Stanley Cheung, Ph.D.

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Status: **U.S. Citizen, Secret Clearance**

Education

University of California, Davis, Department of Electrical Engineering and Computer Engineering — Davis, CA
Doctorate of Philosophy in Electrical Engineering, Advisor: Prof. S. J. Ben Yoo — *2008 - 2014*

Columbia University, Department of Electrical Engineering — New York, NY
Master of Science in Electrical Engineering, Advisor: Prof. Chee-Wei Wong — *2004 - 2005*

University of Southern California, Department of Electrical Engineering — Los Angeles, CA
Bachelor of Science in Electrical Engineering — *1998 - 2002*

Employment and Work Experience

North Carolina State University, Heterogeneously Integrated Photonics (HIP) Laboratory — Raleigh, NC.
Title: Associate Professor and Director — *1/25 - Present*

- https://sites.google.com/ncsu.edu/hip-lab/home: Pushing the state-of-the-art in computational and communication systems research - this entails exploring novel heterogeneous semiconductor photonic devices, large-scale photonic integrated circuits, architecture/algorithm research, and developing a deeper understanding of neuromorphic/quantum-inspired computation that lies closer to physics.
- DARPA HAPPI (Heterogeneously Adaptively Produced Photonic Interfaces) (**PI**) (**$4,800,000**): The HAPPI program aims to revolutionize information transmission within microsystems by achieving a 1000x increase in connectivity density through advanced photonic solutions. The program focuses on developing three-dimensional optical routing capabilities both within and between chips, enabling unprecedented levels of information movement and processing throughout integrated systems.

Hewlett-Packard Laboratories, Large Scale Integrated Photonics Laboratory — Santa Barbara/Milpitas, CA.
Title: Master Technologist (Principal Research Scientist) — *8/19 – 1/25*

- National Reconnaissance Office (NRO) EiCON program (***Co-PI***) (**$200,000**): Electro-optic classification using optical neurons
- DARPA ESPNN program (***Co-PI***) (**$1,000,000**): Energy-Efficient Silicon Photonic Neuromorphic Network
- Department of Energy ARPA-E ULTRALIT program (contract no. DE-AR0001039): Ultra-Energy-Efficient Integrated DWDM Optical Interconnect.
- United States Government (Maryland Procurement Office) ColorWheel program (contract no. H98230-18-3-0001): VLSI DWDM Nano-photonics for High-Performance Information Transport and Processing.
- DARPA INSPIRED program: Intensity-Squeezed Photonic Integration for Revolutionary Detectors
- Managing internal research programs on non-volatile silicon photonics.
- Commercialization of HPE optical interconnects and Silicon Photonics PDK with foundry partners
- Management of outside vendors, foundries, and academic partners.

Psi Quantum — Palo Alto, CA.
Title: Research Engineer — *2/19 – 8/19*

- Managing a team of 8 responsible for data analysis of silicon photonic devices aimed at linear optical quantum computing.
- Improved efficiency (5x) and reliability of superconducting nanowire single photon detector (SNSPD) by designing and integrating an on-chip silicon polarization rotator.
- Designed silicon and silicon nitride cascaded lattice filters for high purity, single photon sources.
- Developed automated experimental systems with Python.

Hewlett-Packard Laboratories, Optical Interconnect Group — Palo Alto, CA.
Title: Sr. Research Scientist — *7/15 – 2/19*

- Contributed optical interconnect research which eventually transitioned into a new business unit.

- Demonstrated record-high GaAs monolithic high contrast grating mirror (>99.8%) for single mode and polarization locked VCSELs. Involved with all facets of design, mask layout, fabrication, and characterization.
- Demonstrated novel 1310 nm InAlGaAs/InP widely tunable (>40nm) laser source with high SMSR (>35dB) for purposes of integration with silicon photonic CWDM transmitters and optical mode transformers for low-loss coupling.
- Developing III-V/Si widely tunable laser sources via hydrophilic wafer-bonding.
- Designed Si and Si_3N_4 grating coupler, MZI lattice filters and arrayed waveguide grating mux/de-mux.
- Involved with all facets of InP /AlInGaAs/GaAs VCSELs (990-1065nm), edge emitting lasers (1310nm), and silicon photonic fabrication and characterization.
- Management of outside vendors, foundries, and academic partners.

