

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> mglerner.com
RESEARCH INTERESTS	Computational biophysics, computational oncology, 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	
ACADEMIC AND PROFESSIONAL EXPERIENCE AND FELLOWSHIPS	Johns Hopkins University, Baltimore, MD USA <i>Visiting Associate Professor, Department of Biomedical Engineering,</i> <i>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 <i>Co-Founder</i> 2005 – 2007 Ricoh Silicon Valley, Cupertino, CA <i>Software Engineer</i> 1999 – 2001 City Year, Chicago, IL <i>Corps Member</i> 1996 – 1997	

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)
- Faculty Seminar in New Zealand (Climate Change and Computational Modeling)
- 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, Joeseeph 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	<p>NIH F33: Computational Prediction of Genetic Drivers of Breast Cancer Metastasis. NIH/NCI (Principal Investigator), \$144,316.00 July 2019 <i>Note: fundable score awarded July 2019, awaiting federal budget for final funding</i></p> <p>Training in RNA-Seq analysis and computational network analysis Burroughs Wellcome Fund (Principal Investigator), \$12,500 May 2019</p> <p>Modeling Climate Change in New Zealand: Collaborative Faculty-Student Research Project. Earlham College (Principal Investigator), \$9,000 August 2018</p> <p>Non-Newtonian Physicists : Assessment mini-grants focusing on Diversity. Earlham College (Principal Investigator), \$500 January 2018</p> <p>Making Molecules Move: Collaborative Faculty-Student Research Project. Earlham College (Principal Investigator), \$10,600 January 2016</p> <p>Expedited Research Grants: Computational Topology and Drug Design. Earlham College (Principal Investigator), \$850 December 2014</p> <p>Experiential Learning Fund: Getting Started with Python: Programming for Everyone. Earlham College (Principal Investigator), \$2,000 October 2014</p> <p>CC*IEE Campus Design: Network Infrastructure for Improved Science Discovery and Education. NSF (Co-Principal Investigator), \$347,228 August 2014</p> <p>Kickstarter Technology Grant: IPython Notebooks for Computer Science and Physics. Earlham College (Principal Investigator), \$500 August 2013</p> <p>Pedagogical Incubator Initiative: Science Scholars Seminar. Earlham College (Co-Principal Investigator), \$2500 February 2012</p>
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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 **October 2015**
Faculty Development Workshop *selected by Earlham to attend* *Ann Arbor, MI*

Indiana University - Purdue University Indianapolis, Department of Physics **October 2015**
Invited colloquium: "Faster, more accurate quantification of diffusion and correlated motions in molecular simulations of lipid bilayers." *Indianapolis, IN*

Biological Membranes and Membrane Proteins: Challenges for Theory and Experiment <i>Invited speaker</i> : “Faster, more accurate diffusion constants”	July 2015 <i>Telluride, CO</i>
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 <i>Miami, OH</i>
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

Chair: Department of Physics and Astronomy, Fall 2013-Spring 2015, Fall 2016-Spring 2019.

Organizer: Decolonising science reading group, August 2017.

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

Faculty Convener: Earlham College Ultimate Frisbee Team, 2013 - 2018.

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

Research mentor: twenty six 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. Student conference presentations have directly resulted in job offers and graduate school applications for several students.

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*, *Nature: Scientific Reports*.