Timothy R. Lezon
Drug Discovery Institute
University of Pittsburgh
200 Lothrop Street
W956 Biomedical Science Tower
Pittsburgh, PA 15261

Tel: 412.383.8042
Fax: 412.648.9009
lezon@pitt.edu
lezonlab.org

Education

Ph.D. in Physics 2007
The Pennsylvania State University

B.S. in Engineering Physics 1997
University of Illinois at Urbana-Champaign

Professional Experience and Appointments

Systems Biology Team Leader 2012–present
University of Pittsburgh Drug Discovery Institute

Assistant Professor 2010–present
Department of Computational and Systems Biology
University of Pittsburgh

Postdoctoral Associate 2007–2010
Department of Computational and Systems Biology
University of Pittsburgh

Manufacturing Engineer 1997–1999
Merkle-Korff Industries

Refereed Publications

1. Pei F, Li H, Henderson MH, Titus SA, Jadhav A, Simeonov A, Cobanoglu MC, Mousavi SH, Shun T, McDermott L, Iyer P, Fioravanti M, Carlisle D, Friedlander RM, Bahar I, Taylor DL, **Lezon TR**, Stern AM, Schurdak, ME. *Connecting neuronal cell protective pathways and drug combinations in a Huntingtons disease model through the application of quantitative systems pharmacology.* Scientific Reports 7:17803 (2017).
2. Spagnolo DM, Al-Kofahi Y, Zhu P, **Lezon TR**, Gough A, Stern AM, Lee AV, Ginty F, Sarachan B, Taylor DL, Chennubholta C. *Platform for quantitative evaluation of spatial intratumoral heterogeneity in multiplexed fluorescence images.* Cancer Research 77:e7174 (2017).
3. Suofu Y, Li W, Jean-Alphonse FG, Jiao J, Khattar NK, Li J, Baranov SV, Leronni D, Mihalik AC, He Y, Cecon E, Wehbi V, Kim J, Heath BE, Baranova OV, Wang X, Gable M, Kretz E, Di Benedetto G, **Lezon TR**, Ferrando L, Larkin TM, Sullivan MLG, Yablonska S, Wang J, Minnigh MB, Guillaumet G, Suzenet F, Richardson RM, Poloyac S, Stolz DB, Jockers R, Witt-Enderby P, Carlisle DL, Vilardaga J-P, Friedlander RM. *Dual role of*

mitochondria in producing melatonin and driving GPCR signaling to block cytochrome c release. Proc. Natl. Acad. Sci. USA 114:E7997–E8006 (2017).

4. Bergman S and **Lezon TR**. *Modeling global changes induced by local perturbations to the HIV-1 capsid.* J Mol Graphics and Modeling 71:218 (2017).
5. Gough A, Maier JS, **Lezon TR**, Shun T-Y, Kienholz M, Stern AM, Chennubhotla C, Schurdak ME, Haney SA Taylor DL. *Implications of Biological Heterogeneity in Biomedical Research, Drug Discovery and Diagnostics.* SLAS Discovery 22:213–227 (2017).
6. Spagnolo DM, Gyanchandani R, Al-Kofahi Y, Stern AM, **Lezon TR**, Gough A, Meyer DE, Ginty F, Sarachan B, Fine J, Lee AV, Taylor DL and Chennubhotla SC. *Pointwise mutual information quantifies intra-tumor heterogeneity in tissue sections labeled with multiple fluorescent biomarkers.* J Pathology Informatics 7:47 (2016).
7. Erdem C, Nagle AM, Casa AJ, Litzenburger BC, Wang Y, Taylor DL, Lee AV and **Lezon TR**. *Proteomic screening and lasso regression reveal differential signaling in insulin and insulin-like growth factor I pathways.* Molecular and Cellular Proteomics 15:3045–3057 (2016).
8. Gough A, Chen N, Schurdak M, Shun TY, **Lezon T**, Boltz R, Reese C, Wagner J, Vernetti L, Grandis J, Lee A and Taylor DL. *Identifying and Quantifying Heterogeneity in High Content Analysis: Application of Heterogeneity Indices to Drug Discovery.* PLoS One 9:e102678 (2014).
9. Bakan A, Dutta A, Mao W, Liu Y, Chennubhotla C, **Lezon TR** and Bahar I. *Evol and ProDy for bridging protein sequence evolution and structural dynamics.* Bioinformatics (2014).
10. **Lezon TR** and Bahar I. *Constraints imposed by the membrane selectively guide the alternating access dynamics of the glutamate transporter Glt_{Ph}.* Biophys. J. 102:1331–1340 (2012).
11. **Lezon TR**. *The effects of rigid motions on elastic network model force constants.* Proteins 80:1133–1142 (2012).
12. **Lezon TR** and Bahar I. *Using entropy maximization to understand the determinants of structural dynamics beyond native contact topology.* PLoS Comp. Biol. 6:e1000816 (2010).
13. Bahar I, **Lezon TR**, Bakan A and Shrivastava IH. *Normal mode analysis of biomolecular structures: functional mechanisms of membrane proteins.* Chem. Rev. 110:1463–1497 (2010).
14. Bahar I, **Lezon TR**, Yang L-W and Eyal E. *Global dynamics of proteins: Bridging between structure and function.* Ann. Rev. Biophys. 39:23–32 (2010).
15. **Lezon TR**, Sali A and Bahar I. *Global motions of the nuclear pore complex: insights from elastic network models.* PLoS Comp. Biol. 5:e1000496 (2009).
16. **Lezon TR**, Banavar JR, Cieplak M, Maritan A and Fedoroff N. *Using entropy maximization to infer genetic interaction networks from gene expression patterns.* Proc. Natl. Acad. Sci. USA 103, 19033–19038 (2006).
17. **Lezon TR**, Banavar JR and Maritan A. *The origami of life.* J. Phys. Cond. Matt. 18, 847-888 (2006).

