simulation of Modal Dynamics in Multimode Fiber Links", *J. of Lightwave Technol.*, vol. 37, pp. 1813-1825, April 15, 2019 (Invited Paper).
44. A. C. Jatoba-Neo, C. E. Rothenberg, D. A. A. Mello, S. Ö. Arik and J. M. Kahn, "Scaling SDM Optical Networks Using Full-Spectrum Spatial Switching", *J. Optical Commun. Netw.*, vol. 10, no. 12, pp. 991-1004, December 2018.
45. K. Choutagunta, S. Ö. Arik, K.-P. Ho and J. M. Kahn, "Characterizing Mode-Dependent Loss and Gain in Multimode Components", *J. of Lightwave Technol.*, vol. 36, no. 18, pp. 3815-3823, September 15, 2018.
46. J. K. Perin, A. Shastri and J. M. Kahn, "Data Center Links Beyond 100 Gbit/s per Wavelength", *Optical Fiber Technology*, vol. 44, pp. 69-85, 2018 (Invited Paper).
47. I. Roberts and J. M. Kahn, "Measurement-Based Optimization of Channel Powers with Non-Gaussian Nonlinear Interference Noise", *J. of Lightwave Technol.*, vol. 36, no. 13, pp. 2746-2756, July 1, 2018.
48. S. Ö. Arik and J. M. Kahn, "Low-Complexity Implementation of Convex Optimization-Based Phase Retrieval", *J. of Lightwave Technol.*, vol. 36, no. 12, pp. 2358-2365, June 15, 2018.
49. I. Roberts, J. M. Kahn, J. Harley and D. Boertjes, "Channel Power Optimization of WDM Systems Following Gaussian Noise Nonlinearity Model in Presence of Stimulated Raman Scattering", *J. of Lightwave Technol.*, vol. 35, no. 23, pp. 5237-5249, December 1, 2017. Also see errata: *J. of Lightwave Technol.*, vol. 36, no. 11, p. 2309, June 1, 2018.
50. J. K. Perin, A. Shastri and J. M. Kahn, "Design of Low-Power DSP-Free Coherent Receivers for Data Center Links", *J. of Lightwave Technol.*, vol. 35, no. 21, pp. 4650-4662, November 1, 2017.
51. I. Roberts and J. M. Kahn, "Efficient Discrete Rate Assignment and Power Optimization in Optical

- Communication Systems Following the Gaussian Noise Model”, *J. of Lightwave Technol.*, vol. 35, no. 20, pp. 4425-4437, October 15, 2017.
52. O. D. Domingues, D. A. A. Mello, R. Silva, S. Ö. Arik and J. M. Kahn, “Achievable Rates of Space-Division Multiplexed Submarine Links Subject to Nonlinearities and Power Feed Constraints”, *J. of Lightwave Technol.*, vol. 35, no. 18, pp. 4004-4010, September 15, 2017.
  53. A. Belmonte, M. T. Taylor, L. Hollberg and J. M. Kahn, “Effect of Atmospheric Anisoplanatism on Earth-to-Satellite Time Transfer over Laser Communication Links”, *Optics Express*, vol. 25, no. 14, pp. 15676-15686, July 10, 2017.
  54. K. Choutagunta and J. M. Kahn, “Dynamic Channel Modeling for Mode-Division Multiplexing”, *J. of Lightwave Technol.*, vol. 35, no. 12, pp. 2451-2463, June 15, 2017.
  55. J. M. Kahn and D. A. B. Miller, “Communications Expands its Space”, *Nature Photon.*, vol. 11, no. 1, pp. 5-8, January 2017 (Invited Paper).
  56. J. K. Perin, M. Sharif and J. M. Kahn, “Sensitivity Improvement in 100 Gbit/s-per-Wavelength Links using Semiconductor Optical Amplifiers or Avalanche Photodiodes”, *J. of Lightwave Technol.*, vol. 33, no. 24, pp. 5542-5553, December 1, 2016.
  57. S. Ö. Arik and J. M. Kahn, “Direct-Detection Mode-Division Multiplexing in Modal Basis Using Phase Retrieval”, *Optics Lett.*, vol. 41, no. 18, pp. 4265-4268, September 15, 2016.
  58. I. Roberts, J. M. Kahn and D. Boertjes, “Convex Channel Power Optimization in Nonlinear WDM Systems using Gaussian Noise Model”, *J. of Lightwave Technol.*, vol. 34, no. 13, pp. 3212-3222, July 1, 2016.
  59. S. Ö. Arik, K.-P. Ho and J. M. Kahn, “Group Delay Management and Multi-Input Multi-Output Signal Processing in Mode-Division Multiplexing Systems”, *J. of Lightwave Technol.*, vol. 34, no. 11, pp. 2867-2880, June 1, 2016 (Invited Paper).
  60. P. Berceau, M. T. Taylor, J. M. Kahn and L. Hollberg, “Space-Time Reference with an Optical Link”, *Class. Quantum Grav.*, vol. 33, p. 135007, May 31, 2016.
  61. 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.
  62. 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.
  63. S. Ö. Arik, 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.
  64. 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.
  65. 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.
  66. 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.
  67. 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.
  68. S. Ö. Arik 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).
  69. S. Ö. Arik, 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).
  70. 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.

71. 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.
72. 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.
73. 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.
74. S. Ö. Arik and J. M. Kahn, "Diversity-Multiplexing Tradeoff in Mode-Division Multiplexing", *Optics Lett.*, vol. 39, pp. 3258-3261, June 1, 2014.
75. 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.
76. S. Ö. Arik, 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.
77. S. Ö. Arik, 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).
78. 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.
79. 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).
80. 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.
81. 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.
82. S. Ö. Arik 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.
83. E. Ip and J. M. Kahn, "The Time-Reversed Twin", *Nature Photonics* vol. 7, pp. 507-508, July 2013 (Invited Paper).
84. 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.
85. S. Ö. Arik, 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.
86. 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.
87. 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.
88. 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.
89. 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.
90. 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.
91. 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.
92. 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.
93. 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.
  94. 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.
  95. 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.
  96. 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.
  97. 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.
  98. 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).
  99. 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.
  100. Y. Huo, S. Sandhu, J. Pan, N. Stuhmann, 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.
  101. 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.
  102. 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.
  103. 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.
  104. 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.
  105. 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.
  106. 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.
  107. 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).
  108. 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.
  109. 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.
  110. 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.
  111. 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.



112. 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.
113. 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.
114. 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.
115. 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.
116. 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.
117. 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.
118. 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.
119. 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.
120. 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.
121. 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.
122. 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.
123. 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.
124. 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.
125. 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.
126. 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.
127. 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.
128. A. P. T. Lau and J. M. Kahn, "Design of Inline Amplifier Gains and Spacings to Minimize Phase Noise in Optical Transmission Systems", *J. of Lightwave Technol.*, vol. 24, no. 3, pp. 1334-1341, March 2006.
129. E. Ip and J. M. Kahn, "Power Spectra of Return-to-Zero Optical Signals", *J. of Lightwave Technol.*, vol. 24, no. 3, pp. 1610-1618, March 2006.
130. L. Zhou, J. M. Kahn and K. S. J. Pister, "Scanning Micromirrors Fabricated by an SOI/SOI Wafer Bonding Process", *IEEE J. of Microelectromech. Syst.*, vol. 15, no. 1, pp. 24-32, February 2006.
131. E. Ip and J. M. Kahn, "Carrier Synchronization for 3- and 4-bit-per-Symbol Optical Transmission", *J. of Lightwave Technol.*, vol. 23, no. 12, pp. 4110-4124, December 2005.
132. X. Shen, J. M. Kahn and M. A. Horowitz, "Compensation for Multimode Fiber Dispersion by Adaptive Optics",

- Optics Lett.*, vol. 30, no. 22, pp. 2985-2987, November 15, 2005.
133. E. Ip, J. M. Kahn, D. Anthon and J. Hutchins, "Linewidth Measurements of MEMS-Based Tunable Lasers for Phase-Locking Applications", *IEEE Photon. Technol. Lett.*, vol. 17, no. 10, pp. 2029-2031, October 2005.
  134. S. Fan and J. M. Kahn, "Principal Modes in Multi-Mode Waveguides", *Optics Lett.*, vol. 30, no. 2, pp. 135-137, January 15, 2005.
  135. J. Wang and J. M. Kahn, "Accurate Bit-Error Ratio Computation in Nonlinear CRZ-OOK and CRZ-DPSK Systems", *IEEE Photon. Technol. Lett.*, vol. 16, no. 9, pp. 2165-2167, September 2004.
  136. J. Wang and J. M. Kahn, "Conventional DPSK vs. Symmetrical DPSK: Comparison of Dispersion Tolerances", *IEEE Photon. Technol. Lett.*, vol. 16, no. 6, pp. 1585-1587, June 2004.
  137. J. Wang and J. M. Kahn "Performance of Electrical Equalizers in Optically Amplified OOK and DPSK Systems", *IEEE Photon. Technol. Lett.*, vol. 16, no. 5, pp. 1397-1399, May 2004.
  138. J. M. Kahn and K.-P. Ho, "Spectral Efficiency Limits and Modulation/Detection Techniques for DWDM Systems", *IEEE J. on Sel. Topics in Quantum Electron.*, vol. 10, no. 2, pp. 259-272, March/April 2004 (Invited Paper).
  139. K.-P. Ho and J. M. Kahn, "Electronic Compensation Technique to Mitigate Nonlinear Phase Noise", *J. Lightwave Technol.*, vol. 22, no. 3, pp. 779-783, March 2004.
  140. K.-P. Ho and J. M. Kahn, "Spectrum of Externally Modulated Optical Signals", *J. of Lightwave Technol.*, vol. 22, no. 2, pp. 658-663, February 2004.
  141. J. Wang and J. M. Kahn, "Impact of Chromatic and Polarization-Mode Dispersions on DPSK Systems using Interferometric Demodulation and Direct Detection", *J. of Lightwave Technol.*, vol. 22, no. 2, pp. 362-371, February 2004.
  142. W. Mao and J. M. Kahn, "Free-space Heterochronous Imaging Reception of Multiple Optical Signals", *IEEE Trans. on Commun.*, vol. 52, no. 2, pp. 269-279, February 2004.
  143. X. Zhu and J. M. Kahn, "Performance Bounds for Coded Free-Space Optical Communications through Atmospheric Turbulence Channels", *IEEE Trans. on Commun.*, vol. 51, no. 8, pp. 1233-1239, August 2003.
  144. L. Zhou, J. M. Kahn and K.S.J. Pister, "Corner-Cube Retroreflectors Based on Structure-Assisted Assembly for Free-Space Optical Communication", *IEEE J. on Microelectromechanical Systems*, vol. 12, no. 3, pp. 233-242, June 2003.
  145. X. Zhu and J. M. Kahn, "Queueing Models of Optical Delay Lines in Synchronous and Asynchronous Optical Packet-Switching Networks", *Optical Engineering*, vol. 42, no. 6, pp. 1741-1748, June 2003.
  146. X. Zhu, J. M. Kahn and J. Wang, "Mitigation of Turbulence-Induced Scintillation Noise in Free-Space Optical Links using Temporal-Domain Detection Techniques", *IEEE Photon. Technol. Lett.*, vol. 15, no. 4, pp. 623-625, April 2003.
  147. X. Zhu and J. M. Kahn, "Markov Chain Model in Maximum-Likelihood Sequence Detection for Free-Space Optical Communication through Atmospheric Turbulence Channels", *IEEE Trans. on Commun.*, vol. 51, no. 3, pp. 509-516, March 2003.
  148. J. Wang, J. M. Kahn and K. Y. Lau, "Minimization of Acquisition Time in Short-Range Free-Space Optical Communication", *Applied Optics*, vol. 41, no. 12, pp. 7592-7602, December 2002.
  149. X. Zhu and J. M. Kahn, "Free-Space Optical Communication through Atmospheric Turbulence Channels", *IEEE Trans. on Commun.*, vol. 50, no. 8, pp. 1293-1300, August 2002.
  150. C. Chuah, D. Tse, J. M. Kahn and R.A. Valenzuela, "Capacity Scaling in MIMO Wireless Systems Under Correlated Fading", *IEEE Trans. on Information Theory*, vol. 48, pp. 637-650, March 2002.
  151. R. You and J. M. Kahn, "Upper-Bounding the Capacity of Optical IM/DD Channels with Multiple-Subcarrier Modulation and Fixed Bias using Trigonometric Moment Space Method", *IEEE Trans. on Information Theory*, vol. 48, pp. 514-523, February 2002.

