

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ACCELIGHT TECHNOLOGIES, INC.,
&
EOPTOLINK TECHNOLOGY USA, INC.,

Petitioners, v.

APPLIED OPTOELECTRONICS, INC.,

Patent Owner.

Case IPR2026-00019

Patent No. 9,448,367

**DECLARATION OF DR. ALAN E. WILLNER, PH.D.
IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE**

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I, Alan E. Willner, declare the following:

I. INTRODUCTION

1. I have been retained by Applied Optoelectronics, Inc. (“AOI” or “Patent Owner”), as an independent expert to provide my expert opinions regarding the validity of various claims of U.S. Patent No. 9,448,367 (the “’367 patent”). I understand that Accelight Technologies, Inc. (“Accelight”) and Eoptolink Technology USA, Inc. (“Eoptolink”) (jointly “Petitioners”) have jointly filed a petition (“the Petition”) requesting that the Patent Trial and Appeal Board (“PTAB”) institute an *inter partes* review (“IPR”) proceeding for the ’367 patent.

2. I am being compensated for my work in this matter at my usual consulting rate of \$475 per hour for the time I spend on this matter. Neither my engagement nor my compensation depends on the substance of my opinions or the outcome of the IPR proceeding or any other proceeding. I understand that the owner of the ’367 patent is AOI, and the Petitioners are Accelight and Eoptolink. To the best of my knowledge, I have no financial interest in the Patent Owner or Petitioners.

3. I understand that this proceeding involves Claims 1-9 (the “Challenged Claims”) of the ’367 Patent. I further understand that Petitioners raises four grounds in the Petition. I understand that the grounds raised by Petitioner are as follows:

- In Ground 1, Petitioners challenge independent claim 1 and dependent claims 2 and 4-9 under an obviousness theory. Petitioners contend that

- claims 1, 2, and 4-9 are obvious over Anderl (U.S. Patent No. 7,458,733, Ex. 1005) in view of Gaio (U.S. Patent No. 6,579,013, Ex. 1006).
- In Ground 2, Petitioners challenge dependent claim 3 under an obviousness theory. Petitioners contend that claim 3 is obvious over Anderl in view of Gaio, Ohki (Japan Patent Publication No. 2005-269474, Ex. 1011 and Ex. 1008 English Translation), and SFP Specifications (Ex. 1009).
 - In Ground 3, Petitioners challenge independent claim 1 and dependent claims 2 and 4-9 under an obviousness theory. Petitioners contend that claims 1, 2, and 4-9 are obvious over Kim (U.S. Patent Publication No. 2009/0010600, Ex. 1007) in view of Gaio.
 - In Ground 4, Petitioners challenge dependent claim 3 under an obviousness theory. Petitioners contend that claim 3 is obvious over Kim in view of Gaio, Ohki and SFP Specifications.

4. I have been asked to provide my independent opinions in response to each of Petitioners' grounds asserted for invalidity.

II. QUALIFICATIONS, PUBLICATIONS, AND PRIOR TESTIMONY

5. My qualifications as set forth in this declaration are summarized in the following paragraphs and explained in more detail in my curriculum vitae, which is attached as Exhibit A to this report.

6. I am a Distinguished Professor of Electrical and Computer Engineering at the University of Southern California (USC). For more than 35 years, I have been involved in several areas of optical communication technologies, including devices, subsystems, systems, and networks.

7. I received both my M.S. and Ph.D. degrees in Electrical Engineering from Columbia University in 1984 and 1988, respectively. There, I received the Edwin Howard Armstrong Foundation Memorial Award for being the highest-ranked Electrical Engineering Master's student. Additionally, I earned a B.A. in Physics (1982) and an Honorary Doctorate of Humane Letters (*Honoris Causa*, 2012) from Yeshiva University.

8. From 1988 to 1990, I worked at AT&T Bell Laboratories as a Postdoctoral Member of the Technical Staff. From 1990 to 1992, I worked as a Member of the Technical Staff in the Photonics Research Department of Bell Communications Research. My work at both companies focused on optical communication systems.

9. Since 1992, I have been assistant, then associate, and full Professor of Electrical Engineering at the University of Southern California (USC). I have been the Director of the Optical Communications Laboratory at the University of Southern California since 1992. I am currently the Andrew & Erna Viterbi Professorial Chair and a Distinguished Professor in the Ming Hsieh Dept. of

Electrical and Computer Engineering at USC. In my position at USC, I also advise students on their doctoral thesis work.

10. From 1999 to 2002, I co-founded and served as CTO of Phaethon Communications, a company whose technology was acquired by Teraxion and that created the ClearSpectrum® chromatic dispersion compensator product line. ClearSpectrum® was marketed to equipment manufacturers and has been deployed in many commercial systems worldwide.

11. I have received various awards and honors. For example, I received the National Science Foundation Presidential Faculty Fellows Award from the White House, one of 30 recipients in 1994 in all areas of science and engineering. I am also a Member of the U.S. National Academy of Engineering, an International Fellow of the U.K. Royal Academy of Engineering, and a Fellow of the National Academy of Inventors. Moreover, I was the recipient of a Fulbright Foundation Senior Scholars Award, Guggenheim Foundation Fellowship, Packard Foundation Fellowship, and U.S. Dept. of Defense Vannevar Bush Faculty Fellowship (formerly the Defense Security Science and Engineering Faculty Fellowship).

12. Additional awards and honors that I have received include the following: Institute of Electronic and Electrical Engineers (IEEE) Eric Sumner Technical Field Award for achievement in communications technology; IEEE Photonics Society Engineering Achievement Award; Optica (formerly Optical

Society of America, OSA) Paul Forman Engineering Excellence Award; SPIE President's Award; IEEE Photonics Society Distinguished Traveling Lecturer Award; Optica Hopkins Leadership Award; Egleston Medal for Distinguished Engineering Achievement from the Columbia University Engineering Alumni Association; Institution of Engineering & Technology (IET) J.J. Thomson Medal for Electronics; Ellis Island Medal of Honor; Civilian Service Commendation Medal from the U.S. Dept. of the Army; IEEE Photonics Society Distinguished Service Award; Eddy Award for Best Technical Paper from Pennwell Publications; and IEEE Globecom Best Paper Award. I also received the USC Associates Award for University-Wide Creativity in Research (highest university research award) and the USC Associates Award for University-Wide Excellence in Teaching (highest university teaching award). I am also a Fellow of the American Association for the Advancement of Science (AAAS), American Physical Society, IEEE, IET, Optica, and SPIE.

13. I have served in various professional activities, including: Co-Chair of the U.S. National Academies' Study on "Optics and Photonics: Essential Technologies for Our Nation"; President of the IEEE Photonics Society (~6,000 members); President of Optica (~20,000 members); Co-Chair of the Science and Engineering Counsel of Optica; Chair of the IEEE Technical Activities Board Ethics and Member Conduct Committee; General & Program Co-Chair of the Conference

on Lasers and Electro-Optics (CLEO); Chair of the National Photonics Initiative; Program Chair of Telecommunications Engineering at SPIE's Photonics West; General Co-Chair of the IEEE Photonics Society Topical Meeting on Broadband Networks; and Chair of the Unclassified Technical Program for the IEEE MILCOM Conference.

14. My editorial positions have included the following: Editor-in-Chief of the *IEEE/OSA Journal of Lightwave Technology* (JLT); Editor-in-Chief of *OSA Optics Letters*; Editor-in-Chief of the *IEEE Journal of Selected Topics in Quantum Electronics*; Associate Editor of the *IEEE Journal of Selected Areas in Communications (JSAC) Series on Optical Networks*; and Guest Co-Editor of the JLT and IEEE JSAC Joint Special Issue on *Multiple-Wavelength Technologies & Networks*.

15. I have been a Member of the U.S. Army Science Board and a Member of the Defense Sciences Research Council (a 16-member body that provided reports to DARPA Director & Office Directors). I have also served on many technical advisory boards, especially for small companies.

16. I have over 1800 publications, including 1 book, ~10 edited books, ~56 keynotes/plenaries, ~26 book chapters, over 470 refereed journal papers, and over 375 invited papers/presentations. I am a named inventor on ~48 published U.S. patents in the fields of optical technologies, communication systems, signal

processing, and networks. According to Google Scholar, my publications have been cited over 51,000 times. Moreover, according to Web of Science, my 2012 Nature Photonics (journal impact factor approximately 32) paper has greater than 5300 citations and is the Number 2 most cited original paper and Number 6 most cited paper overall in Nature Photonics' approximately 18-year history. Nature Photonics is considered one of the most prestigious and selective journals in optics and photonics.

17. Over the past approximately 33 years, I have taught full and short courses (at universities and international conferences) on a variety of subjects, including optical fiber communication systems. I have taught thousands of students, including ~65 graduate students who obtained their Ph.D. degrees under my guidance.

III. MATERIALS CONSIDERED

18. In forming my opinions, I have relied on my own knowledge and experience, including my education, training, and work experience in the field of optical communications technologies, my research and teaching experience, my experience in working with others in this field, and my experience in the design, development, and operation of relevant systems. I have considered the following materials:

- '367 Patent [Exhibit 1001];
- File history of the '367 Patent [Exhibit 1002];
- Petition for *Inter Partes* Review of the '367 Patent;
- Declaration of Dr. Michael Lebby in support of the petition for *Inter Partes* Review of the '367 Patent [Exhibit 1003];
- Art cited in the Petition for *Inter Partes* Review of the '367 Patent [Exhibit 1004-1011];
- Any other materials described or cited in this declaration.

19. I reserve the right to supplement, amend, or modify the opinions provided in this declaration based on any new information that may emerge in this proceeding if the Petition is granted.

IV. LEGAL PRINCIPLES

20. I am not an attorney and offer no legal opinions. For the purposes of this declaration, I have been informed by counsel about certain aspects of the law that are relevant to my opinions. My understanding of the relevant law is summarized below.

Interpretation of Claims

21. I understand that for purposes of this IPR, the claim terms generally should be given their plain and ordinary meaning as understood by a person of

ordinary skill in the art (“POSITA”) at the time the patent application was filed, unless that meaning is inconsistent with the patent specification or the patent’s history of examination by the U.S. Patent and Trademark Office (“USPTO”).

22. I understand that a POSITA is deemed to read the claims in the context of the entire patent, including the specification and prosecution history, which is referred to as the intrinsic record. In other words, the terms are not considered in a vacuum. While the intrinsic record may inform the construction of a claim term, one must be careful not to read words into the claims from the specification and preferred embodiments as the language of the claims controls.

23. I understand that the meaning of the claim terms will depart from their plain and ordinary meaning only when the patentee has acted as its own lexicographer (e.g., provided its own special meaning to a claim term) or clearly and unambiguously disavowed or disclaimed any claim scope.

24. I understand that reference materials that were publicly available at the time that the patent application was filed, such as dictionaries, treatises or other technical references, may provide context and background for deciphering how a POSITA would have considered the terms used in the claims. However, I understand that such references are known as “extrinsic evidence” and are accorded less weight than evidence found within the patent and prosecution history. In addition, I

understand that extrinsic evidence that is inconsistent with the claims, specification, or prosecution history should not be considered in the claim construction process.

25. I understand that in this IPR, Petitioner has the burden of proving that each Challenged Claim is unpatentable by a preponderance of the evidence. I understand that Petitioner has challenged claims 1-9 of the '367 Patent under an obviousness theory.

Obviousness

26. I understand that a patent claim is “obvious” and therefore invalid when the differences between the claimed subject matter of the patent and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains.

27. I also understand that there are several factors to consider with respect to the question of obviousness: (a) the scope and content of the prior art; (b) the level of ordinary skill in the art; (c) the differences between the claimed invention and the prior art; and (d) secondary considerations of non-obviousness, such as any commercial success, copying, prior failure by others, licenses, longstanding need, and unexpected results.

28. I understand that it is improper to rely on hindsight to establish obviousness because the test for obviousness is what would have been obvious at

the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. I also understand that the scope and content of the prior art must be viewed through the perspective of a person of ordinary skill in the art at the time of the invention.

29. I understand that a patent claim with multiple elements is not proved obvious by merely showing that each element was independently known in the prior art, whether those elements are in a single reference or in a combination of references. Instead, it must be shown that it would have been obvious to arrange the elements in the same way as in the claim.

30. I understand that when an obviousness determination relies on a combination of two or more references, there must be a motivation that would lead one of ordinary skill in the art to combine these prior art references.

31. I understand that if the modification of a prior art reference would cause the prior art to be unsatisfactory or inoperable for its intended purpose, then there is no motivation to combine the prior art references, and the obviousness argument would fail.

32. I understand that if a proposed modification of a prior art reference would change the principle of operation of the prior art, then there is no motivation to combine the references, and the obviousness argument would fail.

33. I understand that certain objective evidence of non-obviousness, or secondary considerations may support a determination of non-obviousness and must be considered in an obviousness analysis. I understand that secondary considerations of non-obviousness may include:

- a. Whether the invention was commercially successful as a result of the merits of the claimed invention;
- b. Whether the invention satisfied a long-felt need for the solution;
- c. Whether others had tried and failed to make the invention;
- d. Whether others copied the invention;
- e. Whether the invention achieved unexpected results; and
- f. Whether others in the field accepted the claimed invention as shown by praise for the invention or from licensing of the invention.

34. I understand that for evidence of secondary considerations to be relevant to the obviousness inquiry, there must be a relationship or nexus between the advantages and features of the claimed invention and the evidence of secondary considerations.

35. I understand that if a claim is not obvious, then the claims that depend from it are not obvious.

V. LEVEL OF ORDINARY SKILL IN THE ART

36. For my analysis, I have been asked to assume that the relevant date for my analysis is the priority date of the '367 Patent application, which I understand is December 10, 2012.

37. I understand that Petitioners assert “[a]t the time of the invention described in the '367 patent, a person of ordinary skill in the art (“POSITA”) would have had (1) a bachelor’s degree in electrical or electronics engineering or an equivalent degree, and (2) 2-4 years of work experience in optoelectronics, optical networking, optical communications, or a closely related field.” *See* Petition at pp. 14-15

38. For the purposes of my analysis for this declaration, I assume that a POSITA as of the priority date of the '367 Patent would have had this level of skill.

39. I am qualified as a person having at least this level of skill and was so at the time of the priority date of the '367 Patent. Based on my education, training, and professional experience, I am familiar with the level and abilities of a POSITA. Indeed, I have participated in professional organizations and have taught, trained, and worked closely with many such persons over the course of my career, including prior to and around the time of the claimed invention.

40. I provide my analysis and opinions in this declaration from the perspective of a POSITA as proposed in the Petition.

VI. SUMMARY OF OPINIONS FORMED

41. This declaration explains the opinions that I have formed based on my analysis.

42. It is my opinion, from a technical point of view, that Petitioners and Dr. Lebby have failed to show that claims 1-9 of the '367 Patent are invalid based on the grounds asserted in the Petition.

43. As discussed herein, Ground 1 and Ground 3 fail to demonstrate that independent claim 1 of the '367 Patent is invalid, and therefore the Petition also fails to demonstrate invalidity of claims 2 and 4-9, which depend from claim 1. As to Grounds 2 and 4, claim 3 of the '367 Patent depends from claim 1. Because Petitioners have not shown invalidity of claim 1, Petitioners also have not shown invalidity of claim 3.

44. I have reviewed the Petition and the associated Declaration of Dr. Lebby and disagree with many of the assertions made therein. However, for purposes of my analysis, I only opine on certain positions taken by Petitioners and Dr. Lebby as explained in more detail below. To the extent that I do not specifically reference any particular paragraph(s) or portions of paragraphs of the Petition or Dr. Lebby's Declaration, this does not mean that I agree with or accept any of the statements or opinions expressed in those paragraphs.

VII. TECHNOLOGY BACKGROUND

45. An optical transceiver is a device that can both transmit and receive data. Typically, data is encoded at relatively high data rates onto an optical wave and subsequently sent over an optical fiber, in many cases across long distances.

46. The term transceiver combines the words transmitter and receiver. Thus, an optical transceiver is commonly considered to include both a transmitter and a receiver. The transmitter and receiver may share common circuitry and/or housing.

47. An optical transceiver converts data from electrical signals into optical signals that can typically be transmitted over fiber optic cables, and it receives optical data signals that the transceiver converts into electrical signals.

48. Optical transceivers that include multiple wavelength-specific lasers can convert electrical data signals into multiple independent optical data signals. These electrical data signals may be received from devices such as electronic data switches. Each electrical data signal is converted into an optical signal with a different, unique wavelength.

49. If multiple independent data streams are simultaneously transmitted on multiple wavelengths, with each data stream on a different wavelength, such a system can transmit higher total capacity and is commonly called a wavelength-division-multiplexed (WDM) system.

50. Optical transceiver modules are used in optical communication and networking systems because they typically provide reliable data transmission in a cost-effective package.

51. Optical transceiver modules can be plugged into or embedded in a network device. A number of different types of optical transceiver modules exist, and they come in a variety of shapes and sizes. The different types of optical transceivers can typically be defined by form factors.

52. Optical transceivers are used in many industries. For example, they are important in telecommunication applications, such as for cable TV providers and data centers/server centers.

53. Moreover, cell phone providers using high-speed networks, such as 4G and 5G, can use optical transceivers to transmit data over fiber optic cables to connect cell towers and related networks.

54. A pluggable optical transceiver is often called a modular optical transceiver. Pluggable optical transceivers can provide improved connectivity and internet efficiency for a large number of simultaneous users.

55. Pluggable optical transceivers can be used for telecommunications and data communications in both commercial and residential applications. They can plug into ports on network devices, such as switches, routers, or network interface cards, to connect the various network components and allow transmission of data via fiber

optic cables. Moreover, a pluggable optical transceiver can be conveniently unplugged when it needs to be replaced.

VIII. THE '367 PATENT

A. Overview of the '367 Patent

56. The '367 Patent discloses a multi-channel optical transceiver that includes a multi-channel transmitter optical subassembly (TOSA), a multi-channel receiver optical subassembly (ROSA), and a dual fiber type direct link adapter directly linked to the multi-channel TOSA and the multi-channel ROSA with optical fibers. *See* Exhibit 1001 at Abstract.

57. The dual fiber type direct link adapter is also configured to receive pluggable optical connectors, such as LC connectors, mounted at the end of fiber-optic cables including optical fibers for carrying optical signals to and from the transceiver. The dual fiber type direct link adapter thus provides the optical input and output to the transceiver for the optical signals received by the ROSA and transmitted by the TOSA. *See id.*

58. Figures 4-7 of the '367 Patent discloses an embodiment in which the dual fiber type direct link adapter 250 includes an adapter body portion 260 defining first and second connector receiving regions 262, 264 at the pluggable connector end 254 and defining first and second slots 266, 268 at the direct link end 252. The first

and second connector receiving regions 262, 264 are configured to receive the respective pluggable optical connectors 320, 330, such as LC connectors. The first and second slots 266, 268 are configured to receive respective direct link connector assemblies 270, 272, which are mechanically coupled to optical fibers (not shown) directly linking the TOSA and ROSA (not shown). An adapter cover portion 261 covers the slots 266, 268 and retains the direct link connector assemblies 270, 272. The direct link connector assemblies 270, 272 also include flange portions 274, 276 (shown in FIG. 7) that extend into receiving grooves 267, 269 in the respective slots 266, 268 to prevent axial movement and hold the direct link connector assemblies in the slots. *Id.* at Col. 6:43-63.

This is shown in Figure 7 as follows:

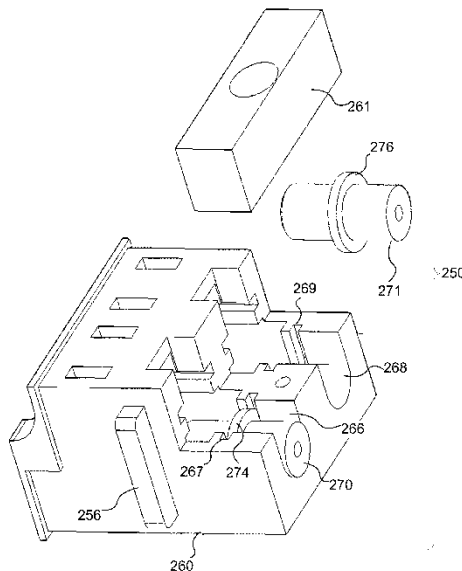


FIG. 7

59. And is further shown in Figures 4-6:

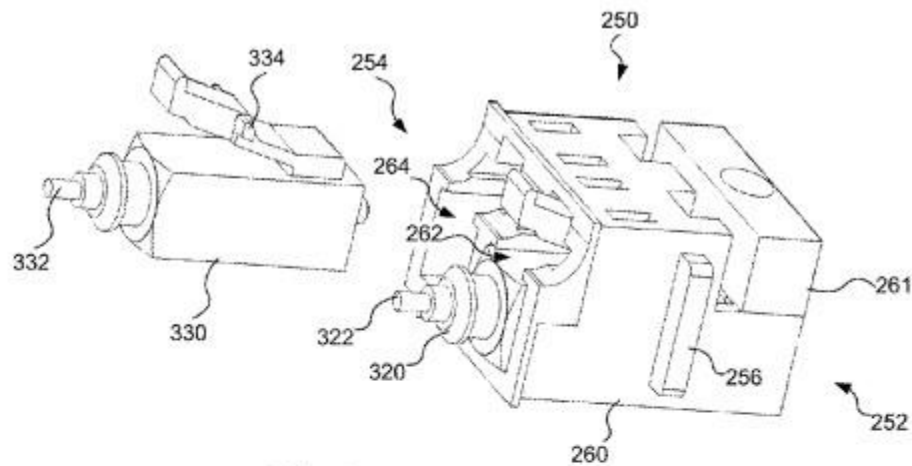


FIG. 4

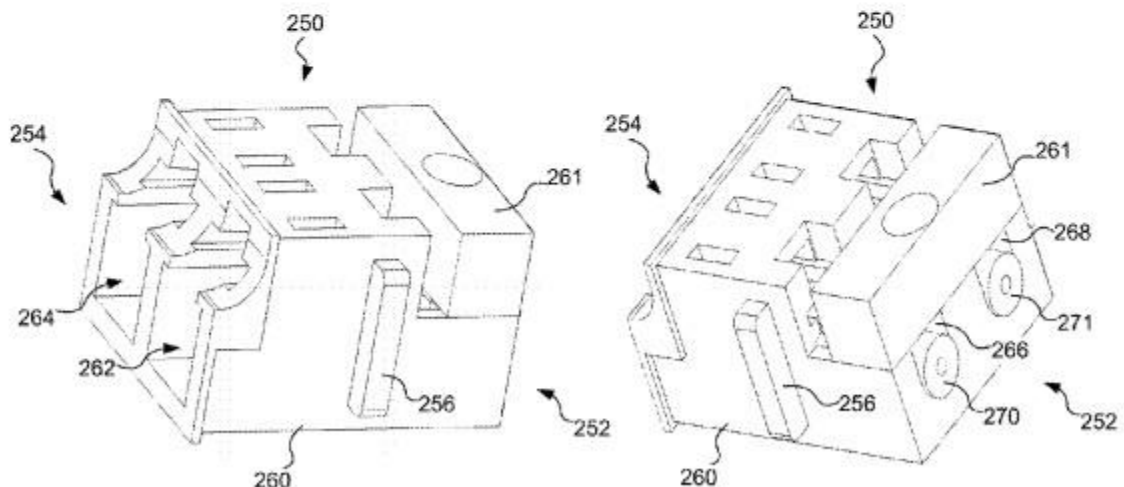


FIG. 5

FIG. 6

B. Prosecution History of the '367 Patent

60. Application no. 14/883,970 for the '367 Patent, entitled "Multi-Channel Optical Transceiver Module including Dual Fiber Type Direct Link Adapter for Optically Coupling Optical Subassemblies in the Transceiver Module,"

was filed on October 15, 2015, with one independent claim and three dependent claims, all depending from independent claim 1. *See* “’367 Patent File History,” Exhibit 1002. During prosecution, five additional dependent claims, again all depending from independent claim 1, were added. *See id.* at pp. 67-68.

61. In allowing claims 1-9 in the Notice of Allowance, the Examiner specifically noted, “Independent Claim 1 is allowed because the prior art of record, taken alone or in combination, fails to disclose or render obvious a dual fiber type direct link LC adapter that comprises *an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots, [see #261 in applicants figures 5-7]*... Dependent Claims 2-9 depend either directly or indirectly on Claim 1 and are thus also allowed.” *Id.* at p. 50 (emphasis in original).

62. The ’367 Patent issued on September 20, 2016 with nine claims, including one independent claim. The ’367 Patent is a divisional of and claims priority to U.S. Patent No. 9,170,383 filed on December 10, 2012. *See* ’367 Patent (Exhibit 1001); *see* “File History”, Exhibit 1002.

C. Challenged Claims of the ’367 Patent

63. My understanding is that Petitioners are requesting *inter partes* review of claims 1-9 (“Challenged Claims”) of the ’367 Patent. The Challenged Claims are

recited as follows, where I have added reference labels (a), (b), (c), etc., to individual portions of the claim for convenience:

Claim	Recitation
[1a]	A dual fiber type direct link LC adapter comprising:
[1b]	an adapter body portion defining first and second LC connector receiving regions at a pluggable connector end and defining first and second slots at a direct link end;
[1c]	first and second direct link connector assemblies configured to be received in the first and second slots, respectively, each of the direct link connector assemblies defining an LC connector receptacle at one end, wherein the LC connector receptacle extends into a respective one of the LC connector receiving regions and is configured to receive a portion of an LC connector for optical coupling, and wherein each of the direct link connector assemblies is configured to be mechanically coupled to an optical fiber at another end; and
[1d]	an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots.
[2]	The dual fiber type direct link LC adapter of claim 1, wherein each of the direct link connector assemblies include a fiber ferrule for receiving the optical fiber and a sleeve around the fiber ferrule for defining at least a portion of the LC connector receptacle.
[3]	The dual fiber type direct link LC adapter of claim 1 wherein a length of the dual fiber type direct link adapter from the direct link end to the pluggable connector end is less than 30 mm.
[4]	The dual fiber type direct link LC adapter of claim 2 wherein each of the direct link connector assemblies further comprises an outer housing around the fiber ferrule and the sleeve, the outer housing defining at least a portion of the connector receptacle and including a flange portion for securing the direct link connector assembly.

[5]	The dual fiber type direct link LC adapter of claim 1 wherein the first and second slots are open on one side to receive the first and second direct link connector assemblies, respectively, in a direction orthogonal to longitudinal axes of the slots.
[6]	The dual fiber type direct link LC adapter of claim 5 wherein the first and second slots include grooves, respectively, for engaging the direct link connector assemblies to prevent axial movement.
[7]	The dual fiber type direct link LC adapter of claim 1 wherein the first and second slots include grooves, respectively, for engaging the direct link connector assemblies to prevent axial movement.
[8]	The dual fiber type direct link LC adapter of claim 7 wherein the first and second direct link connector assemblies further comprises flange portions configured to extend into the grooves of the first and second slots, respectively.
[9]	The dual fiber type direct link LC adapter of claim 6 wherein the first and second direct link connector assemblies further comprises flange portions configured to extend into the grooves of the first and second slots, respectively.

IX. CLAIM CONSTRUCTION

64. In general, for my analysis, I have applied the plain and ordinary meaning of claim terms as a POSITA would have understood those terms as of the priority date of the '367 Patent. For all claim terms, I have assumed the meaning as understood by a POSITA at the time of the claimed invention, where appropriate, in light of the patent's specification, claims, and file history.

65. I understand that Petitioners assert “[n]o claim terms of the '367 patent require claim construction to resolve any disputes in this forum.” Petition at p. 15.

66. Similarly, while I am not a legal expert, based on my independent review, it is my opinion also that claim construction is not necessary to resolve the

controversy presented by the Petition because Petitioners have not demonstrated a reasonable likelihood of prevailing on any Challenged Claim. In forming my opinion, I have considered, among other things, the patent's specification, claims, and file history, as well as my background and experience.

