Carlos A. Ríos Ocampo

Massachusetts Institute of Technology
77 Mass. Avenue. Office: 13-4150. Cambridge, MA 02139, USA
email: carios@mit.edu | Phone: (+1) 617 899 7607

EDUCATION

University of Oxford. United Kingdom July 2017
DPhil (PhD) in Materials Science as Clarendon Scholar | Advisor: Prof. Harish Bhaskaran

- Clarendon Scholarship (awarded to 0.1-0.2% of applicants – one per Department, per year)

Karlsruhe Institute of Technology (KIT). Germany **/ Aix-Marseille Université.** France October 2013
Europhotonics Erasmus Mundus program.
MSc. in Optics and Photonics as Erasmus Mundus Scholar |Advisors: Prof. Wolfram Pernice & Martin Wegener

- MSc. Degree awarded with Distinction for academic performance, KIT
- Erasmus Mundus Scholarship (awarded to 2% of applicants)

University of Antioquia. Colombia October 2010
B.Sc. in Physics. | Advisor: Prof. John F. Barrera

- First Prize Undergraduate Student Research Award in Sciences
- Awarded Distinction for undergraduate thesis on optical processing of information

EXPERIENCE

University of Maryland, College Park. August 2021 -
Dept. of Materials Science & Engineering, and Institute of Research in Electronics and Applied Physics (IREAP)
Assistant Professor and leader of the Photonic Materials group.

Massachusetts Institute of Technology (MIT). Dept. of Materials Science & Engineering Feb. 2018 – July 2021
Postdoctoral Associate | Advisor: Prof. Juejun Hu (Group Website)

- Demonstrated the first large-area switching of phase-change material using graphene and doped-silicon microheaters – currently, lead the project to integrate to photonic systems in collaboration with Lincoln Labs and DRAPER.
- Demonstrated and patented a high-performance on-chip digital Fourier Transform spectrometer, and its application in fully on-chip OCT systems – currently, lead the development of such systems for one of the largest oil companies.
- Lead the efforts of Prof. Hu's MIT team in two projects for space-related applications of nonvolatile photonics in collaboration with DRAPER and NASA.
- Part of the DARPA Extreme program team for Large-scale, Reconfigurable and Multifunctional 2.5-D Conformal Optics, led by Prof. Hu at MIT, and with the collaboration of scientists from UCF, UMass, Lockheed Martin, and Lincoln Labs.
- Theoretically demonstrated reconfigurable photonic topological states.

University of Oxford. Department of Materials Feb. 2017 – Oct. 2017
Postdoctoral Research Assistant in Chalcogenide Photonics | Advisor: Prof. Harish Bhaskaran (Group Website)

- Demonstrated, in collaboration with IBM, Exeter and KIT, a photonic platform for in-memory computing.
- Demonstrated and patented a method to induce artificial volatility in phase-change materials, which was used in coincidence detection and computing applications.

University of Oxford. Department of Materials Jan. 2014 – Jan. 2017
DPhil Research Student | Advisor: Prof. Harish Bhaskaran

- Led the first experimental demonstration of an integrated all-photonic non-volatile multi-level memory by controlling phase-change materials, which set a precedent for the fast-growing field of phase-change photonics. Published in *Nature Photonics,* this work had broad press coverage, including perspective articles in Nat. Photonics and OPN.
- Further work along the same research line resulted in a thorough study of the evanescent coupling phenomena, and the demonstration of on-chip photonic synapse, non-volatile switches, optical computing, and other functionalities.
- Demonstrated color depth modulation, high-resolution holograms, and the resolution limits of PCM-based pixels using Conductive AFM techniques. Led to publication in *Adv. Materials* and a patent currently licensed by Bodle Technologies.

- Technical performer in an international collaborative team that included groups from Oxford, Exeter, and KIT working on phase-change materials for nanophotonics and integrated photonic applications.

Karlsruhe Institute of Technology. Institute of Nanotechnology April 2013 – Dec. 2013
Master's Thesis & Research Assistant. | Advisor: Prof. Wolfram Pernice & Prof. Martin Wegener

- Designed, fabricated and measured the first nanophotonic circuits based on Phase Change Materials. Led to publication in *Adv. Materials*.

Fraunhofer Institute for Optronics, System Technologies & Image Exploitation July 2012 – March 2013
Research Assistant & Master Intern at Group Signatorik. |Advisor: Dr. Szymon Gladysz

- Modelled turbulent horizontal path scenarios and image quality assessment. Led to a SPIE proceeding publication.