152. X. Zhu, V.S. Hsu and J. M. Kahn, "Optical Modeling of MEMS Corner Cube Retroreflectors with Misalignment and Non-flatness", *IEEE J. on Sel. Topics in Quantum Electron.*, vol. 8, no. 1, pp. 26-32, January/February 2002.
153. R. You and J. M. Kahn, "Average Power Reduction Techniques for Multiple-Subcarrier Intensity-Modulated Optical Signals", *IEEE Trans. on Commun.* vol. 49, pp. 2164-2171, December 2001.
154. J. M. Kahn and K.-P. Ho, "A Bottleneck for Optical Fibres", *Nature*, vol. 411, pp. 1007-1010, June 28, 2001 (Invited Paper).
155. T. Ohtsuki and J. M. Kahn, "BER Performance of Turbo-Coded PPM CDMA Systems on Optical Fiber", *J. Lightwave Technol.*, vol. 18, no. 12, pp. 1776-1784, December 2000.
156. P. Djahani and J. M. Kahn, "Analysis of Infrared Wireless Links Employing Multi-Beam Transmitters and Imaging Diversity Receivers", *IEEE Trans. on Commun.*, vol. 48, no. 12, pp. 2077-2088, December 2000.
157. J. M. Kahn, R.H. Katz and K.S.J. Pister, "Emerging Challenges: Mobile Networking for 'Smart Dust'", *J. of Commun. and Networks*, vol. 2, no. 3, pp. 188-196, September 2000 (Invited Paper).
158. J. B. Carruthers and J. M. Kahn, "Angle Diversity for Nondirected Wireless Infrared Communication", *IEEE Trans. on Commun.*, vol. 48, no. 6, pp. 960-969, June 2000.
159. D. Shiu, G. Foschini, M. J. Gans and J. M. Kahn, "Fading Correlation and its Effect on the Capacity of Multi-Element Antenna Systems", *IEEE Trans. on Commun.* vol. 48, pp. 502-513, March 2000.
160. D. Shiu and J. M. Kahn, "Shaping and Non-Equiprobable Signaling for Intensity-Modulated Signals", *IEEE Trans. on Information Theory*, vol. 45, pp. 2661-2668, November 1999.
161. D. Shiu and J. M. Kahn, "Differential Pulse-Position Modulation for Power-Efficient Optical Communication", *IEEE Trans. on Commun.*, vol. 47, no. 8, pp. 1201-1210, August 1999.
162. M. D. Audeh, J. M. Kahn and J. R. Barry, "Decision-Feedback Equalization of Pulse-Position Modulation on Measured Non-Directed Indoor Infrared Channels", *IEEE Trans. on Commun.*, vol. 47, pp. 500-503, April 1999.
163. D. C. Lee and J. M. Kahn, "Coding and Equalization for PPM on Wireless Infrared Channels", *IEEE Trans. on Commun.*, vol. 47, no. 2, pp. 255-260, February 1999.
164. J. M. Kahn, P. Djahani, A. G. Weisbin, K. T. Beh, A. P. Tang and R. You, "Imaging Diversity Receivers for High-Speed Infrared Wireless Communications", *IEEE Communications Magazine*, vol. 36, no. 12, pp. 88-94, December 1998.
165. K.-P. Ho and J. M. Kahn, "Joint Design of Channel-Optimized Quantizer and Multicarrier Modulation", *IEEE Trans. on Commun.*, vol. 46, no. 10, pp. 1254-1257, October 1998.
166. J. B. Carruthers and J. M. Kahn, "Modeling of Nondirected Wireless Infrared Channels", *IEEE Trans. on Commun.*, vol. 45, no. 10, pp. 1260-1268, October 1997.
167. G. W. Marsh and J. M. Kahn, "Channel Reuse Strategies for Indoor Infrared Wireless Communications", *IEEE Trans. on Commun.*, vol. 45, no. 10, pp. 1280-1290, October 1997.
168. D. C. Lee, J. M. Kahn and M. D. Audeh, "Trellis-Coded Pulse-Position Modulation for Indoor Wireless Infrared Communications", *IEEE Trans. on Commun.*, vol. 45, pp. 1080-1087, September 1997.
169. J. M. Kahn and J. R. Barry, "Wireless Infrared Communications", *Proc. of the IEEE*, vol. 85, no. 2, pp. 265-298, February 1997 (Invited Paper).
170. K.-P. Ho and J. M. Kahn, "Image Transmission Over Noisy Channels Using Multicarrier Modulation", *Signal Processing: Image Communication*, vol. 9, no. 2, pp. 159-169, January 1997.
171. R. Narasimhan, M. D. Audeh and J. M. Kahn, "Effect of Electronic-Ballast Fluorescent Lighting on Wireless Infrared Links", *IEE Proceedings-Optoelectronics*, vol. 143, no. 6, pp. 347-354, December 1996.
172. K.-P. Ho and J. M. Kahn, "Transmission of Analog Signals using Multicarrier Modulation: a Combined Source-Channel Coding Approach", *IEEE Trans. on Commun.*, vol. 44, no. 11, pp. 1432-1443, November 1996.
173. K.-P. Ho and J. M. Kahn, "Optimal Predistortion of Gaussian Inputs for Clipping Channels", *IEEE Trans. on Commun.*, vol. 44, no. 11, pp. 1505-1513, November 1996.

174. G. W. Marsh and J. M. Kahn, "Performance Evaluation of Experimental 50-Mb/s Diffuse Infrared Wireless Link using On-Off Keying with Decision-Feedback Equalization", *IEEE Trans. on Commun.*, vol. 44, no. 11, pp. 1496-1504, November 1996.
175. K.-P. Ho and J. M. Kahn, "Methods for Crosstalk Measurement and Reduction in Dense WDM Systems", *J. Lightwave Technol.*, vol. 14., pp. 1127-1135, June 1996.
176. M. D. Audeh, J. M. Kahn and J. R. Barry, "Performance of Pulse-Position Modulation on Measured Non-Directed Indoor Infrared Channels", *IEEE Trans. on Commun.*, vol. 44, pp. 654-659, June 1996.
177. J. B. Carruthers and J. M. Kahn, "Multiple-Subcarrier Modulation for Non-Directed Wireless Infrared Communication", *IEEE J. Sel. Areas in Commun.*, vol. 14, pp. 538-546, April 1996.
178. K.-P. Ho and J. M. Kahn, "On Models of Clipping Distortion for Lightwave CATV Systems", *IEEE Photon. Technol. Lett.*, vol. 8, no. 1, pp. 125-126, January 1996.
179. K.-P. Ho and J. M. Kahn, "Exact Probability Density Function for Phase-Measurement Interferometry", *J. Opt. Soc. Am. A*, vol. 12, no. 9, pp. 1984-1989, September 1995.
180. J. R. Barry and J. M. Kahn, "Link Design for Non-Directed Wireless Infrared Communications", *Applied Optics*, vol. 34, no. 19, pp. 3764-3776, July 1995.
181. M. D. Audeh and J. M. Kahn, "Performance Evaluation of Baseband OOK for Wireless Indoor Infrared LANs Operating at 100 Mb/s", *IEEE Trans. on Commun.*, vol. 43, no. 6, pp. 2085-2094, June 1995.
182. K.-P. Ho and J. M. Kahn, "Compound Parabolic Concentrators for Narrow-Band Wireless Infrared Receivers", *Optical Engineering*, vol. 34, no. 5, pp. 1385-1395, May 1995.
183. J. M. Kahn, W. J. Krause and J. B. Carruthers, "Experimental Characterization of Non-Directed Indoor Infrared Channels", *IEEE Trans. on Commun.*, vol. 43, pp. 1613-1623, April 1995.
184. G. W. Marsh and J. M. Kahn, "50-Mb/s Diffuse Infrared Free-Space Link Using On-Off Keying with Decision Feedback Equalization", *IEEE Photon. Technol. Lett.*, vol. 6, no. 10, pp. 1268-1270, October 1994.
185. J. M. Kahn, J. R. Barry, M. D. Audeh, J. B. Carruthers, W. J. Krause, and G. W. Marsh, "Non-Directed Infrared Links for High-Capacity Wireless LANs", *IEEE Pers. Commun. Mag.* vol. 1, no. 2, pp. 12-25, 1994 (Invited Paper).
186. L. A. Buckman, J. B. Georges, J. Park, D. Vassilovski, J. M. Kahn and K. Y. Lau, "Stabilization of Millimeter-Wave Frequencies from Passively Mode-Locked Semiconductor Lasers Using an Opto-Electronic Phase-Locked Loop", *IEEE Photon. Technol. Lett.*, vol. 5, no. 10, pp. 1137-1140, October 1993.
187. K.-P. Ho and J. M. Kahn, "Equalization Technique to Reduce Laser Clipping-Induced Distortion in Subcarrier-Multiplexed Lightwave Systems", *IEEE Photon. Technol. Lett.*, vol. 5, no. 9, pp. 1100-1103, September 1993.
188. K.-P. Ho, J. D. Walker and J. M. Kahn, "External Optical Feedback Effects on Intensity Noise of Vertical-Cavity Surface-Emitting Lasers", *IEEE Photon. Technol. Lett.*, vol. 5, no. 8, pp. 892-895, August 1993.
189. K.-P. Ho and J. M. Kahn, "Optical Frequency Comb Generator Using Phase Modulation in Amplified Circulating Loop", *IEEE Photon. Technol. Lett.*, vol. 5, no. 6, pp. 721-725, June 1993.
190. J. R. Barry, J. M. Kahn, W. J. Krause, E. A. Lee, and D. G. Messerschmitt, "Simulation of Multipath Impulse Response for Wireless Optical Channels", *IEEE J. Sel. Areas in Commun.*, vol. 11, no. 3, pp. 367-379, April 1993.
191. J. M. Kahn, A. M. Porter and U. Padan, "Heterodyne Detection of 310-Mb/s Quadrature-Phase-Shift Keying Using Fourth-Power Optical Phase-Locked Loop", *IEEE Photon. Technol. Lett.*, vol. 4, pp. 1397-1400, December 1992.
192. J. R. Barry and J. M. Kahn, "Carrier Synchronization for Homodyne and Heterodyne Detection of Optical Quadrature-Phase-Shift Keying", *J. Lightwave Technol.*, vol. 10, pp. 1939-1951, December 1992.
193. J. R. Barry, J. M. Kahn, E. A. Lee, and D. G. Messerschmitt, "High-Speed Nondirective Optical Communication for Wireless Networks", *IEEE Network Magazine*, pp. 44-54, November 1991.
194. C. R. Giles, J. M. Kahn, S. K. Korotky, J. J. Veselka, C. A. Burrus, J. S. Perino and H. M. Presby, "Polarization Effects on Ultra-Long Distance Signal Transmission in Amplified Optical-Fiber Loops", *IEEE Photon. Technol.*

