JIAQI GU

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Ph.D. ⋄ Department of Electrical, Computer and Energy Engineering

RESEARCH INTERESTS

Emerging Hardware for High-Performance, Efficient Computing

- Efficient AI hardware design
- Electronic-photonic mixed-signal computing platform design

Efficient Algorithm, Co-Design & Automation

- Hardware-software co-design & automation (for photonics, post-CMOS electronics, quantum)
- Efficient ML model/algorithm
- AI/ML for hardware design & electronic-photonic design automation

EDUCATION

The University of Texas at Austin, TX, USA *Aug. 2018 – May 2023*
Ph.D. Candidate, Department of Electrical and Computer Engineering
Advisor: David Z. Pan
Co-advisor: Ray T. Chen
(GPA 4.0/4.0)

Fudan University, Shanghai, China *Sep. 2014 – Jun. 2018*
B.E., Department of Microelectronic Science and Engineering
(GPA: 3.91/4.0)
(Rank top 2/71)

AWARDS AND HONORS

NVIDIA Academic Grant Program Award	NVIDIA	2025
Best Paper Award Candidate (1 out of 12)	DATE	2025
Graduate School Outstanding Dissertation Award	UT Austin	2024
3rd Place at DAC Ph.D. Forum	DAC	2023
MLSys Student Travel Award	MLSys	2023
Margarida Jacome Dissertation Prize	UT Austin	2023
Winner at Robert S. Hilbert Memorial Optical Design Competition	Synopsys	2022
Donald O. Pederson Best Paper Award	IEEE TCAD	2021
Cockrell School Graduate Student Fellowship	UT Austin	2021
First Place at ACM Student Research Competition Grand Finals	ACM	2021
Best Poster Award at NSF Workshop on Machine Learning Hardware	NSF Workshop	2020
First Place at ACM/SIGDA Student Research Competition	ACM/SIGDA	2020
7th Place at IWLS Contest on Machine Learning+Logic Synthesis	IWLS	2020
DAC Young Fellow	DAC	2020,2021
Best Paper Finalist (1 out of 6)	DAC	2020
Best Paper Award	ASP-DAC	2020
4th Place, System Design Contest on Low Power Object Detection	DAC-SDC	2019
First Prize Scholarship	Fudan University	2017–2018
2nd & 3rd Prize, National Mathematical Contest in Modeling	Fudan University	2016–2017

PROFESSIONAL EXPERIENCE

Arizona State University, AZ, USA *Aug 2023 – Present*

Assistant Professor, School of Electrical, Computer and Energy Engineering

- Director of the Co-design, Automation, and Optimization across System, Technology, and Intelligence Lab (ScopeX) at ASU.

Nvidia Inc., CA, USA *May 2022 – Oct 2022*

Research Intern, ASIC & VLSI Research Team

- Hardware-efficient Transformer compression for natural language processing

Meta Platforms Inc., CA, USA *May 2021 – Dec 2021*

Research Intern, Meta reality labs, FAST AI team

- Efficient multi-scale Vision Transformer design for high-performance computer vision

SELECTED RESEARCH PROJECTS

Emerging Hardware for Efficient Computing

Open-source library for photonic AI computing: TorchONN [J10], SimPhony [C65]

Contribute to library for quantum machine learning: TorchQuantum [C33]

Electronic-photonic NN accelerator [J16], [J14]–[J12], [J7], [C64], [C57], [C51], [C42], [C16], [C9], [C5], [C2]

Photonic in-memory computing [J11], [C24]

Co-Design & Optimization for Emerging Hardware

Reliability and efficiency-driven model-circuit co-optimization flow [J13], [J58], [C60], [C34], [C27], [C5], [C1]

Machine learning-enabled hardware simulation, performance prediction, and design [J20], [J15], [C58], [C37], [C33]

Automated circuit/architecture design [C59], [C34], [C26], [C25]

Efficient on-chip/on-device training for self-learnable AI hardware [J17], [C28], [C23], [C18], [C11], [C10]

PROFESSIONAL SERVICE

Co-Chair

- OpenCircuits Workshop at ASPLOS, 2024.

Organizer

- Optical/Photonic Computing System (OPTSys) Seminar Series, 2023.

Working Group Member

- NSF AI Institute TILOS Ethics and Early Career Development, 2022.

Local Arrangement Co-Chair

- IEEE CASS Seasonal School: AI/ML for IC Design and EDA, 2022.

