

Zach Marin, Ph.D.

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 <https://zacsimile.github.io>

Experience

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| 2024 – ··· | Postdoctoral researcher. Max Perutz Labs, Dept. of Structural and Computational Biology, University of Vienna, Vienna, Austria.
Supervisor: <i>Jonas Ries</i> . Research: <i>Developing live-cell 4Pi super-resolution microscopy</i> . |
| 2022 – 2023 | Postdoctoral researcher. Lyda Hill Dept. of Bioinformatics, University of Texas Southwestern Medical Center, Dallas, TX, USA.
Supervisor: <i>Kevin Dean</i> . Research: <i>Automating light-sheet microscopy</i> . |
| 2017 – 2022 | Ph.D. student. Dept. of Biomedical Engineering, Yale University, New Haven, CT, USA.
Supervisors: <i>Joerg Bewersdorf</i> and <i>David Baddeley</i> . Research: <i>Quantifying membrane topology at the nanoscale</i> . |
| 2012 – 2017 | Student. Dept. of Mathematics, University of Maine, Orono, ME, USA.
Supervisor: <i>Andre Khalil</i> . Research: <i>Developing wavelet-based algorithms for biological image analysis</i> . |
| 2011 – 2012 | Information Technology/Junior Software Engineer. Maritime Applied Physics Corporation, Brunswick, ME, USA.
Work: <i>Managing interstate computer network for 80 employees and programming real-time seawater quality monitoring system and data loggers for in-house testing</i> . |

Education

- 2017 – 2022 **Ph.D., Yale University** Biomedical Engineering.
Thesis title: *Quantifying Membrane Topology at the Nanoscale.*
 - 2015 – 2017 **M.A., University of Maine** Mathematics.
Thesis title: *Wavelet-based particle tracking in unreconstructed, off-axis holograms.*
 - 2012 – 2015 **B.Sc. Bioengineering and B.A. Mathematics, University of Maine.**
Summa cum laude.

Research Publications

Journal Articles

- 1 J. Lin et al., "Feature-driven whole-tissue imaging with subcellular resolution," *Cell Reports Methods*, vol. 5, no. 9, 2025. DOI: [10.1016/j.crmeth.2025.101148](https://doi.org/10.1016/j.crmeth.2025.101148)
 - 2 Z. Marin and J. Ries, "Evaluating MINFLUX experimental performance in silico," *Nature Communications*, vol. 17, no. 1, p. 246, 2025. DOI: [10.1038/s41467-025-66952-w](https://doi.org/10.1038/s41467-025-66952-w)
 - 3 L. Scheiderer, Z. Marin, and J. Ries, "MINFLUX achieves molecular resolution with minimal photons," *Nature Photonics*, vol. 19, no. 3, pp. 238–247, 2025. DOI: [10.1038/s41566-025-01625-0](https://doi.org/10.1038/s41566-025-01625-0)
 - 4 F. Y. Zhou et al., "Universal consensus 3D segmentation of cells from 2D segmented stacks," *Nature Methods*, vol. 22, no. 11, pp. 2386–2399, 2025. DOI: [10.1038/s41592-025-02887-w](https://doi.org/10.1038/s41592-025-02887-w)
 - 5 J. Lin et al., "Mechanically sheared axially swept light-sheet microscopy," *Biomedical Optics Express*, vol. 15, no. 9, p. 5314, 2024. DOI: [10.1364/BOE.526145](https://doi.org/10.1364/BOE.526145)
 - 6 Z. Marin et al., "Navigate: An open-source platform for smart light-sheet microscopy," *Nature Methods*, 2024. DOI: [10.1038/s41592-024-02413-4](https://doi.org/10.1038/s41592-024-02413-4)
 - 7 C. McFadden et al., "Adaptive optics in an oblique plane microscope," *Biomedical Optics Express*, vol. 15, no. 8, p. 4498, 2024. DOI: [10.1364/BOE.524013](https://doi.org/10.1364/BOE.524013)

