

Curriculum Vitae

Jay Newby

Assistant Professor
Mathematical and Statistical Sciences
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EDUCATION

PhD in Mathematics · University of Utah · 2010
BS in Mathematics · University of Utah · 2006

PREVIOUS EMPLOYMENT

Research Assistant Professor · University of North Carolina, Chapel Hill · September 2017 - July 2018
Postdoctoral Fellow · University of North Carolina, Chapel Hill · September 2015 - August 2017
Postdoctoral Fellow · Ohio State University · September 2012 - August 2015
Postdoctoral Fellow · University of Oxford · October 2010 - August 2012

AWARDS/FELLOWSHIPS

Isaac Newton Institute visiting fellow · 2016
MBI/NSF Postdoctoral Fellowship · 2012-2015
Oxford (OCCAM) Postdoctoral Fellowship · 2010-2012
Oxford (OCCAM) Visiting Studentship · 2009
IGERT/NSF Graduate Fellowship · 2006-2009

TEACHING EXPERIENCE

Differential Equations · Ohio State · Fall 2013
Mathematical Physiology · Oxford · Spring 2011
Perturbation Methods · Oxford · Fall 2010
Business Calculus · University of Utah · Summer 2010
College Algebra · University of Utah · Spring 2009
Calculus · University of Utah · Fall 2008

LABORATORY EXPERIENCE

Cellular Neuroscience Lab Rotation · Eric Jorgensen Lab, University of Utah · Summer 2007
Lab Assistant · Biochemistry Dept., University of Utah · 2002 - 2006
Lab Assistant · Mario Capecchi Lab, Genetics Dept., University of Utah · 2000 - 2002
Cellular Neuroscience Research · Kendal Broadie Lab, University of Utah · 2000 - 2001

SUBMITTED PAPERS

1. Erin M. Langdon, Therese M. Gerbich, Grace A. McLaughlin, John M. Crutchley, Liam

- Holt, Greg Forest, Jay A. Newby, and Amy S. Gladfelter. *PolyQ-dependent phase separations drive spatial heterogeneity in cytoplasmic crowding*. (Submitted), 2018
2. Keshav B. Patel, Shengtan Mao, M. Gregory Forest, Samuel K. Lai, and Jay M. Newby. *Limited processivity of single motors improves overall transport flux of self-assembled motor-cargo complexes*. (Submitted), 2018
 3. I. Seim, J.A. Cribb, J. Newby, P. Vasquez, M. Lysy, D.B. Hill, M.G. Forest. *Evidence that self-similar microrheology of highly entangled polymeric hydrogels scales robustly with, and is tunable by, polymer concentration*. *J. Rheology*, April 2017