Technical Program Committee Member

- International Joint Conference on Artificial Intelligence (IJCAI), 2024
- ACM/IEEE Design Automation Conference (DAC), 2024, 2025
- IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2023, 2024
- IEEE International Conference on Computer Design (ICCD), 2023, 2024
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), 2023
- Association for the Advancement of Artificial Intelligence (AAAI), 2024, 2025
- The Conference on Lasers and Electro-Optics (CLEO), 2025

Reviewer

- IEEE Transaction on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
- ACM Transactions on Design Automation of Electronic Systems (TODAES)
- ACM/IEEE Design Automation Conference (DAC)
- IEEE/ACM International Conference on Computer-Aided Design (ICCAD)
- IEEE Computer Society Annual Symposium on VLSI (ISVLSI)
- IEEE International Conference on Computer Design (ICCD)
- ACM Great Lakes Symposium on VLSI (GLSVLSI)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- Conference on Neural Information Processing Systems (NeurIPS)
- International Conference on Learning Representations (ICLR)
- International Conference on Machine Learning (ICML)
- IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR)
- International Conference on Computer Vision (ICCV)
- European Conference on Computer Vision (ECCV)
- Association for the Advancement of Artificial Intelligence (AAAI)
- International Conference on Intelligent Robots and Systems (IROS)
- Nature Communications (Nat. Commun.)
- Science Advances (Sci. Adv.)
- IEEE Journal of Selected Topics in Quantum Electronics (JSTQE)
- Applied Physics Letters (APL)
- IEEE Photonics Technology Letters (PTL)

TEACHING

Teaching Assistant (UT Austin)	EE382M: VLSI Physical Design Automation	Spring 2022
Instructor (ASU)	EEE425/591: Digital Systems and Circuits	Fall 2023
Instructor (ASU)	EEE525: VLSI Design	Spring 2024
Instructor (ASU)	EEE598: Algorithm/Hardware Co-Design and Design Automation for Emerging AI Hardware	Fall 2024

INVITED TALKS

- "Photonic AI/ML," Invited Guest Lecture at Machine Learning Course, George Washington University, online, Nov. 20, 2024.
- "Cross-Layer Co-design and Design Automation toward Reconfigurable, Robust, and Secure Heterogeneous Electronic-Photonic AI Eco-System," Optical/Photonic Interconnects for Computing Systems (OPTICS) Workshop, Invited Talk, online, Nov. 15, 2024.
- "Cross-Layer Co-Design and Design Automation Toward Reconfigurable, Robust, and Secure Heterogeneous Electronic-Photonic AI Eco-systems," The 4th International Workshop on High Performance Chiplet and Interconnect Architectures (HiPChips), Invited Talk, Austin, TX, Nov. 02, 2024.
- "Cross-Layer Hardware / Algorithm Co-Design and Design Automation for Photonic AI Computing Systems," Open Compute Project Future Technologies Initiative, AI HW-SW CoDesign, Invited Talk, online, May 17, 2024.
- "Cross-Layer Hardware / Software Co-Design and Design Automation for Photonic AI Computing Systems," OpenCircuit Workshop at ASPLOS, Invited Talk, Apr. 27, 2024.
- "Bridging Photonics and AI via Cross-Layer Hardware / Software Co-Design and Intelligent Design Automation," Online Guest Lecture at Optimization and Machine Learning in VLSI Design Automation Course, Peking University, online, Dec. 12, 2023.

- "Light-AI Interaction: Bridging Photonics and Artificial Intelligence via Cross-Layer Hardware/Software Co-Design," Rutgers Efficient AI (REFAI) Seminar, online, Dec. 5, 2023.
- "Light-AI Interaction: Bridging Photonics and Artificial Intelligence via Cross-Layer Hardware/Software Co-Design," Photonics & Advanced Intelligent Systems Workshop (PAIS) & Wiley, online, Dec. 1, 2023.
- "Tutorial: A Journey to Optical Computing: From Physics Fundamentals to Hardware-Software Co-Design, Automation, and Application," IEEE/ACM Design Automation Conference (DAC) Tutorial, San Francisco, Jul. 10, 2023.
- "Light-AI Interaction: The Convergence of Photonic AI and Cross-layer Circuit-Architecture-Algorithm Co-design," SPIE Photonics West Invited Talk, San Francisco, Feb. 1, 2023
- "Light-AI Interaction: Bridging Photonics and Artificial Intelligence via Cross-Layer Circuit-Architecture-Algorithm Co-Design," LSIP Tech Talk, Hewlett Packard Labs, Dec. 16, 2022
- "Light-AI Interaction: The Convergence of Photonic Deep Learning and Cross-Layer Design Automation," ACCESS and CEDA Joint Seminar, Hong Kong, July 29, 2022
- "NeurOLight: A Physics-Agnostic Neural Operator Enabling Parametric Photonic Device Simulation," Nvidia AI Research, Oct. 12, 2022
- "L2ight: Enabling On-Chip Learning for Optical Neural Networks via Efficient in-situ Subspace Optimization," Cornell Univ., Jan. 19, 2022

PUBLICATIONS

Journal Papers

[J20] Pingchuan Ma, Haoyu Yang, Zhengqi Gao, Duane S. Boning, and **Jiaqi Gu**, "PIC^{2}O-Sim: A Physics-Inspired Causality-Aware Dynamic Convolutional Neural Operator for Ultra-Fast Photonic Device FDTD Simulation," *APL Photonics*, Feb. 2025.