18. Banavar JR, Cieplak M, Flammini A, Hoang TX, Kamien RD, **Lezon TR**, Marenduzzo D, Maritan A, Seno F, Snir Y and Trovato A. *Geometry of proteins: hydrogen bonding, sterics and marginally compact tubes.* Phys. Rev. E. 73, 031921 (2006).
19. **Lezon TR**, Banavar JR, Lesk AM and Maritan A. *What determines the spectrum of protein native state structures?* Proteins 63, 273-277 (2006).
20. **Lezon T**, Banavar JR and Maritan A. *Recognition of coarse-grained protein tertiary structure.* Proteins 55, 536-547 (2004).

Book Chapters

1. Gough A, **Lezon T**, Faeder JR, Chennubhotla C, Murphy RF, Critchley-Thorne R and Taylor DL. *High content analysis with cellular and tissue systems biology*, in *The Molecular Basis of Cancer*, 4th Edition. Edited by Mendelsohn J, Howley PM, Israel MA, Gray JW and Thompson CB. Elsevier, 2014.
2. Zomot E, Bakan A, Shrivastava IH, DeChancie J, **Lezon TR** and Bahar I. *Sodium-coupled secondary transporters: insights from structure-based computations*, in *Molecular Machines.* Edited by Roux B. World Scientific, 2011.
3. **Lezon TR**, Shrivastava IH, Yang Z and Bahar I. *Elastic network models for biomolecular dynamics: Theory and application to membrane proteins and viruses*, in *Handbook on Biological Networks.* Edited by Boccaletti S, Latora V and Moreno Y. World Scientific, 2009.
4. **Lezon TR**, Banavar JR, Cieplak M, Fedoroff N and Maritan A. *The most probable genetic interaction networks inferred from gene expression patterns*, in *Analysis of Microarray Data: A Network-Based Approach.* Edited by Dehmer M and Emmert-Streib F. Wiley, 2008.

Invited Seminars and Workshops

1. *ProDy: Overview and applications.* Workshop on Computational Biophysics, Pittsburgh Supercomputing Center, June 2015.
2. *Introduction to ProDy and its applications.* Workshop on Computational Biophysics, Pittsburgh, May 2014.
3. *Elastic network models and collective motions of biomolecular systems using ProDy.* Workshop on Computational Biophysics, Pittsburgh, May 2013.
4. *Protein global dynamics explored through elastic network models.* Workshop on Computer Simulations of Biomolecular Dynamics and Reactions, Pittsburgh Supercomputing Center, June 2012.
5. *Bridging the gap between structure and dynamics with elastic network models.* 66^{th} Annual Pittsburgh Diffraction Conference, Pittsburgh, October 2008.
6. *A framework for globular proteins.* American Physical Society March Meeting, Baltimore, March 2006.

