NATHAN YOUNGBLOOD, PHD

Associate Professor
William Kepler Whiteford Faculty Fellow
Department of Electrical and Computer Engineering
Department of Physics and Astronomy (Secondary)
University of Pittsburgh
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EDUCATION

University of Oxford, Oxford, UK	MSE, Post-Doc	2017–2019
University of Minnesota, Minneapolis, MN	ECE, Ph.D.	2016
University of Minnesota, Minneapolis, MN	ECE, M.S.	2015
Bethel University, St. Paul, MN	Physics, B.S.	2011

PROFESSIONAL POSITIONS

05/2025 – Present	Associate Professor, Department of Electrical and Computer Engineering, University of Pittsburgh, Pittsburgh, PA
	Associate Professor, Department of Physics and Astronomy (Secondary), University of Pittsburgh, Pittsburgh, PA
09/2019 – 05/2025	Assistant Professor, Department of Electrical and Computer Engineering, University of Pittsburgh, Pittsburgh, PA
01/2017 – 08/2019	Postdoctoral Fellow, Department of Materials Science and Engineering, University of Oxford, Oxford, UK

SUMMARY OF SCHOLARLY ACTIVITY

- *h*-index 31; >8,450 total citations (Google Scholar)
- 53 peer-reviewed journal publications including:
  - 4 Web of Science "highly cited" papers (top 1% in field)
  - 1 Web of Science "hot paper" (top 0.1% in field)
  - Top 0.1% of researchers by annual citations in "Optoelectronics & Photonics" according to Stanford's single-year standardized citation list (http://doi.org/10.17632/btchxktzyw.8)
- 41 invited presentations
- 9 graduate and >10 undergraduate students mentored
- ~$6.25M (~$3.5M to Pitt) total external research funding
- NSF CAREER (2024) and AFOSR YIP (2024) awardee
- William Kepler Whiteford Faculty Fellow (2024)
- *Optica* Senior Member (2024)
- Alexander Humboldt Foundation: Friedrich Wilhelm Bessel Research Award (2025)

PUBLICATIONS

(Youngblood Photonics Lab group members and co-advisees in **bold**)

58. **X. Zhang**, **N. Rooney**, **S. Rahimi Kari**, M. Tamura, **N. Nobile**, H. Sun, C. Lian, C. A. Ríos Ocampo, B.J. Shastri, F. Xiong, **N. Youngblood**, "Non-Volatile Trimming of Silicon Photonic Resonators using an Integrated Phase-Change Material Microheater" *Submitted* (2025)
57. C.-Y. Lee, Y.-S. Huang, F. Adams, C. Lian, H. Sun, J. Zhao, Z. Ye, **N. Youngblood**, J.J. Hu, L. H. Allen, Y. Mo, I. Takeuchi, C. A. Ríos Ocampo, "Incorporating Si and $SiSe_2$ into Sb_2Se_3: Tailoring Optical Phase Change Materials via Nanocomposites" *Under Review* (2025)
56. Z. Guo, A. Aadhi, A.N. McCaughan, A.N. Tait, **N. Youngblood**, S.M. Buckley, B.J. Shastri, "Fully analog end-to-end online training with real-time adaptability on integrated photonic platform" *Under Review* (2025)
55. **S. Rahimi Kari**, P. Pintus, J. E. Bowers, M. Robbins, **N. Youngblood**, "Enabling High-Bandwidth Coherent Modulation Through Scalable Lithium Niobate Resonant Devices," *Under Review* (2025)
54. Q. Wan, **D. Vaz**, X. Li, A. Ramavath, B. Vargo, J. Ye, J. Beaumariage, K. Watanabe, T. Takashi, Z. Sun, D. Smirnov, **N. Youngblood**, I. V. Bondarev, D. W. Snoke, "Proof of Light-Induced Electron Pairing in a Bilayer Structure," *Under Review* (2025)
53. **N. Youngblood**, C. A. Ríos Ocampo, J.J. Hu, "Non-Volatile Materials for Photonic Computing," invited contribution to "Roadmap on Neuromorphic Photonics," *to appear in* ***Journal of Physics: Photonics*** (2025)
52. Y. He, P.S. Cao, S. Hashemkhani, Y. Liu, **D. Vaz**, K. Joy, **N. Youngblood**, R. Kubendran, M.P. Anantram, F. Xiong, "Artificial Synapse with Tunable Dynamic Range for Neuromorphic Computing with Ion Intercalated Bilayer Graphene" *Accepted for publication in* ***npj Unconventional Computing*** (2025)
51. C. A. Ríos Ocampo, **N. Youngblood**, "Processing matrix multiplications in a single shot," ***Nature Photonics "News and Views"*** (2025)
50. **N. Nobile**, **V. Shah**, **N. Youngblood**, "A Flexible Testbed for Prototyping Photonic Processors," ***Optics Express*** 33 (21), 45154-45170 (2025)
49. L. Liu, **S. Rahimi Kari**, X. Xin, **N. Youngblood**, Y. Zhang, J. Yang, "LightML: A Photonic Accelerator for Efficient General Purpose Machine Learning," ***The 52nd ACM International Symposium on Computer Architecture (ISCA),*** Tokyo, Japan (2025)
48. H. Sun, C. Lian, F. Vásquez-Aza, **S. Rahimi Kari**, Y.S. Huang, A. Restelli, S. A. Vitale, I. Takeuchi, J.J. Hu, **N. Youngblood**, G. Pavlidis, C. A. Ríos Ocampo, "Microheater hotspot engineering for repeatable multi-level switching in foundry-processed phase change silicon photonics," ***Nature Communications*** 16, 4291 (2025)
47. **V. Shah**, **N. Youngblood**, "Leveraging Continuously Differentiable Activation Functions for Learning in Quantized Noisy Environments," ***IEEE JSTQE*** 31(3), 1-9 (2025)
46. **S. Rahimi Kari**, M. Tamura, Z. Gao, Y.S. Huang, H. Sun, C. Lian, **N. Nobile**, **J. Erickson**, C. A. Ríos, B. Shastri, **N. Youngblood**, "High-Speed Multifunctional Photonic Memory on a Foundry-Processed Photonic Platform," ***Optica*** 12(1), 31-38 (2025)
45. P. Pintus, M. Dumont, **V. Shah**, T. Murai, Y. Shoji, D. Huang, J. E. Bowers, **N. Youngblood**, "Integrated nonreciprocal magneto-optics with ultra-high endurance for photonic in-memory computing," ***Nature Photonics*** 19, 54-62 (2025) **Featured in *Nature Photonics* "News and Views"**