[J19] Zhengqi Gao, **Jiaqi Gu**, Zhengxing Zhang, David Z. Pan, and Duane S. Boning, "Selecting robust silicon photonic designs after Bayesian optimization without extra simulations," *Optics Express (OE)*, Sep. 2024. (**Editor's Pick**)

[J18] Shupeng Ning, Hanqing Zhu, Chenghao Feng, **Jiaqi Gu**, Zhixing Jiang, Zhoufeng Ying, Jason Midkiff, Sourabh Jain, May H. Hlaing, David Z. Pan, and Ray T. Chen, "Photonic-Electronic Integrated Circuits for High-Performance Computing and AI Accelerator," *IEEE Journal of Lightwave Technology (JLT)*, Jul. 2024.

[J17] Haotian Lu, Sanmitra Banerjee, and **Jiaqi Gu**, "DOCTOR: Dynamic On-Chip Temporal Variation Remediation Toward Self-Corrected Photonic Tensor Accelerators," *IEEE Journal of Lightwave Technology (JLT)*, Jun. 2024.

[J16] Meng Zhang*, Dennis Yin*, Nicholas Gangi, Amir Begović, Alexander Chen, Zhaoran Rena Huang, and **Jiaqi Gu**, "TeMPO: Efficient Time-Multiplexed Dynamic Photonic Tensor Core for Edge AI with Compact Slow-Light Electro-Optic Modulator," *Journal of Applied Physics (JAP)*, Jun. 2024. (*Equal Contribution)

[J15] **Jiaqi Gu**, Hanqing Zhu, Chenghao Feng, Zixuan Jiang, Ray T. Chen, and David Z. Pan, "M^{3}ICRO: Machine Learning-Enabled Compact Photonic Tensor Core based on PRogrammable Multi-Operand Multimode Interference," *APL Machine Learning*, Jan. 2024.

[J14] Chenghao Feng, **Jiaqi Gu**, Hanqing Zhu, Rongxing Tang, Shupeng Ning, May Hlaing, Jason Midkiff, Sourabh Jain, David Z. Pan, and Ray T. Chen, "Integrated Multi-Operand Optical Neurons for Scalable and Hardware-Efficient Deep Learning," *Nanophotonics*, Dec. 2023.

[J13] Chenghao Feng*, **Jiaqi Gu***, Hanqing Zhu, Zhoufeng Ying, Zheng Zhao, David Z. Pan, and Ray T. Chen, "A compact butterfly-style silicon photonic-electronic neural chip for hardware-efficient deep learning," *ACS Photonics*, Nov. 2022. (*Equal Contribution)

[J12] **Jiaqi Gu**, Chenghao Feng, Hanqing Zhu, Zheng Zhao, Zhoufeng Ying, Mingjie Liu, Ray T. Chen, and David Z. Pan, "SqueezeLight: A Multi-Operand Ring-Based Optical Neural Network with Cross-Layer Scalability," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Jul. 2022.

[J11] Hanqing Zhu, **Jiaqi Gu**, Chenghao Feng, Mingjie Liu, Zixuan Jiang, Ray T. Chen, and David Z. Pan, "ELight: Towards Efficient and Aging-Resilient Photonic In-Memory Neurocomputing," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Jun. 2022.

[J10] **Jiaqi Gu**, Chenghao Feng, Hanqing Zhu, Ray T. Chen, and David Z. Pan, "Light in AI: Toward Efficient Neurocomputing with Optical Neural Networks - A Tutorial," *IEEE Transactions on Circuits and Systems–II: Express Briefs (TCAS-II)*, Apr. 2022.

[J9] Chenghao Feng, Zhoufeng Ying, Zheng Zhao, **Jiaqi Gu**, David Z. Pan, and Ray T. Chen, "Towards high-speed and energy-efficient computing: A WDM-based scalable on-chip silicon integrated optical comparator," *Laser & Photonics Reviews*, Jun. 2021.

[J8] Zhoufeng Ying, Chenghao Feng, Zheng Zhao, **Jiaqi Gu**, Richard Soref, David Z. Pan, and Ray T. Chen, "Sequential logic and pipelining in chip-based electronic-photonic digital computing," *IEEE Photonics Journal*, Oct. 2020.

[J7] **Jiaqi Gu**, Zheng Zhao, Chenghao Feng, Zhoufeng Ying, Mingjie Liu, Ray T. Chen, and David Z. Pan, "Towards Hardware-Efficient Optical Neural Networks: Beyond FFT Architecture via Joint Learnability," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, 2020.

[J6] Chenghao Feng, Zhoufeng Ying, Zheng Zhao, **Jiaqi Gu**, Ray T. Chen, and David Z. Pan, "Wavelength-division-multiplexing (WDM)-based integrated electronic–photonic switching network (EPSN) for high-speed data processing and transportation," *Nanophotonics*, Aug. 2020.

[J5] Yibo Lin, Zixuan Jiang, **Jiaqi Gu**, Wuxi Li, Shounak Dhar, Haoxing Ren, Brucek Khailany, and David Z. Pan, "DREAMPlace: Deep Learning Toolkit-Enabled GPU Acceleration for Modern VLSI Placement," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Jun. 2020. (**Best Paper Award**)

[J4] Zhoufeng Ying, Chenghao Feng, Zheng Zhao, Shounak Dhar, Hamed Dalir, **Jiaqi Gu**, Yue Cheng, Richard Soref, David Z. Pan, and Ray T. Chen, "Electronic-photonic Arithmetic Logic Unit for High-speed Computing," *Nature Communications*, Apr. 2020.

