

Clayton W. Seitz, Ph.D.

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I am an optical microscopist and machine learning expert with experience with several imaging modalities including widefield, confocal, single molecule localization microscopy, and selective plane illumination. I also have extensive experience with various image processing techniques for quantification, segmentation, and object detection/tracking.

EDUCATION

Doctor of Philosophy, Physics

Purdue University

Thesis: *Advancing super-resolution microscopy for quantitative in-vivo imaging of chromatin nanodomains*

Master of Science, Biophysics

University of Chicago

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

2021-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

2020-2021

University of Chicago, Chicago, IL

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

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

<i>NIH Graduate Training Fellowship</i> University of Chicago, Chicago, IL	2020
<i>Travel Award and Lightning Talk Invitation</i> Physical Sciences in Oncology - Minneapolis, MN	2019
<i>Hudson and Holland Scholarship for Diversity and Inclusion</i> Indiana University, Bloomington, IN	2013-2017
<i>Founders Scholar</i> Indiana University, Bloomington, IN	2013-2017
<i>Digital Scholarship</i> Indiana University, Bloomington, IN	2016-2017

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

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

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

Maele 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

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

