

## CURRICULUM VITAE

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### 1 Education

**Ph.D.**, Appl. Math., Univ. of British Columbia, Vancouver, Canada, 1995

**Ph.D.**, Physics, USSR Academy of Sciences, Sverdlovsk, USSR, 1990

**M.Eng.**, Engineering Physics, Ural Polytech. Inst., Sverdlovsk, USSR, 1985

### 2 Positions

**2002-present:** University of California, Davis, USA:

Professor of Mathematics and Neurobiology.

**1999-2002:** University of California, Davis, USA:

Associate Professor of Mathematics.

**1996-1999:** University of California, Davis, USA:

Assistant Professor of Mathematics.

**1995-96:** University of California, Berkeley, USA:

Research Fellow, Program in Mathematics and Molecular Biology.

**1992-95:** University of British Columbia, Vancouver, Canada:

Teaching and research assistant, Department of Mathematics.

**1990-92:** University of Manitoba, Winnipeg, Canada:

Research Associate, Department of Physics.

**1985-90:** Institute for Metal Physics of the USSR Academy of Sciences:

Researcher, Department of Mathematical and Theoretical Physics.

### 3 Visiting positions

**2004** (April - July): Isaak Newton Institute for Mathematical Sciences, University of Cambridge, England: Visiting Professor.

**2001** (September - November): Isaak Newton Institute for Mathematical Sciences, University of Cambridge, England: Visiting Professor.

**2000** (January - March): University of Utah, Salt Lake City, USA: Visiting Professor, Department of Mathematics.

## 4 Awards, fellowships, grants

Current:

NIH RO1 grant NIGMS GM068952 ‘Modeling mitotic spindle assembly’. PI, 2007-2012.

NSF Grant No. DMS 0715729 ‘Mechanochemical Regulation of the Motile Cell Shape’. PI, 2007-2010.

NIH GLUE grant NIGMS U54 GM64346 ‘Cell Migration Consortium’. Co-PI, 2006-2011.

Past:

NIH RO1 grant NIGMS GM068952-01 ‘Dynamics of Mitotic Spindle Morphogenesis’. PI, 2003-2007.

NSF Grants No. DMS 9707750, 1097749, 0315782 on mathematical models of cellular movements. PI, 1997-2006.

NIH GLUE grant ‘Cell Migration Consortium’. Co-PI, 2001-2006.

Chancellor’s Fellowship, University of California, Davis, 2000-2005.

Fellowship in Mathematics and Molecular Biology, University of California, Berkeley, 1995-96.

Excellence in Teaching Award, University of British Columbia, 1995.

## 5 Conferences

### 5.1 Recent invited talks at the conferences

1. International conference “Common trends in traffic systems: Physical and Computational Models in Transportation Engineering and Biological Sciences” (February 7 - 10, 2006, IIT Kanpur, India).

Invited Lecture: Biophysics of the Mitotic Spindle.

2. International Systems Neurobiology Spring School (March 16 - 18, 2006, Nara, Japan).

Invited Lecture: Ratchet models in biology.

3. International Workshop “Physics of Biological Systems” (June 19 - 25, 2006, Dresden, Germany).

Invited Lecture: A Spatially Regulated Change in Microtubule Dynamics at Anaphase B onset in *Drosophila* Mitotic Spindles.

4. Annual Meeting of Biophysical Society (March 3-6, 2007, Baltimore).

Invited Lecture: How keratocytes crawl.

5. Morphogenesis and Regenerative Medicine Symposium (May 23-25, 2007, Charlottesville, VA).

Invited Lecture: Reverse Engineering of Mitotic Spindle.

6. International Workshop in Physics of Biological Matter (2-7 September, 2007, Safed, Israel).

Invited Lecture: Biophysics of motile cell shape.

7. Workshop ‘Frontiers in Cell Migration; from mechanism to disease’ (16-18 September 2008, Bethesda).

Invited Lecture: Biophysics of motile cell shape.