[J3] Yibo Lin, Wuxi Li, **Jiaqi Gu**, Mark Ren, Brucek Khailany, and David Z. Pan, "ABCDPlace: Accelerated Batch-based Concurrent Detailed Placement on Multi-threaded CPUs and GPUs," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, Feb. 2020.

[J2] Ruoyao Wang, Zhenghan Fang, **Jiaqi Gu**, Yi Guo, Shicong Zhou, Yuanyuan Wang, Cai Chang, and Jinhua Yu, "High-resolution Image Reconstruction for Portable Ultrasound Imaging Devices," *EURASIP Journal on Advances in Signal Processing*, Dec. 2019.

[J1] **Jiaqi Gu**, Zeju Li, Yuanyuan Wang, Haowei Yang, Zhongwei Qiao, and Jinhua Yu, "Deep Generative Adversarial Networks for Thin-section Infant MR Image Reconstruction," *IEEE Access*, May 2019.

Refereed Conference Papers

[C66] Junyao Zhang, Hanrui Wang, Qi Ding, **Jiaqi Gu**, Reouven Assouly, William D. Oliver, Song Han, Kenneth R. Brown, Hai "Helen" Li, and Yiran Chen, "Qplacer: Frequency-Aware Component Placement for Superconducting Quantum Computers," *IEEE/ACM International Symposium on Computer Architecture (ISCA)*, Jun. 2025. (Acceptance Rate: 22.3%)

[C65] Ziang Yin, Meng Zhang, Amir Begovic, Rena Huang, Jeff Zhang, and **Jiaqi Gu**, "SimPhony: A Device-Circuit-Architecture Cross-Layer Modeling and Simulation Framework for Heterogeneous Electronic-Photonic AI System," *ACM/IEEE Design Automation Conference (DAC)*, Jun. 2025. (Acceptance Rate: 22.5%)

[C64] Ziang Yin, Yu Yao, Jeff Zhang, and **Jiaqi Gu**, "Multi-Dimensional Reconfigurable, Physically Composable Hybrid Diffractive Optical Neural Network," *ACM/IEEE Design Automation Conference (DAC)*, Jun. 2025. (Acceptance Rate: 22.5%)

[C63] Pingchuan Ma, Zhengqi Gao, Amir Begovic, Meng Zhang, Haoyu Yang, Haoxing Ren, Rena Huang, Duane S. Boning, and **Jiaqi Gu**, "BOSON^{-1}: Understanding and Enabling Physically-Robust Photonic Inverse Design with Adaptive Variation-Aware Subspace Optimization," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Mar. 2025.

[C62] Junyao Zhang, Guanglei Zhou, Feng Cheng, Jonathan Hao-Cheng Ku, Qi Ding, **Jiaqi Gu**, Hanrui Wang, Hai (Helen) Li, and Yiran Chen, "qGDP: Quantum Legalization and Detailed Placement for Superconducting Quantum Computers," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Mar. 2025. (**Best Paper Candidate**)

[C61] Hongjian Zhou, Keren Zhu, and **Jiaqi Gu**, "LiDAR: Automated Curvy Waveguide Detailed Routing for Large-Scale Photonic Integrated Circuits," *ACM International Symposium on Physical Design (ISPD)*, Mar. 2025.

[C60] Haotian Lu, Ziang Yin, Partho Bhoumik, Sanmitra Banerjee, Krishnendu Chakrabarty, and **Jiaqi Gu**, "The Unlikely Hero: Nonidealities in Analog Photonic Neural Networks as Built-in Adversarial Defenders," *IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC)*, Jan. 2025. (Acceptance Rate: 28.62%)

[C59] Ziyang Jiang, Pingchuan Ma, Meng Zhang, Rena Huang, and **Jiaqi Gu**, "ADEPT-Z: Zero-Shot Automated Circuit Topology Search for Pareto-Optimal Photonic Tensor Cores," *IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC)*, Jan. 2025. (Acceptance Rate: 28.62%)

[C58] Hanqing Zhu, Wenyan Cong, Guojin Chen, Shupeng Ning, Ray T. Chen, **Jiaqi Gu**, and David Z. Pan, "PACE: Pacing Operator Learning to Accurate Optical Field Simulation for Complicated Photonic Devices," *Conference on Neural Information Processing Systems (NeurIPS)*, Dec. 2024. (Acceptance Rate: 25.8%)

[C57] Ziang Yin, Nicholas Gangi, Meng Zhang, Jeff Zhang, Rena Huang, and **Jiaqi Gu**, "SCATTER: Algorithm-Circuit Co-Sparse Photonic Accelerator with Thermal-Tolerant, Power-Efficient In-situ Light Redistribution," *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, Jun. 2024. (Acceptance Rate: 24%)

[C56] Hanrui Wang, Pengyu Liu, Bochen Tan, Yilian Liu, **Jiaqi Gu**, David Z Pan, Jason Cong, Umut Acar, and Song Han, "FPQA-C: A Compilation Framework for Field Programmable Qubit Array," *IEEE/ACM International Symposium on Computer Architecture (ISCA)*, Jun. 2024.