X. GROUND 1 AND 2

A. Overview of Anderl (Exhibit 1005)

67. Anderl discloses a method of cooling an optical transceiver that is mountable in a wall opening and a method of cooling a data transfer system in combination with an optical transceiver is described. An optical transceiver is provided that has a form factor and one end portion that is insertable within a wall opening in a wall. Ambient air is ventilated over a major surface portion of the optical transceiver by mounting said end portion to the wall opening so that at least one vent is formed within confines of the wall opening. The vent allows air to pass between the exterior and interior of the enclosure, and over the major surface portion of the optical transceiver. *See* Exhibit 1005 at Abstract.

B. Opinions Regarding Ground 1

68. In my opinion, based on the following analysis, Petitioners and their expert, Dr. Lebby, have not shown that claims 1-2 and 4-9 of the '367 patent are invalid as rendered obvious by Anderl in view of Gaio.

1. **Anderl in view of Gaio fails to disclose “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the ’367 Patent**

69. In my opinion, Petitioners and Dr. Lebby have failed to show that Anderl in view of Gaio discloses at least the “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the ’367 Patent.

70. As an initial matter, I note Petitioners and Dr. Lebby do not argue or assert that Gaio discloses this limitation. *See, e.g.*, Petition at p. 38-39; *see also* Exhibit 1003 at ¶ 83.

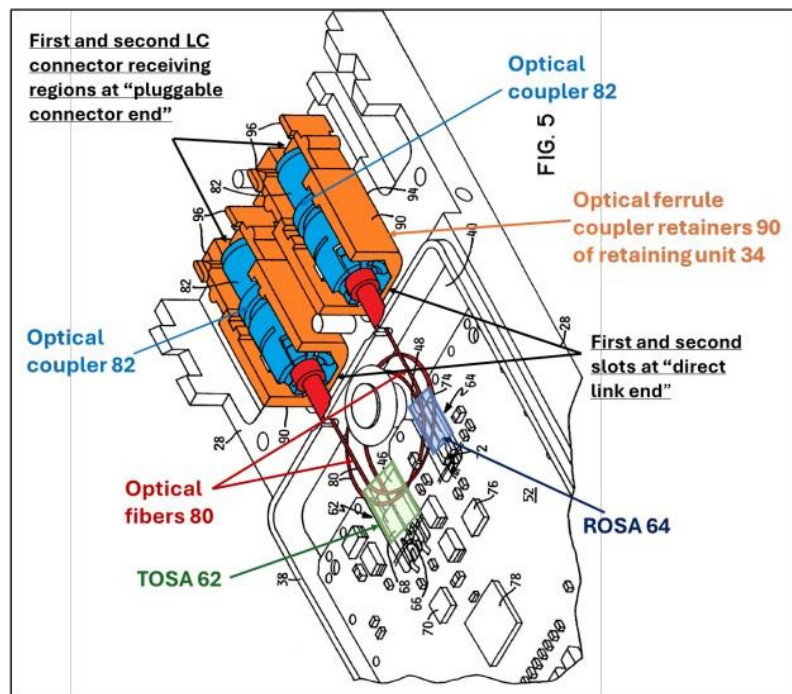
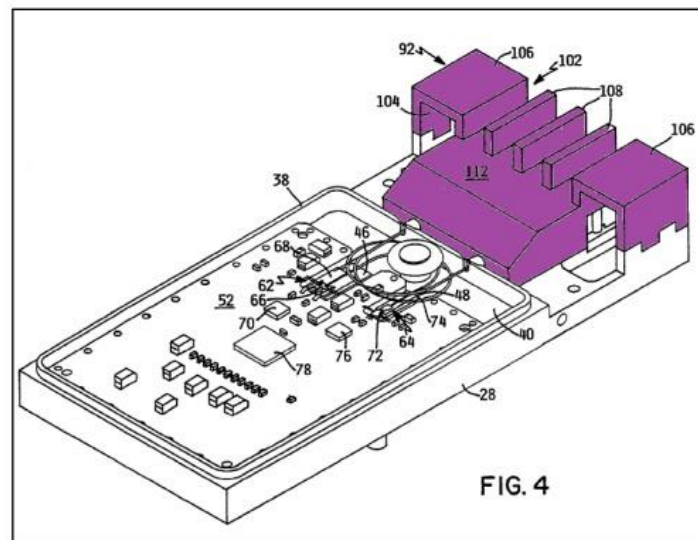
71. Petitioners and Dr. Lebby fail to show that Anderl discloses “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the ’367 Patent.

72. Petitioners and Dr. Lebby assert “Anderl discloses that direct link LC adapter (retaining unit 34) includes a cover portion defined by retainer cover member 92, which includes a hood portion 112.” Petition at p. 38; Exhibit 1003 at ¶ 83. However, hood portion 112 from Anderl does not “retain” the direct link connectors in their respective slots. Instead, hood portion 112 encloses the optical couplers 82 and is an EMI shield to improve signal quality. *See, e.g.*, Exhibit 1005 at Col. 7:45-

49 (“The retainer cover member 92 includes a hood portion 112 that encloses the optical couplers and serves to reduce the EMI as well as enhance heat transfer in this region of the module.”).

73. Moreover, Anderl does not disclose the cover portion 112 and retainer cover member 92 retaining the asserted direct link connector assemblies (optical fibers 80 and optical couplers 82) in their respective slots. Instead, the separate optical ferrule coupler retainers 90 are for retaining the optical couplers 82. *See* Exhibit 1005 at Col. 6:50-56 (“an optical retaining unit 34 comprises a pair of plastic optical ferrule coupler retainers 90 for removably retaining the optical couplers 82 and for being in covering relationship thereto a retainer cover member 92. Each of the optical ferrule coupler retainers 90 is mounted in a respective pocket 94 formed on the carrier thereon.”)

74. The separate optical ferrule coupler retainers 90 for retaining the optical couplers 82 are shown in and evident from Petitioners’ annotated Figures 4 and 5 from Anderl. Figure 5 shows the separate optical ferrule coupler retainers 90 are for retaining the optical couplers 82, while Figure 4 shows the cover member 92 with hood portion 112 are for enclosing and shielding the optical couplers 82:



75. Petitioners and Dr. Lebbly seem to recognize this failure, and instead try to argue that “[i]t would have been obvious to a POSITA based on the disclosure of Anderl that the cover portion (retainer cover member 92) helps with retaining the

direct link connector assemblies (optical couplers 82) in their respective slots.” *See* Petition at p. 38; Exhibit 1003 at ¶ 83. However, in my opinion, a POSITA would not necessarily have understood based on the disclosure of Anderl that the cover portion (cover member 92 and hood portion 112) is “for retaining the direct link connector assemblies [optical couplers 82 in Anderl as alleged by Petitioners] in the respective slots” as required by Claim 1 of the ’367 Patent. My opinion is supported by the fact that Anderl specifically discloses the separate optical ferrule coupler retainers 90 are for retaining the optical couplers 82. *See* Exhibit 1005 at Col. 6:50-56. Moreover, Anderl specifically discloses the cover member 92 and hood portion 112 are for the separate function of enclosing the optical couplers 82 “to reduce the EMI as well as enhance heat transfer in this region of the module.” *See* Exhibit 1005 at Col. 7:45-49.

76. Finally, I note Petitioners only argue “[i]t would have been obvious to a POSITA based on the disclosure of Anderl that the cover portion (retainer cover member 92) helps with retaining the direct link connector assemblies (optical couplers 82) in their respective slots.” *See* Petition at p. 38; Exhibit 1003 at ¶ 83. However, even if it might, at most, Petitioners and Dr. Lebbby seem to only argue that Anderl discloses a cover portion that “helps to retain” the direct link connector assemblies, but is not necessarily configured for retaining it, as required by the limitation in claim 1. Indeed, the ’367 Patent makes clear “[a]n adapter cover portion

261 covers the slots 266, 268 and retains the direct link connector assemblies 266, 268.” Exhibit 1001 at Col. 6:56-58 (emphasis added); *see also* Col. 8:29-33 (“The dual fiber type direct link LC adapter further includes an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots.”). In other words, the adapter cover portion in the ’367 Patent both covers the slots at the direct link end and additionally retains the direct link connector assemblies in the slots. Thus, a POSITA would not have necessarily understood based on the disclosure of Anderl that the cover portion (cover member 92 and hood portion 112) from Anderl is for both covering and retaining the direct link connector assemblies in their respective slots as required by Claim 1 of the ’367 Patent.

77. Thus, Anderl does not disclose “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the ’367 Patent.

2. Anderl and Gaio fails to disclose Claims 2 and 4-9

78. Claims 2 and 4-9 of the ’367 Patent depend from Claim 1. Because Petitioners and Dr. Lebby have not shown that Anderl and Gaio renders obvious Claim 1, Petitioners has also have not shown that Anderl and Gaio renders obvious Claims 2 and 4-9.

C. Opinions Regarding Ground 2

79. Claim 3 of the '367 Patent depends from Claim 1. Because Petitioners and Dr. Lebby have not shown that Anderl and Gaio renders obvious Claim 1, Petitioners has also have not shown that Anderl and Gaio renders obvious Claim 3.

XI. GROUNDS 3 AND 4

A. Overview of Kim (Exhibit 1007)

80. Kim discloses a high-speed optical module, such as a transceiver or transponder. A fiber assembly including a receptacle, a fiber, and a modified connector are provided and enable an optical connection from inside of the optical component to outside of the component. Internally, the fiber assembly is detachable from an internal optical component. The optical component is connected to a PCB using a ball grid array. By detaching the fiber assembly, the optical component can be changed-out without damaging the fiber. The fiber is spooled inside the module to protect the fiber around a spooling assembly that is integrated with the receptacle holders that form part of the module's ports. *See* Exhibit 1007 at Abstract.

B. Opinions Regarding Ground 3

81. In my opinion, based on the following analysis, Petitioners and Dr. Lebby have not shown that Kim in view of Gaio renders invalid as obvious claims 1-2 and 4-9 of the '367 Patent.

1. **Kim in view of Gaio fails to disclose “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the ’367 Patent**

82. In my opinion, Petitioners and Dr. Lebby have failed to show that Kim in view of Gaio discloses at least the “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” limitation as required by Claim 1 of the ’367 Patent.

83. As an initial matter, I note Petitioners and Dr. Lebby do not argue or assert that Gaio discloses this limitation. *See, e.g.*, Petition at p. 70-71; *see also* Exhibit 1003 at ¶¶ 115-117.

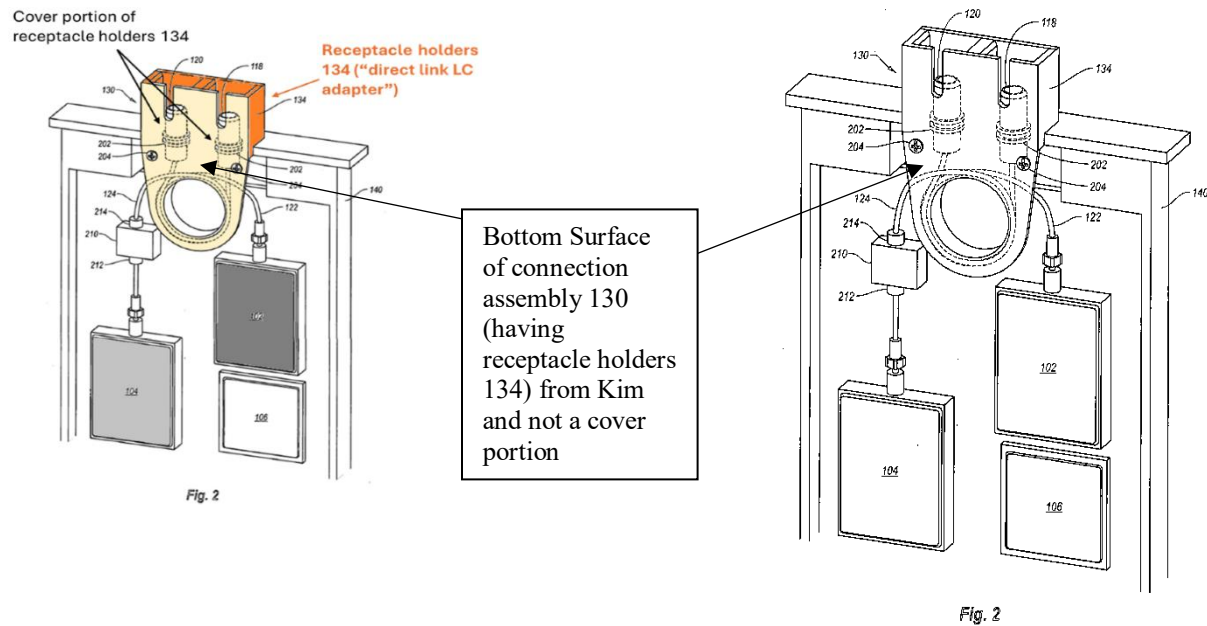
84. Petitioners and Dr. Lebby fail to show that Kim discloses “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the ’367 Patent. Instead, Kim discloses “connection assembly 130 [which] also includes receptacle holders 134....to receive an optical connector such as an LC or SC connector.” *See* Exhibit 1007 (Kim) at ¶ 45.

85. Petitioners and Dr. Lebby assert “Kim discloses that receptacle holders 134 (‘direct link LC adapter’) include a cover portion that covers the first and second slots for receiving direct link connector assemblies receptacles 118, 120,” and further assert that Figure 2 from Kim “show[s] screws 204 attaching a cover portion

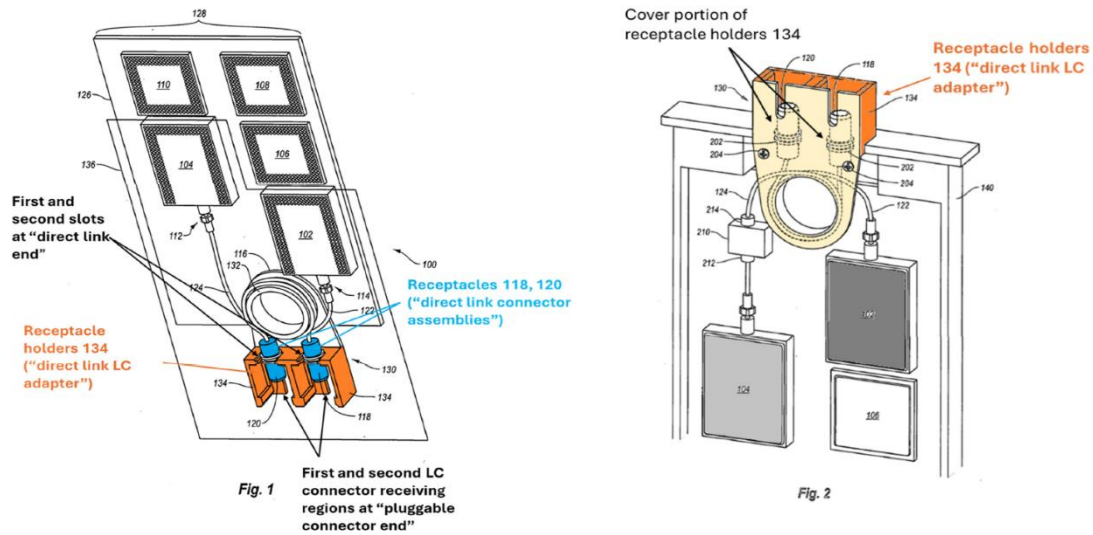
of connection assembly 130 (having receptacle holders 134) to housing 140 of module 100.” *See* Petition at p. 70; *see also* Exhibit 1003 at ¶¶ 115. However, this is incorrect.

86. As an initial point, Petitioners and Dr. Lebby in their annotated Figure 2 from Kim seem to point to the bottom surface of the connection assembly 130 (having receptacle holders 134 and spool assembly 116 (*see* Exhibit 1007 (Kim) at ¶ 46)) in their annotated version of Figure 2 from Kim as the purported cover. However, this is not correct. Although not discussed or mentioned by Petitioners or Dr. Lebby, Figure 2 from Kim does appear to show an unidentified and unlabeled surface on the topside (other side) of receptacle holder 134. However, Kim does not describe this as a separate cover, and Petitioners do not seem to assert that it is. Further, as I stated above, what Petitioners do point to is also not a cover, but the bottom surface of connection assembly 130 and receptacle holder 134. This is

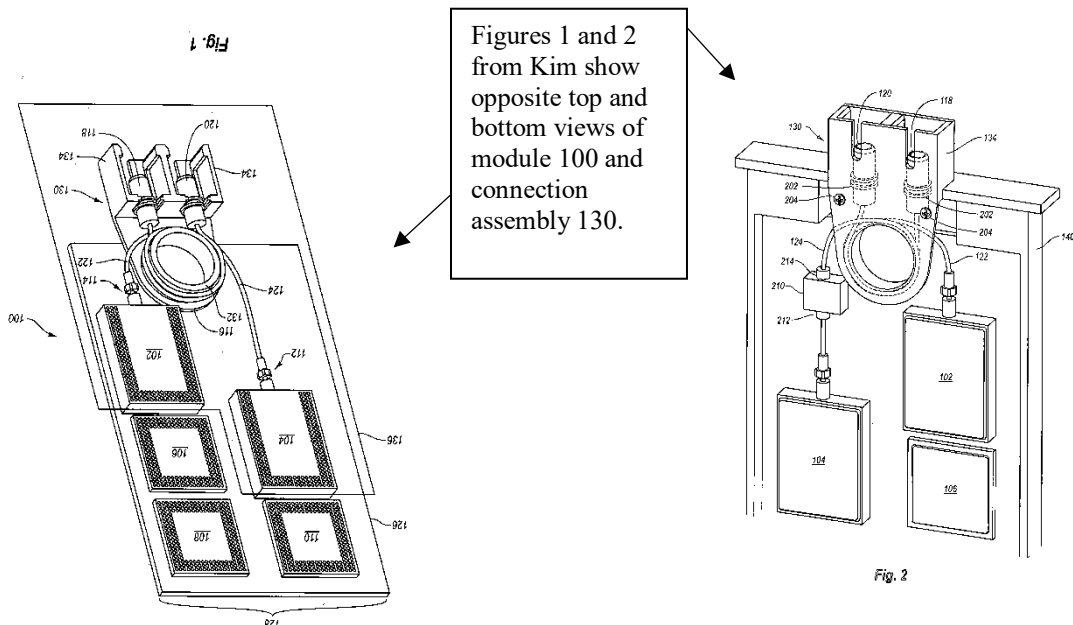
evident by comparing Petitioners' annotated Figure 2 from Kim with the actual Figure 2 from Kim as follows:



87. This is also further supported by comparing Petitioners' annotated Figures 1 and 2 side by side. Figure 1 shows the open top side view of connection assembly 130 and receptacle holder 134. In contrast, Figure 2 shows the bottom side view of connection assembly 130 and receptacle holder 134. In my opinion, a POSITA would understand that these are opposite top and bottom views (i.e., Figures 1 and 2) of receptacle holder 134 by looking at the other elements in the two figures, such as the direction of the spool assembly 116, which is pointing towards the observer in Figure 1 and away from the observer in Figure 2:



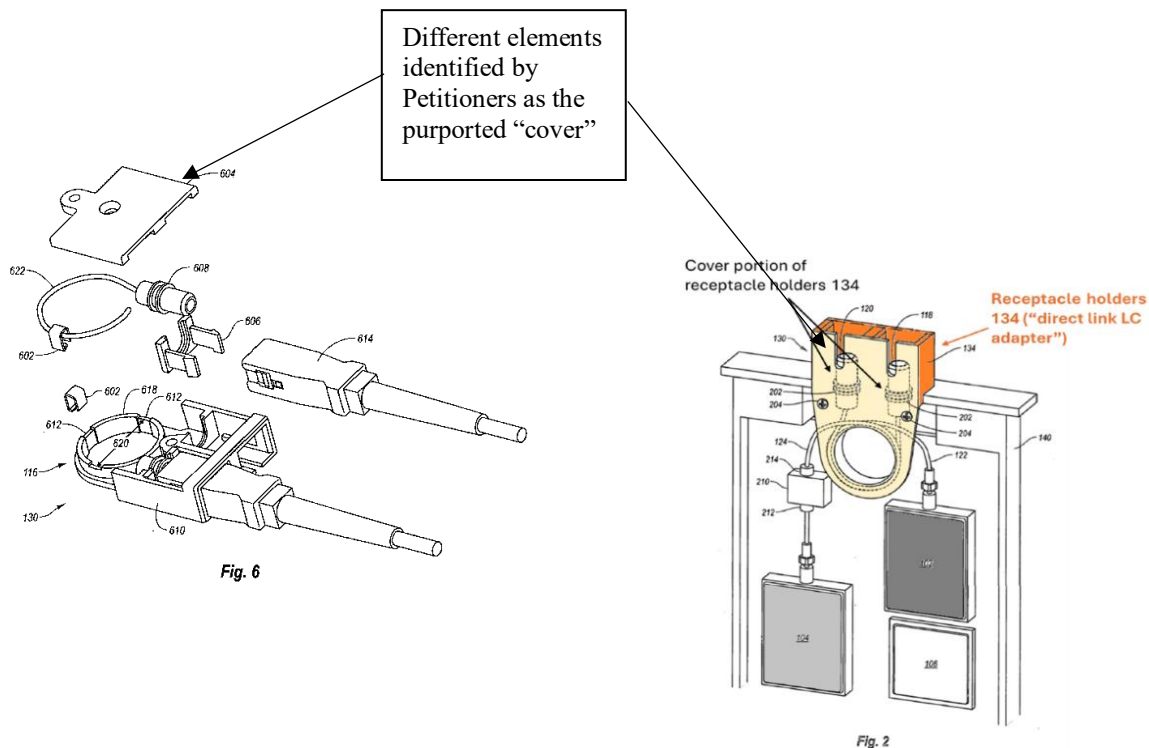
88. I also flip Figure 1 upside and show it next to Figure 2 to further evidence the opposite views of Figures 1 and 2 from Kim to a POSITA, as a POSITA would understand it by looking at the opposite orientation of items 102, 104, and 106 on module 100 in Figures 1 and 2:



89. Furthermore, in my opinion, Petitioners and Dr. Lebby are also not correct in their assertion of obviousness that Kim "show[s] screws 204 attaching a

cover portion of connection assembly 130 (having receptacle holders 134) to housing 140 of module 100.” *See* Petition at p. 70; *see also* Exhibit 1003 at ¶¶ 115. In an important difference, Kim does disclose that the screws 204 are for attaching the entire connection assembly 130 (which includes the spool assembly 116 and receptacle holder 134 (*see* Exhibit 1007 (Kim) at ¶ 46)) to the housing 140 of the module 100. *See* Exhibit 1007 (Kim) at ¶ 48 (“The spool assembly 116 may be secured to the module via screws 204 (or other suitable connectors). In one example, the screws 204 secure the connection assembly 130 to the housing 140 of the module 100.”). Kim disclosing the screws 204 are for attaching the entire connection assembly 130 to the module 100 is clear from Kim, as Kim then next discusses other alternative ways to attach the connection assembly 130 to the module 100. *See id.* (“The connection assembly 130 may also be connected a press fit or other means. The connection assembly 130 may alternatively be connected to a top cover of the housing.”).

90. Moreover, Petitioners and Dr. Lebby seem to point to two different structures for disclosing the claim element at issue. In one instance, they label the bottom surface of receptacle holders 134 as the purported “cover”. In another instance, Petitioners and Dr. Lebby point to “cover” 604 from a separate embodiment in Kim that “can be attached...[and that] may not cover the spool assembly 116, but may only cover the receptacles 610 and may connect with the receptacle holder 610.” *See* Petition at p. 71-72; *see also* Exhibit 1003 at ¶¶ 116. Figure 6 from Kim shows this separate cover 604 that can attach to the receptible holders in a different embodiment from Kim (shown below next to Petitioners’ annotated Figure 2 from Kim for comparison):



91. However, as can be clearly seen, the purportedly identified “cover” from Figure 2 is not the same as the cover 604 shown in Figure 6. It seems that Petitioners might recognize that each different identified purported “cover” is deficient. What Petitioners have identified in Figure 2 is not a cover, but instead is the bottom surface of the integrated connection assembly 130. *See, e.g.*, Exhibit 1007 (Kim) at ¶ 46 (“Often, the connection assembly 130 is integrated to reduce components. Thus, the receptacle holders 134 and the spool assembly 116 are a single piece that can be mounted to the housing of the module 100 and/or to the PCB 126.”). Moreover, with regards to the embodiment from Kim shown in Figure 6, the cover 604 is not configured to retain the identified direct link connector assemblies (receptacles 608) in their respective slots. Instead, Kim specifically discloses that “clip 606 holds the receptacle 608 in place relative to the housing of the module 100 such that the connector 614 can be repeatedly inserted/removed as needed.” *Id.* at ¶ 63.

92. Finally, Petitioners then argue “[a] POSITA would have understood based on the disclosure of Kim that the cover portion helps to retain direct link connector assemblies (receptacles 118, 120) in their respective slots.” *See* Petition at p. 72; *see also* Exhibit 1003 at ¶¶ 117. However, even if might, at most, Petitioners and Dr. Lebby only seem to argue that Kim discloses a cover portion that “helps to retain” the direct link connector assemblies, but is not necessarily configured for

retaining it, as required by the limitation in claim 1. Indeed, the '367 Patent specification also makes clear “[a]n adapter cover portion 261 covers the slots 266, 268 and retains the direct link connector assemblies 266, 268.” Exhibit 1001 at Col. 6:56-58 (emphasis added); *see also* Col. 8:29-33 (“The dual fiber type direct link LC adapter further includes an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots.”). In other words, the adapter cover portion in the '367 Patent both covers the slots at the direct link end and additionally retains the direct link connector assemblies in the slots. Thus, a POSITA would not have necessarily understood based on the disclosure of Kim that any cover or cover portion from Kim is for both covering and retaining the direct link connector assemblies in their respective slots as required by Claim 1 of the '367 Patent.

93. Thus, Kim does not disclose “an adapter cover portion configured to cover the first and second slots for retaining the direct link connector assemblies in the respective slots” as required by Claim 1 of the '367 Patent.

2. Kim and Gaio fails to disclose Claims 2 and 4-9

94. Claims 2 and 4-9 of the '367 Patent depend from Claim 1. Because Petitioners and Dr. Lebbby have not shown that Kim and Gaio renders obvious Claim 1, Petitioners has also have not shown that Kim and Gaio renders obvious Claims 2 and 4-9.

C. Opinions Regarding Ground 4

95. Claim 3 of the '367 Patent depends from Claim 1. Because Petitioners and Dr. Lebby have not shown that Kim and Gaio renders obvious Claim 1, Petitioners has also have not shown that Kim and Gaio renders obvious Claim 3.

AFFIRMATION

96. I hereby declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Alan Willner

Alan E. Willner

January 16, 2026

Date

EXHIBIT A

Biographical Sketch: Alan E. Willner

Alan Willner received a Ph.D. (1988) in Electrical Engineering from Columbia University and a B.A. (1982) in Physics and an Honorary Doctorate (*Honoris Causa*, 2012) from Yeshiva University. Prof. Willner was a Postdoctoral Member of Technical Staff at AT&T Bell Labs and a Member of Technical Staff at Bellcore. He is currently *Distinguished Professor of Electrical & Computer Engineering* and the *Andrew & Erna Viterbi Professorial Chair* in the Ming Hsieh Dept. of Electrical & Computer Eng. of the Viterbi School of Eng. at the Univ. of Southern California; he also has a joint appointment with Dept. of Physics & Astronomy of the Dornsife College. Prof. Willner has been a Visiting Professor at Columbia Univ., Univ. College London, and Weizmann Institute of Science. He has been a Member of the U.S. Army Science Board, a Member of the Defense Sciences Research Council (16-member body that provided reports to DARPA Director & Office Directors), and a member of many technical advisory boards. He was also Founder & CTO of Phaethon Communications, a company whose technology was acquired by Teraxion, that created the ClearSpectrum[®] dispersion compensator product line which is presently deployed in many commercial systems worldwide.

