

Michael G. Lerner

Associate Professor of Physics and Astronomy

CONTACT INFORMATION	Office: CST 213 Lab: CST 110 Department of Physics and Astronomy Earlham College – Drawer 111 Richmond, IN 47374 USA	<i>Voice:</i> (765) 983-1784 <i>Fax:</i> (765) 983-1691 <i>Email:</i> lernemi@earlham.edu <i>Web:</i> mgllerner.com
RESEARCH INTERESTS	Computational biophysics, statistical mechanics, membrane structure and dynamics, computational topology, physics education, biophysics education, nucleic acid structure, protein dynamics, structure-based drug design.	
EDUCATION	University of Michigan , Ann Arbor, MI USA PhD: Biophysics Jan 2004 – Nov. 2007 MS: Biophysics Research Division Aug. 2001 – Dec. 2003 Haverford College , Haverford, PA USA B.S.: Physics May 1999 Concentration: Computer Science	
HONORS AND AWARDS	Outstanding Graduate Instructor (University of Michigan Physics Department) 2007 Michigan Teaching Fellow (University of Michigan) 2006 Molecular Biophysics Training Grant (NIH) May 2003 – Apr. 2005 Haverford College: Departmental Honors in Physics 1999	
RECENT ACADEMIC AND PROFESSIONAL EXPERIENCE AND FELLOWSHIPS	Johns Hopkins University , Baltimore, MD USA <i>Visiting Associate Professor, Department of Biomedical Engineering, Whiting School of Engineering, Johns Hopkins University</i> August 2019 – present Earlham College , Richmond, IN USA <i>Associate Professor, Department of Physics and Astronomy</i> July 2017 – present <i>Assistant Professor, Department of Physics and Astronomy</i> July 2013 – June 2017 <i>Visiting Assistant Professor, Department of Physics and Astronomy</i> July 2011 – June 2013 National Institutes of Health National Heart Lung and Blood Institute , Rockville, MD USA <i>IRTA Postdoctoral Fellow</i> Dec. 2007 – Aug. 2011 Schrödinger , New York, NY USA <i>Warren L. DeLano Memorial PyMOL Open-Source Fellow</i> Oct. 2010 – Oct. 2011	

Campaign Scientific, Philadelphia, PA
Co-Founder

2005 – 2007

Ricoh Silicon Valley, Cupertino, CA
Software Engineer

1999 – 2001

RECENT COURSES
TAUGHT

- NatSci 101-102 (Science Scholar Seminar)
- Physics 110 (Science and Pseudoscience)
- Physics 125 (Matter in Motion, with Calculus)
- Physics 126 (Calculus-based supplement to General Physics I)
- Physics/Biology 225 (Biophysics)
- Physics 230 (Electromagnetism, Waves and Optics)
- Physics 235 (Electromagnetism, Waves and Optics, with Calculus)
- Computer Science 290 (Computational Science)
- Physics/Math 360 (Mathematical Physics)
- Physics 375 (Thermal Physics)
- Physics 435 (Classical Electricity and Magnetism)
- Physics 480 (Senior Seminar; topic: Advanced Statistical Mechanics and Molecular Simulation)
- Physics 480 (Senior Seminar; topic: The Physics of Interfaces)
- Physics 484 (Collaborative Research; topic: Watching Molecules Move: Computational Studies of Proteins and Nucleic Acids)
- Physics 484 (Collaborative Research; topic: Modeling Climate Change in New Zealand)
- Physics 485 (Independent Study; topic: Fluid Mechanics)
- Physics 486 (Physics Research)
- Physics 488 (Senior Capstone)
- Data Science Applied Group

PUBLICATIONS

Richard M. Venable, Helgi I. Ingolfsson, **Michael G. Lerner**, B. Scott Perrin, Jr., Brian A. Camley, Siewert-J. Marrink, Frank L.H. Brown, Richard W. Pastor “Lipid and peptide diffusion in bilayers: the Saffman-Delbrück model and periodic boundary conditions”. *Journal of Physical Chemistry B*, 121(5), 2017.