University of Antioquia (Colombia). Institute of Physics Feb. 2008 – Oct. 2010
Research Assistant at Optics and Photonics Group. | Advisor: Prof. John F. Barrera

- Interferometry, Digital Holography, and diffractive Optics experimental work for optical encryption systems. Led the first demonstration of optical encryption of movies and high-frequency images. Led to several publications.

ACADEMIC HONORS AND SCHOLARSHIPS

2021	OSA Traveling Lecturer. Invited by the Student Chapter at KIT, Germany.
2019	OSA Traveling Lecturer. Invited by the Student Chapter at the University of Antioquia, Colombia
2018	MRS Spring invited speaker and session chair
2017	IEEE Photonics North invited speaker
2016	Student Travel Grant Award, IEEE Photonics Conference
2015	Best Poster Award at INC11
2015	Selected as one of six PhD students representing the European Commission at INC11
2014	JEOL Scholarship for Material Science Graduate Students. Linacre College, Uni. of Oxford
2014	**Clarendon Scholarship for DPhil studies, University of Oxford** • Awarded to 0.1-0.2% of applicants – one per Department per year
2013	MSc. Degree awarded with Distinction for academic performance, KIT, Germany
2013	Outstanding Presentation Award, E\PCOS Conference, Berlin
2012	SPIE Optics and Photonics Education scholarship awardee
2011	**Erasmus Mundus Scholarship for MSc studies, The European Commission** • Awarded to ~2% of applicants
2011	First prize Undergraduate Student Research Award in Sciences, U. of Antioquia
2010	Distinction for undergraudate thesis, University of Antioquia, Colombia
2010	Academic Excellence Award, Faculty of Exact and Natural Sciences. U. of Antioquia
2006-2010	Talented Student program and Dean's list in five semesters

TEACHING AND ADVISING EXPERIENCE

Teaching Certificates

- MIT Kaufmann Teaching Certificate. A 16h program designed to develop teaching skills, including exposure to relevant research in teaching and learning, as well as to reflect on and plan for future teaching. MIT, 2019.

Teaching experience

- Invited Lecturer, Prof. Jeujun Hu's *Amorphous Materials* class for undergraduate and graduate students. MIT, 2019.
- Instructor, *Applied PIC Design*, and Demonstrator, Synapsis/Lumerical integrated photonic simulation tools, for a class of 22 professors, industry engineers, and investors. AIM Photonics Academy Summer School at MIT, 2018 and 2019:
- Teaching Assistant, *Waves and Oscillations* for 20 undergraduate physics students (tasks included designing and teaching the tutorials, marking exams, office hours).Universidad de Antioquia, Colombia, 2011.
- Instructor for full-semester undergraduate laboratory courses in *Mechanics* and *Electromagnetism for Engineering* (2 sections). Class size average: 30. Overall rating: 4.4/5.0. Universidad de Antioquia, Colombia, 2011.
- Designed and taught the course *Optics and Photonics: The light and its wonders*, a one-week full-time hands-on class designed for 25 high-school students – Clubes de Ciencia (translates: Science Clubs). Medellín, Colombia. June 2018.

- IT Demonstrator (Teaching Assistant) for courses on Linux, Latex, Matlab and MS Office for University members – University of Oxford, IT Service Office. 2014-2016.
- Summer School Teacher of Computer Science (Summer 2015) and Engineering (Summer 2016) for international senior-high-school students – Oxford Scholastica, Oxford, UK.

Advising

- Supervise first-year PhD student. Supervised 5 undergraduate research students (including the first place and a gold medalist at the International Physics Olympiad, 2016), and 2 high-school interns – MIT.
- Co-supervisor of the Master's thesis of Takashi Lawson (now a PhD student in Photonics at Cambridge University). Trained 3 first-year PhD students and 2 postdocs – University of Oxford.

Outreach

- Robotics workshop for 9-12 years old children. Taught twice with a class size of 15 – MIT, 2019.
- Teacher of two 16h outreach courses on Nanotechnology and Quantum Mechanics. Class size average: 15 – Universidad de Antioquia, Colombia. 2011.
- Several Optics workshops for kids as a member of the Optical Society of America student chapters at the Univ. of Antioquia (Colombia) between 2007-2011 and University of Oxford (UK) between 2014-2017.

