

John Fricks

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Dept of Statistics
Pennsylvania State University
University Park, PA 16802

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Education

PhD (2004), Statistics.
University of North Carolina, Chapel Hill.
Thesis Title: "Biomolecular Motors and Diffusion Ratchets."
Thesis Advisor: Amarjit Budhiraja.

MS (2003), Statistics.
University of North Carolina, Chapel Hill.

MS (1999), Mathematics.
Western Kentucky University.
Thesis Title: "A Stochastic Analog to the Richardson's Arms Race Model."
Thesis Advisor: Randall Swift.

BM (*summa cum laude*, 1994), Music Performance and Economics.
Western Kentucky University.

Professional Employment

Associate Professor. July 2011-present
Dept of Statistics.
Pennsylvania State University, University Park.

Assistant Professor. July 2005-June 2011
Dept of Statistics.
Pennsylvania State University, University Park.

Research Fellow. January 2010-May 2010
Statistical and Applied Mathematical Sciences Institute.
Durham, NC.

Research Assistant Professor. August 2004-June 2005
Dept of Mathematics.
University of North Carolina, Chapel Hill.
Postdoctoral Mentor: Timothy Elston

Other Affiliations

Member.
Center for Infectious Disease Dynamics.
Pennsylvania State University, University Park.

Member.
Center for Cellular Dynamics.
Pennsylvania State University, University Park.

Manuscripts Submitted for Publication

Gustavo Didier and John Fricks (2012). On the Wavelet-based Simulation of Anomalous Diffusion. Submitted to *Journal of Statistical Computation and Simulation*. <http://arxiv.org/abs/1202.4437>

Publications to Appear

Le Bao, John Fricks, and Murali Haran (2012). Discussion of "Bayesian Spatio-Dynamic Modeling in Cell Motility Studies: Learning Nonlinear Toxic Fields Guiding Immune Response" by Manolopoulou, Matheu, Cahalan, West and Kepler. To appear in *Journal of the American Statistical Association*.

Gustavo Didier, Scott A. McKinley, David B. Hill, and John Fricks (2012). Statistical Challenges in Microrheology. To appear in *Journal of Time Series Analysis*.

Articles in Refereed Journals

Emily Simons, Matthew Ferrari, John Fricks, Kathleen Wannemuehler, Abhijeet Anand, Tony Burton, Peter Strebel (2012). Assessment of the 2010 global measles mortality reduction goal: results from a model of surveillance data. *The Lancet*. **379**, Issue 9832, 2173-2178.

Scott A. McKinley, Avanti Athreya, John Fricks, and Peter R. Kramer (2012). Asymptotic Analysis of Microtubule-based Transport by Multiple Identical Molecular Motors. *Journal of Theoretical Biology*. **305**, 54-69.

John Hughes, William O. Hancock, and John Fricks (2012). Kinesins with Extended Neck Linkers: A Chemomechanical Model for Variable-Length Stepping. *Bulletin of Mathematical Biology*. **74**, No. 5, 1066-1097.

Shi Chen, John Fricks, and Matthew Ferrari (2012). Tracking Measles Infection through Non-linear State Space Models. *Journal of the Royal Statistical Society, Series C*. **61**, No. 1, 117-134.

John Hughes and John Fricks (2011). A Mixture Model for Quantum Dot Images of Kinesin Motor Assays. *Biometrics*. **67**, No. 2, 588-595.

John Hughes, William O. Hancock, and John Fricks (2011). A Matrix Computational Approach to Kinesin Neck Linker Extension. *Journal of Theoretical Biology*. **269**, No. 1, 181-194.

Ivan Simeonov, Xiaoyan Gong, Oekyung Kim, Mary Poss, Francesca Chiaromonte, and John Fricks (2010). Exploratory Spatial Analysis of *in vitro* Respiratory Syncytial Virus Co-infections. *Viruses*. **2**, No. 12, 2782-2802.

Matthew L. Kutys, John Fricks, and William O. Hancock (2010). Monte Carlo Analysis of Neck Linker Extension in Kinesin Molecular Motors. *PLoS Computational Biology*. **6**, No. 11.

John Hughes, John Fricks, and William O. Hancock (2010). Likelihood Inference for Particle Location in Fluorescence Microscopy. *Annals of Applied Statistics*. **4**, No. 2, 830-848.

John Fricks, Lingxing Yao, Timothy Elston, and Gregory Forest (2009). Time-Domain Methods For Diffusive Transport In Soft Matter. *SIAM Journal on Applied Mathematics*. **69**, No. 5, pp. 1277-1308.