[C55] Hanrui Wang, Bochen Tan, Pengyu Liu, Yilian Liu, **Jiaqi Gu**, Jason Cong, and Song Han, "Q-Pilot: Field Programmable Quantum Array Compilation with Flying Ancillas," *ACM/IEEE Design Automation Conference (DAC)*, Jun. 2024. (Acceptance Rate: 25%)

[C54] Meng Zhang, Amir Begović, Dennis Yin, Nicholas Gangi, **Jiaqi Gu**, and Rena Huang, "Foundry Manufactured 6-bit Resolution, 150um Long SlowLight Electro-Optic Modulator for On-Chip Photonic Tensor Computing," *Conference on Lasers and Electro-Optics*, May 2024. (Accepted)

[C53] Shupeng Ning, Hanqing Zhu, Chenghao Feng, Christian Uselton, **Jiaqi Gu**, Rongxing Tang, David Z. Pan, and R. T. Chen, "Realization of a Compact Photoelectric Platform for Optical Convolution Processing," *Conference on Lasers and Electro-Optics*, May 2024. (Accepted)

[C52] Chun-Ju Yang, Hanqing Zhu, Shupeng Ning, Chenghao Feng, **Jiaqi Gu**, David Z. Pan, and Ray T. Chen, "Deep Learning Enhanced Early Detection of Pancreatic Cancer Using Integrated Photonic Chip Based Optical Neural Networks," *Conference on Lasers and Electro-Optics*, May 2024. (Accepted)

[C51] Hanqing Zhu, **Jiaqi Gu**, Hanrui Wang, Rongxing Tang, Zhekai Zhang, Chenghao Feng, Song Han, Ray T. Chen, and David Z. Pan, "Lightening-Transformer: A Dynamically-operated Optically-interconnected Photonic Transformer Accelerator," *IEEE International Symposium on High Performance Computer Architecture (HPCA)*, Mar. 2024.

[C50] Shupeng Ning, **Jiaqi Gu**, Chenghao Feng, Rongxing Tang, Hanqing Zhu, David Z. Pan, and Ray T. Chen, "A Hardware-Efficient Silicon Electronic-Photonic Chip for Optical Structured Neural Networks," *SPIE Photonics West*, Jan. 2024.

[C49] Zixuan Jiang, **Jiaqi Gu**, Hanqing Zhu, and David Z. Pan, "Pre-RMSNorm and Pre-CRMSNorm Transformers: Equivalent and Efficient Pre-LN Transformers," *Conference on Neural Information Processing Systems (NeurIPS)*, Dec. 2023. (**Spotlight**) (Acceptance Rate: 26.1%)

[C48] **Jiaqi Gu**, Mohit Dighamber, Zhengqi Gao, and Duane S Boning, "Benchmarking the robustness of neural network-based partial differential equation solvers," *ICCAD Fast Machine Learning for Science Workshop*, 2023.

[C47] Shanny Lin, Steven Clayton, Chenghao Feng, **Jiaqi Gu**, Christopher Morris, Maninder Singh, Hanqing Zhu, David Z. Pan, Ray T. Chen, and Zhehui Wang, "Deep learning for neutron lifetime measurement," *Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan*, 2023.

[C46] Tianlong Chen, Zhenyu Zhang, Hanrui Wang, **Jiaqi Gu**, Zirui Li, David Z. Pan, Frederic Chong, Song Han, and Zhangyang Wang, "QuantumSEA: In-Time Sparse Exploration for Noise Adaptive Quantum Circuits," *International Conference on Quantum Computing and Engineering (QCE)*, Sep. 2023.

[C45] Chenghao Feng, Shupeng Ning, **Jiaqi Gu**, Hanqing Zhu, David Z. Pan, and Ray T. Chen, "Integrated Photonics for Computing and Artificial Intelligence," *IEEE Photonics Society Summer Topicals Meeting Series (SUM)*, Jul. 2023.

[C44] Zixuan Jiang, **Jiaqi Gu**, and David Pan, "NormSoftmax: Normalizing the Input of Softmax to Accelerate and Stabilize Training," *IEEE International Conference on Omni Layer Intelligent Systems (COINS)*, Jul. 2023.

[C43] Zixuan Jiang, **Jiaqi Gu**, Mingjie Liu, and David Pan, "Delving into Effective Gradient Matching for Dataset Condensation," *IEEE International Conference on Omni Layer Intelligent Systems (COINS)*, Jul. 2023.

[C42] Hanqing Zhu, **Jiaqi Gu**, Hanrui Wang, Rongxing Tang, Zhekai Zhang, Chenghao Feng, Song Han, Ray T. Chen, and David Z. Pan, "DOTA: A Dynamically-Operated Photonic Tensor Core for Energy-Efficient Transformer Accelerator," *Conference on Machine Learning and Systems (MLSys) Systems for Next-Gen AI Paradigms (SNAP) Workshop*, May 2023.