CONSULTING EXPERIENCE

PreScouter, USA**.** Global Scholar 2016-2018

Participated in four projects for renowned corporations as Student/Postdoc Scholar:

- Phase-change materials for warming patients - 5h
- Overview of Photonic Platforms - 30h
- Perovskites thin-film Solar Cells - 25h
- Endoscopic Bio-imaging Technologies - 25h

PATENTS

- Carlos A. Rios Ocampo, Yifei Zhang, Mikhail Shalaginov, Xiaoming Qiu, Tian Gu, Juejun Hu. Optical devices based on Phase Change Materials, file on June 2020.
- Derek Kita, Carlos A. Ríos, Tian Gu, Juejun Hu. *A chip-scale optical coherence tomography engine*. *F*iled on Dec. 2019.
- Derek Kita, Carlos A. Ríos Ocampo, Juejun Hu. *High-Performance On-chip Spectrometers and Spectrum Analyzers*. Application number PCT/US19/65689, 2019.
- Nathan Youngblood, Carlos A. Ríos Ocampo, Zengguang Cheng, Wolfram Pernice, C. David Wright & Harish Bhaskaran. *Optical methods and devices (Volatile Optical Memory and Single Programming Pulse).* UK Patent application/provisional GB1719347.5. Patent pending. Filed in 2017.
- Carlos A. Ríos Ocampo, Nathan Youngblood, Zengguang Cheng, Xuan Li, Wolfram Pernice, C. David Wright & Harish Bhaskaran. *Optical methods and devices (Photonic Memory and Digital to Analogue Conversion).* PCT application number PCT/GB2018/051815. Patent pending. Filed in 2017.
- Nathan Youngblood, Carlos A. Ríos Ocampo, Harish Bhaskaran. *Phase Change switching (Infrared detector and Capacitive PCM Switching).* UK Patent application/provisional. PCT/GB2018/051473. Patent pending. Filed in 2017.
- Zengguang Cheng, Carlos A. Ríos Ocampo, Wolfram Pernice, & Harish Bhaskaran. *Optical Device (Lossless integrated optical switch)*. PCT/GB2017/051143. Patent Pending. Filed in 2016.
- Carlos A. Ríos Ocampo, Matthias Stegmaier, Harish Bhaskaran and Wolfram Pernice**.** *Photonic device* (*photonic switches based on phase-change materials).* Publication numbers WO 2017/046590, US2018267386, EP3350652. Grant in 2020. Filed in 2015.
- Peiman Hosseini, Harish Bhaskaran, Carlos A. Rios Ocampo. *Optical device* (*Phase-change films in security applications)*. Publication numbers US10068606B2, GB201322912D0. Grant in 2018 (**Licensed to Bodle Technologies**).

GRANT WRITING EXPERIENCE

- Principal author of *Phase change material-based photonic integrated circuits for mid-infrared beam steering.* Submitted to NASA STTR Phase I together with Syntec Optics.
- Principal author of *A hybrid optoelectronic platform for high-speed, low-power neuromorphic computing.* Submitted to an internal MIT grant opportunity sponsored by MICRON, 2020.

- Co-author of: *PIC: A high-performance, scalable integrated photonic spectrometer platform.* Submitted to National Science Foundation (NSF) – Electronics, Photonics and Magnetic Devices. A 500K project led by Prof. Juejun Hu (MIT).
- Co-author of: *A Scalable, Ultra-low-loss Switching Technology for Advanced Interconnect Networks enabled by optical phase change materials (SUSTAINable).* A >3M project led by Prof. Juejun Hu (MIT). Finalist of the PIPES program by DARPA but not granted.
- Co-author of: *Beyond silicon for more-Moore scaling: material platforms enabling monolithic photonics for enhanced computing and communications.* DARPA Request for Information (RFI) to MIT team led by Prof. Juejun Hu, 2018.
- Raised over 10k in grants for the Colombian association at MIT for academic, outreach, and cultural events through MIT programs such as ARCADE, LEF, and MindHandHeart.