John Fricks, Hongyun Wang, and Timothy Elston (2006). A Numerical Algorithm for Investigating the Role of the Motor-cargo Linkage in Molecular Motor Driven Transport. *Journal of Theoretical Biology*. **239**, 33-48.

Amarjit Budhiraja and John Fricks (2006). Molecular Motors, Brownian Ratchets, and Reflected Diffusions. *Discrete and Continuous Dynamical Systems-B*, **6**, no. 4, 711-734.

John Fricks and Randall Swift (2001). A Stochastic Richardson's Arms Race Model. *The American Journal of Mathematical and Management Sciences*, **21**, 313-323.

Other Publications John Fricks (2007). Stochastic Processes and Models by David Stirzaker. *Journal of the American Statistical Association*, **101**, March 2007.

Awards & Grants Faculty Fellowship.
Penn State Institute for CyberScience. 2012.
Total award amount: \$25,000.

Principal Investigator.
"Diffusion and Kinetics in Processive Molecular Motor." (DMS-0714939).
National Science Foundation.
September 2007-August 2013. (with Co-PI William Hancock)
Total award amount: \$567,000.

Research Fellowship.
National Science Foundation
via Statistical and Applied Mathematical Sciences Institute.
January 2010-May 2010.
Total award amount: \$14,746.

Principal Investigator.
Mathematical Sciences Postdoctoral Fellowship. (DMS-0403040).
National Science Foundation.
August 2004-August 2007.
Total award amount: \$108,000.

Upcoming Presentations "Spatial Point Processes and Infectious Dynamics in Cell Cultures."
Eastern North American Region (ENAR) Meeting of the
International Biometric Society.
Orlando, FL. March 2013.

"Statistical Inference from Passive Tracer Path Data."
AMS 2012 Fall Southeastern Section Meeting.
Tulane University. New Orleans, LA. October 2012.

"Stochastic Limits for Molecular Motor-Cargo Complexes"
SIAM-Life Science Meeting.
San Diego, CA. August 2012.

Invited Presentations "Microtubule-Based Transport by Multiple Identical Molecular Motors."
Society for Mathematical Biology Annual Meetings.
University of Tennessee. Knoxville, TN. July 2012.

"Bridging Scales in Molecular Motor Models."
Baker Center for Bioinformatics and Biological Statistics.
Iowa State University, Ames, IA. May 2012.

"Bridging Scales in Molecular Motor Models:
From Diffusing Heads to Multiple Steps."
Cell and Population Dynamics Workshop.
Mathematical Biosciences Institute.
Ohio State University, Columbus, OH. October 2011.

"Statistical Inference from Passive Tracer Path Data."
Sandia National Laboratory. Albuquerque, NM. October, 2011.

"Multiple Scales in Molecular Motor Models."
2nd SFB 803 Symposium.
Georg-August-Universität, Göttingen, Germany. September, 2011.

"Statistical Inference from Passive Tracer Path Data"
Microrheology: Transport Properties of Soft Matter
at Microscopic Length Scales Minisymposium.
ICIAM. Vancouver, BC. July 2011.

"Multiple Scales in Molecular Motor Models."
The Fourth Erich L. Lehmann Symposium.
Rice University. Houston, TX. May 2011.

"Multiple Scales in Molecular Motor Models."
Probability Seminar. Dept of Mathematics.
University of Wisconsin. Madison, WI. April 2011.

"Modeling Neck Linker Extension in Kinesin."
Conference on Computational and Systems Biology.
University of Florida. Gainesville, FL. March 2011.

"Modeling Neck Linker Extension in Kinesin."
Stochastic Dynamics Transition Workshop.
SAMSI. Durham, NC. November 2010.

"Bridging Scales in Kinesin Motor Models."
AMS 2010 Fall Western Section Meeting.
UCLA. Los Angeles, CA. October 2010.

"Bridging Scales in Kinesin Motor Models."
Symposium on Biomathematics and Ecology: Education and Research.
Bloomington, IL. September 2010.

"The Role of Neck Linker Extension in Kinesin Stepping."
Molecular Motors Minisymposium.
SIAM Life Science Conference.
Pittsburgh, PA. July 2010.

"A Mixture Model for Qdot Images of Molecular Motor Assays."
Dept of Statistics.
North Carolina State University. Raleigh, NC. February 2010.

