

MATTHEW J. BOVYN, M.S.

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EDUCATION

University of California, Irvine (UCI)

Fall 2014 - Present

PHD PHYSICS | Jun Allard, Departments of Physics and Mathematics
Steven Gross, Department of Developmental and Cell Biology

MS PHYSICS | Chemical and Materials Physics Program
Awarded December 2019

MCSB | Mathematical, Computational, and Systems Biology Gateway Program
Matriculated June 2015

The Physiology Course at the Marine Biological Laboratory. Woods Hole, MA, Summer 2018.

Summer Research Program in Biomedical Sciences. University of Tsukuba, Japan, July 2016.

Northern Arizona University (NAU)

Fall 2007 - Winter 2012

BS PHYSICS | Minor in Mathematics
BSE MECH. ENG. | Minor in Physical Science
Liberal Studies Honors

PUBLICATIONS

- M. J. Bovyn**, B. J. N. Reddy, S. P. Gross, and J. F. Allard, “Roles of motor on-rate and cargo mobility in intracellular transport”, [bioRxiv](#), **2020.07.13.201434** (2020)
- M. J. Bovyn**, “Geometry Matters for Cargos Navigating 3D Microtubule Intersections”, Master’s Thesis (University of California, Irvine, 2019), p. 79
- M. Bovyn**, S. Gross, and J. Allard, “Molecular motor organization and mobility on cargos can overcome a tradeoff between fast binding and run length”, [bioRxiv](#), **686147** (2019)
- D. E. Chapman, B. J. N. Reddy, B. Huy, **M. J. Bovyn**, S. J. S. Cruz, Z. M. Al-Shammari, H. Han, W. Wang, D. S. Smith, and S. P. Gross, “Regulation of in vivo dynein force production by CDK5 and 14-3-3 ϵ and KIAA0528”, [Nature Communications](#) **10**, 228 (2019)
- J. P. Bergman, **M. J. Bovyn**, F. F. Doval, A. Sharma, M. V. Gudheti, S. P. Gross, J. F. Allard, and M. D. Vershinin, “Cargo navigation across 3D microtubule intersections.”, [Proceedings of the National Academy of Sciences](#) **115**, 537–542 (2018)
- * **Bovyn and Bergman contributed equally (Co-First Authors)**
- W. M. Grundy, S. J. Morrison, **M. J. Bovyn**, S. C. Tegler, and D. M. Cornelison, “Remote sensing D/H ratios in methane ice: Temperature-dependent absorption coefficients of CH₃D in methane ice and in nitrogen ice”, [Icarus](#) **212**, 941–949 (2011)

S. C. Tegler, D. M. Cornelison, W. M. Grundy, W. Romanishin, M. R. Abernathy, **M. J. Bovyn**, J. A. Burt, D. E. Evans, C. K. Maleszewski, Z. Thompson, and F. Vilas, “Methane and nitrogen abundances on Pluto and Eris”, [The Astrophysical Journal](#) **725**, 1296–1305 (2010)

SELECTED CONFERENCE AND WORKSHOP PRESENTATIONS

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| Poster: Cargo binding to microtubules | BIOPHYSICAL SOCIETY ANNUAL MEETING Virtual, February 2021. CELL BIO Virtual, December 2020. |
| Poster: Phenotyping of neutrophil populations using deformability cytometry | BIOPHYSICAL SOCIETY ANNUAL MEETING San Diego, February 2020. |
| Poster: Freedom of molecular motors in the membrane of intracellular cargos allows both fast binding and robust transport | BIOPHYSICAL SOCIETY ANNUAL MEETING San Diego, February 2020. CELLULAR DYNAMICS AND MODELS Cold Spring Harbor Laboratory, April 2019. GORDON RESEARCH CONFERENCE ON STOCHASTIC PHYSICS IN BIOLOGY Ventura, January 2019. AMERICAN SOCIETY FOR CELL BIOLOGY ANNUAL MEETING San Diego, December 2018. |
| Invited Talk: 3D stochastic simulations of cargo transport reveal the influence of cargo and environment | MATHEMATICS OF THE CELL: MECHANICAL AND CHEMICAL SIGNALING ACROSS SCALES. Banff International Research Station for Mathematical Innovation and Discovery, August 2018. SIAM CONFERENCE ON THE LIFE SCIENCES, Minneapolis, August 2018. |
| Talk: Brownian dynamics simulation reveals how properties of the cargo and its environment can influence multiple motor transport | AMERICAN PHYSICAL SOCIETY MARCH MEETING, Los Angeles, March 2018. |
| Poster: Geometry Matters for Cargos Navigating 3D Microtubule Intersections | BIOPHYSICAL SOCIETY ANNUAL MEETING, San Francisco, February 2018. AMERICAN SOCIETY FOR CELL BIOLOGY ANNUAL MEETING, Philadelphia, December 2017. |

