

ASHKA SHAH

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EDUCATION

The University of Chicago
Ph.D. in Computer Science

Chicago, IL
June 2026 (Expected)

Harvey Mudd College
B.S. in Physics

Claremont, CA
May 2016

SKILLS

Languages/Software: Python, C++, R, PyTorch, Tensorflow, Docker, Git, Slurm

Research: AI for Science, Causal Discovery, Causal Inference, Knowledge Graphs, Optimal Experimental Design, High Performance Computing, Systems Biology

RESEARCH EXPERIENCE

The University of Chicago

Department of Computer Science, Advised by Rick Stevens

Chicago, IL
October 2019 – Present

- Applied causal discovery at scale for learning context-specific gene regulatory networks for chronic low-dose radiation exposure in human cells by incorporating structural priors, and optimal experimental design to suggest candidate CRISPR/Cas9 perturbation experiments (Ongoing).
- Designed a distributed parallel causal discovery algorithm using an novel graph partition. This work includes a theoretical proof of consistency, synthetic simulation studies, and an empirical analysis of speed and accuracy with comparable algorithms ([Code](#)).
- Developed SP-GIES – a causal discovery algorithm that achieves 4x speedup and improved accuracy compared to existing algorithms. SP-GIES learns causal relationships of gene regulatory networks for E.coli by incorporating CRISPR/Cas9 perturbation experiments ([Code](#)).
- Leveraged graph representations of enumerated drug libraries for efficient navigation of the chemical space using scaffold subgraphs.
- Investigated use of counterfactuals and adversarial examples in tabular RNA sequence model robustness.
- Implemented and trained deep learning image models (convolutional neural networks) to predict dock scores of COVID-19 protein targets for virtual screening tasks.

Flatiron Institute

Center for Computational Biology, Advised by Olga Troyanskaya

New York, NY
May 2023 – August 2023

- Designed and evaluated causal discovery algorithms to infer gene regulatory networks from functional networks with human tissue-specific gene expression data ([Code](#)).

Argonne National Laboratory

Chicago, IL

Advised by Rick Stevens, Arvind Ramanathan
September 2021

June 2020 – September 2020, June 2021 –

- Developed optimal experimental design algorithms for selecting interventional experiments for recovering causal mechanisms in gene regulatory networks.
- Implemented DNA Assembly protocols on Opentrons OT-2 pipetting robots for Argonne's Rapid Prototyping Laboratory.

WORK EXPERIENCE

Lawrence Livermore National Laboratory

Livermore, CA

National Ignition Facility Computation Software Engineer, Supervised by Jarom Nelson
June 2016 – August 2019

- Designed, developed and tested VBL (Virtual Beamline) laser propagation model of NIF laser system in C++ for use in high performance computing environments.

PUBLICATIONS

Structure Learning without Context-Specific Ground Truths: a Case Study in Chronic Low-dose Radiation Exposure in Human Cells *CauScien Workshop Neurips 2025*

Causal Discovery over High-Dimensional Structured Hypothesis Spaces with Causal Graph Partitioning *TMLR 2025, ICML 2024 AI for Science Workshop (Best Paper Award)*

Causal Discovery and Optimal Experimental Design for Genome-Scale Biological Network Recovery *Platform for Advanced Scientific Computing 2023*

Scaffold-Induced Molecular Subgraphs (SIMSG): Effective Graph Sampling Methods for High-Throughput Computational Drug Discovery *BMC Bioinformatics 2022*

Probing Decision Boundaries in Cancer Data Using Noise Injection and Counterfactual Analysis *Computational Approaches to Cancer Workshop at SC 2021*

IMPECCABLE: Integrated Modeling Pipeline for COVID Cure by Assessing Better Leads *ICPP 2021*

POSTERS

Hypothesis Ranking and Causal Discovery for Antimicrobial Resistance

The University of Chicago Data Science Institute AI + Science Summer School, August 2022

Addressing Challenges in Developing Virtual Beamline: A Large-Scale, High-Energy Parallel Laser Simulation Code

Grace Hopper Celebration Poster Session, Sept 2018

HONORS AND LEADERSHIP

Secretary of Energy Achievement Honor Award 2021 (National Virtual Biotech Lab Team)

Graduate Women in Computer Science Co-Chair 2020 – 2022 (The University of Chicago)

Crerar Fellowship 2019 (The University of Chicago)

RELEVANT COURSEWORK

Probabilistic Graphical Models (Toyota Institute of Technology, Spring 2022)
Machine Learning (The University of Chicago, Spring 2020)
Biophysics of Biomolecules (The University of Chicago, Spring 2020)
Topics in Computer Architecture (The University of Chicago, Winter 2020)
Machine Learning in Medicine, (The University of Chicago, Fall 2019)
Argonne Training Program on Extreme-Scale Computing (Argonne National Laboratory, Summer 2020)

TEACHING

CMSC 35440 - Machine Learning in Biology and Medicine (The University of Chicago, Fall 2023)
CMSC 14100 - Introduction to Data Science Lecture (The University of Chicago, Summer 2022)
CMSC 14100 - Introduction to Computer Science I (The University of Chicago, Fall 2019)

VOLUNTEER WORK

South Side Science Festival (August 2022)
Editor at ACM's Student Magazine XRDS (2021 – 2022)
CS Education Week (Little Village High School, 2020)
Girls Who Code (2018 – 2019)