- 8 F. Schueder et al., "Unraveling cellular complexity with transient adapters in highly multiplexed super-resolution imaging," *Cell*, vol. 187, no. 7, 1769–1784.e18, 2024. DOI: [10.1016/j.cell.2024.02.033](https://doi.org/10.1016/j.cell.2024.02.033)
- 9 A. E. S. Barentine et al., "An integrated platform for high-throughput nanoscopy," *Nature Biotechnology*, vol. 41, no. 11, pp. 1549–1556, 2023. DOI: [10.1038/s41587-023-01702-1](https://doi.org/10.1038/s41587-023-01702-1)
- 10 L. A. Fuentes, **Z. Marin**, J. Tyson, D. Baddeley, and J. Bewersdorf, "The nanoscale organization of reticulon 4 shapes local endoplasmic reticulum structure *in situ*," *Journal of Cell Biology*, vol. 222, no. 10, e202301112, 2023. DOI: [10.1083/jcb.202301112](https://doi.org/10.1083/jcb.202301112)
- 11 **Z. Marin**, L. A. Fuentes, J. Bewersdorf, and D. Baddeley, "Extracting nanoscale membrane morphology from single-molecule localizations," *Biophysical Journal*, vol. 122, no. 15, pp. 3022–3030, 2023. DOI: [10.1016/j.bpj.2023.06.010](https://doi.org/10.1016/j.bpj.2023.06.010)
- 12 **Z. Marin** et al., "PYMEVisualize: An open-source tool for exploring 3d super-resolution data," *Nature Methods*, vol. 18, no. 6, pp. 582–584, 2021. DOI: [10.1038/s41592-021-01165-9](https://doi.org/10.1038/s41592-021-01165-9)
- 13 **Z. Marin**, J. K. Wallace, J. Nadeau, and A. Khalil, "Wavelet-based tracking of bacteria in unreconstructed off-axis holograms," *Methods*, vol. 136, pp. 60–65, 2018. DOI: [10.1016/j.ymeth.2017.09.003](https://doi.org/10.1016/j.ymeth.2017.09.003)
- 14 **Z. Marin** et al., "Mammographic evidence of microenvironment changes in tumorous breasts," *Medical Physics*, vol. 44, no. 4, pp. 1324–1336, 2017. DOI: [10.1002/mp.12120](https://doi.org/10.1002/mp.12120)
- 15 E. Gerasimova-Chechkina et al., "Comparative multifractal analysis of dynamic infrared thermograms and x-ray mammograms enlightens changes in the environment of malignant tumors," *Frontiers in Physiology*, vol. 7, p. 336, 2016. DOI: [10.3389/fphys.2016.00336](https://doi.org/10.3389/fphys.2016.00336)
- 16 S. M. Plourde, **Z. Marin**, Z. R. Smith, B. C. Toner, K. A. Batchelder, and A. Khalil, "Computational growth model of breast microcalcification clusters in simulated mammographic environments," *Computers in Biology and Medicine*, vol. 76, pp. 7–13, 2016. DOI: [10.1016/j.combiomed.2016.06.020](https://doi.org/10.1016/j.combiomed.2016.06.020)

Conference Proceedings

- 1 E. Gerasimova-Chechkina et al., "Combining multifractal analyses of digital mammograms and infrared thermograms to assist in early breast cancer diagnosis," in *AIP Conference Proceedings*, vol. 1760, 2016, p. 020 018. DOI: [10.1063/1.4960237](https://doi.org/10.1063/1.4960237)

Contributed Talks

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| 2023 | 2023 CCBIR Annual Investigators Meeting , Minneapolis, MN.
Imaging metastatic proliferation <i>in situ</i> . |
| 2022 | Focus on Microscopy , Online.
Extracting organelle membrane topology from super-resolution microscopy data. |
| 2021 | Single Molecule Localization Microscopy Symposium , Lausanne, CH.
Extracting organelle membrane topology from super-resolution microscopy data. |
| | Biophysical Society Annual Meeting , Online.
Extracting organelle membrane topology from super-resolution microscopy data. |
| 2020 | University of Maine Chemical and Biomedical Engineering Seminar Series , Online.
Imaging endoplasmic reticulum membrane topology and dynamics at the nanoscale. |
| 2018 | Quantitative BioImaging Conference , Göttingen, DE.
Simulating FPALM/(d)STORM data based on measured photokinetic properties. |
| 2017 | UMaine Student Research Symposium , Bangor, USA.
Wavelet-based particle tracking in unreconstructed, off-axis holograms. |
| 2016 | Maine Biological and Medical Sciences Symposium , Bar Harbor, USA.
Loss of tissue homeostasis in mammographic breast tumor environment. |

Contributed Talks (continued)

- **UMaine Student Research Symposium**, Bangor, USA.
Characterization of Chromosome Territory Morphology and Intermingling in Mouse Nuclei.

Skills

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| Languages | ■ Native English speaker with strong communication skills. A1 German. |
| Coding | ■ Fluent in Python, C and LabView. Proficient in MATLAB, Java, C++, OpenCL, OpenGL, CUDA, and R. |
| Development | ■ Version control (git, Subversion). Design and implementation of continuous integration and development workflows. |
| Engineering | ■ Image processing. Data analysis. Optical system design and development. Systems integration of electronics, optics, and control and analysis software. |

Fellowships and honors

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| 2016 | ■ Chase Distinguished Research Assistantship . University of Maine |
| 2015 | ■ Interdisciplinary Teaching Assistantship in Biology . University of Maine |
| 2014 – . . . | ■ Member, Tau Beta Pi . Top 1% of undergraduate engineering class, University of Maine. |

Teaching

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| 2025–2026 | ■ Lecturer . Quantitative Methods in Molecular Biology at <i>University of Vienna</i> . |
| 2024–2025 | ■ Teaching assistant . Quantitative Methods in Molecular Biology at <i>University of Vienna</i> . |
| 2023 | ■ Instructor and course co-developer . Introduction to Python Software Development on GitHub at <i>University of Texas Southwestern Medical Center</i> . |
| 2022 – 2023 | ■ Instructor . Data Science using R at <i>University of Texas Southwestern Medical Center</i> . |
| 2021 | ■ Co-developer and instructor . Yale BBS Diversity and Inclusion Collective Biomedical Image Analysis Workshop at <i>Yale University</i> . |
| 2018 – 2020 | ■ Teaching assistant . Physiological Systems Lab at <i>Yale University</i> . |
| 2015 – 2016 | ■ Mathematics Tutor . International Study Center at <i>University of Maine</i> . |
| 2015 | ■ Teaching assistant . Biology of Organisms at <i>University of Maine</i> . |
| 2014 | ■ Teaching assistant . Basic Biology at <i>University of Maine</i> . |

Leadership

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| 2017 – 2021 | ■ Student government at Yale University. Represented interests of Biomedical Engineering Ph.D. students. Developed and organized Yale Biomedical Engineering Undergraduate Research Day. Organized seminars on tax and legal information for students and members of the local community. |
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References

Available on Request