

## **Wendy W. Zhang**

University of Chicago

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### **Research Interests**

fluid dynamics, soft condensed matter, nonlinear dynamics, biologically inspired physics

### **Employment**

Associate Professor, Physics Department & James Franck Institute The University of Chicago	2009 – present
Assistant Professor, Physics Department & James Franck Institute The University of Chicago	2003 – 2009
Postdoctoral Fellow, Center for Nonlinear Dynamics The University of Texas at Austin	2002 – 2003
Postdoctoral Fellow, James Franck Institute The University of Chicago	2001 – 2002

### **Education**

Ph.D., Harvard University, Engineering Sciences	2001
Thesis: Singularities in free surface flows. (Advisor: H. A. Stone)	
Part III Mathematics (M.Sc. equivalent), with Distinction	1997
Cambridge University, Department of Applied Mathematics & Theoretical Physics	
Honors A.B., magna cum laude, Phi Beta Kappa, Harvard University, Physics	1995

### **Honors & Awards**

A. P. Sloan Foundation Fellowship	2006
NSF Mathematical Sciences Postdoctoral Research Fellowship	2001 – 2003
Harvard Graduate School of Arts & Sciences Merit Fellowship	2000 – 2001
National Science Foundation Graduate Fellowship	1997 – 2000
Herschel Smith Harvard Fellowship	1996 – 1997

### **Teaching**

Physics 197: Statistical Mechanics (undergraduate)  
Physics 330: Mathematical Methods of Physics (graduate)  
Physics 260: Fluid Dynamics (undergraduate elective)  
Physics 185: Intermediate Mechanics (undergraduate)  
Physics 429: Nonlinear Dynamics (graduate elective)  
Physics 316: Classical Mechanics (graduate)  
Physics 426: Topics in Fluid Dynamics (graduate elective)

### **Ph.D. Students**

• Marko Kleine Berkenbusch (co-adviser: Leo P. Kadanoff) Ph.D.	2005
Current position: Renaissance Technologies	

Thesis: Liquid interfaces in viscous straining flows  
• Laura E. Schmidt Ph.D. 2008

Thesis: Azimuthal asymmetries and vibrational modes in bubble pinch-off  
Current position: postdoc. (Physics of Fluids group, D. Lohse, U. Twente Netherlands)  
• Robert D. Schroll Ph.D. 2009

Thesis: Solid substrate and head-on impact of viscous drops  
Current position: postdoc. (B. Davidovich, U. Mass Amherst)

• Lipeng Lai 2008 - present  
• Dan Herbst 2008 – present

### **Undergraduate Thesis Projects**

• Samuel Oberdick “Interference & neck vibrations” 2008 - present  
• Marguerite Brown “Knudsen flow effects in drop impact” 2008 – present

### **Postdoctoral Fellows**

• Francois Blanchette 2004 – 2006  
Current position: Assistant Professor, School of Natural Sciences, UC Merced

• Margo Levine 2007 – 2008  
Current position: researcher, Radiology University of Chicago Hospitals

• Konstantine Turitsyn 2008 – 2009

Kadanoff-Rice MRSEC Postdoctoral Scholar

Ph.D. Landau Institute for Theoretical Physics

Current position: Assistant Professor, Mechanical Engineering, M.I. T.

### **Peer-Reviewed Publications**

• “Asymmetric disconnection of an underwater air bubble: Persistent neck vibrations evolve into a smooth contact”, K. S. Turitsyn, L. Lai & W. W. Zhang, *Phys. Rev. Lett.* **103**, 124501 (2009).

• “Selective withdrawal in liquids of uneven viscosities”  
F. Blanchette & W. W. Zhang, *Phys. Rev. Lett.* **102** 144501 (2009).

• “Memory-encoding vibrations in a disconnecting air bubble”  
L. E. Schmidt, N. C. Keim, W. W. Zhang and S. R. Nagel, *Nature Phys.* **5** 343-346 (2009).

• “Laser microfluidics: fluid actuation by light”  
J. P. Delville, M. R. de Saint Vincent, R. D. Schroll, H. Chraïbi, B. Issenmann, R. Wunenburger, D. Lasseux, W. W. Zhang & E. Brasselet  
*J. Opt. A: Pure Appl. Opt.* **11** 034015 (2009).