Prof. Willner has received the following honors: Member of the U.S. National Academy of Engineering, International Fellow of the U.K. Royal Academy of Engineering, Presidential Faculty Fellows Award from the White House, Ellis Island Medal of Honor, IEEE Eric Sumner Technical Field Award, Packard Foundation Fellowship in Science & Engineering, John Guggenheim Foundation Fellowship, U.S. Dept. of Defense Vannevar Bush Faculty Fellowship, Fellow of National Academy of Inventors, Institution of Eng. & Tech. (IET) J.J. Thomson Medal, Thomas Egleston Medal for Distinguished Engineering Achievement (highest eng. award from Columbia Eng. Alumni Association), Optica (formerly Optical Society, OSA) Paul Forman Engineering Excellence Award, IEEE Photonics Society Engineering Achievement Award, National Science Foundation National Young Investigator Award, Fulbright Foundation Senior Scholar Lecture & Research Fellowship, Honorary Professor of Huazhong Univ. of Science & Technology, Civilian Service Commendation Medal (US Dept. of the Army), IEEE Photonics Society Distinguished Lecturer Award, SPIE President's Award, IEEE Photonics Society Distinguished Service Award, USC Associates Award for University-Wide Creativity in Research (highest USC research award), USC Associates Award for University-Wide Excellence in Teaching (highest USC teaching award), OSA Robert Hopkins Leadership Award, USC Phi Kappa Phi Faculty Recognition Award (for significant scholarly work), Member of European Academy of Sciences and Arts, USC Senior Engineering Research Award, USC Best Engineering Teacher Award, 2001 Eddy Paper Award from Pennwell Publications for Best Contributed Technical Article (across all 30 magazines in Pennwell's Advanced Technology Division), IEEE Globecom Best Paper Award, and Edwin Howard Armstrong Foundation Memorial Award for highest-ranked EE Masters student at Columbia University. He is a Fellow of AAAS, APS, IEEE, IET, OSA, SPIE, and AAIA, and he was a Fellow of the Semiconductor Research Corporation. Prof. Willner was an invited foreign dignitary representing the sciences for the 2009 Nobel Prize Ceremonies in Stockholm.

Prof. Willner's activities include: Co-Chair of U.S. National Academies' Study on Optics & Photonics, President of the OSA, President of the IEEE Photonics Society (formerly LEOS), Co-Chair of OSA Science & Engineering Council, Vice-President for Technical Affairs of IEEE Photonics Society, Editor-in-Chief of OSA Optics Letters, Editor-in-Chief of the IEEE/OSA Journal of Lightwave Technology (JLT), Editor-in-Chief of the IEEE Journal of Selected Topics in Quantum Electronics, Associate Editor of the IEEE Journal of Selected Areas in Communications Series on Optical Networks, Photonics Division Chair of OSA, Chair of IEEE TAB Ethics and Member Conduct Committee, Chair of the National Photonics Initiative, General Co-Chair of the Conference on Lasers and Electro-Optics, Program Co-Chair of OSA Annual Meeting, General Chair of IEEE Photonics Society Annual Meeting, Program Chair of Telecommunications Engineering at SPIE's Photonics West, and Chair of the Unclassified Technical Program for IEEE MILCOM.

Prof. Willner has ≥ 1750 publications (*h-index* ≥ 94 , $\geq 49,300$ citations, *Google Scholar*), including 1 book, ~ 10 edited books, ~ 48 US patents, ~ 56 keynotes/plenaries, ~ 26 book chapters, > 470 refereed journal papers, and > 380 invited papers/presentations. His 2012 Nature Photonics (impact factor ~ 32) paper has > 5000 citations and is the #2 most cited original paper and #6 most cited paper overall in Nature Photonics' ~ 18 -year history. His research is primarily in optical technologies (e.g., communications, signal processing, networks, and subsystems).

FULL CV: ALAN ELI WILLNER

ADDRESS: EEB 538, Dept. of Electrical Engineering, Viterbi School of Engineering, USC, LA, CA 90089-2565, 213-740-4664, F: 213-740-8729, willner@usc.edu

EDUCATION: **Columbia University - Ph.D.** - Electrical Engineering - Aug. 1988 (defended). Thesis Advisor - **Prof. Richard Osgood, Jr.**, Thesis Title: Laser-Controlled Photochemical Etching of Semiconductors for Electro-optical Devices
Columbia University - M.S. - Electrical Engineering (1984)
Overall Columbia grade index - **4.11** (A = 4.0)
Yeshiva University - B.A.- Physics (1982). Grade index - **3.96** (A = 4.0)

WORK EXPERIENCE:

Fall '10 - present	Distinguished Prof. ('21), Ming Hsieh Dept. of Electrical & Computer Eng., Andrew & Erna Viterbi Professorial Chair ('22) Steven & Kathryn Sample Chair in Eng. ('10-'22), Viterbi School of Eng., Joint Appointment w/ Dept. of Physics & Astronomy, Dornsife College ('22) University of Southern California <ul style="list-style-type: none">• Optical Communication Systems and Networks
Mar. '15 - present	Visiting Prof ('15), then Adj. Senior Res. Scientist, Elec Eng Dept, Columbia Univ
Sept. '17 - present	Visiting Scholar, Yeshiva College and Stern College for Women, Yeshiva Univ.
Fall '98 – Spring '10	Professor, Ming Hsieh Dept. of Electrical Eng., USC
Sept. '09 – June '14	Member, Defense Sciences Research Council , Consultant to Booz Allen <ul style="list-style-type: none">• Council performed studies that were presented to DARPA Director & Office Directors
Fall '07 - Summer '12	Co-Director , Communications Sciences Institute, EE Dept. Exec. Comm., USC
Fall '07 -Summer '17	Visiting Professor, Dept. of Electronic & Electrical Eng., Univ. College London
Nov. '99 - Nov. '02	Founder & CTO , Phaethon Communications (technology acquired by Teraxion) <ul style="list-style-type: none">• Created the ClearSpectrum® dispersion compensator product line• ClearSpectrum® presently deployed in many commercial 40-Gbit/s systems
Aug. '94 - Sept. '98	Associate Professor, Dept. of EE - Systems, USC
April '96 - June '04	Associate Director, Student Affairs, NSF-Sponsored Engineering Research Center in Integrated Media Systems, USC
Spring '98	Visiting Fulbright Prof. , Physics Dept., Weizmann Institute of Science, Israel
Apr. '94 – Present	Associate Director, Center for Photonic Technology (CPT), USC
Jan. '92 - Present	Director, Optical Communications Laboratory , USC
Jan. '92 - July '94	Assistant Professor, Dept. of EE - Systems, USC
Nov. '90 - Jan. '92	Member of Technical Staff, Bell Comm. Research , Photonics Research Dept. <ul style="list-style-type: none">• Fiber Optic Wavelength-Division-Multiplexed Communication Systems
Oct. '88 - Oct. '90	Postdoctoral Member of the Technical Staff , Crawford Hill Lab AT&T Bell Laboratories , Photonics Networks and Components Research Department, Postdoctoral Supervisor: Dr. Ivan Kaminow
Sept. '84 - Aug. '88	Graduate Research Assistant, Columbia University , Microelectronics Science Lab & NSF Center for Telecommunications Research
Fall '87	Instructor, Columbia Univ. , “Fundamentals of Circuits and Systems”
June '87	Visiting Scientist, Naval Research Laboratory - Modulation Spectroscopy
Summers '83, '84	Summer Technical Staff, David Sarnoff Research Center, RCA Labs
Fall '83	Teaching Assistant, Columbia Univ., Solid State Devices

HONORS:

Member, U.S. National Academy of Engineering ('16)

U.K. Royal Academy of Engineering ('10)

Of the 4 International Fellows elected from the US in '10, the other 3 were Drs. Howard Bruschi (former Westinghouse CTO), Robert Langer (MIT Institute Prof.) and Charles Vest (former MIT President and NAE President).

Ellis Island Medal of Honor ('20)

Awarded annually to a group of distinguished American citizens who exemplify a life dedicated to their community and the world at large.

IEEE Eric E. Sumner Award ('14)

One "Technical Field Award" in Communications from the entire IEEE.

Vannevar Bush Faculty Fellowship (U.S. DoD) ('16)

Formerly Defense Security Science & Eng. Faculty Fellowship (NSSEFF)
This is considered the DoD's most prestigious single-investigator research award.

J. J. Thomson Medal for Achievement in Electronics, Institution of Engineering & Technology (IET) ('16)

Civilian Service Commendation Medal, US Department of the Army ('21)

"For outstanding service as a member of the Army Science Board."

Distinguished Professor of Electrical and Computer Engineering at USC ('21)

Andrew and Erna Viterbi Endowed Professorial Chair at USC ('22)

Inaugural holder of endowed chair named for Dr. & Mrs. Viterbi.

Steven and Kathryn Sample Endowed Chair in Engineering at USC ('10)

Inaugural holder of endowed chair named after the former USC president.

Fellow of the National Academy of Inventors ('15)

'09 Nobel Prize Ceremonies, "invited foreign dignitary representing sciences"

Thomas Eggleston Medal for Distinguished Engineering Achievement ('17)

Highest honor given to a Columbia engineering graduate for a lifetime of achievement in the engineering profession by the Columbia University Engineering Alumni Association. Notable previous winners include Edwin H. Armstrong, Harvey S. Mudd, and Hyman G. Rickover.

Member, European Academy of Sciences and Arts ('21)

Albert Nelson Marquis Lifetime Achievement Award from Marquis Who's Who Publications Board ('17)

Viterbi School of Engineering Senior Research Award ('19)

Honorary Professor, Huazhong Univ. of Science & Technology (HUST) ('16)

HUST is ranked as one of the top 10 universities in China.

Honorary Doctorate, *Honoris Causa*, Yeshiva University, Commencement ('12)

John Simon Guggenheim Foundation Fellowship ('12)

HONORS: (CONTINUED)

Presidential Faculty Fellows Award ('94)

30 awards are given annually by the **White House** to faculty in all areas of science and engineering. Sponsored by the NSF.

David & Lucile Packard Foundation Fellowship in Science & Eng. ('93)

20 awards given annually in science and eng.
One of three engineering awards.

NSF National Young Investigator Award ('92)

Formerly the **Presidential** YI Award.

Fulbright Foundation Senior Scholar Fellowship Award ('98)

Pursue research and lecturing at the Weizmann Institute of Science.

Optical Society of America (OSA) Paul Forman Eng. Excellence Award ('10)

One award given in 2010 for technical achievements in optical engineering.

IEEE Photonics Society Engineering Achievement Award ('11)

One award given in 2011 for technical achievements in photonics.

Optical Society of America (OSA) Leadership Award / New Focus Prize ('09)

One given for significant contribution to society or impact on optics.

SPIE President's Award ('13)

Fellow – American Physical Society (APS) ('21)

Fellow – American Assoc. for the Advancement of Science (AAAS) ('12)

Fellow – Institute of Electronic and Electrical Engineers (IEEE) ('04)

Fellow - Optical Society of America (OSA) ('96)

Fellow – Society for Photo-Instrumentation Engineers (SPIE) ('10)

Fellow - Institution of Engineering & Technology (IET) ('16)

Fellow – Asia-Pacific Artificial Intelligence Association (AAIA) ('22)

Best Contributed Technical Article, '01 Eddy Award, Pennwell Publications

One award from all 30 magazines in Pennwell's Advanced Technology Division.

Best Paper Award, IEEE Globecom Conference ('14)

Paper Selected as one of the '07 Highlights of *Nature Photonics* by its Editors

Paper Selected: NP, vol. 1, no. 2, pp. 87-88, 2007.

USC Associates Award, University-Wide Creativity in Research ('12)

Two awards given from >2,000 professors at USC. Highest research award.

USC Associates Award, University-Wide Excellence in Teaching ('03)

Two awards given from >2,000 professors at USC. Highest teaching award.

Phi Kappa Phi Faculty Recognition Award ('16)

4 given at USC Academic Honors Convocation for significant scholarly work

IEEE Photonics Society Distinguished Lecturer Award (99', 00')

4 annual awards to present a distinguished lecture to local chapters worldwide.

HONORS: (CONTINUED)

IEEE Photonics Society Distinguished Service Award '03

1 annual award that recognizes exceptional individual contribution of service.

HP Labs Research Innovation Award '08, '09, '10 (see also *Grants*)

Northrop USC Outstanding Junior Eng. Faculty Research Award '94

Given to the **highest ranked** Asst. Prof. in the USC School of Engineering.

Phi Kappa Phi Academic Honor Society, Faculty Inductee '04

Northrop/USC Best Electrical Eng. Research Impact Faculty Award '05

TRW USC School of Engineering Best Teacher Award '99

Teaching award given to the highest ranked teacher in the School of Eng.

NSF Alan T. Waterman Award Finalist ('95, '96, and '97)

Outstanding Teaching Award, Elec. Eng. Dept., USC Eng. School ('95, '97)

The Okawa Foundation Research Award '00

Senior Member – IEEE ('94)

Taiwan Government Travel Grant ('08)

“Academician of Academia Sinica or International Renowned Scholar”

Edwin Howard Armstrong Foundation Memorial Award

Given to the **highest ranked** Columbia Univ. Elec. Eng. Masters Student

IEEE LEOS Figure Contest Winner (L. Zhang, et al.) ('08)

Fellow - Semiconductor Research Corporation - Doctoral Research

Representing Business Professionals from the State of California in Who's Who in America 2020 ('20)

Top 2% Most-cited Scientists Listed by Stanford University ('20)

Marquis Who's Who in America; ... in the World; ... in Science & Eng.

NATO/NSF Summer Fellowship (1985) - Italy

Columbia University Departmental Fellowship (9/83-5/86)

Dr. Samuel Belkin Scholar Award: Yeshiva University

Head Delegate to the Harvard Model United Nations from Yeshiva University

Magna Cum Laude: Yeshiva University

Student Council Member & Junior Class Vice-President: Yeshiva University

Valedictorian (high school); Editor-in-Chief, Yearbook (high school)

JOURNAL EDITOR:

Editor-in-Chief, OSA Optics Letters ('08-'13)

#1 ranked Optics publication for 2007 in terms of ISI Impact Factor

Editor-in-Chief, IEEE/OSA Journal of Lightwave Technology ('01-'06)

Editor-in-Chief, IEEE J. of Selected Topics in Quantum Electronics ('99-'01)

Associate Editor, IEEE/OSA J. of Optical Communications & Networking ('09-'11)

Associate Editor, IEEE Journal of Selected Areas in Communications,
Series on Optical Communications and Networks (2002-2009)

Associate Editor, IEEE/OSA Journal Lightwave Technology (1995-2000)

Guest Editor, MDPI Journal of Applied Sciences

Special Issue on Novel Insights into Orbital Angular Momentum Beams: From Fundamentals and Devices to Applications ('19)

Guest Co-Editor, Light: Science & Applications,

Special Issue, Twisted Light with Orbital Angular Momentum ('17)

Guest Editor, IEEE/OSA Journal of Lightwave Technology, Special Issue,
A Third of a Century of Lightwave Technology Jan. 1983-Apr. 2016 ('16)

Guest Editor, IEEE Journal of Selected Topics in Quantum Electronics,
Special Issue, Optical Waveguides: Technologies and Applications ('16)

Guest Editor, Nanophotonics (a de Gruyter journal),

Special Issue, Advances in Optical Fiber Technology ('14)

Guest Editor, IEEE Journal of Selected Topics in Quantum Electronics,
Special Issue, Optical Modulators - Technologies and Applications ('13)

Guest Editor, IEEE Journal of Selected Areas in Communications,
Special Issue, Next-Generation Broadband Optical Access Network Techn. ('10)

Guest Editor, Applied Physics-A (a Springer Verlag journal),
Special Issue on Photonic Interconnects (June 2009)

Guest Editor, IEEE/OSA Journal of Lightwave Technology,
Special Issue on the 25th Anniversary of JLT (May '08)

Guest Editor, OSA Journal of Optical Networking,
Special Issue on Optical Code-Division-Multiple-Access (2007)

Guest Editor, IEEE Journal of Selected Topics in Quantum Electronics,
Special Millennium Issue (Dec. 2000)

Guest Editor, IEEE Journal of Quantum Electronics

Focus Issue on Ultra-High-Bandwidth Optical Transmission Systems (Nov. 1998)

Guest Editor, IEEE/OSA Journal of Lightwave Technology & IEEE Journal of Selected Areas in Communications, Joint Special Issue,
Multiple-Wavelength Technologies and Networks (June '96)

PROFESSIONAL ACTIVITIES:

Panel Member, Optica Fellow Nominations Webinar ('25)

Member, Technical Program Committee, Optical Sensing and Precision Metrology (OE305), SPIE Photonics West, San Francisco ('25, '26)

Member, the Frederic Ives Medal/Jarus W. Quinn Prize Selection Committee ('25-'27)

Member, National Academy of Engineering (NAE) Section 7 Search Committee ('24-'25)

Member, IEEE Edison Medal Selection Committee ('22-'24)

Member, External Advisory Committee,
Department of Electrical & Computer Engineering, Johns Hopkins University ('24-'27)

Co-Chair, Workshop on Orbital Angular Momentum Transmission,
IEEE International Conference on Communications (ICC), Denver ('24)

Member, International Scientific Committee,
International Conference on Optical Angular Momentum (ICOAM), South Africa ('24)

Member, Program Committee,
OPTICA Topical Meeting on Adaptive Optics: Methods, Analysis, and Applications ('24)

Co-Chair, International Workshop on High Capacity Wireless Communications,
IEEE GLOBECOM ('23)

Member, Search Committee for Editor-in-Chief for the SPIE Journal of Nanophotonics ('23)

General Chair,
OptoElectronics and Communications Conference (OECC), Shanghai ('23)

Member, Technical Program Committee, Conference on High Contrast Metastructures XII, SPIE Photonics West ('23)

Co-chair, Yeshiva University Ad-Hoc Committee,
Explore the possibility of instituting and implementing a doctoral program in Applied Math (YUCAM) ('23)

Chair, Selection Committee for the Optica Foundation Challenge Contest ('22-'25)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Co-Chair, Workshop on High-Capacity Wireless Communications
IEEE Global Communications Conference (GLOBECOM) ('22)

Chair, External Review Panel on Electronics Science and Technology Focus Area,
Naval Research Laboratory ('22)

Co-Chair, Technical Program Committee,
Workshop on Orbital Angular Momentum Transmission, IEEE International
Conference on Communications (ICC) ('22)

Member, Tingye Li Memorial Scholarship Nomination Review Committee,
Photonics Society of Chinese Heritage (PSC) ('20-'25)

Workshop Participant, Crystal Ball Workshop,
The U.S. OSD R&E, USSF, and U.S. AFRL ('22)

Member, Organizing Committee, ComSoc Student Conference,
IEEE WCNC 2022 ('22)

Co-Lead of Photonics Group,
Future Directions Workshop on Wireless Communications: XG and Beyond,
Basic Research Office of the Office of the Under-Secretary of Defense,
Arlington, VA ('22)

Member, International Advisory Committee, Photonics Research Institute,
Hong Kong Polytechnic University ('22-'24)

General Co-Chair,
Asia Communications and Photonics Conference (ACP), Shanghai ('21)

Optica (formerly The Optical Society (OSA)) (Membership ~20,000)

Past-President (2017)

President (2016)

President-Elect (2015)

Elected Vice President (2014)

U.S. National Academy of Engineering, Member Search Committee, Section 7,

- **Chair** (2018)

- **Vice-Chair** (2017)

- **Past Chair** (2019)

- Member ('20-'24)

Member, Technical Program Committee,
Workshop on Orbital Angular Momentum Transmission, IEEE International
Conference on Communications (ICC) ('21)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Member, Technical Program Committee,
Adaptive Optics: Methods, Analysis and Applications, OSA Imaging and Applied
Optics Congress ('20)

Co-Chair, Workshop on High-Capacity Wireless Communications
IEEE Global Communications Conference (GLOBECOM) ('20)

Member, Review Panel on Engineering Sciences at the Army Research Office,
Laboratory Assessments Board, US National Academies ('20)

Member, Advisory Board, Advances in Optics and Photonics (AOP) ('20-'23)

Member, Technical Program Committee,
Workshop on Orbital Angular Momentum, IEEE International Communications
Conference (ICC) ('20)

Member, Technical Program Committee,
OSA Topical Meeting on Adaptive Optics, OSA Imaging and Applied Optics
Congress, Vancouver, Canada ('20)

Member, Technical Program Committee,
SPIE Photonics West, Advanced Optical Techniques for Quantum Information,
Sensing, and Metrology conference ('20)

Co-Chair, Workshop on High-Capacity Point-to-Point Wireless
Communications Program,
IEEE Global Communications Conference (GLOBECOM) ('19)

Co-Chair, Workshop on Electromagnetic Wave Transmission with Orbital
Angular Momentum,
IEEE International Conference on Communications (ICC) ('19)

Member, Planning Committee,
DMMI Workshop on Domestic Manufacturing Capabilities for Critical DoD
Applications: Emerging Needs in Quantum-enabled Systems, National
Academies ('19)

Member, National Academies Review Panel
***“An Assessment of the National Institute of Standards and Technology
Physical Measurements Laboratory”*** ('19)

Member, Distinguished Service Award Committee,
IEEE Photonics Society ('19)

Honorary Chairs,
Asia Communications and Photonics Conference (ACP), Chengdu ('19)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Co-Chair, Charles Kao's Symposium on Optical Fiber Communications,
Asia Communications and Photonics Conference (ACP), Chengdu ('19)

Mentor, Undergraduate Engineering/Robotics Club
Yeshiva Univ. (Yeshiva College and Stern College) ('18-'19)

Member, Department of Defense Bush Fellows Research Study Team ('18-'20)

Member, OSA Nominating Committee ('17-'19)

Member, Editorial Board,
Progress in Electromagnetics Research (PIER) ('17-'23)

Member, Independent Technical Advisory Board,
DoD Applied Research for the Advancement of S&T Priorities (ARAP) Defense
Optical Channel Program (DOC-P) ('17-'19)

Member, International Advisory Committee (IAC),
The Optics & Photonics Taiwan ('17)

Chair, Committee,
IEEE Eric Sumner Technical Field Award ('16-'18)

Member, SRI Technology Council ('16-'19)

Member, Technical Program Committee, Subcommittee Photonics in Switching
System and Related Technologies, Photonics in Switching ('16)

General Co-Chair,
IEEE/OSA/SPIE Asia Communications & Photonics Conference, Wuhan ('16)

Co-Organizer, Workshop on Twisting Light with Orbital Angular Momentum
(OAM): Advances and Opportunities,
IEEE/OSA/SPIE Asia Communications & Photonics Conf (ACP), Wuhan ('16)

National Spectrum Consortium (NSC) Representative, Subject Matter Expert,
Communications Assessment Working Group ('16)

Member, Technical Program Committee,
SPIE Photonics West, Conference on Advances in Photonics of Quantum
Computing, Memory, and Communication ('16-'19)

Member, Conference Program Committee,
SPIE Photonics West, High-Contrast Metastructures IV Conference ('15-'20)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Chair, Steering Committee,
National Photonics Initiative (NPI) ('15-'17)

Member, Organizing Committee,
Conference FIAT LUX on the International Year of Light (IYL), Rome ('15)

Member, International Advisory Board,
School of Engineering Sciences (SES) of Huazhong University of Science and
Technology (HUST), Wuhan, China ('14-'17)

Member, Technical Program Committee,
European Conference on Optical Communications (ECOC) ('13, '14, '15)

Member, Technical Program Committee, Systems Subcommittee,
Photonics in Switching ('13, '14)

Member, **U.S. Army Science Board** ('14-'20)

Member, **Foundation Board of Directors**, OSA ('14)

Member, **Advisory Board**, National Science Review ('14)

Consultant Member, U.S. Army Science Board ('13-'14)

Co-Organizer, Section on Optics and Photonics: An International Perspective,
American Association for the Advancement of Science (AAAS) Annual
meeting, Chicago ('14)

Chair-Elect and Member, Steering Committee
National Photonics Initiative (NPI) ('13-'14)

Chair, Unclassified Technical Program,
IEEE MILCOM (San Diego, CA) (2013)

Co-Chair, U.S. National Academies Committee for NRC Study,
“*Optics and Photonics: Essential Technologies for Our Nation*” (2011-2012)

Chair, Steering Committee,
APS/IEEE/OSA Conf. on Lasers & Electro-Optics (CLEO) ('08-'10&'10-'12)
Member, **Defense Science Research Council**,
Council submits reports to DARPA Director and Office Directors ('09-'14)

Elected Member-at-Large, Section on Engineering,
American Association for the Advancement of Science (AAAS) ('12-'16)

Member, 2015 IEEE Eric E. Sumner Award Committee ('15-'16)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Member, Steering Committee,
Optoelectronics Communications Conference (OECC) ('14)

Member, Technical Program Committee,
22nd Wireless and Optical Communication Conference ('13)

Member, Technical Program Committee, Systems Subcommittee,
Photonics in Switching ('13, '14)

Member, External Advisory Committee,
Department of Electrical & Computer Eng., Johns Hopkins Univ. ('09-'21)

Member, International Advisory Committee,
International Conference on Fiber Optics and Photonics, Madras ('12)

Member, Technical Program Committee,
European Conference on Optical Communications (ECOC) ('12)

Member, Technical Program Committee, Globecom GC12,
Optical Networks & Systems Symposium (ONS) (2012)

Member, Technical Program Committee, Systems Subcommittee,
Photonics in Switching 2012

National Academy of Engineering Representative,
US Advisory Committee, International Commission on Optics ('10-'12,'13-'15)

Co-Chair, Technical Program Committee, SPIE Photonics West,
Conference on High Contrast Metastructures (OE131), San Francisco ('12)

General Co-Chair, OSA Topical Meeting on
Signal Processing in Photonic Communications (SPPCOM), Toronto (2011)

IEEE Photonics Society (Membership~7,000)
(Formerly the IEEE Lasers & Electro-Optics Society (LEOS))

President (2006-2007)

Past-President (2008-2009)

President-Elect (2004-2005)

Member, Strategic Planning Committee,
IEEE Technical Activities Board (2011-2013)

Member, Board of Editors, OSA ('08-'13)

Chair, Awards Committees, IEEE Photonic Society (2010)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Member, Technical Program Committee, IEEE Photonics Society,
Summer Topical Meeting on Terabit Optical Ethernet, Montreal (2011)

Member, International Advisory Committee,
IQEC / CLEO Pacific Rim Conference, Sydney (2011)

Member, Technical Program Committee,
7th Workshop on Fibre Optics & Passive Components, July, Montreal (2011)

Member, International Advisory Committee,
1st International Postgraduate Student Conference (PGSC), Singapore (2011)

Member, Conference Program Committee, SPIE Photonics West,
Free-Space Laser Communication Technologies XXIII (2011)

Program Co-Chair, OSA Topical Meeting on
Signal Processing in Photonic Communications (SPPCOM), Germany (2010)

Symposium Co-Chair, European Conf. on Optical Communications (Italy) ('10)
C. Kao's Nobel Prize & Early Development of Optical Fibres and Optical Comm.

