

Zhen Guo

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EDUCATION

Massachusetts Institute of Technology

Expected: May 2024

Doctor of Philosophy, Computer Engineering, minors in Engineering Leadership

University of California, Berkeley

Graduation: May 2018

Bachelor of Art, highest honor in Physics, minors in EECS

COURSEWORK

Physics & Engineering	Analytic Mechanics; Electrodynamics; Statistical Mechanics; Quantum Mechanics; Many-Body Theory; Solid-State Device; Photonics; Quantum & Nonlinear Optics;
Computer Science	Algorithms & Data Structure; Computer Architecture; Machine Learning; Hardware for Deep Learning; Computer Vision; Computational Photography;

RESEARCH PUBLICATION

1. **Z.Guo**, Z.Liu, Q.Zhang, G.Barbastathis, N.Fang, “*Real-time optical control of 3D printing*”, **Nature, Light Science & Applications**. (preparing)
3. **Z.Guo**, Z.Liu, Q.Zhang, G.Barbastathis, M.Glinsky, B.Alpert, Z.Levine, “*Noise-resilient deep tomographic imaging*”, **Optica**. (preparing for submission)
3. **Z.Guo**, J.Song, G.Barbastathis, M.Glinsky, C.Vaughan, K.Larson, B.Alpert, Z.Levine, “*Physics-assisted generative adversarial network for X-ray tomography*”, **Optics Express**.
4. **Z.Guo**, A.Levitan, G.Barbastathis, R.Comin “*Randomized probe imaging through deep k-learning*”, **Optics Express**.
5. C.Gong, P.Zhang, T.Norden, Q.Li, **Z.Guo**, A.Chaturvedi, A.Najafi, S.Lan, X.Liu, Y.Wang, H.Zeng, H.Zhang, X.Zhang, “*Ferromagnetism emerged from non-ferromagnetic atomic crystals*”, **Nature Communication**. (reviewing)
6. H.Long, T.Pham, A.Yan, **Z.Guo**, H.Ishida, W.Shi, S.Turner, S.Gilbert, A.Zettl, “*Wafer-Scale On-Chip Synthesis and Field Emission Properties of Vertically Aligned Boron Nitride Based Nanofiber Arrays*”, **Applied Physics Letters**.
7. **Z.Guo**, “*Optical Characterizations and Mechanical Modulations of Electrostatic Graphene Speaker*”, **Berkeley Physics Undergraduate Honor Thesis**. (Advisor: Prof. Alex Zettl)

RESEARCH PROJECTS

Physics-assisted machine learning for X-ray tomography

Jan. 2021 - Present

Department of Electrical Engineering and Computer Science at MIT

Prof. Geroe & Dr. Zachary

- Monte Carlo simulation to compute conditional probability in imaging.
- Designed an algorithm “CircuitFaker” to emulate real world 3D circuits.
- Developed generative models for solving ill-conditioned X-ray tomography.

Randomized probe imaging through deep k-learning

Sep. 2020 - Oct. 2021

Department of Electrical Engineering and Computer Science at MIT

Advisor: Prof. George & Riccardo

- Formulated computational toolbox for diffractive imaging.
- Developed machine learning algorithms for Randomized probe imaging.
- Experimental demonstration of the algorithms using tabletop setup.

Energy Efficient Deep Learning Photonics Crossbar Array

Research Laboratory of Electronics at MIT

Jan. 2020 - Aug. 2020

Advisor: Prof. Dirk & Vivienne

- Computational/theoretical estimation of crossbar performance/energy consumption.
- Inverse design using gradient based optimization algorithms.
- Timeloop and Accelergy analysis for different neural network workloads.
- GDS layout for photonic integrated circuits, system-level circuit simulation.
- Reinforcement Learning for search and fast beam steering.

Terahertz Photonic Emission in Intrinsic Ferromagnetic Atomic Layers

Department of Mechanical Engineering, University of California, Berkeley

Jan. 2017 - Aug. 2018

Advisor: Prof. Xiang Zhang

- Developed software for lakeshore controller's module for closed-loop temperature monitoring.
- Automated polarization-resolved low temperature low frequency and high vacuum Raman measurement.
- Optically aligned the low frequency Raman spectroscopy with bragg notch filter, visible linear polarizer, band stop filter and half-wave plate.

Enhanced Optical Valley Splitting Zeeman Effect by Proximity

Department of Mechanical Engineering, University of California, Berkeley

Feb. 2018 - May 2018

Advisor: Prof. Xiang Zhang

- High quality heterostructure preparation for magneto-optics Kerr effect and magnetic circular dichroism measurement via reflection in attoDRY2100 cryostat with 9 Tesla superconducting magnet.
- Developed attocube temperature and magnetic field scanning software system with adaptive optical focus via sub-nanometer piezo positioning controller from the lock-in amplifier feedback.

Optical Characterizations and Mechanical Modulations of Electrostatic Graphene Speaker

Department of Physics, University of California, Berkeley

Dec. 2016 - May 2018

Advisor: Prof. Alex Zettl

- Graphene growth via chemical vapor disposition method, thin film wet transfers and speaker assembling.
- Employed spontaneous Raman spectroscopy to identify the strain and defects within the suspended graphene.
- Designed a dedicated mechanical apparatus to measure the force-displacement curve and the effective spring constant of the graphene diaphragm upon Young's modulus.
- Modulated the mechanical proprieties of graphene diaphragm via electron-beam lithography patterning and uni-axial strain compressing.

Non-electronics Variable Tuning System for Hybridized In-Ear Monitor

Sensible Recording and Rendering of Acoustic Science

Aug. 2013 - Dec. 2016

Director: Forrest Wei

- Cross-compared the frequency response and analyzed the frequency division circuit designs of in-ear monitor.
- Advanced the frequency division circuit in the triple-driver In-Ear Monitor prototype and simulated the stability and durability test for the triple-driver In-Ear Monitor prototype.
- Deconstruction and reconstruction of the RS7, OutLaw 7075 and AT6012 audio system amplifiers.
- Realization of the variable-tuning system for the In-Ear Monitor.

PRESENTATION

Randomized probe imaging through deep k-learning

Computational Optical Sensing and Imaging

July 2021

Information-theoretic approach towards X-ray imaging 3D integrated circuits

Computational Optical Sensing and Imaging

July 2021

Two Dimensional Material in Modern Electronic Audio System

Honor Seminar, Department of Physics, University of California, Berkeley

April 2017

SKILLS

Python, Matlab, C++, Pytorch, Tensorflow, Github, AWS, Google Cloud, Linux, Keras, LaTeX