Clayton W. Seitz, PhD

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PERSONAL STATEMENT

I specialize in the development and application of machine learning methods for computer vision, large language models, time series analysis, and generative modeling. I maintain a strong background in functional and object-oriented programming with experience writing production quality software.

EDUCATION

Doctor of Philosopy, Physics — 2024
Purdue University

Master of Science, Physics — 2021
University of Chicago

Bachelor of Science, Physics, Magna Cum Laude — 2019
Indiana University
Minor: Mathematics

Bachelor of Science, Informatics (Math Focus), Magna Cum Laude — 2019
Indiana University

EXPERIENCE

Graduate Researcher — 2022-Present
Indiana University, Indianapolis, IN
- Designed diffusion models/score-based generative models and general computer vision techniques (object detection, segmentation, etc.) in PyTorch for modeling image datasets in super-resolution fluorescence microscopy
- Developed general probabilistic models for high-dimensional imaging datasets and associated Bayesian methods for statistical inference tasks
- Developed novel hardware systems for super-resolution imaging of human cells

Graduate Researcher — 2020-2022
University of Chicago, Chicago, IL
- Investigated fundamental learning mechanisms in recurrent neural networks (RNNs) using dynamical models, mean-field theory, and time-series analysis.
- Designed and ran Monte Carlo simulations of spiking neural networks

Research Assistant — 2019-2020
Indiana University, Indianapolis, IN
- Developed a scientific package in Python known as "cellquantifier" for high-throughput object detection and tracking
- Managed the package lifecycle and user training throughout the laboratory

Information Systems Intern — 2016
Liberty Mutual Insurance
- Wrote Python scripts to automate attestation testing of web facing servers
- Assisted in configuration of web application firewalls (WAFs)

AWARDS

NIH Graduate Training Fellowship 2020
University of Chicago, Chicago, IL

Travel Award and Lightning Talk Invitation 2019
Physical Sciences in Oncology - Minneapolis, MN

Hudson and Holland Scholarship for Diversity and Inclusion 2013-2017
Indiana University, Bloomington, IN

Founders Scholar 2013-2017
Indiana University, Bloomington, IN

Cigital Scholarship 2016-2017
Indiana University, Bloomington, IN

PUBLICATIONS **Clayton Seitz** and Jing Liu. *Uncertainty-aware localization microscopy by variational diffusion.* In Review. 2024

Clayton Seitz and Jing Liu. *Quantum enhanced localization microscopy with a single photon avalanche diode array.* In Review. 2024

Clayton Seitz[†], Donghong Fu[†], Mengyuan Liu, Hailan Ma, and Jing Liu. *BRD4 phosphorylation regulates the structure of chromatin nanodomains.* In Review. 2024

Maelle Locatelli[†], Josh Lawrimore[†], Hua Lin[†], Sarvath Sanaullah, **Clayton Seitz**, Dave Segall, Paul Kefer, Salvador Moreno Naike, Benton Lietz, Rebecca Anderson, Julia Holmes, Chongli Yuan, George Holzwarth, Bloom Kerry, Jing Liu, Keith D Bonin, Pierre-Alexandre Vidi. *DNA damage reduces heterogeneity and coherence of chromatin motions.* PNAS 12 July 2022; 119 (29): 1-11

Mengdi Zhang, **Clayton Seitz**, Garrick Chang, Fadil Iqbal, Hua Lin, and Jing Liu *A guide for single-particle chromatin tracking in live cell nuclei.* Cell Biology International 15 January 2022; 46 (5): 683-700

Wenting Wu, Farooq Syed, Edward Simpson, Chih-Chun Lee, Jing Liu, Garrick Chang, Chuanpeng Dong, **Clayton Seitz**, Decio L. Eizirik, Raghavendra G. Mirmira, Yunlong Liu, Carmella Evans-Molina; *Impact of Proinflammatory Cytokines on Alternative Splicing Patterns in Human Islets.* Diabetes 25 October 2021; 71 (1): 116–127

Clayton Seitz, Hailan Ma, and Jing Liu. *Cytokine-induced transcriptional memory is evident in the kinetics of transcriptional bursts.* Biophysical Society Annual Conference 2022

Clayton Seitz, Hua Lin, Keith Bonin, Pierre-Alexandre Vidi, and Jing Liu. *Quantifying the spatiotemporal dynamics of dUTP labeled chromatin during the DNA damage response.* Biophysical Society Annual Conference 2020

SOFTWARE SKILLS *Programming Languages & Software:* Linux, Bash, Python, R, PyTorch, C/C++, SQL, LaTeX, Git, Docker, SLURM, Azure, AWS