Brian A. Camley, **Michael G. Lerner**, Richard W. Pastor, Frank L. H. Brown “Strong influence of periodic boundary conditions on lateral diffusion in lipid bilayer membranes”. *Journal of Chemical Physics*, 143(24), 2015.

Zachary Levine, Richard M. Venable, Max C. Watson, **Michael G. Lerner**, Joan-Emma Shea, Richard W. Pastor, Frank L. H. Brown “Determination of Biomembrane Bending Moduli in Fully Atomistic Simulations”. *Journal of the American Chemical Society*, 136(39), 2014.

Frank C. Pickard IV, Benjamin T. Miller, Vinushka Schalk, **Michael G. Lerner**, H. Lee Woodcock III, Bernard R. Brooks “Web-Based Computational Chemistry Education with CHARM-Ming II: Coarse-Grained Protein Folding”. *PLoS Computational Biology*, 10(7), 2014.

Paper highlighted in PLoS editorial “Making Biomolecular Simulations Accessible in the Post-Nobel Era”, Ruth Nussinov and Quiang Cui.

Jefferson D. Knight, **Michael G. Lerner**, Joan G Marcano-Velázquez, Richard W. Pastor, Joeseoph J. Falke “Single molecule diffusion of membrane-bound proteins: Window into lipid contacts and bilayer dynamics”. *Biophysical Journal*, 99(9), 2010.

Michael G. Lerner, Kristin L. Meagher, Heather A. Carlson “Automated clustering of probe molecules from solvent mapping of protein surfaces”. Journal of Computer Aided Molecular Design, 10, 2008.

Michael G. Lerner, Anna L. Bowman, Heather A. Carlson “Incorporating Dynamics in E. coli Dihydrofolate Reductase Enhances Structure-based Drug Discovery”. Journal of Chemical Information and Modeling, 47, 2007.

Anna L. Bowman, **Michael G. Lerner**, Heather A. Carlson “Protein flexibility and species specificity in structure- based drug discovery: Dihydrofolate reductase as a test system”. Journal of the American Chemical Society, 129 (12), 2007.

Kristin L. Meagher, **Michael G. Lerner**, Heather A. Carlson “Refining the multiple protein structure method: consistency across three independent HIV-1 protease models”. Journal of Medicinal Chemistry, 49 (12), 2006.

Leigi Hu, Mark L. Benson, Richard D. Smith, **Michael G. Lerner**, Heather A. Carlson, “Binding MOAD (Mother of All Databases)”. Proteins: Structure, Function and Bioinformatics, 60, 2005.

RECENT GRANTS	Computational Prediction of Genetic Drivers of Breast Cancer NIH/NCI (PI) F33, 1F33CA247344-01, \$37,929	Feb 2020
	Modeling Climate Change in New Zealand: Collaborative Faculty-Student Research Project. Earlham College (PI), \$9,000	August 2018
	Non-Newtonian Physicists : Assessment mini-grants focusing on Diversity. Earlham College (PI), \$500	January 2018
	Making Molecules Move: Collaborative Faculty-Student Research Project. Earlham College (PI), \$10,600	January 2016
	Expedited Research Grants: Computational Topology and Drug Design. Earlham College (PI), \$850	December 2014
	Experiential Learning Fund: Getting Started with Python: Programming for Everyone. Earlham College (PI), \$2,000	October 2014
	CC*IIE Campus Design: Network Infrastructure for Improved Science Discovery and Education. NSF (Co-PI), \$347,228	August 2014
	Kickstarter Technology Grant: IPython Notebooks for Computer Science and Physics. Earlham College (PI), \$500	August 2013
	Pedagogical Incubator Initiative: Science Scholars Seminar. Earlham College (Co-PI), \$2500	February 2012

RECENT
CONFERENCES,
WORKSHOPS, AND
SEMINARS
(UNDERGRADUATE
STUDENTS SHOWN
IN **Bold**)

University of Groningen, Molecular Dynamics Group, **July 2018**
Department of Biological Chemistry *Groningen, The Netherlands*
Invited colloquium: "Correlated motions and two-point microrheology: calculating diffusion coefficients from membrane simulations."