PUBLICATIONS

1. Kelsey Gasior, Jia Zhao, Grace McLaughlin, Greg Forest, Amy S Gladfelter, Jay Newby. *Partial demixing of RNA-protein complexes leads to intra-droplet patterning in phase-separated biological condensates*. (in press, PRE), 2018
2. A. Khan, J. Newby, and A. Gladfelter. *Control of septin filament flexibility and bundling by subunit composition and nucleotide interactions*. *MBoC*, 29:6, 2018
3. J. Newby, A. Schaefer, P. Lee, M. G. Forest, and S. Lai. *Convolutional neural networks automate detection for tracking of submicron scale particles in 2D and 3D*. *PNAS*, 115:36, 2018
4. J. Newby, J. Schiller, T. Wessler, M. G. Forest, and S. Lai. *A blueprint for fast dynamic crosslinking of mobile species in biogels with weak molecular anchors*. *Nature Communications*, 8:833, 2017
5. L. Miao, J. Newby, M. Lin, Z. Lu, F. Xu, W. Kim, M. G. Forest, S. Lai, M. Milowsky, S. Wobker, and L. Huang. *The Binding Site Barrier Elicited by Tumor Associated Fibroblasts Interferes Disposition of Nanoparticles in Stroma-Vessel Type Tumors*. *ACS Nano.*, 10 (10), pp 9243-9258, 2016
6. J. Newby and J. Allard. *First-passage time to clear the way for receptor-ligand binding in a crowded environment*. *Phys. Rev. Lett.*, 116:128101, 2016
7. S. Isaacson, A. Mauro, and J. Newby. *Uniform asymptotic approximation of diffusion to a small target: generalized reaction models*. *Phys. Rev. E*, 2016
8. M. Schwemmer and J. Newby. *Metastable switching in a planar limit cycle system with additive noise*. *Physica D*, 317, pp 15-27, 2016
9. J. Newby. *Bistable switching asymptotics for the self regulating gene*. *J. Phys. A*, 2015
10. J. Newby. *Spontaneous excitability in the Morris–Lecar model with ion channel noise*. *SIAM J. Appl. Dyn. Syst.*, 13:4, pp 1756-1791, 2014
11. J. Newby and M. Schwemmer. *Effects of moderate noise on a limit cycle oscillator: Counterrotation and bistability*. *Phys. Rev. Lett.*, 112:114101, 2014
12. J. Newby, P. C. Bressloff, and J. P. Keener. *Breakdown of fast-slow analysis in an excitable system with channel noise*. *Phys. Rev. Lett.*, 111:128121, 2013

13. J. Newby and J. Chapman. *Metastable behavior in Markov processes with internal states*. *J. Math. Biol.*, 2013
14. S. Isaacson and J. Newby. *Uniform asymptotic approximation of the first passage time density for diffusion to a small spherical trap within a bounded domain*. *Phys. Rev. E*, 88:012820, 2013
15. P. C. Bressloff and J. Newby. *Stochastic models of intracellular transport*. *Rev. Mod. Phys.*, 85:135-196, 2013
16. P. C. Bressloff and J. Newby. *Metastability in a stochastic neural network modeled as a velocity jump Markov process*. *SIAM J. Appl. Dyn. Syst.*, 12:1394-1435, 2013
17. P. C. Bressloff and J. Newby. *Stochastic hybrid model of spontaneous dendritic NMDA spikes*. *Physical Biol.*, 11:-16006, 2013
18. J. Newby. *Isolating intrinsic noise sources in a stochastic genetic switch*. *Physical Biol.*, 9:026002, 2012
19. P. C. Bressloff and J. Newby. *Filling of a Poisson trap by a population of random intermittent searchers*. *Phys. Rev. E*, 85:031909, 2012
20. L. Y. Ming, J. Newby, and P. C. Bressloff. *Effects of demographic noise on the synchronization of a metapopulation in a fluctuating environment*. *Phys. Rev. Lett.*, 107:118102, 2011
21. J. P. Keener and J. Newby. *Perturbation analysis of spontaneous action potential initiation by stochastic ion channels*. *Phys. Rev. E*, 84:011918, 2011
22. J. Newby and J. P. Keener. *An asymptotic analysis of the spatially-inhomogeneous velocity-jump process*. *Multiscale Model. Simul.*, 9:735-765, 2011
23. P. C. Bressloff and J. Newby. *Quasi-steady state analysis of two-dimensional random intermittent search processes*. *Phys. Rev. E*, 83:061139, 2011
24. J. Newby and P. C. Bressloff. *Local synaptic signalling enhances the stochastic transport of motor-driven cargo in neurons*. *Phys. Biol.*, 7:036004, 2010
25. J. Newby and P. C. Bressloff. *Random intermittent search and the Tug-of-war model of motor-driven transport*. *J. Stat. Mech.*, 4:04014, 2010
26. J. Newby and P. C. Bressloff. *Quasi-steady state reduction of molecular motor-based models of directed intermittent search*. *Bull. Math. Biol.*, 72:1840-1866, 2010
27. J. Newby and P. C. Bressloff. *Directed intermittent search for a hidden target on a dendritic tree*. *Phys. Rev. E*, 80(2):021913, 2009

