**SIDDHARTH RAMACHANDRAN**

High Dimensional Photonics Lab; Boston University
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## RESEARCH INTERESTS

Quantum nonlinear photonics; Imaging & microscopy; Topologically, vectorially and spatially complex light; High-power lasers & fiber optics; Applications to quantum information science, data science and neuroscience.

## EDUCATION

**University of Illinois, Urbana, IL; Ph.D. – Electrical Engineering – October 1998**
**University of Wisconsin, Madison; WI; M.S. – Materials Science – August 1993**
**Indian Institute of Technology, Kanpur; B. Tech. – Metallurgical Engineering – June 1991**

## EXPERIENCE

07/'24-06/'25 **Associate Dean for Research *ad interim*, BU College of Engineering, Boston, MA, USA.**
03/'22-present **Distinguished Professor of Engineering, Boston University,** Boston, MA, USA
04/'19-present **Professor, Physics, Boston University,** Boston, MA, USA
09/'13-present **Professor, Electrical and Computer Engineering, Boston University,** Boston, MA, USA
09/'13-present **Professor, Materials Science and Engineering, Boston University,** Boston, MA, USA
01/'10-08/'13 **Associate Professor (Tenured), Electrical and Computer Engineering, Boston University**
03/'09-10/'09 **Visiting Professor, Technical University of Denmark,** Lyngby, Denmark
03/'03-03/'09 **Distinguished Member of Technical Staff, OFS Laboratories,** Somerset & Murray Hill, NJ
11/'01-03/'03 **Member of Technical Staff, OFS Laboratories,** Murray Hill, NJ, USA
11/'98-11/'01 **Member of Technical Staff, Bell Laboratories, Lucent Technologies**, Murray Hill, NJ, USA

## AWARDS and PRESS

– Fellow, AAAS, APS, IEEE, Optica and SPIE.
– SPIE G.G. Stokes Award (inducted class of 2026)
– Vannevar Bush Faculty Fellow (inducted class of 2019)
– Distinguished visiting fellowship, UK Royal Society of Engineering, 2016
– IEEE Photonics Society, Distinguished Lecturer: 2013-2015
– Distinguished Member of Technical Staff; OFS Laboratories, 2003
– Dean's Catalyst Award, Boston University, 2012
– Over 100 news articles, reviews and citations in news media, popular journals and trade magazines.
– Cover art in *Journal of Biomedical Opt.* (2022); *APL Photon.* (Jan 2020); *Optica* (Jan 2015 & Mar 2019); *Photonics Res.* (Jan 2019); *IEEE Photonics Soc. Newsletter* (Aug 2009); *Applied Phy. Lett.* (Dec 2003).

## PUBLICATIONS, PATENTS and CITATIONS SUMMARY

– Book Editor "*Fiber-based Dispersion Compensation*," Springer, New York, 2007.
– 4 Book Chapters.
– 44 Patents granted.
– 7 Plenary & 5 Keynote lectures, 4 Short Courses, 9 Tutorials, 106 Invited talks & papers.
– 21 Post-deadline papers in refereed international conferences.
– 448 Publications in refereed scientific journals (131) and conferences (317).
– More than 18,000 Journal Citations; h-index = 59 (Google Scholar)
– 5 Papers in list of *Web of Science* Highly Cited Papers (top 1% by citations in the sub-field of physics)

## GRANTS

PI: Boston University (since Jan. 2010; total awarded to date: $ 15.03 M)

- II-VI Foundation: $ 330,000: "pB/s scale optical amps by exploiting light's topological complexity," 7/2026 – 6/2029;
- MURI (ONR): $ 3M: "Fundamental studies and applications of spin-orbit interactions of light," 6/2020 – 8/2025;
- ONR: $ 472,831: "Low SWAP sources for high-power blue communications," 5/2020 – 07/2024;
- DURIP ONR: $ 309,840: "Intermodal nonlinear optics," 4/2020 – 12/2022;
- Vannevar Bush Faculty Fellowship: $3M; "Light matter interactions with a twist," 9/2019 – 12/2026;
- NSA/DOE: $ 757,631; "High Capacity Data Centers with OAM supporting Fibers," 1/2019 – 12/2021;
- DURIP AFOSR: $ 311,506; "High power lasers via intermodal nonlinear optics in fiber," 9/2017 – 8/2019;
- ONR: $ 464,278; "Power-scalable blue fiber lasers," 4/2017 – 4/2021;
- NSF EPMD: $ 360,684; "High Throughput Tip-Enhanced Near Field Microscopy …," 7/2016 – 6/2021;
- NIH BRAIN initiative: $ 492,500; "Multiplexed Multiphoton Interrogation of Brain Connectomics," 9/2015 – 8/2018;
- AFOSR BRI: $ 1,250,000; "High-power Fiber Lasers Using Intermodal Nonlinearities," 9/2014 – 8/2021;
- NSF EPMD: $ 359,222; "Endoscopic STED Nanoscopy with Optical Fiber Vortices," 6/2013 – 5/2017;
- DURIP ARO: $ 201,600; "Photon pair generation with OAM states in fiber," 4/2013 – 4/2015;
- DARPA InPho Phase II: $ 799,624; "Higher Dim. Information Encoding with Vortex Fibers," 7/2012 – 9/2014;
- BU Dean's Catalyst Award: $30,000; "Silicon-Germanium Optical Fibers," 7/2012 – 12/2012;
- DURIP ONR: $ 297,200; "High-power fiber lasers," 6/2011 – 6/2012;
- DARPA Seedling: $ 318,784; "Higher Dim. Information Encoding with Vortex Fibers," 4/2011 – 4/2012;
- ONR: $ 765,043; "Power-Scalable Bessel Beams," 1/2011 – 12/2013;
- ONR: $ 1,222,923; "High-Power Blue-Green Lasers for Communications," 11/2010 – 4/2014;
- ARO: $ 250,001; "A Flexible, Remotely-Accessible THz Source & Detector," 7/2010 – 6/2011;
- Exxon-Mobil; $ 30,000; "Harsh Environment Sensing with Photonic Crystal Fiber gratings," 6/2010;
- Japan Patent Office; $10,000; "Research on photonic crystal fibre devices," 5/2010.