Laboratory of Computational Biology, NHLBI, National Institutes of Health **July 2018**
Invited colloquium: "Two-point microrheology and correlated motions: a few ways to calculate diffusion coefficients from membrane simulations." *Bethesda, MD*

Biological Membranes and Membrane Proteins: Challenges for Theory **June 2017**
and Experiment *Santa Fe, NM*
Invited speaker: "Diffusion and correlated motions in lipid simulations"

Georgia Tech, Department of Physics **April 2017**
Invited colloquium: "Diffusion, correlated motions and periodic boundary conditions in lipid membranes." *Atlanta, GA*

Biophysical Society 61st Annual Meeting **February 2017**
Poster: Heather A. Carlson, **Craig J. Earley**, Michael G. Lerner, *New Orleans, LA*
Paul F. Maxson, Arish Mudra Rakshasa "Correlated Motions in the DHFR-NADPH Complex"
Poster: Allan T. Ansevin, **Micaela E. Bush, Alma Gracic, Jinhee Kim, Ahsan A. Khoja,**
Michael G. Lerner, **Lam T. Nguyen, Sunil Pun Ashutosh Rai, Alexander K. Seewald,**
Benjamin Yee "Improved Sampling in Molecular Dynamics Studies of DNA and the B to Z[WC] to Z-DNA Transition".

Biophysical Society 60th Annual Meeting **February 2016**
Poster: **Gwendolyn A. Claffin, Rodoula Kyvelou-Kokkaliaris,** *Los Angeles, CA*
Michael G. Lerner, **Hoang T. Tran, Tara M. Urner** "Faster, More Accurate Quantification of Diffusion and Correlated Motions in Lipid Bilayers".
Poster: Allan T. Ansevin, **Micaela E. Bush, Alma Gracic, Jinhee Kim,** Michael G. Lerner,
Ashutosh Rai, Alexander K. Seewald, Benjamin Yee "Molecular Dynamic Investigations of Z[WC] DNA and Its Potential Role in the B to Z- Transition".

Earlham College **December 2015**
Faculty Forum: "How did Earlham Students figure out that everybody's error bars were wrong?"
Richmond, IN

West Virginia University, Department of Chemistry **November 2015**
Invited colloquium: "Faster, more accurate quantification of diffusion and correlated motions in molecular simulations of lipid bilayers." *Morgantown, WV*

American Association of Physics Teachers (AAPT) New Faculty Workshop **November 2015**
Selected participant *College Park, MD*

GLCA Academic Leadership and Innovation (GALI) Institute
Faculty Development Workshop *selected by Earlham to attend*

October 2015
Ann Arbor, MI

Indiana University - Purdue University Indianapolis, Department of Physics
Invited colloquium: “Faster, more accurate quantification of diffusion and correlated motions in molecular simulations of lipid bilayers.”

October 2015
Indianapolis, IN

Biological Membranes and Membrane Proteins: Challenges for Theory
and Experiment
Invited speaker: “Faster, more accurate diffusion constants”