Next Generation Networking Systems Laboratory, *Electrical and Computer Engineering Department* Davis, CA.
Title: Postdoctoral Scholar *12/14 – 7/15*

- Arrayed waveguide grating router (AWGR) based silicon photonic network on chip for high performance computing applications
- Epitaxial wafer designs for mid-IR wavelengths (4.6 μm and 7.5 μm)
- Designing tunable III-V/Si and III-V/Si_3N_4 hybrid lasers

Next Generation Networking Systems Laboratory, Electrical and Computer Engineering Department Davis, CA.
Title: Ph.D. student *5/08 – 12/14*
Thesis Topic: Heterogeneous Integration of III-V Semiconductor Compounds on Silicon for Functional Photonic Circuits

- Demonstrated long cavity, lowest repetition-rate 1-GHz hybrid mode-locked InGaAsP/InP monolithically integrated laser. (sponsor: Agilent Technologies)
- Demonstrated 10-GHz ring resonator colliding pulse mode-locked InGaAsP/InP semiconductor lasers. (sponsor: DARPA O-CDMA)
- Hydrophobic/hydrophilic wafer bonding of InP/InGaAsP and AlInGaAs quantum well active layers on patterned waveguides/arrayed waveguide gratings/modulators, etc. (sponsor: DARPA Si-PHASER)
- Highly efficient III-V/Si hybrid semiconductor optical amplifiers based on hydrophilic wafer bonding
- Worked on 8x8 AWGR silicon optical router with OPSIS-IME foundry
- Involved with all facets of InP/InGaAsP and InAlGaAs and silicon photonic fabrication including optimizing plasma dry etch of waveguides
- Familiarity with simulation and design of III-V InP epitaxy and InP laser performance when integrated with silicon photonic components
- Familiarity with fabrication of integrated III-V/Si hybrid lasers and semiconductor optical amplifiers
- Theoretical and numerical studies of pulse dynamics and semiconductor laser mode-locking regimes as well as semiconductor optical amplifiers.

L3 Harris, Photonics Division Carlsbad, CA.
Title: Optical Engineer *6/06 – 04/08*

- Designed MATLAB software for phase contrast microscopy to identify and classify optical fibers.
- Software development includes extracting feature points of the optical fiber's phase profile, fiber matching using statistical correlation, image enhancement algorithms, identifying and classifying all optical fibers in existence, camera calibration factors and a graphical user interface for fiber library updates.
- Developed and deployed a fully functional graphical user interface for a customer.
- Developed a non-destructive technique to extract refractive index of any optical fibers from phase contrast microscopy data.

Columbia University Optical Nanostructures Laboratory, Mechanical Engineering Department New York, NY.
Title: Graduate Researcher *9/05 – 12/05*

- Involved in the design of an electro-optic switch node with AlGaAs nanophotonics
- Optical switch was designed for nano-second switch time, low cross-talk, high extinction ratio, low switching power and met scalability for high performance computing
- Design was simulated in a finite-difference-time-domain (FDTD) software program.

MIT Lincoln Laboratories, Advanced Sensor Technologies Lexington, MA.

Title: Intern Engineer *6/05-8/05*

- Developed MATLAB code to account for radar signal anomalies from random motion vibrations of the UAV helicopter platform.
- RF component device testing, characterization and writing instrument data acquisition software.

Lawrence Livermore National Laboratory, Defense Sciences Engineering Division Livermore, CA.
Title: Intern Engineer *6/04 – 9/04*

- Studied lightning physics and lightning safety systems.
- Used a lab computational finite-difference-time-domain (FDTD) electromagnetic code (EIGER) to model a lightning safety system for nuclear weapons storage facilities.
- Wrote a 70 page report evaluating analytical and computational results.