Contributed Talks and Posters

1. *Global changes induced by local perturbations to the HIV-1 capsid.* Biophysical Society 61^{st} Annual Meeting, Los Angeles, 2016.
2. *Function theoretical analysis of high content data.* Great Lakes Bioinformatics Conference, Pittsburgh, 2013.
3. *Understanding heterogeneity of cellular responses in tumors by computational and systems biology.* American Society for Cell Biology Annual Meeting, San Francisco, 2012.
4. *Specificity in protein conformational ensembles.* International Conference on Biological Physics, San Diego, 2011.
5. *Frustration in protein elastic network models.* American Physical Society March Meeting, Portland OR, 2010.
6. *Rules for selecting optimal elastic network model force constants.* VIII European Symposium of the Protein Society, Zurich, 2009.
7. *Generalized rules for the optimization of elastic network models.* American Physical Society March Meeting, Pittsburgh, 2009.
8. *Reality's a drag: accounting for friction in simple protein models.* Biophysical Society 53^{rd} Annual Meeting, Boston, 2008.
9. *Using the principle of entropy maximization to infer genetic interaction networks from gene expression patterns.* First Annual Systems Biology Workshop, Pennsylvania State University, State College PA, September 2006.
10. *Asymmetric scoring functions for proteins.* American Physical Society March Meeting, Austin, 2003.

Research Mentoring

Graduate

Feng Guo	Tsinghua-Pitt	2017–2018
Cemal Erdem	Computational Biology	2013–2018

Undergraduate

Glenn Mersky	Mathematics	2018
Derek Alton	Mathematics	2017–2018
Michelle Situ	Bioinformatics	2017–2018
Stephen Provencher	Chemical Engineering	2016–2017
Shana Bergman	TECBio REU	2015
Ariel Gewirtz	TECBio REU	2013
Nicholas Giangreco	TECBio REU	2012
Andrew King	Bioinformatics	2012–2013

Courses Taught

Introduction to Computational Structural Biology
(Graduate-level course on protein statistical mechanics)

10 Lectures, 20 students	2017
16 Lectures, 15 students	2016
7 Lectures, 16 students	2015
6 Lectures, 14 students	2014
6 Lectures, 10 students	2013
6 Lectures, 25 students	2012

Current Topics in Computational Biology 2016
2015

Other Teaching Activities

Facilitator

Evidence-Based Medicine – Applied

8 Sessions, 9 students	2017
8 Sessions, 9 students	2018

Investigation and Discovery

8 Sessions, 7 students	2017

Instructor

Hands-on Workshop on Computational Biophysics 2013–2015
(Annual lecture on computational modeling of protein dynamics)

Drug Discovery 2014, 2018
(Delivered 1 lecture on quantitative systems pharmacology)

Functional genomics of infectious disease 2012, 2014
(Delivered 1 lecture on protein structure to graduate-level course)

Co-Director

Drug Discovery, Systems & Computational Biology International Academy
(8-week summer research program for high school students) 2013–2018

Professional Activities

- Organizing Committee, *Modeling the Opioid Epidemic*, Pittsburgh PA, 2017
- Program Committee, Great Lakes Bioinformatics (GLBIO) Conference, 2016 & 2017
- Named "Outstanding Reviewer" by Elsevier, 2015
- Referee for numerous scientific journals, including Physical Review Letters, PNAS, Scientific Reports, Biophysical Journal, Chemical Physics Letters, BMC Biophysics, Bioinformatics, Journal of Structural Biology, Proteins, PLoS Computational Biology, PLoS One, Journal of Molecular Graphics and Modeling

- Member, American Society for Cell Biology, 2012–2013
- Member, Biophysical Society, 2009–2016
- Member, American Physical Society, 2001–2010

Research Support

Current

NIH 1UL1TR001857-01 (Reis) 07/01/2016–06/30/2021
University of Pittsburgh Clinical and Translational Science Institute
Role: Core Director 3.6 Cal.

NIH 1U01CA204826-01 (Chennubhotla, Taylor, Sarachan) 05/04/2016–04/30/2019
Informatics Tools for Tumor Heterogeneity in Multiplexed Fluorescence Images
Role: Co-Investigator 2.8 Cal.

NIH 1U24TR001935 (Schurdak) 09/22/2016–08/31/2018
University of Pittsburgh Tissue Chip Testing Center
Role: Co-Investigator 2.8 Cal.

NIH 5U24TR001935-02S (Schurdak) 9/01/2017–8/31/2018
University of Pittsburgh Tissue Chip Testing Center Admin Supplement
Role: Co-Investigator 1.2 Cal.

Pending

NIH R01 DK001881 (Taylor) 7/1/2018–6/30/2023
Applying a Human Liver Microphysiology System to Develop Therapeutic Strategies for Non-Alcoholic Fatty Liver Disease (NAFLD)
Role: Co-Investigator 0.6 Cal.

Complete

UPMC Center for Commercial Applications Grant (Chennubhotla)
Computational pathology for accurate diagnosis of cancer (COMPACD)
Role: Co-Investigator 3.0 Cal.

Commonwealth of PA (CURE) SAP 4100062224 (Camacho) 01/01/2013–12/31/2016
Identification and Characterization of Regulators and Therapeutics of Cancer Signaling Networks
Role: Co-Investigator 12 Cal. for student