Zach Marin

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Academic Qualifications

Max F. Perutz Laboratories Vienna, Austria
Postdoctoral Researcher, Department of Structural and Computational Biology, Max F. Perutz Laboratories, University of Vienna, January 2024 - Present. Mentor: Jonas Ries.

UT Southwestern Medical Center Dallas, TX, USA
Postdoctoral Researcher, Lyda Hill Department of Bioinformatics, June 2022 - December 2023. Mentor: Kevin Dean.

Yale University New Haven, CT, USA
Doctor of Philosophy, Biomedical Engineering, May 2022. Advisors: Joerg Bewersdorf and David Baddeley. Dissertation: Quantifying Membrane Topology at the Nanoscale.

University of Maine Orono, ME, USA
Master of Arts, Mathematics, May 2017. Advisor: Andre Khalil. Thesis: Wavelet-based particle tracking in unreconstructed, off-axis holograms.
Bachelor of Science, Bioengineering, *summa cum laude*, May 2015.
Bachelor of Arts, Mathematics, *summa cum laude*, May 2015.

Awards & Honors

Chase Distinguished Research Assistantship (2016). Interdisciplinary Teaching Assistantship in Biology (2015). Presidential Scholar (2015). Tau Beta Pi (2015-Present). Dean's List (2012-2015).

Leadership

Yale Graduate Student Assembly, Representative (2017-2021) and Service Committee Co-Chair (2018-2019).

Technical Skills

Fluent in Python, C and LabView. Proficient with MATLAB, Tcl, C++, OpenCL, OpenGL, CUDA, Java and R. Version control and developing continuous integration pipelines. Image processing and data analysis algorithm development. Optical system design and development, specializing in axially-swept light-sheet, differential interference contrast and single-molecule localization microscopes. Systems integration of electronics, optics, and control and analysis software. Basic wet lab techniques.

Teaching Experience

Instructor and course co-developer, Introduction to Python Software Development on GitHub, UT Southwestern (Fall 2023). Instructor, Data Science using R, UT Southwestern (Fall 2022, Fall 2023). Co-developer and instructor for inaugural Yale BBS Diversity and Inclusion Collective Biomedical Image Analysis Workshop (Fall 2021). Lab Leader, Physiological Systems Lab, Yale (Fall 2018, Fall 2019, Fall 2020). Mathematics Tutor, International Study Center, University of Maine (2015-2016). Teaching Assistant, Biology of Organisms, University of Maine (Spring 2015). Teaching Assistant, Basic Biology, University of Maine (Fall 2014).

Peer-reviewed Journal Articles

Marin, Z, Wang, X., Collison, D. W., McFadden, C., Lin, J., Borges, H. M., Chen, B., Mehra, D., Shen, Q., Gałecki, S., Daetwyler, S., Sheppard, S. J., Thien, P., Porter, B. A., Conzen, S. D., Shepherd, D. P., Fiolka, R. & Dean, K. M. Navigate: an open-source platform for smart light-sheet microscopy. *Nature Methods.* ISSN: 1548-7105. https://doi.org/10.1038/s41592-024-02413-4 (Sept. 2024).

Lin, J., Mehra, D., **Marin, Z.**, Wang, X., Borges, H. M., Shen, Q., Gałecki, S., Haug, J., Abbott, D. H. & Dean, K. M. Mechanically sheared axially swept light-sheet microscopy. en. *Biomedical Optics Express* **15,** 5314. ISSN: 2156-7085, 2156-7085. https://opg.optica.org/abstract.cfm?URI=boe-15-9-5314 (2024) (Sept. 2024).

Mcfadden, C., **Marin, Z.**, Chen, B., Daetwyler, S., Wang, X., Rajendran, D., Dean, K. M. & Fiolka, R. Adaptive optics in an oblique plane microscope. en. *Biomedical Optics Express* **15,** 4498. ISSN: 2156-7085, 2156-7085. https://opg.optica.org/abstract.cfm?URI=boe-15-8-4498 (2024) (Aug. 2024).

Schueder, F., Rivera-Molina, F., Su, M., **Marin, Z.**, Kidd, P., Rothman, J. E., Toomre, D. & Bewersdorf, J. Unraveling cellular complexity with transient adapters in highly multiplexed super-resolution imaging. en. *Cell* **187,** 1769–1784.e18. ISSN: 00928674. https://linkinghub.elsevier.com/retrieve/pii/S0092867424002368 (2024) (Mar. 2024).

