

Rachel M. Lee

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August 24, 2018

EDUCATION

Doctor of Philosophy, Physics
University of Maryland – College Park, Maryland
August 2016, 4.0 GPA

Bachelor of Science, Physics
Bachelor of Science, Chemical Engineering
Minor, Mathematics
University of Arkansas – Fayetteville, Arkansas
May 2010, Summa Cum Laude, 4.0 GPA

PUBLICATIONS

- P. C. Bailey, R. M. Lee, M. I. Vitolo, S. J. P. Pratt, E. Ory, K. Chakrabarti, C. J. Lee, K. N. Thompson, and S. S. Martin. Single cell tracking of breast cancer cells enables highly accurate prediction of sphere formation using only early doubling information. *iScience*, 2018. doi:10.1016/j.isci.2018.08.015
- S. J. Pratt, E. O. Hernández-Ochoa, R. M. Lee, E. C. Ory, J. S. Lyons, H. C. Joca, A. Johnson, K. Thompson, P. Bailey, C. J. Lee, T. Mathias, M. I. Vitolo, M. Trudeau, J. P. Stains, C. W. Ward, M. F. Schneider, and S. S. Martin. Real-time scratch assay reveals mechanisms of early calcium signaling in breast cancer cells in response to wounding. *Oncotarget*, 9:25008–25024, 2018. doi:10.18632/oncotarget.25186
- C. H. Stuelten, R. M. Lee, W. Losert, and C. A. Parent. Lysophosphatidic acid regulates the motility of MCF10CA1a breast cancer cell sheets via two opposing signaling pathways. *Cellular Signalling*, 45, 2018. doi:10.1016/j.cellsig.2018.01.005
- Y. Zhang, G. Xu, R. M. Lee, Z. Zhu, J. Wu, S. Liao, G. Zhang, Y. Sun, A. Mogilner, W. Losert, T. Pan, F. Lin, Z. Xu, and M. Zhao. Collective cell migration has distinct directionality and speed dynamics. *Cellular and Molecular Life Sciences*, 74(20):3841–3850, 2017. doi:10.1007/s00018-017-2553-6
- R. M. Lee, H. Yue, W.-J. Rappel, and W. Losert. Inferring single-cell behaviour from large-scale epithelial sheet migration patterns. *Journal of The Royal Society Interface*, 14(130):20170147, 2017. doi:10.1098/rsif.2017.0147
- R. M. Lee, C. H. Stuelten, C. A. Parent, and W. Losert. Collective cell migration over long time scales reveals distinct phenotypes. *Convergent Science Physical Oncology*, 2:025001, 2016. doi:10.1088/2057-1739/2/2/025001
- R. M. Lee, D. H. Kelley, K. N. Nordstrom, N. T. Ouellette, and W. Losert. Quantifying stretching and rearrangement in epithelial sheet migration. *New Journal of Physics*, 15(2):025036, 2013. doi:10.1088/1367-2630/15/2/025036
- D. Fologea, E. Krueger, R. Al Faori, R. M. Lee, Y. I. Mazur, R. Henry, M. Arnold, and G. J. Salamo. Multivalent ions control the transport through lysenin channels. *Biophysical chemistry*, 152(1-3):40–45, Nov. 2010. doi:10.1016/j.bpc.2010.07.004
- D. Fologea, E. Krueger, R. M. Lee, M. Naglak, Y. I. Mazur, R. Henry, and G. J. Salamo. Controlled gating of lysenin pores. *Biophysical chemistry*, 146(1):25–29, Jan. 2010. doi:10.1016/j.bpc.2009.09.014

W. R. Penney, R. M. Lee, M. E. Magie, and E. C. Clausen. Design projects in undergraduate heat transfer: Six examples from the fall 2007 course at the University of Arkansas. *Proceedings of the 2007 Midwest Section Conference of the American Society for Engineering Education*, 2007

RESEARCH EXPERIENCE

Migration Dynamics during Breast Cancer Progression Spring 2017 – Present
 — Postdoctoral Fellow, Marlene and Stewart Greenebaum Comprehensive Cancer Center, University of Maryland School of Medicine
 — Research project supervised by Stuart S. Martin
 — Supported by the T32 Training Program in Cancer Biology

Nanotopographic Guidance of Cell Migration Fall 2016 – Spring 2017
 — Postdoctoral Associate, Institute for Physical Science and Technology, UMD
 — Collaborative research project lead by Wolfgang Losert and John Fourkas

Dynamics of Collective Cell Migration Summer 2011 – Summer 2016
 — Doctoral research supervised by Wolfgang Losert, University of Maryland
 — In collaboration with Carole Parent, National Cancer Institute
 — Supported by the ARCS Foundation (Fall 2013 - Summer 2016) and a National Science Foundation Graduate Research Fellowship (Fall 2010 – Summer 2013)

Liposomes as Carriers for Drug Delivery Fall 2007 - Spring 2010
 — Undergraduate research supervised by Gregory Salamo, University of Arkansas
 — Honors College Thesis Defense (April 2010)
 — Supported by the University of Arkansas Physics Department (Spring 2009 – Spring 2010) and the University of Arkansas Howard Hughes Medical Institute Research Studio (Fall 2007 – Spring 2009)