Member, Technical Program Committee,
European Conference on Optical Communications (ECOC) ('00, '11, '12)

Chair ('08) and Member ('10), Int'l Advisory Committee,
IEEE Photonics Global Singapore

General Co-Chair, IEEE Photonics in Switching Conference, Pisa, Italy (2009)

Member, Board of Visitors,
Army Research Office (ARO) Electronics Division ('10)

Member, Technical Program Committee,
OSA Topical Meeting on Photonics in Switching, Monterey, CA ('10)

Member, Technical Program Committee,
Optical Networks & Systems Symposium, IEEE Globecom, Miami ('10)

Member, International Advisory Committee (IAC),
BGPP'10 (Bragg Gratings, Photosensitivity, & Poling), Germany ('10)

Member, International Advisory Committee,
3rd Int'l Photonics & Optoelectronics Meetings (POEM), Wuhan ('10)

Co-Chair, Technical Subcommittee,

PROFESSIONAL ACTIVITIES: (CONTINUED)

Optical Transmission Systems, Switching and Subsystems,
IEEE/OSA/SPIE Asia Communications & Photonics Conf (ACP), Shanghai ('09)
Member, Conference Committee, IEEE/LEOS Summer Topical Meeting,
The Future Global Network, CA (2009)

Member, Conference Committee, IEEE/LEOS Summer Topical Meeting,
Optical Code Division Multiple Access (OCDMA), CA (2009)

Member, Publication Advisory Board,
OSA's Advances in Optics & Photonics (AOP) ('08-'09)

Member, Editorial Advisory Board, Lightwave Magazine, Pennwell Publishers

Member, Int'l Advisory Committee,
8th Int'l Conf. on Optical Communications & Networks (ICO CN), Beijing ('09)

Member, IEEE Photonics Soc. Distinguished Service Award Committee ('08,'09)

Member, Technical Program Committee, Globecom,
Optical Networks & Systems Symposium (ONSS), Hawaii (2009)

Member, Conference Program Committee, SPIE Photonics West,
Advanced Optical Concepts in Quantum Computing, Memory, & Comm. (2009)

Member, Conference Program Committee, SPIE Photonics West,
Free-Space Laser Communications, CA (2009)

Member, Tech. Prog. Comm., Symp. on Optical Fiber Devices & Applications,
Int'l Conf. on Materials for Advanced Technologies (ICMAT), Singapore (2009)

Member, OSA Review Committee of the J. of the Optical Society of Korea ('09)

Program Co-Chair, OSA Topical Meeting on
Coherent Optical Technologies and Applications (COTA) (2008)

Member, Technical Program Committee,
CS/IEICE Int'l Conference on Photonics in Switching, Sapporo, Japan (2008)

Member, Tech. Prog. Comm., ONS (Optical Networks & Systems Symposium),
IEEE Int'l Conference on Communications (ICC) (2008, 2009)

Member, Optical Network & Broadband Access Subcommittee,
Opto-Electronics and Communications Conference, Sydney (2008)

Chair, Ethics and Conflict Resolution Committee,

PROFESSIONAL ACTIVITIES: (CONTINUED)

IEEE Technical Activities Board (TAB) (2007)

Member, Strategic Planning Committee,
IEEE Technical Activities Board (2008-2010)

Member, New Initiatives Committee, IEEE-Wide Committee (2008)

General Co-Chair, OSA Topical Meeting on Slow & Fast Light (2007)

Member, Ethics and Member Conduct Committee Hearing Panel,
IEEE Institute-Wide (2006-2008)

Member, Frederic Ives Medal/Jarus Quinn Endowment Award Committee,
highest award of the Optical Society of America (OSA) ('06,'07)

Member, International Program Committee (IPC),
International Association of Science & Technology for Development (IASTED)
Int'l Conf. on Wireless and Optical Communications (WOC), Quebec 2008
Int'l Conf. on Communication, Internet & Info. Tech. (CIIT), Banff (2007)
Int'l Conf. on Power and Energy Systems, Thailand (2007)
Int'l Conf. on Wireless and Optical Communications, Montreal (2007)

Co-Organizer, Workshop on Slow Light,
Conference on Optical Fiber Communications 2007

Chair, Steering Committee, AOE Expo and Conference, Shanghai (2007)

Program Co-Chair, OSA Topical Meeting on Slow & Fast Light (2006)

Chair, Communications Subcommittee, OSA Topical Meeting
Coherent Optical Technologies and Applications (COTA) (2006)

Co-Chair, Science and Engineering Council (2001-2003),
Optical Society of America (OSA) (Total Membership~15,000)

Workshop Co-Chair, The Future of Optical Telecommunications,
European Conf. on Optical Communications (Cannes) ('06)

Chair, External Int'l Review Panel, Research Program in Network Technol.,
National ICT Australia (NICTA), University of Melbourne ('06-'07)

Member, Technical Program Committee, IEEE LEOS Summer Topical Meetings
Quantum Communications in Telecom Networks (2006)

Member, Board of Directors, NSERC Canada Research Center,

PROFESSIONAL ACTIVITIES: (CONTINUED)

Agile All-Photonics Networks (AAPN) ('05-'10)

Chair, Membership Committee,
IEEE Lasers & Electro-Optics Society (LEOS) ('04-'06)
Member, Technical Program Committee, Photonics in Switching,
OSA Topical Meeting, Greece (2006)

Member, International Program Committee, IASTED,
Int'l Conf. on Comm., Internet and Information Tech., St. Thomas, USVI ('06)

Chair, Distinguished Service Award Committee,
IEEE Lasers & Electro-Optics Society (LEOS) ('04,'05,'06)

Chair, Planning Committee, Science & Engineering Council,
Optical Society of America (OSA) ('04)

Member, Technical Program Committee, Optical Signal Processing,
IEEE LEOS Summer Topical Meetings (2005)

Member, Technical Program Committee,
Photonic Technologies for Communications, IEEE Globecom, St. Louis (2005)

Member, Technical Prog. Committee, Optical Systems & Networks Symposium
IEEE International Communications Conference (ICC) 2006, Turkey

Member, International Steering Committee, Asia-Pacific Optical and Wireless
Communications Conference (APOC), Beijing, Shanghai, Korea ('04,'05,'06)

Member, International Advisory Committee,
Symp. on Technology Fusion of Optoelectronics and Communications (STFOC),
International Conference on Photonics ('05)

Steering Committee, Conf. on Optical Fiber Communications (**OFC**) (99-04)
Budget Subcommittee ('02-'03)
Long-Range Planning Committee ('03-'04)

Vice-President, Technical Affairs (1996-1999),
IEEE Lasers & Electro-Optics Society (LEOS) (Membership~7,500)
Responsible for all Technical Affairs, including Technical
Council, Standards Committees, & Gov't Liaison Committees

Conference on Lasers and Electro-Optics (CLEO)
(>1000 invited & contributed papers, >6000 attendees)

General Co-Chair (2003)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Program Co-Chair (2001)

Member, Long Range Planning Subcomm., Steering Committee ('03)

Co-Chair, Lasers and Electro-Optics Applications Program (2002)

Committee Chair, Lightwave Communications (2000)

Member, Program Committee ('97, '98, '99)

Member, **Board of Directors, OSA (2001-2003)**

Workshop Co-Chair, Ultra-High Capacity Optical Communications and Networking: Challenges in Broadband Optical Access, Materials Processing, and Manufacturing, National Science Foundation (2002)

Chair, Distinguished Traveling Lecturer Awards Committee, IEEE LEOS ('02)

Member, Curriculum Committee, NSF-Funded Advanced Technology Education (ATE) Planning Grant for the California Optical and Photonics Technology Education Center (Cal-OPTEC) at San Jose City College (**'03-'04**)

Member, Technical Program Committee, Optical Interconnects,
IEEE LEOS Summer Topical Meeting '04

Member, Technical Program Committee, IASTED,
Int'l Conf. on Optical Communication Systems & Networks, Banff, Canada (04)

Member, **Technical Program Committee**, Photonics In Switching, Paris ('03)

Member, International Advisory Committee, Asia-Pacific Optical and Wireless Communications Conference (APOC), Wuhan, China ('03)

Member, **Advisory Board**, Photonics Technology Access Program (PTAP),
Optoelectronics Industry Development Association

Member, **Public Policy Committee**, OSA ('03)

Member, **Publications Council**, Liason to Science & Eng. Council, OSA ('03)

Member, **Board of Editors**, OSA ('01-'6)

Member, **Finance Committee**, OSA ('02-'04)

Member, **Nominating Committee for President and Directors**, OSA ('00)

Elected Member of the Board of Governors, IEEE LEOS ('98-'01)

Member, Technical Program Committee, IASTED,
Int'l Conf. on Comm., Internet & Information Technology, Scottsdale, AZ ('03)

Member, **Technical Program Committees**,

PROFESSIONAL ACTIVITIES: (CONTINUED)

IEEE LEOS Summer Topical Meetings '02:

- (1) Fast Optical Signal Processing in Optical Transmission Committee
- (2) Dynamic Enablers of Next-Gen Optical Comm. Systems Committee

Steering Committee Member,

IEEE Workshop on Fiber & Optical Passive Components, Sept., Italy (02,04,05)

Member, Technical Program Committee, IASTED,
Wireless & Optical Comm. Conference, Banff, Canada (2002)

IEEE Lasers and Electro-Optics Society (LEOS) Annual Meeting

(570 invited & contributed papers, ~ 800 attendees)

General Chair (1999)

Program Chair (1997)

Program Co-Chair, OSA Annual Meeting 2001

OSA Topical Meeting on Optical Amplifiers and Their Applications

General Co-Chair (1999)

Technical Co-Chair (1998)

Chair, Systems Applications (1997)

Program Committee Member (1996)

**Chair, Photonics Division, Technical Council,
Optical Society of America ('98-'00)**

**Workshop Co-Chair, The Future Revolution in Optical Communications &
Networks, National Science Foundation (2000)**

Member, Technical Program Committee, IEEE Microwave Photonics Conf. ('01)

Member, Optoelectronics Task Force, Semiconductor Research Corp. ('01)

Member, Technical Program Committee, CLEO Pacific Rim ('01)

Member, Technical Program Committee,
Optoelectronics Communications Conference (OECC), Sydney ('01)

Member, Technical Program Committee, Optical Networking Subcommittee,
Asia-Pacific Optical and Wireless Communications Conference (APOC)

(1) Beijing ('01)

(2) Shanghai ('02)

Member, Technical Program Committee, SPIE, Photonics West,

PROFESSIONAL ACTIVITIES: (CONTINUED)

WDM and Photonic Switching Devices for Network Applications, San Jose ('01)

Member, Technical Program Committee,
International Conference on Fiber Optics and Photonics, Calcutta ('01)

Chair, Standing Tech. Committee,
Optical Networks, **IEEE LEOS (1996-1999)**

Co-Chair, IEEE LEOS Summer Topical Meeting '98,
Broadband Optical Networks: An Emerging Reality

Member, **Scientific Advisory Board**, U.S./Japan Joint Optoelectronics
Project, **Optoelectronics Industrial Development Association**

Workshop Co-Organizer, Conference on Optical Fiber Communications
(1) Passive Optical Devices ('98)
(2) Systems Software Modeling ('98,'99,'00,'01)

Member, US Advisory Committee,
International Commission on Optics ('97-'02)

Member, IEEE Tech. Activities Board Subcommittee on
New Technology Directions '96, '97

Conference Program Committee, SPIE, Optical Comm., Taiwan ('98)

General Co-Chair, IEEE LEOS Summer Topical Meeting '97,
Technologies for the Global Information Infrastructure

Invited Workshop Participant, Frontiers in Engineering,
National Academy of Engineering (nominations of engineers <40 years old)

Chair, Optical Communications Technical Committee, **IEEE LEOS ('94-'96)**

Vice-Chair, Optical Communications Group, Technical Council,
Optical Society of America (OSA) ('93-'97)

Conference General Co-Chair, IEEE LEOS Summer Topical
Meeting '95, Technologies for the Global Information Infrastructure

Program Committee, System Technologies,
Conference on Optical Fiber Communications (OFC) ('96-'98)

Program Committee, IEEE LEOS Summer Topical Meeting ('96),
Broadband Optical Networks and Their Enabling Technologies

PROFESSIONAL ACTIVITIES: (CONTINUED)

Chair, Optical Communications Committee,
LEOS Annual Meeting ('94-'96)

Standing Technical Committee,
IEEE LEOS, Optical Networks ('93-'96)
Program Chair, Telecommunications Engineering, Society of Photo-Instrumentation Engineers (**SPIE**), Photonics West ('95)

Chair, Conf. on Emerging Technologies for All-Optical Networks,
SPIE ('95-'96)

Chair, Information & Comm., NSF Forum on Optical Science & Eng. ('95)

Chair, Symposium, System Modeling, Conf. on Integrated Photonics Res. '96

Technical Program Committee, Committee on Numerical Modeling, IPR '96

Awards Committee Member,
IEEE LEOS Fellows Selection Committee ('00)

Awards Committee Member,
IEEE LEOS Distinguished Traveling Lecturer Award ('01, '03, '04)

Awards Committee Member,
IEEE LEOS Wm. Streifer Scientific Achievement ('96, '03, '04, '05)

Awards Committee Member, IEEE LEOS Quantum Electronics Award ('97)

Technical Committee, IEEE Interconnects Workshop ('96)

Chair, Panel on Optical Information and Communications, Workshop on Optical Science and Engineering, National Science Foundation ('94)

Technical Program Committee, Symposium Organizer,
Optical Society of America Annual Meeting:
 '98 (WDM Systems)
 '96 (Optical Networks)
 '95 (Wavelength Conversion Techn.)
 '92 (EDFA Appl.: Distribution)

Conf. Program Committee, SPIE,
Components for WDM ('95, '99, '00, '01, '02)

Program Committee, IEEE/ACM/SPIE Workshop on Optical Networks, ('00)

Standing Technical Committee, IEEE LEOS, Optical Comm. ('92-'94)

PROFESSIONAL ACTIVITIES: (CONTINUED)

Program Committee, IEEE LEOS Ann. Meeting '92,'93; Lightwave Comm.

Review Panel Member, NSF, Optical Communications
('92,'93,'94,'95,'97,'98,'03)

TEACHING:

STUDENT EVALUATIONS

I. Univ. of Southern California (5.0 is highest possible score)

Average student evaluations for all USC courses since 1992: 4.94/5.0

Undergraduate Course: Introduction to Communications (EE 467)

1. Spring '25: **4.89/5.0**, 10 students, 9 had evaluated
2. Spring '24: **5.0/5.0**, 8 students, 7 had evaluated
3. Spring '23: **5.0/5.0**, 8 students, 8 had evaluated
4. Spring '22: **5.0/5.0**, 11 students, 11 had evaluated
5. Spring '21: **4.70/5.0**, 11 students, 10 had evaluated
6. Spring '20: **4.95/5.0**, 29 students, 21 had evaluated
7. Spring '19: **4.83/5.0**, 21 students, 18 had evaluated
8. Spring '18: **5.0/5.0**, 27 students, 16 had evaluated
9. Spring '17: **4.91/5.0**, 15 students, 11 had evaluated
10. Spring '16: **4.96/5.0**, 27 students, 27 had evaluated
11. Spring '15: **4.96/5.0**, 27 students, 24 had evaluated
12. Spring '14: **4.84/5.0**, 25 students, 19 had evaluated
13. Spring '13: **5.0/5.0**, 21 students, all had evaluated
14. Spring '12: **4.94/5.0**, 20 students, 18 had evaluated
15. Spring '11: **5.0/5.0**, 22 students, 18 had evaluated
16. Spring '10: **5.0/5.0**, 19 students, 16 had evaluated
17. Spring '09: **5.0/5.0**, 10 students, all had evaluated
18. Fall '07: **5.0/5.0**, 11 students, all had evaluated
19. Fall '06: **5.0/5.0**, 10 students, 9 had evaluated
20. Fall '04: **5.0/5.0**, 11 students, all had evaluated
21. Fall '03: **5.0/5.0**, 7 students, all had evaluated
22. Fall '02: **5.0/5.0**, 11 students, all had evaluated
23. Fall '01: **5.0/5.0**, 21 students, all had evaluated
24. Fall '00: **5.0/5.0**, 20 students, all had evaluated
25. Fall '99: **5.0/5.0**, 22 students, 21 had evaluated
26. Fall '98: **5.0/5.0**, 18 students, all had evaluated
27. Fall '97: **5.0/5.0**, 22 students, all had evaluated
28. Fall '96: **4.92/5.0**, 14 students, all had evaluated
29. Fall '95: **5.0/5.0**, 8 students, all had evaluated
30. Fall '94: **5.0/5.0**, 9 students, all had evaluated
31. Fall '93: **5.0/5.0**, 8 students, all had evaluated
32. Fall '92: **5.0/5.0**, 13 students, all had evaluated

Graduate Course: Optical Fiber Communications Systems (EE 558)

1. Fall '19: **4.95/5.0**, 20 students, 19 had evaluated

2. Fall '18: **4.91/5.0**, 25 students, 23 had evaluated
3. Fall '17: **4.95/5.0**, 24 students, 22 had evaluated
4. Fall '16: **4.94/5.0**, 22 students, 17 had evaluated
5. Fall '15: **5.0/5.0**, 24 students, 19 had evaluated
6. Fall '14: **4.95/5.0**, 29 students, 22 had evaluated
7. Fall '13: **5.0/5.0**, 26 students, 24 had evaluated
8. Fall '11: **4.88/5.0**, 29 students, 24 had evaluated
9. Fall '10: **4.96/5.0**, 35 students, 28 had evaluated
10. Fall '09: **4.97/5.0**, 31 students, 30 had evaluated
11. Fall '08: **4.94/5.0**, 33 students, all had evaluated
12. Spring '08: **4.88/5.0**, 28 students, 25 had evaluated
13. Spring '07: **4.92/5.0**, 29 students, 24 had evaluated
14. Spring '06: **5.0/5.0**, 20 students, 17 had evaluated
15. Spring '05: **4.97/5.0**, 31 students, 29 had evaluated
16. Spring '04: **4.91/5.0**, 24 students, 23 had evaluated
17. Spring '03: **4.88/5.0**, 26 students, 25 had evaluated
18. Spring '02: **4.73/5.0**, 30 students, all had evaluated
19. Spring '01: **5.0/5.0**, 25 students, 24 had evaluated
20. Spring '00: **4.95/5.0**, 22 students, all had evaluated
21. Spring '99: **5.0/5.0**, 17 students, all had evaluated
22. Spring '97: **4.79/5.0**, 23 students, all had evaluated
23. Spring '96: **4.93/5.0**, 29 students, all had evaluated
24. Spring '95: **4.97/5.0**, 31 students, all had evaluated
25. Spring '94: **4.93/5.0**, 28 students, 27 had evaluated
26. Spring '93: **4.93/5.0**, 40 students, all had evaluated
27. Spring '92: **4.72/5.0**, 19 students, all had evaluated

II. Columbia Univ. (while a graduate student) (10.0 is highest possible score)

Undergraduate Course: Fundamentals of Circuits and Systems

1. Fall '87: **8.3/10.0**, 110 students, 93 had evaluated

Ph.D. THESES ADVISED AND GRANTED:

1. Syang-Myau Hwang, 10/95, "System Performance and Channel Equalization of Optically-Amplified WDM Long-Distance Links and Ring Networks"
2. Andrew David Norte, 1/96, "Experimental Demonstrations of Wavelength Routing Functions for an All-Optical Wavelength-Division-Multiplexed Fiber Optic Communication Network Switching Node"
3. William Shieh, 3/96, "Experimental and Theoretical Study of All-Optical Wavelength Shifting Techniques by using Semiconductor Optical Amplifiers"
4. Eugene Park, 3/96, "Applications of All-Optical Wavelength Shifting using Semiconductor Optical Amplifiers for Switching and Routing Functions in a Dynamically Reconfigurable Wavelength-Division-Multiplexed Fiber-Optical Communication Network"
5. James E. Leight, 8/96, "System and Network Implementations of 2-D Multiple-Plane Wavelength-Division-Multiplexed Optical Interconnects"
6. J.-C. Wu, 8/96, "Protocols and Design Tradeoffs for Packet-Switched WDM Networks with Large Tuning Latencies"
7. M. Imran Hayee, 12/98, "Modeling of Dispersion and Nonlinearities in High-Performance Transmission"
8. Jin-Xing Cai, 6/99, "Experimental Demonstrations of Techniques to Improve System Performance in Non-Static Optical Wavelength Division Multiplexing Systems and Networks"
9. Kai-Ming Feng, 6/99, "System Performance Improvement in Optical Wavelength Division Multiplexing Systems and Networks using Optical Gratings"
10. Jong-Jin Yoo, 12/99, "System Performance and Network Structure of Two-Dimensional Multiple-Plane WDM Optical Interconnects"
11. Steve A. Havstad, 9/00, "Generation, Filtering, and Applications of Subcarriers in Optical Communication Systems"
12. Sanggeon Lee, 9/00, "Characterization and Compensation of Polarization Mode Dispersion and Chromatic Dispersion Slope Mismatch for High Bit-Rate Data Transmission"
13. Reza Khosravani, 10/00, "Reduction of Signal Degrading Effects in Wavelength Division Multiplexed Systems and Networks"
14. Mustafa C. Cardakli, 1/01, "Optical Techniques to Implement Networking Functions in Dynamically Reconfigurable Wavelength-Division-Multiplexed Fiber-Optic Communication Networks"
15. Olaf H. Adamczyk, 2/01, "Experimental Demonstration of Techniques to Improve System Performance in Fiber-Optic Communication Systems using Subcarrier-Multiplexed and Digital Baseband Signals"
16. Zhongqi Pan, 11/02, "Overcoming Fiber Dispersive Effects in High-Speed Reconfigurable Multi-Wavelength Optical Systems and Networks"
17. Asaf B. Sahin, 4/03, "Experimental Demonstration of Techniques to Improve System Performance in Non-Static Microwave Frequency Analog and Digital Signal Transmission over Fiber-Optic Communication Systems"

Ph.D. THESES ADVISED AND GRANTED: (CONTINUED)

18. Deniz Gurkan, 5/03, "Experimental Demonstrations of Optical Networking Functions for Wavelength-Division-Multiplexed (WDM) Optical Networks"
19. Yong-Won Song, 10/03, "Mitigation of Signal Degradations in Reconfigurable Wavelength-Division-Multiplexed Fiber-Optic Communication Systems"
20. S.M. Reza Motaghian Nezam, 4/04, "Chromatic and Polarization Mode Dispersion Monitoring for Equalization in Fiber-Optic Communication Systems"
21. Paniz Ebrahimi, 5/04, "Design and Implementation of Novel Optical Subsystems for Enhancing Spectral Efficiency, Security, and Performance of High-Speed Wavelength Division Multiplexed and Optical Code-Division-Multiple-Access Systems"
22. Lian-Shan Yan, 11/04, "Investigation of Degrading Effects and Performance Optimization in Long-Haul WDM Transmission Systems and Reconfigurable Networks "
23. John E. McGeehan, 5/05, "Experimental Demonstration of Optical Router and Signal Processing Functions in Dynamically Reconfigurable Wavelength-Division-Multiplexed Fiber Optic Networks"
24. Changyuan Yu, 8/05, "Dispersive and Nonlinear Effects in High-Speed Reconfigurable WDM Optical Fiber Communication Systems"
25. Yan Wang, 12/05, "Monitoring and Utilization of Dispersive and Nonlinear Effects in High-Speed Reconfigurable WDM Optical Fiber Networks"
26. Ting Luo, 2/06, "Management of Dispersion, Nonlinearity and Polarization-Dependent Effects in High-Speed Reconfigurable WDM Fiber Optic Communication Systems"
27. Saurabh Kumar, 11/06, "Optical Signal Processing For High-Speed, Reconfigurable Fiber Optic Networks"
28. Poorya Saghari, 11/06, "Techniques for Increasing the Number of Users in Dynamically Reconfigurable Optical Code Division Multiple Access Systems and Networks"
29. Louis C. Christen, 9/08, "Detection and Optical Signal Processing using Phase Based Optical Modulation Formats"
30. Bo Zhang, 12/08, "Nonlinear Optical Signal Processing For High-Speed, Spectrally Efficient Fiber Optic Systems and Networks"
31. Lin Zhang, 11/10, "Silicon Integrated Devices for Optical System Applications"
32. Scott R. Nuccio, 12/10, "Applications of All Optical Signal Processing for Advanced Optical Modulation Formats"
33. Irfan Fazal, 7/11, "Optical Signal Processing for Enabling High-Speed, Highly Spectrally Efficient and High Capacity Optical Systems"
34. Jeng-Yuan Yang, 9/11, "Optical Performance Monitoring and Signal Processing to Enable Robust and Reconfigurable Optical Networks"
35. Xiaoxia Wu, 10/11, "High-Speed Optical Signal Processing and Performance Monitoring Towards Tbit/s Optical Networks"

Ph.D. THESES ADVISED AND GRANTED: (CONTINUED)

37. Omer Yilmaz, 12/11, "Advanced Nonlinear Optical Signal Processing Techniques For High Speed, Reconfigurable Optical Fiber Networks"
38. Yang Yue, 10/12, "Integrated Silicon Waveguides and Specialty Optical Fibers for Optical Communications System Applications"
39. Salman Khaleghi, 6/13, "High-Speed and Reconfigurable All-Optical Signal Processing for Phase and Amplitude Modulated Signals"
40. Reza Chitgarha, 6/14, "Reconfigurable High-Speed Optical Signal Processing and High-Capacity Optical Transmitter"
41. Hao Huang, 11/14, "Multiplexing Techniques and Reconfigurable Networking Functions for Optical Communications using OAM Beams"
42. Asher Voskoboinik, 12/14, "Sweep-Free Brillouin Optical Time-Domain Analyzer"
43. Nisar Ahmed, 1/16, "Orbital Angular Momentum based Spatially Multiplexed Optical and Millimeter-wave Communications"
44. Yan Yan, 4/16, "High Capacity Optical and RF/mm-wave Communications Utilizing Orbital Angular Momentum Multiplexing"
45. Yongxiong Ren, 11/16, "Orbital Angular Momentum-Based Space Division Multiplexing for High-Capacity Optical and Millimeter-Wave Communications"
46. Morteza Ziyadi, 01/17, "Reconfigurable High-Speed Optical Signal Processing Using Optical Frequency Comb for High-Capacity, Spectrally Efficient Fiber Optic Systems and Networks"
47. Guodong Xie, 12/17, "Using Waves Carrying Orbital Angular Momentum for Communications and Remote Sensing"
48. Changjing Bao, 12/17, "On-Chip Kerr Frequency Comb Generation and Its Effects on the Application of Optical Communications"
49. Ahmed Almainan, 4/18, "Optical Wave Mixing for Tunable Delays and High-Speed Signal Processing"
50. Amirhossein Mohajerin Ariaei, 5/18, "Reconfigurable High-Speed Processing and Noise Mitigation of Optical Data"
51. Long Li, 02/19, "Applications of Orbital Angular Momentum in High-Capacity Free-Space Optical Communications"
52. Yinwen Cao, 04/19, "Reconfigurable Optical Signal Processing for Efficient Spectrum Utilization in High-speed Optical Communication Systems"
53. Peicheng Liao, 11/19, "Microresonator-based Kerr Frequency Comb for Optical Communications and Signal Processing"
54. Zhe Zhao, 07/20, "Optical and mm-wave Orbital-angular-momentum Beam Generation and its Applications in Communications"
55. Cong Liu, 03/21, "Applications in Optical Communications: Quantum Communication Systems and Optical Nonlinear Devices"

Ph.D. THESES ADVISED AND GRANTED: (CONTINUED)

56. Ahmad Fallahpour, 03/21, “Reconfigurable High-Speed Optical Signal Processing for Optical Communication and Modulation Format Manipulation”
57. Fatemeh Alishahi, 09/21, “Reconfigurable and Flexible High-Speed Optical Signal Processing and Spectrally Shared Optical Subsystems”
58. Kai Pang, 03/22, “Spatial Modes for Optical Communications and Spatiotemporal Beams”
59. Runzhou Zhang, 04/22, “High-Capacity Optical Communications Using Structured Light in Random and Disturbed Media”
60. Haoqian Song, 04/22, “Using Spatial Modes for Data Transmission Through the Air and Through the Air-Water Interface”
61. Hao Song, 02/23 “Optical Communications, Optical Ranging, and Optical Signal Processing using Tunable and Reconfigurable Technologies”
62. Kaiheng Zhou, 04/23, “Optical Communication Systems and Space-Time Wave Packet Generation using Frequency Combs and Spatial Modes”
63. Huibin Zhou, 02/24, “Free-Space Optical Communications and Probing through Turbulence Links Using Structured Light”
64. Amir Minoofar, 03/25, “High-Capacity Sub-THz Wireless Communications Using LG Modes and Optical Signal Processing Using Wave Mixing”
65. Xinzhou Su, 05/25, “Manipulation of Light Degrees of Freedom for Applications in Communications and Spatiotemporal Phenomena”

GRANTS:

National Science Foundation (NSF) Young Investigator Award (9/92-8/94), PI,
"Optical Fiber Communication Systems"

Advanced Research Projects Agency (ARPA) (8/93-7/96), Co-PI, "Two-Dimensional WDM Interconnects for Highly Parallel and Dense High-Speed Optical Processing", with C.J. Chang-Hasnain (Stanford Univ.)

