

Elena F. Koslover

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EMPLOYMENT ◇ **University of California, San Diego**

Assistant Professor, Department of Physics, 06/30/2016 - present

EDUCATION ◇ **Stanford University**

Postdoctoral scholar, Biochemistry, 12/2013-06/2016
Advisor: Julie Theriot

◇ **Stanford University**

Ph.D., Biophysics, 2013
Thesis: *The Physical Genome: Force, Elasticity, and Transport in DNA Processing*
Advisor: Andrew J. Spakowitz

◇ **University of Cambridge**

M.Phil., Chemistry, 2007
Thesis: *A Comparison of Double-Ended Transition State Search Methods*
Advisor: David J. Wales

◇ **California Institute of Technology**

B.S., Biology, *with honors*, 2006
B.S., Mathematics, *with honors*, 2006

AWARDS

- ◇ **J. S. McDonnell Foundation Postdoctoral Fellowship** (2 years funding) 2013-2015
- ◇ John and Fannie **Hertz Foundation Fellowship** (5 years of funding), 2006-2012
- ◇ **NSF Graduate Research Fellowship** (3 years of funding), 2006-2011
- ◇ Winston Churchill Foundation Scholarship (1 year of funding), 2006-2007
- ◇ Goldwater Scholarship 2005-2006
- ◇ Caltech Upper Class Merit Award; full scholarship 2003–2006

CURRENT RESEARCH INTERESTS

mechanical properties of biomolecular and cellular systems; intracellular transport and rheology;
biological applications of statistical mechanics and polymer physics

Organization and rheology of intracellular transport

Modeling active and passive transport within eukaryotic cells, with particular emphasis on the role of cytoplasmic flow, hydrodynamic coupling, crowding in the cytoplasm, and cell-scale organization of active transport.

Reaction-diffusion kinetics in complex geometries

Understanding the role of microscale molecular confinement within organelles on the kinetics of signal transduction, aggregation, and trafficking in eukaryotic cells.

Coarse-grained modeling of polymers and polymer networks

Development of analytical and computational tools for studying systems composed of semiflexible polymers within active, biologically relevant environments.

PUBLICATIONS

S Mogre and **EF Koslover**, “Multi-modal transport and dispersion of organelles in narrow tubular cells”, arXiv preprint arXiv:1712.01981 (2017)

EF Koslover, CK Chan, and JA Theriot, “Cytoplasmic flow and mixing due to deformation of motile cells”, in *Biophys. J.* 113(9), 2077-2087 (2017)

EF Koslover, MA Díaz de la Rosa, and AJ Spakowitz, “Crowding and hopping in a protein’s diffusive transport on DNA.” in *J. Phys. A: Mat. Theor.* 50, 074005 (2017)

EF Koslover, CK Chan, and JA Theriot, “Disentangling Random Motion and Flow in a Complex Medium”, in *Biophys. J.* 110(3), 700-709 (2016)

X Zhou, DK Halladin, ER Rojas, **EF Koslover**, TK Lee, KC Huang, and JA Theriot, “Mechanical crack propagation drives millisecond daughter cell separation in *Staphylococcus aureus*”, in *Science*, 348(6234), 574-578 (2015)

P. J. Mulligan, **EF Koslover** and AJ Spakowitz “Thermodynamic model of heterochromatin formation through epigenetic regulation”, in *J. Phys.:Condens. Matter*, 27(6), 064109 (2015)

EF Koslover and AJ Spakowitz “Multi-scale dynamics of semiflexible polymers from a universal coarse-graining procedure”, in *Phys. Rev. E*, 90(1), 013304 (2014)

D. K. Breslow, **EF Koslover**, F Seydel, AJ Spakowitz, and MV Nachury, “A quantitative assay for protein entry into primary cilia”, *J. Cell Biol.*, 203(1), 129-147 (2013)

F. Ye, D. K. Breslow, **EF Koslover**, AJ Spakowitz, WJ Nelson, MV Nachury, “Single molecule imaging of ciliary membrane protein dynamics”, in *eLife*, 2 (2013)

EF Koslover and AJ Spakowitz, “Discretizing elastic chains for coarse-grained polymer models”, in *Soft Matter*, 9(29), 7016-7027 (2013)

EF Koslover and AJ Spakowitz, “Systematic coarse-graining of microscale polymer models as effective elastic chains”, in *Macromolecules* (2013)

EF Koslover and AJ Spakowitz, “Force fluctuations impact kinetics of biomolecular systems ” in *Phys. Rev. E.*, 86(1), 011906 (2012)

EF Koslover, MA Díaz de la Rosa, and AJ Spakowitz, “Theoretical and computational modeling of target-site search kinetics in vitro and in vivo” in *Biophys. J.*, 101(4), 856-865 (2011)

B Sudhanshu, S Mihardja, **EF Koslover**, S Mehraeen, C Bustamante, and AJ Spakowitz, “Tension - dependent structural deformation alters single-molecule transition kinetics” in *Proc. Nat. Acad. Sci.*, 108(5), 1885-1890 (2011)