FELLOWSHIPS

T32 Trainee Fellowship in Cancer Biology	2017-2019
ARCS Foundation Scholar (JCM Foundation)	2014-2016
ARCS Endowed Fellowship	2013-2014
NSF Graduate Fellowship	2010-2013
University Graduate Fellowship, University of Maryland	2010-2012
Computer, Mathematical, and Physical Sciences Dean's Fellowship	2010
Goldwater Scholar	2009-2010
University of Arkansas Bodenhamer Fellow	2005-2010
State Undergraduate Research Fellowship	2008-2009
National Merit Scholar	2005
Arkansas Governor's Distinguished Scholar	2005-2009
Carl B. & Florence E. King Foundation Scholar	2005-2009

AWARDS

Best Postdoctoral Oral Presentation, UMB Cancer Biology Retreat	2018
University of Maryland School of Medicine Postdoctoral Travel Award	2018
First Place, Trainee Poster Competition, UMGCCC Research Day	2017
George A. Snow Memorial Award, UMD Physics	2016
SIAM Student Travel Award	2015
Biophysics Category Poster Winner, UMD Bioscience Day	2013
Arkansas INBRE Physics Poster Competition, First place	2009
Honors College Study Abroad Grant	2007, 2009
Girl Scout Gold Award Recipient	2005

INVITED TALKS

Dynamics phenotyping across length and time scales in collective cell migration. *Mathematics of the Cell: Mechanical and Chemical Signaling across Scales*, Banff International Research Station, August 2018

Guided migration and collective behavior: Cell dynamics during cancer progression. *Department of Physics and Astronomy Colloquium*, West Virginia University, October 2017

Guided migration and collective behavior: Cell dynamics during cancer progression. *Integrative Cancer Research Seminar*, University of Maryland, November 2016

Studying the physics of cancer with cell migration dynamics. *Quince Orchard High School*, September 2016

Studying the physics of cancer with cell migration dynamics. *U.S. Physics Team Training Camp*, University of Maryland, May 2016

Quantifying collective cell migration during cancer progression. *SIAM Conference on Applications of Dynamical Systems, Minisymposium on Emerging Collective Patterns in Dynamic Swarms*, May 2015

Quantifying collective cell migration during cancer progression. *Eleventh Annual Symposium of the Burgers Program for Fluid Dynamics*, University of Maryland, November 2014

Studying the physics of cancer with cell migration dynamics. *Summer Girls Program*, University of Maryland, August 2014, 2015, 2017

Quantifying collective migration in cancer progression. *University of Arkansas Physics Colloquium*, March 2014

Fighting cancer with biophysics. *Institute for Academic Challenge Community Seminar Series*, March 2013

Quantifying collective migration in cell monolayers. *University of Maryland Applied Dynamics Seminar*, November 2012

Liposomes as carriers for drug delivery. *Sigma Pi Sigma Induction Ceremony*, University of Arkansas, April 2010

Developing and visualizing nano-carriers for cellular drug delivery. *Undergraduate Research Colloquium*, University of Arkansas Physics Department, September 2008

INTERVIEWS

Ask Rachel Lee about: The physics of migrating cancer cells. *BioBuzz*, 2016. URL: <https://biohive.breezio.com/discussion/4580442791158482829/>

K. Keefe. Rachel Lee - Medical Researcher - Univ. of Maryland. *LabTV on YouTube*. URL: <http://youtu.be/JHWeScGj4DI>

J. Powviriya. Researchers use fat to fight cancer. *University of Arkansas Research Frontiers*, 2009

TEACHING EXPERIENCE

MATLAB Boot Camp 2013-2017

- Week long session designed to prepare summer students for image analysis projects. Also attended by researchers from the National Institutes of Health.
- Developed lectures and in class problem sets.
- Participated as a lecturer and provided guidance during student coding sessions.