co-PI: Boston University (since Jan. 2010; total award/Ramachandran portion: $ 10.5M / 1.7M)

- NIH NIGMS R01: $ 1.85M; "Multiplexed Imaging in the Near-IR with InP Quantum Shells," 9/2019 – 7/2023;
- ARO SBIR Phase I: $ 150k/33k; "Mid-IR nonlinear frequency generation in multimode fibers" 1/2018 – 5/2018;
- NIH: $ 490k/155k; "Ultraminiaturized fiber probe for functional brain imaging…," 9/2015 – 8/2018;
- ONR: MURI: $ 7.5M/1.25M; "Fundamental res. on high-rate QKD in a marine environment," 7/2013 – 7/2019;
- NSF: $ 440k/220k; "Processing of layered semiconductor-core optical fibers for mid-IR apps.," 5/2013 – 4/2016;
- BU Innovation Grant: $ 10k/5k; "Novel semiconductor core fibers for mid-IR applications," 12/2011 – 12/2012.

Lead investigator*: Bell-Labs & OFS (2009 and before; total awarded ~ $ 8.3 M)

- DARPA: $ 5M; "Higher order mode fiber amplifiers," 10/2008 – 12/2009;
- HEL-JTO: $ 1.3M; "Scalable higher order mode fiber amplifiers," 01/2008 – 01/2010;
- NIST-ATP: $ 2M; "Specialty fiber for high-power fiber lasers," 09/2004 – 06/2006;

co-PI: Bell-Labs & OFS (2009 and before; Bell/OFS/Ramachandran portion: $ 2.2 M)

- NIH: $ 2M; "Academic-industrial partnerships for development and validation of in vivo imaging systems and methods for cancer investigation," 08/2008 – 08/2011;
- NIH: $ 400k; "All-fiber, wavelength tunable fs sources for biomedical applications," 04/2008 – 03/2011;
- ONR: $ 1.5M; "Scalable, high-power eye-safe laser technology," 09/2007 – 08/2010;
- NIH: $ 400k; "Energetic fs fiber source at 1300 nm for multiphoton imaging," 09/2007 – 07/2009;

## PROFESSIONAL ACTIVITIES

Journal Activities

- Editor-in-Chief, *Optics Express*: Jan. 2025 – present
- Deputy Editor, *Optica*: Nov. 2021 – Oct. 2024.
- Associate Editor, *Optica*: Sept. 2015 – Aug. 2021.
- Member, Editorial Board, *Photonix*, 2020 – present.

- Guest Editor, *Nanophotonics*, Special issue on *Photonic Angular Momentum*, 2022.
- Guest Editor, *Applied Physics Letters – Photonics*, Special issue on *intermodal & multimode fiber photonics*: 2018.
- Associate Editor, *IEEE Journal Quantum Electronics*: Oct. 2011 – Dec. 2014
- Topical Editor, *Optics Letters*: March 2008 – May 2011.
- Guest Editor, *IEEE J. Special Topics Quant. Elec.*, Special issue on Fiber Lasers: 2009.
- Book editor in *Springer* Series on *Optical and Fiber Communications Reports*, 2007.

Conference Organisation

- General (2017) and Program (2015) Chair, Conf. Lasers & Electro-optics (CLEO).
- Chair (2014) and co-Chair (2013), Fiber Lasers Conference, Photonics West (SPIE).
- Program Chair, IEEE Lasers and Electro-Optics Society (LEOS), Summer Topicals: 2006.
- Sub-committee chair, Optical Society of America, Topical meetings, European Science Congress: 2010; *Fibers & Fiber Devices Committee*, Opt. & Comm. Conf. (OECC): 2011; *Fiber and Guided-Wave Lasers Committee*, Conf. Lasers & Electro-optics (CLEO): 2013, 2014; *Nonlinear Optics, Meta-Optics and Quantum Photonics* Horizontal at VAIBHAV 2020; *Optical Fibers and Fiber-based Devices Track*, Asia Communications and Photonics Conference (*ACP*): 2021; *Optical Fiber and Waveguide Technologies*, International Conference on Information Optics and Photonics (CIOP): 2024.
- Symposium Chair, "Singular light: Applications of Vortices, OAM, Bessel & Airy Beams," CLEO 2012.
- Workshop Organiser, "High-Power Fiber Lasers," Optical Fiber Comm. (OFC): 2009.
- Conference subcommittees: OSA-WSOF: 2015, 2017, 2019; ECOC: 2014; CLEO: 2010-2012; OFC: 2008-2010; SPIE Photonics West: 2011-2016; SPIE Photonics Europe: 2014, 2016; FIO/OSA Annual: 2011-2013; OSA Topicals: 2005, 2007, 2010-2012; IEEE-IPS Annual: 2003-2010; IEEE-IPS Topicals: 2010, 2012, 2013; OECC: 2008, 2010; Asia Communications & Photonics Conf. (ACP): 2012, 2017; Photonics: 2010, 2012, 2016, 2018; WSOF-2017, 2019, 2025; IEEE-WRAP – 2017, VAIBHAV: 2020; CLEO-PR: 2022.
- Conference advisory committees: Photonics 2024; OPTOIn-2024, WSOF-2025, FOP 2026.

Award Committees & Promotion/Grant Evaluation Activities

- Chair, OSA 2011 Nick Holonyak Jr. Award Committee.
- Member, OSA 2010 Nick Holonyak Jr. Award Committee.
- Member, Grant Proposal Review Panels for US National Science Foundation (NSF), Science Foundation of Ireland, Israel Science Foundation, NSERC, Canada (2015), EPSRC, UK (2017).
- Academic & Tenure appointment evaluations: Yale Univ., Univ. Illinois, Univ. Wisconsin, Univ. Colorado, Univ. South Florida, Baylor Univ., Univ. Arizona, Harvey Mudd College, Tufts Univ. Missouri University of Science and Technology, Univ. Rochester, Univ. Melbourne, Australia (2026), Korea Advanced Institute Sci. & Tech. (KAIST) (2020), McGill Univ. (2014), Shanghai Jiao Tong Univ. (2015), Hong Kong Polytechnic University (2017), Indian Inst. of Science, Bengaluru (2020), Indian Institute of Technology, Kanpur (2018), Univ. Southampton, UK (2018), Boston University.