44. D. Upcraft, **D. Vaz**, **N. Youngblood**, S.-H. Oh, "Efficient TE-polarized mode coupling between a plasmonic tunnel junction and a photonic waveguide," ***Optics Express*** (2024)
43. M. Zheng, C. Chu, Q. Lou, **N. Youngblood**, M. Li, S. Moazeni, L. Jiang, "OFHE: An Electro-Optical Accelerator for Discretized TFHE," ***ISLPED 24: Proceedings of the 29th ACM/IEEE International Symposium on Low Power Electronics and Design*** (2024)
42. **S. Rahimi Kari**, **N. Nobile**, **D. Pantin**, **V. Shah**, **N. Youngblood**, "Realization of an integrated coherent photonic platform for scalable matrix operations," ***Optica*** 11(4), 542-551 (2024)
41. **N. Nobile**, C. Lian, H. Sun, Y.-S. Huang, B. Mills, C. Constantin Popescu, D. Callahan, J. Hu, C.A. Ríos Ocampo, **N. Youngblood**, "Nonvolatile Tuning of Bragg Structures Using Transparent Phase-Change Materials" ***Optics Materials Express*** 13(10), 2700-2710 (2023)
40. **J. Erickson**, **N. Nobile**, **D. Vaz**, G. Vinod, C. Ríos, Y. Zhang, JJ Hu, S. Vitale, F. Xiong, **N. Youngblood**, "Comparing the thermal performance and endurance of resistive and PIN silicon microheaters for phase-change photonic applications," ***Optics Materials Express*** 13 (6), 1677-1688 (2023)
39. **N. Youngblood**, C. Ríos, W.H.P Pernice, H. Bhaskaran "Integrated Optical Memristors," ***Nature Photonics*** 17, 561-572 (2023)
38. W. Zhou, B. Dong, N. Farmakidis, X. Li, **N. Youngblood**, K. Huang, Y. He, C. D. Wright, W. H. P. Pernice, H. Bhaskaran, "In-memory photonic dot-product engine with electrically programmable weight banks," ***Nature Communications*** 14, 2887 (2023)
37. **S. Rahimi Kari**, C. Ríos, L. Jiang, J. Meng, N. Peserico, V. J. Sorger, JJ Hu, **N. Youngblood**, "Optical and Electrical Memories for Analog Optical Computing," ***IEEE JSTQE*** 29(2), 16100812 (2023)
36. **N. Youngblood**, "Coherent Photonic Crossbar Arrays for Large-Scale Matrix-Matrix Multiplication [Invited]," ***IEEE JSTQE*** 29(2), 1–11 (2023)
35. **V. Shah**, **N. Youngblood**, "AnalogVNN: A Fully Modular Framework for Modeling and Optimizing Photonic Neural Networks," ***APL Machine Learning*** 1, 026116 (2023)
34. **N. Nobile**, **J. Erickson**, C. Ríos, Y. Zhang, JJ Hu, S. Vitale, F. Xiong, **N. Youngblood**, "Time-resolved temperature mapping leveraging the strong thermo-optic effect in phase-change devices," *advanced online publication in* ***ACS Photonics*** (2023)
33. J. Y. S. Tan* / Z. Cheng*, J. Feldmann, X. Li, **N. Youngblood**, U. E. Ali, C. D. Wright, W. H. P. Pernice, H. Bhaskaran, "Monadic Pavlovian associative learning in a backpropagation-free photonic network," ***Optica*** 9(7), 792–802 (2022)
32. C. Lian, C. Vagionas, T. Alexoudi, N. Pleros, **N. Youngblood**, C. Ríos, "Photonic (computational) memories: tunable nanophotonics for data storage and computing," ***Nanophotonics*** 11(17), 3823-3854 (2022)
31. N. Farmakidis* / **N. Youngblood***, J. S. Lee, J. Feldmann, A. Lodi, X. Li, S. Agarwal, W. Zhou, L. Bogani, W. H. P. Pernice, C. D. Wright, H. Bhaskaran, "Electronically reconfigurable photonic switches incorporating phase change plasmonics," ***Advanced Science*** 2200383 (2022)
30. **J. Erickson**, **V. Shah**, Q. Wan, **N. Youngblood**, F. Xiong, "Designing fast and efficient electrically driven phase change photonics using foundry compatible waveguide-integrated microheaters," ***Optics Express*** 30, 13673-13689 (2022)

