Yuanhao Liang

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Education

2023.08 - 2024.12 M.S. in ECE at **University of Southern California** C.A. USA
2019.08 - 2023.06 B.S. in Physics at **Nankai University** Tianjin, China
- Advanced Honor Class of Physics Education, Boling College. **Top 3%**.
- **Summa Cum Laude**.

Research Experience

University of Southern California *RA* Advisor: Prof. Zaijun Chen
Time of Flight Optical Neural Networks Dec. 2023 - present

– Developed an optical system with SLM for high-performance computing with the throughput $\simeq$ 50 TOPS, Latency $<$ 0.1 ns, and energy consumption $\simeq$ 0.3 fj/OP.

– Implemented neural networks on system for real world application. E.g. Digit-classification, fast frame-by-frame image processing in video files.

• This project is expected to be completed in Dec. 2024, along with an academic paper.

Enhancing Optical Computing with Coherent VCSEL Injection Locking Nov. 2023 - present

– Built the optical system to implement injection locking between VCSELs.

– Collaborated with team members to perform random data multiplication at 10 GHz between two VCSELs with an accuracy greater than 96%.

Single-shot in-sensor optical spectral Al processing Oct. 2024 - Dec.2024

– Designed and demonstrated an in-network spectral optical neural network (ONN) for high-speed, low-latency spectral sensing with a latency of less than 100 ps at ¿10 GS/s detection bandwidth.

– Constructed MLP models for digit-classification and heart attack detection using blood Raman spectroscopy.

Purdue University *Undergrad. Intern* Advisor: Prof. Chen-Lung Hung
Laser Thermal Locking for Microrings Jul. 2022 - Nov. 2022

– Developed and optimized optical and electronic systems, including TEC circuits and LabVIEW-controlled digital systems; built optical setups for microring resonator frequency locking.

– Achieved precise frequency locking of microring resonators to the Hz level using the thermal effect of free-space lasers through the PDH method, ensuring finely controlled integration with electronic devices.

Monte-Carlo Method for 1-D Simulation of Atom Trapping Jul. 2022 - Aug. 2022

– Simulated the two-colored evanescent field distribution of microresonator through COMSOL.

– Calculated the atom trapping probabilities and trajectories through Monte-Carlo Method in Python.

Tsinghua University *Undergrad. Intern* Advisor: Prof. Yongchun Liu
Laser Stabilization for Faraday Rotation Spectroscopy Jul. 2021 - Nov. 2021

– Designed and built optical layouts, assembled the magnetic supply, and managed thermal control for the Rb gas chamber to achieve far-off resonance locking.

– Used a Herriot cell to extend the optical path, simulated light spot positions, acquired key spectroscopic data, and validated the results through experimentation.

Honors

- **Outstanding Graduate Awards** (Top 1%), 2023
- First Prize Scholarship (Top 5%), 2022
- **Technical Institute of Physics and Chemistry, CAS, Scholarship** (Top 3%) 2021
- First Prize Scholarship (Top 5%), 2021
- **National Scholarship** (Top 1%), 2020
- Top Prize of China Undergraduate Physics Tournament, 2020
- **Meritorious Winner** of the American Mathematical Contest in Modeling (Top 10% internationally).

PUBLICATIONS

Manuscripts

1. Yuanhao Liang, James Wang, Yin Ran, ..., and Zaijun Chen.
   Time-of-flight Optical Neural Network.
   In preparation.

Conference

1. Yuanhao Liang, James Wang, Xinyi Ren, ..., and Zaijun Chen.
   VCSEL Optical Neural Networks for High-throughput AI Training.
   Sumbitted to *CLEO*, 2025.
2. Kaiwen Xue, Lian Zhou, ..., Yuanhao Liang, ..., and Zaijun Chen.
   Scalable, Low-energy Homodyne Computing Crossbar based on TFLN and SiN/Si Photonics.
   Sumbitted to *CLEO*, 2025.
3. Yuan Li, Lian Zhou, ..., Yuanhao Liang, ..., and Zaijun Chen.
   Single-shot in-sensor optical spectral AI processing.
   Sumbitted to *CLEO*, 2025.
4. Ran Yin, Yue Yu, ..., Yuanhao Liang, ..., and Mengjie Yu.
   Intrinsic Frequency Noise of the Thin Film Lithium Niobate Platforms.
   Sumbitted to *CLEO*, 2025.

Teaching Assistance Experience

- Atomic Physics. (Undergraduate Course, Prof. Yuanbin Wu) 2023 Spring
- College Physics. (Undergraduate Course, Prof. Zubin Li) 2021 Fall

Skills and Interests

Programming	Python, C++, MATLAB	
Leadership	President of Sibian Club, an academic association	2022
Hobbies	Soccer: College Cup Champion	2019