

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.
- 6 Plenary & 5 Keynote lectures, 4 Short Courses, 9 Tutorials, 102 Invited talks & papers.
- 21 Post-deadline papers in refereed international conferences.
- 436 Publications in refereed scientific journals (129) and conferences (307).
- More than 17,000 Journal Citations; h-index = 58 ([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: \$ 14.7 M)

- 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.

Award/Evaluation Committees

- 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, EPSRC, UK.
- Academic & Tenure appointment committees: Yale Univ., Univ. Illinois, Univ. Wisconsin, Korea Advanced Institute Sci. & Tech. (KAIST), McGill Univ., Univ. South Florida, Baylor Univ., Shanghai Jiao Tong Univ., Hong Kong Univ. Sci. & Tech., 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).

TEACHING, MENTORING and OUTREACH ACTIVITIES

- Current mentoring (BU): 1 Postdoctoral fellow; 8 PhD and 2 Undergraduate Students.
- Past mentoring (at BU): 11 Postdoc/Visiting scientists; 14 Undergraduate, 5 Exchange & 3 High-school students.
- Graduated (at BU): 11 PhD and 9 MS Students.
- Awards & Honours for Students/Mentees:
 - 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 Kabagöz.
- 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/committees: *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) 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)
- (2) 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).
- (3) 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).
- (4) 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).

- (5) 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.
- (6) 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).
- (7) 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)
- (8) Z. Ma, P. Kristensen and S. Ramachandran, [“Scaling information pathways in optical fibers by topological confinement,”](#) *Science* 380, 278-282 (2023).
- (9) 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).
- (10) 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).
- (11) S. Ramachandran, [“3D-printing yields structured light,”](#) **Invited Paper**, *Nat. Photon.* 16, 618 (2022).
- (12) 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)
- (13) Ilaria Cristiani *et al*, [“Roadmap on multimode photonics,”](#) **Invited Paper**, *J. Opt.* 24, 083001 (2022).
- (14) X. Liu, Z. Ma, A. Antikainen, S. Ramachandran, [“Raman gain control in optical fibers with orbital-angular-momentum-induced chirality of light,”](#) *Opt. Express* 30, 26967-26974 (2022)
- (15) L. Rishøj, I.C. Hernández, S. Ramachandran, N. Jowett, N., [“Multiphoton microscopy for label-free multicolor imaging of peripheral nerve,”](#) *Journal of Biomedical Optics* 27, 056501 (2022).
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- (1) S. Ramachandran, "Topological Confinement Leveraged Fiber Lasers and Amplifiers," **Invited Talk**, *Photonics West* 2026.
- (2) 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.

