

# Curriculum Vitae

## Alexandra Jilkine

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CONTACT INFORMATION      University of Arizona  
Molecular and Cellular Biology  
1007 E Lowell St, LSS 527  
Tucson, AZ 85721  
E-mail: jilkine@email.arizona.edu

CITIZENSHIP:              Canadian

RESEARCH INTERESTS      Applied Mathematics, Mathematical Cell Biology, Nonlinear Dynamics, Pattern Formation, Systems Biology

EDUCATION                **University of British Columbia**, Vancouver, BC, Canada

Ph.D. Applied Mathematics, (December 2009)

- Thesis Title: A Wave-Pinning Mechanism for Eukaryotic Cell Polarization Based on Rho GTPase Dynamics.
- Advisor: Leah Edelstein-Keshet

**University of British Columbia**, Vancouver, BC, Canada

M.Sc. Applied Mathematics, (November 2005)

- Thesis Title: Mathematical Study of Rho GTPases in Motile Cells.
- Advisor: Leah Edelstein-Keshet

**University of Manitoba**, Winnipeg, MB, Canada

B.Sc.(Honors) Mathematics, (2003)

RESEARCH EXPERIENCE

**Postdoctoral Research Associate**

- University of Arizona, Molecular and Cellular Biology, July 2011-present.
- Mentor: Ryan Gutenkunst

**Postdoctoral Fellow**

- University of Texas Southwestern Medical Center, Green Center for Systems Biology and Department of Pharmacology, January 2010-June 2011.
- Mentors: Steven Altschuler and Lani Wu

**Research Apprenticeship Program**

- University of Washington Friday Harbor Laboratories (Course on Gene Network Dynamics and Cellular Behavior), Fall 2005.
- Mentors: E. Munro, G. von Dassow and G. Odell

**Undergraduate Summer Research Assistant**

- University of Manitoba (Mathematical Modelling of Infectious Diseases), Summer 2002, 2003.
- Mentor: A. Gumel

### Undergraduate Research Assistant

- University of Manitoba (Mass Spectrometry Laboratory), Summer 2000, 2001.
- Mentors: W. Ens and K. Standing

### AWARDS

- NSERC Postdoctoral Fellowship, 2010–2011.
- NSERC Alexander Graham Bell Canada Graduate Scholarship, 2007–2009.
- Graduate Entrance Scholarship, University of British Columbia, 2003.
- NSERC Undergraduate Summer Research Award, 2003.
- NSERC Undergraduate Summer Research Award, 2002.
- Bernice Warkov Safer Prize for Excellence in Mathematical Sciences, University of Manitoba, 2002.
- Bernard Noonan Memorial Prize, University of Manitoba, Dept. of Mathematics, 2002.
- Agnes Stewart Hart Award, University of Manitoba Dept. of Mathematics, 2001.

### PUBLICATIONS

Houk, A.R., **Jilkine, A.**, Mejean, C.O., Boltyskiy, R., Dufresne, E.R., Angenent, S.B., Altschuler, S.J. Wu, L.F. and Weiner, O.D. *Mechanical tension maintains cell polarity by spatially restricting signals during neutrophil migration*. Cell, Accepted.

**Jilkine, A.**, Angenent, S. B., Wu, L.F. and Altschuler, S.J. (2011) *A density-dependent switch drives stochastic clustering and polarization of signaling molecules*; PLoS Comput Biol, Accepted.

Mori, Y., **Jilkine, A.**, Edelstein-Keshet, L. (2011) *Asymptotic and bifurcation analysis of a wave-based pattern formation mechanism in a model of cell polarization*. Siam J Appl Math. 71(4):1401-1427

**Jilkine, A.**, Edelstein-Keshet, L. (2011) *A Comparison of mathematical models for polarization of single eukaryotic cells in response to guided cues*. PLoS Comput Biol, 7: e1001121.

Mori, Y., **Jilkine, A.**, Edelstein-Keshet, L. (2008) *Wave-pinning and cell polarity from a bistable reaction-diffusion system*. Biophys J 94(9): 3684-3697

**Jilkine, A.**, Maree, A.F., Edelstein-Keshet, L. (2007) *Mathematical model for spatial segregation of the Rho-family GTPases based on inhibitory crosstalk*. Bull Math Biol. 69(6):1943-78.