"A Mixture Model for Qdot Images of Molecular Motor Assays."
Dept of Statistics.
University of Virginia. Charlottesville, VA. February 2010.

"Modeling Neck Linker Extension in Kinesin Molecular Motors."
Workshop on Multi-scale Stochastic Modeling of Cell Dynamics.
Banff International Research Station. Banff, AB. January 2010.

"The Role of Neck Linker in Kinesin Stepping."
Special Session on Stochastic Calculus and its Applications.
AMS 2009 Fall Western Section Meeting.
UC Riverside. Riverside, CA. November 2009.

"The Role of Neck Linker in Kinesin Stepping."
Mathematical Models of Molecular Motors Minisymposium.
International Conference on Mathematical Biology and
SMB Annual Meeting. Vancouver, BC. July 2009.

"Modeling and Inference for Single Particle Experiments in Biophysics."
Division of Natural Sciences.
New College of Florida. Sarasota, FL. November 2008.

"Inference for Molecular Motors: The Flashing Ratchet."
Cell Motility and Single Molecule Modeling Minisymposium.
SIAM Annual Meeting. San Diego. July 2008.

"Diffusion in Biofluids: Microbeads in Mucus."
Dept of Statistics.
University of Pittsburgh. Pittsburgh, PA. November 2007.

"Diffusion in Biofluids: Microbeads in Mucus."
Dept of Mathematics.
Tulane University. New Orleans, LA. November 2007.

"Diffusion of Particles in Biofluids."
Random Media Program Opening Workshop.
SAMSI. Durham, NC. September 2007.

"Generalized Langevin Equations and Maximum Likelihood Methods."
Spring Research Conference of IMS/ASA-SPES.
Iowa State University. Ames, IA. May 2007.

"Diffusion Ratchets and Molecular Motors."
Biosystems Modeling Workshop.
SAMSI. Durham, NC. March 2007.

"Beads in Mucus, Generalized Langevin Equations, and State Space Models."
Stochastic Systems and Statistical Inference Minisymposium.
SMB/SIAM Life Sciences. Raleigh, NC. August 2006.

"Beads in Mucus, Generalized Langevin Equations, and State Space Models."
Mathematical Modeling, Analysis and Scientific Computations of
Complex Fluids Minisymposium.
SIAM Annual Meeting. Boston. July 2006.

"Diffusion Ratchets and Molecular Motors."
Brownian Motors and Protein Dynamics Minisymposium.
SIAM Annual Meeting. New Orleans. July 2005.

"Diffusion Ratchets and Molecular Motors."
Workshop on Stochastic Models in Molecular Biology and Systems Biology.
30th Conference on Stochastic Processes and their Applications.
University of California, Santa Barbara. June 2005.

"Diffusion Ratchets and Molecular Motors"
Dept of Statistics.
Pennsylvania State University. University Park, PA. February 2004.

"Diffusion Ratchets and Molecular Motors."
Dept of Statistics.
Iowa State University. Ames, IA. February 2004.

"Diffusion Ratchets and Molecular Motors."
Dept of Mathematics and Statistics.
Boston University. Boston, MA. February 2004.

"Diffusion Ratchets and Molecular Motors."
Dept of Mathematics.
College of William and Mary. Williamsburg, VA. January 2004.

"Diffusion Ratchets and Molecular Motors."
Dept of Mathematical Sciences.
Clemson University. Clemson, SC. January 2004.

**Conference &
Workshop
Participation**

"Detecting Sub-diffusion in Complex Fluids."
Poster Presentation.
Nonlocal Continuum Model Workshop.
SAMSI. Durham, NC. June, 2012.

"Multiple Scales in Molecular Motor Models."
Poster Presentation.
Gordon Research Conference: Stochastic Physics in Biology.
Ventura, CA. January, 2011.

"Stochastic Models of Neck Linker Extension in Kinesin."
Breakout Session Moderator and Poster Presentation.
Frontiers in Mathematical Biology: NSF-NIH Pls Meeting 2010
University of Maryland. College Park, MD. April 2010.

Moderator and Organizing Committee Member.
Workshop on Molecular Motors, Neuron Models, and Epidemics on Networks.
SAMSI. Durham, NC. April 2010.

"Modeling Neck Linker Extensions for Kinesin Molecular Motors."
Invited Panelist and Poster Presentation.
Stochastic Dynamics Program Opening Workshop.
SAMSI. Durham, NC. September 2009.

Participant.
Stochastic Models for Intracellular Reaction Networks Workshop.
Institute for Mathematics and Its Applications.
University of Minnesota. May 2008.