- (3) S. Ramachandran, "High-Dimensional Entanglement in Optical Fibers," **Invited Talk**, Defence Basic Research Conference, 2025.
- (4) S. Ramachandran, "Multimode Nonlinear Fiber optics for High Dimensional Quantum Entanglement," **Invited Talk**, *IEEE Summer Topicals*, 2025.
- (5) S. Ramachandran, "Long-lived Photons in Forbidden States: the influence of light's topology on its propagation characteristics," **Plenary Lecture**, *Light*, 2025.
- (6) D.I. Shahr, S. Wanare, S. Ramachandran, "Low Noise, 9-Dimensional Fiber-Based Biphoton Source," FF107.7, *CLEO* 2025.
- (7) 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.
- (8) V. Ashok, A.P. Greenberg, P. Kristensen, M. Mitrovic, S. Ramachandran, "Highest mode count fiber via Topological Confinement," SS178.1, *CLEO* 2025.
- (9) S. Wanare, D.I. Shahr, S. Ramachandran, "Toward Generation of Hyperentanglement in Optical-Fibers," PS200.49, *CLEO* 2025.
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- (11) S. Ramachandran, "Topological Confinement: Light Guidance beyond Cutoff," **Invited Talk**, *WSOF*, 2025.
- (12) 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.
- (13) A.P. Greenberg, P. Kristensen, M. Mitrovic, S. Ramachandran "Multimode Fiber Amplifier with 44 Uncoupled OAM Modes," Tu1A.1, *ECOC* 2024.
- (14) S. Ramachandran, "Scaling fiber mode counts to 100 and beyond: Light guidance via Topological Confinement," **Invited Talk**, *CLEO Pacific Rim*, 2024.
- (15) S. Ramachandran, "Light guidance via topological confinement: long-lived photons in forbidden states," **Invited Talk**, *ICOAM*, 2024.
- (16) D. Shahr, J. Demas, A.G. Peterson-Greenberg, S. Ramachandran, "High-Dimensional Biphoton Emission in the OAM Basis," FF2K.2, *CLEO* 2024.
- (17) A.G. Peterson-Greenberg, P. Kristensen, M. Mitrovic, S. Ramachandran, "Erbium-Doped Fiber Amplification of 28 OAM Modes," **Invited Talk**, STu4D.3, *CLEO* 2024.
- (18) J. Demas M. Hary, G. Genty, S. Ramachandran, "Machine-Learning-Optimized OAM Excitation in Optical Fibers," SM2E.7, *CLEO* 2024.
- (19) S. Ramachandran, "Transport of "Forbidden" Photonic States in Fibers via Topological Confinement, **Invited Talk**, SM1B.3, *CLEO* 2024.
- (20) 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.
- (21) S. Ramachandran, "Topological Confinement: a new mechanism for light transport in optical fibers," **Hot Topics, Plenary Session**, *Photonics West* 2024.
- (22) S. Ramachandran, "High Dimensional Structured Light Quantum Sources," **Invited Talk**, *Photonics West* 2024.
- (23) S. Ramachandran, "Multimode Fiber Nonlinear Optics," **Short Course**, *ASSL/FIO* 2023.
- (24) S. Ramachandran, "High-dimensional quantum sources via multimode nonlinearities in fibers, **Invited Talk**, *IEEE Summer Topicals* 2023.
- (25) S. Ramachandran, "Fiber Mode Count Scalability via Topological Confinement," **Invited Talk**, *OECC* 2023.
- (26) Z. Ma, S. Ramachandran, "Wideband Transmission of Topologically Confined Modes with Record Low Crosstalk in Fibers," SM4L.1, *CLEO* 2023.
- (27) P. Bhumkar, J. Demas, S. Ramachandran, "All-Fiber Visible Light Generation using Orbital Angular Momentum mediated Parametric Nonlinearities," SW3G.1, *CLEO* 2023.
- (28) D.I. Shahr, 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.
- (29) H.B. Kabagöz, S. Ramachandran, "Ultrafast Sources at On-Demand Wavelengths via Seeded Intermodal Raman Scattering," STh1P.4, *CLEO* 2023.
- (30) A.P. Greenberg, Z. Ma, H.B. Kabagöz, D.I. Shahr, S. Ramachandran, "60-Mode Erbium Doped Fiber Amplifier with Low Differential Modal Gain," SF2H.2, *CLEO* 2023.