Maree, A.F.M., **Jilkine, A.**, Dawes, A.T., Grieneisen, V.A., Edelstein-Keshet, L. (2006) *Polarization and movement of keratocytes: a multiscale modelling approach*. Bull Math Biol, 68(5):1169-1211.

Griffin, T.J., Gygi, S.P., Rist, B., Aebersold, R., Loboda, A., **Jilkine, A.**, Ens, W., Standing, K.G. (2001) *Quantitative proteomic analysis using a MALDI quadrupole time-of-flight mass spectrometer*. Anal Chem, 73(5):978-86.

Lee, C.H., McComb, M.E., Bromirski, M., **Jilkine, A.**, Ens, W., Standing, K.G., Perreault, H. (2001) *On-membrane digestion of beta-casein for determination of phosphorylation sites by matrix-assisted laser desorption/ionization quadrupole/time-of-flight mass spectrometry*. Rapid Commun Mass Spectrom, 15(3):191-202.

TEACHING  
EXPERIENCE

**University of Arizona**

- Taught a graduate mini-course in Mathematics Department on "Cell Polarity and Directional Sensing" in Fall 2011.

**University of Texas Southwestern Medical Center**

- Teaching Assistant, Quantitative Biology Graduate Course, 2011.
- Teaching Assistant, Systems Biology Journal Club, 2010.

**University of British Columbia**

- Teaching Assistant, PIMS IGTC Graduate Summer School in Mathematical Biology, Summer 2008.
- Teaching Assistant, Introduction to Mathematical Biology, Fall 2006.
- Instructor, Calculus for Life Sciences, 2004.
- Teaching Assistant, Multivariable Calculus, 2003.

**University of Manitoba**

- Teaching Assistant, Calculus, Linear Algebra, (2002-2003)

CONFERENCE  
PRESENTATIONS

**Invited Talks**

*Mathematical Modelling of Cell Polarization: Theory and Experiments.*

- Mechanics of Cell Motility mini-workshop. Oberwolfach, Germany. August 2010.

**Contributed Talks (Refereed)**

*A density-dependent switch for controlling the onset of stochastic cell polarization and formation of signalling clusters.*

- q-Bio conference on Cellular Information Processing. Santa Fe, NM. August 2011.

*A density-dependent switch for controlling the onset of stochastic cell polarization and formation of signalling clusters.*

- ICIAM 2011. Vancouver, BC. July 2011.

*Asymptotic and Bifurcation Analysis of a Wave-Pinning Mechanism in a Model of Cell Polarization.*

- Society of Mathematical Biology Annual Conference. Vancouver, BC. July 2009.

**Poster Presentations**

- Gordon Research Conference on Stochastic Physics in Biology. Ventura, CA. January 2011.
- OCCAM Conference on Multi-Scale Modelling in Biology. Oxford, UK. June 2010.
- Mathematical Biosciences Institute Workshop on Dynamics of Signal Transduction and of Gene-Protein Regulatory Networks. Columbus, OH. November 2009.
- MITACS Annual Conference. Fredericton, NB, Canada. June 2009.
- Mathematical Biosciences Institute Workshop on Cell and Tissue Movement. Columbus, OH. September 2008.
- European Conference on Mathematical and Theoretical Biology. Edinburgh, UK. July 2008.

- Gordon Research Conference on Theoretical Biology and Biomathematics. Lucca, Italy. June 2008.
- MITACS/CAIMS Joint Annual Conference. Montreal, QC, Canada. June 2008.
- Gordon Research Conference on Gradient Sensing and Directed Cell Migration. January 2007.
- Second Annual Meeting of the National Centers for Systems Biology: Predictive Models of Complex Systems. June 2006. Friday Harbor, WA.
- CAIMS-MITACS 2006 Joint Annual Conference. York, ON, Canada. June 2006.

OTHER TALKS  
(NON-REFEREED)

*Mathematical Modelling of Cell Polarization: Theory and Experiments.*

- University of Arizona. January 2010.