Participant.
Gordon Research Conference of Theoretical Biology and Biomathematics.
Tilton, NH. June 2006.

"ARMA, Generalized Langevin Equations, and Beads in Mucus."
Poster Presentation.
First Young Researchers Workshop.
Mathematical Biosciences Institute.
Ohio State University. April 2005.

"A Numerical Method for Asymptotic Quantities of a
Biomolecular Motor Process with Cargo."
Submitted Presentation.
Society for Mathematical Biology Annual Meeting.
University of Dundee. August 2003.

Participant.
Industrial Math and Stat Modeling Workshop for Graduate Students.
North Carolina State University. July 2003.

**Expository
Presentations &
Outreach**

Stochastic Cell Biology: Molecular Motors I & II.
Escuela de Modelación y Métodos Numéricos 2012.
Summer School on Mathematical Modeling of Biological Systems:
From Molecules to Populations.
CIMAT. Guanajuato, México. June 2012.

Time Series and Stochastic Processes.
Astrostatistics Summer School.
Pennsylvania State University. June 2008.

Time Series I & II.
Astrostatistics Summer School.
Pennsylvania State University. June 2007.

**Intrauniversity
Presentations**

"Simulation Techniques for Generalized Langevin Equations."
Seminar on Probability and its Applications.
Dept of Mathematics.
Pennsylvania State University. University Park, PA. December 2011.

"Bridging Scales in Kinesin Motor Models."
Mathematics in Biology and Geosciences Seminar.
Dept of Mathematics.
Pennsylvania State University. University Park, PA. November 2011.

"Bridging Scales in Kinesin Motor Models."
Center for Cellular Dynamics.
Pennsylvania State University. University Park, PA. March 2011.

“Bridging Scales in Kinesin Motor Models.”
MRSEC Seminar. Dept of Physics.
Pennsylvania State University. University Park, PA. October 2010.

“Beads in Mucus, Generalized Langevin Equations, and State Space Models.”
Dept of Mathematics.
Pennsylvania State University. University Park, PA. April 2008.

“Diffusion in Biofluids: Microbeads in Mucus.”
Dept of Bioengineering.
Pennsylvania State University. University Park, PA. October 2007.

Student Mentoring

Thesis Advisor:

Ivan Simeonov	PhD, Dept of Statistics, PSU. (August 2012) (jointly w. Francesca Chiaromonte) Initial Employment: Travelers Insurance Hartford, CT
John Hughes	MS, Dept of Statistics, PSU. (December 2010) PhD, Dept of Statistics, PSU. (August 2011) (jointly w. Murali Haran) Initial Employment: Asst Prof (tenure-track) Dept of Biostatistics University of Minnesota
Matthew Kutys	MS, Dept of Statistics, PSU. (May 2009) Honors Thesis. BS, Dept of Bioengineering, PSU. (jointly w. William Hancock, May 2009)

Thesis Committee Member:

Zhan Huang	PhD, Dept of Mathematics, PSU.
Lucia Tabacu	PhD, Dept of Statistics, PSU.
Jessica Trail	PhD, Dept of Statistics, PSU.
Guoliang Fang	PhD, Dept of Mathematics, PSU.
Assieh Saadatpour-Moghaddam	PhD, Dept of Mathematics, PSU. (graduated Summer 2012)
Yanping Ma	PhD, Dept of Mathematics, PSU. (graduated Fall 2011)
Chen Shi	PhD, Dept of Entomology, PSU. (graduated Summer 2011)
Maral Amini	PhD, Civil & Environmental Engineering, PSU. (graduated Spring 2011)
Manlin Li	PhD, Dept of Mathematics, PSU. (graduated Spring 2010)
Angela Luis	PhD, Ecology Program, PSU. (graduated Spring 2010)
Van Cyr	PhD, Dept of Mathematics, PSU. (graduated Spring 2010)
Tanya Myers	MS, Civil & Environmental Engineering, PSU. (graduated Spring 2009)
Zhe “Bob” Zhang	PhD, Dept of Statistics, PSU. (graduated Spring 2007)

**Professional
Activities & Service**

Served as Referee:

Journal of Theoretical Biology.	Journal of Statistical Software.
The Astrophysical Journal.	Physical Review E.
Journal of Mathematical Physics.	Applied Mathematics Letters.
Journal of Multivariate Analysis.	Nano Letters.
SIAM Journal for Applied Mathematics.	JASA: Case Studies.
Biophysical Journal.	Biostatistics.
Fluctuation and Noise Letters.	Nature Communications.
Journal of Mathematical Biology	Annals of Applied Statistics

Membership in Professional Societies:

Institute of Mathematical Statistics	2003-present
Society for Industrial and Applied Mathematics	2003-present
Society for Mathematical Biology	2003-present

Service to the Profession:

Minisymposium Organizer.
Minisymposium on Molecular Motors-I & II.
SIAM Conference on Life Sciences/SIAM Annual Meeting 2010.
Pittsburgh, PA.