- (31) S. Ramachandran, "The physics and applications of topologically complex light, **Invited Talk**, *APS March Meeting* 2023.
- (32) S. Ramachandran, "Scaling modal capacity of fibers by exploiting topological properties of light," **Invited Talk**, *OFC* 2023.
- (33) S. Ramachandran, "New selection rules for Raman scattering with spatially complex light," **Invited Talk**, *ROWS* 2022.
- (34) S. Ramachandran, "Multimode Nonlinear Fiber Optics," **Plenary Lecture**, *AFL* 2022.
- (35) S. Ramachandran, "Space: The less explored dimension of light," **Keynote Lecture**, Student Conference on Optics and Photonics, 2022.
- (36) S. Ramachandran, "Spatially, vectorially and topologically complex light in fibers: Implications & Applications," **Tutorial**, *ECOC* 2022.
- (37) S. Ramachandran, "Scaling fiber modal capacity by topological confinement," **Invited Talk**, Workshop, *ECOC* 2022.
- (38) S. Ramachandran, "Structured Light in Fibres: Principles and Applications," **Invited Talk**, *ICO Congress* 2022.
- (39) 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.
- (40) Z. Ma and S. Ramachandran, "Topological guidance: a new form of light transport for scaling fiber modal capacity," **Invited Talk**, *IEEE Summer Topicals* 2022.
- (41) S. Ramachandran, "High Dimensional Quantum Sources with Optical Fibers," **Invited Talk**, *ICOAM* 2022.
- (42) 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.
- (43) X. Liu, D.B. Kim, V.O. Lorenz, S. Ramachandran, "Engineering Joint Spectral Densities with Orbital Angular Momentum States in Optical Fibers," FF2J.1, *CLEO* 2022.
- (44) H.B. Kabagöz, A. McCall, S. Ramachandran, "Electronic Control of Soliton Self-Mode Conversion," STh4E.3, *CLEO* 2022.
- (45) Z. Ma, M.W. Khalid, S. Ramachandran, "Long-distance Pulse Propagation of 50 Uncoupled Fiber Modes due to Topological Confinement," STu4P.3, *CLEO* 2022.
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- (49) A. Bandara, Z. Zuo, K. McCutcheon, S. Ramachandran, T. Inzana, J.R. Heflin, "Optical Fiber Biosensor Assay with Nanomaterial Coating for Rapid Detection of *Histophilus somni*," *Biophotonics Congress* 2022.
- (50) S. Ramachandran, "Sensing and Imaging with Topologically Complex Light, **Invited Talk**, *Winter Colloquium on Physics of Quantum Electronics (PQE)* 2022.
- (51) S. Ramachandran, "Multimode Fiber Optics: recent paradigm shifts driving its resurgence," **Plenary Lecture**, *USST Young Scientist Forum*, 2021.
- (52) S. Ramachandran, "Nonlinear optics influenced by light's topological structure," **Invited Talk**, *OSI Symposium* 2021.
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- (56) H.B. Kabagöz, Z. Ma, S. Ramachandran, "Nonlinear Generation of Energetic Ultrashort Vortex Pulses with Spectral and Topological Charge Diversity," SW3R.7, *CLEO* 2021.
- (57) A. Antikainen, S. Ramachandran, "A Fiber-Based Dual-Color Infrared Pulse Source with Tunable 12-60 THz Frequency Separation," JTu3A.111, *CLEO* 2021.
- (58) S. Ramachandran, "Optical Activity in Strictly Isotropic Materials (Fibers)," **Invited Talk**, *OSA-FIO* 2020.
- (59) X. Liu, A. Antikainen, S. Ramachandran, "Dependence of Raman scattering on the orbital angular momentum of light," Th-A2.5, *EuroPhoton* 2020.

- (60) 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.
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- (62) S. Ramachandran, "Linear, nonlinear and peculiar properties of OAM fiber modes," **Tutorial**, *IEEE Summer* 2020.
- (63) 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.
- (64) H.B. Kabagöz, S. Zhang, S. Ramachandran, "Time-Synchronized 3-Color Single-Aperture Fiber Sources via Soliton Self-Mode Conversion," SM1P.7, *CLEO* 2020.
- (65) 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.
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- (67) H.B. Kabagöz, A. Antikainen, S. Ramachandran, "Experimental Demonstration of the Noisy Origins of Soliton Self-Mode Conversion," FTh1A.3, *CLEO* 2020.
- (68) 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.
- (69) A.P. Greenberg, G. Prabhakar, S. Ramachandran, "Measuring spectral bandwidth with OAM fiber mode induced optical activity," AF1K.6, *CLEO* 2020.
- (70) Z. Ma, P. Kristensen, S. Ramachandran, "Light guidance beyond cutoff in optical fibers," SF1P.2, *CLEO* 2020.
- (71) A. Bandara, Z. Zuo, K. McCutcheon, S. Ramachandran, T. Inzana, J.R. Heflin, "Rapid Detection of *Histophilus somni* by a Nanomaterial Optical Fiber Biosensor Assay," *OSA Biophotonics Congress* 2020.
- (72) S. Ramachandran, "Four-Wave Mixing (FWM) with OAM modes in fibers," **Invited Talk**, *ACP* 2019.
- (73) S. Ramachandran, "The influence of OAM in fiber nonlinear optics," **Invited Talk**, *IEEE-IPS Annual*, 2019.
- (74) S. Ramachandran, "Space: the less explored dimension of light," **Short Course**, *Siegman School on Lasers*, 2019
- (75) S. Ramachandran, "Nonlinear optics exploiting the spatial dimension," **Keynote**, *CLEO-Europe*, 2019.
- (76) E.N. Christensen, X. Liu, K. Rottwitt, S. Ramachandran, "Kilowatt-level parametric wavelength exchange using OAM modes," CJ-9.3, *CLEO-Europe*, 2019.
- (77) S. Ramachandran, "Spin-orbit interactions of light in optical fibers," **Invited Talk**, *ICOAM* 2019.
- (78) S. Ramachandran, "Structured light in fibers: Physics & Applications," **Keynote**, *IMCO* 2019.
- (79) S. Ramachandran, "The physics and applications of fibers supporting OAM," **Invited Talk**, *EXAT symposium*, 2019.
- (80) 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.
- (81) L. Rishoj, B. Tai, F. Deng, Ji-Xin Cheng, S. Ramachandran, "Jitter-Free Multi-Wavelength Fiber Sources using Intermodal Solitons," STu3L.6, *CLEO* 2019.
- (82) X. Liu, E.N. Christensen, G. Prabhakar, K. Rottwitt, S. Ramachandran, "Four-wave mixing in orbital angular momentum modes, SW3H.1, *CLEO* 2019.
- (83) V. Balaswamy, S. Harshitha, S. Ramachandran, V.R. Supradeepa, "High power, ultra-high spectral purity, broadly wavelength tunable cascaded Raman fiber laser," *SPIE Photonics West*, 2019.
- (84) G. Prabhakar, X. Liu, S. Ramachandran, "Tailoring SBS thresholds using OAM fiber modes," *SPIE Photonics West*, 2019.
- (85) 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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- (87) S. Ramachandran, "Physics of guided-wave light propagation: Applications to fiber lasers and nonlinear optics," **Short Course**, *ASSL* 2018.
- (88) S. Ramachandran and G.P. Agrawal, "Soliton Self-Mode Conversion (SSMC): Revisiting ultrashort pulse Raman scattering," **Invited Talk**, *ERC Workshop*, 2018.
- (89) S. Ramachandran, "Classical and Quantum Communications with OAM in fibers," **Invited Talk**, *IEEE Annual Meeting*, 2018.

