Clayton W. Seitz, PhD

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PERSONAL STATEMENT

I maintain a diverse background and specialize in the development and application of machine learning models in microscopy. Recently, I have developed deep generative models as well as analytical probabilistic methods for modeling imaging datasets. These models have been applied to fluorescence microscopy to fuel biological discovery.

EDUCATION

Doctor of Philosopy, Physics
Purdue University
Thesis: *Advancing super-resolution microscopy for quantitative in-vivo imaging of chromatin nanodomains*

Master of Science, Biophysics
University of Chicago
Thesis: *Stable cell assembly formation in excitatory-inhibitory neural networks*

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

Bachelor of Science, Informatics, Magna Cum Laude
Luddy School of Informatics, Computing, and Engineering, Indiana University
Concentration: Mathematics

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 microscopy systems for super-resolution imaging of living cells
- Investigated the impact of point mutations of epigenetic proteins on the structure of nucleosome nanodomains and complement experimental data with molecular dynamics simulations

Graduate Researcher 2020-2022
University of Chicago, Chicago, IL

- Performed Monte Carlo simulations of spiking neural networks to relate neural network architecture to spiking dynamics
- Utilized fluorescence microscopy to measure temporal dynamics of calcium concentration in MIN6 cells

Research Assistant 2019-2020
Indiana University, Indianapolis, IN

- Developed a scientific package in Python for high-throughput object detection and tracking

- Managed the package lifecycle and user training throughout the laboratory

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. *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

Clayton Seitz and Jing Liu. *Uncertainty-aware localization microscopy by variational diffusion.* 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

TECHNICAL SKILLS

Linux, Bash, Python, R, PyTorch, C/C++, SQL, LaTeX, Git, Docker, SLURM