- Lett.*, vol. 3, pp. 948-951, October 1991.
195. A. H. Gnauck, K. C. Reichmann, J. M. Kahn, S. K. Korotky, J. J. Veselka and T. L. Koch, "4 Gbit/s Heterodyne Transmission Experiments Using ASK, FSK, and DPSK Modulation," *IEEE Photon. Technol. Lett.*, vol. 2, pp. 908-910, December 1990.
  196. J. M. Kahn, "BPSK Homodyne Detection Experiment Using Balanced Optical Phase-Locked Loop with Quantized Feedback," *IEEE Photon. Technol. Lett.*, vol. 2, pp. 840-843, November 1990.
  197. J. M. Kahn, A. H. Gnauck, J. J. Veselka, S. K. Korotky and B. L. Kasper, "4 Gbit/s PSK Homodyne Transmission System Using Phase-Locked Semiconductor Lasers," *IEEE Photon. Technol. Lett.*, vol. 2, pp. 285-287, April 1990.
  198. J. M. Kahn, "1 Gbit/s PSK Homodyne Transmission System Using Phase-Locked Semiconductor Lasers," *IEEE Photon. Technol. Lett.*, vol. 1, pp. 340-342, October 1989.
  199. J. M. Kahn, C. A. Burrus and G. Raybon, "High-Stability 1.5  $\mu\text{m}$  External-Cavity Lasers for Phase-Lock Applications," *IEEE Photon. Technol. Lett.*, vol. 1, pp. 159-161, July 1989.
  200. J. M. Kahn, B. L. Kasper and K. J. Pollock, "Optical Phaselock Receiver with Multi-Gigahertz Signal Bandwidth," *Electron. Lett.*, vol. 25, pp. 626-627, May 1989.
  201. C. R. Giles and J. M. Kahn, "1 Gbit/s Integrate-and-Dump Filter for Digital Communication Systems," *Electron. Lett.*, vol. 25, pp. 212-214, February 1989.
  202. J. M. Kahn, I. M. I. Habbab and C. R. Giles, "1 Gbit/s Zero-IF DPSK Coherent Optical System Using a Single Photodetector," *Electron. Lett.*, vol. 24, pp. 1455-1456, November 1988.
  203. I. M. I. Habbab, J. M. Kahn and L. J. Greenstein, "Phase-Insensitive Zero-IF Coherent Optical System Using Phase Switching," *Electron. Lett.*, vol. 24, pp. 974-975, July 1988.
  204. J. M. Kahn, R. E. McMurray, Jr., E. E. Haller and L. M. Falicov, "Trigonal Hydrogen-Related Acceptor Complexes in Germanium," *Phys. Rev. B*, vol. 36, pp. 8001-8014, November 15, 1987.
  205. R. E. McMurray, Jr., N. M. Haegel, J. M. Kahn and E. E. Haller, "Beryllium-Hydrogen and Zinc-Hydrogen Shallow Acceptor Complexes in Germanium," *Solid State Commun.*, vol. 61, pp. 27-32, January 1987.
  206. J. M. Kahn, "Hydrogen-Related Acceptor Complexes in Germanium", Ph.D. Thesis, Dept. of Physics, Univ. of Calif., Berkeley, November 1986, Lawrence Berkeley Laboratory Report # 22652.
  207. J. M. Kahn, L. M. Falicov and E. E. Haller, "Isotope-Induced Symmetry Change in Dynamic Semiconductor Defects," *Phys. Rev. Lett.*, vol. 57, pp. 2077-2080, October 20, 1986.
  208. S. J. Pearton, W. L. Hansen, E. E. Haller and J. M. Kahn, "Hydrogenation of Gold-Related Levels in Silicon by Electrolytic Doping," *J. Appl. Phys.*, vol. 55, pp. 1221-1223, February 1984.
  209. S. J. Pearton, E. E. Haller and J. M. Kahn, "Quenched-In Deep Acceptors in Germanium," *J. Phys. C*, vol. 17, pp. 2375-2379, May 10, 1984.
  210. S. J. Pearton, J. M. Kahn, W. L. Hansen and E. E. Haller, "Deuterium in Germanium: Interaction with Point Defects," *J. Appl. Phys.*, vol. 55, pp. 1464-1471, March 15, 1984.
  211. S. J. Pearton, A. J. Tavendale, J. M. Kahn and E. E. Haller, "The Nature of the Dominant Gamma-Induced Defects in High-Purity Germanium," *Rad. Effects*, vol. 81, pp. 293-308, March 1984.
  212. S. J. Pearton, A. J. Tavendale, J. M. Kahn and E. E. Haller, "Deep Level Impurities in Germanium and Silicon: Low Temperature Passivation or Removal Techniques," *IEEE Trans. Nucl. Sci.*, vol. NS-31, pp. 326-330, February 1984.
  213. S. J. Pearton, J. M. Kahn and E. E. Haller, "Deep Level Effects in Silicon and Germanium after Plasma Hydrogenation," *J. Electron. Matls.*, vol. 12, pp. 1003-1014, November 1983.
  214. S. J. Pearton and J. M. Kahn, "Dislocations in Germanium: Effects of Plasma Hydrogenation," *Phys. Stat. Solidi A*, vol. 78, pp. K65-K69, July 16, 1983.

### Invited Conference Presentations

215. D. A. A. Mello, H. Srinivas, K. Choutagunta, R. S. B. Ospina and J. M. Kahn, "Impact and Mitigation of Mode-Dependent Gain in Ultra-Long-Haul SDM Systems, to be presented at Optical Fiber Commun. Conf., San Diego, CA, March 5-9, 2023.
216. J. M. Kahn and A. Belmonte, "Modal Multiplexing and Atmospheric Turbulence Mitigation in Free-Space Optical Communications", tutorial presentation at Euro. Conf. on Optical Commun., Basel, Switzerland, September 18-22, 2022.
217. E. Chou and J. M. Kahn, "Achievable Rates of Coupled SDM Systems Utilizing Successive Interference Cancellation", *Proc. of Optica Advanced Photonics Congress on Signal Processing in Photonic Commun.*, Maastricht, Netherlands, July 25-28, 2022.
218. A. Belmonte and J. M. Kahn, "Optimal Modes for Spatially Multiplexed Free-Space Communications", *Proc. of IEEE Phot. Soc. Summer Topical Meeting on Space Division Multiplexing*, Cabo San Lucas, Mexico, July 11-13, 2022.
219. D. A. A. Mello, H. Srinivas, K. Choutagunta, R. S. B. Ospina and J. M. Kahn, "Impact of Mode-Dependent Gain on the Capacity of Ultra-Long-Haul SDM Systems", *Proc. of IEEE Phot. Soc. Summer Topical Meeting on Space Division Multiplexing*, Cabo San Lucas, Mexico, July 11-13, 2022.
220. E. Chen, B. Buscaino and J. M. Kahn, "Frequency Comb-Based Analog Coherent Data Center Links", in Workshop S1E Time to Face the Cost Per Bit "Crunch": Trends and Expectations for the Next Decade, Optical Fiber Commun. Conference, San Diego, CA, March 6-10, 2022.
221. J. M. Kahn, "Extremes: From Coherent Data Center Links to Amplifier Physics-Optimized Submarine Cables", plenary talk at Extremely Advanced Optical Transmission Technologies Symposium, Matsue, Japan, November 3-5, 2021.
222. H. Srinivas, J. D. Downie, J. M. Kahn, J. Hurley, X. Liang, J. Himmelreich, J. K. Perin and D. A. A. Mello, "Power Efficiency Measurements in Amplifier Physics-Optimized Power-Limited SDM Submarine Transmission Systems", Optoelectron. and Commun. Conf., Hong Kong, July 3-7, 2021.
223. E. Chou, H. Srinivas and J. M. Kahn, "Phase Retrieval-Based Coherent Receivers", *Proc. of Optical Fiber Commun. Conf.*, San Francisco, CA, June 6-10, 2021.
224. J. M. Kahn, B. Buscaino, J. K. Perin and A. Shastri, "Drivers and Design Options for Coherent Links in Data Centers", plenary talk at IEEE Optical Interconnects Conf., Vancouver, BC, September 27-October 1, 2020.
225. B. Buscaino, J. M. Kahn and B. D. Taylor, "External vs. Integrated Light Sources for Co-Packaged Intra-Data Center Optics", *Proc. of IEEE Photonics Conf.*, Vancouver, BC, September 27-October 1, 2020.
226. H. Srinivas, E. Chou, D. A. A. Mello, K. Choutagunta and J. M. Kahn, "Impact and Mitigation of Polarization- or Mode-Dependent Amplifier Gain in Ultra-Long-Haul Systems", *Proc. of Intl. Conf. on Transparent Optical Networks*, July 19-23, 2020.
227. J. M. Kahn, J. K. Perin and A. Shastri, "Low-Complexity Coherent Interfaces for Intra-Data Center Networks", tutorial at IEEE Phot. Soc. Summer Topical Meeting on Coherent Optics for Short-Reach Networks, July 13-15, 2020.
228. K. Choutagunta and J. M. Kahn, "Topology Optimization of Multimode Optical Fibers", *Proc. of IEEE Phot. Soc. Summer Topical Meeting on Space Division Multiplexing*, July 13-15, 2020.
229. K. Choutagunta and J. M. Kahn, "Dynamic Mode Coupling in Mode-Division-Multiplexed Systems", *Proc. of Conf. on Lasers and Electro-Optics*, San Jose, CA, May 10-15, 2020.
230. J. M. Kahn, J. K. Perin and A. Shastri, "Data Center Links Beyond 100 Gb/s per Wavelength", tutorial at Optical Fiber Commun. Conf., San Diego, CA, March 8-12, 2020.
231. J. M. Kahn, "Revolutions at the Extremes in Optical Communications", plenary talk at Intl. Microwave and Optoelectronics Conf., Aveiro, Portugal, November 10-14, 2019.
232. B. Buscaino, J. M. Kahn and B. D. Taylor, "Coherent Co-packaged Optical Interfaces for Next-Generation Electrical Switches" *Proc. of IEEE Photonics Conf.*, San Antonio, TX, September 29-October 3, 2019.