Space and Naval Warfare Systems Center (SPAWAR), Electromagnetic and Advanced Technology Branch San Diego, CA.
Title: Engineer *8/02 – 8/03*

- Built NEC-BSC computer model of the MHC-51 (mine hunter) class ship for electromagnetic compatibility analysis of shipboard antennas and anti-jamming radar system. This particular ship was deployed in Bahrain.
- Assisted with mast-clamp current probe antenna measurements onboard the U.S.S. Stennis (a Nimitz-class nuclear-powered aircraft carrier).

SKILLS

Topics: Optics / Photonics / Semiconductor Physics / Electromagnetics / Quantum / Semiconductor Lasers / CMOS / Non-Volatile Memory / Machine Learning / Neural Networks / Neuromorphic Computing / Programming / Proposal Writing
Semiconductor Device Modeling Experience: Lumerical (FDTD, MODE, Interconnect, Device), PhotonDesign (FimmWave, FimmProp, Harold, EpiProp), Silvaco (ATLAS, QUANTUM), R-SOFT (BeamProp, FullWave, LaserMOD), Olympios, CrossLight, SimWindows, BandProf, NextNano, COMSOL, SRIM-TRIM
Mask Layout: IPKISS, Nazca, GDSFactory, GDSPY, PHIDL, PICWriter, L-Edit
Programming Languages: Python, MATLAB, C, C++, LATEX
Libraries: PyTorch, Tensorflow, Numpy, SciPy, Keras, scikit-learn, matplotlib, PyTorch, TensorFlow

Cleanroom and Fabrication Experience: ASML DUV Stepper (248nm), Karl-Suss Mask Aligners (MA-4, MA-6, MA-8), Electron-beam lithography, production level photoresist coating and developer tracks, Inductively-coupled-plasma (ICP) III-V Oxford plasma etcher, TCP LAM silicon etcher, TCP Lam SiO2 etcher, metal e-beam evaporators and sputters, Tystar horizontal oxidation furnaces (SiO2, Si_3N_4, LTO LPCVD, wet/dry oxidation), PECVD deposition machines (Si_3N_4, SiO_2), VCSEL oxidation process, TEOS deposition machines (SiO_2), dicing saw, wire-bonding, flip-chip bonding, FEI scanning electron microscope (SEM), III-V/Si hydrophobic and hydrophilic wafer bonding, surface profiler, Nanospec thin film thickness measurement, etching end-point detection, RCA-1/RCA-2 wafer cleaning procedures, various chemical wet etching for III-V compound semiconductors, silicon, silicon dioxide.

Laboratory Experience: Most optical equipment, optical test setups, Optical spectrum analyzers (OSA), Optical Vector Network Analyzer (OVNA) oscilloscopes, Vector Network Analyzers (VNA), Digital Communications Analyzer (DCA), RF spectrum analyzer, single mode optical fiber alignment, MATLAB/Python data acquisition, DC probe stations, RF probe stations, Signal generators, Machine shop-lathe, drill press, automated saws/cutters, etc., equipment purchasing.

Tape-out Experience:
Tower Semi PH18DA (2x), AMF (2x), ANT (1x), OPSIS-IME (2x), TSMC (1x), Skywater (1x), Ligentec (1x), LioniX (1x), HHI (1x), Custom tape-outs (> 20)

TEACHING EXPERIENCE

Folsom Lake College, *Physics program (Phys 421)* Folsom, CA.
Title: Adjunct Physics Instructor *1/06 – 5/06*

- Topics covered: classical electricity and magnetism (including electrostatics, electric fields and potential, magnetic fields, electromagnetic induction, Maxwell's equations and electromagnetic radiation), DC and AC circuits, light, geometric and wave optics, special relativity, atomic structure, quantum phenomena and nuclear phenomena.

