

# 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 ( $2\Delta$ ) 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.

## 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