[C41] **Jiaqi Gu**, Chenghao Feng, Hanqing Zhu, Ray T. Chen, and David Z. Pan, "Light-AI Interaction: Bridging Photonics and AI with Cross-Layer Hardware-Software Co-Design," *Conference on Machine Learning and Systems (MLSys) Systems for Next-Gen AI Paradigms (SNAP) Workshop*, May 2023.

[C40] Chenghao Feng, **Jiaqi Gu**, Hanqing Zhu, Rongxing Tang, David Z. Pan, and Ray T. Chen, "Evaluation of a compact butterfly-style photonic-electronic neural chip on complicated deep learning tasks," *Conference on Lasers and Electro-Optics*, May 2023.

[C39] **Jiaqi Gu**, Chenghao Feng, Hanqing Zhu, Ray T. Chen, and David Z. Pan, "Light-AI Interaction: The Convergence of Photonic AI and Cross-layer Circuit-Architecture-Algorithm Co-design," *SPIE Photonics West*, Jan. 2023. (**Invited Paper**)

[C38] Chenghao Feng, Rongxing Tang, **Jiaqi Gu**, Hanqing Zhu, David Z. Pan, and Ray T. Chen, "Optically-Interconnected, Hardware-Efficient, Electronic-Photonic Neural Network using Compact Multi-Operand Photonic Devices," *SPIE Photonics West*, Jan. 2023.

[C37] **Jiaqi Gu**, Zhengqi Gao, Chenghao Feng, Hanqing Zhu, Ray T. Chen, Duane S. Boning, and David Z. Pan, "NeurOLight: A Physics-Agnostic Neural Operator Enabling Parametric Photonic Device Simulation," *Conference on Neural Information Processing Systems (NeurIPS)*, Dec. 2022. (**Spotlight**) (Acceptance Rate: 25.6%)

[C36] **Jiaqi Gu**, Ben Keller, Jean Kossaifi, Anima Anandkumar, Brucek Khailany, and David Z. Pan, "HEAT: Hardware-Efficient Automatic Tensor Decomposition for Transformer Compression," *Conference on Neural Information Processing Systems (NeurIPS), ML for System Workshop (MLSys)*, Dec. 2022. (**Spotlight**)

[C35] Wei Shi, Hanrui Wang, **Jiaqi Gu**, Mingjie Liu, David Pan, Song Han, and Nan Sun, "RobustAnalog: Fast Variation-Aware Analog Circuit Design Via Multi-task RL," *ACM/IEEE Workshop on Machine Learning for CAD (MLCAD)*, Aug. 2022.

[C34] Hanqing Zhu, Keren Zhu, **Jiaqi Gu**, Harrison Jin, Ray T.Chen, Jean Anne Incorvia, and David Z. Pan, "Fuse and Mix: MACAM-Enabled Analog Activation for Energy-Efficient Neural Acceleration," *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, Jul. 2022. (Acceptance Rate: 23.5%)

[C33] Hanrui Wang, Zhiding Liang, **Jiaqi Gu**, Zirui Li, Yongshan Ding, Weiwen Jiang, Yiyu Shi, David Z. Pan, Frederic T. Chong, and Song Han, "TorchQuantum Case Study for Robust Quantum Circuits," *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, Jul. 2022. (**Invited Paper**)

[C32] Chenghao Feng, **Jiaqi Gu**, Hanqing Zhu, Zhoufeng Ying, Zheng Zhao, David Z. Pan, and Ray T. Chen, "Optoelectronically Interconnected Hardware-Efficient Deep Learning using Silicon Photonic Chips," *Conference on Lasers and Electro-Optics*, Mar. 2022.

[C31] Chenghao Feng, **Jiaqi Gu**, Hanqing Zhu, David Z. Pan, and Ray T. Chen, "Design and Experimental Demonstration of A Hardware-Efficient Integrated Optical Neural Network," *Conference on Lasers and Electro-Optics*, Mar. 2022.

[C30] **Jiaqi Gu**, Hyoukjun Kwon, Dilin Wang, Wei Ye, Meng Li, Yu-Hsin Chen, Liangzhen Lai, Vikas Chandra, and David Z. Pan, "Multi-Scale High-Resolution Vision Transformer for Semantic Segmentation," *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2022. (Acceptance Rate: 25.3%)

[C29] **Jiaqi Gu**, Hanqing Zhu, Chenghao Feng, Zixuan Jiang, Mingjie Liu, Shuhan Zhang, Ray T. Chen, and David Z. Pan, "ADEPT: Automatic Differentiable DEsign of Photonic Tensor Cores," *ACM/IEEE Design Automation Conference (DAC)*, Jul. 2022. (**Best-in-Track Paper**) (Acceptance Rate: 23%)

[C28] Hanrui Wang, Zirui Li, **Jiaqi Gu**, Yongshan Ding, David Z. Pan, and Song Han, "QOC: Quantum On-Chip Training with Parameter Shift and Gradient Pruning," *ACM/IEEE Design Automation Conference (DAC)*, Jul. 2022. (Acceptance Rate: 23%)