- Responsible for overseeing student lab activities

University of California, Davis, *Department of Electrical Engineering and Computer Engineering* Davis, CA.
Title: Graduate Teaching Assistant *1/12 – 5/14*

- MATLAB programming (ENG 6)
- Semiconductor Lasers (EEC 238)
- Introduction to Electromagnetics (EEC 130A/130B)

HONORS AND AWARDS

- Hewlett Packard Enterprise most prolific inventor (14 patents) 2023
- OECC photonics conference Best Paper Award in Industry Innovation 2023
- OFC conference Best Session Paper Award 2023
- ACP photonics conference Best Paper Award in Industry 2022
- GAANN Fellowship (Graduate Assistance in Areas of National Need) 2008 - 2010
- U.C. Davis Graduate Student Research Award 2014
- U.C. Davis Soohoo-Lee Graduate Student Fellowship 2014
- U.C. Davis Graduate Student Research Award 2013
- U.C. Davis Graduate Student Research Award 2012
- U.C. Davis Richard C. and Joy Dorf Graduate Student Fellowship 2012
- U.C. Davis Work Study Award 2011

PROFESSIONAL SERVICE

Editorial Board: Nature Portfolio Journal – Nano-photonics (2023 – present)
Editor: Nature Light Science & Applications (2024 – present)
Associate Editor: IEEE Access (2020 – present)
Guest Editor: MDPI Chips (2024)
Technical Committee Service: NSF Reviewer (2023, 2024), Frontiers in Optics + Laser Science (FiO + LS) (2023, 2024), Photonics and Electromagnetics Research Symposium (PIERS) (2021-2024)
Journal Reviewer: Nature Photonics (1), Nature Light Sciences (5), Nature Scientific Reports (1), Optica (1), Photonics Research (2), Optics Express (20), Optics Letters (9), Journal of Selected Topics in Quantum Electronics (2), Photonics Journal (2), Photonics Technology Letters (2), IEEE Access (3), Fiber and Integrated Optics (1), Optical and Quantum Electronics (1), Journal of Applied Physics, Nanomaterials
Others: OSA Early Career Mentorship (2021), HPE Patent Review Committee (2016 – Present), HPE internal technical conference review committee (2019 – present)
IEEE Senior Member (2024)
OPTICA Member (2017 - present)

PATENTS

1. Y. Peng, W. Sorin, Y. Yuan, **S. Cheung**, T. Van Vaerenbergh, M. Fiorentino. Mach-zehnder interferometer with improved modulation efficiency and linearity, 18/192,509 (2024)
2. Y. Peng, Y. Yuan, **S. Cheung**. Microring resonator-based optical device with improved linearity, 18/178,094 (2024)
3. X. Xiao, **S. Cheung**, S. Hooten, G. Kurczveil, R.G. Beausoleil. Wavelength-parallel photonic tensor core, 18/175,970 (2024)
4. Y. Peng, Y. Yuan, **S. Cheung**. Reconfigurable all-optical nonlinear activation functions having normalized output power, 17/972,927 (2024)
5. **S. Cheung**, G. Kurczveil, Y. Peng, Y. Yuan, R. G. Beausoleil. Optical devices and systems for optical source redundancy, 20240204881 (2024)
6. **S. Cheung**, Y. Yuan, D. Liang, R. G. Beausoleil. Hybrid metal oxide semiconductor capacitor with enhanced phase tuning, 12012568 (2024)
7. Y. Peng, Y. Yuan, **S. Cheung**. Reconfigurable all-optical nonlinear activation functions on silicon-integrated platform, 17/963,027 (2024)