Centers, Boards & Executive Committees

- Interim Associate Dean for Research & Faculty Development, BU College of Engineering (2024-2025).
- Member, Strategic Advisory Board: *Quantic* – UK Quantum Technology Hub (2020-2024).
- Member, Advisory Board: Harvard NIH U01 on time-gated diffuse correlation spectroscopy (2020-2024).
- Member, Advisory Board: European FiberWorks Consortium (2020-2024)
- Member, BU Electrical & Computer Engineering Dept. Executive Committee (EXCOM) (2021-2022).
- Coordinator, BU ECE Dept. Electrophysics Division (2021-2022).
- Member, BU College of Engineering Strategic Planning Taskforce (2019-2021).
- Chair, BU Electrical & Computer Engineering Dept. Faculty Search Committee (2015-2016).
- Member, BU: Photonics Center (2010-present); Neurophotonics Center (2017-present), Center for Systems Neuroscience (2018-present).

Consulting

- Q-Peak/PSI Corp., Bedford, MA; 2017

## TEACHING, MENTORING and OUTREACH ACTIVITIES

- Current mentoring (BU): 1 Postdoctoral fellow; 6 PhD and 2 Undergraduate Students.
- Past mentoring (at BU): 11 Postdoc/Visiting scientists; 16 Undergraduate, 5 Exchange & 3 High-school students.
- Graduated (at BU): 12 PhD and 9 MS Students.
- Awards & Honours for Students/Mentees:
  - 2026 SPIE Graduate Fellow Award for Sanjana Wanare
  - 2026 Best EE PhD Thesis Award for Daniel Shahar
  - 2024 Best EE PhD Thesis Award for Zelin Ma.
  - 2024 CLEO paper by Aaron Greenberg upgraded to *Highlighted* talk.
  - 2023 Doctoral Achievement Award for Havva Begüm Kabagöz
  - 2022 NSF GRFP Fellowship: Daniel Shahar.
  - 2021 ECOC highly scored paper designation for Zelin Ma
  - 2020 Europhoton contributed submission upgraded to invited talk for Havva Begüm Kabagoz.
  - 2018 Best EE PhD Thesis Award for Jeff Demas.
  - 2017 SPIE Optics and Photonics Education Scholarship for Gautam Prabhakar.
  - 2017 Best EE PhD Thesis Award for Patrick Gregg.
  - 2016 ECOC best paper runner up award for Patrick Gregg.
  - 2016 OSA Travelling Lecturer Award for Lu Yan.
  - 2016 CLEO Tingye Li Award semifinalist: Patrick Gregg.
  - 2015 CLEO Maiman award semifinalist: Patrick Gregg.
  - 2013 CLEO Maiman award runner-up: Jeff Demas.
  - 2013 CLEO Maiman award semifinalist: Patrick Gregg.
  - 2013 NSF GRFP Fellowship: Patrick Gregg.
- Courses taught: Electromagnetics, Solid state physics, Guided-wave optics, Nonlinear & ultrafast optics, Lasers, Electric Circuit Theory.
- PhD thesis evaluator: *Boston University*; *Ecole Nationale Supérieure des Télécommunications, Paris*; *Technical University of Denmark*; *University of Limoges*, *Tel Aviv University*, *Friedrich-Schiller-Universität Jena*, *University of Witwatersrand*, South Africa, *Indian Inst. Technology* – Delhi, Bombay, Indian Institute of Science, Bangalore, *Shanghai Jiao Tong Univ.*
- BU Inspirational Ambassadors program for Science outreach in high schools in the MA area.
- BU Engineering Anti-Racist Taskforce (2020-present)
- Projects member: ASHA, a non-profit organisation funding literacy and education in India.
- Volunteer: AID, Association for India Development.

## PUBLICATIONS, PATENTS & PRESS

### Press & Recognition

(1) Topological confinement paper in *Science* highlighted as one of 30 significant articles in 2023 by *Optics and Photonics News* (OPN).

(2) *News & Views* article: "3D-printing yields structured light," *Nat. Photon.* (2022).

(3) Cover art article on Multiphoton Microscopy in *Journal of Biomedical Optics* **27**, 056501 (2022).

(4) Conference abstract Tu4A.3, *ECOC* 2021 designated highly scored (top 10% score amongst conference submissions).

(5) Conference abstract Th-A2.1, *EuroPhoton* 2020 upgraded to invited talk.

(6) Cover art article on Nonlinear four-wave mixing with OAM modes in *APL Photonics* **5**, 010802 (2020).

(7) *APL Photonics* article on "Nonlinear four-wave mixing with OAM modes," featured as a *Scilight* news item.

(8) Top 10 downloads in all of 2019 – broadband intermodal nonlinear optics in *Photon. Res.* **7**, 1 (2019).

(9) 2013 *Science* article on vortex fiber data transmission designated (since May/June 2019) a "Highly Cited Paper" by *Web of Science* in the Physics category (top 1% in citations, amongst physics publications).

(10) Top 10 downloads in 1st & 3rd quarter 2019 and – broadband intermodal nonlinear optics in *Photon. Res.* **7**, 1 (2019).

(11) Cover art article on Soliton Self-Mode Conversion (SSMC) in *Optica* **6**, 304-308 (2019).

(12) Cover art article and editor's pick – broadband intermodal nonlinear optics in *Photon. Res.* **7**, 1-7 (2019).

(13) Editor's pick: *APL Photonics* article on "Vortex fibers for stimulated emission depletion (STED) microscopy."

(14) Editor's selection of noteworthy *Optics Letters* articles on 40th Anniversary – *Optics Letters* **34**, 2525 (2009).