233. J. K. Perin, J. M. Kahn, J. D. Downie, J. Hurley and K. Bennett, "Substantial Capacity Increase via Optimized Power/Bit Allocation in Spatially Multiplexed Power-Limited Submarine Systems", *Proc. of OSA Signal Processing in Photonic Communications*, July 29-August 1, 2019, Burlingame, CA.
234. E. S. Chou and J. M. Kahn, "Adaptive Coding and Modulation for Robust 50G PONs", *Proc. of Intl. Conf. on Transparent Optical Networks*, Angers, France, July 9-13, 2019.
235. K. Choutagunta, I. Roberts, D. A. B. Miller and J. M. Kahn, "Mach-Zehnder Mesh Adaptation Methods for Direct-Detection Mode-Division Multiplexing", *Proc. of IEEE Phot. Soc. Summer Topical Meeting on Programmable Photonics*, Ft. Lauderdale, FL, July 8-10, 2019.
236. E. S. Chou, T. Hayashi, T. Nagashima, J. M. Kahn and T. Nakanishi, "Stable Measurement of Near/Far Field Profiles of Coupled Multi-Core Fiber", *Proc. of Optoelectronics and Communications Conference*, Fukuoka, Japan, July 7-11, 2019.
237. K. Choutagunta, R. Ryf, N. Fontaine, S. Wittek, J. C. Alvarado-Zacarias, M. Mazur, H. Chen, R.-J. Essiambre, R. Amezcua-Correa, T. Hayashi, Y. Tamura, T. Hasegawa, T. Taru and J. M. Kahn, "Modal Dynamics in Spatially Multiplexed Links", *Proc. of Optical Fiber Commun. Conf.*, San Diego, CA, March 3-7, 2019.
238. J. K. Perin, A. Shastri and J. M. Kahn, "Sensitivity and Power Consumption of Direct Detection and Coherent Receivers for Intra- and Inter-Data Center Systems", presentation in workshop on Will Advanced Direct-Detection Systems Ever Be the Solution of Choice for Metro, Access, and Data Center Applications?, *Optical Fiber Commun. Conf.*, San Diego, CA, March 3-7, 2019.
239. J. M. Kahn, B. Buscaino and B. D. Taylor, "Coherent Co-Packaged Optical Interfaces in Next-Generation Electrical Switches", presentation in workshop on Will Coherent Optics Become a Reality for Intra-Data Center Applications?, *Optical Fiber Commun. Conf.*, San Diego, CA, March 3-7, 2019.
240. K. Choutagunta, S. O. Arik, K.-P. Ho and J. M. Kahn, "Modal Dispersion and Mode-Dependent Loss in Multimode fibers: Modeling, Measurement and Compensation", *Proc. of IEEE Intl. Photon. Conf.*, Reston, VA, September 30-October 4, 2018.
241. K. Choutagunta, I. Roberts and J. M. Kahn, "Modeling and Tracking Dynamic Mode Coupling in MDM Systems", *Proc. of Euro. Conf. on Optical Commun.*, Rome, IT, September 23-27, 2018.
242. J. K. Perin, A. Shastri and J. M. Kahn, "DSP-Free Coherent Receivers for Data Center Links", Presentation in Workshop on Has the Time Come for Coherent Optics in the Data Centres?, *Euro. Conf. on Optical Commun.*, Rome, IT, September 23-27, 2018.
243. J. K. Perin, I. Roberts and J. M. Kahn, "Maximizing Capacity via Channel Power Optimization under Energy Constraints", *Proc. of IEEE Phot. Soc. Summer Topical Meeting on Machine Learning-Assisted Software-Defined Optical Networks*, Waikoloa, HI, July 9-11, 2018.
244. K. Choutagunta and J. M. Kahn, "Models for Mode Coupling Dynamics for Mode-Division Multiplexing", *Proc. of IEEE Phot. Soc. Summer Topical Meeting on Space-Division Multiplexing and Beyond*, Waikoloa, HI, July 9-11, 2018.
245. I. Roberts, J. K. Perin and J. M. Kahn, "Improving the Capacity of Terrestrial and Submarine Systems via Channel Power Optimization", *Proc. of Intl. Conf. on Trans. Optical Networks*, Bucharest, Romania, July 1-5, 2018.
246. J. K. Perin, A. Shastri and J. M. Kahn, "DSP-Free Coherent Interconnects for Data Center Networks", *Proc. of IEEE Optical Intercon. Conf.*, Santa Fe, NM, June 4-6, 2018.
247. J. M. Kahn, "Capacity Limits for Spatially Multiplexed Free-Space Optical Communication", keynote talk at Signal and Image Sciences Workshop, Center for Advanced Signal and Imaging Sciences, Lawrence Livermore National Laboratory, Livermore, CA, May 23, 2018.
248. I. Roberts and J. M. Kahn "Convex Optimization for Channel Rate and Power Control", Panel Presentation in Workshop on AI-Assisted Automated Network Operation, *Optical Fiber Commun. Conf.*, San Diego, CA, March 11-15, 2018.
249. J. K. Perin, A. K. Shastri and J. M. Kahn, "DSP-Free Coherent Receivers for Data Center Links", *Proc. of Optical Fiber Commun. Conf.*, San Diego, CA, March 11-15, 2018.

250. J. M. Kahn and A. Belmonte, "Approaching Fundamental Limits to Free-Space Communication through Atmospheric Turbulence", *Proc. of Photon. West*, San Francisco, CA, January 27-February 1, 2018.
251. J. K. Perin, A. K. Shastri and J. M. Kahn, "Data Center Links beyond 100 Gb/s per Wavelength", *Proc. of Photon. West*, San Francisco, CA, January 27-February 1, 2018.
252. A. Belmonte and J. M. Kahn, "Achieving Fundamental Limits to Free-Space Optical System Capacity Imposed by Atmospheric Turbulence", ICERM Workshop on Waves and Imaging in Random Media, Providence, RI, September 25-29, 2017.
253. K. Choutagunta and J. M. Kahn, "Low-Complexity Modeling of Dynamic Mode-Division Multiplexing Channels", *Proc. of OSA Topical Meeting on Photonic Networks and Devices*, New Orleans, LA, July 24-27, 2017.
254. J. M. Kahn, "Optical Communications for Data Centers", Panel Presentation in Workshop on Prospects and Challenges for Photonic Technologies Inside Data Centers, OSA Topical Meeting on Photonic Networks and Devices, New Orleans, LA, July 24-27, 2017.
255. J. M. Kahn and G. Li, "Capacity Limits for Spatially Multiplexed Free-Space Optical Communication", NSF Workshop on Free-Space Optical Networks, Arlington, VA, July 13-14, 2017.
256. K. Choutagunta, S. Ö. Arık, M. Moradshahi and Joseph M. Kahn, "Optical MIMO Signal Processing for Direct-Detection Mode-Division Multiplexing", *Proc. of Intl. Conf. on Trans. Optical Networks*, Girona, Spain, July 2-6, 2017.
257. J. M. Kahn, G. Li, X. Li and N. Zhao, "Capacity Limits for Spatially Multiplexed Free-Space Communication", *Proc. of Optical Fiber Commun. Conf.*, Los Angeles, CA, March 19-23, 2017.
258. S. Ö. Arık and J. M. Kahn, "Optical MIMO Processing for Direct-Detection Mode-Division Multiplexing", *Proc. of Euro. Conf. on Optical Commun.*, Düsseldorf, Germany, September 18-22, 2016.
259. K. Choutagunta and J. M. Kahn, "Dynamic Channel Modeling for Mode-Division Multiplexing", *Proc. of Euro. Conf. on Optical Commun.*, Düsseldorf, Germany, September 18-22, 2016.
260. J. M. Kahn, G. Li, X. Li and N. Zhao, "To Twist or Not to Twist: Capacity Limits for Free-Space Channels", *Proc. OSA Topical Meeting on Signal Processing in Photonic Communication*, Vancouver, BC, July 18-20, 2016.
261. K. Choutagunta and J. M. Kahn, "Dynamic Channel Modeling for Mode-Division Multiplexing", *Proc. IEEE Photonics Society Summer Topical on Space-Division Multiplexing and Multimode Photonics*, Newport Beach, CA, July 11-13, 2016.
262. J. M. Kahn, G. Li, X. Li and N. Zhao, "Are OAM States an Optimal Basis for Spatially Multiplexed Free-Space Links?", *Proc. IEEE Photonics Society Summer Topical on Optical Wireless Communication*, Newport Beach, CA, July 11-13, 2016.
263. J. M. Kahn, G. Li, X. Li and N. Zhao, "Comparing OAM and Other Basis Sets for Spatially Multiplexed Free-Space Links", *Proc. of OSA Photonics North Conference*, Québec, QC, May 24-26, 2016.
264. J. M. Kahn, G. Li, X. Li and N. Zhao, "Capacity Limits of Spatially Multiplexed Free-Space Communication", SU2P Symposium, Edinburgh, UK, April 4-5, 2016.
265. S. Ö. Arık, K.-P. Ho and J. M. Kahn, "Group Delay Statistics and Management in Mode-Division Multiplexing", *Proc. of Asilomar Conf. on Signals, Systems and Computers*, Pacific Grove, CA, November 8-11, 2015.
266. D. A. A. Mello, A. N. Barreto, T. C. Lima, T. F. Portela, L. Beygi and J. M. Kahn, "Variable-Code-Rate Transceivers: Impact on Cost, Throughput and Survivability of Wavelength-Routed Networks", European Conference on Optical Communication, Valencia, Spain, September 27-October 1, 2015.
267. J. M. Kahn, S. Ö. Arık and K.-P. Ho, "MIMO Channel Statistics and Signal Processing in Mode-Division Multiplexing Systems", *Proc. of 16<sup>th</sup> IEEE Intl. Workshop on Signal Processing Advances in Wireless Communications*, Stockholm, Sweden, June 28-July 1, 2015.
268. S. Ö. Arık, D. Askarov and J. M. Kahn, "MIMO DSP Complexity in Mode-Division Multiplexing", *Proc. of Optical Fiber Commun. Conf.*, Los Angeles, CA, March 22-26, 2015.



