REES W. CHANG

rees-c.github.io | linkedin.com/in/reeschang | github.com/rees-c | reeswc2@illinois.edu
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EDUCATION

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN 2020 – present
PhD Candidate, Materials Science & Engineering
GPA: 4.0/4.0

Activities: Materials Research Society, UIUC Engineers Volunteering in STEM Education
Graduate coursework: Condensed Matter Physics, Quantum Mechanics, Mathematical Physics, Statistical Mechanics, Atomic Structure and Bonding

CORNELL UNIVERSITY 2016 – 2020
B.S. Materials Science & Engineering with Honors
Cum Laude | GPA: 3.601/4.3

Activities: Theta Tau Professional Engineering Fraternity, Cornell Materials Society, Cornell Prison Education Program, Intramural Soccer

Featured Coursework: Computational Chemistry; Computational Materials Science; Bayesian Estimation; Supervised Machine Learning; Unsupervised Machine Learning; Large-Scale Machine Learning; Numerical Linear Algebra; Networks; Mechanical Properties of Materials; Electronic, Dielectric, and Magnetic Properties of Materials; Kinetics; Thermodynamics; Materials Chemistry

AWARDS

NSF Graduate Research Fellowship (2022 – present)
DIGI-MAT NSF Traineeship (2021 – present)
Hamer Fellowship (2020)
Cornell Engineering Learning Initiatives Research Award (2017)

PUBLICATIONS

Rees Chang, Yu-Xiong Wang, and Elif Ertekin. "Towards overcoming data scarcity in materials science: unifying models and datasets with a mixture of experts framework" (2022). arXiv:2207.13880. *Under review*.

PRESENTATIONS

Rees Chang, Yu-Xiong Wang, and Elif Ertekin, "Overcoming Data Scarcity in Materials Science with Mixture of Experts," in Materials Research Society (MRS) Spring Meeting Symposium, 2022.

SKILLS

Proficient: Python (numpy, pandas, pytorch, scikit-learn), Git, Bash, MATLAB, LaTeX
Experienced: VASP, HOOMD-Blue, TensorFlow, BoTorch, Mongo, HTML/CSS, R, Mathematica, Java

RESEARCH EXPERIENCE

UIUC, Materials Science & Engineering Aug 2020 – present
PhD student
Advisors: Professors Elif Ertekin, Yu-Xiong Wang
Project: Developing machine learning methods to accelerate materials discovery

- Developing machine learning frameworks to predict data-scarce properties of inorganic crystals
- Developing a generative deep learning model to rapidly generate stable atomic structures of crystals

Cornell University, Materials Science & Engineering Aug 2019 – May 2020
Undergraduate Researcher
PI: Prof. Julia Dshemuchadse
Project: "Active Machine Learning of Binary Compound Pair Potentials to Discover Exotic Self-Assembling Materials"

- Led independent project using molecular dynamics to study how molecular building blocks self-assemble
- Implemented a Random Embedding Bayesian optimization framework (arXiv:1301.1942) in GPyTorch to accelerate discovery of new self-assembling structures by exploring the high-dimensional parameter space of a flexible interaction potential function

Lawrence Berkeley National Lab Summer 2019
SULI Research Intern
PI: Dr. Anubhav Jain
Project: "Compressed Sensing Lattice Dynamics for High-Throughput Thermal Conductivity Calculations"

- Developed and implemented a supercell generation algorithm into *pymatgen*
- Conducted Density Functional Theory (DFT) calculations with VASP to calculate electronic band diagrams, electronic density of states, and atomic forces

- Used Compressive Sensing Lattice Dynamics (CSLD) to calculate 2nd through 4th order interatomic force constants, phonon dispersion curves, and anharmonic lattice thermal conductivities
- Developed an automated workflow in *atomate* incorporating DFT and CSLD to rapidly produce high-fidelity vibrational property calculations of materials

Cornell University, Chemical Engineering Jan 2017 – Jun 2019
Undergraduate Researcher
PI: Prof. Tobias Hanrath
Project: "Computational Optimization of Light Absorption in Thin Film Solar Cells"
- Awarded $1850 from Air Products
- Developed genetic algorithms in Python and MATLAB, interfacing them with electromagnetic simulations via Bash scripts
- Achieved 822% increased absorption from introducing nanostructures to an amorphous silicon thin film
- Generated data visualization workflows in MATLAB for on-the-fly interpretability

NASA Goddard Space Flight Center, Detector Systems Jun – Aug 2018
Research and Development Intern
PI: Dr. Larry Hess
Project: "Quasi-Resonant Absorption for Quantum Efficiency Improvement in UV Detectors"
- Designed, fabricated, patterned, and characterized multilayer thin film UV detectors for the LUVOIR mission with photolithographic and optical methods
- Modeled devices for 3D printing using SolidWorks

Columbia University, Environmental Engineering May 2015 – Aug 2016
Research Intern
PI: Prof. Robert Farrauto
Project: "Carbon Capture and Conversion to Methane with a Dual-Functioning Material"
- Conducted high-throughput experiments of new carbon dioxide adsorbents and methanation catalysts
- Conceptualized/tested catalyst processing procedures
- Examined surface area and adsorption properties using BET analysis and a thermal gravimetric analyzer
- Drove scale-up studies using gas flow reactors

TEACHING EXPERIENCE

UIUC Engineers Volunteering in STEM Education Spring 2021
- Virtually volunteered at Franklin Middle School to teach concepts about materials science and chemistry

Cornell CS 4780, Prof. Thorsten Joachims Fall 2019
Undergraduate Teaching Assistant
Course: Machine Learning for Intelligent Systems
- Held weekly office hours and graded assignments and exams for a course of over 600 students

Cornell Prison Education Program, Prof. Marjo Schat Fall 2019
Volunteer Teaching Assistant
Course: Environmental Science Tutorial
- Led discussions and activities for 17 incarcerated students at Cayuga Correctional Facility

Cornell MSE 2610, Prof. Shefford Baker Fall 2017
Undergraduate Teaching Assistant
Course: Mechanical Properties of Materials
- Graded problem sets for a course of ~80 sophomores and first-year graduate students