(15) Editor's selection of noteworthy *Optics Letters* articles on 40th Anniversary – *Optics Letters* **37**, 2451 (2012).

(16) "Demonstration of an all-fiber stimulated emission depletion illumination system," in *SPIE Newsroom*, Nov. 2016.

(17) "Orbital angular momentum states may vastly increase fiber's bandwidth," in *ARS Technica*, August 14, 2016.

(18) "All fiber illumination brings superior stability to STED," *Laser Focus World*, July 2016.

(19) Top downloaded fiber optics article in OSA journals – (Invited paper, *Opt. Exp.* **23**, 3721, 2015).

(20) Top 10 downloaded *Optica* article in last quarter 2015 – (*Optica* **2**, 900, 2015).

(21) "Year of Light: Beam me down," NSF International Year of Light Blog, Nov. 2015, highlights *Optica* **2**, 900, 2015.

(22) Top 10 downloaded *Optica* article in Jan. – March 2015 – (*Optica* **2**, 14, 2015).

(23) Cover art article on intermodal fiber nonlinearities in *Optica* **2**, 14, 2015.

(24) Article on solid immersion microscopy (*Opt. Exp*. **22**, 7320, 2014) listed in the Virtual Journal of Biomedical Optics.

(25-95) *Science* article on vortex fiber data transmission covered by over 70 news media in June/July 2013, including the BBC, Boston Globe, Nature, Scientific American, Associate Press, Agence France-Presse, to name a few.

(96) Top 20 in downloaded OSA journal articles in 2 years (2012-2013) – *Optics Letters* **34**, 2525 (2009).

(97) Top 20 in downloaded OSA journal articles in 2 years (2011-2012) – *Optics Letters* **37**, 2451 (2012).

(98) Article on bottle beams (*Optics Letters* **37**, 3327, 2012) listed in the Virtual Journal of Biomedical Optics.

(99) Top downloaded article for 2 months in a row (July, August 2012) – *Optics Letters* **37**, 2451 (2012).

(100) Top downloaded article in a month (August 2012) – Optics Letters **37**, 3327 (2012).

(101) Cover art article on large mode area higher order modes, IEEE Photonics Society Newsletter, October 2009.

(102) "Fibre lasers look to large mode areas," Optics.org (http://optics.org/cws/article/research/38646), 04/2009.

(103) "Fibre delivers self-healing Bessel beam," *Optics.org* (http://optics.org/cws/article/research/34282), 05/2008.

(104) "*A New Kind of PM Fiber, Using Cylindrical Vector Beams*," CLEO-2008 list of newsworthy papers.

(105) "High power fibers," in *Photonik International*, vol. 4, 2007.

(106) "Higher-order mode propagation may enable power scaling" in *Laser Focus World*, May 2007.

(107) "Novel Fibers for Dispersive Control of Ultra-Short Pulses," in *SPIE NewsRoom*, 2007.

(108) "Silica fiber achieves anomalous dispersion below 1300 nm," in *Laser Focus World*, October 2006.

(109) "HOM fibers provide robust propagation," in *FiberSystems International*, September 2006.

(110) "Robust light propagation in ultra-large mode-area fibers," in *Photonics Spectra*, p. 68, September 2006.

(111) "Novel Chromatic Dispersion Compensation," in *Photonics Spectra*, p. 103, July 2003.

(112) "Fibre device offers PDL compensation," in *FiberSystems Europe*, p. 12, September 2002.

(113) "Higher order modes transmit signals further," in *FiberSystems International*, p. 12, March 2002.

(114) "Higher order modes push further," in *FiberSystems Europe*, p. 13, February 2002.

## Patents

(1) "Tunable polarizers," S. Ramachandran, US Patent 6768824.

(2) "Tunable mode-converters using few mode fibers," S. Ramachandran, US Patent 6768835.

(3) "Optical fiber-based device with tunable birefringence," S. Ramachandran, US Patent 6778715.

(4-5) "Optical bandpass filter using long period gratings," S. Ramachandran, US Patent 6845194, 6980578.

(6) "Adjustable dispersion compensator with few mode fibers and switchable mode converters," S. Ramachandran, US Patent 6937788.

(7) "Highly index-sensitive optical devices including long period gratings," S. Ramachandran, US Patent 6950578.

(8) "Optical fiber having enhanced separation of HOMs," S.E. Golowich, S. Ramachandran, US Patent 7110651.

(9-12) "Large mode area fibers using higher order modes," D.J. Digiovanni, S. Ramachandran, US Patent 7171074, 7272288, 7386209, 7483612.

(13-17) "Polarization insensitive microbend fiber gratings and devices using the same," S. Ramachandran, US Patent 7177510, 7340132, 7340139, 7352939, 7519254.

(18) "Short pulse lasers using large mode area fibers and higher order modes," S. Ramachandran, J.W. Nicholson, US Patent 7228029.

(19) "Fiber structure with improved bend resistance," J.M. Fini, S. Ramachandran, US Patent 7257293.

(20) "Fiber optic sensor or modulator using tuning of long period gratings with self-assembled layers," Z. Wang, J.R. Heflin, S. Ramachandran, US Patent 7336861.

(21) "Achieving gaussian outputs from large-mode-area-higher-order mode fibers," G. Leuchs, N. Lindlein, S. Ramachandran, US Patent 7672552.

(22) "Measuring modal content of multi-moded fibers," P. Kristensen, J.W. Nicholson, S. Ramachandran, A.D. Yablon, US Patent 7817258.

(23) "Visible continuum generation utilizing a hybrid optical source," J.W. Nicholson, S. Ramachandran, US Patent 7826499.

(24) "Locally perturbed optical fibers for mode transformers," S. Ramachandran, M. Sumetsky, P.S. Westbrook, US Patent 7865045.

(25) "Pumping in a higher-order mode that is different from a signal mode," S. Ramachandran, US Patent 7925128.

(26) "Phase-engineered fibers for generating cylindrical vector beams," S. Ramachandran, US Patent 7941012.