29. **N. Youngblood**, C. Talagrand, B. Porter, C. G. Galante, S. Kneepkens, D. Yarmolich, R. S. Bonilla, P. Hosseini, R. Taylor, H. Bhaskaran, "Reconfigurable Low-Emissivity Optical Coating Using Ultrathin Phase Change Materials," ***ACS Photonics*** 9(1), 90–100 (2022) **Featured in *The Times, London* and the *Daily Mail***
28. N. Farmakidis* / J. L. Swett*, **N. Youngblood**, X. Li, C. Evangeli, S. Agarwal, J. A. Mol, H. Bhaskaran, "Exploiting rotational asymmetry for sub-50 nm mechanical nanocalligraphy," ***Microsystems & Nanoengineering*** 7, 84 (2021)
27. J. Feldmann* / **N. Youngblood*** / M. Karpov*, H. Gehring, X. Li, M. Stappers, M. Le Gallo, X. Fu, A. Lukashchuk, A. Raja, J. Liu, C. D. Wright, A. Sebastian, T. Kippenberg, W. H. P. Pernice, H. Bhaskaran, "Parallel convolution processing using an integrated photonic tensor core," ***Nature*** 589, 52–58 (2021) [Web of Science ***"Hot Paper"***] **Featured in *Nature* "News and Views"**
26. X. Ma, **N. Youngblood**, X. Liu, Y. Cheng, P. Cunha, K. Kudtarkar, X. Wang, S. Lan, "Engineering photonic environments for two-dimensional materials," ***Nanophotonics*** 10(3), 1031-1058 (2021)
25. Q. He, **N. Youngblood**, Z. Cheng, X. Miao, H. Bhaskaran, "Dynamically tunable transmissive color filters using ultra-thin phase change materials," ***Optics Express*** 28, 39841–39849 (2020)
24. X. Li, **N. Youngblood**, Z. Cheng, S. G.-C. Carrillo, E. Gemo, W. Zhou, W. H. P. Pernice, C. D. Wright, H. Bhaskaran, "Experimental investigation of silicon and silicon nitride platforms for phase change photonic in-memory computing," ***Optica*** 7(3), 218–225 (2020)
23. J. Feldmann, **N. Youngblood**, X. Li, C. D. Wright, H. Bhaskaran, W. H. P. Pernice, "Integrated 256 cell photonic phase change memory with 512-bit capacity," ***IEEE JSTQE*** 26(2), 1–7 (2020)
22. F. Zokaee, Q. Lou, **N. Youngblood**, W. Liu, Y. Xie, L. Jiang, "LightBulb: a photonic-nonvolatile-memory-based accelerator for binarized convolutional neural networks" ***2020 Design, Automation & Test in Europe Conference & Exhibition (DATE)*** 1438–1443 (2020)
21. N. Farmakidis* / **N. Youngblood***, X. Li, J. Tan, J. L. Swett, Z. Cheng, W. H. P. Pernice, C. D. Wright, H. Bhaskaran, "Plasmonic nanogap enhanced phase change devices with dual electrical-optical functionality," ***Science Advances*** 5(11), eaaw2687 (2019) **Featured in *Nature* "Research Highlights"**
20. S. G.-C. Carrillo, E. Gemo, X. Li, **N. Youngblood**, A. Katumba, P. Bienstman, W. H. P. Pernice, H. Bhaskaran, C. D. Wright, "Behavioral modeling of integrated phase-change photonic devices for neuromorphic computing applications," ***APL Materials*** 7, 091113 (2019)
19. S. G. Sarwat, Z. Cheng, **N. Youngblood**, M. S. Alias, S. Sinha, J. H. Warner, H. Bhaskaran, "Strong Opto-structural coupling in low dimensional GeSe3 films," ***Nano Letters*** 19 (10), 7377–7384 (2019)
18. E. Gemo, S. G.-C. Carrillo, C. R. De Galarreta, A. Baldycheva, H. Hayat, **N. Youngblood**, H. Bhaskaran, W. H. P. Pernice, C. D. Wright, "Plasmonically-enhanced all-optical integrated phase-change memory," ***Optics Express*** 27(17), 24724–24737 (2019)
17. J. Feldmann, **N. Youngblood**, C. D. Wright, H. Bhaskaran, W. H. P. Pernice, "All-optical spiking neurosynaptic networks with self-learning capabilities" ***Nature*** 569, 208–214 (2019) [Web of Science ***"Highly Cited Paper"***] **Featured in *Nature* "News and Views"**