8. **S. Cheung**, G. Kurczveil, Y. Yuan, X. Xiao, R.G. Beausoleil. Parity time symmetric directional couplers with phase tuning, 11,953,766 (2024)
9. **S. Cheung**, W.V. Sorin, Y. Yuan, R.G. Beausoleil, D. Liang. Optical device having unidirectional microring resonator laser capable of single-mode operation, 11,953,766 (2024)
10. Y. Peng, Y. Yuan, **S. Cheung**, Z. Huang. Optical device including a grated optical waveguide to improve modulation efficiency, 17/815,403 (2024)
11. **S. Cheung**, D. Liang, R.G. Beausoleil, M.R.T. Tan, W.V. Sorin. Micro-ring laser bandwidth enhancement with micro-ring resonator, 17/875,367 (2024)
12. B. Tossoun, **S. Cheung**. Mach-zehnder interferometer integrated with memristor, 17/855,690 (2024)
13. Y. Yuan, W.V. Sorin, **S. Cheung**. Optical device for phase shifting an optical signal, 17/661,249 (2023)
14. **S. Cheung**, Y. Yuan, D. Liang, R.G. Beausoleil. Hybrid metal oxide semiconductor capacitor with enhanced phase tuning, 17/695,673 (2023)
15. **S. Cheung**, D. Liang, S. Srinivasan. Optical coupler, 11630334 / 20220091446 (2023)
16. K. Leigh, P. Rosenberg, **S. Cheung**. Stackable waveguide shuffle blocks and systems and methods of identifying same, 11617029 (2023)
17. **S. Cheung**, M. Tan, B. Wang, W. Sorin, C. Lin. Coupled-cavity VCSELs for enhanced modulation bandwidth, 11588298 / 20210399522 (2023)
18. **S. Cheung**, M. Tan, W. Sorin, J. Matres, S. Mathai. Tunable laser, 11177624 / 20200203918 / 10530124 / 10439357 / 10290013640 / 20180331500 (2021)
19. B. Wang, W. Sorin, M. Tan, S. Mathai, **S. Cheung**. Intensity noise mitigation for vertical-cavity surface emitting lasers, 10985531 / 20200244040 (2021)
20. B. Wang, W. Sorin, M. Tan, **S. Cheung**. Mode division multiplexing using vertical-cavity surface emitting lasers, 10795098 / 20200200985 (2020)
21. **S. Cheung**, M. Tan, S. Mathai, W. Sorin, P. Rosenberg. Hybrid coarse wavelength division multiplexing (CWDM) transceiver, 10756839 (2020)
22. J. Matres, W. Sorin, **S. Cheung**, S. Mathai, M. Tan. Polarization diverse distributed perturbation receivers, 10488593 / 20190154920 (2019)
23. S. Mathai, **S. Cheung**, W. Sorin, M. Tan. Bottom emitting vertical-cavity surface-emitting lasers, 10290996 (2019)
24. B. Wang, W. Sorin, M. Tan, S. Mathai, **S. Cheung**. Orthogonally polarized VCSELs, 10177872 / 10084285 (2019)

55 + pending

TALKS

1. Hybrid III-V/Si micro-ring laser with non-volatile charge trap memory, IEEE International Semiconductor Laser Conference, Orlando, Fl (2024)
2. Energy-Efficient Heterogeneous Photonics for Next Generation AI and Hardware Accelerators [Keynote], Cool Chips 27, Tokyo, JP (2024)
3. Recent Progress on Heterogeneous III-V/Si Non-Volatile Photonics[invited], OECC, Melbourne, AU (2024)
4. Energy-Efficient Integrated Photonics for Future Optical Interconnects and Neuromorphic Computing [invited], ICSJ, Kyoto, JP (2023)
5. Non-Volatile III-V/Si Photonic Charge-Trap Flash Memory, IPC, Orlando, USA (2023)
6. Co-integrated Non-Volatile Charge Trap Memory with III-V/Si Photonics [invited], OECC, Shanghai, CN (2023)
7. Non-Volatile Memristive III-V/Si Photonics [invited], Silicon Photonics Conference, Washington D.C., USA (2023)
8. Demonstration of an Ultra-Power-Efficient 425 Gb/s Silicon Photonic DWDM Transmitter based on Quantum Dot Lasers and Wavelength (De-) Interleavers, HPE TechCon, Orlando, USA (2023)
9. Non-Volatile Silicon Photonics Integrated with a Charge-Trap Flash Memory Cell, HPE TechCon, Orlando, USA (2023)
10. Heterogeneous III-V/Si (De-) Interleaver Filters with Non-Volatile Memristive Behavior [Post-deadline], IPC, Vancouver, CA (2022)
11. Silicon Nitride (De-) Multiplexers for 1-um CWDM Optical Interconnects, Ligentec/Luceda, Webinar (2022)
12. Low-Latency, Terabit, Heterogeneous III-V/Si DWDM Silicon Photonics for High Performance Computing [invited], AWAD, Busan, KR (2002)
13. Heterogeneous III-V/Si Non-Volatile Optical Memory: A Mach-Zehnder Memristor, CLEO, San Jose, USA (2022)