## 5.2 Recent organized courses, sessions and conferences; series of lectures and mini-courses

1. Lecturer at winter school on “Cell Motility” at National Center for Theoretical Sciences, Hsinchu (Jan 11-14, 2006)
2. Lecturer at summer school on “Computational Biology” at Instituto Gulbenkian de Cincia, Lisbon (June 26-30, 2006)
3. Lecturer at summer school on “Mathematics in Molecular Cell Biology” at RICAM, Linz, Austria (September 18-23, 2006)
4. Lecturer at summer school on “Bio-Systems” at Beijing (September 25-30, 2006)
5. Lecturer at spring school on I2CAM - FAPERJ biophysics school at Rio de Janeiro (March 17-21, 2008)
6. Organizer of the international workshop “Quantitative approaches to cell migration and chemotaxis” at IMA, Minneapolis (May 26-30, 2008).
7. Lecturer at PIMS summer school on mathematical biology at UBC, Vancouver (June 3-10, 2008)
8. Organizer of the session at the Gordon Research Conference “Quantitative approaches to mitosis” at Il Ciocco, Italy (June 22-27, 2008).
9. Organizer of the international meeting “Computational cell biology” at Cold Spring Harbor (March 24-27, 2009).

## 6 Professional activities

- Chair of NIH panel “Modeling and Analysis of Biological Systems”.
- Associate Editor, Bulletin of Mathematical Biology.
- Editorial Board Member, Biophysical Journal.
- Editorial Board Member, Cell.

## Publication List

- [1] A.Mogilner, On weakly bound states of several quasi-particles in a three-dimensional crystal, *Soviet Journal of Low Temperature Physics*, **14**: 536-538 (1988).
- [2] R.A.Minlos, A.Mogilner, On the bound states of two weakly interacting quasi-particles with a strongly degenerated dispersion relation, *Soviet Journal of Low Temperature Physics*, **14**: 592-594 (1988).
- [3] A.Mogilner, Magnon bound states in an easy-axis Heisenberg ferromagnet of arbitrary dimensionality: Relation to magnetic solitons, *Soviet Journal of Experimental and Theoretical Physics*, **69**: 1033-1037 (1989).
- [4] A.Khaitov, A.Mogilner, Bound states of two electrons and a magnon in SD Model, *Soviet Physics Doklady*, **34**: 886-887 (1989).
- [5] A.Mogilner, M.H.Shermatov, Binding of two fermions with the third different particle by a point-like interaction, *Physics Letters A* **149**: 398-400 (1990).
- [6] A.I.Artemjev, A.Mogilner, Bound states and scattering of two quasi-particles with a linear dispersion law, *Physics Letters A* **152**: 477-480 (1991).
- [7] A.N.Melnikov, A.Mogilner, A generalization of Iorrio-O'Carrol theorem to the case of lattice Hamiltonian, *Journal of Physica A* **24**: 3671-3676 (1991).
- [8] A.Mogilner, Hamiltonians in solid state physics as multiparticle discrete Schrodinger operators: Problems and results, *Advances in Soviet Mathematics*, **5**: 139-194 (1991).
- [9] A.Mogilner, P.D.Loly, Vanishing gaps in 1D bandstructures, *Journal of Physics A* **25**: L855-L860 (1992).
- [10] A.Mogilner, J.A.Tuszynski, Analytical solutions to classical nonlinear wave equations and their quantum meaning, *Nuovo Cimento B* **108**: 1159-1170 (1993).
- [11] A.Mogilner, L.Edelstein-Keshet, Selecting a common direction. I. How orientational order can arise from simple contact responses between interacting cells, *Journal of Mathematical Biology*, **33**: 619-660 (1995).
- [12] A.Mogilner, L.Edelstein-Keshet, G.B.Ermentrout, Selecting a common direction. II. Peak-like solutions representing total alignment of cell clusters, *Journal of Mathematical Biology*, **34**: 811-842 (1996).
- [13] A.Mogilner, L.Edelstein-Keshet, Spatio-angular order in populations of self-aligning objects: formation of oriented patches, *Physica D*, **89**: 346-367 (1996).