16. **N. Youngblood**, C. A. Rios, 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," ***Advanced Functional Materials*** 29, 1807571 (2019)
15. X. Li, **N. Youngblood**, C. A. Rios, 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*** 6(1), 1–6 (2019) [Web of Science ***"Highly Cited Paper"***] **Featured on the cover of *Optica***
14. C. A. Rios* / **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) [Web of Science ***"Highly Cited Paper"***] **Featured on IBM's research blog and in *Nature Electronics* "Research Highlights"**
13. S. G. Sarwat, **N. Youngblood**, Y.-Y. Au, J. A. Mol, C. D. Wright, H. Bhaskaran, "Engineering interface-dependent photoconductivity in $Ge_2Sb_2Te_5$ nanoscale devices," ***ACS Applied Materials and Interfaces*** 10(51), 44906–44914 (2018)
12. C. A. Rios, 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]," ***Optical Materials Express*** 8(9), 2455–2470 (2018)
11. Z. Cheng, C. A. Rios, **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, 1802435 (2018)
10. Z. Cheng, C. A. Rios, **N. Youngblood**, C. D. Wright, W. H. P. Pernice, H. Bhaskaran, "On-chip phase-change photonic memory and computing," ***SPIE Proceedings***, 10345:1034519 (2017)
9. R. Peng, K. Khaliji, **N. Youngblood**, R. Grassi, T. Low, M. Li, "Mid-infrared electro-optic modulation in few-layer black phosphorus," ***Nano Letters***, 17, 6315–6320 (2017)
8. M. Xu, Y. Gu, R. Peng, **N. Youngblood**, M. Li, "Black phosphorus mid-infrared photodetectors," ***Applied Physics B***, 123:130 (2017)
7. **N. Youngblood**, M. Li, "Ultrafast photocurrent measurements of a black phosphorus photodetector," ***Applied Physics Letters***, 110, 051102 (2017)
6. C. Chen, **N. Youngblood**, R. Peng, D. Yoo, D. A. Mohr, T. W. Johnson, S.-H. Oh, M. Li, "Three-dimensional integration of black phosphorus photodetector with silicon photonics and nanoplasmonics," ***Nano Letters***, 17, 6315–6320 (2017)
5. **N. Youngblood**, R. Peng, A. Nemilentsau, T. Low, M. Li, "Layer tunable third-harmonic generation in multilayer black phosphorus," ***ACS Photonics***, 4(1), 8–14 (2017)
4. **N. Youngblood**, M. Li, "Integration of 2D materials on a silicon photonics platform for optoelectronics applications," *Invited Review Article for* ***Nanophotonics***, 6(6), 1205–1218 (2016)
3. **N. Youngblood**, C. Chen, S. J. Koester, M. Li, "Waveguide-integrated black phosphorus photodetector with high responsivity and low dark current," ***Nature Photonics***, 9, 249–252 (2015) [Web of Science ***"Highly Cited Paper"***]
2. S. C. Lee, **N. Youngblood**, Y. B. Jiang, E. J. Peterson, C. J. M. Stark, T. Detchprohm, C. Wetzel, S. R. J. Brueck, "Incorporation of indium on cubic GaN epitaxially induced on a nanofaceted Si(001) substrate by phase transition," ***Applied Physics Letters***, 107(23), 231905 (2015)

1. **N. Youngblood**, Y. Anugrah, R. Ma, S. J. Koester, M. Li, "Multifunctional graphene optical modulator and photodetector integrated on silicon waveguides," ***Nano Letters***, 14(5), 2741–2746 (2014)

BOOK CHAPTERS

1. **N. Youngblood**, C. A. Rios, "Configuring Phase Change Photonics for Memories and Computing," *Phase Change Materials-Based Photonic Computing,* (2024) edited by H. Bhaskaran, W. Pernice, (Elsevier, Amsterdam, Netherlands, ISBN: 978-0-12-823491-4).

CONFERENCES PROCEEDINGS

34. **S. Rahimi Kari**, M. Tamura, Z. Guo, Y.-S. Huang, H. Sun, C. Lian, **N. Nobile**, M. Moridsadat, C.A. Ríos Ocampo, B. Shastri, **N. Youngblood**, "Integrated PN Microheaters for Fast and Efficient Control of Phase-Change Photonic Memory," ***Conference on Lasers and Electro-Optics (CLEO)***, Long Beach, CA (May 2025)
33. **N. Nobile**, **V. Shah**, D. Luberger, D. Feathers, M. Kornish, B. Kornish, D. Flynn, **N. Youngblood**, "A Flexible Testbed for Prototyping Photonic Processors," ***Conference on Lasers and Electro-Optics (CLEO)***, Long Beach, CA (May 2025)
32. **S. Rahimi Kari**, **N. Nobile**, **D. Pantin**, **V. Shah**, **N. Youngblood**, "Realization of an integrated photonic platform for coherent photoelectric processing," ***Conference on Lasers and Electro-Optics (CLEO)***, Charlotte, NC (May 2024)
31. **N. Nobile**, C. Lian, H. Sun, Y.-S. Huang, B. Mills, C. Constantin Popescu, D. Callahan, J. Hu, C.A. Ríos Ocampo, **N. Youngblood**, "Nonvolatile Tuning of Bragg Structures Using Transparent Phase-Change Materials," ***Conference on Lasers and Electro-Optics (CLEO)***, Charlotte, NC (May 2024)
30. F. Vasquez-Aza, H. Sun, C. Lian, Y.S. Huang, S. A. Vitale, I. Takeuchi, J. Hu, **N. Youngblood**, C. Rios, G. Pavlidis, "Maximizing the Thermal Performance of Microheaters for Non-Volatile Phase Change Photonics: A Comparative Study of Pulse Width Parameter Effects," ***IEEE ITherm 2024***, Denver, CO (May 2024)
29. **S. Rahimi Kari**, **D. Pantin**, **N. Youngblood**, "Scalable and efficient coherent photonic unit cell for time-multiplexed multiplication and correlation detection," ***SPIE Photonics West***, San Francisco, CA (Jan 2023)
28. **V. Shah**, **N. Youngblood**, "AnalogVNN: A Fully Modular Framework for Photonic Analog Neural Networks," ***IEEE IPC 2022***, Vancouver, Canada (Nov 2022)
27. **N. Nobile**, **J. Erickson**, C. Rios, Y. Zhang, JJ Hu, F. Xiong, **N. Youngblood**, "Dynamic Mapping of Temperature Using Phase-Change Materials," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2022)
26. N. Farmakidis, **N. Youngblood**, J. S. Lee, J. Feldmann, W. H. P. Pernice, C. D. Wright, H. Bhaskaran, "Plasmonically Enhanced Electronically Addressable Photonic Switches Incorporating Phase-Change Materials," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2022)
25. W. Zhou, X. Li, **N. Youngblood**, W. H. P. Pernice, C. D. Wright, H. Bhaskaran, "Electrical switching of $Ge_2Sb_2Te_5$ memory cells based on silicon photonic waveguide microheaters," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2022)