14. Demonstration of a Heterogeneous III-V/Si DWDM Transmitter based on (De-) Interleaved Frequency Comb, CLEO, San Jose, USA (2022)
15. Comparison of Al_2O_3 and HfO_2 MOSCAP III-V/Si Power Splitter and (De-) Interleavers for DWDM Optical Links, OFC, San Diego, USA (2022)
16. Demonstration of Record Ultra-Power-Efficient Silicon Photonic (De-) Interleavers for DWDM Optical Links, HPE TechCon, Phoenix, USA (2022)
17. A Fundamental Building Block for Non-Volatile Optical Memory in Silicon Photonics: A Memristive Optical Switch, HPE TechCon, Phoenix, USA (2022)
18. Energy-Efficient Integrated DWDM Optical Interconnects for Future HPC Systems [invited], IEEE Summer Topicals, Los Cabos, Baja California, Mexico (2022)
19. Ultra-Power Efficient Heterogeneous III-V/Si De-Interleavers for DWDM Optical Links, GFP, Virtual (2021)
20. On-Chip, Optical Injection-Locked III-V/Si Micro-Ring Lasers, ACP, Shanghai, CN (2021)
21. Heterogeneous Lasers on Silicon Photonics System [invited], DAC, San Francisco, USA (2021)
22. Ultra-Low Loss and Fabrication Tolerant Silicon Nitride (Si_3N_4) (De-) Muxes for CWDM Optical Interconnects, OFC, San Diego, USA (2020)
23. High Contrast Grating VCSELs for Low Relative-Intensity-Noise (RIN) and Low-Series Resistance, HPE TechCon, Houston, USA (2019)
24. Efficient III-V/Si Hybrid SOAs for Optical Interconnects, CLEO, San Jose, USA (2015)
25. A Silicon Photonic Chip-Scale AWGR Switch for High Performance Computing Systems, CLEO, San Jose, USA (2014)
26. Heterogeneous Integration of III-V Semiconductor Compounds on Silicon for Functional Photonic Circuits [thesis defense], Davis, USA (2014)
27. Design Optimization of Energy-Efficient Hydrophobic Wafer-Bonded III-V/Si Semiconductor Optical Amplifiers, OIC, Santa Fe, USA (2013)
28. Athermal Silicon Ring Modulators Clad with Titanium Dioxide by RF Magnetron Sputtering, OIC, Santa Fe, USA (2013)
29. 1550-nm Germanium Light-Emitting Diode by Momentum Conservation Transport, ISPEC, Tokyo, JP (2012)
30. Monolithically Integrated 10-GHz Ring Colliding Pulse Mode-Locked Laser for On-Chip Coherent Communications, CLEO, San Jose, USA (2012)
31. Low-Loss and High Contrast Silicon-on-Insulator (SOI) Arrayed Waveguide Grating, CLEO, San Jose, USA (2012)
32. Super-Long Cavity, Monolithically Integrated 1-GHz Hybrid Mode-Locked InP Laser for All-Optical Sampling, PIS, Monterey, USA (2010)