Charles Lee Powell Foundation USC New Investigator Award (1/92-6/94), PI,
"WDM Amplified Optical Networks"

ILX Lightwave Corp. (10/92), University Donations Program Award, PI,
"WDM Systems Research using Wavelength-Tunable Lasers"

National Science Foundation (NSF) (9/93-8/96), Co-PI, "Wavelength Converting and Wavelength Routing for High-Efficiency Almost-All-Optical Networks," with V.O.K. Li and P.D. Dapkus (USC)

(Proposal ranked #1 out of 70 letters-of-intent and 33 final proposals)

David and Lucile Packard Foundation (10/93-9/99), PI, "Fellowship in Science and Engineering: WDM Optical Communications"

Advanced Research Projects Agency (ARPA) (8/94-7/96), Co-PI, "Optically-Amplified Scalable WDM Networks using Acousto-Optic Filters for Amplifier Gain Equalization and Signal Routing," with D.A. Smith (Case Western Reserve) and Kathryn D. Li (New Focus)

National Science Foundation, Presidential Faculty Fellows Award (9/94-8/97), PI,
"High-Capacity WDM Optical Communication Systems"

ILX Lightwave Corp. (4/95), University Donations Award, PI, "WDM Systems using Multi- λ VCSELs"

Ballistic Missile Defense Org., Focused Research Initiative (5/95-5/98),
"Multiscale Photonic Data Fusion Networks and Their Interfaces," **Senior Investigator** (PI - A.A. Sawchuk)

Optoelectronics Industry Development Assoc. / Joint Optoelectronics Project (OIDA/JOP) (2/96), PI,
"Ultra-High-Capacity WDM Switching Systems"

Defense Univ. Research Instrumentation Program (DURIP / ARPA) (5/96), Co-PI, "Transparent High-Speed Optically-Amplified Multiple-Wavelengths Networks using AOTFs for Add/Drop Multiplexing and Gain Equalization", with D.A. Smith (Case Western Reserve Univ.)

National Science Foundation (NSF) 7/96-6/06, "Multiwavelength Switching in High-Capacity Media Systems," Engineering Research Center in Integrated Media Systems, **Key Investigator** (PI - C.L. Nikias)

Defense Advanced Research Projects Agency (DARPA) (9/96-8/99), Co-PI, "Novel WDM Device and System Research for Ultra High Capacity Optical Interconnects", with C.J. Chang-Hasnain (UC Berkeley)

National Science Foundation (NSF) 8/96-7/97, Co-PI, Instrumentation Grant,
"Wired and Wireless High-Speed Networks," with R.A. Scholtz and J. Choma (USC)

National Science Foundation (NSF) 7/96-6/97, Co-PI, with L.A. McAdams (Optivision, Inc.), Small Business Technology Transfer (STTR) Program, "Novel Wavelength Shifting Structures for Optical Networks,"

GRANTS: (CONTINUED)

Joint Services Electronics Program (JSEP) (4/97-3/00), **Senior Investigator** (PI - W. Steier, USC),
"Ultra-High-Speed Wavelength and Time Switching for Bursty Communications"

Defense Advanced Research Projects Agency (DARPA) (9/97-8/00), **Senior Investigator** (PI - S.R.J. Brueck, Univ. of New Mexico), "Optoelectronic Materials Center for Manufacturable, Multi-dimensional High Capacity Optoelectronic Interconnects"

Defense Univ. Research Initiative Program (DURIP/ DARPA) (5/98-4/99), **Co-PI**, "2D VCSEL Arrays for Optical Imaging, Interconnects, and Signal Processing," with C. Chang-Hasnain (UC Berkeley)

Defense Advanced Research Projects Agency (DARPA) (6/98-5/01), **PI**, "Using a Recirculating Fiber Loop to Determine the Limitations Placed on Ultra-High-Performance Soliton and Linear Optical Systems by Polarization Mode Dispersion," Next Generation Internet

National Science Foundation (NSF) (9/98-8/01), **Co-PI**, "Rapidly-Tunable Integrated Vertical Cavity Filters and Attenuators For Dynamically Reconfigurable Packet-Switched WDM Optical Networks," with C. Chang-Hasnain (UC Berkeley)

Optoelectronics Industry Development Assoc. / Joint Optoelectronics Project (OIDA/JOP) (2/98), **PI**,
"Ultra-High-Capacity WDM Networks"

Charles Lee Powell Foundation (7/98-6/01), **PI**, "Photonics Backbone for Wireless Communications"

ILX Lightwave Corp. (6/00), **University Donations Program Award**, **PI**,
"WDM Systems Research for the Next Generation Internet"

Defense Advanced Research Projects Agency (DARPA) (7/00-6/04), **Senior Investigator** (PI - S.R.J. Brueck, Univ. of New Mexico), "Optoelectronic Materials Center for High Capacity Optoelectronic Interconnects"

Department of Defense (6/99-5/01), **PI**, "Compensation of Channel-Degrading Effects in Reconfigurable WDM Systems"

Hitachi Corporation (10/99-6/01), **PI**, "Compensation of Polarization Mode Dispersion"

Phaethon Communications (10/00-11/02), **PI**, "Studies of Optical-Fiber-Induced Dispersion Effects"

Defense Advanced Research Projects Agency (DARPA) (6/00-5/03), **PI**, "Tunable Compensation of Chromatic- and Polarization-Dispersion Effects for Enabling Significantly Higher Performance in the BOSSNET and NTON SUPERNET Testbeds," Next Generation Internet Program

The Okawa Foundation (10/00-9/01), **PI**, "Ultra-High-Capacity Multi-Wavelength Optical Systems"

Intel Corporation (12/01-11/02), **PI**, "New Technologies for Internet Routing in All-Optical Networks "

National Science Foundation (NSF) (10/00-9/03), **PI**, "Novel Dispersion-Division-Multiplexing Technique for Enabling Double the Spectral Efficiency in Transmission & Routing of Photonic & Microwave Networks"

National Science Foundation (NSF) (10/00-9/03), **Co-PI**, "Vertically-Integrated Primitives for a Bufferless All-Optical Packet-Switched Network," with C. Chang-Hasnain and V. Anantharam (UC Berkeley)

GRANTS: (CONTINUED)

Defense Advanced Research Projects Agency (DARPA) (6/00-5/03), **Co-PI**, "Programmable Miniaturized Devices for CDMA WDM Systems," Chip-Scale WDM Program (PI - D.A.B. Miller, Stanford University)

Defense Advanced Research Projects Agency (DARPA) (6/00-5/03), **Co-PI**, "Microresonator and Photonic Crystal Filters, Lasers and Modulators for Analog and Digital Chip Scale WDM Systems," Chip-Scale WDM Program, (PI - P.D. Dapkus and J. O'Brien, USC)

JDS Uniphase Corporation (3/02), **PI**, "Equipment Donation for the Optical Communications Lab at USC"

Cisco Systems (9/03-8/04), **PI**, "Mitigation of Fiber Nonlinear Effects in PMD-Limited WDM Systems"

Virtual Photonics Inc. (5/03), **PI**, "Software Donation for the Optical Communications Lab at USC"

Defense Advanced Research Projects Agency (DARPA) (12/02-11/06), **PI**, "Secure Communications Over LANs using O-CDMA," OCDMA Program

Intel Corporation (1/03-12/04), **PI**, "Optical Buffers for Enhancing Optical Burst Switching"

Cisco Systems (9/04-8/05), **PI**, "Analysis of the Transmission Limitations of Directly Modulated Digital Signals in Metropolitan Optical Communication Systems"

Missile Defense Agency (10/03-9/04), **Co-PI**, "Measurements of Thin-Film Waveguides" (PI – Boyd Hunter, TPL, Inc.)

National Science Foundation (NSF) (9/03-8/06), **PI**, "High-Capacity Optical Communication Networks: Device and Systems Research using Photonic Crystal Structures that Enable Highly-Advanced Classical and Quantum Optical Networking," with A. Scherer (Caltech)

Defense Advanced Research Projects Agency (DARPA) (7/04-6/08), **Senior Investigator** (PI - S.R.J. Brueck, Univ. of New Mexico), "Optoelectronic Materials Center for Spatial, Temporal and Spectral Localization for Advanced Photonic Capabilities," University Photonics Research Program

Defense Advanced Research Projects Agency (DARPA) (4/04-10/05), **PI**, "DOD-N Network Performance Based on Specific Physical DOD-N Technology Parameters: Connecting Multiple Core Routers," DOD-N Program

Defense Advanced Research Projects Agency (DARPA) (7/04-9/08), **Co-PI** (PI – R.W. Boyd, Univ. of Rochester), "Applications of Slow Light in Optical Fibers," Slow Light Program

Intel Corporation (5/05-12/05), **PI**, "Measurements of Silicon-Based Photonic Filters"

Cisco Systems (9/05-8/06), **PI**, "Systems Measurements and Demonstrations of Cost-Effective Reach Extension and Monitoring using Intel-Fabricated Silicon-Based Waveguide Grating Filters"

National Science Foundation (NSF) (9/05-8/09), **Senior Investigator**, "NIRT: Integrated Nanophotonics for Quantum Computation and Quantum Information Processing" (PI – J.D. O'Brien, USC)

Hewlett Packard Corporation (10/05-1/06), **PI**, "Optical Interconnections"

Intel Corporation (1/06-12/06), **PI**, "Link Studies of Silicon Photonic Devices"

GRANTS: (CONTINUED)

National Science Foundation (NSF) (9/06-8/09), **Co-PI**, "A Hybrid Integrated Bidirectional Transparent RF-Optical Interface for Heterogeneous Data Traffic" (PI – H. Hashemi, USC)

Defense Advanced Research Projects Agency (DARPA) (10/06-7/07), **Co-PI** (PI – R. Beausoleil, Hewlett Packard), "Applications of Nanophotonics to Information Technology," Intra-Chip Communications Program (ARL)

Defense Advanced Research Projects Agency (DARPA) (7/07-6/08), **PI**, "Cisco: Variable-Bit-Rate and Multiple-Modulation Format DQPSK/ASK Receivers," Industrial Matching Program for the University Photonics Research Program

Cisco Systems (7/07-6/08), **PI**, "Techniques for Enhancing WDM Transmission Performance when using Advanced Modulation Formats at 40 Gb/s and Beyond"

Defense Advanced Research Projects Agency (DARPA) (7/07-6/08), **PI**, "Intel: Phase and Amplitude Response of Silicon Modulators for Optical Systems," Industrial Matching Program for the University Photonics Research Program

Intel Corporation, (7/07-6/08), **PI**, "Phase and Amplitude Response of Silicon Modulators for Optical Systems"

Optoelectronics Industry Development Association (OIDA), (11/07-3/08), **PI**, "High-Speed Optical Modulators," Photonics Technology Access Program (PTAP)

National Institute of Standards and Technology (NIST), (10/07-9/08), **PI**, "Optical Performance Monitoring to Enable Robust and Reconfigurable Optical Networks," Research Grants Program

Defense Advanced Research Projects Agency (DARPA) (1/08-12/10), **Co-PI** (PI – Ann C. Von Lehman, Telcordia), "Dynamic Resilient Terabit IP/Optical Networks," CORONET Program

Defense Advanced Research Projects Agency (DARPA) (1/08-6/12), **PI**, "Enhanced Performance & Functionality of Continuously-Tunable Optical Delays," POPS Program

Hewlett Packard Corporation (5/08-9/08), **PI**, "Micro-ring Resonators for Optical Interconnections"

Defense Security Cooperation Agency (DSCA) (8/09-7/11), **PI**, "Enabling Higher-Performance Nonlinearity-Based Optical Sensors: Advances in Sensitivity and Dynamic Behavior "

Defense Univ. Research Instrumentation Program / Air Force Office of Scientific Research (DURIP/AFOSR) (6/08-5/09), **PI**, "A 100-Gbit/s Base Multiplexer for Generation and Transmission of 400-Gbit/s Optical Polarization-Multiplexed Differential Quadrature Phase-Shift-Keying Signals"

Defense Advanced Research Projects Agency (DARPA) (6/08-5/09), **PI**, "Exploring Signal Distortion in an Ultra-Low-Loss Waveguide," iPhOD Program

Defense Advanced Research Projects Agency (DARPA) (9/08-8/09), **Co-PI** (PI – A.L. Gaeta, Cornell Univ.), "Large Tunable Delays in Fiber and On-Chip via Conversion/Dispersion," Slow Light Program

Hewlett Packard Corporation (8/08-7/09), **PI**, "Signal Processing in On-Chip Optical DWDM Networks," HP Labs Innovation Research Program (IRP)

GRANTS: (CONTINUED)

Defense Advanced Research Projects Agency (DARPA) (11/08-10/09), **Co-PI** (PI – Ann C. Von Lehman, Telcordia), "Data in the Optical Domain Networks (DOD-N) Enabling Technology Transition," DOD-N Program

National Science Foundation (NSF) 9/08-8/13, "Center for Integrated Access Networks (CIAN)," Engineering Research Center, **Thrust Leader** (PI - Nasser Peyghambarian, Univ. of Arizona)

Hewlett Packard Corporation (8/09-7/10), **PI**, "Signal Processing in On-Chip Optical DWDM Networks II," HP Labs Innovation Research Program (IRP)

Defense Advanced Research Projects Agency (DARPA) (11/09-5/14), **Co-PI**, "Ultra-low Loss, Chip-Based Hollow-Core Waveguide using High-Contrast Grating," integrated Photonic Delay (iPhoD) Program (PI: C.J. Chang Hasnain, UC Berkeley)

Gigoptix Corp. (11/09-10/10), **PI**, "High-Speed Modulation in Optical Communication Systems"

Hewlett Packard Corporation (8/10-7/11), **PI**, "Signal Processing in On-Chip Optical DWDM Networks III," HP Labs Innovation Research Program (IRP)

Defense Advanced Research Projects Agency (DARPA) (6/10-4/11), **PI**, "Optical Tapped-Delay-Line High-Speed Signal Processing," MTO Study

Cisco Systems (10/09-9/10), **PI**, "Novel Techniques to Enhance the Capacity Planning and Resource Management Efficiency of High-Capacity Optical Networks," Univ. Research Program

Defense Advanced Research Projects Agency (DARPA) (9/10-8/13), **Co-PI**, "The Ultimate Capacity-Achieving Receiver for Classical Optical Communications," Information on a Photon (InPho) Program (PI: S. Dolinar, JPL)

National Science Foundation (NSF) (11/11-10/16), **Co-PI**, Major Instrumentation Grant (MRI), "Development of Measurement and Testing Equipment for Distributed Wireless Communications," with A. Molisch (PI, USC).

Defense Univ. Research Initiative Program (DURIP/ONR) (12/11-11/12), **Co-PI**, "Ultra-wideband MIMO Channel Sounder for Distributed Electronic Warfare Applications and Localization Systems," with A. Molisch (PI, USC)

Cisco Systems (10/11-9/12), **PI**, "Flexible, Reconfigurable Capacity Output of High-Performance Optical Transceivers Enabling Cost-Efficient, Scalable Network Architectures," Univ. Research Program

Defense Security Cooperation Agency (DSCA) (2/1/2012-1/31/2013), **PI**, "Performance Enhancement of Optical Fiber Sensors Based on Nonlinearities and Multi-Dimensional Parameterization"

Gigoptix Corp. (11/10-10/11), **PI**, "100-Gbaud Modulation in Optical Communication Systems"

Defense Advanced Research Projects Agency (DARPA) (2/11-2/12), **PI**, "High-Speed Optical Processing of Sparse Aperture Image Data (50 Megapixels, 10-bit Depth) using Tunable Optical Tapped-Delay-Lines," MTO/STO Study

Google Faculty Research Awards Program (11/11-10/12), **PI**, "Cost-Effective, Ubiquitous Optical SNR Performance Monitoring to Enhance Stability and Reconfigurability in Advanced, High-Capacity Google Networks"

GRANTS: (CONTINUED)

Defense Advanced Research Projects Agency (DARPA) (6/12-1/14), **PI**, "Reconfigurable Networking Functions (Add/Drop, Data Exchange, Multicasting) in OAM-Based Systems," DSO Study

National Science Foundation (NSF) (3/2012-3/2015), **PI**, "Terabit-per-second Data Processing to Extract Features of Interest in Enormous Amount of Data"

Air Force Office of Scientific Research (AFOSR) (7/12-7/15), **PI**, "Tailoring of Dispersion and Nonlinearity of Slotted Waveguides and Ring Resonators to Achieve Stable, Efficient, Octave-Spanning Optical Frequency Combs," Basic Research Initiative (BRI) Program

Intel Labs University Research Office (URO) (12/12-12/15), **Co-PI**, "Higher, Denser, Wilder: Massively Broadband and Adaptive Wireless for 5th Generation Wireless Communications" (PI: A. Molisch, USC)

Google Faculty Research Awards Program (1/13-12/13), **PI**, "Reconfigurable, Ubiquitous Optical Signal-to-Noise-Ratio Monitoring to Enhance Stability and Upgradability in Google's Present and Future High-Capacity Networks"

National Science Foundation (NSF) (9/13-8/15), "Center for Integrated Access Networks (CIAN)," Engineering Research Center, **Thrust Leader** (PI - Nasser Peyghambarian, Univ. of Arizona)

National Science Foundation (NSF) (10/13-9/16), **Co-PI**, INSPIRE Program, "An Optical Turing Machine for Native Computing using High-Capacity Transmission Modulation Format Symbols" (PI: Joe Touch, USC ISI)

Nxgen Partners (5/14-8/15), **PI**, "Application of Orbital Angular Momentum to Communications"

Bandwidth10 (5/14-7/15), **PI**, USC-1347563, NSF, Option 1: Small-Business ERC Collaborative

Air Force Office of Scientific Research (AFOSR) (12/14-6/15), **Co-PI**, "Terabit Optical COMMunications System (TOCOMM)," STTR Program

Air Force Office of Scientific Research (AFOSR) (6/15-6/19), **PI**, "Fundamental Understanding of the Physics of Kerr Frequency Comb and Its Effects on the Applications of Coherent Communication, Signal Processing and Measurement"

Defense Security Cooperation Agency (DSCA) (11/15-1/16), **PI**, "Tunable Discrete Random Access Optical Buffer"

Defense Security Cooperation Agency (DSCA) (11/15-11/16), **PI**, "Generic Fabrication Methodology for VIS-IR Integrated Electrooptical Circuits"

Fujitsu (4/15-4/16), **PI**, "Optical Signal Processing Functions in an Optical Network"

National Institute of Standards and Technology (NIST) (2/16-1/17), **PI**, "Measurement, Technology, and Analysis of Overlapped Channels for the Optimal Use of Spectrum in Communication Systems"

NxGen Partners (12/15-8/16), **PI**, "Using OAM Beams for High-capacity RF E-band & Optical Fiber km Links"

Air Force Office of Scientific Research (AFOSR) (3/16-2/18), **Co-PI**, "Phase II, The Terabit Optical COMMunications (TOCOMM) System" (PI: Robert Bock, R-Dex)

GRANTS: (CONTINUED)

National Science Foundation (NSF) (6/15-5/18), **Co-PI**, “Fundamentals of Wireless Communication Systems using Orbital Angular Momenta” (PI: Andreas F. Molisch)

Office of Naval Research (ONR) (7/15-7/18), **Co-PI**, “High-Capacity, Free-Space Quantum Key Distribution based on Spatial and Polarization Encoding” (PI: Robert Boyd, University of Rochester)

Office of Naval Research (ONR) (10/15-6/16), **Co-PI**, “STTR: Precision Optical Navigation Guidance (PRONG) System” (PI: D. Starodubov, FOMS, Inc.)

Huawei / Futurewei (2/16-2/18), **PI**, “Optical Signal Processing for All-Optical Networks”

Intel Labs (2/16-2/19), **PI**, “OAM-Based Wireless Systems”

Defense University Research Instrumentation Program (DURIP) (07/16-06/17), **PI**, “High Baud-Rate and High-Order QAM Optical Transmitter for Long-Range Terabit-per-Second Free-Space Optical Communications Using Orbital Angular Momentum”

National Science Foundation (NSF) (07/16-03/17), **Co-PI**, “STTR Phase I: TeraLink - Next Generation Free Space Optical Communications System”

Huawei / Futurewei (7/16-7/17), **PI**, “Perspectives on the Future of Optical Communications”

Vannevar Bush Faculty Fellowship (VBFF) (08/16-07/21), **PI**, “Multiple Structured Electromagnetic Waves Containing Orbital Angular Momentum for Novel Communications, Imaging, and Directed Energy”

Fujitsu (4/17-9/18), **PI**, “Insights for Future Optical Communication Systems”

Lyteloo Technologies, (11/17), “Equipment donation (spatial light modulator)”

Air Force Office of Scientific Research (AFOSR) SBIR (01/18-03/19), **Co-PI**, "The Tunable and Reconfigurable Integrated Platform (TRIP) for OAM Generation, Multiplexing, Demultiplexing and Detection" (PI: Robert Bock, R-Dex)

Fujitsu (04/18-04/19), **PI**, “Optical Signal Processing”

Naval Air Systems Command (NAVAIR) SBIR (06/18-12/18), **Co-PI**, "Enhanced Robustness and Reliability for Free-Space Optical Communication Link Using Spatial Diversity (SD-Link)" (PI: Robert Bock, R-Dex)

Defense Advanced Research Projects Agency (DARPA) (7/18-6/22), **Co-PI**, "Giant Nonlinear Response of ENZ Metastructures" (PI: Robert Boyd, University of Rochester)

Air Force Office of Scientific Research (AFOSR) SBIR (12/19-12/21), **Co-PI**, "Phase II: The Tunable and Reconfigurable Integrated Platform (TRIP) for OAM Generation, Multiplexing, Demultiplexing and Detection" (PI: Robert Bock, R-Dex)

Defense University Research Instrumentation Program (DURIP) (04/20-04/21), **PI**, “Signal Source Analyzer for Frequency Comb, Orbital Angular Momentum Applications, and Highly Nonlinear Materials”

GRANTS: (CONTINUED)

Naval Information Warfare Center (NIWC) (07/20-01/21), **PI**, “Physics Based Propagation Modeling for OAM Multiplexed Optical Communication Links”

Office of Naval Research under a Multidisciplinary University Research Initiative (MURI) (06/20-06/25), **Co-PI**, “High Photon Density Spatiotemporal (OAM+SAM) Vector Beams for Maritime Environments” (PI: E. Johnson, Clemson University)

Office of Naval Research under a Multidisciplinary University Research Initiative (MURI) (07/20-07/25), **Co-PI**, “Classical Entanglement in Structured Optical Fields” (PI: A. Abouraddy, Univ. of Central Florida)

Defense Security Cooperation Agency (DSCA) (07/2020-07/21), **PI**, “High-Capacity Data Transmission Link Between a Ground Terminal and a Flying Drone using Multiplexing of Multiple Optical Orbital-Angular-Momentum Beams”

Defense Security Cooperation Agency (DSCA) (06/2020-06/21), **PI**, “Enhancing the Utilization of Structured Beams for Localization and Hiding by Diversity and Compensating Turbulence Effects”

Nippon Telephone and Telegraph (NTT) (07/20-07/21), **PI**, “Experimental Implementation of a High-Capacity Wireless Link by Exploiting Orbital Angular Momentum Modes Multiplexing in the Sub-THz Regime”

Defense Advanced Research Projects Agency (DARPA) (07/20-07/21), **Co-PI**, “Scalable All-Optical Processing – Remotely (SCALOP-R)” (PI: J. Habif, USC ISI)

Airbus Institute for Engineering Research (AIER) Board (09/20-09/22), **PI**, “Towards Terabit/sec High-Capacity Free-Space Optical Communication Links to Airplanes using Multiplexing of Orthogonal Beams”

Qualcomm Innovation Fellowship (9/20-10/21), **Supervisor**, “High-Capacity Mode-Division-Multiplexed Wireless Communications Within and Beyond Millimeter-Wave Band”

Air Force Research Laboratory (AFRL) through University of New Mexico COSMIAC (9/2021-9/2023), **PI**, Subaward on Program “Communications and Position Navigation and Timing (PNT) (COMPNT)”

Airbus Institute for Engineering Research (AIER) Board (09/22-09/25), **PI**, “Utilizing Structured Light to Enable Both 3D Probing of Turbulence and Resilient High-Capacity Communications Through Turbulence”

Office of Naval Research (ONR) STTR (06/22-12/22), **Co-PI**, “Phase I: Structured-Light-Based High-Resolution and High-Dynamic-Range Optical Underwater Ranging” (PI: Robert Bock, R-Dex)

Defense Advanced Research Projects Agency (DARPA) (9/22-10/24), **Co-PI**, “Phase I: Space-Based Adaptive Communications Node” (PI: Keren Bergman, Columbia University)

Defense Advanced Research Projects Agency (DARPA) (4/22-4/24), **Co-PI**, “DIAMOND: Distributed Training of Massive Models at Bandwidth Frontiers” (PI: Jonathan Habif, USC ISI)

Office of Naval Research (ONR) STTR (5/23-10/23), **Co-PI**, “Phase I Option: Structured-Light-Based High-Resolution and High-Dynamic-Range Optical Underwater Ranging” (PI: Robert Bock, R-Dex)

Office of Naval Research (ONR) STTR (10/23-09/25), **Co-PI**, “Phase II: Structured-Light-Based High-Resolution and High-Dynamic-Range Optical Underwater Ranging” (PI: Robert Bock, R-Dex)

GRANTS: (CONTINUED)

National Science Foundation (NSF) (10/23-9/26), **Co-PI**, “Impact of Radiation Trapping on Sensing and Communication Systems in the THz, Infrared, and Optical Regime - Foundations, Challenges, and Opportunities” (PI: Andreas F. Molisch, USC)

Office of Naval Research (ONR) STTR (10/24-8/25), **Co-PI**, “Phase I: Direct Cross-Domain Optical Data Transfer” (PI: Austin Jantzi, Physical Sciences, Inc.)