(27) "Sequentially increasing effective area in higher-order mode (HOM) Signal Propagation," D.J. Digiovanni, S. Ramachandran, US Patent 8000570.

(28) "Preventing dielectric breakdown in optical fibers," S. Ramachandran, A.D. Yablon, US Patent 8103142.

(29-31) "Optical fibers and optical fiber devices with total dispersion greater than material dispersion," S. Ramachandran, US Patent 8175435, 8175436, 8189977.

(32-33) "Production of optical pulses at a desired wavelength utilizing higher-order-mode (HOM) fiber," S. Ramachandran, US Patent 8126299, 8290317.

(34) "Systems and techniques for generating Bessel beams," S. Ramachandran, US Patent: 8358888.

(35) "Segmented gain-doping of an optical fiber," D.J. Digiovanni, S. Ramachandran, S. Ghalmi, M. Mermelstein, US Patent 8412015.

(36) "Compression of generated optical continuum utilizing higher-order-mode fiber," J.W. Nicholson, S. Ramachandran, US Patent 8478134.

(37) "Non-linear optical system and techniques," J.W. Nicholson, S. Ramachandran, US Patent 8507877.

(38) "Selectively pumping a gain-doped region of an optical fiber," D.J. Digiovanni, S. Ramachandran, US Patent 8520299.

(39) "High-power fiber laser employing nonlinear wave mixing with higher-order modes," S. Ramachandran, US Patent 9203209.

(40) "Optical fiber systems for delivering short high power pulses," S. Ramachandran, S. Wielandy, US Patent 9417381.

(41) "Ultrashort pulse fiber laser employing Raman scattering in higher order mode fibers," S. Ramachandran, L. Rishoj, J.D. Demas, US Patent 10734782.

(42) "Engineered optical fibers and uses thereof," S. Ramachandran, G. Prabhakar, A.P. Greenberg, US Patent 10823667.

(43) "Optical imaging system employing vortex fiber for multiple-mode illumination," S. Ramachandran, L. Yan, P. Kristensen, US Patent 10827911.

(44) "Optical fiber system employing topological guidance of light," S. Ramachandran, Z. Ma, US Patent 11506841.

### Books, Book Chapters

(1) Y. Jung, S. Alam, D.J. Richardson, S. Ramachandran and K.S. Abedin, "Multicore and multimode optical amplifiers for space division multiplexing," in *Optical Fiber Telecommunications* VII, Chapter 7, A.E. Willner, Ed., Academic Press, 2020.

(2) J. Wang, M.J. Padgett, S. Ramachandran, N. Bozinovic, S. Golowich, M.P.J. Lavery, H. Huang, Y. Yue, A.E. Willner "Multimode communications using OAM," in *Optical Fiber Telecommunications* VI-B, I. Kaminow, T. Li, A.E. Willner, Ed., Academic Press, 2013.

(3) *Fiber-based dispersion compensation*, S. Ramachandran, Editor, Springer, New York, 2007.

(4) S. Ramachandran and M.F. Yan, "Static and tunable dispersion management with higher order mode fibers," in *Fiber-based dispersion compensation*, S. Ramachandran, Ed., Springer, New York, 2007.

(5) S. Ramachandran, "Dispersion-tailored higher order mode fibers for in-fiber photonic devices," in *Guided wave optical components and devices*, B.P. Pal, Ed., Elsevier, Burlington, 2005.

### Journal Articles:

(1) A. Arduin, J. Demas, L.S. Rishøj, J. Lægsgaard, and S. Ramachandran, "Power scaling of dispersive wave generation in higher angular order modes," *Opt. Lett.* **51**, 3949-3952 (2026)

(2) J. Liu, Z. Ma, J. Liu, J. Dong, H. Zhou, S. Mo, L. Wu, S. Li, Y. Chen, L. Rusch, S. Larochelle, S. Ramachandran, and S. Yu, "Optical fiber communications using orbital angular momentum modes," **Invited Paper**, *Optica* **13**, 602-620 (2026)

(3) X. Liu, D.I. Shahar, D.B. Kim, V.O. Lorenz, and S. Ramachandran, "Generation and engineering of orbital angular momentum biphotons in optical fibers," *Optica Quantum* **3**, 280-288 (2025)

(4) Aku Antikainen and Siddharth Ramachandran, "Fundamental limits on fiber-based electron acceleration—and how to overcome them," J. Opt. Soc. Am. B 42, 587-596 (2025).

(5) J. Demas, M. Hary, G. Genty, S. Ramachandran, "Optimization and realignment of OAM mode excitation in ring-core optical fibers using machine learning," *Optics Letters* **49**, 5003 (2024).

(6) L. Xiang, F. Pang, Z. Xiao, L. Zhang, H. Wei, M. Zhu, S. Ramachandran, T. Wang, "Vibration-insensitive polarimetric fiber optic current sensor based on orbital angular momentum modes in an air-core optical fiber," *Optics Letters* **49**, 1753 (2024).

(7) D. I. Shahar, H. B. Kabagöz, S. Ramachandran "Generation of spatial combs digitized by orbital angular momentum," *APL Photonics* 1 January 2024; 9 (1): 016113.

(8) H. Wang, J. Ai, Z. Ma, S. Ramachandran, J. Wang, "Finding the superior mode basis for mode-division multiplexing: a comparison of spatial modes in air-core fiber," *Advanced Photonics* **5**, 056003 (2023).

(9) Y. Liang, H. Wang, X. Zhang, J. Ai, Z. Ma, S Ramachandran, J. Wang, "Reconfigurable structured light generation and its coupling to air-core fiber," *Adv. Photon. Nexus* **2**, 036015 (2023)

(10) Z. Ma, P. Kristensen and S. Ramachandran, "Scaling information pathways in optical fibers by topological confinement," ***Science*** 380, 278-282 (2023).

(11) A.D. White, L. Su, D.I. Shahar, K.Y. Yang, G.Ho Ahn, J.L. Skarda, S. Ramachandran, J. Vučković, "Inverse Design of Optical Vortex Beam Emitters," *ACS Photonics* **10**, 803 (2023).