EF Koslover, CJ Fuller, AF Straight, and AJ Spakowitz, “Local Geometry and Elasticity in Compact Chromatin Structure” in *Biophys. J.*, 99(12), 3941-3950 (2010)

MA Díaz de la Rosa, **EF Koslover**, PJ Mulligan, and AJ Spakowitz, “Dynamic Strategies for Target-Site Search by DNA-Binding Proteins” in *Biophys. J.*, 98(12), 2943-2953 (2010)

MS Bauer, B Strodel, SN Fejer, **EF Koslover** and DJ Wales, “Interpolation schemes for peptide rearrangements” in *J. Chem. Phys.*, 132, 054101 (2010)

EF Koslover, and AJ Spakowitz, “Twist-and Tension-Mediated Elastic Coupling between DNA-Binding Proteins” *Phys. Rev. Lett.*, 17, 178102 (2009)

S Mehraeen, B Sudhanshu, **EF Koslover**, AJ Spakowitz, “End-to-end distribution for a worm-like chain in arbitrary dimensions” in *Phys. Rev. E*, 77, 061803 (2008)

EF Koslover, and DJ Wales, “Geometry optimization for peptides and proteins: Comparison of Cartesian and internal coordinates” in *J. Chem. Phys.*, 127, 234105 (2007)

EF Koslover and DJ Wales, “Comparison of double-ended transition state search methods” in *J. Chem. Phys.*, 127, 134102 (2007)

REFEREED
PRESENTA-
TIONS

“Cytoplasmic Flow Enhances Organelle Dispersion in Eukaryotic Cells”, E. F. Koslover, talk at APS March meeting, 3/2017

“Cytoplasmic Rheology and Particle Motion in Deforming Cells”, E. F. Koslover, Caleb Chan, and J. Theriot, poster at ASCB annual meeting, 12/2015

“Cytoplasmic Microrheology from Particle Trajectory Analysis in Motile Cells”, E. F. Koslover, Caleb Chan, and J. Theriot, talk at AIChE annual meeting, 11/2015

“Cytoplasmic Fluid Flow and Intracellular Transport in Motile Cells”, E. F. Koslover, Caleb Chan, and J. Theriot, talk at AIChE annual meeting, 11/2014

“The Physical Genome: DNA Mechanics Across Length Scales”, E. F. Koslover, C. J. Fuller, S. H. Hong, M. A. Díaz, A. Straight, L. Shapiro, H. McAdams, and A. J. Spakowitz, talk at ASCB annual meeting, 12/2012

“Bridging length scales: hierarchical coarse-graining of elastic biopolymer models”, E. F. Koslover and A. J. Spakowitz, talk at AIChE annual meeting, 10/2012

“Fluctuations and the Physics of Genome Processing”, E. F. Koslover and A. J. Spakowitz, poster at Biophysical Society Meeting, 03/2012

“Dynamics of target site search by DNA-binding proteins”, E. F. Koslover, M. A. Díaz de la Rosa, and A. J. Spakowitz, poster at Gordon Research Conference, January 2011 and Biophysical Society Meeting, 03/2011

INVITED
TALKS

Physical Biology of the Cell course, MBL, Woodshole, MA, 8/2017

Department of Mechanical Engineering, UCSD, 3/2017

qBio Seminar Series, UCSD, 2/2017

Department of Mechanical Engineering seminar, Boston University, 2/2016

Department of Chemical Engineering seminar, MIT, 2/2016

Department of Physics seminar, Northeastern University, 2/2016

Department of Bioengineering seminar, Stanford University, 2/2016

Department of Chemical Engineering seminar, Caltech, 1/2016

Department of Physics seminar, North Carolina State University, 1/2016

Condensed Matter Physics colloquium, Caltech, 9/2015

Quantitative Biology & Theoretical Biophysics Speaker Series, Emory University, 9/2015

Department of Chemistry seminar, Stanford University, 12/2014

TEACHING &
MENTORING
EXPERIENCE

◇ Research advisor:

- Saurabh Mogre, UCSD physics graduate student(2016-)
- Anamika Agrawal, UCSD physics graduate student (2017-)
- Alexander Lorenzo, UCSD undergraduate (2017-)

◇ Courses taught:

- Phys177/277 (UCSD, Physics of the Cell)
- Phys1A (UCSD, Introductory Mechanics)

◇ Scientific consultant for Physical Biology of the Cell course at the MBL, Woodshole, MA. Summer, 2017.

- Supervised life sciences students in short research rotations designed to teach physical modeling skills.

COMMITTEE
SERVICE AND
OUTREACH

◇ Program committee member, QBio Summer Conference, 2017-2018

◇ Faculty host for Tech Trek, summer camp for middle school girls, 2017

◇ Consultant for science curriculum development, Expii, Inc., 2013-2015

- Designed curricula for crowd-sourcing educational content in math and science

◇ Volunteer with LABSci project, Lucile Packard Children’s Hospital, Stanford, 2008-2011

- Designed and implemented hands-on science curriculum for hospitalized students.

AD HOC
REVIEWER

Soft Matter, ACS Nano, Biophysical Journal, J. Physical Chemistry Lett.