

HAOHAI SHI

Department of Physics

University of Maryland, College Park

+1 (240) 485-9570 | e: hhshi@umd.edu | website: <https://shawhaines.github.io>

EDUCATION

University of Maryland, College Park

Ph. D. in Physics

Maryland

Sep 2022 – Present

Chu Kochen Honors College, Zhejiang University

BSc in Physics

Hangzhou, China

Sep 2018 – Jun 2022

- GPA: 3.95/4.00 (91.2/100; rank 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)

PUBLICATIONS & MANUSCRIPTS

- Yao, Y. *et al.* Observation of many-body Fock space dynamics in two dimensions. Preprint at <https://doi.org/10.48550/arXiv.2211.05803> (2022).

RESEARCH EXPERIENCE

Zhejiang University (Provincial Key Lab for Quantum Technologies and Devices)

Research Assistant to Professor WANG Haohua, Assistant Dean of the Physics Department

Hangzhou, China

Aug 2021 – Jun 2022

Microwave Package Design for Superconducting Chip

- Actively engaged in the assembly, characterization, control and measurement process of a 36-qubit superconducting quantum processor.
- Investigated the factors in the microwave package that might affect coherence time T_1 . 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)

Research Assistant to Professor ZHOU Huiyang

Online

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). Investigated how the geometries would affect those quantities.
- 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)

Research Assistant to Professor LU Xin, Assistant Dean of the CKC Honors College

Hangzhou, China

Sept 2020 – Jun 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 incredibly 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)

Research Assistant to Professor ZHAO Daomu, Assistant Dean of the Physics Department

Hangzhou, China

Jun 2020 – Oct 2020

China Undergraduate Physics Tournament (CUPT)

- Investigated the phase-transition regions where a number of 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 Team of CKC college (Sep. 2018-Jun. 2022), 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