- [14] A. Mogilner, G.Oster, Cell motility driven by actin polymerization, *Biophysical Journal*, **71**: 3030-3045 (1996).
- [15] A. Mogilner, G.Oster, The physics of lamellipodial protrusion, *European Biophysics Journal*, **25**: 47-53 (1996).
- [16] H.-Y. Wang, T. Elston, A. Mogilner, G.Oster, Force generation in RNA Polymerase, *Biophysical Journal*, **74**: 1186-1202 (1998).
- [17] A.Mogilner, M.Mangel, R.J.Baskin, Motion of molecular motor ratcheted by internal fluctuations and protein friction, *Physics Letters A* **237**: 297-306 (1998).
- [18] E. Geigant, K. Ladizhansky, A. Mogilner, An integro-differential model for orientational distribution of F-actin in cells, *SIAM Journal of Applied Mathematics*, **59**: 787-809 (1998).
- [19] A. Mogilner, G.Oster, The polymerization ratchet model explains the force-velocity relation for growing microtubules, *European Biophysics Journal*, **28**: 235-242 (1999).
- [20] A.Mogilner, L.Edelstein-Keshet, A non-local model for a swarm, *Journal of Mathematical Biology*, **38**: 534-570 (1999).
- [21] C. Lee, M. F. Hoopes, J. Diehl, W. Gilliland, G. Huxel, E. Liever, K. McCann, J. Umbanhowar, A. Mogilner, Nonlocal concepts and models in biology, *Journal of Theoretical Biology*, **210**: 201-219 (2001).
- [22] A. Mogilner, A. J. Fisher, R. J. Baskin, Structural changes in the neck linker of kinesin explain the load dependence of the motor's mechanical cycle, *Journal of Theoretical Biology*, **211**: 143-157 (2001).
- [23] O. Igoshin, A. Mogilner, R. Welch, D. Kaiser, G. Oster, Pattern formation and traveling waves in myxobacteria: Theory and modeling. *Proc. Nat. Acad. Sci. USA*, **98**: 14913-14918 (2001).
- [24] A. Mogilner, T. Elston, H.-Y. Wang, G. Oster, Molecular motors: Theory, in *Joel Keizer's Computational Cell Biology*, C. P. Fall, E. Marland, J. Tyson and J. Wagner, Eds., pp. 321-355, Springer, N.Y. (2002).
- [25] A. Mogilner, T. Elston, H.-Y. Wang, G. Oster, Molecular motors: Examples, in *Joel Keizer's Computational Cell Biology*, C. P. Fall, E. Marland, J. Tyson and J. Wagner, Eds., pp. 356-380, Springer, N.Y. (2002).
- [26] D. Bottino, A. Mogilner, T. Roberts, M. Stewart, G. Oster, How nematode sperm crawl. *J. Cell Science*, **115**: 367-384 (2002).
- [27] A. Mogilner, L. Edelstein-Keshet, Regulation of Actin Dynamics in Rapidly Moving Cells: A Quantitative Analysis. *Biophys. J.*, **83**: 1237-1258 (2002).