24. **J. Erickson**, **V. Shah**, Q. Wan, **N. Youngblood**, F. Xiong, "Designing fast and efficient electrically driven phase change photonics using foundry compatible waveguide-integrated microheaters," ***Photonics and Electronics Research Symposium (PIERS)***, Hangzhou, China (2022)
23. J. Tan, Z. Cheng, J. Feldmann, X. Li, **N. Youngblood**, U. E. Ali, C. D. Wright, W. H. P. Pernice, H. Bhaskaran, "Associative learning on phase change photonics," ***SPIE Nanoscience + Engineering***, San Diego, CA (2021)
22. E. Gemo, S. G. C. Carrillo, J. Faneca, C. Ruíz de Galarreta, H. Hayat, **N. Youngblood**, A. Baldycheva, W. H. P. Pernice, H. Bhaskaran, C. D. Wright, "Sub-wavelength plasmonic-enhanced phase-change memory," ***SPIE OPTO***, San Francisco, CA (2020)
21. X. Li, **N. Youngblood**, W. Zhou, J. Feldmann, J. L. Swett, S. Aggarwal, A. Sebastian, C. D. Wright, W. H. P. Pernice, H. Bhaskaran, "On-chip Phase Change Optical Matrix Multiplication Core," ***2020 IEEE International Electron Devices Meeting (IEDM)***, San Francisco, CA, 7.5.1–7.5.4 (2020)
20. **N. Youngblood**, N. Farmakidis, X. Li, H. Bhaskaran, "Nanoscale Optoelectronic Memory with Nonvolatile Phase-Change Photonics [Highlighted Talk]," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, California USA (2020)
19. E. Gemo, S. G. C. Carrillo, J. Faneca, **N. Youngblood**, W. H. P. Pernice, H. Bhaskaran, C. D. Wright, "A plasmonic route towards the energy scaling of on-chip integrated all-photonic phase-change memories," ***European Phase-Change and Ovonic Symposium (E\PCOS)***, Grenoble, France (2019)
18. **N. Youngblood**, Z. Cheng, N. Farmakidis, X. Li, J. Tan, H. Bhaskaran, "Phase change photonics for brain-inspired computing," ***SPIE Defense + Commercial Sensing***, Baltimore, MD (2019)
17. C. Ríos, **N. Youngblood**, Z. Cheng, M. Le Gallo, W. H. P. Pernice, C. D. Wright, A. Sebastian, and H. Bhaskaran, "All-photonic in-memory computing based on phase-change materials," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2019)
16. C. D. Wright, H. Bhaskaran, W. H. P. Pernice, S. G. Carrillo, E. Gemo, A. Baldycheva, Z. Cheng, X. Li, C. Rios, **N. Youngblood**, J. Feldmann, N. Gruhler, and M. Stegmaier, "Integrated Phase-change Photonics: A Strategy for Merging Communication and Computing," ***Optical Fiber Communication Conference (OFC),*** San Diego, CA (2019)
15. E. Gemo, **N. Youngblood**, Z. Cheng, C. Ríos, M. Stegmaier, A. Baldycheva, W. H. P. Pernice, H. Bhaskaran, C. D. Wright, "Modelling phase-change integrated photonic devices," ***European Phase-Change and Ovonic Symposium (E\PCOS)***, Catania, Italy (2018)
14. **N. Youngblood**, X. Li, H. Bhaskaran, "Phase-change materials for non-volatile, integrated photonic memory and computation [Invited Talk]," ***LIMIS***, Changsha, China (2018)
13. **N. Youngblood**, C. Talagrand, P. Hosseini, H. Bhaskaran, "Dynamic Smart Windows Using Phase Change Materials [Late Breaking Paper]," ***MRS Spring Meeting***, Phoenix, Arizona USA (2018)
12. **N. Youngblood**, C. Rios, E. Gemo, Z. Cheng, W. H. P. Pernice, C. D. Wright, H. Bhaskaran, "Phase change materials exhibit tunable volatility in integrated photonics," ***SPIE Photonics West***, San Francisco, California USA (2018)
11. R. Peng, K. Khaliji, **N. Youngblood**, R. Grassi , T. Low, M. Li, "Mid-infrared electro-optic modulation in few-layer black phosphorus," ***SPIE OPTO***, San Francisco, CA (2018)