Poster: Brownian dynamics simulation reveals freedom of motors in the cargo membrane can influence cargo dynamics

BIOPHYSICAL SOCIETY THEMATIC MEETING, Taipei, June 2017.
 QUANTITATIVE CELL BIOLOGY NETWORK WORKSHOP ON CELLS AS DYNAMICAL SYSTEMS. University of California, San Francisco, May 2017.
 BIOPHYSICAL SOCIETY ANNUAL MEETING, Los Angeles, February 2016.
 AMERICAN SOCIETY FOR CELL BIOLOGY ANNUAL MEETING, San Diego, December 2015.
 QUANTITATIVE CELL BIOLOGY NETWORK WORKSHOP ON CYTOSKELETAL MECHANICS. Chicago, October 2015.

Talk: Driving Sodium-Potassium Pumps With An Oscillating Electric Field: Effects On Muscle Recovery

AMERICAN PHYSICAL SOCIETY MARCH MEETING, Baltimore, March 2013.
 Won “Outstanding Undergraduate Presenter” Award

FUNDING AND AWARDS

UCI CCBS OPPORTUNITY AWARD: \$10,000 to develop a project on determining cell state from cell physical properties. Preliminary results presented at the CCBS retreat, March 2019.

NIH R01: Made plots and contributed to application for grant awarded to Jun Allard and Steve Gross (NIGMS R01 GM123068)

NSF GRFP: Honorable Mention 2014

FELLOWSHIPS: Won fellowship support for 5 years:

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| Years 4 & 5 | NSF Integrative Graduate Education and Research Traineeship (IGERT) DGE-1144901 to Vasana Venugopalan, UCI Beckman Laser Center |
| Years 2 & 3 | NIH T32 Training Grant EB009418-07 to Arthur Lander and Qing Nie, UCI Center for Complex Biological Systems |
| Year 1 | UCI Mathematical, Computational and Systems Biology Fellowship NSF GRFP Honorable Mention |

UNDERGRADUATE

OUTSTANDING SENIOR: Selected as the outstanding senior of the NAU College of Engineering, Forestry and Natural Sciences

GOLD AXE AWARD: NAU award for graduating seniors, one of 10 selected out of graduates from entire university

BEDWELL SCHOLARSHIP: awarded by NAU Department of Physics and Astronomy

ADEL SCHOLARSHIP: awarded by NAU Department of Physics and Astronomy

RAYTHEON MISSILE SYSTEMS SCHOLARSHIP

CHAIR'S SCHOLARSHIP: awarded by NAU Department of Physics and Astronomy

ARIZONA BOARD OF REGENT'S HIGH HONORS TUITION SCHOLARSHIP: Four year scholarship awarded based on high school achievement

DEAN'S LIST: 7 Semesters

PROFESSIONAL ACTIVITY

PEER REVIEWER

- PLoS Computational Biology: 2020
- ASME Journal of Computational and Nonlinear Dynamics: 2019

ASSISTED WITH PEER REVIEW

- Bulletin of Mathematical Biology: 2019
- PLoS Computational Biology: 2020, 2018
- Molecular Biology of the Cell: 2019, 2018, 2017
- Biophysical Journal: 2017
- Physics Letters A: 2016
- Biology Direct: 2016
- PNAS: 2020, 2017, 2015

FOUNDER AND ORGANIZER: Biophysics and Systems Biology Seminar Series

- Began a series of research in progress talks for students in the Mathematical, Computational, and Systems Biology program with co-founder Kerrigan Blake, 2016. Organized 66 talks 2016-2019.
- Expanded the seminar series to host invited speakers, 2017. Hosted 9 visiting speakers 2017-2019.

