

Clayton Seitz

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RESEARCH INTERESTS

My research focuses on reconstruction of super-resolution fluorescence microscopy images from recordings of Markovian photoswitching of fluorescent molecules in mammalian nuclei. I combine deep generative models for image restoration, physical models of sCMOS sensors, and Bayesian localization methods to achieve reconstructions of nuclear protein complexes with sub 10-nanometer resolution. This involves a broad array of theoretical tools from physics, information theory, information geometry, and Bayesian statistics. Currently I am applying these models to study nucleosome organization and phase transitions of DNA-protein condensates during the immune response.

EDUCATION

Doctor of Philosophy, Physics
Purdue University, Indianapolis, IN, 2024
Thesis: *Untitled*

Master of Science, Biophysics
University of Chicago, Chicago, IL, 2021
Thesis: *Stable cell assembly formation in excitatory-inhibitory neuronal networks*

Bachelor of Science, Magna Cum Laude, Physics
Purdue University, Indianapolis, IN, 2019
Minor: Mathematics

Bachelor of Science, Magna Cum Laude, Informatics
Luddy School of Informatics, Computing, and Engineering, Indiana University Bloomington, 2019
Concentration: Mathematics

COMPUTER SKILLS

Languages & Software: Python, R, PyTorch, C, Git, LaTeX, Bash, Linux

EXPERIENCE

Research Assistant 2019-2021
Indiana University - Purdue University, Indianapolis, IN

- Develop an image processing software pipeline for high-throughput quantification of images in fluorescence microscopy
- Utilize high performance computing clusters for image segmentation, single particle tracking, and image registration

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

- Utilize 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)
- Design and utilize a 3-color imaging protocol to perform single-molecule imaging of mRNA transcripts in human epithelial kidney and osteosarcoma cells

Undergraduate Tutor 2018-2019
 Indiana University - Purdue University, Indianapolis, IN

- Tutored undergraduate students in introductory physics courses covering classical mechanics, classical electromagnetism, circuit analysis, and modern physics

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

Digital Scholarship 2016-2017
 Indiana University, Bloomington, IN

PUBLICATIONS

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. 2022

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. January 2022.

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 1 January 2022; 71 (1): 116–127

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

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*. Physical Sciences in Oncology Annual Conference 2019

Clayton Seitz, Andrew Reeser, Fangjia Li, and Jing Liu. *Machine learning methods in image based transcriptomics at single molecule resolution*. Biophysical Society Annual Conference 2019