269. S. Ö. Arik, D. Askarov and J. M. Kahn, "MIMO Signal Processing in Mode-Division Multiplexing Systems", *Proc. of SPIE Photonics West*, San Francisco, CA, February 7-12, 2015.
270. S. Ö. Arik, K.-P. Ho and J. M. Kahn, "Roles of Spectral and Spatial Aggregation in Optical Network Scaling", *Proc. of SPIE Photonics West*, San Francisco, CA, February 7-12, 2015.
271. S. Ö. Arik and J. M. Kahn, "Adaptive MIMO Signal Processing in Mode-Division Multiplexing", *Proc. of IEEE Photonics Society Summer Topical Meeting on Space-Division Multiplexing Technologies for High-Capacity Transmission*, Montreal, QC, July 14-16, 2014.
272. J. M. Kahn "Digital Signal Processing for Short-Reach Optical Links", Panel Presentation in Workshop on DSP for Short-Reach Applications, Optical Fiber Commun. Conf., San Francisco, CA, March 9-13, 2014.
273. J. M. Kahn, "Four-Fold Resolution Increase in Scan-Free Single-Fiber Endoscopic Imaging", Berkeley Photonics Symposium, Berkeley, CA, February 10-11, 2014.
274. J. M. Kahn and K.-P. Ho, "Modal Statistics in Mode-Division-Multiplexed Systems", *Proc. of European Conference on Optical Communication*, London, UK, September 22-26, 2013.
275. J. M. Kahn, "Four-Fold Resolution Increase in Scan-Free Single-Fiber Endoscopic Imaging", SU2P Symposium, Glasgow, UK, April 15-16, 2013.
276. J. M. Kahn and K.-P. Ho, "Mode-Division Multiplexing Systems: Propagation Effects, Performance and Complexity", *Proc. of Optical Fiber Commun. Conf.*, Anaheim, CA, March 17-21, 2013.
277. J. M. Kahn and K.-P. Ho, "Mode Coupling in Coherent Mode-Division-Multiplexed Systems: Impact on Capacity and Signal Processing Complexity", *Proc. of Asilomar Conf. on Signals, Systems and Computers*, Pacific Grove, CA, November 4-7, 2012.
278. J. M. Kahn, "Optical MIMO Transmission: Opportunities and Challenges", Plenary Talk at 30th Brazilian Telecommunications Symposium, Brasília, Brazil, September 13-16, 2012.
279. J. M. Kahn, Daniel J. F. Barros and Sarah Kate Wilson, "Multi-Carrier versus Single-Carrier Intensity Modulation Techniques for Indoor Optical Wireless Links", *Proc. of IEEE Photonics Society Summer Topical on Optical Wireless Systems and Applications*, Seattle, WA, July 9-11, 2012.
280. J. M. Kahn, K.-P. Ho and M. B. Shemirani, "Mode-Coupling Effects in Multimode Fibers", *Proc. of Optical Fiber Commun. Conf.*, Los Angeles, CA, March 4-8, 2012.
281. J. M. Kahn, "Bandwidth-Scalable OFDM Long-Haul Transmission", *Proc. of IEEE Photonics 2011 Conference*, Arlington, VA, October 9-13, 2011.
282. D. J. F. Barros, J. M. Kahn and S. K. Wilson, "Comparison of Multi-Carrier and Single-Carrier Intensity Modulation Techniques for Indoor Optical Wireless Links", *Proc. of IEEE Photonics 2011 Conference*, Arlington, VA, October 9-13, 2011.
283. D. J. F. Barros, J. M. Kahn, J. P. Wilde and T. Abou Zeid, "System Architecture for Bandwidth-Scalable OFDM Long-Haul Transmission", *Proc. of IEEE Photon. Soc. Summer Topical Meeting on Terabit Optical Ethernet*, Montreal, QC, July 18-20, 2011.
284. J. M. Kahn, "Understanding and Exploiting Multimode Fiber Dispersion", presented at OIDA Short-Distance High Density Optical Interconnects Roadmapping Workshop, Stanford, CA, April 12-13, 2011.
285. G.-H. Gho and J. M. Kahn, "Rate-Adaptive Modulation and Coding for Optical Fiber Transmission Systems", *Proc. of SPIE Photonics West*, San Francisco, CA, January 22-27, 2011.
286. J. M. Kahn and G.-H. Gho, "Rate-Adaptive Transmission Techniques for Optical Fiber Systems", *Proc. of OSA Annual Meeting*, Rochester, NY, October 24-29, 2010.
287. G.-H. Gho and J. M. Kahn, "Rate-Adaptive Coding for Optical Fiber Transmission Systems", *Proc. of OSA Topical Meeting on Signal Processing in Photonic Communication*, Karlsruhe, Germany, June 21-24, 2010.
288. S. E. Harris, C. Belthangady, C.-S. Chuu, S. Du, P. Kolchin, S. Sensarn, I. A. Yu, J. M. Kahn and G. Y. Yin, "Modulation of Photons and Biphotons", *Proc. of OSA Conference on Lasers and Electro-Optics*, San Jose, CA, May 16-21, 2010.

289. A. Belmonte and J. M. Kahn, "Analysis of a Field-Conjugation Adaptive Array for Coherent Free-Space Optical Links", *Proc. of OSA Topical Meeting on Applications of Lasers for Sensing and Free Space Communications*, San Diego, CA, January 31-February 3, 2010.
290. A. Belmonte and J. M. Kahn, "Understanding the Performance of Atmospheric Free-Space Laser Communications Systems using Coherent Detection", *Proc. of SPIE Photonics West*, San Francisco, CA, January 23-28, 2010, paper number 7588-1.
291. A. Belmonte and J. M. Kahn, "Fundamental Limits on Diversity Coherent Reception on Atmospheric Optical Channels", *Proc. of Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, November 1-4, 2009.
292. M. B. Shemirani and J. M. Kahn, "Principal Modes in Graded-Index Multimode Fibers", *Proc. of OSA Annual Meeting*, San Jose, CA, October 11-15, 2009.
293. J. M. Kahn and E. Ip, "Principles of Digital Coherent Receivers for Optical Communications", *Proc. of Optical Fiber Communications Conference*, San Diego, CA, March 22-26, 2009.
294. E. Ip and J. M. Kahn, "Increasing Optical Fiber Transmission Capacity Beyond Next-Generation Systems", *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, Newport Beach, CA, November 9-13, 2008.
295. E. Ip, A. P. T. Lau, D. J. F. Barros and J. M. Kahn, "Compensation of Dispersion and Nonlinearity in WDM Transmission using Simplified Digital Backpropagation", *Proc. of IEEE LEOS Summer Topical on Coherent Optical Communication Systems*, Acapulco, Mexico, July 21-23, 2008.
296. E. Ip, A. P. T. Lau, D. J. F. Barros and J. M. Kahn, "Compensation of Chromatic Dispersion and Nonlinearity using Simplified Digital Backpropagation", *Proc. of OSA Topical Meeting on Coherent Optical Technologies and Applications*, Boston, MA, July 13-16, 2008.
297. A. Belmonte and J. M. Kahn, "Performance of Synchronous or Nonsynchronous Receivers Using Atmospheric Compensation Techniques", *Proc. of OSA Topical Meeting on Coherent Optical Technologies and Applications*, Boston, MA, July 13-16, 2008.
298. J. M. Kahn, "Spectral Efficiency Limits and How to Approach Them", Panel Presentation at IEEE LEOS Summer Topical on Advanced Digital Signal Processing in Next-Generation Fiber-Optic Transmission, Portland, OR, July 23-25, 2007.
299. J. M. Kahn and E. Ip, "Advanced Modulation Formats and Digital Signal Processing in Optical Communications", *Proc. of Conference on Lasers and Electro-Optics*, Baltimore, MD, May 7-11, 2007
300. J. M. Kahn, "Compensating Multimode Fiber Dispersion using Adaptive Optics", *Proc. of Optical Fiber Communications Conference*, paper number OTuL1, Anaheim, CA, March 25 - 29, 2007.
301. J. M. Kahn and L. G. Kazovsky, "Coherent Optical Communications: Fundamentals and Future Prospects", *Proc. of OSA Annual Meeting*, Rochester, NY, October 8-12, 2006.
302. K.-P. Ho and J. M. Kahn, "Electronic Compensation of Linear and Nonlinear Impairments in Phase-Modulated Systems", *Proc. of OSA Annual Meeting*, Rochester, NY, October 8-12, 2006.
303. J. M. Kahn, "Modulation and Detection Techniques for Optical Communication Systems", *Proc. of OSA Topical Meeting on Coherent Optical Technologies and Applications*, paper number CThC1, Whistler, BC, June 28-30, 2006.
304. J. M. Kahn and K.-P. Ho, "Spectral Efficiency Limits in DWDM Systems", *Proc. of 31st Euro. Conf. on Optical Commun.*, Glasgow, Scotland, September 25-29, 2005.
305. K.-P. Ho and J. M. Kahn, "Electronic Compensation of Nonlinear Phase Noise for Phase-Modulated Signals", *Proc. of 31st Euro. Conf. on Optical Commun.*, Glasgow, Scotland, September 25-29, 2005.
306. J. M. Kahn and K.-P. Ho, "Modulation and Detection Techniques for DWDM Systems", *Proc. of 2004 Tyrrhenian International Workshop on Digital Communications*, Pisa, Italy, October 17-18, 2004. Published in: *Optical Communication Theory and Techniques*, E. Forestieri, Editor, Springer, 2004, pp. 13-20.
307. X. Zhu and J. M. Kahn, "Communication Techniques to Mitigate Atmospheric Turbulence in Free-Space Optical

- Links”, *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, pp. 89-90, Tucson, AZ, October 26-30, 2003.
308. J. M. Kahn, K. S. J. Pister and O. Solgaard, “MEMS for Free-Space Optical Communications”, Annual Conf. of Council for Optical Radiation Measurements, Stanford, CA, June 18-20, 2003.
  309. J. M. Kahn, “Secure Free-Space Optical Communication Between Moving Platforms”, *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, pp. 455-456, Glasgow, Scotland, November 10-14, 2002.
  310. J. D. Ralston, J. M. Kahn and K.-P. Ho, “The Role of Electronic Modulation and Signal Processing in Next-Generation Fiber Transport”, *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, pp. 432-433, Glasgow, Scotland, November 10-14, 2002.
  311. J. M. Kahn, and K.-P. Ho, “Ultimate Spectral Efficiency Limits in DWDM Systems”, *Proc. of Optoelectronics and Communications Conference*, pp. 552-553, Yokohama, Japan, July 8-12, 2002.
  312. J. M. Kahn, “Spectral Efficiency and Coherent Detection in Optical Communications”, Defense Sciences Research Council Workshop on Novel Applications of Optical Coherence, Arlington, VA, June 25, 2002.
  313. J. M. Kahn, “Ultimate Spectral Efficiency Limits in DWDM Systems”, Optical Fiber Commun. Conf., Anaheim, CA, March 17-22, 2002, panel session W202, “Modulation Formats and Ultimate Capacity”.
  314. W. Mao and J. M. Kahn, “Free-space Heterochronous Imaging Reception of Multiple Optical Signals”, *Proc. of 35th Asilomar Conference on Signals, Systems and Computers*, pp. 18-22, Pacific Grove, CA, November 4-7, 2001.
  315. D. Tse, C. Chuah and J. M. Kahn, “Capacity Scaling in Dual Antenna Array Wireless Systems”, *Proc. of 34th Asilomar Conference on Signals, Systems and Computers*, pp. 694-698, Pacific Grove, CA, October 29-November 1, 2000.
  316. D. Tse, C. Chuah and J. M. Kahn, “Capacity Scaling in Dual Antenna Array Wireless Systems”, *Proc. of IEEE Wireless Commun. and Networking Conf.*, pp. 25-29, Chicago, IL, September 23-28, 2000.
  317. D. Shiu and J. M. Kahn, “Scalable Layered Space-Time Codes for Wireless Communications: Performance Analysis and Design Criteria”, *Proc. of IEEE Wireless Commun. and Networking Conf.*, pp. 159-163, New Orleans, LA, September 21-24, 1999.
  318. J. M. Kahn, “Infrared Wireless Communications”, tutorial session at IEEE Global Commun. Conf., Sydney, Australia, November 8-12, 1998.
  319. J. M. Kahn, “Wireless Infrared Communications”, tutorial session at IEEE Intl. Conf. on Commun., Atlanta, GA, June 7-11, 1998.
  320. J. M. Kahn, “Wireless Infrared Communications”, tutorial session at 8th IEEE Intl. Symp. on Personal, Indoor, and Mobile Radio Communications, Helsinki, Finland, September 1-4, 1997.
  321. J. M. Kahn, “Wireless Infrared Communications”, tutorial session at IEEE Hot Interconnects V Symposium, Stanford University, Stanford, CA, August 21-23, 1997.
  322. J. M. Kahn, “Infrared Wireless Communications: Recent Results”, DIMACS (Center for Discrete Mathematics and Theoretical Computer Science) Workshop on Network Switching, Princeton, NJ, July 7-9, 1997.
  323. J. M. Kahn, “Infrared Wireless Communication”, tutorial session at 7th IEEE Intl. Symp. on Personal, Indoor, and Mobile Radio Communications, Taipei, Taiwan, October 15-18, 1996.
  324. J. M. Kahn, “Tetherless Optical Networks”, tutorial session at IEEE Intl. Conf. on Commun., Dallas, Texas, June 23-27, 1996.
  325. J. M. Kahn, “Wireless Optical Local-Area Networks”, tutorial session at IEEE Hot Interconnects III Symposium, Stanford University, Stanford, CA, August 10-12, 1995.
  326. J. M. Kahn, “High-Speed Wireless Infrared Communications”, presented at 19th IEEE Computer Elements Workshop, Vail, CO, June 26-29, 1995.
  327. J. M. Kahn, “Wireless Optical Local-Area Networks”, tutorial session at Intl. Conf. on Commun., Seattle, WA,

June 18-22, 1995.

