

NINGXU ZHU

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Education

University of Science and Technology of China (USTC)

Bachelor of Science in Physics

Major: Photoelectric Information Science and Engineering

Overall GPA: 3.76/4.30 Ranking: 7/37

Sep. 2021 – Present

Expected in Jun. 2025

Research Interests

Atomic, Molecular, and Optical Physics (AMO)

- *Cavity quantum electrodynamics (cavity QED)*: How can we precisely control the quantum states? How does the coupling between atoms (or molecules) and photons provide insights into some unsolvable many-body Hamiltonians?
- *Spectroscopy*: Various spectroscopy techniques, including infrared, photoluminescence, and terahertz spectroscopy, to explore the potential applications of quantum behaviors in materials.

Research Experience

Terahertz time-domain spectroscopy studies of cavity QED systems

Jul. 2024 – Present

Advisor: Prof. Junichiro Kono, Rice University

- Extracted the complex optical conductivity of a superconducting film embedded in free space or in a one-dimensional photonic crystal cavity from transmittance spectra as a function of temperature and magnetic field.
- Applied the Mattis-Bardeen model to analyze changes in superconducting gap (2Δ) or transition temperature (T_c), identifying a potential decrease in T_c induced by the quantum vacuum electromagnetic fields.

Ultrastable cavity for improving laser's frequency stability

Oct. 2023 – Jan. 2024

Advisor: Prof. Jian Wang, USTC

- Designed a vacuum chamber (10^{-7} mbar) and temperature control solution to stabilize the length of an ultrastable cavity, enabling effective use of Pound–Drever–Hall (PDH) method to improve laser frequency stability ($\frac{\delta\nu}{\nu} \approx 10^{-12}$).
- Assembled electronic components into a PDH circuit to generate the error signal, enabling modulation of the laser frequency to achieve resonance with an ultrastable cavity.

Time sequence control in AMO experiment

May 2023 – Sep. 2023

Advisor: Prof. Jian Wang, USTC

- Developed a LabVIEW program to synchronize voltage outputs across 16 channels and ensured successful interaction with Field-Programmable Gate Array, enabling atoms to load into an optical dipole trap.

Conferences

2024 SCI Annual Summer Research Colloquium

Poster: Rigorous Determination of the Complex Terahertz Conductivity of a Superconducting Thin Film Embedded in a Cavity

Honors

Outstanding Student Cadre of the School of Physical Sciences

Dec. 2023

Endeavour Scholarship

Nov. 2023

Outstanding Student Scholarship

Nov. 2022

Skills

Computer Skills: C, Python, MATLAB, LabVIEW, LaTeX

TOEFL: 99 (Reading: 25; Listening: 26; Writing: 25; Speaking: 23)

Teaching Experience

Teaching Assistant for Electrodynamics (90 undergraduate students)

Spring 2024

Extracurricular Activities

Class president

Sep. 2021 – Present

Science popularization to rural primary school students

Sichuan, Aug. 2023

A tour guide at technology events

USTC, Nov. 2022