Defense Advanced Research Projects Agency (DARPA) (10/24-9/25), **Co-PI**, “Phase II: Space-Based Adaptive Communications Node” (PI: Keren Bergman, Columbia University)

Defense Advanced Research Projects Agency (DARPA) (3/25-9/26), **Co-PI**, “EMON Program: Next-Generation Radar with Enhanced Information Extraction and Resolution Utilizing Advanced Spatially Structured Electromagnetic Waves” (PI: Andreas Molisch, USC)

USC ACTIVITIES:

Co-Chair, Provost's University Committee on Appointments, Promotions, and Tenure (UCAPT) ('24-'26)

Member, Panel to interview Candidates, Director of Faculty Administration, Provost's Office ('25)

Chair, Natural Sciences and Engineering Panel, Provost's University Committee on Appointments, Promotions, and Tenure (UCAPT) ('23-'25)

Member, ECE Department Merit Review Committee, Research Subcommittee ('24)

Member, Proposal Review Committee, Energy Frontier Research Center Program, USC Office of VP Research ('22)

Member, USC University Research Network ('22-'24)

Chair, Teaching & Service Subcommittee, Merit Review Committee, Dept. of ECE-Systems ('22)

Member, Natural Sciences/Engineering Panel, University Committee on Appointments, Promotions, and Tenure (UCAPT) ('21-'23)

Member, Review Committee, Vice President of Research, USC Nominations for Packard Fellowships in Science & Engineering ('21-'24)

Member, Provost's USC Decanal Review Advisory Committee of Dean Yortsos ('21)

Member, ECE Merit Review Committee (Teaching) ('21)

Member (VSoE Committee) and Chair (ECE-S, Subcommittee), Covid-19 Research Restart Task Force, VSoE ('20)

Member, USC VSoE Space Council ('19-'20)

Member, Award Committee, Associates Award for Creativity in Research (several years within '13-'19)

Director, Communications Sciences Institute, Ming Hsieh Dept. of Electrical Eng. ('16-'17)

Faculty Advisor, IEEE, USC Student Chapter ('15-'18)

Faculty Advisor, OSA Student Chapter at USC ('14-'18)

Member, Graduate Curriculum Committee, Ming Hsieh Dept. of Electrical Engineering – Systems ('16-'17)

Chair, Provost's University-Wide Committee on Academic Review (UCAR) (2013-2015)

Co-Chair, Provost's University-Wide Committee on Academic Review (UCAR) (2012-2013)

Chair, Provost's University-Wide Ph.D. Fellowship Evaluation Task Force (2011-2012)

Chair, Provost's University-Wide Graduate School Committee, Fellowships, Prizes & Awards ('09-'11)

President, USC Chapter of Phi Kappa Phi All-University Honor Society ('11-'12)

Vice President, USC Chapter of Phi Kappa Phi All-University Honor Society ('10-'11)

Executive Board Member, USC Chapter of Phi Kappa Phi All-University Honor Society ('09-'12)

Member, Provost's Advisory Committee on Transformational Hiring in Sciences & Eng. ('11-'12)

Member, Vice-Provost's The Graduate School Faculty Advisory Council (2011-2012)

Faculty Advisory Committee, USC Viterbi School of Eng., New Frontiers of Science & Eng. Bldg. ('10)

Provost's Conflict of Interest in Research Committee ('07-'08, '08-'09, '09-'10)

Provost's Conflict of Interest in Research Task Force ('10-'11)

Member, Award Committee, Associates Award for Excellence in Teaching (several years within '04-'09)

Provost's Faculty Working Group for "Defining the New Diploma in Ph.D. Innovation" ('08-'09)

Provost's Graduate School Committee on Fellowships, Prizes, and Awards ('07-'08, '08-'09)

Member, Dean's Committee of the Unification of the Ming Hsieh EE Dept., USC Viterbi School of Eng. ('10)

Executive Committee, Ming Hsieh Dept. of Electrical Engineering - Systems ('07-'11 and '16-'17)

Co-Director, Communications Sciences Institute, Ming Hsieh Dept. of Electrical Eng. ('07-'11)

Academic Program Review Subcommittee, Ming Hsieh Dept. of EE Advisory Board Committee ('10)

Student Affairs Committee of the USC Board of Trustees, Faculty Member ('06-'07)

Organizer, Students' Practical Guide Seminar Series, Ming Hsieh Dept. of Electrical Eng. ('07-'09)

Co-Chair, Departmental Retreat Committee, Ming Hsieh Dept. of Electrical Eng. ('07)

USC ACTIVITIES: (CONTINUED)

Member, Awards Committee, Ming Hsieh Dept. of Electrical Eng. ('07-'08, '08-'09, '11-'12)
Member, Research Committee of the Engineering Faculty Council, USC Viterbi School of Eng. ('07)
USC Center for Excellence in Teaching (CET), Teaching Assistant Training Program ('06)
University-Wide Committee on Appointments, Promotions, & Tenure (UCAPT) ('03-'04, '04-'05, '08-'10)
Provost's University Financial Disclosures Review Committee ('03-'04, '04-'05, '05-'06, '06-'07)
Committee, University-Wide Associates Awards, Excellence in Teaching & Outstanding TA ('03-'05, '07-'10)
Faculty Advisor, Alpha Delta Sigma, USC Jewish Honor Campus Fraternity
Nominated and Accepted, Provost's Leadership Council ('97-'98)
USC Department of Electrical Engineering – Systems, Chair Search Committee ('02-'03)
Chair, Best Student Research Paper Award Committee, Dept. of Electrical Engineering ('02)
Director's Search Committee, USC's NSF Engineering Research Center in Multimedia ('01-'02)
USC School of Engineering Dean's Search Committee ('00-'01)
USC School of Engineering Research Committee ('99-'00)
Elected, USC Engineering Appointments, Promotions, & Tenure Committee ('94-'98)
Associate Director, USC Integrated Media Systems Center, Student Affairs ('96-'01)
University Committee on Patents and Technology ('94-'97)
Associate Director, USC Center for Photonic Technology ('94-present)
USC School of Engineering Restructuring Subcommittee ('96)
USC School of Engineering Systems Architecting Committee ('97)
USC School of Eng. Recruitment Enrollment Management Committee ('94-'96)
Faculty Advisor, Optical Society of America, USC Student Chapter ('95-present)
Board of Directors, LA Hillel City Board, USC Representative ('95-'97)
Faculty Advisory Board, USC Hillel Organization ('92-'99)
Seminar Series Coordinator (Communications Sciences Institute) ('92-'95)
Ph.D. Screening Exam Coordinator (Communications Sciences Institute) ('92-'97)

PUBLICATIONS

U.S. PATENTS: (*non-U.S. patents not listed here*)

1. Title: A Method of Localized Photochemical Etching of Multilayered Semiconductor Body (U.S. Pat. Ser. No. 5,081,002), Co-Inventors w/ A.E. Willner: M. N. Ruberto, D. V. Podlesnik, and R. M. Osgood, Jr. (Jan. 14, 1992)
2. Title: One-To-Many Simultaneous Optical Two-Dimensional Plane Interconnections using Multiple Wavelength, Vertical Cavity, Surface-Emitting Lasers and Wavelength-Dependent Detector Arrays (U.S. Pat. Ser. No. 5,546,209), Co-Inventors w/ A.E. Willner: C.J. Chang-Hasnain and J.E. Leight. (Aug. 13, 1996)
3. Title: Tunable Dispersion Compensator Based on a Nonlinearly-Chirped Fiber Bragg Grating (U.S. Pat. Ser. No. 5,982,963), Co-Inventors w/ A.E. Willner: J.-X. Cai, J. Feinberg, K.-M. Feng, V. Grubsky, and D.S. Starodubov. (Nov. 9, 1999)
4. Title: Integrated Bi-directional Gradient Refractive Index Multiplexer (U.S. Pat. Ser. No. 6,011,885), Co-Inventors w/ A.E. Willner: J.R. Dempewolf, R.H. Dueck, B.V. Hunter, and R.K. Wade. (Jan. 4, 2000)
5. Title: Dispersion Compensation by using Tunable Nonlinearly Chirped Gratings (U.S. Pat. Ser. No. 6,330,383), Co-Inventors w/ A.E. Willner: J.-X. Cai, K.-M. Feng, R. Khosravani, S. Lee, and J. Peng. (Dec. 11, 2001)
6. Title: Optical Compensation for Dispersion-Induced Power Fading in Optical Transmission of Double-Sideband Signals (U.S. Pat. Ser. No. 6,388,785), Co-Inventors w/ A.E. Willner: O.H. Adamczyk, S.A. Havstad, A.B. Sahin, and Y. Xie. (May 14, 2002)
7. Title: Tunable Compensation for Polarization-Mode Dispersion using a Birefringent Nonlinearly-Chirped Grating in a Dual-Pass Configuration (U.S. Pat. Ser. No. 6,400,869), Co-Inventors w/ A.E. Willner: S. Lee, Z. Pan, and Y. Xie. (June 4, 2002)
8. Title: Dynamic Power Equalization of Many Wavelength-Division-Multiplexed Channels in a Fiber Optic System using Acousto-Optic Technology (U.S. Pat. Ser. No. 6,341,021), Co-Inventors w/ A.E. Willner: J.-X. Cai, K.-M. Feng, S.H. Huang, D.A. Smith, and X.Y. Zou. (Jan. 22, 2002) [*Note: Name misspelled as "Wilner" in patent.*]
9. Title: Tunable Optical Dispersion-Slope Compensation Based on a Nonlinearly-Chirped Bragg Grating (U.S. Pat. Ser. No. 6,453,093), Co-Inventors w/ A.E. Willner: S. Lee, Z. Pan, and Y. Xie. (Sept. 17, 2002)
10. Title: Tuning of Optical Dispersion by using a Tunable Fiber Bragg Grating (U.S. Pat. Ser. No. 6,453,095), Co-Inventors w/ A.E. Willner: J.-X. Cai, J. Feinberg, K.-M. Feng, V. Grubsky, and D.S. Starodubov. (Sept. 17, 2002)
11. Title: Optical Detection of a Fiber Span with High Polarization-Mode Dispersion in a Fiber System (U.S. Pat. Ser. No. 6,459,479), Co-Inventors w/ A.E. Willner: S. Lee. (Oct. 1, 2002)
12. Title: Technique for Detecting the Status of WDM Optical Signals (U.S. Pat. Ser. No. 6,480,648), Co-Inventors w/ A.E. Willner: J.R. Dempewolf, W.W. Peck, I. Turner, and R.K. Wade. (Nov. 12, 2002)
13. Title: Polarization-Mode Dispersion Emulator (U.S. Pat. Ser. No. 6,542,650), Co-Inventors w/ A.E. Willner: P. Ebrahimi, E. Ibragimov, R. Khosravani, I.T. Lima, Jr., and C.R. Menyuk. (April 1, 2003)

14. Title: Compensation and Control of Both First-Order and Higher-Order Polarization-Mode Dispersion (U.S. Pat. Ser. No. 6,654,103), Co-Inventors w/ A.E. Willner: S. Lee, L.-S. Yan, and Q. Yu. (Nov. 25, 2003)
15. Title: Compensation for Polarization-Mode Dispersion in Multiple Wavelength-Division Multiplexed Channels Without Separate Compensation for Each Individual Channel (U.S. Pat. Ser. No. 6,603,890), Co-Inventors w/ A.E. Willner: P. Ebrahimi, S.A. Havstad, R. Khosravani, and Y.W. Song. (Aug. 5, 2003)
16. Title: WDM Fiber Amplifiers using Sampled Bragg Gratings (U.S. Pat. Ser. No. 6,621,627), Co-Inventors w/ A.E. Willner: Z. Pan and Y. Xie. (Sept. 16, 2003)
17. Title: Polarization-Division Multiplexing Based on Power Encoding of Two Different Polarization Channels (U.S. Pat. Ser. No. 6,714,742), Co-Inventors w/ A.E. Willner: M.C. Cardakli and M.I. Hayee. (March 30, 2004)
18. Title: Intra-Bit Polarization Diversity Modulation (U.S. Pat. Ser. No. 6,646,774), Co-Inventors w/ A.E. Willner: T. Luo, Z. Pan, A.B. Sahin, Y. Wang, C.-Y. Yu, and Q. Yu. (Nov. 11, 2003)
19. Title: Reconfigurable Optical Recognition of Bit Information in a Digital Data Stream with Different Bit Rates (U.S. Pat. Ser. No. 6,751,416), Co-Inventors w/ A.E. Willner: M.C. Cardakli, D. Gurkan, and S. Lee. (June 15, 2004)
20. Title: Devices and Applications Based on Tunable Waveguiding Bragg Gratings with Nonlinear Group Delays (U.S. Pat. Ser. No. 6,915,040), Co-Inventors w/ A.E. Willner: Y.W. Song and S.M.R. Motaghian Nezam. (July 5, 2005)
21. Title: Optical Dispersion Monitoring Based on Vestigial Sideband Optical Filtering (U.S. Pat. Ser. No. 7,035,538), Co-Inventors w/ A.E. Willner: Z. Pan, L.-S. Yan, and Q. Yu. (April 25, 2006)
22. Title: Monitoring and In-Line Compensation of Polarization Dependent Loss for Lightwave Systems (U.S. Pat. Ser. No. 7,206,517), Co-Inventors w/ A.E. Willner: L.-S. Yan and Q. Yu. (April 17, 2007)
23. Title: Optically Boosted Router (U.S. Pat. Ser. No. 7,369,766), Co-Inventors w/ A.E. Willner: J. Bannister, J. McGeehan, P. Kamath, A. Patel, and J.D. Touch. (May 6, 2008)
24. Title: Code Cycle Modulation: Concept and Implementation (U.S. Pat. Ser. No. 7,616,618), Co-Inventors w/ A.E. Willner: P.V. Kumar, R. Omrani, P. Saghari, and J.D. Touch. (Nov. 10, 2009)
25. Title: Waveguide-Based Dispersion Device (U.S. Pat. Ser. No. 8,483,529), Co-Inventors w/ A.E. Willner: Y. Yue and L. Zhang. (July 9, 2013)
26. Title: Sweep-Free Stimulated Brillouin Scattering-Based Fiber Optical Sensing (U.S. Pat. Ser. No. 8,800,375), Co-Inventors w/ A.E. Willner: M. Tur and A. Voskoboinik. (Aug. 12, 2014)
27. Title: All-optical Tunable Tapped-Delay-Lines using Wavelength Conversion and Chromatic Dispersion Based Delays (U.S. Pat. Ser. No. 8,976,445), Co-Inventors w/ A.E. Willner: S. Khaleghi, M. R. Chitgarha, and O. Yilmaz. (March 10, 2015)
28. Title: On-Chip Two-Octave Supercontinuum Generation Enabled by Advanced Chromatic Dispersion Tailoring in Slotted Waveguides (U.S. Pat. Ser. No. 9,110,219), Co-Inventors w/ A.E. Willner: Y. Yan, Y. Yue, and L. Zhang. (Aug. 18, 2015)
29. Title: Mirrorless-Oscillation in a Waveguide using Non-Degenerate Four-Wave Mixing (U.S. Pat. Ser. No. 9,086,609), Co-Inventors w/ A.E. Willner: Y. Yan and L. Zhang (July 21, 2015)

30. Title: Reconfigurable Optical Transmitter (U.S. Pat. Ser. No. 9,166,721), Co-Inventors w/ A.E. Willner: S. Khaleghi and M. R. Chitgarha. (October 20, 2015)
31. Title: Automatically Locked Homodyne Detection (U.S. Pat. Ser. No. 9,625,320), Co-Inventors w/ A.E. Willner: M. R. Chitgarha, S. Khaleghi, A. Mohajerin-ariaei and M. Ziyadi (Apr. 18, 2017)
32. Title: Systems and Techniques for Orbital Angular Momentum Based Reconfigurable Switching (U.S. Pat. Ser. No. 9,768,909), Co-Inventors w/ A.E. Willner: N. Ahmed, H. Huang, Y. Ren, M. Tur, M. J. Willner, Y. Yan and Y. Yue (Sept. 19, 2017)
33. Title: Adaptive Optics Based Simultaneous Turbulence Compensation of Multiple Orbital Angular Momentum Beams (U.S. Pat. Ser. No. 9,780,872), Co-Inventors w/ A.E. Willner: H. Huang, Y. Ren and G. Xie (Oct. 3, 2017)
34. Title: Phase-Sensitive Regeneration without a Phase-Locked Loop using Brillouin Amplification (U.S. Pat. Ser. No. 10,270,536), Co-Inventors w/ A.E. Willner: A. Almainan, Y. Cao, and M. Ziyadi (Apr. 23, 2019)
35. Title: Systems and Techniques for Communication using Multiple-Input-Multiple-Output Processing of Orbital Angular Momentum Modes (U.S. Pat. Ser. No. 10,291,300), Co-Inventors w/ A.E. Willner: Y. Ren, and L. Li (May 14, 2019)
36. Title: Tunable Optical Channel Slicing and Stitching to Enable Dynamic Bandwidth Allocation (U.S. Pat. Ser. No. 10,277,326), Co-inventor: Y. Cao (April 30, 2019)
37. Title: Systems and Techniques for Communication Using Combined Orbital Angular Momentum and Multiple-Input-Multiple-Output Processing (U.S. Pat. Ser. No. 10,411,811), Co-Inventors w/ A.E. Willner: Y. Ren, L. Li, G. Xie, Y. Cao, Z. Wang, C. Liu, and A. J. Willner (Sept. 10, 2019)
38. Title: Data Encoding and Channel Hopping Using Orbital Angular Momentum Modes (U.S. Pat. Ser. No. 10,750,257), Co-Inventors w/ A.E. Willner: Y. Ren, L. Li, A. J. Willner, and G. Xie (August 18, 2020)
39. Title: System and Method for Extending Path Length of a Wave Signal Using Angle Multiplexing (U.S. Pat. Ser. No. 10,789,009), Co-Inventors w/ A.E. Willner: P. F. McManamon, D. Damaghi, O. Harlev, A. Vedadi-Comte, C. R. Palanzo, and R. J. Howard (Sept. 29, 2020)
40. Title: Data in Motion Storage System and Method (U.S. Pat. Ser. No. 10,812,880), Co-Inventors w/ A.E. Willner: D. Damaghi, O. Harlev, A. Litvin, N. Barak, P. F. McManamon, A. McGuffin (Oct. 20, 2020)
41. Title: Spatial Light Structuring Using a Combination of Multiple Orthogonal Orbital Angular Momentum Beams with Complex Coefficients (U.S. Pat. Ser. No. 10,914,959), Co-Inventors w/ A.E. Willner: L. Li, C. Liu, Y. Ren, G. Xie, and Z. Zhao (Feb. 9, 2021)
42. Title: Multiple Kerr-Frequency-Comb Generation Using Different Lines from a Remote Kerr Comb (U.S. Pat. Ser. No. 11,106,111), Co-Inventors w/ A.E. Willner: P. Liao, A. Almainan, C. Bao (Aug. 31, 2021)
43. Title: Data in Motion Storage System and Method (U.S. Pat. Ser. No. 11,190,858), Co-Inventors w/ A.E. Willner: D. Damaghi, O. Harlev, A. Litvin, N. Barak, P. F. McManamon, A. McGuffin (Nov. 30, 2021)
44. Title: Systems and Methods for Building, Operating and Controlling Multiple Amplifiers, Regenerators and Transceivers Using Shared Common Components (U.S. Pat. Ser. No. 11,243,355), Co-Inventors w/ A.E. Willner: D. Damaghi, O. Harlev, P. F. McManamon, A. Vedadi-Comte, D. D. Choudhary (Feb. 8, 2022)

45. Title: Apparatus and Method for Storing Wave Signals in a Cavity (U.S. Pat. No. 11,361,794), Co-Inventors w/ A.E. Willner: D. Damaghi, O. Harlev, A. Vedadi-Comte, P. F. McManamon (June 14, 2022)
46. Title: System and Method for Extending Path Length of a Wave Signal Using Angle Multiplexing (U.S. Pat. Ser. No. 11,467,759), Co-Inventors w/ A.E. Willner: P. F. McManamon, D. Damaghi, O. Harlev, A. Vedadi-Comte, C. R. Palanzo, and R. J. Howard (Oct. 11, 2022)
47. Title: Optical Mitigation of Inter-Channel Crosstalk for WDM Channels (U.S. Pat. Ser. No. 11,652,556), Co-Inventors w/ A.E. Willner: F. Alishahi, Y. Cao, A. Fallahpour, A. Mohajerin-Ariaei (May 16, 2023)
48. Title: Remotely Biasing, Controlling, and Monitoring a Network Routing Node Based on Remotely Provided Optical Signals (U.S. Pat. Ser. No. 12,250,502), Co-Inventors w/ A.E. Willner: A. Minoofar, F. Alishahi, A. Fallahpour, and J.L. Habif (Mar. 11, 2025)

BOOKS:

1. **Optical Fiber Telecommunications VII**, Alan E. Willner, editor, Elsevier Publishers, Academic Press, San Diego, Oct. 2019, ISBN: 978-0-12-816502-7.
** Top 10 Best Electrical Fiber Optics Books Ranked by FINDTHISBEST.COM **
2. **Novel Insights into Orbital Angular Momentum Beams: From Fundamentals, Devices to Applications**, Yang Yue, Hao Huang, Yongxiong Ren, Zhongqi Pan, and Alan E. Willner, co-editors, MDPI AG, Basel, Switzerland, Sept. 2019, ISBN: 978-3-03921-223-1.
3. **Optical Fiber Telecommunications VI, Volumes A and B**, Ivan P. Kaminow, Tingye Li, and Alan E. Willner, co-editors, Elsevier Publishers, Academic Press, San Diego, May 2013, ISBN: 978-0-12-396958-3 and 978-0-12-396960-6.
4. **Optical Fiber Telecommunications ebook Collection: Ultimate CD**, Stewart E Miller, Ivan P. Kaminow, Thomas Koch, Tingye Li, and Alan E. Willner, co-editors, Elsevier Publishers, Academic Press, San Diego, Sept. 2008, ISBN: 978-0-12-374643-4 and 978-0-12-374643-6.
5. **Optical Fiber Telecommunications V, Volumes A and B**, Ivan P. Kaminow, Tingye Li, and Alan E. Willner, co-editors, Elsevier Publishers, Academic Press, San Diego, Feb. 2008, ISBN: 978-0-12-374171-4 and 978-0-12-374172-4.
6. **Optical Fiber Communication Systems**, L.G. Kazovsky, S. Benedetto, and A. E. Willner, co-authors, Artech House Publishers, Boston, Oct. 1996, ISBN: 0-89006-756-2.
7. **System Technologies, Trends in Optics and Photonics**, vol. 12, Alan E. Willner and Curtis R. Menyuk, co-editors, Optical Society of America, Washington, D.C., 1997, ISBN: 1-55752-484.
8. **Optical Amplifiers and Their Enabling Technologies, Trends in Optics and Photonics**, vol. 16, and M. N. Zervas, Alan E. Willner, and S. Sasaki, co-editors, Optical Society of America, Washington, D.C., 1998, ISBN: 1-55752-505-6.
9. **Emerging Components and Technologies for All Optical Networks**, Proceedings of SPIE - the International Society for Optical Engineering, vol. 2613, Emil S. Koteles and Alan E. Willner, co-editors, SPIE, Bellingham, WA, 1995, ISBN-13: 978-0819419774.
10. **Optical Fiber Communication**, Proceedings of SPIE - the International Society for Optical Engineering, Winston I. Way, Franklin K. Tong, and Alan E. Willner, co-editors, SPIE, Bellingham, WA, 1998, ISBN-13: 978-0819428745.

INVITED BOOK CHAPTERS:

1. Alan E. Willner, "The Consummate Scholar and Gentleman: Professor Solomon Wolf Golomb," **"The Wisdom of Solomon: The Genius and Legacy of Solomon Golomb"**, Chapter 3, pp. 331-345, Beatrice A. Golomb, Guang Gong, and Alfred W. Hales, editors, World Scientific Publishing, July 2023, ISBN: 978-9811234361.
2. Alan E. Willner, Runzhou Zhang, Kai Pang, Haoqian Song, Cong Liu, Hao Song, Xinzhou Su, Huibin Zhou, Nanzhou Hu, Zhe Zhao, Guodong Xie, Yongxiong Ren, Hao Huang, and Moshe Tur, "High-Capacity Communications Using Multiplexing of Multiple Orbital-Angular-Momentum Beams," **Engineering Electromagnetic Vortices: Theory and Applications, First Edition**, Chapter 12, Zhi Hao Jiang and Doug Werner, editors, Wiley, Dec. 2021, ISBN: 978-1119662822.
3. Alan E. Willner, Haoqian Song, Cong Liu, Runzhou Zhang, Kai Pang, Huibin Zhou, Nanzhe Hu, Hao Song, Xinzhou Su, Zhe Zhao, Hao Huang, Guodong Xie, Yongxiong Ren, and Moshe Tur, "Causes and Mitigation of Modal Crosstalk in OAM Multiplexed Optical Communication Links," **Structured Light and Optical Communication, First Edition**, Chapter 10, Mohammad Al-Amri, Mohamed Babiker, and David Andrews, editors, Elsevier Science, May 2021, ISBN: 978-0-128-21510-4.
4. Alan. E. Willner, Yan Yan, Yongxiong Ren, Nisar Ahmed and Guodong Xie, "Orbital Angular Momentum-based Wireless Communications: Designs and Implementations," **Signal Processing for 5G: Algorithms and Implementations, First Edition**, Chapter 13, Fa-Long Luo and Charlie Zhang, editors, John Wiley & Sons, Ltd., Chichester, October 2016, ISBN: 978-1-119-11646-2.
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INVITED PAPERS AND PRESENTATIONS:

1. Alan E. Willner, "Mode-Multiplexed Free-Space Optical Communications," **Keynote Presentation, Smart Photonic and Optoelectronic Integrated Circuits conference, SPIE Photonics West**, San Francisco, CA, Jan. 2026 (SPIE, Bellingham, Wash., 2026).
2. Alan E. Willner, "Underwater Optical Ranging Techniques," **Invited Presentation, Conference OE305: Optical Sensing and Precision Metrology, SPIE Photonics West (OPTO)**, San Francisco, CA, Jan. 2026 (SPIE, Bellingham, Wash., 2026).
3. Alan E. Willner, Huibin Zhou, and Xinzhou Su, "Perspective on Tailoring Longitudinal Structured Beam and Its Applications," **Invited Paper, Nanophotonics**, accepted for publication, 2025.
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5. Alan E. Willner and Yuxiang Duan, "High-Accuracy Ranging in Turbid Water using Structured Light," **Plenary Lecture, Lasers, Optics, Photonics, Sensors & Ultrafast Nonlinear Optics (LOPS)**, Hollywood Beach, Florida, June 2025.
6. Alan E. Willner, "Photonics Research Webinar with Alan E. Willner," **Invited Webinar, Photonics Research**, Apr 2025.
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** Paper selected by the editors as the front cover image of this issue of JLT. **

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

10. Vignesh Gopal, Asher Novick, Xinzhou Su, James Venditto, Muralekrishnan Ramakrishnan, Zile Jiang, Maarten Hattink, Anthony Rizzo, Ricard Menchon-Enrich, Xiang Meng, Alan E. Willner, and Keren Bergman, "Fully Reconfigurable Silicon Photonic Transceiver for Optical Inter-Satellite Links," **Invited Paper, IEEE/Optica Conference on Optical Fiber Communications (OFC)**, paper M3D.3, San Francisco, CA, March 2025.
11. Alan E. Willner, "Structured-Light-Based High-Resolution and High-Dynamic-Range Optical Underwater Ranging Subsystem," **Invited Seminar, OUSD Basic Research Office Forum**, Feb. 2025.
12. Alan E. Willner, "Lessons Learned In Using Optics for Signal Processing," **Invited Tech Talk, IEEE/Optica Conference on Optical Fiber Communications (OFC)**, San Francisco, CA, March 2025.
13. Alan E. Willner, "Underwater Optical Ranging Using Multiple Orbital-Angular-Momentum Modes," **Invited Paper, Conference OE305: Optical Sensing and Precision Metrology, SPIE Photonics West (OPTO)**, paper 13380-44, San Francisco, CA, Jan. 2025 (SPIE, Bellingham, Wash., 2025).
14. Alan E. Willner, "Tunable Superluminal-to-Negative Group Velocities in Free-Space and Fiber Using Frequency Combs," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West, Optical, Quantum Sensing, Imaging, and Precision Metrology III**, paper 13392-55, San Francisco, CA, Jan. 2025 (SPIE, Bellingham, Wash., 2025).
15. Alan E. Willner, "Tailoring the Transverse, Longitudinal, and Temporal Properties of Space-Time Structured Light," **Invited Presentation, Optica Incubator Workshop on Spatiotemporal Structuring of Light**, Washington, DC, Nov. 2024 (Optica, D.C., 2024).
16. Alan E. Willner, "Integrated Optics to Metasurfaces—Impact and Legacy of Professor Richard Osgood, Jr.," **Invited Paper, Materials Research Society Fall Meeting**, paper EL07.08.02, Boston, MA, Dec. 2024.
17. Alan E. Willner, "Advances in Mode-Multiplexed Free-Space Optical Communications," **Invited Paper, Frontiers in Optics Conference 2024 (FiO)**, paper FM3C. 1, Denver, Colorado, Sep. 2024.
18. Alan E. Willner, "Value of Professional Societies to Your Career: Plant a Flag to be a Leader," **Invited Presentation, Frontiers in Optics Conference 2024 (FiO)**, Student Workshop, Denver, Colorado, Sep. 2024.
19. Alan E. Willner, "Optical Communications: Innovations and Applications Abound," **Invited Seminar, Elhanan and Solomon Golomb Memorial Lecture, Jerusalem College of Technology**, June 2024.
20. Alan E. Willner, "Structured Light for Communications and Sensing," **Invited Seminar, Distinguished Seminars, ECE /CQD, Northwestern University**, Nov. 2024.
21. Alan E. Willner, Huibin Zhou, Yuxiang Duan, Zile Jiang, Murale Ramakrishnan, Xinzhou Su, Kaiheng Zou, and Kai Pang, "Advances in Multi-Channel Mid-IR Free-Space Optical Communications," **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. 42, no. 19, pp. 6739-6748, 2024.
22. Alan E. Willner, "Dynamic Space-Time Wave Packets," **Invited Paper, SPIE Active Photonic Platforms (APP) 2024 Conference, of the Nanoscience+Engineering Symposium, part of SPIE Optics and Photonics**, paper 13110-16, San Diego, CA, August 2024.
23. Huibin Zhou, Yuxiang Duan, Murale Ramakrishnan, Zile Jiang, Xinzhou Su, Kaiheng Zou, Adam T. Heiniger, Moshe Tur, and Alan E. Willner, "Demonstration of an Optical Parametric Oscillator (OPO)-Based High-Power Data Transmitter for a 10-Gbit/s QPSK Mid-IR Coherent Free-Space Link Through Fog," **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. 42, no. 11, pp. 3989-3996, 2024.