INVITED TALKS

1. *A tale of Photonics, phase-change materials and career decisions.* OSA Traveling lecturer, KIT, Karlsruhe, Germany, July 2021.
2. La física en el mundo nano [In Spanish]. Graduate Seminar. National Univ. of Colombia, Medellín, April 2021. *Reconfigurable Photonics: a phase-change for the better.* Group selection symposium - Chemistry, Physics, and Technology Section . **Max Planck Institute**, Germany. February 2021.
3. *Reconfigurable Photonics: a phase-change for the better.* Thayer School of Engineering. **Dartmouth College**, NH. February 2021.
4. *Reconfigurable Photonics: a phase-change for the better.* Dept. of Materials Science & Engineering. **Carnegie Mellon University**, PA. January 2021.
5. *Reconfigurable Photonics: a phase-change for the better.* Webinar: Microphotonics Everywhere. MIT Industrial Liason Program (ILP). MIT. Boston, MA. October 2020.
6. *Why supercomputers need optics?* OSA Day of the Light Celebration. The National University of Colombia. May 2020.
7. *Nonvolatile reconfigurable photonic systems enabled by phase-change materials.* **Boston University**. February 2020.
8. *Reconfigurable Photonics: a phase-change for the better.* Dept. of Materials Science & Engineering. **University of Maryland at College Park**, MD. March 2020.
9. *Reconfigurable Photonics: a phase-change for the better.* **University of Twente**, Netherlands, April 2020.
10. *Reconfigurable Photonics and Phase-change materials*. **OSA Travelling Lecturer**. Colombian National Meeting of Optics, November 2020
11. *Optical phase-change materials for nonvolatile reconfigurable photonic devices.* XXVIII International Materials Research Conference **(IMRC**), Cancún, Mexico. August 2019.
12. *All-photonic in-memory computing based on phase-change materials*. **TSMC** in San Jose, CA. April 2019.
13. *Switching mechanisms of phase-change materials driven by evanescent-field coupling in integrated photonics.* **MRS Spring conference**. Phoenix, USA. April 2018.
14. *Reconfigurable integrated photonics enabled by phase-change materials [Plenary presentation].* 1st Applied Physics, Engineering and Innovation Conference. Bucaramanga, Colombia. October 2018.
15. *Phase Change Materials for Advanced Silicon Photonics Applications: From Optical Switches to Neuromorphic Computing*. **MIT Lincoln Lab**: Chemical, Microsystem, and Nanoscale Technologies Group seminar, April 2018.
16. *Phase-change materials for photonics applications*. **Photonics North 2017** Conference. Ottawa, Canada. June 2017.
17. *On-chip photonic memories and computing based on Phase-Change Materials***. Microsoft Research Lab**. Systems and Networking Seminar. Cambridge, UK. April 2016.
18. *Photonic circuits: processing and storing data using light*. Linacre College Seminars (Michaelmas 2015). University of Oxford, UK. September 2015.
19. *Phase-change materials meet nanophotonics*. FOPS-Workshop 2014. Universitat de Valencia, Spain. Nov. 2014

JOURNAL PUBLICATIONS

Citations >2250; h-index: 19; i10-index: 26 (Google Scholar profile)

In Preparation:

- C. Mao, C. Ríos, Y. Yang, M. Soljačić, J. Hu. "Tunable topological photonics using phase-change materials."
- C. Rios et al. "High-performance digital Fourier Transform spectrometer."

Submitted:

- D. Kita, J. Scholvin, C. Ríos, J. Hu. "A quick-turn fabrication process for Si_3N_4 photonic integrated circuits with heaters". Submitted to Journal of Lightwave technology.
- E. Dolgopolova, D. Li, J. Watt, C. Rios, *et al.* "Spinel Fe3O4 Nanocrystals with Size-Tunable Plasmonic Properties Afford Strong Enhancement of Emission at Telecom Wavelengths". Submitted to ACS Nano.

Published:

1. Y. Zhang, Q. Zhang, C. Rios, *et al.* "Transient tap couplers for wafer-level photonic testing based on opti-cal phase change materials." ACS Photonics, ASAP article, 2021.
2. C. Ríos *et al.* "Ultra-compact nonvolatile photonics based on electrically reprogrammable transparent phase change materials." arXiv:2105.06010, 2021.
3. Y. Zhang, C. Ríos, M.Y. Shalaginov, M. Li, A. Majumdar, T. Gu, J. Hu. "Myths and truths about optical phase change materials: A perspective." Applied Physics Letters 118(21), 210501, 2021.
4. [OA] Y. Zhang *et al. "Electrically reconfigurable nonvolatile metasurface using low-loss optical phase change material'* **Nat. Nanotechnology** 16 (6), 661-666, 2021.
5. C. M. Schwarz, S. M. Kuebler, C. Rivero-Baleine, B. Triplett, M. Kang, Q. Altemose, C. Blanco, K. A. Richardson, Q. Du, S. Deckoff-Jones, J. Hu, Y. Zhang, Y. Pan, C. Ríos. "Structurally and morphologically engineered chalcogenide materials for optical and photonic devices" J. Opt. Microsystems 1(1), 2021.
6. ★ [OA] C. Ríos, Y. Zhang, M. Shalaginov, S. Deckoff-Jones, H. Wang, S. An, H. Zhang, M. Kang, K. A. Richardson, C. Roberts, J. B Chou, V. Liberman, S. Vitale, J. Kong, T. Gu, J. Hu. "Multi-level electro-thermal switching of optical phase-change materials using graphene". **Adv. Photonics Research**. 202000034. 2021
7. [OA] M. Shalaginov *et al*. "Reconfigurable all-dielectric metalens with diffraction-limited performance." **Nat. Communications 12(1)**. 2021.
8. [OA] M. Y. Shalaginovr, S.D. Campbel, S. An, Y. Zhang, C. Ríos, et al. "Design for quality: reconfigurable flat optics based on active metasurfaces" Nanophotonics 9(11), 3505-3534, 2020.
9. ★ [OA] C. Ríos**,** N. Youngblood, Z. Cheng, M. Le Gallo, W.H.P. Pernice, C.D. Wright, A. Sebastian & H. Bhaskaran. "In-memory computing on a photonic platform". ***Science Advances***, 5(2), eaau5759, 2019.
    - **Nature Electronics Research Highlight**: Photonic devices compute in memory. Nat. Electronics 2, p. 91, 2019.
10. ★ [OA} Y. Zhang, *et al*. "Broadband Transparent Optical Phase Change Materials for High-Performance Nonvolatile Photonics". **Nat. Communications** 10 (1), 1-9, 2019.
11. [OA] S. García-Cuevas, L. Trimby, Y-Y. Au, V.K. Nagreddy, P. Hosseini, G. Rodriguez-Hernandez, C. Ríos, H.Bhaskaran & C.D. Wright. "A Nonvolatile Phase-Change Metamaterial Color Display". ***Adv. Opt. Materials***, p. 1801782, 2019.
12. [OA] N. Youngblood, C. Ríos, E. Gemo, J. Feldmann, Z. Cheng, A. Baldycheva, W.H.P. Pernice, C. D. Wright & H. Bhaskaran. "Tunable volatility of $Ge_2Sb_2Te_5$ in integrated photonics". ***Adv. Functional Materials,*** p.1807571, 2019.
13. [OA] X. Li, N. Youngblood, C. Ríos, Z. Cheng, W.H.P. Pernice, C.D. Wright & H. Bhaskaran. "Fast and reliable storage using a 5-bit, non-volatile photonic memory cell". ***Optica,*** Vol. 6(1), 1-6, 2019.
14. J. von Keitz, J. Feldmann, N. Gruhler, C. Ríos, C. David Wright, Harish Bhaskaran & Wolfram Pernice. "Reconfigurable nanophotonic cavities with non-volatile response ". ***ACS Photonics*****,** Vol. 5 (11), 4644-4649, 2018.
15. [OA] C. Ríos, M. Stegmaier, Z. Cheng, N. Youngblood, C.D. Wright, W.H.P. Pernice & H. Bhaskaran. "Controlled switching of phase-change materials by evanescent-field coupling in integrated photonics [**Invited**]" *Opt. Mat. Express* 8(9), 2018.
16. [OA] Z. Cheng, C. Ríos, N. Youngblood, C.D. Wright, W.H.P. Pernice & H. Bhaskaran. "Device-Level Photonic Memories and Logic Applications Using Phase-Change Materials". ***Advanced Materials***, *30*(32), 1802435, 2018.
17. [OA] Z. Cheng, C. Ríos, W.H.P. Pernice, C.D. Wright, A. Sebastian & H. Bhaskaran. "On-chip photonic synapse". ***Science Advances,*** Vol. 3 (9), e1700160, 2017.
18. [OA] J. Feldman, M. Stegmaier, N. Gruhler**,** C. Ríos**,** H. Bhaskaran, CD. Wright, WHP Pernice. "Calculating with light using a chip-scale all-optical abacus" ***Nature Communications,*** Vol 8 (1), 1256, 2017.
19. [OA] M. Stegmaier, C. Ríos**,** H, Bhaskaran, CD. Wright, WHP Pernice. "Non-volatile All-Optical 1x2 Switch for Chipscale Photonic Networks". ***Adv. Optical Materials***, Vol. 5(1), 1600346, 2017.
20. [OA] G. Rodriguez-Hernandez, P. Hosseini, C. Ríos, C.D. Wright, & H. Bhaskaran. "Mixed-Mode Electro-Optical Operation of $Ge_2Sb_2Te_5$ Nanoscale Crossbar Devices". ***Advanced Electronic Materials***, *3*(8), 1700079, 2017.

21. ★ [OA] C. Ríos**,** P. Hosseini, R. Taylor, H. Bhaskaran. "Color depth modulation and resolution in phase-change material nanodisplays*". **Advanced Materials***. 28(23), 4720–4726, 2016.