328. J. R. Barry and J. M. Kahn, "Design of Non-Directed Infrared Links for High-Speed Wireless Networks", *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, p. 207, Boston, MA, October 31-November 1, 1994.
329. G. W. Marsh and J. M. Kahn, "50-Mb/s Diffuse Infrared Free-Space Link Using On-Off Keying with Decision Feedback Equalization", *Proc. of 28th Asilomar Conference on Signals, Systems and Computers*, pp. 74-77, Pacific Grove, CA, October 31-November 2, 1994.
330. J. M. Kahn, "Wireless Optical LANs", tutorial session at 5th IEEE Intl. Symp. on Personal, Indoor, and Mobile Radio Communications, The Hague, Netherlands, September 21-23, 1994.
331. G. W. Marsh and J. M. Kahn, "50-Mb/s Diffuse Infrared Free-Space Link Using On-Off Keying with Decision Feedback Equalization", *Proc. of 5th IEEE Intl. Symp. on Personal, Indoor, and Mobile Radio Communications*, pp. 1086-1089, The Hague, Netherlands, September 21-23, 1994.
332. J. M. Kahn and J. S. Hoch, "Simulation Tools for Free-Space Optical Interconnects Based on Computer-Generated Holograms", *Proc. of LEOS Topical Meeting on Hybrid Optoelectronic Integration and Packaging*, pp. H45-H46, Santa Barbara, CA, July 26-28, 1993.
333. J. M. Kahn, "Free-Space Infrared Communication for Wireless Indoor Networks", *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, pp. 236-237, Boston, MA, November 15-20, 1992.
334. J. M. Kahn, "Free-Space Infrared Communication for Wireless Indoor Networks", *Proc. of 26th Asilomar Conference on Signals, Systems and Computers*, pp. 83-87, Pacific Grove, CA, October 26-28, 1992.
335. J. M. Kahn, J. R. Barry, M. D. Audeh, E. A. Lee, and D. G. Messerschmitt, "Design of High-Speed Wireless Links Using Non-Directional Infrared Radiation", in *Wireless Communications: Future Directions*, Kluwer Academic Publishers, 1992, pp. 109-126 (Proc. of Winlab Workshop on Third Generation Wireless Information Networks, East Brunswick, NJ, April 28-29, 1992).
336. J. R. Barry, J. M. Kahn, E. A. Lee, and D. G. Messerschmitt, "Modeling of Indoor Free-Space Infrared Propagation", *Proc. of IEEE Workshop on Wireless Local Area Networks*, pp. 81-87, Worcester, MA, May 9-10, 1991.
337. J. M. Kahn, "Homodyne Detection of Phase-Shift-Keying for Multi-Gigabit Lightwave Transmission," *Tech. Digest of Optical Fiber Commun. Conf.*, p. 211, San Francisco, CA, January 22-26, 1990.
338. J. M. Kahn, "Hydrogen-Related Complexes in Silicon and Germanium: Static or Dynamic Defects?," Gordon Res. Conf. on Point Defects, Line Defects and Interfaces in Semicond., Plymouth, NH, July 20-24, 1987.

#### Contributed Conference Presentations

339. Y. Hu, M. Yu, B. Buscaino, N. Sinclair, D. Zhu, A. Shams-Ansari, L. Shao, M. Zhang, J. M. Kahn, and M. Loncar, "High-Efficiency and Broadband Electro-Optic Frequency Combs using Coupled Lithium-Niobate Microresonators", *Proc. of Conf. on Lasers and Electro-Optics*, San Jose, CA, May 9-14, 2021.
340. J. D. Downie, J. Hurley, X. Liang, J. Himmelreich, H. Srinivas, Jose Krause Perin, D. A. A. Mello and J. M. Kahn, "Experimental Characterization of Power Efficiency for Power-Limited SDM Submarine Transmission Systems", *Proc. of Euro. Conf. on Optical Commun.*, Brussels, Belgium, December 6-10, 2020.
341. M. T. Taylor, J. M. Kahn and L. Hollberg, "Two-Way Time and Frequency Transfer via Ground-to-Satellite Optical Communications Links", *Proc. of Institute of Navigation Precise Time and Time Interval Meeting*, San Diego, CA, January 21-24, 2020.
342. B. Buscaino, B. D. Taylor and J. M. Kahn, "Temperature-Insensitive Coherent Co-Packaged Optical Interfaces for Data Center Switches", *Open Compute Project Regional Summit*, Amsterdam, NL, September 26-27, 2019.
343. B. Buscaino, M. Zhang, M. Loncar and J. M. Kahn, "Design of an Efficient Dual-Resonator Electro-Optic Frequency Comb Generator", *Proc. of Frontiers in Optics*, Washington, DC, September 15-19, 2019.
344. S. Wittek, R. Ryf, N. K. Fontaine, K. Choutagunta, M. Mazur, H. Chen, J. C. Alvarado-Zacarias, M. Capuzzo, R. Kopf, A. Tate, H. Safar, C. Bolle, D. T. Neilson, E. Burrows, K. Kim, M. Bigot-Astruc, F. Achten, P. Sillard, A. Amezcua-Correa, J. M. Kahn, J. Schroder, R. Amezcua-Correa and J. Carpenter, "Mode-Multiplexed Transmission Within and Across Mode Groups of a Multimode-Fiber", *Proc. of Optical Fiber Commun. Conf.*, San Diego, CA, March 3-7, 2019.

345. R. Ryf, N. K. Fontaine, S. Wittek, K. Choutagunta, M. Mazur, H. Chen, J. C. Alvarado-Zacarias, R. Amezcua-Correa, M. Capuzzo, R. Kopf, A. Tate, H. Safar, C. Bolle, D. T. Neilson, E. Burrows, K. Kim, M. Bigot-Astruc, F. Achten, P. Sillard, A. Amezcua-Correa, J. M. Kahn, J. Schröder and J. Carpenter, “High-Spectral-Efficiency Mode-Multiplexed Transmission over Graded-Index Multimode Fiber”, *Proc. of Postdeadline Papers, Euro. Conf. on Optical Commun.*, Rome, IT, September 23-27, 2018.
346. R. Y. Gu, E. S. Chou, C. Rewcastle, O. Levi and J. M. Kahn, “Improved Spot Formation through Flexible Multimode Fiber Using a Partial Reflector”, *Proc. of Conf. on Lasers and Electro-Optics*, San Jose, CA, May 13-18, 2018.
347. M. Zhang, C. Wang, B. Buscaino, A. Shams-Ansari, J. M. Kahn and M. Loncar, “Electro-optic Frequency Comb Generation in Ultrahigh-Q Integrated Lithium Niobate Micro-Resonators”, *Proc. of Conf. on Lasers and Electro-Optics*, San Jose, CA, May 13-18, 2018.
348. E. S. Chou, T. Hayashi, T. Nagashima, J. M. Kahn and T. Nakanishi, “Stable Measurement of Effective Area in Coupled Multi-core Fiber”, *Proc. of Optical Fiber Commun. Conf.*, San Diego, CA, March 11-15, 2018.
349. A. C. Jatoba-Neo, C. E. Rothenberg, D. A. A. Mello, S. Ö. Arık and J. M. Kahn, “Scaling Optical Networks Using Full-Spectrum Spatial Switching”, *Proc. of IEEE 18th International Conference on High Performance Switching and Routing*, São Paulo, Brazil, June 18-21, 2017.
350. O. D. Domingues, D. A. A. Mello, R. Silva, S. Ö. Arık and J. M. Kahn, “Capacity Limits of Space-Division Multiplexed Submarine Links Subject to Nonlinearities and Power Feed Constraints”, *Proc. of Optical Fiber Commun. Conf.*, Los Angeles, CA, March 19-23, 2017.
351. A. Belmonte, M. T. Taylor, L. Hollberg, and J. M. Kahn, “Impact of Atmospheric Anisoplanaticity on Earth-to-Satellite Time Transfer over Laser Communication Links”, *Proc. of SPIE Photonics West*, San Francisco, CA, January 28-February 2, 2017.
352. S. Ö. Arık and J. M. Kahn, “Direct-Detection Mode-Division Multiplexing Enabled by Phase Retrieval”, *Proc. IEEE Photonics Society Summer Topical on Space-Division Multiplexing and Multimode Photonics*, Newport Beach, CA, July 11-13, 2016.
353. A. Belmonte and J. M. Kahn, “Array Receivers in Downlink Coherent Lasercom”, *Proc. of SPIE Photonics West*, San Francisco, CA, February 7-12, 2015.
354. E. Ip, R. Y. Gu, M.-J. Li, Y.-K. Huang and J. M. Kahn, “Experimental Demonstration of a Gain-Flattening Filter for Few-Mode Fiber Based on a Spatial Light Modulator”, *Proc. of Optical Fiber Commun. Conf.*, San Francisco, CA, March 9-13, 2014.
355. R. Y. Gu, E. Ip, M.-J. Li, Y.-K. Huang and J. M. Kahn, “Experimental Demonstration of a Spatial Light Modulator-based Few-Mode Fiber Switch for Space-Division Multiplexing”, *Proc. of OSA Annual Meeting*, Orlando, FL, October 6-10, 2013.
356. R. Nasiri Mahalati, D. Askarov and J. M. Kahn, “Adaptive Control of Mode-Dependent Gain in Multi-Mode Erbium-Doped Fiber Amplifiers”, *Proc. of IEEE Photonics Society Summer Topical on Space Division Multiplexing for Optical Communication*, Waikoloa, HI, July 8-10, 2013.
357. A. Belmonte and J. M. Kahn, “Blind Adaptation of Channel-Matched Receivers in Free-Space Coherent Laser Communication”, *Proc. of OSA Annual Meeting*, Rochester, NY, October 14-18, 2012.
358. A. Belmonte and J. M. Kahn, “Field Conjugation Adaptive Arrays for Reliable Space Downlink Coherent Laser Communications”, *Proc. of International Conference on Space Optical Systems and Applications*, Ajaccio, Corsica, France, October 9-12, 2012.
359. J. M. Kahn and K.-P. Ho, “Mode Coupling Effects in Mode-Division-Multiplexed Systems”, *Proc. of IEEE Photonics Society Summer Topical on Space Division Multiplexing for Optical Systems and Networks*, Seattle, WA, July 9-11, 2012 (Tutorial).
360. D. Askarov and J. M. Kahn, “Design of Multi-Mode Erbium-Doped Fiber Amplifiers for Low Mode-Dependent Gain”, *Proc. of IEEE Photonics Society Summer Topical on Space Division Multiplexing for Optical Systems and Networks*, Seattle, WA, July 9-11, 2012.
361. K. J. Boucher, C. Jan, J. M. Kahn, J. P. Wilde, and O. Solgaard, “Spot Formation and Scanning Microscopy via