FOUNDER: UCI Center for Complex Biological Systems Outreach Program

- Began an outreach program for the UCI Center for Complex Biological Systems with co-founder Sean Horan
- Won ASCB COMPASS outreach grant

UNDERGRADUATE

PRESIDENT: NAU Society of Physics Students

- Organized and led outreach events to local schools
- Organized “Zone Meeting” for chapters throughout Arizona

MEMBER: Tau Beta Pi, The Engineering Honor Society

MEMBER: Sigma Pi Sigma, National Physics Honor Society

TEACHING

ORGANIZER AND LECTURER, UCI MCSB BOOTCAMP 2019

Built a new curriculum from scratch to teach incoming first year graduate students coding and computer skills, as well as mathematical modeling (one week). Lessons taught on git and GitHub, command line, generating and analyzing mathematical models, fitting models to data.

TEACHING ASSISTANT, UCI:

- Physics 106W: Laboratory Skills and Scientific Writing for Applied Physics Majors
- Physics 193 / Biology 108 / Chemistry 193: Research Methods for CalTeach (high school teacher preparation program)

SUPPLEMENTAL INSTRUCTOR, NAU:

- Physics 111: General Physics I (mechanics, non-calculus based)
- Physics 262: University Physics II (electricity and magnetism, calculus based)

OTHER PROJECTS

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| SUMMER 2018 | MBL Physiology 2018 Rotations WALLACE MARSHALL Stentor Phototaxis CLARE WATERMAN Neutrophil Extracellular Traps (NETosis) DAN FLETCHER Engineering Cell Motility by targeting actin under tension |
| WINTER 2014 | Rotation Student LABORATORY FOR FLUORESCENCE DYNAMICS Irvine, California <i>Fluorescence Lifetime Imaging of Turbid Samples</i> Advisors: Professor Enrico Gratton and Dr. Ylenia Santoro |
| SUMMER 2014 | Graduate Student Researcher BECKMAN LASER INSTITUTE Irvine, California <i>Deep Tissue Biophotonics for Breast Cancer Diagnostics</i> Advisors: Professor Bruce Tromberg and Dr. Albert Cerussi |
| JAN 2014 TO JUN 2014 | Tutor TUTOR DOCTOR & VARSITY TUTORS Irvine, California <i>High School Physics and Calculus</i> |
| FEB 2013 TO JUN 2013 | Research Assistant UNIVERSITY OF PUERTO RICO, RIO PIEDRAS San Juan, Puerto Rico <i>Herbarium Server Development</i> |
| FALL 2012 | Research Assistant NORTHERN ARIZONA UNIVERSITY <i>Planetary Astrophysics of Icy Outer Solar System Objects</i> Advisors: Dr. Will Grundy and Professor Stephen Tegler |
| SUMMER 2012 | NSF Research Experience for Undergraduates Intern UNIVERSITY OF SOUTH FLORIDA <i>Biophysics of Sodium-Postassium Pumps</i> Advisor: Professor Wei Chen |
| FALL 2011 TO SPRING 2012 | Research Assistant NORTHERN ARIZONA UNIVERSITY <i>Planetary Astrophysics of Icy Outer Solar System Objects</i> Advisors: Dr. Will Grundy and Professor Stephen Tegler |
| SUMMER 2011 | NSF Research Experience for Undergraduates Intern UNIVERSITY OF IDAHO <i>Solid State Physics of Nanosprings</i> Advisor: Professor Dave McIlroy |

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| FALL 2010 | NASA Space Grant Intern |
| TO | NORTHERN ARIZONA UNIVERSITY |
| SPRING 2011 | <i>Near Infrared Spectroscopy of Carbon Dioxide Ice</i> |
| | Advisors: Dr. Will Grundy and Professor Stephen Tegler |
| SUMMER 2010 | Research Assistant |
| | LOWELL OBSERVATORY, Flagstaff Arizona |
| | <i>Planetary Astrophysics of Icy Outer Solar System Objects</i> |
| | Advisors: Dr. Will Grundy and Professor Dave Cornelison |