Yuanhao Liang

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Education

University of Southern California **C.A., USA**
Doctoral Program in ECE department *Aug. 2023– Present*

Nankai University **Tianjin, China**
Bachelor of Science in Physics *Sept. 2019 – Jun. 2023*

- GPA: **3.87/4.0**, ranked in the top **5%** in the department.
- Minor: Advanced Honor Class of Physics Education, Boling Honor College.

Research Experiences

Research Assistant| Electrical & Computer Engineering |**Univ. of Southern California**
Supervisor: Assistant Prof. Zaijun Chen & Assistant Prof. Mengjie Yu

Project I: Large-scale computing with VCSEL arrays (*Oct. 2023 – Dec. 2023*)

- Developed and optimized optical layouts for the spectral characterization of multiple VCSEL types, gaining expertise in light collimation and Optical Spectrum Analyzer operations
- Programmed Spatial Light Modulators via MATLAB for precise phase modulation of light in advanced optical research applications.

Research Assistant Intern| Department of Physics and Astronomy | **Purdue University**
Supervisor: Prof. Chen-Lung Hung

Project I: Lock the Resonance of Microring through the Pound-Drever-Hall Method (*Aug. 2022 – Nov. 2022*)

- Conducted advanced simulations to analyze system error signals, optimizing performance and reliability.
- Engineered and constructed sophisticated optical layouts for precise microring resonator frequency locking.
- Implemented precise control of electronic devices (Acoustic-optic modulator) via LabVIEW, refining error functions for enhanced system accuracy.

Outcome: Achieved precise thermal laser beam locking of microring resonances utilizing the Pound-Drever-Hall technique, contributing to a collaborative target of single atoms trapping.

Project II: Frequency Locking of Microring Using Temperature Cooler (*Aug. 2022 – Sept. 2022*).

- Designed and soldered Thermoelectric Cooler (TEC) circuits, considering chip integration thermal effects and operational efficiency.
- Developed a digital control system using LabVIEW for function generation and PID control, enabling precise sweeping of laser frequencies and thermal tuning.

Outcome: Locked the resonance of microring by PID controlling the Temperature Cooler (TEC) through the temperature controller (Both digitally and through hardware).

Project III: Monte-Carlo Method for 1-D Simulation of Atom Trapping (*Jul. 2022 – Aug. 2022*).

- Simulated the two-colored evanescent field distribution of nanophotonic resonator through COMSOL Multiphysics.
- Calculated the total trapping potential and found that, e.g., the different ratios of red and blue detuned optical power would lead to whether atoms could be trapped.
- Calculated the atom trapping probabilities and atom trajectories corresponding to the Maxwell Velocity Distribution through Monte-Carlo Method in Python.

Research Assistant Intern | Department of Physics | **Tsinghua University**

Supervisor: Prof. Yongchun Liu

Project I: Far Off-resonance Laser Frequency Stabilization Using Multi-pass Cells for Faraday rotation spectroscopy (*Jul. 2021 – Oct. 2021*).

- Engineered optical layouts for enhanced laser frequency stabilization, including frequency locking and thermal control mechanisms for Rubidium (Rb) gas chambers.
- Executed assembly and thermal management of magnetic supplies, alongside simulation and alignment of light spots within multi-pass cell systems using Python.
- Achieved robust laser frequency locking with an extended range of over 20 GHz and minimized fluctuations to 80 MHz, maintaining stability 6.5 GHz away from resonance.

Research Assistant Intern | School of Physics | **Nankai University**

Supervisor: Prof. Yongnan Li

Project I: Simulation for the Distribution of Orbital Angular Momentum (OAM) of Entangled Biphotons (*Dec. 2020 – Jun. 2021*).

- Simulated mode distributions for various material lengths and quantum numbers, confirming the correlation of bi-photon OAM with material properties.

Honors

- First Prize Scholarship funded by Nankai University (Top 5%), 2022
- **TIPC Scholarship** funded by Technical Institute of Physics and Chemistry, CAS (Top 5%), 2021
- First Prize Scholarship funded by Nankai University (Top 5%), 2021
- **National Scholarship** funded by China Ministry of Education (Top 1%), 2020
- First Prize of China Undergraduate Physics Tournament (4/62), 2020
- **Champion** of Northern China Undergraduate Physics Tournament (1/18), 2020

Skills

- **Programming:** C/C++, Python, MATLAB, LabVIEW
- **Licenses & certifications:** Exploratory Data Analysis for Machine Learning @ IBM

Teaching Assistant Experience

- **College Physics** (Undergraduate Course, Prof. Zubin Li) 2021 Fall
- **Physics Winter Camp in Nankai University** (Organized by School of Physics) 2022 Winter

Leadership

President of Sibian Club, **an academic association** Jun. 2021 – July. 2022

- Organized the first academic forum for student research collaboration and exchange.
- Organized school-level, regional-level and national-level physics academic competitions.