*Mathematical model for cell polarity: understanding the role of Rho GTPases in motile cells*

- University of Texas Southwestern Medical Center, June 2009.
- University of Minnesota. July 2009.

*Wave-pinning and cell polarity mechanism from a bistable reaction-diffusion system.*

- PIMS International Graduate Training Centre Mathematical Biology Summit. September 2007.
- Aspen Center for Physics Workshop on Cytoskeletal Assembly and Cellular Motility. Aspen, CO. May 2007.

*Mathematical model of cell polarization based on inhibitory crosstalk of Rho GTPases.*

- University of British Columbia/ Simon Fraser University Biophysics retreat. October 2006.

*Cytoskeletal dynamics during cleavage of the *C. elegans* embryo.*

- UBC Mathematical Biology Seminar. January 2006.

WORKSHOPS AND  
SUMMER SCHOOLS

- Oberwolfach Mini-workshop on Mechanics of Cell Motility. Speaker. Oberwolfach, Germany. August 2010.
- Mathematical Biosciences Institute Workshop on Dynamics of Signal Transduction and of Gene-Protein Regulatory Networks. Poster presenter. Columbus, OH. November 2-6, 2009.
- Mathematical Biosciences Institute Workshop on Cell and Tissue Movement. Poster presenter. Columbus, OH. September 15-19, 2008.
- 97th International Titisee Conference on Mechanisms of Cell Polarity. Participant. Titisee, Germany. March 12-16, 2008.
- PIMS International Graduate Training Centre Mathematical Biology Summit. Speaker. Vancouver, BC, Canada. September 28-30, 2007.
- Aspen Center for Physics Workshop on Cytoskeletal Assembly and Cellular Motility. Speaker. Aspen, CO. May 28-June 10, 2007.
- Frontiers in Biophysics: Modelling and Experiment. Loon Lake, BC. Oct. 13-15, 2006.
- Banff International Research Station workshop on Mathematical Biology of the Cell: Cytoskeleton and Motility. Poster Presenter. Banff, AB, Canada. July 16 -July 21, 2005.

- Institute for Advanced Study / Park City Mathematics Institute Graduate Summer School in Mathematical Biology. Participant. Park City, UT. June 26 -July 16, 2005.
- Summer School on Systems Biology Dynamics: from Genes to Organisms. Center for Nonlinear Dynamics, McGill University. Participant. Montreal, QC/ June 2004.
- PIMS Mathematical Biology Summer Workshop for undergraduate students. Participant. University of Alberta, May 2002.

#### SERVICE TO THE COMMUNITY

Reviewed papers for Biophysical Journal, Molecular Biology of the Cell, Cell (joint with S. Altschuler), Science (joint with S. Altschuler).

MITACS Student Advisory Committee B.C. representative, 2008-2009.

- organizing activities for the MITACS student council, designing and giving presentations about MITACS opportunities for graduate students, designing and printing promotional material for the student sessions at the MITACS annual conference, contributing to the MITACS student newsletter.

Volunteer, Society of Mathematical Biology Annual Meeting, Vancouver, B.C., July 2009.

Volunteer, MathMania, (2006, 2007, 2008)

- Outreach event for elementary school children.

Marker, Euclid Mathematics Contest, (2007, 2008).

Co-organizer, Frontiers in Biophysics: Modelling and Experiment, October 2006.

Society Membership: Society for Mathematical Biology (SMB), Biophysical Society, Society for Industrial and Applied Mathematics (SIAM).

#### REFERENCES

- Prof. Ryan Gutenkunst, Molecular and Cellular Biology, University of Arizona, Tucson, AZ 85721
- Prof. Steven Altschuler and Prof. Lani Wu, Department of Pharmacology, University of Texas Southwestern Medical Center, Dallas, TX 75390
- Prof. Orion Weiner, Department of Biochemistry, University of California, San Francisco, 94158-9001
- Prof. Leah Edelstein-Keshet, Department of Mathematics, University of British Columbia, Vancouver, BC V6T 1Z2
- Prof. Eric Cytrynbaum, Department of Mathematics, University of British Columbia, Vancouver, BC V6T 1Z2