10. Z. Cheng, C. Ríos, **N. Youngblood**, C. D. Wright, W. H. P. Pernice, H. Bhaskaran, "On-chip phase-change photonic memory and computing," ***SPIE Nanoscience + Engineering***, San Diego, CA (2017)
9. S. G. C. Carrillo, E. Gemo, **N. Youngblood**, X. Li, A. Katumba, P. Bienstman, W. H. P. Pernice, H. Bhaskaran, C. D. Wright, "A behavioural model for integrated phase-change photonics," ***European Phase-Change and Ovonic Symposium (E\PCOS)***, Aachen, Germany (2017)
8. R. Peng, **N. Youngblood**, M. Li, "Mid-infrared electro-optic modulation in black phosphorus," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2017)
7. C. Chen, D. Yoo, **N. Youngblood**, S. Oh, M. Li, "Mid-infrared plasmonic coaxial nanorings for surface enhanced infrared absorption (SEIRA) spectroscopy," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2017)
6. **N. Youngblood**, M. Li, "Ultrafast photocurrent spectroscopy in a black phosphorus van der waals heterostructure [Invited Talk]," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2016)
5. C. Chen, N. Youngblood, D. Mohr, D. Yoo, T. Johnson, R. Peng, S. Oh, and M. Li, "Black Phosphorus Photodetector on Silicon Photonic and Plasmonic Hybrid Platform," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2016)
4. **N. Youngblood**, R. Peng, A. Nemilentsau, T. Low, M. Li, "Thickness dependent third-harmonic generation in few-layer black phosphorus [Post-Deadline Talk]," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2016)
3. C. Chen, **N. Youngblood**, M. Li, "Study of black phosphorus anisotropy on silicon photonic waveguide," ***IEEE Optoelectronics Global Conference (OGC)***, Shenzhen, China (2015)
2. **N. Youngblood**, C. Chen, S. J. Koester, M. Li, "A black phosphorus FET integrated on a silicon waveguide for high speed, low dark current photodetection," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2015)
1. **N. Youngblood**, Y. Anugrah, R. Ma, S. J. Koester, M. Li, "Simultaneous optical modulation and detection using graphene integrated on a silicon waveguide," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, CA (2014)

INVITED TALKS

41. **N. Youngblood**, "Addressing Scalability Challenges in Photonic Computing Through Device and Architectural Design Strategies" ***International Conference on Physical Computing***, Erice, Italy (November 2025)
40. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***ECE Seminar***, University of Birmingham (October 2025)
39. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***MSE Seminar***, University of Oxford (October 2025)
38. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***Physics Seminar***, Imperial College London (October 2025)
37. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***ECE Seminar***, University College London (October 2025)

36. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***ECE Seminar***, DTU (September 2025)
35. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***ECE Seminar***, ETH Zurich (July 2025)
34. **S. Rahimi Kari**, P. Pintus, **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***15th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META)***, Torremolinos, Spain (July 2025)
33. **N. Youngblood**, "Phase-Change Materials for Photonic Memory and Computation" ***Virtual Guest Lecture for Photonic Computing Summer Course***, ETH Zurich (July 2025)
32. **N. Youngblood**, "Scalable Architectures for Photonic Compute-In-Memory Using Nonvolatile Optical Materials" ***PQI Workshop on Rivals to Quantum Computing***, Pittsburgh, PA (May 2025)
31. **N. Youngblood**, "Addressing Challenges in Programming Endurance and Speed for Nonvolatile Photonic Memory" ***MRS Fall 2024***, Boston, Massachusetts, USA (Dec 2024)
30. **N. Youngblood**, "Non-reciprocal materials for photonic in-memory computing" ***CSU ECE seminar***, Fort Collins, Colorado, USA (Sept 2024)
29. P. Pintus, M. Dumont, V. Shah, T. Murai, Y. Shoji, D. Huang, J. E. Bowers, **N. Youngblood**, "Non-reciprocal materials for photonic in-memory computing" ***Frontiers in Optics + Laser Science***, Denver, Colorado, USA (Sept 2024)
28. **N. Youngblood**, "Nonreciprocal platforms for on-chip photonic computing" ***UCSB ECE seminar***, Santa Barbara, California, USA (Aug 2024)
27. **N. Youngblood**, "Nonreciprocal platforms for on-chip photonic computing" ***SPIE Optics + Photonics***, San Diego, California, USA (Aug 2024)
26. P. Pintus, M. Dumont, V. Shah, T. Murai, Y. Shoji, D. Huang, J. E. Bowers, **N. Youngblood**, "Non-reciprocal materials for photonic in-memory computing" ***Advanced Photonics Conference***, Quebec City, Canada (July 2024)
25. **N. Youngblood**, "Nonvolatile platforms for on-chip photonic computing" ***Conference on Lasers and Electro-Optics (CLEO)***, Charlette, North Carolina, USA (May 2024)
24. **N. Youngblood**, "Photonic Architectures for In-Memory Computing" ***Q.ANT Q.olloquium***, Virtual Talk (Mar 2024)
23. **N. Youngblood**, "Photonic Architectures for In-Memory Computing Using Nonvolatile Optical Materials" ***CadenceCONNECT 2024 Photonics***, San Jose, CA (Feb 2024)
22. **N. Youngblood**, "Reconfigurable phase-change photonic platforms for fast and efficient in-memory computing" ***SPIE Optics + Photonics***, San Diego, CA (Aug 2023)
21. **N. Youngblood**, "Computational photonic crossbar arrays for scalable and efficient matrix operations," ***2nd Workshop on Neuromorphic Photonics and Applications***, Athens, Greece (July 2023)
20. **N. Youngblood**, "Measuring the dynamic thermal response in electrically programmable phase-change photonics," ***PhotoniX Forum 2023***, Hangzhou, China (May 2023)
19. **N. Youngblood**, "Measuring the dynamic thermal response in electrically programmable phase-change photonics," ***Materials Research Society (MRS) Spring Meeting***, San Francisco, CA (April 2023)