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

24. Runzhou Zhang, Xinzhou Su, Hao Song, Huibin Zhou, Moshe Tur, and Alan E. Willner, "Automatic Turbulence Resilience in Pilot-Assisted Self-Coherent Free-Space Optical Communications," **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. **42**, no. 10, pp. 3760-3769, 2024.
25. Alan E. Willner and Huibin Zhou, "Efficiently Adding Mode Multiplexing for Cost-Effective, High-Capacity Fiber Links," **Invited Commentary Paper, Advanced Photonics**, vol. **6**, no. 1, paper 010502, 2024.
26. Alan E. Willner, "Longitudinally-Structured Light Fields for Sensing and Dynamic Behavior," **Keynote Presentation, Lasers, Optics, Photonics, Sensors, Bio Photonics, Ultrafast Nonlinear Optics & Structured Light (LOPS) 2024 Conference**, Fort Lauderdale, FL, June 2024.
27. Alan E. Willner, "Free-Space Mid-IR Communication Systems," **Invited Tech Talk, IEEE/OSA Conference on Optical Fiber Communications (OFC)**, San Diego, CA, March 2024.
28. Alan E. Willner, "Optical and THz Broadband Integrated Circuits for Mode-Dependent Free-Space Communications," **Invited Paper, IEEE/OSA Conference on Optical Fiber Communications (OFC)**, paper **Tu2A.2**, San Diego, CA, March 2024.
29. Alan E. Willner, "Longitudinally Structured Light Fields for Sensing and Dynamic Behavior," **Invited Paper, SPIE Photonics West**, paper **12912-88**, San Francisco, CA, January 2024.
30. Alan E. Willner, Huibin Zhou, Xinzhou Su, Hao Song, Kai Pang, and Haoqian Song, "Utilizing Structured Modal Beams in Free-Space Optical Communications for Performance Enhancement," **Invited Paper, IEEE Journal of Selected Topics in Quantum Electronics**, vol. **29**, no. 6, article 3700213, 2023.
31. Alan E. Willner, "Mid-IR Free-Space Optical Communications Using WDM and OAM," **Invited Paper, European Conference on Optical Communication (ECOC)**, paper **We.A.2.1**, Glasgow, UK, Oct. 2023.
32. Runzhou Zhang and Alan E. Willner, "Turbulence-Robust Free-Space Optical Transmission Assisted by a Pilot Beam," **Invited Paper, Photonic Networks and Devices**, paper **NeM4B.3**, Busan, Republic of Korea, July 2023.
33. Alan E. Willner, "Introducing and Defending Your Research Paper," **Invited Presentation, Opto-Electronics and Communications Conference (OECC)**, Student Workshop, Shanghai, China, July 2023.
34. Jeremy Upham, Zhimin Shi, Robert W. Boyd, and Alan E. Willner, "Vectorial Phase Conjugation for High-Fidelity Spatial Mode Transmission," **Invited Talk, Photonics North**, Montreal, Quebec, Canada, June 2023.
35. Alan E. Wilner, "Optical Communications: Innovations and Applications "Abound"," **Invited Talk, Benjamin Franklin Medal Symposium Celebrating Prof. Nader Engheta**, Villanova University, Villanova, PA, April 2023.
36. Alan E. Wilner, "Advances in Probing of Turbulent Media using Spatially Structured Light," **Invited Talk**, University of Pennsylvania, Philadelphia, PA, April 2023.
37. Alan E. Willner, "Structured Light for High-Capacity Communications," **Plenary Lecture, Lasers, Optics, Photonics, Sensors & Ultrafast Nonlinear Optics (LOPS)**, Fort Lauderdale, FL, June 2023.
38. Alan E. Willner, Hao Song, Kaiheng Zou, Huibin Zhou, and Xinzhou Su, "Orbital Angular Momentum Beams for High-Capacity Communications," **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. **41**, no. 7, pp. 1918-1933, 2023.
39. Huibin Zhou, Runzhou Zhang, Xinzhou Su, Yuxiang Duan, Haoqian Song, Hao Song, Kaiheng Zou, Robert W. Boyd, Moshe Tur, and Alan E. Willner, "Demonstration of Turbulence-Resilient Self-Homodyne 12-Gbit/s 16-QAM Free-Space Optical Communications Using a Transmitted Pilot Tone," **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. **41**, no. 11, pp. 3438-3445, 2023.

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

40. Xinzhou Su, Hao Song, Huibin Zhou, Kaiheng Zou, Yuxiang Duan, Narek Karapetyan, Runzhou Zhang, Amir Minoofar, Haoqian Song, Kai Pang, Shlomo Zach, Andreas F. Molisch, Moshe Tur, and Alan E. Willner, “A THz Integrated Circuit based on a Pixel Array to Mode Multiplex Two 10-Gbit/s QPSK Channels Each on a Different OAM Beam,” **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. **41**, no. 4, pp. 1095-1103, 2023.
41. Alan E. Willner, Xinzhou Su, Hao Song, Huibin Zhou, and Kaiheng Zou, “Integrated Circuits Based on Broadband Pixel-Array Metasurfaces for Generating Data-Carrying Optical and THz Orbital Angular Momentum Beams,” **Invited Paper, Nanophotonics**, vol. **12**, no. 14, pp. 2669-2685, 2023.
42. Kiyoul Yang, Chinmay Shirpurkar, Alex White, Jizhao Zang, Lin Chang, Farshid Ashitani, Melissa Guidry, Daniil Lukin, Srinivas Pericherla, Josh Yang, Hyoungghan Kwon, Jesse Lu, Geunho Ahn, Kasper Van Gasse, Yan Jin, Su-Peng Yu, Travis Briles, Jordan Stone, David Carlson, Hao Song, Kaiheng Zou, Huibin Zhou, Kai Pang, Han Hao, Lawrence Trask, Mingxiao Li, Andy Netherton, Lior Rechtman, Jeffery Stone, Jinhie Skarda, Logan Su, Dries Vercruysse, Jean-Philippe MacLean, Shahriar Aghaeimeibodi, Ming-Jun Li, David Miller, Dan Marom, Alan Willner, John Bowers, Scott Papp, Peter Delfyett, Firooz Aflatouni, and Jelena Vuckovic, “Optical Data Transmission Using Inverse-Designed Silicon Multimode Photonic Circuits and Spectrally Flattened Microcombs,” **Invited Paper, APS/IEEE/Optica Conference on Lasers and Electro-Optics (CLEO)**, paper STh3J.3, San Jose, CA, May 2023 (Optica, DC, 2023).
** Contributed Paper highly ranked by conference committee and upgraded to Invited Paper status. **
43. Alan E. Willner, Kaiheng Zou, Kai Pang, Hao Song, Huibin Zhou, Amir Minoofar, and Xinzhou Su, “Free-Space Mid-IR Communications Using Wavelength and Mode Division Multiplexing,” **Invited Paper, Optics Communications**, volume **541**, article 129518, 2023.
44. Amir Minoofar, Xinzhou Su, Huibin Zhou, and Alan E. Willner, “High-Capacity THz Communications Using Multiple Orbital-Angular-Momentum Beams”, **Invited Paper, 5th OAM Transmission (OAMT) Workshop WS05, IEEE International Conference on Communications (ICC)**, paper #1570882583, Rome, Italy, May 2023.
45. Alan E. Willner, “Sculpting Waves with Complex Structures,” **Invited Presentation, Franklin Medal Symposium Celebrating Prof. Engheta**, Villanova University, Villanova, PA, April 2023.
46. Runzhou Zhang, Xinzhou Su, Hao Song, Huibin Zhou, Moshe Tur, and Alan E. Willner, “Automatic Turbulence Resilience in Self-Coherent Free-Space Optical Communications,” **IEEE/Optica Conference on Optical Fiber Communications (OFC)**, **Invited Paper**, paper M1J.4, March 2023 (Optica, Washington, D.C., 2023).
47. Yijie Shen, Qiwen Zhan, Logan G. Wright, Demetrios N. Christodoulides, Frank W. Wise, Alan E. Willner, Zhe Zhao, Kai-heng Zou, Chen-Ting Liao, Carlos Hernández-García, Margaret Murnane, Miguel A. Porras, Andy Chong, Chenhao Wan, Murat Yessenov, Ayman F. Abouraddy, Liang Jie Wong, Michael Go, Suraj Kumar, Cheng Guo, Shanhui Fan, Nikitas Papasimakis, Nikolay I. Zheludev, Lu Chen, Wenqi Zhu, Amit Agrawal, Christophe Dorrer, Spencer W. Jolly, Íñigo J. Sola, Ignacio Lopez-Quintas, Miguel López-Ripa, Benjamín Alonso, Konstantin Y. Bliokh, Yiqi Fang, Qihuang Gong, Yunquan Liu, Junyi Huang, Hongliang Zhang, Zhichao Ruan, Mickael Mounaix, Nicolas K. Fontaine, Joel Carpenter, Ahmed H. Dorrah, Federico Capasso, and Andrew Forbes, “Roadmap on Spatiotemporal Light Fields,” **Invited Paper, Journal of Optics**, vol. **25**, no. 9, 2023.
48. Alan E. Willner, “Advances in Probing of Turbulent Media Using Spatially Structured Light,” **Invited Paper, Conference QW102: Quantum Sensing, Imaging, and Precision Metrology, Quantum West Symposium, SPIE Photonics West Conference**, paper **12447-98**, San Francisco, CA, Jan. 2023.

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

49. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Optica Invited Webinar**, Sept. 2022.
50. Alan E. Willner, Xinzhou Su, Huibin Zhou, Amir Minoofar, Zhe Zhao, Runzhou Zhang, Moshe Tur, Andreas F Molisch, Doohwan Lee, and Ahmed Almainan, “High-Capacity Terahertz Communication Systems Based on Multiple Orbital-Angular-Momentum Beams,” **Invited Paper, Journal of Optics**, vol. **24**, no. 12, paper number: 124002, 2022.
51. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Keynote Talk, International Commission for Optics (ICO), TU Dresden**, Dresden, Germany, Sept. 2022.
52. Alan E. Willner, “Integrated Circuits for High-Capacity Optical and THz Communication Links Based on OAM Beams,” **Invited Paper, 3rd generation metamaterials (METAMATERIALS 3.1) symposium 2022**, Centrarò, Italy, Aug. 2022.
53. Jorge Gomez-Ponce, Naveed A. Abbasi, Alan E. Willner, Charlie J. Zhang, and Andreas F. Molisch, “Directionally Resolved Measurement and Modeling of THz Band Propagation Channels,” **Invited Paper, IEEE Open Journal of Antennas and Propagation**, vol. **3**, pp. 663–686, Jun. 2022.
54. Amir Minoofar, Xinzhou Su, Huibin Zhou, Runzhou Zhang, Fatemeh Alishahi, Kaiheng Zou, Hao Song, Kai Pang, Shlomo Zach, Moshe Tur, Andreas F. Molisch, Hirofumi Sasaki, Doohwan Lee, and Alan E. Willner, “Experimental Demonstration of Sub-THz Wireless Communications Using Multiplexing of Laguerre-Gaussian Beams When Varying Two Different Modal Indices,” **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. **40**, no. 10, pp. 3285-3292, May 2022.
55. Huibin Zhou, Nanzhe Hu, Xinzhou Su, Runzhou Zhang, Haoqian Song, Hao Song, Kai Pang, Kaiheng Zou, Amir Minoofar, Brittany Lynn, Moshe Tur, and Alan E. Willner, “Experimental Demonstration of a 100-Gbit/s 16-QAM Free-Space Optical Link Using a Structured Optical “Bottle Beam” to Circumvent Obstructions,” **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. **40**, no. 10, pp. 3277-3284, May 2022.
56. Alan E. Willner, “Advances in Utilizing OAM Multiplexing for Communication Systems,” **Invited Presentation, International Conference on Optical Angular Momentum (ICOAM)**, Tampere, Finland, June 2022.
57. Alan E. Willner, “Optical Signal Processing and Networking Functions Using Nonlinear Wave Mixing”, **Invited Presentation, International All-Optical Signal Processing Workshop, Aston Institute of Photonic Technologies (AiPT)**, April 2022.
58. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Internal Faculty Seminar, CILQ Institute, USC**, Feb. 2022.
59. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Invited Presentation, Celebrate the 60th Anniversary of the Fiber Laser, The National Academy of Sciences, India (NASI) - Delhi Chapter**, Jan. 2022.
60. Alan E. Willner, “Tunable and Broadband Photonic Integrated Circuits Using Metasurfaces for the Generation and Detection of Orbital-Angular-Momentum Beams,” **Keynote Paper, Conference on Quantum Sensing and Nano Electronics and Photonics XVIII, SPIE Photonics West**, paper 12009-44, San Francisco, CA, Jan. 2022.
61. Amir Minoofar, Fatemeh Alishahi, Ahmad Fallahpour, Kaiheng Zou, Narek Karapetyan, Jonathan Habib, and Alan E. Willner, “Remotely Biasing, Controlling, and Monitoring a Network Routing Node based on

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

Optically Provided Signals,” **Invited Paper, Conference of Metro and Data Center Optical Networks and Short Reach Links V, SPIE Photonics West**, paper **12027-4**, San Francisco, CA, Jan. 2022.

62. Alan E. Willner, “Spatio-Temporal Pulses with Controllable Propagation Properties based on a Combination of Spatial Modes on Different Frequency Comb Lines,” **Invited Paper, Conference on Optical and Quantum Sensing and Precision Metrology II, SPIE Photonics West**, paper **12016-55**, San Francisco, CA, Jan. 2022.
63. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Invited Colloquium, Institute of Optics**, University of Rochester, Rochester, NY, Nov. 2021.
64. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Invited Seminar, IEEE Photonics Society Student Chapter, University of Laval**, Quebec, Canada, Nov. 2021.
65. Alan E. Willner, “Lessons Learned in Optical Communications,” **Invited Presentation, 2021 Workshop of "111" Program and International Cooperation Research Center of China, School of Information Science and Technology**, Southwest Jiaotong University (SWJTU), China, Dec. 2021.
66. Hao Song, Huibin Zhou, Kaiheng Zou, Runzhou Zhang, Kai Pang, Haoqian Song, Amir Minoofar, Xinzhou Su, Nanzhe Hu, Cong Liu, Robert Bock, Brittany Lynn, Shlomo Zach, Moshe Tur, and Alan E. Willner, “Demonstration of Recovering Orbital-Angular-Momentum Multiplexed Channels Using a Tunable, Broadband Pixel-Array-based Photonic-Integrated-Circuit Receiver,” **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. 40, no. 5, pp. 1346-1352, March 2022.
67. Haoqian Song, Runzhou Zhang, Nanzhe Hu, Huibin Zhou, Xinzhou Su, Hao Song, Kaiheng Zou, Kai Pang, Cong Liu, Daeyoung Park, Brittany Lynn, Greg Gbur, Aristide Dogariu, Richard J. Watkins, Jerome K. Miller, Eric Johnson, Moshe Tur and Alan E. Willner, “Dynamic Aerosol and Dynamic Air-Water Interface Curvature Effects on a 2-Gbit/s Free-Space Optical Link Using Orbital-Angular-Momentum Multiplexing,” **Invited Paper, Nanophotonics**, vol. 11, no. 4, pp. 1-11, Nov. 2021.
68. Alan E. Willner, “Orbital-Angular-Momentum of Electromagnetic Waves: Principles and Applications,” **Invited Colloquium, USC Dept. of Physics and Astronomy Colloquium Series**, Sept. 2021,
69. Alan E. Willner, “High-Capacity Optical, THz, and Millimeter-Wave Communications Using Multiple Orbital-Angular-Momentum Beams,” **Invited Paper, Metamaterials Congress**, paper **MCPCA83316**, Sept. 2021.
70. Alan E. Willner, Kai Pang, Hao Song, Kaiheng Zou, and Huibin Zhou, “Orbital Angular Momentum of Light for Communications,” **Invited Paper, Applied Physics Reviews**, vol. 8, Article number: 041312, 2021.

** Paper chosen as a "Featured Article" for that issue. **

** Selected as a "Highly Cited Paper" by Web of Science in the Physics category (top 1% in citations amongst physics publications). **

71. Alan E. Willner, “Mitigation of Intra-Modal-Group Power Coupling of Few-Mode Fiber,” **Invited Paper, IEEE Photonics Conference (IPC) 2021**, paper **TuF4.3**, Oct. 2021 (IEEE, Piscataway, NJ, 2021).
72. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Plenary Paper, Applied Optics and Photonics China**, Beijing, China, July 2021.
73. Alan E. Willner, “Optical Communications: Innovations and Applications Abound,” **Invited Presentation, Distinguished Lecture, Institute for Broadband Research and Innovation (IBRI), Soochow University**, Jiangsu, China, July 2021.

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

** Highest number of attendees of the Distinguished Lecture Series. **

74. Alan E. Willner, "Optical Communications Innovations for Free-Space and Optical-Signal-Processing Applications," **Invited Paper, IPEC Workshop**, June 2021.
75. Alan E. Willner, "Lessons Learned in Data Transmission and Processing in Optical Communication Systems," **Invited Tech Talk, IEEE/OSA Conference on Optical Fiber Communications (OFC)**, June 2021.
76. Alan E. Willner, "Signal Processing Techniques that Impact Optical Communications," **Invited Paper, IEEE Radio Frequency Integrated Circuits Symposium, Workshop on Coherent Optical Communications for Cloud Data Centers, Metro, and Submarine Networks**, Atlanta, GA, June 2021.
77. Alan E. Willner, "Optical Communications: Innovations and Applications Abound," **Plenary Paper, APS/IEEE/OSA Conference on Lasers and Electro-Optics (CLEO)**, San Jose, CA, May 2021 (Optical Society of America, Washington, D.C., 2021).
78. Alan E. Willner, "Free-Space Quantum Communication Links using Orbital-Angular-Momentum Encoding," **Keynote Paper, Quantum Engineering Workshop - Theory & Practice**, May 2021.
79. Alan E. Willner, "High-Capacity, Free-Space Optical and Millimeter-Wave Communications Using Mode-Division-Multiplexing," **Plenary Paper, China Microwave Week (CMW)**, Nanjing, China, May 2021.
80. Alan E. Willner, "High-Capacity Optical and Millimeter-Wave Communications using Multiple Orbital-Angular-Momentum Beams," **Invited Colloquium, Department of Physics and Astronomy, University of New Mexico**, Albuquerque, New Mexico, Feb. 2021.
81. Alan E. Willner, "OAM Light for Communications," **Invited Paper, OSA Optics & Photonics News**, vol. **32**, no. 6, pp. 34-41, 2021.
82. Alan E. Willner, Z. Zhao, C. Liu, R. Zhang, H. Song, K. Pang, K. Manukyan, H. Song, X. Su, G. Xie, Y. Ren, Y. Yan, M. Tur, A.F. Molisch, R.W. Boyd, H. Zhou, N. Hu, A. Minoofar, and H. Huang, "Perspectives on Advances in High-Capacity, Free-Space Communications Using Multiplexing of Multiple Orbital-Angular-Momentum Beams," **Invited Perspective, APL Photonics**, vol. **6**, Article number: 030901, 2021.

** Paper selected as "Editors' Pick" (5 out of 20 in that issue) and chosen as cover art for that issue. **

83. Karapet Manukyan, M. Zahirul Alam, Cong Liu, Kai Pang, Hao Song, Zhe Zhao, Moshe Tur, Robert W. Boyd, and Alan E. Willner, "Dependence of the Coupling Properties between a Plasmonic Antenna Array and a Sub-Wavelength Epsilon-Near-Zero Film on Structural and Material Parameters," **Invited Paper, Applied Physics Letters**, vol. **118**, Article number: 241102, 2021.
84. Alan E. Willner and Zhe Zhao, "Spatiotemporal Beams that Combine Two Orbital-Angular Momenta Using a Frequency Comb," **Invited Paper, SPIE Photonics West**, paper **11700-108**, San Francisco, CA, March 2021.
85. Alan E. Willner, "Dynamic Spatiotemporal Beams that Combine Two Independent and Controllable Orbital-Angular-Momenta Using Multiple Optical-Frequency-Comb Lines," **Invited Paper, SPIE Photonics West**, San Francisco, CA, March 2021.
86. Alan E. Willner and Cong Liu, "Perspective on Using Structured Light for Enhanced Capacity in Mode-Division-Multiplexed Free-Space Optical Communication Links," **Invited Paper, Nanophotonics**, vol. **10**, no. 1, pp. 225-233, 2021.

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

87. Alan E. Willner, "High-Capacity Optical Communications Using Multiple Orbital-Angular-Momentum Beams," **Plenary Paper, Global Summit and Expo on Laser, Optics and Photonics (GSELOP)**, Paris, France, Aug. 2021.
88. Alan E. Willner, "Recent Advances in High-Capacity Free-Space Communication Links Using Mode-Division Multiplexing," **Keynote Paper, IEEE GLOBECOM, Workshop on High-Capacity Wireless Communications**, Taipei, Taiwan, Dec. 2020.
89. Alan E. Willner, "High-Capacity Optical and Millimeter-Wave Communications Using Multiple Orbital-Angular-Momentum Beams," **Invited Seminar, Electrical & Computer Engineering, Brigham Young University**, Provo, UT, Nov. 2020.
90. Alan E. Willner, "High-Capacity Optical and Millimeter-Wave Communications Using Multiple Orbital-Angular-Momentum Beams," **Invited Presentation, Distinguished Colloquium Speaker, School of Electrical Engineering and Computer Science, The Pennsylvania State University**, Centre County, PA, Oct. 2020.
91. Alan E. Willner, Ahmad Fallahpour, Kaiheng Zou, Fatemeh Alishahi, and Huibin Zhou, "Optical Signal Processing Aided by Optical Frequency Combs," **Invited Paper, IEEE Journal of Selected Topics in Quantum Electronics**, vol. 27, no. 2, article number: 7700916, 2020.
92. Alan E. Willner, "Advances in High-Capacity Optical Communications Using Multiple Structured Beams," **Invited Paper, APS/IEEE/OSA Conference on Lasers and Electro-Optics (CLEO)**, paper JM4N.3, San Jose, CA, May 2020 (Optical Society of America, Washington, D.C., 2020).
93. Alan E. Willner, "High-Capacity Free-Space Optical and Millimeter-Wave Communications Using Mode-Division-Multiplexing," **Plenary Paper, 29th Wireless and Optical Communications Conference (WOCC)**, Newark, NJ, May 2020.
94. Huibin Zhou, Runzhou Zhang, Hao Song, Nanzhe Hu, Haoqian Song, Kaiheng Zou, Xinzhou Su, Zhe Zhao, Kai Pang, Ahmed Almainan, Cong Liu, Amir Minoofar, Brittany Lynn, Daeyoung Park, Robert W. Boyd, Moshe Tur, and Alan E. Willner, "Demonstration of Turbulence Resiliency in a Mode-, Polarization-, and Wavelength-Multiplexed Free-Space Optical Link Using Pilot-Assisted Optoelectronic Beam Mixing," **Invited Paper, IEEE/Optica Journal of Lightwave Technology**, vol. 40, no. 3, pp. 588-596, Feb. 2022.
95. Ahmad Fallahpour, Fatemeh Alishahi, Kaiheng Zou, Yinwen Cao, Ahmed Almainan, Arne Kordts, Maxim Karpov, Martin Hubert Peter Pfeiffer, Karapet Manukyan, Huibin Zhou, Peicheng Liao, Cong Liu, Moshe Tur, Tobias J. Kippenberg, and Alan E. Willner, "Demonstration of Tunable Optical Aggregation of QPSK to 16QAM over Optically Generated Nyquist Pulse Trains Using Nonlinear Wave Mixing and a Kerr Frequency Comb," **Invited Paper, IEEE/OSA Journal of Lightwave Technology**, vol. 32, no. 2, pp. 359-365, 2019.
96. Haoqian Song, Hao Song, Runzhou Zhang, Karapet Manukyan, Long Li, Zhe Zhao, Kai Pang, Cong Liu, Ahmed Almainan, Robert Bock, Brittany Lynn, Moshe Tur, Alan E Willner, "Experimental Mitigation of Atmospheric Turbulence Effect Using Pre-Signal Combining for Uni- and Bi-directional Free-Space Optical Links with Two 100-Gbit/s OAM-Multiplexed Channels," **Invited Paper, IEEE/OSA Journal of Lightwave Technology**, vol. 38, no. 1, pp. 82-89, 2020.
97. Alan E. Willner, "Optical Communications Using Orbital Angular Momentum Beams," **Invited Presentation, SRC/SIA/DoE Decadal Plan Workshop on New Trajectories for Communication**, San Diego, CA, Feb. 2020.

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

98. Alan E. Willner, "Using Kerr Frequency Combs for Optical Signal Processing Functions," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Optics and Photonics, Photonics West, Optical, Opto-Atomic and Entanglement-Enhanced Precision Metrology II**, paper 11296-79, San Francisco, CA, Feb. 2020 (SPIE, Bellingham, Wash., 2020).
99. Alan E. Willner, "High-Capacity Free-Space Communication Links Using Mode-Division Multiplexing," **Keynote Paper, IEEE GLOBECOM, Workshop on High-Capacity Point-to-Point Wireless Communications**, Waikoloa, HI, Dec. 2019.
100. Alan E. Willner, "Industry Podium Talk: High-Capacity Free-Space Communication Links Using Mode-Division Multiplexing," **Invited Presentation, Industry Podium Talk, IEEE GLOBECOM**, Waikoloa, HI, Dec. 2019.
101. Alan E. Willner, "OAM Light for Classical and Quantum Communications," **Keynote Presentation, Materials Research Society Fall Meeting, Symposium on Bridging the Gap Between Academia and Industry in Electronics and Photonics**, Boston, MA, Dec. 2019.
102. Alan E. Willner, "High-Capacity Communications Using Multiplexing of Multiple Orbital-Angular-Momentum Beams," **Invited Presentation, Distinguished Lecture Series, Department of Electrical and Computer Engineering, University of Delaware**, Newark, Delaware, Nov. 2019.
103. Alan E. Willner, "High-Capacity Optical Communications Using Multiplexing of Multiple Orthogonal Beams," **Plenary Talk, IEEE/OSA/SPIE Asia Communications and Photonics Conference (ACP)**, Chengdu, China, Nov. 2019.
104. Alan E. Willner, "Modal Crosstalk Issues in OAM-Based Optical Communication Systems," **Invited Presentation, 5th International Conference on Optical Angular Momentum (ICOAM)**, Ottawa, Canada, Jun. 2019.
105. Peicheng Liao and Alan E. Willner, "Optical Signal Processing Functions Using Frequency Combs," **Invited Presentation, International Symposium on Ultrafast Photonic Technologies (ISUPT), Workshop on Advanced Electronic and Photonic Signal Processing Technologies for Ultra-high Capacity Communications**, NAPA, CA, June 2019.
106. Alan E. Willner, "'Twisted Light': High-Capacity Optical Communications Using Multiplexing of Multiple Orbital-Angular-Momentum Beams," **Invited Presentation, Applied Physics Colloquium**, School of Engineering and Applied Science, Harvard University, Cambridge, MA, April 2019.
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189. Joe Touch, Joseph Bannister, Stephen Suryaputra, and Alan E. Willner, "A Design for an Internet Router With a Digital Optical Data Plane," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 9008-8, Feb. 2014, San Francisco, CA (SPIE, Bellingham, Wash., 2014).
190. Alan E. Willner, "2D and WDM Correlators using Tunable Optical Delays," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 8998-47, Feb. 2014, San Francisco, CA (SPIE, Bellingham, Wash., 2014).
191. Alan E. Willner, "Tbit/s Optical Communications using Multiplexing of Multiple Orbital-Angular-Momentum Modes," **Plenary Presentation**, Optical Society of Korea Winter Meeting, Feb. 2014.
192. Alan E. Willner, "Exciting Prospects for Optical Signal Processing," **Invited Seminar**, KAIST, Daejeon, Korea, Feb. 2014.
193. Alan E. Willner, "The National Academies' Report on Optics and Photonics: The Road to a National Photonics Initiative," **Invited Paper**, APS March Meeting, Denver, March 2014 (American Physical Society, NY, 2014).
194. Alan E. Willner, "Orbital Angular Momentum Multiplexing," **Invited Presentation, 5th Danish-Californian Workshop on Photonic Technologies for Communication and Sensing**, University of California, Berkeley, Feb. 2014.
195. Alan E. Willner, "Technologies in Lightwave Communications: Innovations (and their Needs) Abound," **Plenary Presentation, Asia Communications and Photonics Conference 2013**, paper AW1A.1, Beijing, China, Nov. 2013 (Optical Society of America, Washington, D.C., 2013).
196. Alan E. Willner, "Tbit/s Optical Communications using Multiplexing of Multiple Orbital-Angular-Momentum Modes," **Invited Seminar, IEEE Computer Society—Coastal Los Angeles Chapter**, Loyola Marymount University, Nov. 2013 (IEEE, Piscataway, NJ, 2014).
197. Alan E. Willner, "National Photonics Initiative," **Invited Presentation, Board on Physics and Astronomy (BPA) Fall Meeting, National Research Council**, Irvine, Nov. 2013.