- [28] J. M. Scholey and A. Mogilner, Mitotic Spindle Motors, in *Molecular Motors*, pp. 327-355. M. Schliwa, Ed., Wiley-VCH (2002).
- [29] A. Mogilner, D. Verzi, A Simple 1-D Physical Model for the Crawling Nematode Sperm Cell. *J. Stat. Phys.*, **110**: 1169-1189 (2003).
- [30] E. Cytrynbaum, J. Scholey, A. Mogilner, A force balance model of early spindle pole separation in Drosophila Embryos. *Biophys. J.*, **84**: 757-769 (2003).
- [31] A. Mogilner, G. Oster, Force generation by actin polymerization II: The elastic ratchet and tethered filaments. *Biophys. J.*, **84**: 1591-1605 (2003).
- [32] J. M. Scholey, I. Brust-Mascher, A. Mogilner, Cell division. *Nature*, **422**: 746-752 (2003).
- [33] M. Luca, A. Chavez-Ross, L. Edelstein-Keshet, A. Mogilner, Chemotactic signaling, microglia, and Alzheimer's disease senile plaques: is there a connection? *Bull. Math. Biol.*, **65**: 693-730 (2003).
- [34] A. Mogilner, L. Edelstein-Keshet, L. Bent, A. Spiros, Mutual interactions, potentials, and individual distance in a social aggregation. *J. Math. Biol.*, **47**: 353-389 (2003).
- [35] A. Mogilner, G. Oster, Polymer Motors: Pushing out the Front and Pulling up the Back. *Curr. Biol.*, **13**: R721-R733 (2003).
- [36] H. P. Grimm, A. B. Verkhovskiy, A. Mogilner, J.-J. Meister, Analysis of Actin Dynamics at the Leading Edge of Crawling Cells: Implications for the Shape of Keratocyte Lamellipodia. *Eur. Biophys. J.*, **32**: 563-577 (2003).
- [37] A. Mogilner, G. Oster, Shrinking Gels Pull Cells. *Science*, **302**: 1340-1341 (2003).
- [38] B. C. Mazzag, I. B. Zhulin, A. Mogilner, Model of bacterial band formation in aerotaxis. *Biophys. J.*, **85**: 3558-3574 (2003).
- [39] C. Wolgemuth, A. Mogilner, G. Oster, The hydration dynamics of polyelectrolyte gels with applications to drug delivery and cell motility. *Eur. Biophys. J.*, **33**: 146-158 (2004).
- [40] E. Cytrynbaum, V. Rodionov, A. Mogilner, Computational model of dynein-dependent self-organization of microtubule asters. *J. Cell Sci.*, **117**: 1381-1397 (2004).
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- [43] G. Civelekoglu-Scholey, A. Wayne Orr, I. Novak, J.-J. Meister, M.A. Schwartz, A. Mogilner, Model of Coupled Transient Changes of Rac, Rho, Adhesions and Stress Fibers Alignment in Endothelial Cells Responding to Shear Stress, *J. Theor. Biol.*, **232**: 569-585 (2005).
- [44] B. Rubinstein, K. Jacobson, A. Mogilner, Multiscale Two-Dimensional Modeling of a Motile Simple-Shaped Cell. *SIAM J. MMS*, **3**: 413-439 (2005).
- [45] R. Wollman, E. N. Cytrynbaum, J. T. Jones, T. Meyer, J.M. Scholey, A. Mogilner, Efficient chromosome capture requires a bias in the "Search-and-Capture" process during mitotic spindle assembly. *Curr. Biol.*, **15**: 828-832 (2005).
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- [47] E. N. Cytrynbaum, P. Sommi, I. Brust-Mascher, J.M. Scholey, A. Mogilner, Early Spindle Assembly in Drosophila Embryos: Role of a Force-balance Involving Cytoskeletal Dynamics and Nuclear Mechanics, *Mol. Biol. Cell*, **16**: 4967-4981 (2005).
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- [53] A. Gallegos, B. Mazzag, A. Mogilner, Two continuum models for the spreading of myxobacteria swarms, *Bull. Math. Biol.*, **68**:837-861 (2006).
- [54] M. Karakozova, M. Kozak, C. C. L. Wong, A. Bailey, A. Mogilner, J. Yates, A. Kashina, Arginylation of beta actin regulates actin cytoskeleton and cell motility, *Science*, **313**: 192-196 (2006).

- [55] E. Cytrynbaum, V. Rodionov, A. Mogilner, Nonlocal mechanism of self-organization and centering of microtubule asters, *Bull. Math. Biol.*, **68**: 10531072 (2006).
- [56] A. Mogilner, R. Wollman, W. Marshall, Quantitative modeling in cell biology: what is it good for?, *Dev. Cell*, **11**: 279-287 (2006).
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- [61] D. K. Cheerambathur, G. Civelekoglu-Scholey, I. Brust-Mascher, P. Sommi, A. Mogilner, J. M. Scholey, Quantitative analysis of an anaphase B switch: predicted role for a microtubule catastrophe gradient. *J. Cell Biol.*, **177**: 995-1004 (2007).
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- [78] A. Mogilner and B. Rubinstein, Actin disassembly ‘clock’ and membrane tension determine cell shape and turning: mathematical model, *J Phys: Cond Matter*, In Press