PUBLICATIONS

1. S. Cheung *et al.,* "Heterogeneous III-V/Si micro-ring laser array with multi-state non-volatile memory for ternary content-addressable memories," in review Nature Communications, 2025.
2. D. Brunner *et al.*, "Roadmap on Neuromorphic Photonics," accepted in Journal of Physics: Photonics, 2025
3. B. Tossoun *et al.,* "Large-scale integrated photonic device platform for energy-efficient AI/ML accelerators," accepted in Journal of Selected Topics in Quantum Electronics (JSTQE), 2025.
4. Y. Yuan *et al.,* "All-silicon non-volatile optical memory based on photon avalanched-induced trapping," accepted in Nature Communications Physics, 2025.
5. Y. Yuan *et al.,* "All-silicon photonics platform for computing and communications," accepted in ACS Photonics, 2025.
6. S. Cheung *et al.,* "Arrays of non-volatile III-V/Si micro-ring lasers for memory search applications," Optical Fiber Communications Conference (OFC), 2025.
7. Y. Peng *et al.,* "Photonic KAN: a Kolmogorov-Arnold Network Inspired Efficient Neuromorphic Accelerator," Optical Fiber Communications Conference (OFC), 2025.
8. Y. Yuan *et al.,* "Silicon Photonics Platform and Optical Memory," Optical Fiber Communications Conference (OFC), 2025.
9. Y. Peng *et al.,* "1.28 Terabit-per-second all-silicon avalanche receiver," accepted in Nature Photonics, 2024.
10. S. Cheung *et al*., "Hybrid III-V/Si micro-ring laser with non-volatile charge trap memory," in *International Semiconductor Laser Conference (ISLC)* 2024.
11. S. Cheung *et al*., "Ultra-power-efficient, electrically programmable, multi-state photonic flash memory on a heterogeneous III-V/Si platform," Laser & Photonics Review (18), 5, 2024.
12. X. Xiao, *et al*., "Optical Neural Networks with Tensor Compression and Photonic Memory," in *Optical Fiber Communication Conference (OFC)*, Tu3F. 5 2024.
13. Y. Peng *et al*., "Photonic KAN: a Kolmogorov-Arnold network inspired efficient photonic neuromorphic architecture," in arXiv preprint arXiv:2408.08407, 2024.
14. B. Tossoun, *et al.*, "Large-scale integrated photonics for energy-efficient AI hardware," in IEEE Photonics Society Summer Topicals Meeting Series, 1 – 2, 2024.