[C27] Hanrui Wang, **Jiaqi Gu**, Yongshan Ding, Zirui Li, Frederic T. Chong, David Z. Pan, and Song Han, "QuantumNAT: Quantum Noise-Aware Training with Noise Injection, Quantization and Normalization," *ACM/IEEE Design Automation Conference (DAC)*, Jul. 2022. (Acceptance Rate: 23%)

[C26] Zizheng Guo, Mingjie Liu, **Jiaqi Gu**, Shuhan Zhang, David Z. Pan, and Yibo Lin, "A Timing Engine Inspired Graph Neural Network Model for Pre-Routing Slack Prediction," *ACM/IEEE Design Automation Conference (DAC)*, Jul. 2022. (**Best-in-Track Paper**) (Acceptance Rate: 23%)

[C25] Hanrui Wang, Yongshan Ding, **Jiaqi Gu**, Yujun Lin, David Z. Pan, Frederic T. Chong, and Song Han, "QuantumNAS: Noise-Adaptive Search for Robust Quantum Circuits," *IEEE International Symposium on High Performance Computer Architecture (HPCA)*, Feb. 2022. (Acceptance Rate: 29%)

[C24] Hanqing Zhu, **Jiaqi Gu**, Chenghao Feng, Mingjie Liu, Zixuan Jiang, Ray T. Chen, and David Z. Pan, "ELight: Enabling Efficient Photonic In-Memory Neurocomputing with Life Enhancement," *IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC)*, Jan. 2022.

[C23] **Jiaqi Gu**, Hanqing Zhu, Chenghao Feng, Zixuan Jiang, Ray T. Chen, and David Z. Pan, "L2ight: Enabling On-Chip Learning for Optical Neural Networks via Efficient in-situ Subspace Optimization," *Conference on Neural Information Processing Systems (NeurIPS)*, Dec. 2021. (Acceptance Rate: 22.7%)

[C22] **Jiaqi Gu**, Hanqing Zhu, Chenghao Feng, Mingjie Liu, Zixuan Jiang, Ray T. Chen, and David Z. Pan, "Towards Memory-Efficient Neural Networks via Multi-Level in situ Generation," *International Conference on Computer Vision (ICCV)*, Oct. 2021. (Acceptance Rate: 25.9%)

[C21] Zixuan Jiang, **Jiaqi Gu**, Mingjie Liu, Keren Zhu, and David Z. Pan, "Optimizer Fusion: Efficient Training with Better Locality and Parallelism," *International Conference on Learning Representations (ICLR) Workshop, Hardware Aware Efficient Training (HAET)*, May 2021. (Acceptance Rate: 28.7%)

[C20] Chenghao Feng, **Jiaqi Gu**, Hanqing Zhu, David Z. Pan, and Ray T. Chen, "Experimental Demonstration of a WDM-based Integrated Optical Decoder for Compact Optical Computing," *Conference on Lasers and Electro-Optics*, May 2021.

[C19] Jason Midkiff, Ali Rostamian, Kyoung Min Yoo, Aref Asghari, Chao Wang, Chenghao Feng, Zhoufeng Ying, **Jiaqi Gu**, Haixia Mei, Ching-Wen Chang, James Fang, Alan Huang, Jong-Dug Shin, Xiaochuan Xu, Michael Bukshtab, David Z. Pan, and Ray T. Chen, "Integrated Photonics for Computing, Interconnects and Sensing," *Conference on Lasers and Electro-Optics*, May 2021. (**Invited Paper**)

[C18] **Jiaqi Gu**, Chenghao Feng, Zheng Zhao, Zhoufeng Ying, Ray T. Chen, and David Z. Pan, "Efficient On-Chip Learning for Optical Neural Networks Through Power-Aware Sparse Zeroth-Order Optimization," *Association for the Advancement of Artificial Intelligence (AAAI)*, Feb. 2021. (Acceptance Rate: 21%)

[C17] Shubham Rai, Walter Lau Neto, Yukio Miyasaka, Xinpei Zhang, Mingfei Yu, Qingyang Yi, Masahiro Fujita, Guilherme B. Manske, Matheus F. Pontes, Leomar S. da Rosa Junior, Marilton S. de Aguiar, Paulo F. Butzen, Po-Chun Chien, Yu-Shan Huang, Hoa-Ren Wang, Jie-Hong R. Jiang, **Jiaqi Gu**, Zheng Zhao, Zixuan Jiang, David Z. Pan, *et al.*, "Logic Synthesis Meets Machine Learning: Trading Exactness for Generalization," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Feb. 2021. (Acceptance Rate: 24%)

[C16] **Jiaqi Gu**, Chenghao Feng, Zheng Zhao, Zhoufeng Ying, Mingjie Liu, Ray T. Chen, and David Z. Pan, "SqueezeLight: Towards Scalable Optical Neural Networks with Multi-Operand Ring Resonators," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Feb. 2021. (Acceptance Rate: 24%)

[C15] **Jiaqi Gu**, Zheng Zhao, Chenghao Feng, Zhoufeng Ying, Ray T. Chen, and David Z. Pan, "O2NN: Optical Neural Networks with Differential Detection-Enabled Optical Operands," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Feb. 2021. (Acceptance Rate: 24%)

[C14] Chenghao Feng, **Jiaqi Gu**, Zhoufeng Ying, Zheng Zhao, Ray T. Chen, and David Z. Pan, "Scalable fast-Fourier-transform-based (FFT-based) integrated optical neural network for compact and energy-efficient deep learning," *SPIE Photonics West*, Mar. 2021.