(12) Z. Wan, Y. Liang, X. Zhang, Z. Tang, L. Fang, Z. Ma, S. Ramachandran, J. Wang, "Remote measurement of the angular velocity vector based on vectorial Doppler effect using air-core optical fiber," *Research* 9839502 (2022).

(13) S. Ramachandran, "3D-printing yields structured light," **Invited Paper**, *Nat. Photon.* **16**, 618 (2022).

(14) A.P. Greenberg, Z. Ma, and S. Ramachandran, "Angular momentum driven dynamics of stimulated Brillouin scattering in multimode fibers," *Opt. Express* **30**, 29708-29721 (2022)

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(1) S. Ramachandran, "Topological Confinement: A distinctive regime of light manipulation in fibers," **Plenary Lecture**, *IEEE Photonics Society Annual Meeting* 2026.

(2) S. Ramachandran, "Scaling to 100 modes and beyond, via topological confinement," **Invited Talk**, *ICTON* 2026.

(3) S. Ramachandran, "Topologically protected transmission with topologically confined light," **Invited Talk**, *ICOAM* 2026.

(4) C. Peters, V. Ashok, S. Ramachandran and A. Forbes, "Combining optical topologies for ultrarobust high dimensional states of light in optical fibre", 140910W, *Fiber Lasers and Glass Photonics: Materials through Applications V* 2026

(5) V. Ashok, C. Peters, R. Haubold, A. Forbes, and S. Ramachandran, "~0.5 km Propagation of Optical Skyrmions in a Multimode Fiber via Topological Confinement," SW3A.1, *CLEO* 2026.

(6) S. Wanare, D.I. Shahar, S. Ramachandran, "Complete *d*-Dimensional Tomography Using Inverse-Designed Phase Plates," FTH3A.7, *CLEO* 2026.

(7) M.F. Kabir, J.G. George, S. Bhattacharya, S. Ramachandran, "Generation of Bottle Beams with a Single Metasurface," FTU1A.6, *CLEO* 2026.

(8) P. Bhumkar, D. Roy, S. Ramachandran, "Fiber-based Power-Scalable Red-Light Generation via Multi-Stage Seeded Intermodal Four-Wave Mixing," SM2D.3, *CLEO* 2026.

(9) V. Ashok, C. Peters, R. Haubold, A. Forbes, S. Ramachandran, "Robust and Tunable Transport of Higher Order Optical Skyrmions through Fiber via Topological Confinement," STH3F.5, *CLEO* 2026.

(10) S. Ramachandran, "OAM fibers for high-dimensional entanglement generation," **Invited Talk**, *SIPQNP*, 2026.

(11) S. Ramachandran, "Topological Confinement Leveraged Fiber Lasers and Amplifiers," **Invited Talk**, *Photonics West* 2026.

(12) S. Ramachandran, "Breaking the information capacity barrier of optical fibers via topological confinement of "forbidden" states," **Invited Talk**, Workshop on Twisted Light in Nanophotonic and Quantum Systems, 2025.

(13) S. Ramachandran, "High-Dimensional Entanglement in Optical Fibers," **Invited Talk**, Defence Basic Research Conference, 2025.

(14) S. Ramachandran, "Multimode Nonlinear Fiber optics for High Dimensional Quantum Entanglement," **Invited Talk**, *IEEE Summer Topicals*, 2025.

(15) S. Ramachandran, "Long-lived Photons in Forbidden States: the influence of light's topology on its propagation characteristics," **Plenary Lecture**, *Light*, 2025.

(16) D.I. Shahar, S. Wanare, S. Ramachandran, "Low Noise, 9-Dimensional Fiber-Based Biphoton Source," FF107.7, *CLEO* 2025.

(17) A.P. Greenberg, V. Ashok, P. Kristensen, M. Mitrovic, S. Ramachandran, "High-gain, Low-noise, High-Channel-Count Amplification from a Topologically Confined Multimode EDFA," SS178.3, *CLEO* 2025.

(18) V. Ashok, A.P. Greenberg, P. Kristensen, M. Mitrovic, S. Ramachandran, "Highest mode count fiber via Topological Confinement," SS178.1, *CLEO* 2025.

(19) S. Wanare, D.I. Shahar, S. Ramachandran, "Toward Generation of Hyperentanglement in Optical-Fibers," PS200.49, *CLEO* 2025.

(20) C. Peters, V. Ashok, A. Forbes, S. Ramachandran, "Guided Transport of Optical Skyrmions through Optical Fibre using Topological Confinement," PS200.177, *CLEO* 2025.

(21) S. Ramachandran, "Topological Confinement: Light Guidance beyond Cutoff," **Invited Talk**, *WSOF*, 2025.

(22) P. Bhumkar, J. Demas, S Ramachandran, "Cascaded intermodal four-wave mixing for visible light generation in a multimode fiber," Proc. SPIE PC13347, *Photonics West*, 2025.

(23) A.P. Greenberg, P. Kristensen, M. Mitrovic, S. Ramachandran "Multimode Fiber Amplifier with 44 Uncoupled OAM Modes," Tu1A.1, *ECOC* 2024.

(24) S. Ramachandran, "Scaling fiber mode counts to 100 and beyond: Light guidance via Topological Confinement," **Invited Talk**, *CLEO Pacific Rim*, 2024.

(25) S. Ramachandran, "Light guidance via topological confinement: long-lived photons in forbidden states," **Invited Talk**, *ICOAM*, 2024.

(26) D. Shahar, J. Demas, A.G. Peterson-Greenberg, S. Ramachandran, "High-Dimensional Biphoton Emission in the OAM Basis," FF2K.2, *CLEO* 2024.

(27) A.G. Peterson-Greenberg, P. Kristensen, M. Mitrovic, S. Ramachandran, "Erbium-Doped Fiber Amplification of 28 OAM Modes," **Invited Talk**, STu4D.3, *CLEO* 2024.

(28) J. Demas M. Hary, G. Genty, S. Ramachandran, "Machine-Learning-Optimized OAM Excitation in Optical Fibers," SM2E.7, *CLEO* 2024.

