# **Yizhuo Tan**

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**experience**

**Research & Teaching Assistant - Computer Architecture and Security** (Yale University)  09/2023 – Present

**- Quantum Systems Lab** (Yale University) 09/2024 – Present

* Administered pioneering research in Quantum Computing Security, mostly using Python
* Investigated novel methods to attack and protect quantum algorithms and quantum hardware, focusing on higher energy attacks and long-range crosstalk for quantum computers
* Taught Introduction to Electronics course in Fall 2024 at Yale

**Research Assistant -** **Microscale Nanoscience Laboratory, USTC** (Hefei, China) 09/2021 - 03/2022

* Aimed to perform Gaussian boson sampling to demonstrate the quantum computational advantage
* Built high-quality light path for the entangled photon source: obtained optimal coincidence rate, reaching coincidence rate of 0.57 after adding a long focus concave reflector
* Helped design a method of determining coherent light using retarders and achieved optimal deployment of the retarders with improved performance

**Research Assistant -** **Microscale Nanoscience Laboratory, USTC** (Hefei, China) 09/2021 - 12/2021

* Designing controlled droplet suspension equipment based on standing waves theory
* Designed and welded planar phased array circuits to independently adjust phase and voltage of each ultrasonic sensor, realizing stable suspension and movement of multiple rows of objects
* Simulated dynamic distribution of potential field in MATLAB based on the approximate solution of GOVCOV potential
* Used finite element method (FEM) and particle tracking module in COMSOL to gain the static distribution of the suspended objects, proving feasibility and validity of dynamic approximate solution gained with MATLAB
* **Awarded:** First Prize in the 17th Physical Innovation Research Experimental Paper Competition, USTC

**Teaching Assistant -** **USTC** (Hefei, China) 09/2022 - 12/2022

* Taught Mechanics B course in Fall 2022 at USTC

**education**

**PhD in Electrical Engineering** 09/2023 - Present

* Yale University, Connecticut, United States
  + Advisor: Jakub Szefer, Yongshan Ding
  + Area: Quantum Computing Security

**Bachelor of Science in Physics**  09/2019 – 07/2023

* University of Science and Technology of China (USTC), Hefei, China
  + Major: Physics (Atomic and Molecular Physics track)
  + Dual Major/Minor: Computer Science and Technology

**skills**

* **Programming** Python, C, C++, Verilog, Pytket, Qiskit, Matlab, COMSOL

**honors & awards**

• Silver Award of Excellent Student Scholarship, USTC (Top 2%) 2022, 2021

• First Prize in 17th Physical Innovation Research Experimental Paper Competition, USTC 2021

• Scholarship of Yan Jici Talent Program in Physics, USTC (Top 10%) 2021, 2020

• Second Prize in 6th China Undergraduate Physics Experiment Competition 2020

• Chen Linyi Scholarship, USTC (Top 1%) 2020

• Provincial First Prize in 35th Chinese Physics Olympiad 2018

**invited talks**

•   2nd **Quantum Computer Cybersecurity Symposium**, New Haven, Connecticut 2024

**peer-reviewed publications**

• **Yizhuo Tan,** Hrvoje Kukina, Jakub Szefer. “Study of Attacks on the HHL Quantum Algorithm” in Proceedings of, IEEE Workshop on Quantum IntelLigence, Learning & Security, **QUILLS,** 2024.

• **Yizhuo Tan,** Chuanqi Xu, Jakub Szefer. “Exploration of Timing and Higher-Energy Attacks on Quantum

Random Access Memory” in Proceedings of the International Conference on Computer-Aided Design, **ICCAD,** 2024.

**papers in praperation**

• **Yizhuo Tan,** Hrvoje Kukina, Jakub Szefer. “Securing HHL Quantum Algorithm against Quantum Computer Attacks”

• **Yizhuo Tan,** Navnil Choudhury, Kanad Basu, Jakub Szefer. “QubitHammer Attacks: Qubit Flipping Attacks in Superconducting Quantum Computers”

• **Yizhuo Tan,** Pranet Sharma, Jakub Szefer. “Moving Target Defense for Securing Cloud-Based Quantum Computers”

• Theodoros Trochatos, Sanjay Deshpande, Chuanqi Xu, **Yizhuo Tan,** Jakub Szefer. “Security of Quantum Computing Systems -- Proposal for Foundations and Trends in Privacy and Security Tutorial Paper”