July 2015
Telluride, CO

Biophysical Society 59 th Annual Meeting Poster: Gwendolyn A. Claffin , Rodoula Kyvelou-Kokkaliaris , Michael G. Lerner, Hoang T. Tran “Faster Calculations of Diffusion Constants for Lipids, Water and Proteins”. Poster: Allan T. Ansevin, Alma Gracic , Jinhee Kim , Michael G. Lerner, Ashutosh Rai , Alexander K. Seewald , Benjamin Yee “Molecular Dynamic Studies of Z[WC]-DNA and the B to Z-DNA Transition”.	February 2015 <i>Baltimore, MD</i>
Lilly International Conference on College Teaching	November 2014
Biophysical Society 58 th Annual Meeting Poster: Michael G. Lerner, Hoang T. Tran “Measuring diffusion coefficients using non-equilibrium techniques”. Poster: Allan T. Ansevin, Jinhee Kim , Michael G. Lerner, Alexander K. Seewald “Molecular Dynamic Studies of Z[WC]-DNA and the B to Z-DNA Transition”.	February 2014 <i>San Francisco, CA</i>
National Institutes of Health 2014 Orloff Science Awards <i>Invited speaker</i>	January 2014 <i>Bethesda, MD</i>
Biological Membranes and Membrane Proteins: Challenges for Theory and Experiment <i>Invited participant</i>	July 2013 <i>Sowmass, CO</i>
Biophysical Society 57 th Annual Meeting	February 2013 <i>Philadelphia, PA</i>
South Dakota State University <i>Invited seminar</i> : Computational and theoretical studies of protein and lipid dimers and trimers diffusing in lipid membranes.	December 2012 <i>Brookings, SD</i>
Earlham College Economics Department <i>Invited speaker/panel discussion member</i> : The Nate Silver Phenomenon – Methodological Issues.	December 2012 <i>Richmond, IN</i>
Laboratory Instruction Beyond the First Year of College <i>Invited session chair</i> : Statistical Physics/Soft Matter Instructional Labs. Poster: Michael G. Lerner, “Using computer simulations to teach the Jarzynski equality”.	July 2012 <i>Philadelphia, PA</i>
Biophysical Society 56 th Annual Meeting	February 2012 <i>San Diego, CA</i>
Biological Membranes and Membrane Proteins: Challenges for Theory and Experiment <i>Invited speaker</i> : “Diffusion of tethered dimer and trimer systems”	July 2011 <i>Sowmass, CO</i>

SERVICE

Convener: Department of Physics and Astronomy, Fall 2013, Spring 2014, Spring 2015, Fall 2016, Spring 2017, Fall 2017, Spring 2018

Program Liaison: 3-2 Engineering Program, Fall 2016.

Convener: Earlham College Ultimate Frisbee Team (2013 - present).

Committees: fourteen search committees (convener of seven), board observer, campus life advisory committee, GLI internship implementation group, science phase 2 building committee, scientific equipment fund (convener), mentoring committee (Earlham-wide), mentoring committee (Departments of Mathematics, Physics and Computer Science, 2016-2017), *Ad hoc* committee on general education goals at Earlham, student conduct council, academic advisory committee.

Convener: yearly review for Physics/Astronomy/Mathematics/Computer Science administrative staff.

Adviser: Currently 20 advisees, including 10 first-year students. Periodically: auxiliary duties for all 3-2 students (roughly 15 at a time).

Research mentor: twenty eight research students over five summers and several semester, resulting in poster presentations (by students) at four national meeting, three in-progress publications, several invited talks.

Organizer: Earlham College Python Workshop, an immersive introduction to Python, taught by Software Carpentry-certified instructors, Jan 11-12, 2015.

Earlham Panels and presentations: Faculty Forum – Teaching students to deeply understand primary scientific and social science literature using the Paperbox, New Faculty Orientation Panel (*Who are We*), August 2014. Earlham economics panel (see above). Faculty Forum – interactive, reproducible lessons with IPython Notebooks, November 2013. Faculty Forum – “How did Earlham Students figure out that everybody’s error bars were wrong?”, December 2015. Mentorship panel for new science faculty – presentation on efficiency, October 2016.

NSF Panel: Invited participant, January 2016.

Reviewer: *Biophysical Journal*, *Journal of Chemical Information and Modeling*, *PLoS Computational Biology*, *Journal of Chemical Theory and Computation*, *Scientific Reports*