Clayton Seitz

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PERSONAL STATEMENT

I maintain a diverse academic background and specialize in the development of probabilistic models, including deep generative models, for biological discovery and computer vision. I have previously used cutting-edge modeling techniques to study the interaction of epigenetic proteins with nucleosome nanodomains and validated findings experimentally using super-resolution fluorescence microscopy.

EDUCATION

Doctor of Philosopy, Physics
Indiana 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

RESEARCH EXPERIENCE

Graduate Research Assistant 2022-Present
Indiana University, Indianapolis, IN

- Designed diffusion models, score-based generative models, general convolutional networks for computer vision tasks in super-resolution fluorescence microscopy
- Investigated the impact of point mutations of epigenetic proteins on the structure of nucleosome nanodomains and complement experimental data with molecular dynamics simulations
- Developed novel microscopy systems for super-resolution imaging of living cells

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

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

Undergraduate Research Assistant 2019-2020
Indiana University, Indianapolis, IN

- Developed an image processing package in Python for processing large volumes of images generated by fluorescence microscopy
- Utilized time-correlated single photon counting (TCSPC) to characterize the sub-Poissonian emission of organic quantum dots dispersed in a thin film of poly-methyl methacrylate (PMMA)

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†, 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

Programming Languages & Software: Python, R, PyTorch, C/C++, Git, LaTeX, Bash, HPCs/SLURM