Member.

Student Paper Award Committee 2010.
ASA Section on Bayesian Statistical Science.

Organizing Committee.

Workshop on Molecular Motors, Neuron Models, and Epidemics on Network.
SAMSI. Durham, NC. April 2010.

Minisymposium Organizer.

Stochastic Dynamical Systems and Statistical Inference in Math. Biology.
SIAM Conference on Life Sciences/SMB joint meeting 2006.
Raleigh, NC.

Departmental Committee Service (Penn State):

Undergraduate Program Committee	2007-2012
(Assistant Chair, 2010-2012 Acting Assistant Chair, 2007-2008)	
Undergraduate Statistics Club	2007-2012
(Faculty Sponsor)	
PhD Exam Committee	2007-2009
(Chair, 2008-2009)	
Graduate Admissions Committee	2006-2008
Colloquium Committee	2006-2010
(Chair, 2006-2007)	
Social Committee	2005-2008
Library Committee	2005-2007
Master's Exam Committee	2005-2006
	2012-present

<i>Interdepartmental Service (Penn State):</i>	
Quantitative Infectious Disease Dynamics Hiring Committee	2009-2010
Joint Committee for Probability (Mathematics and Statistics Depts)	2008-2009
<i>Ad Hoc</i> NIH Training Grant Committee	2008-2009
<i>Ad Hoc</i> Initiative for IBIOS Systems Biology Option	2005-2006

Teaching Activities *Pennsylvania State University:*

Stat/Math 414	Introduction to Probability Theory Spring 2011 (2 sections), Fall 2005
Stat/Math 415	Introduction to Mathematical Statistics Fall 2005
Stat/Math 416	Introduction to Stochastic Models Fall 2012, Spring 2012, Spring 2008, Fall 2007
Stat 463	Applied Time Series Analysis Fall 2007, Fall 2006
Stat 464	Applied Non-parametric Statistics Fall 2008
Stat 496	Independent Studies Fall 2008 w. Kelly Coughlin taught jointly w. Nicola Constanzino Spring 2008 w. Theodore Villacorta
Stat 510	Applied Time Series Analysis Fall 2010, Fall 2009, Fall 2009 (online), Spring 2009, Spring 2007
Stat 513	Statistical Theory I Fall 2012, Fall 2011
Stat 514	Statistical Theory II Spring 2012
Stat 596	Individual Studies Spring 2012, Fall 2011 w. Lucia Tabacu
Stat 597A	Stochastic Dynamics of the Living Cell Spring 2009

University of North Carolina:

Math 10	Algebra Summer 2001, Summer 2000
Math 30	Trigonometry and Analytic Geometry Summer 2002
Stat 31	Introduction to Statistics Summer 2004, Spring 2001

Western Kentucky University:

Math 55	Basic Algebra Spring 1997, Fall 1996
Math 100	Intermediate Algebra Spring 1999, Fall 1998, Spring 1998, Fall 1997

Other Employment & Awards (Pre-PhD)	Graduate Research Assistant. Virtual Lung Project. Dept of Mathematics. University of North Carolina.	August 2003-May 2004
	Graduate Teaching Assistant. Dept of Statistics. University of North Carolina.	August 2000-May 2001, Summer 2004

Instructor.
Summer Bridge Program.
Dept of Mathematics.
University of North Carolina.

Summers of 2000, 2001 and 2002

Graduate Teaching Assistant.
Dept of Mathematics.
Western Kentucky University.

August 1997-May 1999

Instructor.
Community College.
Western Kentucky University.

August 1996-May 1997

Kenan Fellowship.
Graduate School at the University of North Carolina.
Total award amount: \$42,000 plus tuition. Three years of full support.

Landahl Travel Scholarship.
Society of Mathematical Biology. 2003.

Outstanding Graduate Student.
Ogden College of Science. Western Kentucky University. 1999.

Glenn Powers Scholarship.
Dept of Mathematics. Western Kentucky University. 1998.