18. **N. Youngblood**, "Reconfigurable photonic platforms for fast and efficient in-memory computing," ***Hewett Packard LSIP Tech Talk***, Virtual Seminar (Mar 2023)
17. **N. Youngblood**, "Photonic Architectures for Computing in Memory Using Nonvolatile Optical Materials," ***IEEE HPCA-29***, Montreal, Canada (Feb 2023)
16. **N. Youngblood**, **V. Shah**, **S. Rahimi Kari**, "Computational photonic crossbar arrays for scalable and efficient matrix operations," ***SPIE Photonics West***, San Francisco, CA (Jan 2023)
15. **N. Youngblood**, "Reconfigurable phase-change photonics for fast and efficient in-memory computing," *NanoES Seminar*, ***University of Washington***, Seattle, WA (Nov 2022)
14. **N. Youngblood**, "Photonic crossbar arrays for scalable photonic computing," *Invited Talk*, ***IEEE IPC 2022***, Vancouver, Canada (Nov 2022)
13. **N. Youngblood**, "Reconfigurable photonic materials for optical memory, computation, and beyond," *MSE Graduate Seminar*, ***University of Maryland***, College Park, MD (Oct 2022)
12. **N. Youngblood**, "Integrated photonics circuits for fast and efficient (classical) computing," *Invited Talk,* ***PQI 2022 Conference***, Pittsburgh, PA (Sept 2022)
11. **N. Youngblood**, "Design and characterization of electrically programmable phase change photonic devices," *Invited Talk*, ***12th International Conference on Metamaterials, Photonic Crystals and Plasmonics (META 2022)***, Torremolinos, Spain (July 2022)
10. **N. Youngblood**, "Controlling and characterizing phase change devices for photonic computing applications," *Invited Seminar for Advanced Nanoscale Engineering Group*, ***University of Oxford***, Oxford, UK (July 2022)
9. **N. Youngblood**, "Phase change materials for photonic memory and neuromorphic computing," *Guest Lecture*, ***CMC Active Silicon Photonics Fabrication Course***, Virtual Event (June 2022)
8. **N. Youngblood**, "Reconfigurable photonic systems for optical memory, computation, and beyond," *ECE Graduate Seminar*, ***Tufts University***, Medford, MA (March 2022)
7. **N. Youngblood**, "Reconfigurable photonic processors for ultrafast and efficient computation," ***Accipiter Systems***, Wexford, PA (March 2022)
6. **N. Youngblood**, "Nanoscale Optoelectronic Memory with Nonvolatile Phase-Change Photonics," ***Pittsburgh Quantum Institute***, Pittsburgh, PA (July 2020)
5. **N. Youngblood**, "Phase-change materials for photonic memory, computing, and beyond," *ECE Graduate Seminar*, ***University of Minnesota***, Minneapolis, MN (Feb 2020)
4. **N. Youngblood**, "Phase-change materials for photonic memory, computing, and beyond," *Physics Undergraduate Seminar*, ***Bethel University***, St. Paul, MN (Feb 2020)
3. **N. Youngblood**, "Phase-change photonic computing and beyond," *ECE Graduate Seminar*, ***University of Pittsburgh***, Pittsburgh, PA (2019)
2. **N. Youngblood**, X. Li, H. Bhaskaran, "Phase-change materials for non-volatile, integrated photonic memory and computation," ***LIMIS***, Changsha, China (2018)
1. **N. Youngblood**, M. Li, "Ultrafast photocurrent spectroscopy in a black phosphorus van der waals heterostructure," ***Conference on Lasers and Electro-Optics (CLEO)***, San Jose, California USA (2016)

DISCLOSURES AND PATENTS

8. **N. Youngblood**, **N. Nobile**, **V. Shah**, "COTS Photonic Tensor Processor," Invention Disclosure, 11 Jan 2024
7. **N. Youngblood**, F. De Ros, "Distributed Coherent Time-Multiplexed Photonic Computing," Invention Disclosure, 6 Nov 2023
6. **N. Youngblood**, P. Pintus, "Systems and methods for non-reciprocal magneto-optics," US Patent App. 63/608,796, 22 Dec 2023
5. M. Robbins, **N. Youngblood**, M. Puckett, "Methods and apparatus for modulating light," US Patent App. 63/604,130, 29 Nov 2023
4. **N. Youngblood**, "Systems and methods for coherent photonic crossbar arrays," US-20240370050-A1, US Patent App. 63/224,994 and 63/278,885, 13 Sept 2022
3. A. Sebastian, M. Le Gallo-Bourdeau, C. D. Wright, **N. Youngblood**, H. Bhaskaran, X. Li, W. H. P. Pernice, J. Feldmann, "Photonic in-memory co-processor for convolutional operations" P201904211US01, US Patent App. 16/925,998, July 2020
2. C. Rios, **N. Youngblood**, Z. Cheng, H. Bhaskaran, "Optical methods and devices," US 16/764,893, 29 Oct 2020
1. **N. Youngblood**, C. Rios, H. Bhaskaran, "Large area switching & sensing of a phase-change material integrated in a capacitor via displacement current," WO 2018/224807, 13 Dec 2018

DOCUMENTED SOFTWARE

1. **V. Shah**, **N. Youngblood**, "AnalogVNN: A PyTorch Framework for Modeling Analog Neural Networks," https://analogvnn.readthedocs.io/en/latest/, Oct 2022

GRANTS

External, Competitive Grants ($3.5M total Pitt share):