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(30) V. Ashok, A.P. Greenberg, Z. Ma, I. Boegholm, C. Peng, P. Kristensen, S. Ramachandran, "Scaling to 100 modes by exploiting topological confinement," M2A, *OFC* 2024.

(31) S. Ramachandran, "Topological Confinement: a new mechanism for light transport in optical fibers," *Hot Topics*, **Plenary Session**, *Photonics West* 2024.

(32) S. Ramachandran, "High Dimensional Structured Light Quantum Sources," **Invited Talk**, *Photonics West* 2024.

(33) S. Ramachandran, "Multimode Fiber Nonlinear Optics," **Short Course**, *ASSL*/*FIO* 2023.

(34) S. Ramachandran, "High-dimensional quantum sources via multimode nonlinearities in fibers, **Invited Talk**, *IEEE Summer Topicals* 2023.

(35) S. Ramachandran, "Fiber Mode Count Scalability via Topological Confinement," **Invited Talk**, *OECC* 2023.

(36) Z. Ma, S. Ramachandran, "Wideband Transmission of Topologically Confined Modes with Record Low Crosstalk in Fibers," SM4L.1, *CLEO* 2023.

(37) P. Bhumkar, J. Demas, S. Ramachandran, "All-Fiber Visible Light Generation using Orbital Angular Momentum mediated Parametric Nonlinearities," SW3G.1, *CLEO* 2023.

(38) D.I. Shahar, X. Liu, D.B. Kim, V.O. Lorenz, S. Ramachandran, "Photon Pair Generation in OAM Modes at 780 and 1550 nm via Spontaneous Intermodal Four Wave Mixing," FF1L.5, *CLEO* 2023.

(39) H.B. Kabagöz, S. Ramachandran, "Ultrafast Sources at On-Demand Wavelengths via Seeded Intermodal Raman Scattering," STh1P.4, *CLEO* 2023.

(40) A.P. Greenberg, Z. Ma, H.B. Kabagöz, D.I. Shahar, S. Ramachandran, "60-Mode Erbium Doped Fiber Amplifier with Low Differential Modal Gain," SF2H.2, *CLEO* 2023.

(41) S. Ramachandran, "The physics and applications of topologically complex light, **Invited Talk**, *APS March Meeting* 2023.

(42) S. Ramachandran, "Scaling modal capacity of fibers by exploiting topological properties of light," **Invited Talk**, *OFC* 2023.

(43) S. Ramachandran, "New selection rules for Raman scattering with spatially complex light," **Invited Talk**, *ROWS* 2022.

(44) S. Ramachandran, "Multimode Nonlinear Fiber Optics," **Plenary Lecture**, *AFL* 2022.

(45) S. Ramachandran, "Space: The less explored dimension of light," **Keynote Lecture**, Student Conference on Optics and Photonics, 2022.

(46) S. Ramachandran, "Spatially, vectorially and topologically complex light in fibers: Implications & Applications," **Tutorial**, *ECOC* 2022.

(47) S. Ramachandran, "Scaling fiber modal capacity by topological confinement," **Invited Talk**, Workshop, *ECOC* 2022.

(48) S. Ramachandran, "Structured Light in Fibres: Principles and Applications," **Invited Talk**, *ICO Congress* 2022.

(49) S. Ramachandran, "Nonlinear Optics meets Topological Photonics: the Influence of Angular Momentum and Chirality on Fiber Nonlinear Optics," **Tutorial**, *CIVIS Workshop on Multimode Photonics* 2022.

(50) Z. Ma and S. Ramachandran, "Topological guidance: a new form of light transport for scaling fiber modal capacity," **Invited Talk**, *IEEE Summer Topicals* 2022.

(51) S. Ramachandran, "High Dimensional Quantum Sources with Optical Fibers," **Invited Talk**, *ICOAM* 2022.

(52) X. Liu, D.B. Kim, V.O. Lorenz and S. Ramachandran, "Shaping Biphoton Spectral Correlations with Orbital Angular Momentum Fiber Modes," QTh4B.1, *Quantum 2.0* 2022.

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(60) S. Ramachandran, "Sensing and Imaging with Topologically Complex Light, **Invited Talk**, *Winter Colloquium on Physics of Quantum Electronics* (PQE) 2022.

(61) S. Ramachandran, "Multimode Fiber Optics: recent paradigm shifts driving its resurgence," **Plenary Lecture**, *USST* Young Scientist Forum, 2021.

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(65) X. Liu, A. Antikainen, S. Ramachandran, "Topological Charge Mediated Raman Gain Modulation," SM1F.1, *CLEO* 2021.

(66) H.B. Kabagöz, Z. Ma, S. Ramachandran, "Nonlinear Generation of Energetic Ultrashort Vortex Pulses with Spectral and Topological Charge Diversity," SW3R.7, *CLEO* 2021.

(67) A. Antikainen, S. Ramachandran, "A Fiber-Based Dual-Color Infrared Pulse Source with Tunable 12-60 THz Frequency Separation," JTu3A.111, *CLEO* 2021.

(68) S. Ramachandran, "Optical Activity in Strictly Isotropic Materials (Fibers)," **Invited Talk**, *OSA-FIO* 2020.

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(70) H.B. Kabagöz, A. Antikainen, S. Ramachandran, "Time-Locked Multi-Color Single-Aperture Fiber Sources via Soliton Self-Mode Conversion," **Invited Talk**, Th-A2.1, *EuroPhoton* 2020.

(71) R. Lindberg, X. Liu, S. Ramachandran and V. Pasiskevicius "Joint spatial profile and frequency conversion of an LP07-fiber mode to-wards the blue spectral region,"·Th-M1.4, *EuroPhoton* 2020.

(72) S. Ramachandran, "Linear, nonlinear and peculiar properties of OAM fiber modes," **Tutorial**, *IEEE Summer* 2020.

(73) R. Lindberg, X. Liu, S. Ramachandran and V. Pasiskevicius, "kW-peak Power Level Blue Light Sources via a Hybrid Fiber and Crystal Nonlinear Process Using Higher Order Modes," STh1P.1, *CLEO* 2020.

