

Clayton Seitz

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RESEARCH INTERESTS

My research focuses on reconstruction of 3D super-resolution fluorescence microscopy images from recordings of Markovian photoswitching of fluorescent molecules *in vitro*. In particular, I have combined deep image models for image restoration with Bayesian localization methods based on stochastic gradient langevin dynamics to achieve reconstructions of nuclear protein complexes with sub 10-nanometer resolution. This involves a broad array of theoretical tools from statistical 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