15. Y. Yuan, *et al.*, "Silicon Non-volatile optical memory and all-silicon photonics," in IEEE Photonics Society Summer Topicals Meeting Series, 1 – 2, 2024.
16. Z. Gong, et al., "All-optical nonlinear activation functions based on parity-time phase transition," in Conference on Lasers and Electro-Optics (CLEO) 2024
17. Y. Peng *et al*., "A Cost-efficient 1.28 Tb/s DWDM Receiver using All-Si Double Microring Avalanche Photodiodes," in *2024 Optical Fiber Communications Conference and Exhibition (OFC)*, 1-3, 2024.
18. S. Cheung *et al*., "Energy efficient photonic memory based on electrically programmable embedded III-V/Si memristors: switches and filters," Nature Communications Engineering 3 (1), 49, 2024.
19. B. Tossoun *et al*., "Energy-efficient integrated photonics for next-generation computing," in Optical Interconnects XXIV 12892, 94-101, 2024.
20. Y. Yuan *et al*., "A 5× 200 Gbps microring modulator silicon chip empowered by two-segment Z-shape junctions," Nature Communications 15 (1), 918, 2024.
21. B. Tossoun *et al*., "High-speed and energy-efficient non-volatile silicon photonic memory based on heterogeneously integrated memresonator," Nature Communications 15 (1), 551, 2024.
22. Y. Yuan *et al*., "Silicon Optical Memory: Non-Volatile Optoelectronic Devices via Si-SiO Hysteresis Effect," arXiv preprint arXiv:2401.03414, 2024.
23. Y. Peng et al. "Polarization-insensitive high-speed all-silicon double-microring avalanche photodiodes," IEEE Silicon Photonics Conference, 2024
24. S. Cheung *et al*., "Energy-Efficient Integrated Photonics for Future Optical Interconnects and Neuromorphic Computing" in IEEE CPMT Symposium Japan (ICSJ), 200-203, Orlando, FL, 2023.
25. S. Cheung *et al*., "Non-volatile iii-v/si photonic charge-trap flash memory," in IEEE Photonics Conference (IPC), 1-2, Orlando, FL, 2023.
26. Y. Yuan *et al*., "A 160 Gb/s Two-Segment Silicon Microring Modulator with Z-Shape Doping Profile," in IEEE Photonics Conference (IPC), 1-2, 2023.
27. Y. Yuan *et al*., "All-Silicon Microring Transceivers Enabling Single-Lane Throughput Exceeding 128 Gb/s," in Frontiers in Optics + Laser Sciences Conference, Tacoma, WA, 2023.
28. Y. Peng *et al.,* "All-Optical Reconfigurable Low-Threshold Nonlinear Activation Functions for High-Precision Neural Network," in Frontiers in Optics + Laser Sciences Conference, Tacoma, WA, 2023.
29. Y. Yuan *et al.,* "All-Silicon Microring Transceivers Enabling Single-Lane Throughput Exceeding 128 Gb/s," in Frontiers in Optics + Laser Sciences Conference, Tacoma, WA, 2023.
30. Z. Fang *et al.,* "Non-Volatile Materials for Programmable Photonics," APL Materials, vol. 11, no. 10, 2023
31. Y. Yuan *et al.*, "A 1 Tbps DWDM Microring Modulator Silicon Chip Empowered by Two-Segment Z-Shape Junctions," preprint (Version 1) available at Research Square [https://doi.org/10.21203/rs.3.rs-3311530/v1]
32. Y. Yuan *et al.*, "Mechanisms of enhanced sub-bandgap absorption in high-speed all-silicon avalanche photodiodes," *Photonics Research*, vol. 11, no. 2, pp. 337–346, 2023.
33. Y. Yuan *et al.*, "An O-Band All-Silicon Microring Avalanche Photodiode with> 38 GHz RF Bandwidth," in *2023 IEEE Silicon Photonics Conference (SiPhotonics)*, IEEE, 2023, pp. 1–2.
34. Y. Yuan *et al.*, "A 4\times 100 Gbps DWDM Receiver using All-Si Microring Avalanche Photodiodes," in *Optical Fiber Communication Conference*, Optica Publishing Group, 2023, pp. W1A-5.
35. Y. Yuan *et al.*, "A 7-bit Precision Linearized Mach-Zehnder Interferometer for High Accuracy Optical Neural Networks," in *2023 Opto-Electronics and Communications Conference (OECC)*, IEEE, 2023, pp. 1–3.
36. Y. Yuan *et al.*, "Low-phase quantization error Mach–Zehnder interferometers for high-precision optical neural network training," *APL Photonics*, vol. 8, no. 4, 2023.
37. X. Xiao *et al.*, "Wavelength-Parallel Photonic Tensor Core Based on Multi-FSR Microring Resonator Crossbar Array," in *Optical Fiber Communication Conference*, Optica Publishing Group, 2023, pp. W3G-4.
38. B. Tossoun *et al.*, "High-Speed and Energy-Efficient Non-Volatile Silicon Photonic Memory Based on Heterogeneously Integrated Memresonator," *arXiv preprint arXiv:2303.05644*, 2023.
39. B. Tossoun *et al.*, "Heterogeneously Integrated III–V on Silicon Photonics for Neuromorphic Computing," in *2023 IEEE Photonics Society Summer Topicals Meeting Series (SUM)*, IEEE, 2023, pp. 1–2.
40. Y. Peng *et al.*, "High-Speed All-Silicon Double Microring Avalanche Photodetectors," in *2023 Opto-Electronics and Communications Conference (OECC)*, IEEE, 2023, pp. 1–4.
41. Y. Peng *et al.*, "Demonstration of an Ultra-High-Responsivity All-Silicon Avalanche Photodetectors," in *2023 Optical Fiber Communications Conference and Exhibition (OFC)*, IEEE, 2023, pp. 1–3.
42. Y. Peng *et al.*, "All-silicon microring avalanche photodiodes with a> 65 A/W response," *Optics Letters*, vol. 48, no. 5, pp. 1315–1318, 2023.
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