Fuentes, L. A., **Marin, Z.**, Tyson, J., Baddeley, D. & Bewersdorf, J. The nanoscale organization of reticulon 4 shapes local endoplasmic reticulum structure *in situ*. *Journal of Cell Biology.* https://doi.org/10.1083/jcb.202301112 (2023).

Marin, Z., Fuentes, L. A., Bewersdorf, J. & Baddeley, D. Extracting nanoscale membrane morphology from single-molecule localizations. *Biophysical Journal,* S0006349523003983. https://linkinghub.elsevier.com/retrieve/pii/S0006349523003983 (2023).

Barentine, A. E. S., Lin, Y., Courvan, E. M., Kidd, P., Liu, M., Balduf, L., Phan, T., Rivera-Molina, F., Grace, M. R., **Marin, Z.**, Lessard, M., Rios Chen, J., Wang, S., Neugebauer, K. M., Bewersdorf, J. & Baddeley, D. An integrated platform for high-throughput nanoscopy. *Nature Biotechnology.* https://doi.org/10.1038/s41587-023-01702-1 (2023).

Marin, Z., Graff, M., Barentine, A. E. S., Soeller, C., Chung, K. K. H., Fuentes, L. A. & Baddeley, D. PYMEVisualize: an open-source tool for exploring 3D super-resolution data. *Nature Methods* **18,** 582–584. http://www.nature.com/articles/s41592-021-01165-9 (2021).

Marin, Z., Wallace, J. K., Nadeau, J. & Khalil, A. Wavelet-based tracking of bacteria in unreconstructed off-axis holograms. *Methods* **136,** 60–65. https://www.sciencedirect.com/science/article/pii/S1046202317302219 (2018).

Marin, Z., Batchelder, K. A., Toner, B. C., Guimond, L., Gerasimova-Chechkina, E., Harrow, A. R., Arneodo, A. & Khalil, A. Mammographic evidence of microenvironment changes in tumorous breasts. *Medical Physics* **44,** 1324–1336. https://aapm.onlinelibrary.wiley.com/doi/abs/10.1002/mp.12120 (2017).

Plourde, S. M., **Marin, Z.**, Smith, Z. R., Toner, B. C., Batchelder, K. A. & Khalil, A. Computational growth model of breast microcalcification clusters in simulated mammographic environments. *Computers in Biology and Medicine* **76,** 7–13. https://www.sciencedirect.com/science/article/pii/S0010482516301585 (2016).

Gerasimova-Chechkina, E., Toner, B., **Marin, Z.**, Audit, B., Roux, S. G., Argoul, F., Khalil, A., Gileva, O., Naimark, O. & Arneodo, A. Comparative Multifractal Analysis of Dynamic Infrared Thermograms and X-Ray Mammograms Enlightens Changes in the Environment of Malignant Tumors. *Frontiers in Physiology* **7,** 336. https://www.frontiersin.org/article/10.3389/fphys.2016.00336 (2016).

Gerasimova-Chechkina, E., Toner, B., **Marin, Z.**, Audit, B., Roux, S. G., Argoul, F., Khalil, A., Gileva, O., Naimark, O. & Arneodo, A. in *AIP Conference Proceedings* **1760** (2016), 020018. https://aip.scitation.org/doi/abs/10.1063/1.4960237.

Invited & Selected Talks

Imaging metastatic proliferation *in situ*. 2023 CCBIR Annual Investigators Meeting, Minneapolis, MN. June 2023.

Extracting organelle membrane topology from super-resolution microscopy data. Focus on Microscopy 2022, Online. April 2022.

Extracting organelle membrane topology from super-resolution microscopy data. Single Molecule Localization Microscopy Symposium 2021, Lausanne, CH. August 2021.

Extracting organelle membrane topology from super-resolution microscopy data. Biophysical Society Annual Meeting 2021, Virtual. February 2021.

Imaging endoplasmic reticulum membrane topology and dynamics at the nanoscale. University of Maine Chemical and Biomedical Engineering Seminar Series. Virtual. October 2020.

Simulating FPALM/(d)STORM data based on measured photokinetic properties. 2018 Quantitative BioImaging Conference, Göttingen, DE. January 2018.

Wavelet-based particle tracking in unreconstructed, off-axis holograms. 2017 UMaine Student Research Symposium, Cross Insurance Center, Bangor, ME. April 2017.

Loss of tissue homeostasis in mammographic breast tumor environment. 43rd Maine Biological and Medical Sciences Symposium, MDI Biological Lab, Bar Harbor, ME. April 2016.

Characterization of Chromosome Territory Morphology and Intermingling in Mouse Nuclei. 2016 UMaine Student Research Symposium, Cross Insurance Center, Bangor, ME. April 2016.