- (90) 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.
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- (97) S. Ramachandran, "Space – the less explored dimension of light," **Plenary**, *IONS Denmark*, 2018.
- (98) S. Ramachandran, "Multimode Nonlinear Fiber Optics: New perspectives, opportunities & challenges," **Tutorial**, *CLEO* 2018.
- (99) 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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- (101) Z. Ma, G. Prabhakar, P. Gregg, S. Ramachandran, "Robustness of OAM fiber modes to geometric perturbations," *SW3K.1, CLEO* 2018.
- (102) G. Prabhakar, X. Liu, J. Demas, P. Gregg, S. Ramachandran, "Phase Conjugation in OAM fiber modes via Stimulated Brillouin Scattering," *FTh1M.4, CLEO* 2018.
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- (105) S. Ramachandran, "Nonlinear Optics with Structured Light," **Invited Talk**, *JSAP* 2018.
- (106) S. Ramachandran, "Orbital Angular Momentum (OAM) of light in fiber," **Invited Talk**, *OFC* 2018.
- (107) S. Ramachandran, "Scaling power and creating new colour sources via multimode nonlinear fiber optics," **Tutorial**, *ACP* 2017.
- (108) S. Ramachandran, "OAM in fibers: how they are different from OAM in free space and other fiber modes," **Invited Talk**, *ACP* 2017.
- (109) S. Zhu, S. Pidishety, Y. Feng, J. Demas, S. Ramachandran, B. Srinivasan, J. Nilsson, "Multimode Raman Pumping for Power-Scaling of Large Area Higher Order Modes in Fiber Amplifiers," *ATh4A.4, ASSL* 2017.
- (110) S. Ramachandran, "OAM in Optical Fibers: similarities with, and differences from, OAM in free space," **Invited Talk**, *ICOAM*, 2017.
- (111) S. Ramachandran, "Orbital Angular Momentum (OAM) of light in fiber," **Invited Talk**, *ICO-24*, 2017.
- (112) S. Ramachandran, "Intermodal nonlinear optics with Bessel and OAM beams in fibers," **Invited Talk**, *OSA Nonlinear Optics*, 2017.
- (113) S. Ramachandran, "MW power level fiber nonlinear optics via intermodal interactions" **Invited Talk**, *ISUPT* 2017.
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- (128) L. Rishoj, B. Tai, P. Kristensen, S. Ramachandran, "High Power Spatially Coherent Pulse Formation via Intermodal Soliton Interactions in Fiber," ATH1A.6, *ASSL* 2016
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