

Matthew Schmitt

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Education

Ph.D. (Physics), University of Chicago	(expected) May 2026
<i>Thesis topic: Physical constraints for interpretable machine learning</i>	
<i>Advisor: Vincenzo Vitelli</i>	
M.Sc. (Physics), Ludwig Maximilian University of Munich	September 2020
<i>Thesis: "Stochastic dynamics of cell shape and protrusion in confined cell migration"</i>	
<i>Advisor: Chase Broedersz</i>	
B.Sc. (Physics), Ludwig Maximilian University of Munich	September 2017
<i>Thesis: "Geometric quantization of a charged particle in an external magnetic field on a flat 2-torus"</i>	
<i>Advisors: Robert Helling, Ilka Brunner</i>	

Publications and Projects

Machine learning functional groups from microbiome data	<i>in progress</i>
M. Schmitt , K. Lee, S. Kuehn, V. Vitelli	
Information theory for model reduction in physics and biology	2024
M. Schmitt , M. Koch-Janusz, M. Fruchart, D. Seara, M. Rust, V. Vitelli	
<i>arXiv</i> [link], <i>poster at NeurIPS ML4PS workshop 2023</i> [link]	
Machine learning interpretable models of cell mechanics from protein images	2024
M. Schmitt , J. Colen, S. Sala, J. Devany, S. Seetharaman, M. L. Gardel, P. W. Oakes, V. Vitelli	
<i>Cell</i> [link]	
Geometry adaptation of protrusion and polarity dynamics in confined cell migration	2022
D. B. Brückner, M. Schmitt , A. Fink, J. Flommersfeld, N. Arlt, E. Hannezo, J. O. Rädler and C. P. Broedersz	
<i>Physical Review X</i> [link], <i>Focus story</i> [link]	

Funding and Awards

CLS Travel Grant (\$500), <i>UChicago Center for Living Systems</i>	2024
MRSEC Graduate Fellowship (one year stipend), <i>NSF</i>	Oct. 2023 – Oct. 2024
AI + Science Travel Grant (\$1500), <i>UChicago Data Science Institute</i>	2023
NRT Fellowship for AI-enabled Molecular Engineering of Materials and Systems for Sustainability (two year stipend), <i>NSF</i>	Oct. 2021 – Sept. 2023

Conference Presentations

Information bottleneck learns transfer operator eigenfunctions in dynamical systems	Mar. 2024
<i>APS March Meeting, Session: Information Theory and Physics</i>	
Information bottleneck learns transfer operator eigenfunctions in dynamical systems	Dec. 2023
<i>NeurIPS Workshop: ML for Physical Sciences (Poster)</i>	
Neural networks for data-driven models of cell mechanics	Mar. 2023
<i>APS March Meeting, Session: Data Science, ML and Active Matter</i>	
Machine learning continuum models for cellular force generation	Mar. 2022
<i>APS March Meeting, Session: Data Science for Biophysics</i>	

Other talks

Function-informed coarse graining for the microbiome <i>NITMB Sparse Model Workshop</i>	May 2025
Learning interpretable latent variables for dynamical systems <i>NITMB Workshop on “Coarse graining methods for spatial data”</i>	Mar. 2025
Discovering interpretable latent variables in dynamical biological systems <i>UChicago Center for Living Systems (CLS) Cell State Transition Retreat</i>	May 2024

Mentoring

Noah Sodickson (Undergrad @ UChicago)	June 2025-Present
Tyler Chang (NITMB REU student; Undergrad @ UW Madison)	Summer 2024

Teaching

<i>University of Chicago</i>	
Machine Learning Bootcamp	Fall 2022
Introduction to Programming Bootcamp	Fall 2021
Honors Electricity & Magnetism (Prof. Mark Oreglia)	Winter 2021
Honors Mechanics (Prof. Abigail Vieregge)	Fall 2021
<i>Ludwig Maximilian University of Munich</i>	
Soft Condensed Matter Physics (Prof. Chase Broedersz; grad course)	Winter 2020
Advanced Statistical Mechanics (Prof. Chase Broedersz; grad course)	Summer 2019
Optics (Prof. Joachim Rädler)	Winter 2019
Mechanics (Prof. Thomas Udem)	Winter 2019
Mathematical Methods (Prof. Jan von Delft)	Winter 2018

Engagement

Chan-Zuckerberg Chicago Biohub Confab Poster; <i>University of Chicago</i>	Sept. 2025
NITMB Annual Meeting Poster; <i>Simons Foundation, NYC</i>	Apr. 2025
NITMB Annual Meeting Poster; <i>University of Chicago</i>	Apr. 2024
AI + Science Summer School [link] Poster; <i>University of Chicago</i>	Aug. 2024
AI + Science Summer School [link] Poster; <i>University of Chicago</i>	Aug. 2022
Arnold Sommerfeld School on the Physics of Life [link] Poster; <i>Ludwig Maximilian University of Munich</i>	Aug. 2019
44th conference of the Middle European Cooperation in Statistical Physics [link] Poster; <i>Kloster Seeon, Bavaria, Germany</i>	May 2019

Outreach

South Side Science Festival	Oct. 2025
South Side Science Festival	Sept. 2023
Leyden High School visit to UChicago Dept. of Molecular Engineering	Apr. 2023
Physics/Chemistry Tutoring for Refugees (Bavarian Red Cross)	Summer 2017

Other technical experience

Quantitative Analyst Internship, <i>J.P. Morgan Chase</i>	Summer 2025
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Technical Skills and Interests

Programming languages: (*Fluent*) Python, Bash; (*Familiar*) Matlab, SQL, C++, Mathematica

Libraries and Frameworks: (*ML*) Pytorch, Scikit-learn; (*Data analysis and visualization*) Pandas, Matplotlib, NumPy, SciPy; (*Computer Vision*) OpenCV

Languages: English (native), German (fluent), Russian (proficient)

Interests: Piano, Triathlon