INVITED TALKS

- *McGill Physiology Seminar*
Montreal, Canada

12 October 2018

- ▶ *Yale Statistics & Data Science Colloquium*
New Haven, USA 12 February 2018
- ▶ *U. of Alberta Mathematics Colloquium*
Edmonton, Canada 5 February 2018
- ▶ *U. of British Columbia Mathematics Colloquium*
Vancouver, Canada 1 February 2018
- ▶ *Harvard Widely Applied Math Seminar*
Cambridge, USA 21 September 2017
- ▶ *Arizona State Statistics Seminar*
Phoenix, USA 10 February 2017
- ▶ *UNC Chapel Hill Probability Seminar*
Chapel Hill, USA 3 November 2016
- ▶ *UNC Chapel Hill Applied Math Seminar*
Chapel Hill, USA 7 October 2016
- ▶ *U. of Washington Applied Math Colloquium*
Seattle, USA 19 January 2016
- ▶ *U. of Notre Dame Applied Math Colloquium*
Notre Dame, USA 1 December 2015
- ▶ *UC Irvine Math Biology Seminar*
Irvine, USA 1 June 2015
- ▶ *U. of Texas at Austin Joint Math/Neuro Colloquium*
Austin, USA 29 January 2015
- ▶ *Duke University Probability Seminar*
Durham, USA 2 October 2014
- ▶ *U. of Wisconsin Probability Seminar*
Madison, USA 2 February 2014
- ▶ *Northwestern Applied Math Colloquium*
Chicago, USA 9 December 2013
- ▶ *RPI Math Colloquium*
Troy, USA 14 November 2013
- ▶ *U. of Delaware Math Colloquium*
Delaware, USA 1 October 2013

INVITED CONFERENCE TALKS

- ▶ *Stochastic Perturbations of Dynamical Systems*
A conference in honor of Alexander Wentzell and his work
New Orleans, USA 5 October 2017
- ▶ *Isaac Newton Institute Workshop*
Stochastic Dynamical Systems in Biology
Cambridge, UK 5 April 2016
- ▶ *Multiscale transport of particles*
Vienna, Austria 14 September 2015
- ▶ *Search and Exploration*
Cargèse, France 3 June 2013
- ▶ *MBI Cellular Neuroscience Workshop*
Columbus, USA 8 April 2013
- ▶ *Mathematical Modeling in Cell Biology*
Lyon, France 25 March 2013
- ▶ *Stochastic Phenomena in Physical and Biological Systems*
Mallorca, Spain 28 May 2012
- ▶ *Search and Exploration*
Cargèse, France 25 May 2011

EVENT ORGANIZATION

- ▶ *Axonal transport and neuronal mechanics*
Columbus, USA 3 November 2014
- ▶ *Workshop for young researchers in mathematical biology*
Columbus, USA 25 August 2014

CURRENT GRANT AWARDS

1. *Collaborative Research: Computational Modeling of How Living Cells Utilize Liquid-Liquid Phase Separation to Organize Chemical Compartments*
Primary Investigator: Greg Forest
Co-Investigators: Jay Newby and Kelsey Gaisor
Project Location: University of North Carolina at Chapel Hill
Source of Support: NSF-DMS
Total Award Amount: \$555,886
Total Award Period: 36 months
2. *Collaborative Research: Spatial stochastic rare events by asymptotics and weighted ensemble sampling to understand how cells make space*

Primary Investigator: Elizabeth Read
Co-Investigators: Jun Allard and Jay Newby
Project Location: University of California-Irvine
Source of Support: NSF-DMS
Total Award Amount: \$369,293
Total Award Period: 36 months

3. *Artificial neural networks for high performance, fully automated particle tracking analysis even at low signal-to-noise regimes*

Primary Investigator: Sam Lai
Co-Investigators: Greg Forest and Jay Newby
Project Location: University of North Carolina at Chapel Hill
Source of Support: NIH
Total Award Amount: \$210,278
Total Award Period: 12 months