SCOTT FORTH

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Center for Biotechnology and Interdisciplinary Studies
Rensselaer Polytechnic Institute

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EDUCATION

Ph.D. Physics, **Cornell University** 2009
B.A. Physics / B.M. Music Performance, **Oberlin College** 2002

EXPERIENCE

Assistant Professor – **Rensselaer Polytechnic Institute** 2016 - present
Department of Biological Sciences

Post-doctoral Researcher – **Rockefeller University** 2010 – 2016
NIH NRSA Postdoctoral Fellowship (2011-2014)
In the Laboratory of Tarun Kapoor, *Laboratory of Chemistry and Cell Biology*

Graduate Student/Research Associate – **Cornell University** 2004 – 2010
In the Laboratory of Michelle D. Wang, *HHMI / Laboratory of Solid State Physics*

FELLOWSHIPS AND AWARDS

- National Institutes of Health NRSA Postdoctoral Fellowship, 2011–2014
- Sigma Xi Scientific Honor Society
- Robert Weinstock Prize for Excellence in Physics
- Graduated Summa Cum Laude from Oberlin College

PUBLICATIONS

S. Forth, T.M. Kapoor
The mechanics of microtubule networks in cell division
Journal of Cell Biology **216**, 1525-31 (2017).

Y. Shimamoto*, **S. Forth***, T.M. Kapoor (*co-first authors)
Measuring pushing and braking forces generated by ensembles of kinesin-5 crosslinking two microtubules
Developmental Cell **34**, 669-681 (2015).

- highlighted in Dev. Cell Preview **34**, 609-610 (2015)

S. Forth, K.-C. Hsia, Y. Shimamoto, T.M. Kapoor
Asymmetric friction of non-motor MAPs can lead to their directional motion in active microtubule networks
Cell **157**, 420-32 (2014).

- highlighted in Dev. Cell Preview **29**, 5-6 (2014)
- Faculty of 1000 recommended

S.-C. Ti, M.C. Pamula, S.C. Howes, C. Duellberg, N.I. Cade, R.E. Kleiner, **S. Forth**, T. Surrey, E. Nogales and T.M. Kapoor
Mutations in Human Tubulin Proximal to the Kinesin-Binding Site Alter Dynamic Instability at Microtubule Plus- and Minus-Ends
Developmental Cell **37**, 72-84 (2016).

K.-C. Hsia, E.M. Wilson-Kubalek, A. Dottore, Q. Hao, K.-L. Tsai, **S. Forth**, Y. Shimamoto, R.A. Milligan, and T.M. Kapoor
Reconstitution of the augmin complex provides insights into its architecture and function
Nature Cell Biology **16**, 852-863 (2014).

M. Li, A. Hada, P. Sen, L. Olufemi, M.A. Hall, B.Y. Smith, **S. Forth**, J.N. McKnight, A. Patel, G.D. Bowman, B. Bartholomew, M.D. Wang
Dynamic regulation of transcription factors by nucleosome remodeling
eLife 2015;4:e06249 (2015).

S. Forth, M.Y. Sheinin, J.T. Inman, and M.D. Wang
Torque Measurement at the Single Molecule Level
Annual Review of Biophysics **42**, 583-604 (2013).

S. Forth and M.D. Wang
Angular Optical Trapping
Encyclopedia of Biophysics, Springer Reference, (2012).

S. Forth, C. Deufel, S.S. Patel, M.D. Wang
Direct Measurements of Torque during Holliday Junction Migration
Biophysical Journal **100**, L05-L07 (2011).

M. Sheinin, **S. Forth**, J.F. Marko, and M.D. Wang
Underwound DNA under Tension: Structure, Elasticity, and Sequence-Dependent Behaviors
Physical Review Letters **107**:108102 (2011).

J. Inman*, **S. Forth***, and M.D. Wang (*contributed equally to this work)
Passive Torque Wrench and Angular Position Detection Using a Single Beam Optical Trap
Optics Letters **35**:17, 2949-51 (2010).

B. Daniels, **S. Forth**, M.Y. Sheinin, M.D. Wang and J.P. Sethna
Discontinuities at the DNA Supercoiling Transition
Physical Review E **80:**040901 (2009).

S. Forth, C. Deufel, M.Y. Shienin, B. Daniels, J.P. Sethna and M.D. Wang
Abrupt Buckling Transition Observed during the Plectoneme Formation of Individual DNA Molecules
Physical Review Letters **100:**148301 (2008).

C. Deufel, **S. Forth**, C.R. Simmons, S. Dejgosha and M.D. Wang
Nanofabricated quartz cylinders for angular optical trapping: torque detection during DNA supercoiling
Nature Methods **4**, 223-5 (2007).

O. Byl, P. Kondratyuk, **S. Forth**, S.A. Fitzgerald, L. Chen, J.K. Johnson and J.T. Yates, Jr.
Adsorption of CF_4 on the Internal and External Surfaces of Opened Single-Walled Carbon Nanotubes: A Vibrational Spectroscopy Study
Journal of the American Chemical Society **125**, 5889 (2003).

S.A. Fitzgerald, **S. Forth** and M. Rinkoski
Induced infrared absorption of molecular hydrogen in solid C_{60}
Physical Review B **65**:140302 (2002).

