

# Clayton W. Seitz, Ph.D.

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## PERSONAL STATEMENT

I have a background in computer vision, machine learning, and mathematics. Recently, I have researched novel image generation methods based on deep learning. I also specialize in image/video processing, object detection, segmentation, and object tracking. These methods were applied in biological research.

## EDUCATION

<b>Doctor of Philosophy, Physics</b> Purdue University	2024
<b>Master of Science, Physics</b> University of Chicago	2021
<b>Bachelor of Science, Physics, Magna Cum Laude</b> Indiana University Minor: Mathematics	2019
<b>Bachelor of Science, Informatics (Math Focus), Magna Cum Laude</b> Indiana University	2019

## EXPERIENCE

<b>Graduate Researcher</b> Purdue University, Indianapolis, IN	2021-2024
<ul style="list-style-type: none"><li>• 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</li><li>• Applied deep neural networks for three dimensional reconstruction of objects in microscopy images</li><li>• Applied general probabilistic models for high-dimensional imaging datasets and associated Bayesian methods for statistical inference tasks</li><li>• Developed novel hardware systems for super-resolution imaging of human cells</li></ul>	
<b>Graduate Researcher</b> University of Chicago, Chicago, IL	2020-2021
<ul style="list-style-type: none"><li>• Investigated fundamental learning mechanisms in recurrent neural networks (RNNs) using dynamical models, mean-field theory, and time-series analysis.</li><li>• Designed and ran Monte Carlo simulations of spiking neural networks</li></ul>	
<b>Research Assistant</b> Purdue University, Indianapolis, IN	2018-2020
<ul style="list-style-type: none"><li>• Developed a scientific package in Python for high-throughput object detection and tracking</li><li>• Managed the package lifecycle and user training throughout the laboratory</li></ul>	

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

**PUBLICATIONS** **Clayton Seitz**<sup>†</sup>, Donghong Fu<sup>†</sup>, Mengyuan Liu, Hailan Ma, and Jing Liu. *BRD4 phosphorylation regulates the structure of chromatin nanodomains*. Physical Review Letters (In Review). <https://doi.org/10.1101/2024.09.03.611057>. 2024

**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

Maelle Locatelli<sup>†</sup>, Josh Lawrimore<sup>†</sup>, Hua Lin<sup>†</sup>, Sarvath Sanaullah, **Clayton Seitz**, Dave Segall, Paul Kefer, Salvador Moreno Naïke, 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. Mir-mira, 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

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