(74) H.B. Kabagöz, S. Zhang, S. Ramachandran, "Time-Synchronized 3-Color Single-Aperture Fiber Sources via Soliton Self-Mode Conversion," SM1P.7, *CLEO* 2020.

(75) X. Liu, Z. Ma, P. Kristensen, S. Ramachandran, "Suppression of Raman scattering by controlling the angular momentum content of fiber modes," FM2P.5, *CLEO* 2020.

(76) A. Antikainen, H.B. Kabagöz, S. Ramachandran, "Inheriting from a Daughter Pulse: Coherence Eradication in Soliton Self-Mode Conversion," SM4P.5, *CLEO* 2020.

(77) H.B. Kabagöz, A. Antikainen, S. Ramachandran, "Experimental Demonstration of the Noisy Origins of Soliton Self-Mode Conversion," FTh1A.3, *CLEO* 2020.

(78) L. Rishoj, I.C. Hernandez, N. Jowett, S. Ramachandran, "Multiharmonic Imaging of Human Peripheral Nerves using a 1300 nm Ultrafast Fiber Laser," ATh3K.2, *CLEO* 2020.

(79) A.P. Greenberg, G. Prabhakar, S. Ramachandran, "Measuring spectral bandwidth with OAM fiber mode induced optical activity," AF1K.6, *CLEO* 2020.

(80) Z. Ma, P. Kristensen, S. Ramachandran, "Light guidance beyond cutoff in optical fibers," SF1P.2, *CLEO* 2020.

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(82) S. Ramachandran, "Four-Wave Mixing (FWM) with OAM modes in fibers," **Invited Talk**, *ACP* 2019.

(83) S. Ramachandran, "The influence of OAM in fiber nonlinear optics," **Invited Talk,** *IEEE-IPS Annual*, 2019.

(84) S. Ramachandran, "Space: the less explored dimension of light," **Short Course**, *Siegman School on Lasers*, 2019

(85) S. Ramachandran, "Nonlinear optics exploiting the spatial dimension," **Keynote**, *CLEO-Europe*, 2019.

(86) E.N. Christensen, X. Liu, K. Rottwitt, S. Ramachandran, 'Kilowatt-level parametric wavelength exchange using OAM modes," CJ-9.3, *CLEO-Europe*, 2019.

(87) S. Ramachandran, "Spin-orbit interactions of light in optical fibers," **Invited Talk,** *ICOAM* 2019.

(88) S. Ramachandran, "Structured light in fibers: Physics & Applications," **Keynote**, *IMCO* 2019.

(89) S. Ramachandran, "The physics and applications of fibers supporting OAM," **Invited Talk**, *EXAT symposium*, 2019.

(90) A.G. Peterson-Greenberg, G. Prabhakar, S. Ramachandran, "Single-shot, sub-picometer-resolution wavemeter using topologically enhanced optical activity of OAM fiber modes," **Post-deadline paper**. JTh5A.9, *CLEO* 2019.

(91) L. Rishoj, B. Tai, F. Deng, Ji-Xin Cheng, S. Ramachandran, "Jitter-Free Multi-Wavelength Fiber Sources using Intermodal Solitons," STu3L.6, *CLEO* 2019.

(92) X. Liu, E.N. Christensen, G. Prabhakar, K. Rottwitt, S. Ramachandran, "Four-wave mixing in orbital angular momentum modes, SW3H.1, *CLEO* 2019.

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(94) G. Prabhakar, X. Liu, S. Ramachandran, "Tailoring SBS thresholds using OAM fiber modes," *SPIE Photonics West*, 2019.

(95) S. Ramachandran and G.P. Agrawal, "Soliton Self-Mode Conversion (SSMC): Power-scalable frequency conversion with multimode fibers," **Invited Talk**, *SPIE Photonics West*, 2019.

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(97) S. Ramachandran, "Physics of guided-wave light propagation: Applications to fiber lasers and nonlinear optics," **Short Course**, *ASSL* 2018.

(98) S. Ramachandran and G.P. Agrawal, "Soliton Self-Mode Conversion (SSMC): Revisiting ultrashort pulse Raman scattering," **Invited Talk**, *ERC Workshop*, 2018.

(99) S. Ramachandran, "Classical and Quantum Communications with OAM in fibers," **Invited Talk**, *IEEE Annual Meeting*, 2018.

(100) D. Cozzolino, D. Bacco, B. Da Lio, K. Ingerslev, Y. Ding, K. Dalgaard, P. Kristensen, M. Galili, K. Rottwitt, S. Ramachandran and L.K. Oxenløwe "High-dimensional quantum communication with twisted photons propagating in a fiber link," **Plenary**, *Asian Quantum Information Science Conference*, 2018.

(101) L. Rishøj, B. Tai, S. Ramachandran, "MW peak power level fiber sources via Soliton Self-Mode Conversion for 3-photon biological imaging," *EuroPhoton* 2018.

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(106) A. Gulistan, S. Ghosh, S. Ramachandran, B.M.A Rahman, "Enhancing mode stability of higher order modes in a multimode fiber," SoW2H.7, *OSA Advanced Photonics*, 2018.

(107) S. Ramachandran, "Space – the less explored dimension of light," **Plenary**, *IONS* Denmark, 2018.

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(109) B. Tai, L. Rishøj, S. Ramachandran, "Ultrafast, High Energy, Wideband Wavelength Conversion Via Continuous Intra-pulse and Discrete Intermodal Raman Scattering," SM1K.1, *CLEO* 2018.

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(111) Z. Ma, G. Prabhakar, P. Gregg, S. Ramachandran, "Robustness of OAM fiber modes to geometric perturbations," SW3K.1, *CLEO* 2018.

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(116) S. Ramachandran, "Orbital Angular Momentum (OAM) of light in fiber," **Invited Talk**, *OFC* 2018.

(117) S. Ramachandran, "Scaling power and creating new colour sources via multimode nonlinear fiber optics, **Tutorial**, *ACP* 2017.

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