- Multimode Fibers”, *Proc. of IEEE Photonics 2011 Conference*, Arlington, VA, October 9-13, 2011.
362. A. Belmonte and J. M. Kahn, “Field Conjugation Adaptive Arrays in Atmospheric Coherent Optical Links”, *Proc. of SPIE Photonics West*, San Francisco, CA, January 22-27, 2011.
  363. A. Belmonte and J. M. Kahn, “Field Conjugation Adaptive Arrays in Atmospheric Coherent Optical Links”, *Proc. of 2010 Workshop on Optical Wireless Communications*, Globecom 2010, Miami, FL, December 6-10, 2010.
  364. D. J. F. Barros and J. M. Kahn, “OFDM vs. OOK with MLSD for IM/DD Systems”, *Proc. of Optical Fiber Commun. Conf.*, San Diego, CA, March 21-25, 2010.
  365. A. Belmonte and J. M. Kahn, “Effects of Atmospheric Compensation Techniques on the Performance of Synchronous Receivers”, *Proc. of SPIE Conference on Optical Engineering and Applications*, San Diego, CA, August 2-6, 2009.
  366. J. P. Wilde, G. W. Yoffe and J. M. Kahn, “Frequency Noise Characterization of a Widely Tunable Narrow-Linewidth DFB Laser Array Source”, *Proc. of Optical Fiber Communications Conference*, San Diego, CA, March 22-26, 2009.
  367. E. Ip, D. Büchter, H. Herrmann, C. Langrock, J. M. Kahn, W. Sohler and M. M. Fejer, “QPSK Transmission over Free-Space Link at 3.8  $\mu\text{m}$  using Coherent Detection with Wavelength Conversion”, *Proc. of Euro. Conf. on Optical Commun.*, Brussels, Belgium, September 21-25, 2008.
  368. 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”, *Proc. of Optical Fiber Communications Conference*, San Diego, CA, February 24-28, 2008.
  369. A. P. T. Lau and J. M. Kahn, “16-QAM Signal Design and Detection in Presence of Nonlinear Phase Noise”, *Proc. of IEEE LEOS Summer Topical on Advanced Digital Signal Processing in Next-Generation Fiber-Optic Transmission*, Portland, OR, July 23-25, 2007.
  370. A. P. T. Lau and J. M. Kahn, “Non-Optimality of Distributed Amplification in Presence of Nonlinear Phase Noise”, *Proc. of OSA Topical Meeting on Coherent Optical Technologies and Applications*, paper number JWB23, Whistler, BC, June 28-30, 2006.
  371. X. Shen, J. M. Kahn and M. A. Horowitz, “Compensation of Multimode Fiber Dispersion using Adaptive Optics”, *Proc. of 31st Euro. Conf. on Optical Commun.*, Glasgow, Scotland, September 25-29, 2005.
  372. E. Alon, V. Stojanović, J. M. Kahn, S. P. Boyd and M. A. Horowitz, “Equalization of Modal Dispersion in Multimode Fiber using Spatial Light Modulators”, *Proc. of IEEE Global Telecommun. Conf.*, Dallas, TX, Nov. 29-Dec. 3, 2004.
  373. J. Wang and J. M. Kahn, “Dispersion Limitations in Optical Systems using Offset DPSK Modulation”, *Proc. of 2004 Tyrrhenian International Workshop on Digital Communications*, Pisa, Italy, October 17-18, 2004. Published in: *Optical Communication Theory and Techniques*, E. Forestieri, Editor, Springer, 2004, pp. 173-179.
  374. M. Last, L. Zhou, V. Milanović, J. M. Kahn and K. S. J. Pister, “Towards a 1 mm<sup>3</sup> Camera: The Field Stitching Micromirror”, *Proc. of Eurosensors 2003*, Guimaraes, Portugal, September 21-24, 2003.
  375. L. Zhou, M. Last, V. Milanovic, J. M. Kahn, K. S. J. Pister, “Two-Axis Scanning Mirror for Free-Space Optical Communication between UAVs”, *Proc. of IEEE Conference on Optical MEMS*, Waikoloa, HI, August 18-21, 2003.
  376. J. D. Ralston, J. M. Kahn and K.-P. Ho, “Spectrally Efficient and Impairment-Robust Modulation Techniques for 40 Gb/s Optical Transmission Systems”, *Proc. of National Fiber Optic Engineers Conf.*, pp. 317-324, Dallas, TX, September 15-19, 2002.
  377. J. Wang and J. M. Kahn, “Acquisition in Short-range Free-Space Optical Communication”, *Proc. of SPIE ITCOM*, Boston, MA, July 29-August 2, 2002, vol. 4873, pp. 121-132.
  378. B. Yu, J. M. Kahn and R. You, “Power-Efficient Multiple-Subcarrier Modulation Scheme for Optical Wireless Communications”, *Proc. of SPIE ITCOM*, Boston, MA, July 29-August 2, 2002, vol. 4873, pp. 41-53.
  379. X. Zhu and J. M. Kahn, “Queueing Models of Optical Delay Lines in Synchronized Optical Packet-Switching

- Networks with Non-Uniform Traffic”, *Proc. of IEEE Intl. Conf. on Telecommun.*, pp. 1306-1309, Beijing, China, June 23-26, 2002.
380. B. A. Warneke, M. D. Scott, B. S. Liebowitz, L. Zhou, C. L. Bellew, J. A. Chediak, J. M. Kahn, B.E. Boser and K.S.J. Pister, “An Autonomous 16 mm<sup>3</sup> Solar-Powered Node for Distributed Wireless Sensor Networks”, *Proc. of IEEE Sensors 2002 Conf.*, pp. 1510-1515, Orlando, FL, June 12-14, 2002.
  381. K.-P. Ho and J. M. Kahn, “Channel Capacity of WDM Systems Using Constant-Intensity Modulation Formats”, *Proc. of Optical Fiber Commun. Conf.*, pp. 731-733, Anaheim, CA, March 17-22, 2002.
  382. L. Zhou, K.S.J. Pister and J. M. Kahn, “Assembled Corner-Cube Retroreflector Quadruplet”, *Proc. of IEEE Intl. Conf. on MicroElectroMechanical Systems*, pp. 556-559, Las Vegas, NV, January 20-24, 2002.
  383. X. Zhu and J. M. Kahn, “Pilot-Symbol Assisted Modulation for Correlated Turbulent Free-Space Optical Channels”, *Proc. of SPIE Intl. Symp. on Optical Science and Technol.*, pp. 138-145, San Diego, CA, July 29-August 3, 2001.
  384. X. Zhu and J. M. Kahn, “Pairwise Codeword Error Probability for Coded Free-Space Optical Communication through Atmospheric Turbulence Channels”, *Proc. of IEEE Intl. Conf. on Commun.*, pp. 161-164, Helsinki, Finland, June 11-15, 2001.
  385. R. You and J. M. Kahn, “Capacity Bound of Optical IM/DD Channels Using Multiple-Subcarrier Modulation with Fixed Bias”, *Proc. of IEEE Intl. Conf. on Commun.*, pp. 2757-2762, Helsinki, Finland, June 11-15, 2001.
  386. X. Zhu and J. M. Kahn, “Computing Insertion Loss in MEMS Optical Switches Caused By Non-Flat Mirrors”, *Proc. of CLEO/QELS 2001*, pp. 185-186, Baltimore, Maryland, May 6-11 2001.
  387. X. Zhu and J. M. Kahn, “Maximum-Likelihood Spatial-Diversity Reception on Correlated Turbulent Free-Space Optical Channels”, *Proc. of IEEE Conf. on Global Commun.*, pp. 1237-1241, San Francisco, CA, November 27-December 1, 2000.
  388. T. Ohtsuki and J. M. Kahn, “Performance Analysis of Linear Binary Block-Coded Optical PPM CDMA Systems with Soft-Decision Decoding”, *Proc. of IEEE Conf. on Global Commun.*, pp. 1196-1200, San Francisco, CA, November 27-December 1, 2000.
  389. C. Chuah, G. J. Foschini, R. A. Valenzuela, D. Chizhik, J. Ling, and J. M. Kahn, “Capacity Growth of Multi-Element Arrays in Indoor and Outdoor Wireless Channels”, *Proc. of IEEE Wireless Commun. and Networking Conf.*, pp. 1340-1344, Chicago, IL, September 23-28, 2000.
  390. R. You and J. M. Kahn, “Average Power Reduction Techniques for Multiple-Subcarrier Intensity-Modulated Optical Signals”, *Proc. of IEEE Intl. Conf. on Commun.*, pp. 1620-1627, New Orleans, LA, June 18-22, 2000.
  391. T. Ohtsuki and J. M. Kahn, “Transfer Function Bounds on Performance of Binary Turbo Coding Followed by  $M$ -ary Orthogonal Signal Mapping through Interleaver”, *Proc. of IEEE Intl. Conf. on Commun.*, pp. 623-627, New Orleans, LA, June 18-22, 2000.
  392. T. Ohtsuki and J. M. Kahn, “Turbo-Coded Optical PPM CDMA Systems”, *Proc. of IEEE Intl. Conf. on Commun.*, pp. 939-943, New Orleans, LA, June 18-22, 2000.
  393. T. Ohtsuki and J. M. Kahn, “Performance of Turbo Codes with Two-Branch Diversity and Correlated Fading”, *Proc. of IEEE Vehicular Technol. Conf.*, pp. 1026-1030, Tokyo, Japan, May 15-18, 2000.
  394. F. Chow and J. M. Kahn, “Effect of Non-Reciprocity on Infrared Wireless Local-Area Networks”, *Proc. of IEEE Intl. Conf. on Global Commun.*, pp. 330-338, Rio de Janeiro, Brazil, December 5-9, 1999.
  395. P. Djahani and J. M. Kahn, “Analysis of Infrared Wireless Links Employing Multi-Beam Transmitters and Imaging Diversity Receivers”, *Proc. of IEEE Intl. Conf. on Global Commun.*, pp. 497-504, Rio de Janeiro, Brazil, December 5-9, 1999.
  396. T. Ohtsuki and J. M. Kahn, “Transfer Function Bounds on Performance of Turbo Codes for  $M$ -ary Orthogonal Signals”, *Proc. of IEEE Intl. Conf. on Global Commun.*, Rio de Janeiro, Brazil, December 5-9, 1999, pp. 515-519.
  397. J. M. Kahn, R.H. Katz and K.S.J. Pister, “Mobile Networking for ‘Smart Dust’”, *Proc. of ACM/IEEE Intl. Conf. on Mobile Computing and Networking (MobiCom 99)*, pp. 271-278, Seattle, WA, August 17-19, 1999. *Voted best*