22. M. Stegmaier, C. Ríos, H. Bhaskaran & W.H.P. Pernice. "Thermo-optical effect in phase-change nanophotonics". ***ACS Photonics***, *3*(5), 828-835, 2016.

23. ★ C. Ríos**,** M. Stegmaier, P. Hosseini, D. Wang, T. Scherrer, C.D. Wright, H. Bhaskaran, W.H.P. Pernice. "Integrated all-photonic non-volatile multi-level memory" ***Nature Photonics*** 9, 725-732, 2015.
    - Extensively featured across world media, reaching over 11,000 viewers in under 3 months and featured in over 50 news articles, including in MIT Technology Review, IFL science, and Science News.
    - Ranked as top article of similar age in Nature Photonics (Altmetrics).
    - News and views article in Nature Photonics "Optical memory: Phase-change memory" and OPN: "A Photonic Upgrade for Computer Memory?"

24. ★ [OA] C. Ríos, P. Hosseini, CD. Wright, H. Bhaskaran, WHP. Pernice. "On-chip photonic memory elements employing phase change materials". ***Advanced Materials*** 26(9), 1372-1377, 2014.

25. [OA] J.F. Barrera, M. Tebaldi, C. Ríos, E. Rueda, N. Bolognini, R. Torroba. "Experimental multiplexing of encrypted movies using a JTC architecture". *Opt. Express*, Vol. 20 (4), 2012.

26. E. Rueda, C. Ríos, J. F. Barrera, and R. Torroba. "Master key generation to avoid the use of an external reference wave in an experimental JTC encrypting architecture". *Applied Optics*, Vol. 51 (11), 2012.

27. J.F. Barrera, E Rueda, C. Ríos, N. Bolognini, M. Tebaldi, R. Torroba, "Experimental opto-digital synthesis of encrypted sub-samples of an image to improve its decoded quality". *Optics Communications*, Vol. 284 (19), 2011.

28. E. Rueda, C. Ríos, J. F. Barrera, R. Henao and R. Torroba. "Experimental multiplexing approach via code key rotations under a joint transform correlator scheme". *Optics Communications*, Vol. 284 (10), 2011.

29. [OA] C. A. Ríos, E. Rueda & J.F. Barrera. "Sistema Óptico de Encriptación de Doble Máscara de Fase bajo Arquitectura 4f". *TecnoLógicas*, Special edition II, 75-96, 2010.

30. [OA] C. A. Ríos-Ocampo, E. Rueda, & J.F. Barrera. "Análisis de la Sensibilidad de un Sistema óptico de Encriptación Bajo Rotaciones de la Llave de Seguridad". *Revista Colombiana de Física* 42(2), 5, 2010.

CONFERENCE PAPERS

1. C. Ríos *et al*. "On-chip Electrothermal Switching of Low-loss Phase Change Materials for Nonvolatile Programmable Photonic Circuits" CLEO/EQEC Europe, Postdeadline Session PD-2, 2021.
2. C. Ríos *et al*. "Integrated Nonvolatile Phase-shifter Based on Electrically Reconfigurable Low-loss Phase-change Materials" CLEO, JTu2P.2, 2021.
3. Y. Zhang, C. Rios*, et al.* "Optical phase-change materials (O-PCMs) for reconfigurable photonics." Asia Communication sand Photonics Conference, T2D. 1, 2020
4. M. Shalaginov, Y. Zhang, Q. Zhang, J.B. Chou, R. Soref, J. Li, C. Roberts, M. Kang, C. Gonçalves, C. Ríos, K. Richardson, V. Liberman, T. Gu, J. Hu. "Reconfigurable all-dielectric metalens for diffraction-limited imaging". Proc. SPIE 11461, Active Photonic Platforms XII, 114610M. August 2020.
5. T. Gu, *et. al*. "High-performance reconfigurable meta-optics based on optical phase change materials". Proc. SPIE 11389, Micro- and Nanotechnology Sensors, Systems, and Applications, 113890O, 2020.
6. M. Shalaginov, S. An, Y. Zhang, F. Yang, P. Su, V. Liberman, J.B. Chou, C. Roberts, M. Kang, C. Ríos, Q. Du, C. Fowler, A. Agarwal, K. Richardson, C. Gonçalves, H. Zhang, J. Hu, T. Gu. "Reconfigurable Non-Volatile High-Performance Metalens". Conference on Lasers and Electro-Optics (CLEO): Science and Innovations, JM2G.3, 2020.
7. C. Ríos, Y. Zhang, S. Deckoff-Jones, H Li, J.B. Chou, H. Wang, M. Shalaginov, C. Roberts, C. Gonçalves, V. Liberman, T. Gu, J. Kong, K. Richardson, and J. Hu. "Reversible Switching of Optical Phase Change Materials Using Graphene Microheaters (Rising researcher conference presentation)". Conference on Lasers and Electro-Optics (**CLEO**): Science and Innovations, SF2H. 4, 2019.
8. C. Ríos, N. Youngblood, Z. Cheng, M. Le Gallo, WHP. Pernice, CD. Wright, A. Sebastian, H. Bhaskaran. "All-photonic in-memory computing based on phase-change materials". Conference on Lasers and Electro-Optics (**CLEO**): Science and Innovations: Science and Innovations, SM2J. 2, 2019.
9. Y. Zhang, J. Liang, M. Shalaginov, S. Deckoff-Jones, C. Ríos, JB. Chou, C. Roberts, S. An, C. Fowler, S. D Campbell, B. Azhar, C. Gonçalves, K. Richardson, H. Zhang, D. H Werner, T. Gu, J. Hu. "Electrically Reconfigurable Nonvolatile

