

Michael J. Nickerson

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SUMMARY

Integrated photonics engineer specializing in integrated optical phased arrays. Expertise in full PIC lifecycle from system and epitaxy design through component modeling, PDK development, mask layout, semiconductor fabrication, device measurement, and data analysis.

EDUCATION

UC Santa Barbara, Electrical and Computer Engineering	Sep 2018 – Oct 2023
Ph.D., GPA 4.00	Oct 2023
M.S.	Jun 2020
University of Washington, Physics	Aug 2003 - Jun 2006
B.S., GPA 3.60	Jun 2006

RESEARCH EXPERIENCE

Sr. Integrated Photonics Engineer, Analog Photonics	Nov 2023 – Present
<ul style="list-style-type: none"> - Managing multiple projects to develop optical phased array FMCW LiDAR with FSOC capability. 	
Graduate Student Researcher, UC Santa Barbara	Sep 2018 – Oct 2023
<ul style="list-style-type: none"> - Managed and executed an externally sponsored program to develop an integrated optical phased array, including defining project goals and timeline, device design, simulation, layout, fabrication, and testing. Project renewed for 3 years in a row. - Developed GaAs-based efficient broadband integrated optical phase modulators, resulting in 2 oral conference presentations at <i>CLEO 2022</i> and <i>APC IPR 2022</i>. The modulators exhibit single-sided $V_{\pi} \cdot L$ efficiency of $0.7 \text{ V} \cdot \text{cm}$ and RAM below 0.5 dB at 1030 nm, and $\geq 770 \text{ MHz}$ electro-optical bandwidth. - Developed GaAs-based integrated optical phased array with less than 10% deviation from theoretical performance, resulting in <i>Optics Express</i> paper. The 16-channel OPA achieves 0.92° beamwidth with 15.3° grating-lobe-free steering range and 12 dB sidelobe level at 1064 nm. 	
Assistant Technical Staff, MIT Lincoln Laboratory	May 2014 – Aug 2018
<ul style="list-style-type: none"> - Extended and maintained multiple high power coherently combined pulsed fiber laser testbeds. - Constructed automated wafer-level QCL testbench, reducing array measurement time from days to hours. 	
Professional Research Assistant, JILA, University of Colorado	Jun 2006 – Apr 2014
<ul style="list-style-type: none"> - Developed and executed laser cavity metrology and stabilization experiments involving multi-modal extended time scale measurements under high vacuum. - Managed the laboratory, designed and assembled optical, vacuum, and data acquisition systems. 	
Undergraduate Research Assistant, University of Washington	Aug 2003 – Jun 2006

AWARDS AND MEMBERSHIPS

Best Student Paper Award, 2023 Advanced Photonics Conference	July 2023
Dr. Samuel Blankenship DEPS Graduate Scholarship	Sep 2022
DEPS Graduate Scholarship	Aug 2019, Aug 2020, Aug 2021
Photonics Society at UCSB	Sep 2018 – Oct 2023
Treasurer, Executive Committee	Sep 2019 – Dec 2021
OSA, SPIE, IEEE, and IEEE Photonics Society Member	Sep 2018 – Present

PUBLICATIONS

- M. Nickerson, B. Song, J. Brookhyser, G. Erwin, J. Kleinert, and J. Klamkin, "Gallium arsenide optical phased array photonic integrated circuit," *Opt. Express*, vol. 31, no. 17, pp. 27106–27122, Aug. 2023. <https://doi.org/10.1364/OE.492556>
- M. Nickerson, J. Brookhyser, G. Erwin, B. Song, J. Kleinert, and J. Klamkin, "Gallium Arsenide Optical Phased Array Beam Steering Photonic Integrated Circuit," *Optica Advanced Photonics Congress* (2023), Jul. 2023.
- M. Nickerson, P. Verrinder, L. Wang, B. Song, and J. Klamkin, "Broadband Optical Phase Modulator with Low Residual Amplitude Modulation," *Optica Advanced Photonics Congress* (2022), paper IW4B.4, Jul. 24, 2022. <https://doi.org/10/grtvck>
- M. Nickerson *et al.*, "Broadband and Low Residual Amplitude Modulation Phase Modulator Arrays for Optical Beamsteering Applications," *Conference on Lasers and Electro-Optics* (2022), paper SS1D.4, May 15, 2022. <https://doi.org/10/grtvcm>
- P. A. Verrinder *et al.*, "Gallium Arsenide Photonic Integrated Circuit Platform for Tunable Laser Applications," *IEEE Journal of Selected Topics in Quantum Electronics*, vol. 28, no. 1, Jan 2022. <https://doi.org/10/gmzfnn>
- P. A. Verrinder *et al.*, "SGDBR tunable laser on gallium arsenide for 1030 nm lidar applications," *27th International Semiconductor Laser Conference (ISLC)*, Oct 2021. <https://doi.org/10/gpd82j>
- J. Fridlander *et al.*, "Photonic Integrated Circuits for Precision Spectroscopy," *2020 Conference on Lasers and Electro-Optics (CLEO)*, May 2020.
- C. A. Wang *et al.*, "MOVPE Growth of LWIR AlInAs/GaInAs/InP Quantum Cascade Lasers: Impact of Growth and Material Quality on Laser Performance," *IEEE Journal of Selected Topics in Quantum Electronics*, vol. 23, no. 6, pp. 1–13, Nov 2017. <https://doi.org/10/gfzm6b>
- M. Nickerson, E. Ames, and P. L. Bender, "Recent LISA studies at the University of Colorado," *J. Phys.: Conf. Ser.*, vol. 154, p. 012027, Mar 2009. <https://doi.org/10/bt7dpz>

TECHNICAL TALKS

Advanced Photonics Congress, Integrated Photonics Research (IPR), <i>Busan, South Korea</i>	Jul 2023
DEPS Directed Energy Science & Technology Symposium, <i>San Antonio, TX</i>	Apr 2023
Advanced Photonics Congress, Integrated Photonics Research (IPR), <i>remote</i>	Jul 2022
Conference on Lasers and Electro-Optics (CLEO), <i>remote</i>	May 2022
DEPS Directed Energy Science & Technology Symposium, <i>remote</i>	Mar 2021, Apr 2022
DEPS Directed Energy Science & Technology Symposium, <i>West Point, NY</i>	Mar 2020

PROFESSIONAL SKILLS

- Optical:** *proficient with* free space, integrated photonic, and fiber optical devices and systems including waveguides, phase and amplitude modulators, and standard optical components
- Fabrication:** *proficient in* semiconductor fabrication, fiber splicing, optical layout and alignment
- Programming and Software:** *proficient with* MATLAB, Lumerical, POSIX shell, nazca-design; *formerly proficient with* C++, PHP; *familiar with* Python, Mathematica, KLayout, SQL
- Test and Analysis:** *proficient in* electro-optical test and measurement system design and implementation; multi-modal automation of system operation, data collection, and analysis
- Electrical:** *proficient with* passive and active filters, high speed oscilloscopes, AWGs, optical and RF spectrum analyzers; *formerly proficient with* RF counters and design of analog signal conditioners and PLLs