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198. Alan E. Willner, "Optical Communications using Orbital-Angular-Momentum-Based Multiplexing" **Invited Paper, OSA Incubator Workshop on Structured Light in Structured Material**, Washington, DC, Sept. 2013(Optical Society of America, Washington, D.C., 2014).
 199. Alan E. Willner, "Tbit/s Optical Communications using Multiplexing of Multiple Orbital-Angular-Momentum Modes," **Invited Seminar**, Tianjin University, Nov. 2013.
 200. Alan E. Willner, "National Academies Perspective," **Invited Seminar, NSF Workshop on US-based Silicon Photonics Foundry/Fabrication Resources**, Washington, DC, Sept 2013 (Optical Society of America, Wash., D.C., 2013).
 201. Alan E. Willner, "National Academies Study on Optics and Photonics: Essential Technologies for Our Nation," **Plenary Presentation, IEEE Optical Interconnects Conference**, Santa Fe, NM, May 2013 (IEEE, Piscataway, NJ, 2013).
 202. Alan E. Willner, "Orbital Angular Momentum Transmission," **Invited Paper, European Conference on Optical Communications (ECOC)**, paper Mo.4. A.1, London, Great Britain, Sept. 2013.
 203. Alan E. Willner, "Multiplexing Information-Carrying Orthogonal Beams using Orbital Angular Momentum States," **Invited Paper, Frontiers in Optics Conference 2013 (FiO)**, paper FM3F.1, Oct. 2013, Orlando, FL (Optical Society of America, Wash., D.C., 2013).
 204. Morteza Ziyadi, Mohammad Reza Chitgarha, Salman Khaleghi, Amirhossein Mohajerin-Ariaei, Ahmed Almainan, Joe Touch, Moshe Tur, Carsten Langrock, Martin M. Fejer, and Alan E. Willner, "Tunable Optical Correlator using an Optical Frequency Comb and a Nonlinear Multiplexer," **Invited Paper, Optics Express**, Special Issue on European Conference on Optical Communications, vol. **22**, no. 1, pp. 84-89, 2014.
 205. Yan Yan, Andrey Matsko, Changjing Bao, Lute Maleki, and Alan E. Willner, "Increasing the Spectral Bandwidth of Optical Frequency Comb Generation in a Microring Resonator using a Slotted Waveguide," **Invited Paper, IEEE Photonics Conference 2013**, paper TuD3.2, September, Bellevue, WA (IEEE, Piscataway, NJ, 2013).
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206. Yi Rao, Weijian Yang, Chris Chase, Michael C. Y. Huang, D. P. Worland, Salman Khaleghi, Mohammad R. Chitgarha, Morteza Ziyadi, Alan E. Willner, and Connie J. Chang-Hasnain, "Long-Wavelength VCSEL using High Contrast Grating," **Invited Paper, IEEE Journal of Selected Topics in Quantum Electronics**, vol. **13**, no. 4, 2013.
 207. Alan E. Willner, "Tbit/s Optical Communications using Orbital Angular Momentum," **Invited Paper, 18th Microoptics Conference (MOC'13)**, Tokyo, Japan, Oct. 2013.
 208. Yongxiong Ren, Hao Huang, Guodong Xie, Nisar Ahmed, Baris Erkmen, Nivedita Chandrasekaran, Martin Lavery, Jeffrey Shapiro, Nicholas Steinhoff, Moshe Tur, Miles Padgett, Robert Boyd, and Alan Willner, "Experimental Turbulence Effects on Crosstalk and System Power Penalty over a Free Space Optical Communication link using Orbital Angular Momentum Multiplexing," **Invited Paper, APS/IEEE/OSA Conference on Lasers and Electro-Optics (CLEO)**, paper CM2G.4, San Jose, CA, June 2013 (Optical Society of America, Wash., D.C., 2013).
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209. Alan E. Willner, "National Academies Study on 'Optics and Photonics: Essential Technologies for Our Nation,'" **Invited Paper, IEEE Avionics, Fiber-Optics and Photonics Conference (AVFOP)**, San Diego, CA, May 2013 (IEEE, Piscataway, NJ, 2013).

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

210. Alan E. Willner, "Optics and Photonics: Essential Technologies for Our Nation," **Invited Presentation, Division Committee on Engineering and Physical Sciences (DEPS) Spring Meeting, National Research Council**, Washington, March 2013.
211. Alan E. Willner, "Terabit/sec Free-Space Data Transmission using Orbital Angular Momentum," **Invited Paper, The 43rd Winter Colloquium on the Physics of Quantum Electronics (PQE)**, Snowbird, UT, Jan. 2013.
212. Robert W. Boyd, Mehul Malik, Mohammad Mirohosseini, Colin O'Sullivan, Brandon Rodenburg, Zhimin Shi, Daniel J. Gauthier, Miles J. Padgett, Martin P.J. Lavery, Stephen M. Barnett, Alan Willner, and Yongxiong Ren, "Orbital-Angular-Momentum Encoding for Free Space QKD," **Invited Paper, The 43rd Winter Colloquium on the Physics of Quantum Electronics (PQE)**, Snowbird, UT, Jan. 2013.
213. Alan E. Willner, "Multiplexing Vortex Beams for Tbit/s Free-Space Optical Communications," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 8610-4, Feb. 2013, San Francisco, CA (SPIE, Bellingham, Wash., 2013).
214. Alan E. Willner, "Reconfigurable Optical Networking Functions using Orbital Angular Momentum," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 8647-4, Feb. 2013, San Francisco, CA (SPIE, Bellingham, Wash., 2013).
215. Alan E. Willner, "Optical Techniques for Generating and Demultiplexing Higher-Order Modulation Formats," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 8646-21, Feb. 2013, San Francisco, CA (SPIE, Bellingham, Wash., 2013).
216. Alan E. Willner, Jian Wang, and Hao Huang, "Applied Physics Perspective: A Different Angle on Light Communications," **Invited Paper, Science**, vol. **337**, no. 6095, pp. 655-656, 10 August 2012.
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219. L.-S. Yan, A.E. Willner, X. Wu, A.-L. Yi, A. Bogoni, Z.-Y. Chen, and H.-Y. Jiang, "All-Optical Signal Processing for Ultra-High Speed Optical Systems and Networks," **Invited Paper, IEEE/OSA Journal of Lightwave Technology**, vol. 30, no. 24, pp. 3760-3770, 2012).
220. Alan E. Willner, "Terabit/sec Free-Space Data Transmission using Orbital Angular Momentum," **Invited Paper, International Nano-Optoelectronic Workshop (iNOW)**, Berkeley, CA, Aug. 2012.
221. Alan E. Willner and J. Wang, "Optical Communications using Light Beams Carrying Orbital Angular Momentum," **Invited Paper**, in Special Symposium on "Singular Light: Applications of Vortices, Orbital angular momentum, Bessel and Airy beams," **APS/IEEE/OSA Conference on Lasers and Electro-Optics (CLEO)**, paper JTu2K.1, San Jose, MD, May 2012 (Optical Society of America, Wash., D.C., 2012).
222. Alan E. Willner and Scott R. Nuccio, "Electro-Optic Polymer Modulators," **Invited Paper, IEEE/OSA Conference on Optical Fiber Communications (OFC) and National Fiber Optics Engineers Conference (NFOEC)**, Los Angeles, CA, Mar. 2012 (Optical Society of America, Washington, D.C., 2012).

INVITED PAPERS AND PRESENTATIONS: (CONTINUED)

223. Y. Rao, C. Chase, M. C.Y. Huang, S. Khaleghi, M. R. Chitgarha, M. Ziyadi, D. P. Worland, A.E. Willner, and C. J. Chang-Hasnain, "Tunable 1550-nm VCSEL using High Contrast Gratings," **Invited Paper, IEEE Photonics Conference 2012**, paper WU4, September, Burlingame, CA (IEEE, Piscataway, NJ, 2012).
224. Alan E. Willner, "Optical Tapped-Delay-Lines," **Invited Presentation**, in Workshop "All-optical Signal Processing: Next-generation Materials," **IEEE/OSA Conference on Optical Fiber Communications (OFC) and National Fiber Optics Engineers Conference (NFOEC)**, Los Angeles, CA, Mar. 2012 (Optical Society of America, Washington, D.C., 2012).
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226. Alan E. Willner, "Tunable Optical Tapped-Delay-Lines for Signal Processing Applications," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 8273-40, Jan. 2012, San Francisco, CA (SPIE, Bellingham, Wash., 2012).
227. Alan E. Willner, Yang Yue, Hao Huang, and Lin Zhang, "Signal Propagation Effects in HCG Hollow-Core Waveguides," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, paper 8270-15, Jan. 2012, San Francisco, CA (SPIE, Bellingham, Wash., 2012).
228. Alan E. Willner, O. Yilmaz, J. Wang, X. Wu, A. Bogoni, L. Zhang, and S.R. Nuccio, "Optically Efficient Nonlinear Signal Processing," **Invited Paper, IEEE Journal of Selected Topics in Quantum Electronics**, Special Issue on Green Photonics, vol. 17, pp. 320-332, 2011.
229. A.E. Willner, "Optical Communications: Innovations (and Their Needs) Abound," **Plenary Paper, IEEE Co-Sponsored 45th Annual Conference on Information Sciences and Systems (CISS)**, Johns Hopkins University, Baltimore, March 2011.
230. A.E. Willner, Z. Pan, and M. I. Hayee, "Major Accomplishments in 2010 on Optical Fiber Communications," **Invited Paper, IEEE Photonics Journal**, vol. 3, no. 2, pp. 320-324, 2011.
231. A.E. Willner, "All-Optical Signal Processing using Optical Nonlinearities," **Invited Paper**, OSA Topical Meeting on Signal Processing in Photonic Communications (SPPCom), OSA Optics & Photonics Congress on "Advanced Photonics," paper SPMC1, Toronto, Canada, June 2011 (Optical Society of America, Washington, DC, 2011).
232. A.E. Willner, "Nonlinear Optics in Optical Fiber Communications: *For Worse and For Better*," **Invited Presentation, Quantum Electronics Seminar**, Stanford University, Oct. 31, 2011.
233. A.E. Wilner, "Technologies in Lightwave: From (Cavity) Modes to (WDM) Nodes," **Plenary Presentation, 2011 International Symposium on Information Photonics & Optical Communications**, July 2011, Chengdu, China.
234. A.E. Willner, "All-Optical Signal Processing using Optical Nonlinearities," **Invited Presentation, 5th International Symposium on Ultrafast Photonic Technologies**, at HHI in Berlin, Sept. 2011.
235. A.E. Willner, S.R. Nuccio, and O. Yilmaz, "Recent Advances in Tunable Optical Delays and Their Applications," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**, Conference 7949, paper 7949-7, Jan. 2011, San Jose, CA (SPIE, Bellingham, Wash., 2011).
236. Lin Zhang, Yang Yue, and Alan E. Willner, "Micro-Resonator Devices for Optical Broadband Access Application," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West**,

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Broadband Access Communication Technologies V Conference 7959, paper 7959-2, Jan. 2011, San Jose, CA (SPIE, Bellingham, Wash., 2011).

237. A.E. Willner, "All-Optical Signal Processing using Optical Nonlinearities," **Invited Seminar, Bar Ilan University**, Israel, July 26, 2011.
238. A.E. Willner, L. Zhang, and Y. Yue, "Tailoring of Dispersion and Nonlinear Properties of Integrated Silicon Waveguides for Signal Processing Applications," **Invited Paper, IOP Semiconductor Science and Technology**, Special Issue Honoring Zhores Alferov: From Heterostructures to Nanostructures, vol. 26, no. 1, paper 014044, Jan. 2011.
239. Zahra Bakhtiari, Jian Wang, Xiaoxia Wu, Jeng-Yuan Yang, Robert Hellwarth, and Alan E. Willner, "Demonstration of 10-40-Gbaud Baud-Rate-Tunable Optical Generation of 16-QAM from a QPSK Signal using a Variable DGD Element," **Invited Paper, Conference on Lasers and Electro-Optics (CLEO)**, paper CThY5, Baltimore, MD, May 2011 (Optical Society of America, Wash., D.C., 2011).

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240. A.E. Willner, "Optical Communications: Innovations (and Their Needs) Abound," **Invited Presentation, IEEE Student Chapter at USC**, Nov. 1, 2011.
241. A. Bogoni, L. Poti, A. Willner, P. Ghelfi, C. Porzi, M. Scaffardi, G. Meloni, G. Berrettini, F. Fresi, E. Lazzeri, and X. Wu, "Overview on Optical Logic Elementary Circuits," **Invited Paper, Journal of IET Circuits, Devices & Systems**, vol. 5, pp. 76-83, 2011.
242. A.E. Willner, "Towards Robust and Reconfigurable Optical Communication Systems," **Plenary Paper, Third International Photonics and Optoelectronics Meetings (POEM 2010)**, Wuhan, China, Nov. 2010.
243. A.E. Willner, "Optical Performance Monitoring," **Invited Paper, IEEE Avionics, Fiber-Optics and Photonics Conference (AVFOP)**, paper WA1, Denver, CO, Sept. 2010 (IEEE, Piscataway, NJ, 2010).
244. Alan E. Willner, Lin Zhang, Yang Yue, and Xiaoxia Wu, "Integrated Nano-Structured Silicon Waveguides and Devices for High-Speed Optical Communications," **Invited Paper, Chinese Optics Letters**, Special Issue on Science and Technology for High-Speed Optical Communications, vol. 8, no. 9, pp. 909-917, 2010.
245. A.E. Willner, "Dispersion and Nonlinearity Tailoring using Slotted Waveguides," **Invited Paper, IEEE Photonics Society 21st Annual Workshop on Interconnections Within High-Speed Digital Systems**, Santa Fe, May 2010 (IEEE, Piscataway, NJ, 2010).
246. Scott R. Nuccio, Omer F. Yilmaz, Xue Wang, Jian Wang, Xiaoxia Wu, Alan E. Willner, "1.16- μ s Continuously Tunable Optical Delay of a 100-Gb/s DQPSK Signal using Wavelength Conversion and Chromatic Dispersion in an HNLF," **Invited Paper, Conference on Lasers and Electro-Optics (CLEO)**, paper X, San Jose, CA, May 2010 (Optical Society of America, Wash., D.C., 2010).

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247. A.E. Willner, "U.S. Leadership Role in R&D: A Researcher's Perspective," **Invited Paper, Optoelectronics Industry Development Association (OIDA) Annual Forum**, Arlington, VA, Nov. 2010.
248. A.E. Willner, "Towards Robust and Reconfigurable Optical Communication Systems," **Invited Seminar, CREOL, Univ. of Central Florida**, IEEE Photonics Society Student Local Chapter, Orlando, June 2010.
249. A.E. Willner, "Towards Robust and Reconfigurable Optical Communication Systems," **Invited Seminar, Stanford University, OSA/SPIE Student Chapter Seminar Series**, May 2010.

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250. Antonella Bogoni, Xiaoxia Wu, Jian Wang, Alan E. Willner, "Ultra-Fast All Optical Signal Processing and Switching Based on PPLN Waveguides," **Invited Paper, OSA Topical Meeting on Photonics in Switching**, paper PWA1, Monterey, CA, July (Optical Society of America, Wash., D.C., 2010).
251. A.E. Willner, "A Researcher's Perspective to the Energy Issue," **Invited Presentation, OSA Topical Meeting on Photonics in Switching**, Workshop 1: Energy Efficient Networking and Systems, Monterey, CA, July (Optical Society of America, Wash., D.C., 2010).
252. A.E. Willner, "Efficient Communications for Access and Interconnects," **Invited Presentation, Annual Danish-Californian Workshop on Photonic Technologies for Access and Interconnects**, Stanford University, CA, Jan.2010.
253. Zhongqi Pan, Changyuan Yu, and Alan E. Willner, "Optical Performance Monitoring for the Next Generation Optical Communication Networks," **Invited Paper, Journal of Optical Fiber Technology**, vol. 16, pp. 20-45, 2010.
254. A.E. Willner, "Writing Your CV and Cover Letter," **Invited Seminar, USC Center for Excellence in Teaching (CET) 2010 Academic Careers Week Program**, Oct. 2010.
255. A.E. Willner, "A Broader-Bandwidth Optical Network," **Keynote Paper, 14th Opto-Electronics and Communications Conference (OECC)**, Hong Kong, July 13, 2009.
256. Alan E. Willner, "Optical Communications: Innovations (and Their Needs) Abound," **Plenary Presentation, IPOS Launch and Symposium: Faster, Further, Smarter**, Institute of Photonics and Optical Science, Univ. of Sydney, April 2009.
257. Alan E. Willner, "Towards High-Performance and Reconfigurable Optical Communication Networks," **Invited Presentation, Distinguished Lecturer Series**, Dipartimento di Ingegneria dell'Informazione, Universita' di Padova, Italy, 2009.
258. M. Scaffardi, P. Ghelfi, C. Porzi, G. Meloni, G. Berrettini, A. Malacarne, F. Fresi, E. Lazzeri, J. Wang, X. Wu, I. Fazal, A. Willner, L. Potì, A. Bogoni, "Photonic Digital Processing for Enabling Next Generation Optical," **Invited Paper, IEEE Photonics in Switching Meeting**, paper WeI2-5, Pisa, Italy, Sept. 2009 (IEEE, Piscataway, NJ, 2009).
259. Alan E. Willner, "Advanced Optical Communication Functions using Nanophotonic Devices," **Invited Paper, International Nano-Optoelectronic Workshop (iNOW)** (sponsored by U.S. and German NSF), Stockholm, Aug. 2009.
260. A.E. Willner, "Enhancing Optical Communication Systems by using Advanced OE Devices," **Invited Paper, The 12th Meeting on Optical Engineering and Science in Israel (2nd OASIS)**, Association of Engineers and Architects in Israel, Tel Aviv, March 2009.
261. A.E. Willner, "Optical Communications: Innovations (and Their Needs) Abound," **Invited Seminar, W.V.T. Rusch Engineering Honors Colloquium**, USC Viterbi School of Engineering, Feb. 2009.
262. Alan E. Willner, "Advanced Optical Signal Processing Functions using Integrated Photonics," **Invited Paper, Center for High Technology Materials (CHTM) Silver Event**, Univ. of New Mexico, Aug. 2009.
263. Alan E. Willner, "Acute Need for Optical Chip Fab & Packaging: An Academic User's Perspective," **Invited Presentation, Workshop on Photonics Engineering Prototyping Resource (PEPR)** (sponsored by Air Force Research Laboratory), Dayton, OH, July 2009.

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264. A.E. Willner, "Achieving Tunable Delays using Wavelength Conversion," **Invited Paper, Society of Photo-Instrumentation Engineers (SPIE) Photonics West, Conference on Advances in Slow and Fast Light II (OPTO OE116)**, paper 7226-11, Jan. 2009, San Jose, CA (SPIE, Bellingham, Wash., 2009).
265. Alan E. Willner, "Optical Communications: Innovations (and their Needs) Abound," **Invited Presentation, Colloquium Lecture Series**, College of Optical Sciences, Univ. of Arizona, March 5, 2009.
266. Alan Willner, "Negotiating an Academic Job Offer," **Invited Seminar, USC Center for Excellence in Teaching (CET) Seminar**, Oct. 2009.
267. A.E. Willner, B. Zhang, L. Zhang, L.-S. Yan, and I. Fazal, "Optical Signal Processing using Tunable Delay Elements Based on Slow Light," **Invited Paper, IEEE Journal of Selected Topics in Quantum Electronics**, Special Issue on Nonlinear Optical Signal Processing, vol. **14**, pp. 691-705, 2008.
268. Alan E. Willner, "Optical Communications: Innovations (and their Needs) Abound," **Invited Presentation, 100th Anniversary of Corning's R&D, Corning's Stookey Award Ceremony**, Corning R&D Laboratories, Corning, NY, Oct. 2008.
269. A.E. Willner, "Stable and Reconfigurable High-Capacity Optical Networks," **Plenary Paper, IEEE Photonics Global Singapore (IPGC 2008)**, 7th Int'l Conference on Optical Communications & Networks (ICOON), Singapore, Dec. 2008.
270. Alan E. Willner, "Towards Stable and Reconfigurable High-Capacity Optical Networks," **Plenary Paper, International Conference on Optics and Photonics in Taiwan 2008**, paper Fri-AP-01, Taipei, Taiwan, Dec. 2008.
271. A.E. Willner, "Targeted Optical Signal Processing for High-Performance Optical Networking," **Plenary Paper, CS/IEICE/IEEE Conference on Photonics in Switching**, Saporro, Japan, Aug. 2008.
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273. Alan Willner, "Towards High-Performance and Reconfigurable Optical Communication Networks," **Invited Seminar, Applied Physics Seminar Series, California Institute of Technology (Caltech)**, Nov. 2008.
274. Alan E. Willner, "Optical Communications: Innovations (and their Needs) Abound," **Invited Presentation, Distinguished Lecture, The Annual Boris Stoecheff Lecture**, Jointly by the Institute of Optical Sciences (Univ. of Toronto) and the Royal Canadian Institute, Dec. 2008.
275. Alan E. Willner, "Towards High-Performance and Reconfigurable Optical Communication Networks," **Invited Seminar, IEEE ComSoc and LEOS Baltimore Chapter Seminar Series**, Oct. 2008.
276. Alan E. Willner, "Optical Performance Monitoring for Reconfigurable Optical Networks," **International Nano-Optoelectronic Workshop (iNOW)**, Japan, Aug. 2008.
277. Lin Zhang, Muping Song, Raymond G. Beausoleil and Alan E. Willner, "Embedded Ring Resonators," **Invited Paper for Winner of LEOS Figure Contest, IEEE LEOS Newsletter**, vol. 22, no. 6, pp. 21-22, 2008.
278. A.E. Willner, "High-Performance Gbit/s Data Transmission Through Slow Light Elements," **Invited Paper, Optical Society of America (OSA) Topical Meeting on Slow and Fast Light**, paper SMC1, Boston, July 2008 (OSA, D.C., 2008).
279. Alan E. Willner and Lin Zhang, "Physical Layer Challenges of On-Chip Optical Interconnects," **Invited Presentation, HP Photonic Interconnect Forum**, Hewlett-Packard Laboratories, Palo Alto, CA, May 2008.

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280. A.E. Willner, "Value of Societies to Your Career: Plant the Flag to be a Leader," **Invited Presentation**, OSA Student Activities Workshop, **Conference on Lasers and Electro-Optics (CLEO)**, San Jose, CA, May 2008 (Optical Society of America, Wash., D.C., 2008).
281. A.E. Willner and B. Zhang, "Tunable Delay Lines using Slow Light for Gbit/s Data Signals," **Invited Paper**, **Society of Photo-Instrumentation Engineers (SPIE) Photonics West, Conference on Advances in Slow and Fast Light (OE21)**, paper 6904-09, Jan. 2008, San Jose, CA (SPIE, Bellingham, Wash., 2008).
282. A.E. Willner, "All-Optical Signal Processing in Next-Generation Communication Systems" **Invited Presentation**, Workshop OMD on All-Optical Signal Processing and Conditioning, **Conference on Optical Fiber Communications (OFC)**, San Diego, CA, Feb. 2008.
283. A.E. Willner, "Specialty Fibers to Realize Signal Processing Functions," **Invited Presentation**, Workshop OSuA on "Is Optical Transmission Fiber a Commodity or is Further Innovation Required?," **Conference on Optical Fiber Communications (OFC)**, San Diego, CA, Feb. 2008.
284. A.E. Willner, "Systems Requirements for Signal Processing using Parametric Processes," **Invited Presentation**, Workshop OMD on All-Optical Signal Processing and Conditioning, **Conference on Optical Fiber Communications (OFC)**, San Diego, CA, Feb. 2008.
285. Alan E. Willner, "Optical Networking Perspectives vs. Optical Technologies Reality," **Keynote Presentation**, **ONDM Conference COST 291 Workshop**, International Federation of Information Processing (IFIP), Athens, Greece, May 2007.
286. A.E. Willner, "Opportunities & Challenges in Optical Networking," **Plenary Presentation**, **9th International Conference on Transparent Optical Networks (ICTON)**, Rome, Italy, July 2007.
287. A.E. Willner, "Robust and Reconfigurable Optical Communication Systems," **Plenary Presentation**, Workshop on Optical Communications, **Advanced Communications Center**, Tel Aviv University, Dec. 2007.
288. A.E. Willner, "Stable and Reconfigurable Optical Networks," **Invited Paper**, **IEEE Lasers and Electro-Optics Society Annual Meeting 2007**, paper WFF1, Orlando, Oct. (IEEE, Piscataway, NJ, 2007).
289. Yannick Keith Lize, Xiaoxia Wu, Louis Christen, Mathieu Faucher, and Alan E. Willner, "Free Spectral Range and Optical Filtering Optimization in NRZ-, RZ- and CSRZ-DPSK Demodulation," **Invited Paper**, **IEEE Lasers and Electro-Optics Society Annual Meeting 2007**, paper MP1, Orlando, Oct. (IEEE, Piscataway, NJ, 2007).

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290. Alan E. Willner, Poorya Saghari, and Vahid R. Arbab, "Advanced Techniques to Increase the Number of Users and Bit Rate in OCDMA Networks," **Invited Paper**, **IEEE Journal of Selected Topics in Quantum Electronics**, Special Issue on Optical Codes in Optical Communications and Networks, vol. **13**, pp. 1403-1414, 2007.
291. A.E. Willner, "The Resume Process: Not it, but about it," **Invited Presentation**, **USC Academic Careers Week**, Oct. 2007.
292. A.E. Willner, "Managing Multiple Roles for Faculty: Just say no, sometimes," **Invited Presentation**, **USC's Academic Leadership and Development Workshop on Managing Multiple Roles as Faculty**, November 2007.

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293. Alan E. Willner, "Physical-Layer Challenges in Stable, High-Capacity Optical Communication Networks," **Invited Presentation**, Dept. of Applied Physics Seminar Series, Hebrew University, June 6, 2007.
294. A.E. Willner, "Tunable Optical Delay Lines for Switching and Processing," **Invited Paper, IEEE Photonics in Switching Topical Meeting**, San Francisco, Aug. 2007 (IEEE, Piscataway, NJ, 2007).
295. Alan E. Willner, "Physical-Layer Challenges in Stable, High-Capacity Optical Communication Networks," **Invited Colloquium, Institute of Optics**, University of Rochester, Rochester, NY, Feb. 2007.
296. Alan E. Willner, "Monitoring and Channel Measurements to Enable Stable, High-Capacity Optical Networks," **Invited Seminar**, NIST, Boulder, Colorado, Feb. 2007.
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