Metasurface Using Optical Phase Change Materials". **Postdeadline paper, Conference on Lasers and Electro-Optics (CLEO)**:Science and Innovations, JTh5B. 3, 2019

10. DM Kita, C.Ríos, J. Hu. "Performance Optimization Strategies for Nanophotonic Digital Fourier Transform Spectrometers. Fourier Transform Spectroscopy conference". FT Spectroscopy Conference. FTu4B. 5, 2019.
11. DM Kita, B. Miranda, C. Ríos, D. Favela, D. Bono, J. Michon, H. Lin, T. Gu, J. Hu. Chip-scale high-performance digital Fourier Transform (dFT) spectrometers. Next-Generation Spectroscopic Technologies XII 10983, 1098306.
12. Y. Zhang, Q. Zhang, J.B. Chou, R. Soref, J. Li, C. Roberts, M. Kang, C. Gonçalves, C. Ríos, M. Shalaginov, K. Richardson, V. Liberman, T. Gu, J. Hu. Designing non-volatile integrated photonics with low-loss optical phase change materials. Proc. SPIE 11081, Active Photonic Platforms XI, 110811S (12 September 2019).
13. V. Liberman, Y Zhang, M Shalaginov, C. Ríos, P Robinson, C Roberts, K Tibbetts, M Kang, K Richardson, J Hu, JB Chou. Reconfigurable Infrared Flat Optics with Novel Phase Change Materials. OSA Advanced Photonics Congress (AP), paper NoW3B.2, 2019.
14. Y. Zhang, J. B. Chou, M. Shalaginov, C. Ríos, *et. al*. Reshaping light: reconfigurable photonics enabled by broadband low-loss optical phase change materials. Proc. SPIE 10982, Micro- and Nanotechnology Sensors, Systems, and Applications XI, 109820Q, 2019.
15. E. Gemo, N Youngblood, Z. Cheng, C. Ríos, M. Stegmaier, A. Baldycheva, W.H.P. Pernice, H. Bhaskaran, CD Wright. "Modelling phase-change integrated photonic devices". *European Phase-Change and Ovonic Symposium E\PCOS, 2018.*
16. Z. Cheng, C. Ríos, N. Youngblood, C.D. Wright, W.H.P. Pernice & H. Bhaskaran. "On-chip phase-change photonic memory and computing". Active Photonic Platforms IX, *Proc. of SPIE*. Vol. 1034519. 2017.
17. J. Feldman, M. Stegmaier, N. Gruhler**,** C. Ríos**,** H. Bhaskaran, CD. Wright, WHP Pernice. "All-optical signal processing using phase-change nanophotonics," *19th Conference on Transparent Optical Networks (ICTON)*, pp. 1-3, 2017.
18. C. Ríos, M. Stegmaier, C.D. Wright, W.H.P. Pernice & H. Bhaskaran. "Multi-level storage in non-volatile phase-change nanophotonic memories". *IEEE Photonics Conference (IPC),* pp. 408-409, *2016*.
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- C.A. Ríos-Ocampo, "INC11: it's all about Maxwell's equations!". **European Commission Blog**, June 2015.

THESES

Phase-change materials for photonic memories and optoelectronic applications. 2016
DPhil (PhD) Dissertation – University of Oxford.

Tunable nanophotonic circuits based on phase-change materials. 2013
Master's Thesis – Karlsruhe Institute of Technology.