Active

10. PI, "Distributed Coherent Optical Computing via Injection-Locked Photonic Networks," DoD/ONR, 01/26–01/29, $492,853 (*selected for award, pending contract*)
9. Research Fellow, "Friedrich Wilhelm Bessel Research Award," Alexander Humboldt Foundation, 12/25–12/27, €60,000
8. PI, "CAREER: Multi-Dimensional Photonic Accelerators for Scalable and Efficient Computing," NSF/CCSS, 04/24–03/29, $552,166
7. PI, "YIP: Photonic in-memory accelerators for low-latency and efficient computing," DoD/AFOSR, 02/24–01/27, $449,240
6. Co-Investigator (PI: Accipiter Systems), "SBIR: High Throughput Photonic Processor for AI/ML Programs," DoD/SCO, 10/22–06/24, $1,471,417
5. PI, "Waveguide-Integrated Graphene Nano-tweezERs (WIGNER) for rapid sorting and analysis of nanovesicles and viruses," NSF/CCSS, 09/22–08/25, $480,000
4. Co-Investigator (PI: Rios), "Fast and efficient phase-change photonics using low-dimensional materials" NSF/EPMD, 09/22–08/25, $475,000

3. Co-Investigator (PI: Moazeni), "FET: Medium: A Hybrid Co-processing Unit (HCU) using Phase-change Photonics in CMOS for Large-scale and Ultra-fast Machine Learning Acceleration," NSF/CISE, 03/21–02/25, $1,200,000
2. PI, "High-endurance phase-change devices for electrically reconfigurable optical systems," NSF/EPMD, 09/20–08/24, $390,000
1. PI, "Elucidating Structural Transformations in MoTe2 for Efficient Optoelectronic Memory," NSF/DMR, 07/20–06/24, $501,953

Internal or Non-Competitive Grants:

Active

6. PI, "Gift Supporting Photonics Research," OPe Technologies, 11/25–12/26, $25,000
5. Faculty Fellow, "William Kepler Whiteford Faculty Fellowship," Swanson School of Engineering, 09/24–08/28, $60,000

Previous

4. PI, "CrystaLight near-memory compute demonstrator," Steel Perlot, 09/23–09/24, $44,673
3. PI, "Highly Scalable and Efficient Deep Learning Accelerator Enabled by 3D Photonic Integration," Pitt Momentum Funds, 07/22–06/23, $25,000 (with additional $25,000 in matching support)
2. PI, "Pitt Lumerical Site License for Research of Impact," Pitt UPCAM, 01/22–12/22, $9,800
1. PI, "Rad-hard ferroelectric memory," NSF SHREC Industrial Support, 09/20–08/21, $40,000

SERVICE AND LEADERSHIP

Department, College, and University:

- Member, SSoE Computational Science and Engineering ad hoc committee, Feb 2024–present
- Member, Nano Fabrication and Characterization Facility committee, Fall 2024–present
- Member, University of Pittsburgh Strategic Quantum Advisory Committee, 2021–2024
- Member, University of Pittsburgh Quantum Computing Certificate Committee, 2021–2022
- Member, ECE ABET Outcome Sub-committee, 2020–2021
- Member, ECE Faculty Search Committee, March 2020

Conference:

- Optica (formerly OSA): Optical Fiber Conference (OFC)
  - Session Organizer, "SC N2: Optical and Photonics Networking for Data Center and Computing Applications," 2026
- Optica (formerly OSA): Conference on Lasers & Electro-Optics (CLEO)
  - Session Organizer, "A&T: Advances in Semiconductor Technology," 2026–2028
  - Session Organizer, "S&I: Micro- and Nanophotonics," 2021–2023
  - Session Chair for 3 sessions, 2021–2022
  - Special Panel Organizer and Moderator, "Opportunities and Challenges for Optical Phase-Change Materials in Foundry-Processed Photonics," May 2022
- IEEE: Si Photonics Conference (Formerly GFP)
  - Session Organizer, "Novel Materials and Processes," April 2023

- Optica (formerly OSA): Advanced Photonics Congress
  - Session Organizer, "IPR: Novel Materials," July 2022
- Photonics and Electromagnetics Research Symposium (PIERS)
  - Special Session Organizer and Chair, "SC3: Reconfigurable Photonic Circuits for Computing and Switching," April 2022
- Pittsburgh Quantum Institute (PQI) Conference
  - Organizer, "Workshop on 2D Materials: Bridging Research Communities," July 2025
  - Judge, Graduate Student Poster Competition, Fall 2019, Spring 2020, Fall 2020
- Conversations in Oxford: Future of Integrated Photonics in Computing
  - Conference Organizer, Aug 2019

Reviewer:

- NSF:
  - Panelist, MRSEC Review Panel, Sept 2022
  - Ad Hoc Panelist, HBCU-UP Panel, Nov 2020
  - Panelist and Scribe, NSF Workshop on AI session, "Opportunities for Photonics in ML Hardware," Nov 2020
  - Panelist, EPMD Core Panel, Oct 2020
- NASA:
  - Panelist, NASA Space Technology Graduate Research Opportunity, Jan 2021
- Optica (formerly OSA):
  - Reviewer, OSA Foundation Siegman School Fellowships, March 2020 & Feb 2023
- Journal Reviewer:
  - Nature, Nature Photonics, Nature Communications, Optica, Optics Express, ACS Photonics, Applied Physics Letters, Journal of Applied Physics, Scientific Bulletin, Advanced Materials, Advanced Electronic Materials

Community Outreach:

- Panelist at HCS Mon Valley high school "Engineering Job Shadow" panel, 2023–2024
- Workshop Organizer, LEAD AI Summer Workshop for high school students from underrepresented groups in STEM, 2021–present
- Workshop Organizer, Invest NOW: Virtual AI Summer Workshop for high school students from underrepresented groups in STEM, June 2021
- Volunteer/Lecturer, AI Group (part of the Boys & Girls Clubs of Western PA), 2019–2020