

Assistant Professor

Cecil H. and Ida Green Endowed Scholar in Biomedical Research
Center for Molecular, Computational, and Systems Biology;
Department of Biophysics;
Center for Alzheimer's and Neurodegenerative Diseases;
UT Southwestern Medical Center

Dallas, TX

EDUCATION & RESEARCH

University of California, Berkeley

Miller Independent Research Fellow

Host: Prof. David Chandler

Berkeley, CA

2012-2015

- correlated dynamics in inhomogeneous media, and applications to protein communication and allostery
- protein self-assembly

California Institute of Technology

Ph.D. in Physics

Advisor: Prof. Ahmed H. Zewail(1999 Nobel Prize in Chemistry)

- predictive analytic limits on protein length and folding speed as a result of fundamental forces.

Pasadena, CA

June, 2012

California Institute of Technology

Bachelor of Science in Physics with Distinction

Advisors: Prof. Ahmed H. Zewail and Prof. Thomas Tombrello

June, 2006

FELLOWSHIPS & AWARDS

- 2017 Alzheimer's Disease Research Award, UTSW
- 2015-present Cecil H. and Ida Green Endowed Scholar in Biomedical Research, UTSW
- 2014-2018 Heising-Simons Foundation Transition to Independence Award
- 2012-2015 Miller Research Fellowship, UC Berkeley
- 2012 Clauser Prize for Most Significant PhD Thesis at Caltech
- 2007-2011 DOE Computational Science Graduate Fellow (CSGF)
- 2006 Richard Feynman Prize in Theoretical Physics (Caltech)
- 2004 Fisher Prize in Physics (Caltech)
- 2002-2006 Axline Merit Scholarship (full tuition, room, and board at Caltech)

PUBLICATIONS

1. **M.M. Lin** Leveraging symmetry to predict self-assembly of multiple polymers. *Chem. Phys. Lett.* 683: 347-351, 2017.
2. **M.M. Lin**, Generalized Boltzmann distribution for systems out of equilibrium, arXiv 1610.02612v1, 2016.
3. **M.M. Lin**, Timing Correlations in Proteins Predict Functional Modules and Dynamic Allostery. *J. Am. Chem. Soc.* 135: 5036-5043, 2016.
4. J. Shenker and **M.M. Lin**, Conditional activity predicts the functional behavior of the gene regulatory network of the lambda-phage infection cycle. *Front. Plant Sci.* 6, Article 214, 2015.
5. **M. M. Lin**, D. Shorokhov, and A. H. Zewail, Dominance of Misfolded Intermediates in the Dynamics of α -Helix Folding *Proc. Natl. Acad. Sci. USA* 40, 14424-14429, 2014.
6. **M. M. Lin**, and A. H. Zewail, Einstein Lecture: Protein Folding – Simplicity in Complexity, *Ann. Phys. (Berlin)* 524: 379-391, 2012 (cover).
7. **M. M. Lin** and A. H. Zewail, Hydrophobic Collapse and the Length Limit of Foldable Protein Domains, *Proc. Natl. Acad. Sci. USA* 109: 9851-9856, 2012.
8. **M. M. Lin**, D. Shorokhov, and A. H. Zewail, Structural Dynamics of Free Proteins in Diffraction, *J. Am. Chem. Soc.* 133: 17072-17086, 2011.
9. **M. M. Lin**, O. F. Mohammed, and A. H. Zewail, Speed Limit of Protein Folding Evidenced in Secondary Structure Dynamics. *Proc. Natl. Acad. Sci. USA* 108: 16622-16627, 2011.
10. Y. Li, **M. M. Lin**, and J. W. Davenport, Ab initio Studies of Cellulose I: Crystal Structure, Intermolecular Forces, and Interactions with Water, *J. Phys. Chem. C* 115: 11533-11539, 2011.
11. S. T. Park, **M. M. Lin**, and A. H. Zewail, Photon-Induced Near Field Electron Microscopy (PINEM): Theoretical and Experimental, *New J. Phys.* 12: 123028 (57 pp), 2010.
12. **M. M. Lin**, D. Shorokhov, and A. H. Zewail, Structural Ultrafast Dynamics of Macromolecules: Diffraction of Free DNA and Effect of Hydration, *Phys. Chem. Chem. Phys.* 11: 10619-10632, 2009.
13. C. Othon , O.H. Kwon , **M. M. Lin** , and A. H. Zewail, Solvation in Protein (Un)folding: Effect of Local and Bulk Dynamics in the Melittin Tetramer-Monomer Transition, *Proc. Natl. Acad. Sci. USA* 106: 12593-12598, 2009.
14. O. Mohammed, G. Jas, **M. Lin**, A. H. Zewail. Primary Peptide Folding Dynamics Observed with Ultrafast Temperature Jump. *Angew. Chem. Int. Ed.* 48: 5628-5632, 2009 (inside cover).
15. **M. M. Lin**, D. Shorokhov, A. H. Zewail. Conformations and Coherences in Structure Determination by Ultrafast Electron Diffraction, *J. Phys. Chem. A* 113: 4075-4093, 2009.
16. **M. M. Lin**, L. Meinhold, D. Shorokhov, A.H. Zewail. Unfolding and Melting of DNA (RNA) Hairpins: the Concept of Structure-Specific 2D Dynamic Landscapes, *Phys. Chem. Chem. Phys.* 10: 4227-4239, 2008.

17. **M. M. Lin**, D. Shorokhov, and A. H. Zewail. Helix-to-Coil Transitions in Proteins: Helicity Resonance in Ultrafast Electron Diffraction, *Chem. Phys. Lett.* 420: 1-7, 2006.
18. R. M. Dirks, **M. M. Lin**, E. Winfree, and N. A. Pierce. Paradigms for Computational Nucleic Acid Design. *Nucleic Acids Res.* 32: 1392-1403, 2004.

INVITED TALKS

- A New Nonequilibrium Approach, Center for Physics of Evolving Systems, University of Chicago, June 2018
- A Circuit Theory of Biology, Frontiers in Physics, Chemistry, and Biology, Nanyang Technical University, Singapore, May 2018
- Generalizing the Boltzmann Distribution for Systems Out of Equilibrium, Ahmed Zewail Memorial Conference on Ultrafast and Physical Biology Symposium, California Institute of Technology, January 17, 2017
- Folding-Coupled Protein Self-Assembly, Thomas Tombrello Ph11 Conference, August 7, 2015
- New Approach for Revealing Cooperative Dynamics, from Protein Allostery to Neural Networks, Biophysics Speaker, Washington U. St. Louis, November 10, 2014
- Leveraging Symmetry to Predict Oligomer Formation in Alzheimer's Disease, 11th International Congress on Plant Medicine, Jackson Hole, Oct. 12, 2014
- Fundamental Limits of Protein Folding and Function, Physics Seminar, Princeton, March 6, 2014
- Universal Laws Governing Protein Folding and Function, George Raiziss Speaker, U Penn, January 16, 2014
- Glassy Dynamics in Proteins, Statistical Mechanics Seminar, UC Berkeley, 2013.

TEACHING

- Director of the Quantitative Biology course at UTSW, 2018-present
- Co-teaching the Mathematical Foundations course at UTSW, 2016-present