Optical Processing for encrypted data multiplexing and codification using orbital angular momentum 2010
Undergradudate Thesis *(In Spanish)* – Universidad de Antioquia

CONFERENCE PRESENTATIONS

- C. Ríos, Y. Zhang, S. Deckoff-Jones, H Li, J.B. Chou, H. Wang, M. Shalaginov, C. Roberts, C. Gonçalves, V. Liberman, T. Gu, J. Kong, K. Richardson, and J. Hu. "Reversible Switching of Optical Phase Change Materials Using Graphene Microheaters*". Conference on Lasers and Electro-Optics (CLEO): Science and Innovations*, SF2H. 4, 2019.
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- C. Ríos, P. Hosseini, and H. Bhaskaran. "Growth and nucleation dominated phase-change materials for nano-optoelectronics and display technology". 11th International Nanotechnology Conference (INC) 2015. Fukuoka, Japan.
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SCIENTIFIC COMMUNITY SERVICES

- Journal reviewer for: Nat. Communications, ACS Photonics, Nano Letters, J. of Lightwave Technology, Advanced Optical Materials, Optical Materials Express, Optics Express, Applied Optics, IEEE Photonics, APL Materials, Engineering reports, Journal of Non-solid crystals, Solar Energy, Applied Science, ACS Applied Electronic Materials, Micromachines, IEEE Access, JOSA B, and Optics Letters.
- Guest editor OMEX special edition on Phase-change photonics 2021.
- CLEO 2022, Optical Materials subcommittee member.
- Session Chair at MRS Spring 2019.
- Optical Society of America (OSA) Travelling Lecturer
- Project reviewer for the Colombian observatory of science and technology.

ADDITIONAL PROFESSIONAL INFORMATION

LANGUAGES	Spanish (Native), English (Fluent), German (Basic).
PROGRAMMING	MATLAB. Mathematica, LabView, Cadence, Python.

COMPUTER TRAINING	Linux, LaTex, 3Ds Max, Corel Draw, Origin, Lumerical, Labview, COMSOL, Synopsis.
LAB TRAINING	Broad experience in free space and integrated Optics laboratory. Class 1M, 2, 3R and 3B laser experience. FEM/FDTD computational modelling. Nanoscale characterization SEM, CAFM, PFM. Cleanroom nanofabrication: E-beam and optical lithography, Sputtering, E-beam and thermal evaporation, ALD. Electrical testing.
MEMBERSHIPS	Materials Research Society | Optical Society of America | Red Colombiana de Óptica

PERSONAL

LEADERSHIP ROLES	Core Officer of the Colombians@MIT Association (2018-present) International Officer of the Network of Colombian Optics researchers Organizing Committee of the 2018 and 2019 MIT/Harvard Colombian conferences Colombian Representative to the Erasmus Mundus Association (2013-2016) Oxford University Latin American Society, Treasurer (2015-2016) Oxford University Colombian Society, Treasurer (2014-2016) Antioquia OSA Student Chapter, President (2009-2010)
SPORTS ACHIEVEMENTS	JKA England (Karate) squad member 2015 – Silver and Bronce medalist in All England Championship and Oxford University Squad Captain (2015) Colombian Karate national team competitor (2006-2008) – South American Silver medalist and Panamerican Bronce medalist. Multiple Colombian national champion.
HONORS	Congress of Colombia distinction to the Committee of Colombian Association at MIT (2019) MIT Association of the year to the Colombian Association at MIT Oxford University Full Blue award (2015 & 2016) and half-blue award (2014) Sport and social leader, Rionegro (Colombia) Town Hall (2002)
INTERESTS	Science outreach, gardening, literature, guitar, social justice, football, hiking, and karate.

REFERENCES

Prof. Harish Bhaskaran - PhD Advisor
University of Oxford - Department of Materials
Parks Road, OX1 3HP, Oxford, UK.
email: harish.bhaskaran@materials.ox.ac.uk
Tel: +44 18652 73772

Prof. Juejun Hu - Postdoctoral advisor
Massachusetts Institute of Technology
Department of Materials Science and Engineering
77 Mass. Ave., Cambridge, MA 02139, USA.
Email: hujuejun@mit.edu | Tel: +1 302 766 3083

Prof. Wolfram Pernice - Master's thesis Advisor
University of Münster -Physics Institute / CeNTech
Heisenbergstr. 11, D - 48149 Münster, Germany
email: wolfram.pernice@uni-muenster.de
Tel: +49 251 83-63957

Prof. John Fredy Barrera - Undergrad Thesis Advisor
Universidad de Antioquia - Instituto de Física
Calle 67 No. 53-108, AA 1226, Medellín, Colombia
Email: john.barrera@udea.edu.co
Tel: +57 4 219 5630