Andi Gu
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EDUCATION

University of California, Berkeley Berkeley, CA

Bachelor of Arts in Computer Science and Honors Physics; GPA: 4.0/4.0 *August 2018 - May 2022*

RESEARCH EXPERIENCE

Quantum Computing Summer Program Los Alamos National Lab, Los Alamos, NM

Advised by Prof. Patrick Coles *May 2021 - Present*

- **Optimizers for variational hybrid quantum-classical algorithms**: Developed novel adaptive, shot frugal optimizer and demonstrated its success on a number of chemical structure problems (VQE)
- **Hamiltonian learning**: Ongoing work on methods to learn the parameters for the Hamiltonian of a black box physical systems – in collaboration with Quantum Nanoelectronics Lab as part of a senior thesis

Quantum Nanoelectronics Lab UC Berkeley, Berkeley, CA

Advised by Prof. Irfan Siddiqi *September 2020 - Present*

- **Noise mitigation**: Applying restricted Boltzmann machines and Monte Carlo techniques to build accurate estimators for operator expectation values and tested these noise mitigation techniques to demonstrate shot frugality on VQE for H_2, LiH, and BeH_2

Lee Teng Program Argonne National Lab, Chicago, IL

Advised by Dr. Uli Wienands *May - August 2020*

- **Accelerator simulation**: Ran simulations of Argonne's 'Advanced Photon Source' (APS) to better understand behavior of high charge particle beams
  * Developed a new workflow for the APS Upgrade team to run parallel simulations with varying parameter configurations
  * Analyzed simulation outputs to create a set of recommendations on how to ensure beam stability and achieve target efficiency

Supernova Cosmology Project Lawrence Berkeley National Lab, Berkeley, CA

Advised by Prof. Saul Perlmutter and Prof. Xiaosheng Huang *August 2019 - Present*

- **Strong gravitational lens detection**: Designed, implemented, and tested various deep neural network architectures for the identification of gravitational lenses
  * Developed models with fewer parameters and better performance than current state of the art models, and applied these models to discover over 1500 new strong lens candidates.
  * Applied methodologies for learning with class imbalances and sparse data, such as adaptive discriminative domain adaptation (ADDA), generative adversarial networks (GANs), and variational autoencoders (VAEs)
- **Lens modeling**: Developed a novel modeling code in TensorFlow that achieved a 50-fold speed increase over existing codes, and introduced a novel technique for uncertainty estimation using variational inference and Hamiltonian Monte Carlo
  * Demonstrated the success of the lensing code by modeling a sample of 12 lenses using Hubble Space Telescope data

Ultrafast Nano-Optics Group UC Berkeley, Berkeley, CA

Advised by Prof. Feng Wang *October 2018 - May 2019*

- **2D material exfoliation and assembly**: Worked in the exfoliation and stacking of various two dimensional materials (graphene, hBN)
- **Single-shot graphene identification**: Developed an image analysis algorithm building upon the Kang-Weiss model for the automatic detection and labelling of monolayer graphene.

Goh Lab University of Toronto, Toronto, Canada

Advised by Prof. Cynthia Goh *April 2017 - March 2018*

- **Transmittance studies using AFM**: Studied the relationship between light transmittance and surface roughness using an atomic force microscope.

PUBLICATIONS

1. **Gu, A.**, Lowe, A., et al. "Adaptive Shot Allocation for Fast Convergence in Variational Quantum Algorithms." ArXiv:2108.10434 [Quant-Ph], Aug. 2021.

2. Huang, X., Storfer, C., **Gu, A.**, et al. "Discovering New Strong Gravitational Lenses in the DESI Legacy Imaging Surveys." The Astrophysical Journal, vol. 909, no. 1, Mar. 2021, p. 27.

3. **Gu, A.** "Tracking Studies with Frequency Ramp for the APS-U Booster." Report produced for the Lee Teng Program, available for viewing online, Aug. 2020.

4. **Gu, A.** "A Method for Single-Image Identification of Graphene." Report produced for the Ultrafast Nano-Optics Group, available for viewing online, Sep. 2019.

Presentations and Posters

DESI Undergraduate Research Forum	Berkeley, CA
Modeling Strong Gravitational Lenses Discovered in DESI Legacy Imaging Surveys with the Hubble Space Telescope	*September 2021*
Information Science & Technology Institute Summer School Presentations	Los Alamos, NM
Learning Properties of Physical Systems from Quantum Circuit Data	*August 2021*
UC Berkeley Undergraduate Physics Poster Session	Berkeley, CA
Restricted Boltzmann Machines for Quantum State Tomography	*May 2021*
2020 Lee Teng Symposium	Chicago, IL
Tracking Studies with Frequency Ramp for the APS-U Booster	*August 2020*

Awards & Honors

- H2H8 Research Grant (Spring 2021 – Spring 2022)
- Electrical Engineering & Computer Science Departmental Award (Fall 2021)
- Berkeley Physics Undergraduate Research Scholar (Spring 2021, Fall 2021)
- Western Union Foundation Global Scholarship (Fall 2019 – Spring 2020)
- Grand prize winner (from over 100 participants) at Jane Street's San Francisco ETC (Summer 2019)
- Overall third place winner (from over 700 participants) at CalHacks 2018, as well as the winner of best Google hack. Collaborated with Google on a case study for Google Cloud Platform.
- Edward Frank Kraft Award (Fall 2018)
- Broadridge Scholarship (Fall 2018 – Spring 2022)

Work Experience

Physics 111A Instrumentation Lab Undergraduate Student Instructor	UC Berkeley, Berkeley, CA
Supervised by course instructors Dr. Amin Jazaeri and Dr. Mathias Reinsch	*May 2021 - August 2021*
Course Grader	UC Berkeley, Berkeley, CA
Math 104 Real Analysis, Physics 89 Mathematical Physics, Physics 5A Introduction to Mechanics	*August 2020 - May 2021*
Gridware	San Francisco, CA
Research Intern	*December 2019 - February 2020*
Salesforce	San Francisco, CA
Software Engineer Intern	*May - August 2019*