**SELECTED
TALKS AND
POSTERS**

- R. M. Lee. Response of collective cell migration to surface topography reveals distinct phenotypes. *9th Annual Cancer Biology Research Retreat, University of Maryland Baltimore*, April 2018. – **Award for Best Postdoctoral Oral Presentation**
- R. M. Lee, M. J. Hourwitz, K. Thompson, M. Vitolo, J. T. Fourkas, W. Losert, and S. S. Martin. Response of collective cell migration to surface topography reveals distinct phenotypes. *American Physical Society March Meeting*, March 2018
- R. M. Lee, H. Yue, C. Stuelton, W.-J. Rappel, C. A. Parent, and W. Losert. Collective dynamics over long time scales and large length scales reveals distinct cell migration phenotypes. *2017 ASCB Annual Meeting*, December 2017. (poster). doi: [10.1091/mbc.E17-10-0618](https://doi.org/10.1091/mbc.E17-10-0618)
- R. M. Lee, C. Stuelton, C. A. Parent, and W. Losert. Collective cell migration over long time scales reveals distinct phenotypes. *UMGCC Research Day*, September 2017. (poster) – **1st Place, Trainee Poster Competition**
- R. M. Lee, B. U. S. Schmidt, L. Campanello, M. J. Hourwitz, J. T. Fourkas, and W. Losert. Physical guidance of the actin cytoskeleton and cell migration dynamics in epithelial cells. *American Physical Society March Meeting*, March 2017
- R. M. Lee, C. Stuelton, C. A. Parent, and W. Losert. Collective cell migration over long time scales reveals distinct phenotypes. *Directed Cell Migration Gordon Research Conference*, January 2017. (poster)
- R. M. Lee, S. Das, M. Hourwitz, X. Sun, C. Parent, J. Fourkas, and W. Losert. Nanotopography guides and directs cell migration in amoeboid and epithelial cells. *American Physical Society March Meeting*, March 2016
- R. M. Lee, H. Yue, W.-J. Rappel, and W. Losert. Characterization of collective cell migration dynamics. *American Physical Society March Meeting*, March 2015
- R. M. Lee, C. Stuelton, C. A. Parent, and W. Losert. Quantifying collective cell migration during cancer progression. *Directed Cell Migration Gordon Research Conference*, January 2015. (poster)
- R. M. Lee. Quantifying collective cell migration during cancer progression. *Directed Cell Migration Gordon Research Seminar*, January 2015
- R. M. Lee, C. Stuelten, K. Nordstrom, D. Kelley, N. Ouellete, C. Parent, and W. Losert. Quantifying collective cell migration during cancer progression. *International Meeting of the Physics of Living Systems Student Research Network*, July 2014
- R. M. Lee, C. Stuelten, K. Nordstrom, C. Parent, and W. Losert. Quantifying collective cell migration during cancer progression. *American Physical Society March Meeting*, March 2014
- R. M. Lee, D. H. Kelley, K. N. Nordstrom, M. Weiger, C. Stuelton, C. A. Parent, N. T. Ouellette, and W. Losert. Quantifying collective migration in cancer progression. *University of Maryland Bioscience Day*, November 2013. (poster) – **Biophysics Category Poster Winner**
- R. M. Lee, D. H. Kelley, K. N. Nordstrom, N. T. Ouellette, and W. Losert. Quantifying stretching and rearrangement in epithelial sheets. *American Physical Society March Meeting*, March 2013
- R. M. Lee, D. H. Kelley, K. N. Nordstrom, M. Weiger, C. Stuelton, C. A. Parent, N. T. Ouellette, and W. Losert. Quantifying stretching and rearrangement in epithelial sheets. *Directed Cell Migration Gordon Research Conference*, January 2013. (poster)
- R. M. Lee, D. H. Kelley, K. N. Nordstrom, M. Weiger, C. Stuelton, C. A. Parent, N. T. Ouellette, and W. Losert. Quantifying stretching and rearrangement in epithelial sheets. *University of Maryland Bioscience Day*, November 2012. (poster)

R. M. Lee, M. Weiger, C. Stuelton, C. A. Parent, and W. Losert. Analysis of collective forces involved in epithelial sheet migration. *Dynamics Days (Baltimore, Maryland)*, January 2012. (poster)

R. M. Lee, M. Weiger, C. Stuelton, C. A. Parent, and W. Losert. Mechanics of collective cell motion. *UMD-NCI Cancer Technology Workshop, National Institute of Health*, November 2011. (poster)

R. Lee, R. Henry, G. Salamo, and D. Fologea. Liposomes as carriers for drug delivery. *Nanotechnology for Health Care, Winthrop Rockefeller Institute*, January 2010. (poster)

R. Lee, M. Naglak, R. Henry, G. Salamo, and D. Fologea. Uptake and release of drugs and nanoparticles from liposomes. *Arkansas INBRE Fall 2009 Research Conference*, October 2009. (poster) – **1st place, Physics Poster Competition**

R. Lee, M. Naglak, R. Henry, G. Salamo, and D. Fologea. Uptake and release of drugs and nanoparticles from liposomes. *Nanotechnology for Health Care, Winthrop Rockefeller Institute*, January 2009. (poster)

R. Lee, M. Naglak, R. Henry, G. Salamo, and D. Fologea. Liposomal carriers for drug delivery. *Sigma Pi Sigma 2008 Quadrennial Congress, Fermi National Accelerator Laboratory*, November 2008. (poster)

AFFILIATIONS	American Physical Society	2007-Present
	Society of Physics Students	2006-2016
	American Institute of Chemical Engineers	2005-2010
	Phi Beta Kappa	Inducted Spring 2010
	Sigma Pi Sigma	Inducted Spring 2009
	Tau Beta Pi	Initiated Spring 2007
	Girl Scouts of the USA	Lifetime Membership
COMMUNITY OUTREACH	Maryland Day	2011-2014, 2017
	Physics is Phun	2011
	Society of Physics Students Haunted Lab Outreach	2006-2009
	Physics Fantastic Fun and Follies Fair	2009
	Student Day of Caring	2007
	Make a Difference Day	2005, 2006