Xueyue Zhang

PhD candidate in Applied Physics, Caltech

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Research Positions

Research assistant, Caltech — **Aug 2017 - Present**
Advisor: Oskar J. Painter, John G. Braun Professor of Applied Physics

Summer undergraduate research fellow, Caltech — **June 2016 - Sept 2016**
Advisor: Kerry J. Vahala, Ted and Ginger Jenkins Professor of Applied Physics

Undergraduate researcher, Peking University — **Jan 2016 - June 2017**
Advisor: Yun-Feng Xiao, Associate Professor of Physics

Undergraduate researcher, Georgia Tech — **Sept 2015 - Dec 2015**
Advisor: Wenshan Cai, Associate Professor of Electrical and Computer Engineering

Undergraduate researcher, Tsinghua University — **Sept 2014 - June 2017**
Advisors: Wei Zhang, Associate Professor of Electronic Engineering. Yu-xi Liu, Professor of Microelectronic Science and Engineering

Education

Ph. D. in Applied Physics (expect in Feb. 2023) — **Sept 2017 - Present**
California Institute of Technology

Exchange student in Electrical and Computer Engineering — **Sept 2015 - Dec 2015**
Georgia Institute of Technology

B. Eng. in Microelectronic Science and Engineering — **Sept 2013 - June 2017**
Tsinghua University

Research Interests

- **Quantum simulations**: many-body physics, topological physics, quantum optics
- **Quantum devices and their applications**: superconducting circuits, microwave metamaterials
- **Micro- and nano-photonics**: ultra-high-quality optical resonators, nonlinear optics

Academic Awards

Yariv/Blauvelt fellowship, Caltech — 2017

Graduate fellowships, Stanford (3-year SGF fellowship)/UC Berkeley/MIT/Harvard/Princeton. All declined for the Caltech fellowship — 2017

Outstanding Graduate, Beijing Ministry of Education — 2017

Best undergraduate thesis, Tsinghua University — 2017

First place in college entrance exam, Xinjiang Ministry of Education — 2013

Publications

Up to date list is always available on my Google Scholar page [link].

- "A scalable superconducting quantum simulator with long-range connectivity based on a photonic bandgap metamaterial"
  Xueyue Zhang* (*Equal contribution), Eunjong Kim*, Daniel K. Mark, Soonwon Choi, Oskar Painter
  arXiv: 2206.12803 (2022)

- "Quantum electrodynamics in a topological waveguide"
  Eunjong Kim*, **Xueyue Zhang***, Vinicius S Ferreira, Jash Banker, Joseph K Iverson, Alp Sipahigil, Miguel Bello, Alejandro Gonzalez-Tudela, Mohammad Mirhosseini, Oskar Painter
  Phys. Rev. X **11** 1, 011015 (2021)
  Featured in *Physics*

- "Cavity quantum electrodynamics with atom-like mirrors"
  Mohammad Mirhosseini*, Eunjong Kim*, **Xueyue Zhang**, Alp Sipahigil, Paul B Dieterle, Andrew J Keller, Ana Asenjo-Garcia, Darrick E Chang, Oskar Painter
  Nature **569**, 7758 (2019)

- "Metasurfaces for near-eye augmented reality"
  Shoufeng Lan*, **Xueyue Zhang***, Mohammad Taghinejad, Sean Rodrigues, Kyu-Tae Lee, Zhaocheng Liu, Wenshan Cai
  ACS Photonics **6**, 4 (2019)

- "Symmetry-breaking-induced nonlinear optics at a microcavity surface"
  Xueyue Zhang*, Qi-Tao Cao*, Zhuo Wang, Yu-xi Liu, Cheng-Wei Qiu, Lan Yang, Qihuang Gong, Yun-Feng Xiao
  Nature Photonics **13**, 1 (2019)

- "Single-mode dispersive waves and soliton microcomb dynamics"
  Xu Yi*, Qi-Fan Yang*, **Xueyue Zhang***, Ki Youl Yang, Xinbai Li and Kerry Vahala
  Nature Communications **8**, 14869 (2017)

- "A point acoustic device based on aluminum nanowires"
  Qian-Yi Xie*, Zhen-Yi Ju*, He Tian, Qing-Tang Xue, Yuan-Quan Chen, Lu-Qi Tao, Mohammad Ali Mohammad, **Xue-Yue Zhang**, Yi Yang and Tian-Ling Ren
  Nanoscale **8**, 10 (2016)

Conference Presentations

- Xueyue Zhang, Eun Jong Kim, Oskar Painter, "Characterization of a superconducting metamaterial quantum many-body simulator", APS March Meeting 2022, Chicago IL
- Xueyue Zhang, Eun Jong Kim, Oskar Painter, "A superconducting metamaterial quantum processor for studying quantum many-body physics: Part 1", APS March Meeting 2021, virtual
- Xueyue Zhang, Eun Jong Kim, Alp Sipahigil, Vinicius Ferreira, Jash Banker, Mohammad Mirhosseini, Oskar Painter, "Quantum electrodynamics in a topological metamaterial: Part 2", APS March Meeting 2020, virtual
- Xueyue Zhang, Eun Jong Kim, Mohammad Mirhosseini, Alp Sipahigil, Paul Dieterle, Andrew Keller, Ana Asenjo-Garcia, Darrick Chang, Oskar Painter, "Waveguide-mediated interaction of artificial atoms in the strong coupling regime, part 1", APS March Meeting 2019, Boston MA
- Xueyue Zhang, Eun Jong Kim, Mohammad Mirhosseini, Alp Sipahigil, Andrew Keller, Oskar Painter, "Interaction of a superconducting qubit and an atomic mirror in waveguide quantum electrodynamics", Gordon Research Conference: Quantum Science 2018, Eaton MA

Invited Talks

- "Waveguide quantum electrodynamics towards many-body physics", Institute for Interdisciplinary Information Sciences, Tsinghua University (virtual), May 20, 2022
- "Waveguide quantum electrodynamics with superconducting qubits", Institute of Computing technology, Chinese Academy of Sciences (virtual), March 30, 2021

Professional Activities

Reviewer for *Nature Physics*, *Physical Review Letters*, *Physical Review A*, *Physical Review B*, *Scientific Report*

Teaching and Mentoring

- **Teaching assistant**, EE/APh 158 Quantum Electrical Circuits. Instructor: Prof. Mohammad Mirhosseini. Caltech 2022.
  Co-developed the course content and homework for the first-run class. Lectured the part on quantum gates. TA rating 4.92/5.
- **Invited teaching**, HSSP summer school: Quantum Information and Technology, MIT 2019
- **Research mentor**, for Zhaoyi Zheng, an undergraduate summer researcher at Caltech (now a PhD student at Princeton) in 2020.
- **Research mentor**, for Aziza Almanakly, an undergraduate summer researcher at Caltech (now a PhD student at MIT) in 2019.

Outreach and Diversity Activities

- Invited speaker for a lightning talk session (virtual) with hundreds of high school students as the audience. Organized by QubitByQubit , Dec 12, 2021.
- Invited speaker for a scientific talk with audience of junior and senior undergraduate women*. Organized by FUTURE at Caltech, Sept 13, 2021.
- Steering committee member, Womxn in EAS, Caltech, Aug 2021 – present.