*paper in session.*

398. F. Chow and J. M. Kahn, "Effect of Non-Reciprocity on Infrared Wireless Local-Area Networks", *Proc. of IEEE Colloq. on Optical Wireless Commun.*, London, England, June 22, 1999.
399. R. You and J. M. Kahn, "Average-Power Reduction Techniques for Multiple-Subcarrier Optical Intensity Modulation", *Proc. of IEEE Colloq. on Optical Wireless Commun.*, London, England, June 22, 1999.
400. D. Shiu and J. M. Kahn, "Layered Space-Time Codes for Wireless Communications using Multiple Transmit Antennas", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 436-440, Vancouver, B.C., June 6-10, 1999.
401. L. Diana and J. M. Kahn, "Rate-Adaptive Modulation Techniques for Infrared Wireless Communications", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 597-603, Vancouver, B.C., June 6-10, 1999.
402. D. Shiu and J. M. Kahn, "Shaping and Non-Equiprobable Signaling for Intensity-Modulated Signals", *Proc. of IEEE Global Commun. Conf.*, pp. 213-218, Sydney, Australia, November 8-12, 1998.
403. D. Shiu and J. M. Kahn, "Differential Pulse-Position Modulation for Power-Efficient Optical Communication", *Proc. of IEEE Global Commun. Conf.*, pp. 219-224, Sydney, Australia, November 8-12, 1998.
404. D. C. Lee and J. M. Kahn, "Coding and Equalization for PPM on Wireless Infrared Channels", *Proc. of IEEE Global Commun. Conf.*, pp. 201-206, Sydney, Australia, November 8-12, 1998.
405. C. Chuah, D. Tse and J. M. Kahn, "Capacity of Multi-Antenna Array Systems in Indoor Wireless Environment", *Proc. of IEEE Global Commun. Conf.*, pp. 1894-1899, Sydney, Australia, November 8-12, 1998.
406. D. Shiu, G. Foschini, M. J. Gans and J. M. Kahn, "Fading Correlation and its Effect on the Capacity of Multi-Element Antenna Systems", *Proc. of IEEE Intl. Conf. on Universal Pers. Commun.*, pp. 429-433, Florence, Italy, October 5-9, 1998.
407. D. C. Lee and J. M. Kahn, "Experimental 25-Mb/s Wireless Infrared Link Using 4-PPM with Scalar Decision-Feedback Equalization", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 26-30, Atlanta, GA, June 7-11, 1998.
408. J. B. Carruthers and J. M. Kahn, "Angle Diversity for Nondirected Wireless Infrared Communication", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 1665-1670, Atlanta, GA, June 7-11, 1998.
409. G. W. Marsh and J. M. Kahn, "Channel Reuse Strategies for Indoor Infrared Wireless Communications", *Proc. of Globecom '96*, pp. 1597-1602, London, England, November 18-22, 1996.
410. D. C. Lee, J. M. Kahn and M. D. Audeh, "Trellis-Coded Pulse-Position Modulation for Indoor Wireless Infrared Communications", *Proc. of 7th IEEE Intl. Symp. on Personal, Indoor, and Mobile Radio Communications*, pp. 349-353, Taipei, Taiwan, October 15-18, 1996, pp. 349-353.
411. J. B. Carruthers and J. M. Kahn, "Modeling of Non-Directed Wireless Infrared Channels", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 1227-1231, Dallas, Texas, June 23-27, 1996.
412. A.P. Tang, J. M. Kahn and K.-P. Ho, "Wireless Infrared Communication Links using Multi-Beam Transmitters and Imaging Receivers", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 180-186, Dallas, Texas, June 23-27, 1996.
413. M. D. Audeh, J. M. Kahn and J. R. Barry, "Decision-Feedback Equalization of Pulse-Position Modulation on Measured Non-Directed Indoor Infrared Channels", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 1220-1226, Dallas, Texas, June 23-27, 1996.
414. R. Narasimhan, M. D. Audeh and J. M. Kahn, "Effect of Electronic-Ballast Fluorescent Lighting on Wireless Infrared Links", *Proc. of IEEE Intl. Conf. on Commun.*, pp. 1213-1219, Dallas, Texas, June 23-27, 1996.
415. K.-P. Ho and J. M. Kahn, "Combined Source-Channel Coding Using Channel-Optimized Quantizer and Multicarrier Modulation," *Proc. of IEEE Intl. Conf. on Commun.*, pp. 1323-1327, Dallas, Texas, June 23-27, 1996.
416. J. S. Hoch, A. Grot and J. M. Kahn, "Diffractive Spot-Array Generation Using Multimode Surface-Emitting Lasers and Light-Emitting Diodes", *Proc. of OSA Conf. on Diffractive Optics and Micro-Optics*, Boston, MA, April 29- May 3, 1996.
417. D. C. Lee, M.D Audeh and J. M. Kahn, "Performance of  $L$ -Pulse-Position Modulation with Trellis-Coded Modulation on Non-Directed Indoor Infrared Channels", *Proc. of IEEE Globecom 95*, pp. 1830-1834, Singapore,



November 13-17, 1995.

418. K.-P. Ho and J. M. Kahn, "Combined Source-Channel Coding Using Multicarrier Modulation", *Proc. of 29th Asilomar Conference on Signals, Systems and Computers*, pp. 7-9, Pacific Grove, CA, October 29-November 1, 1995.
419. K.-P. Ho and J. M. Kahn, "Transmission of DCT-Coded Images by Multicarrier Modulation for Noisy Channels", *Proc. of Intl. Symp. on Signals, Systems and Electronics*, pp. 55-58, San Francisco, CA, October 25-27, 1995.
420. G. W. Marsh and J. M. Kahn, "Performance Evaluation of Experimental 50-Mb/s Diffuse Infrared Wireless Link using On-Off Keying with Decision-Feedback Equalization", *Proc. of Hot Interconnects III Symposium*, Stanford University, Stanford, CA, August 10-12, 1995.
421. K.-P. Ho and J. M. Kahn, "Crosstalk Measurement and Reduction in Dense WDM Systems Using Subcarrier Tone Channel Identification and Linear Cancellation", *Proc. of Intl. Conf. on Commun.*, pp. 287-291, Seattle, WA, June 18-22, 1995.
422. M. D. Audeh, J. M. Kahn and J. R. Barry, "Performance of PPM with Maximum-Likelihood Sequence Detection on Measured Non-Directed Indoor Infrared Channels", *Proc. of Intl. Conf. on Commun.*, pp. 1177-1181, Seattle, WA, June 18-22, 1995.
423. K.-P. Ho and J. M. Kahn, "Crosstalk Cancellation in Dense WDM Systems Using Filter-Bank Receiver", *Tech. Digest of Optical Fiber Commun. Conf.*, pp. 35-36, San Diego, CA, February 26-March 3, 1995.
424. J. B. Carruthers and J. M. Kahn, "Multiple-Subcarrier Modulation for Non-Directed Wireless Infrared Communication", *Proc. of IEEE Globecom '94*, pp. 1055-1059, San Francisco, CA, November 27-December 1, 1994.
425. M. D. Audeh and J. M. Kahn, "Performance Evaluation of  $L$ -Pulse-Position Modulation on Non-Directed Indoor Infrared Channels", *Proc. of Intl. Conf. on Commun.*, pp. 660-664, New Orleans, LA, May 1-5, 1994.
426. K.-P. Ho and J. M. Kahn, "Channel Compression in Subcarrier-Multiplexed Lightwave Systems", *Proc. of Optical Fiber Commun. Conf.*, pp. 263-264, San Jose, CA, February 20-25, 1994.
427. K.-P. Ho, J. D. Walker, and J. M. Kahn, "Reduction of Feedback-Induced Intensity Noise in Vertical-Cavity Surface-Emitting Laser by Superposition of High-Frequency Current", *Proc. of IEEE Lasers and Electro-Optics Society Annual Meeting*, pp. 554-555, San Jose, CA, November 15-19, 1993.
428. J. M. Kahn and W. J. Krause, "Experimental Characterization of Multipath Free-Space Infrared Channels for Wireless In-Building Networks", *Tech. Digest of 19th Euro. Conf. on Opt. Commun.*, pp. 397-400, Montreux, Switzerland, September 12-16, 1993.
429. A. M. Porter, J. M. Kahn and U. Padan, "Heterodyne Detection of 310-Mb/s Quadrature-Phase-Shift Keying Using Fourth-Power Optical Phase-Locked Loop", *Tech. Digest of Optical Fiber Commun. Conf.*, San Jose, CA, February 21-26, 1993.
430. M. D. Audeh and J. M. Kahn, "Performance Simulation of Baseband OOK Modulation for Wireless Infrared LANs at 100 Mb/s", *Proc. of Intl. Conf. on Sel. Top. in Wireless Commun.*, pp. 271-274, Vancouver, BC, June 25-26, 1992.
431. J. R. Barry, M. D. Audeh, A. M. Porter, and J. M. Kahn, "Fourth-Power Phased-Locked Loop for Heterodyne Detection of Optical Quadrature Phase-Shift Keying", *Tech. Digest of Optical Fiber Commun. Conf.*, p. 292, San Jose, CA, February 3-7, 1992.
432. C. R. Giles, J. M. Kahn, S. K. Korotky, J. J. Veselka, C. A. Burrus, J. S. Perino and H. M. Presby, "Polarization Effects on Ultra-Long Distance Signal Transmission in Amplified Optical-Fiber Loops", *Tech. Digest of 17th Euro. Conf. on Opt. Commun.*, pp. 385-388, Paris, France, September 9-12, 1991.
433. J. M. Kahn, "BPSK Homodyne Detection Experiment Using Balanced Optical Phase-Locked Loop with Quantized Feedback," *Tech. Digest of Postdeadline Papers, 16th Euro. Conf. on Opt. Commun.*, pp. 991-994, Amsterdam, Netherlands, September 16-20, 1990.
434. J. M. Kahn, A. H. Gnauck, J. J. Veselka, S. K. Korotky and B. L. Kasper, "4 Gbit/s PSK Homodyne Transmission System Using Phase-Locked Semiconductor Lasers," *Tech. Digest of Postdeadline Papers, Optical Fiber Commun. Conf.*, pp. PD10/1-PD10/4, San Francisco, CA, January 22-26, 1990.

435. J. M. Kahn and B. L. Kasper, "PSK Homodyne Lightwave Transmission Using Semiconductor Lasers," *Tech. Digest of 15th Euro. Conf. on Opt. Commun.*, Gothenburg, Sweden, *Tech. Digest of 17th Euro. Conf. on Opt. Commun.*, September 10-14, 1989.
436. J. M. Kahn, B. L. Kasper and K. J. Pollock, "Optical Phaselock Receiver with Multigigahertz Signal Bandwidth," *Tech. Digest of Seventh Intl. Conf. on Integ. Optics and Opt. Fiber Commun.*, Kobe, Japan, July 18-21, 1989.
437. J. M. Kahn, I. M. I. Habbab and C. R. Giles, "1 Gbit/s Zero-IF DPSK Coherent Optical System Using a Single Photodetector," *Tech. Digest of Optical Fiber Commun. Conf.*, p. 72, Houston, TX, February 6-9, 1989.
438. J. M. Kahn, R. E. McMurray, Jr., E. E. Haller and L. M. Falicov, "Trigonal Hydrogen-Related Acceptor Complexes in Germanium," *Bull. Am. Phys. Soc. Ser. II*, vol. 32, p. 841, New York, NY, March 1987.
439. J. M. Kahn, E. E. Haller and L. M. Falicov, "Copper-Dihydrogen Acceptors in High-Purity Germanium," *Proc. 18th Intl. Conf. on Phys. of Semicond.*, pp. 1003-1006, Stockholm, Sweden, August 1986.
440. J. M. Kahn, E. E. Haller and L. M. Falicov, "Copper-Dihydrogen Complex Shallow Acceptors in High-Purity Germanium," *Bull. Am. Phys. Soc. Ser. II*, vol. 31, p. 695, Las Vegas, NV, March 1986.
441. R. E. McMurray, Jr., N. M. Haegel, J. M. Kahn and E. E. Haller, "A Shallow Hydrogen-Zinc Acceptor in Germanium," *Solid State Commun.*, vol. 53, p. 1137, 1985 (*Proc. of First Intl. Conf. on the Spectroscopy of Shallow Centers in Semicond.*, Berkeley, CA, August 2-3, 1984).
442. J. M. Kahn, S. J. Pearton and E. E. Haller, "Low Temperature Atomic Hydrogen Diffusivity in Si and Ge," *Bull. Am. Phys. Soc. Ser. II*, vol. 29, p. 208, Detroit, MI, March 1984.

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