HAOHAI SHI

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EDUCATION

Zhejiang University Hangzhou, China
BSc in Physics September 2018 – Present

- GPA: 3.95/4.00 (91.2/100; top 5%)
- Exempted from National College Entrance Exam for entering the finals of Chinese Physics Olympiad (CPhO)
- Two-time Winner of Innovation Scholarship in CKC college (~20 out of ~900 for each)

RESEARCH EXPERIENCE

Zhejiang University - Provincial Key Lab for Quantum Technologies and Devices Hangzhou, China
Research Assistant to Professor Haohua Wang, Assistant Dean of the Physics Department August 2021 –Present

- **Microwave Package Design for Superconducting Chip**

- Studied the basic principles of transmon qubits, QND measurement schemes, quantum gate schemes, etc.
- Helped in maintaining the 36-qubit NISQ
- Investigated the factors in the microwave package that might affect coherence time T1
- Used HFSS and COMSOL to model and analyze the signal crosstalk and energy loss ratio of the package
- Redesigned a readily scalable 24-qubit microwave package, significantly improved its performance in terms of signal crosstalk

North Carolina State University - Department of Electrical and Computer Engineering Online
Research Assistant to Professor Huiyang Zhou Jul 2021 – Aug 2021

- **Quantum Device Design and Analysis Based on Qiskit Metal**

- Explored how to generate custom qubit design, as well as a scalable multi-qubit circuit with Qiskit Metal toolkit
- Analyzed the key properties of the qubits, waveguides, and resonators; e.g., eigenmodes, impedance, and energy participation ratio (EPR)
- Implemented a quantum half adder circuit and reduced the number of required quantum gates by optimizing the connectivity of the qubits

Zhejiang University - Center for Correlated Matter Hangzhou, China
Research Assistant to Professor Xin Lu, Assistant Dean of the CKC Honors College September 2020 – June 2021

- **Scanning Probe Based on Tuning Fork Shaped Quartz Crystal Oscillator**

- Learned LABVIEW coding and designed; manufactured and assembled the apparatus independently
- Successfully developed a prototype scanning probe and its driver program with sub-micron-level resolution
- It will provide convenience as well as stability to order to control the contact positions accurately when integrated into point-contact spectroscopy (PCS)

- **Torque Differential Magnetometry based on Quartz Crystal Oscillator**

- Implemented PID and Phase-Lock Loop (PLL) scheme and achieved a high sensitivity at a low cost
- Successfully observed the de Haas van Alphen (dHvA) quantum oscillation effect in heavy-fermion superconductor CeRnIn5 and measured its period spectrum. The result showed excellent agreement with reported value

Zhejiang University (Department of Physics) Hangzhou, China
Research Assistant to Professor Daomu Zhao, Assistant Dean of the Physics Department June 2020 – October 2020

- **China Undergraduate Physics Tournament (CUPT)**

- Investigated the phase-transition regions where several identical balls on a vibrating plate could spontaneously form an ordered crystal-like structure. Proposed several indicators as order parameters and conducted a quantitative discussion on the impacts of filling ratio, external drive acceleration, materials, etc.
- Investigated the conditions that allow a tower made up of stacked discs to remain standing when its bottom disc is abruptly removed by a sudden horizontal force. Proposed a good approximation method to predict the stability of the tower without heavy numerical analysis

SELECTED AWARDS AND HONORS

- First Prize in China Undergraduates Physics Tournament (CUPT) (7th place among ~150 teams) 2020
- Innovation Scholarship of CKC college (~20 out of ~900, awarded to those who showed an outstanding performance in competitions or research) 2020 & 2021
- First-class Scholarship of Zhejiang University (top 3%) 2021
- First-class Scholarship in Basic Sciences (awarded to top 10% of students majoring in basic science) 2019
- First Prize in the Chinese Mathematics Competitions (Provincial) 2019
- Third Prize in Chinese Physics Olympiad (National) 2017

ADDITIONAL INFORMATION

Additional Professional and Extracurricular Experiences

- Member of the Soccer School Team of CKC college (Sep. 2018-Present), won the 2nd place out of 16 teams in school soccer championship.
- Member of the Microsoft Students Club (Sep. 2018-Sep. 2020)
- Group Leader, Club of Science and Technology (Sep. 2019-Sep. 2020)
- Excellent Volunteer in the 5th China "Internet+" College Students Innovation and Entrepreneurship Competition (Oct. 2019), and the 36th CPhO (Nov. 2019)

Computer and Language Skills

- Coding Languages: Python, MATLAB, C++, Javascript, LABVIEW
- Selected open source project:
  Tron, an online flight game demo inspired by movie Tron. Implemented on an original WebGL Javascript 3D graphics engine. (https://github.com/ShawHaines/Tron)
- Languages known: English (fluent), Chinese (native), Cantonese (fluent)

Interests

Soccer, Geek inventions