[C13] Chenghao Feng, Zhoufeng Ying, Zheng Zhao, **Jiaqi Gu**, Ray T. Chen, and David Z. Pan, "Wavelength-division-multiplexing (WDM)-based integrated electronic–photonic switching network (EPSN) for high-speed data processing and transportation," *SPIE Photonics West*, Mar. 2021.

[C12] **Jiaqi Gu**, Zixuan Jiang, and David Z. Pan, "DREAMPlace 3.0: Multi-Electrostatics Based Robustness VLSI Placement with Region Constraints," *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, Nov. 2020. (Acceptance Rate: 27%)

[C11] Zixuan Jiang, Keren Zhu, Mingjie Liu, **Jiaqi Gu**, and David Z. Pan, "An Efficient Training Framework for Reversible Neural Architectures," *European Conference on Computer Vision (ECCV)*, Aug. 2020. (Acceptance Rate: 26%)

[C10] **Jiaqi Gu**, Zheng Zhao, Chenghao Feng, Wuxi Li, Ray T. Chen, and David Z. Pan, "FLOPS: Efficient On-Chip Learning for Optical Neural Networks Through Stochastic Zeroth-Order Optimization," *ACM/IEEE Design Automation Conference (DAC)*, Jul. 2020. (**Best Paper Finalists**) (Acceptance Rate: 23.2%)

[C9] Mario Miscuglio, Zibo Hu, Shurui Li, **Jiaqi Gu**, Aydin Babakhani, Puneet Gupta, Chee-Wei Wong, David Pan, Seth Bank, Hamed Dalir, and Volker J. Sorger, "Massive parallelism Fourier-optic convolutional processor," *Signal Processing in Photonic Communications (SPPCom)*, Jul. 2020.

[C8] Mario Miscuglio, Zibo Hu, Shurui Li, **Jiaqi Gu**, Aydin Babakhani, Puneet Gupta, Chee-Wei Wong, David Z. Pan, Seth Bank, Hamed Dalir, and Volker J. Sorger, "Million-channel parallelism Fourier-optic convolutional filter and neural network processor," *Conference on Lasers and Electro-Optics*, May 2020.

[C7] Chenghao Feng, Zhoufeng Ying, Zheng Zhao, **Jiaqi Gu**, Ray T. Chen, and David Z. Pan, "Integrated WDM-based Optical Comparator for High-speed Computing," *Conference on Lasers and Electro-Optics*, May 2020.

[C6] Chenghao Feng, Zheng Zhao, Zhoufeng Ying, **Jiaqi Gu**, David Z. Pan, and Ray T. Chen, "Compact design of on-chip elman optical recurrent neural network," *Conference on Lasers and Electro-Optics*, May 2020.

[C5] **Jiaqi Gu**, Zheng Zhao, Chenghao Feng, Hanqing Zhu, Ray T. Chen, and David Z. Pan, "ROQ: A Noise-Aware Quantization Scheme Towards Robust Optical Neural Networks with Low-bit Controls," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Mar. 2020. (Acceptance Rate: 24.5%)

[C4] Mingjie Liu, Keren Zhu, **Jiaqi Gu**, Linxiao Shen, Xiyuan Tang, Nan Sun, and David Z. Pan, "Towards Decrypting the Art of Analog Layout: Placement Quality Prediction via Transfer Learning," *IEEE/ACM Proceedings Design, Automation and Test in Europe (DATE)*, Mar. 2020. (Acceptance Rate: 24.5%)

[C3] Chenghao Feng, Zhoufeng Ying, Zheng Zhao, **Jiaqi Gu**, Ray T. Chen, and David Z. Pan, "Wavelength-division-multiplexing-based electronic-photonic network for high-speed computing," *SPIE, Smart Photonic and Optoelectronic Integrated Circuits XXII*, Feb. 2020.

[C2] **Jiaqi Gu**, Zheng Zhao, Chenghao Feng, Mingjie Liu, Ray T. Chen, and David Z. Pan, "Towards Area-Efficient Optical Neural Networks: An FFT-based Architecture," *IEEE/ACM Asia and South Pacific Design Automation Conference (ASPDAC)*, Jan. 2020. (**Best Paper Award**)

[C1] Zheng Zhao, **Jiaqi Gu**, Zhoufeng Ying, Chenghao Feng, Ray T. Chen, and David Z. Pan, "Design Technology for Scalable and Robust Photonic Integrated Circuits," *IEEE/ACM International Conference on Computer-Aided Design (ICCAD)*, 2019. (**Invited Paper**)