SELECTED CONFERENCE PRESENTATIONS

S. Forth
The mechanics of cell division
Poster presented at 2017 Gordon Research Conference “Motile and Contractile Systems”
Colby Sawyer College, New London NH; July 30-August 4, 2017.

S. Forth, Y. Shimamoto, T.M.Kapoor
Measuring Forces Generated by Ensembles of Kinesin-5 crosslinking two Microtubules
Talk presented at 2017 Biophysical Society Annual Meeting Conference, New Orleans, LA; Feb 12, 2017

S. Forth, M. Pamula, W.R. Legant, E. Betzig, T.M. Kapoor
Temporal and Spatial Dynamics of Spindle Midzone Assembly Revealed by Lattice Light Sheet Microscopy
'Centrosomes and Spindles' Mini-symposium Talk at 2015 American Society for Cell Biology Meeting
San Diego, CA; Dec. 14, 2015.

S. Forth
Examining the Mechanics of Microtubule Networks
Stadtman Investigator Presentation Symposium, Biomedical Engineering/Biophysics/Physics
National Institutes of Health, Bethesda, MD; Dec. 16, 2014.

S. Forth and T.M. Kapoor
Asymmetric friction of non-motor MAPs can lead to their directional motion in active microtubule networks
Invited talk at 2013 American Society for Cell Biology, subgroup "Dynamics and Mechanics of Mitosis",
New Orleans, LA; Dec. 14, 2013

S. Forth, K.-C. Hsia, and T.M. Kapoor
Asymmetric Force Response Reveals Mechanical Role in Spindle Protein Localization
Talk presented at 2013 Biophysical Society Annual Meeting Conference, Philadelphia, PA; Feb. 6, 2013

S. Forth and T.M. Kapoor
Understanding Cell Division: The micromechanics of non-motor MAPs
Talk presented at 2012 Pels Family Chemical and Structural Biology Retreat
Edith Macy Conference Center, Briarcliff Manor, NY; November 17, 2012

S. Forth and T.M. Kapoor
The Micromechanics of Central Spindle Organization
Poster presented at 2011 Anderson Cancer Center Symposium
Rockefeller University, New York, NY; September 9, 2011.

S. Forth
The Micromechanics of Central Spindle Organization
Poster presented at 2011 Pels Family Chemical and Structural Biology Retreat
Edith Macy Conference Center, Briarcliff Manor, NY; April 30, 2011.

S. Forth
Angular Optical Trapping and its Application to DNA Structures
Poster presented at 2010 Howard Hughes Medical Institute Science Meeting
Howard Hughes Medical Institute, Chevy Chase, MD; January 24-27, 2010.

S. Forth
A Biological Nano-Torque Wrench: Holliday Junction Mechanics Studied Using an Angular Optical Trap
Talk presented at 13th annual Buffalo Symposium on DNA Replication and Repair
Roswell Park Cancer Institute, Buffalo, NY; May 15, 2009.

S. Forth, C. Deufel, and M.D. Wang
Holliday Junction Mechanics Studied Using an Angular Optical Trap
Poster presented at 2009 Biophysical Society Meeting Conference, Boston, MA; March 2, 2009.

S. Forth, C. Deufel, C.R. Simmons, S. Dejgosha and M.D. Wang
Angular Optical Trapping with Nanofabricated Quartz Cylinders: Measuring the Torsional Properties and Plectoneme Dynamics of DNA
Poster presented at 2007 Biophysical Society Meeting Conference, Baltimore, MD; March 3, 2007.

S. Forth, C. Deufel and M.D. Wang
Angular Optical Trapping: Measuring the Twist Elasticity of DNA
Invited poster presentation at the inaugural Gordon Conference on Single Molecule Approaches to Biology, Colby-Sawyer College, New London, NH; June 18-23, 2006.

TECHNICAL SKILLS

- Extensive experience with optics and microscopy techniques, including advanced optical trap design, lattice light sheet microscopy, TIRF microscopy, super-resolution methods (STORM), confocal fluorescence imaging
- Extensive experience with computer programming and theoretical/statistical modeling, including Python, LabView, C, C++, Java, R, Mathematica, Matlab, HTML
- Experience with biochemical/molecular biology techniques, including protein expression and purification, live mammalian cell imaging, cloning, Xenopus egg extract system, PCR, nucleosome assembly
- Experience with theoretical modeling, including formulation of computational models of cytoskeletal protein behavior, DNA mechanics, as well as statistical analysis of large data sets

TEACHING EXPERIENCE

Guest Lecturer – Microbiology Course, Rensselaer Polytechnic Institute — Spring 2017

Department of Biology – Graduate Core Course, Rensselaer Polytechnic Institute — Fall 2016, Spring 2017

Facilitator - Department of Physics, Cornell University — Fall 2003
Teaching Assistant Training Program

Teaching Assistant - Department of Physics, Cornell University
Physics 330: Modern Experimental Optics — Fall 2003
Physics 204: Physics of Musical Sound — Spring 2003
Physics 101: General Physics I — Fall 2002

PROFESSIONAL ASSOCIATIONS

- Biophysical Society
- American Society for Cell Biology
- American Physical Society

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