• “Liquid interfaces in viscous straining flows: numerical studies of the selective withdrawal transition”  
M. Kleine Berkenbusch, I. Cohen & W. W. Zhang, *J. Fluid Mech.*, **613** 171-203 (2008).

• “Bridging dielectric by light: a ray optics approach”  
R. D. Schroll, E. Brasselet, W. W. Zhang, J. P. Delville,  
*Eur. Phys. J. E–Soft Matter*, **26** 405-409 (2008).

• “Viscous withdrawal of miscible liquid layers”  
L. E. Schmidt and W. W. Zhang, *Phys. Rev. Lett.*, **100** 044502 (2008).

- “Liquid Transport Due to Light Scattering”  
R. D. Schroll, R. Wunenburger, A. Casner, W. W. Zhang, & J. P. Delville,  
*Phys. Rev. Lett.*, **98** 133601 (2007).
- “Breakup of Air Bubbles in Water: Memory and Breakdown of Cylindrical Symmetry”  
N. C. Keim, P. Moller, W. W. Zhang & S. R. Nagel,  
*Phys. Rev. Lett.*, **97** 144503 (2006).
- Reply on “Drop Splashing on a Dry Smooth Surface”  
L. Xu, W. W. Zhang & S. R. Nagel, *Phys. Rev. Lett.*, **96** 179402 (2006).
- “Balance of Actively Generated Contractile and Resistive Forces Controls Cytokinesis Dynamics”  
W. W. Zhang & D. R. Robinson, *Proc. Natl. Acad. Sci. USA*, **102** 7186-7191 (2005).
- “Drop Splashing on a Dry Smooth Surface”  
L. Xu, W. W. Zhang & S. R. Nagel, *Phys. Rev. Lett.*, **94** 184505 (2005).
- “Viscous Entrainment from a Nozzle: Singular Liquid Spouts”  
W. W. Zhang, *Phys. Rev. Lett.*, **93** 184502 (2004).
- “Persistence of Memory in Drop Breakup: The Breakdown of Universality”  
P. Doshi, I. Cohen, W. W. Zhang, P. Howell, M. Siegel, O. A. Basaran, & S. R. Nagel,  
*Science*, **302** 1185-1188 (2003).
- “Shake-Gels: Shear-Induced Gelation of Laponite-PEO Mixtures”  
J. Zebrowski, V. Prasad, W. W. Zhang, L. M. Walker & D. A. Weitz,  
*Colloid & Surface Sci. A*, **213** 189-197 (2003).
- “Pressure-Driven Laminar Flow in Tangential Microchannels: an Elastomeric Microfluidic Switch.”  
R. F. Ismagilov, D. Rosmarin, P. J. A. Kenis, W. W. Zhang, H. A. Stone,  
& G. M. Whitesides, *Anal. Chem.* **73** (19) 4682-4687 (2001).
- “Similarity Solutions for Capillary Pinch-off in Fluids of Differing Viscosity.”  
W. W. Zhang & J. R. Lister, *Phys. Rev. Lett.* **83** (6) 1151-1154 (1999).
- “Similarity Solutions for Film Rupture on a Plate.”  
W. W. Zhang & J. R. Lister, *Phys. Fluids* **11** (9) 2454-2462 (1999).
- “Oscillatory Motions of Circular Disks and Near-Spheres in Viscous Flow.”  
W. W. Zhang & H. A. Stone, *J. Fluid Mech.* **367** 329-358 (1998).
- “Mass Transfer at a Microelectrode in Channel Flow.”  
W. W. Zhang, H. A. Stone & J. D. Sherwood,  
*J. Phys. Chem.* **100** (22) 9462-9464 (1996).

### **Papers in Preparation**

- “Impact of a viscous liquid drop”  
R. D. Schroll, C. Josserand, S. Zaleski & W. W. Zhang, submitted to *Phys. Rev. Lett.*  
(arXiv: 0904.0483v1)

### **Conference Proceedings**

- “Memory-encoding shape vibrations in a disconnecting air bubble”  
W. W. Zhang, Proc. XXII International Congress of Theoretical and Applied Mechanics (IUTAM) Adelaide, Australia (2008)
- “Memory and the break-down of cylindrical symmetry in bubble break-up”  
L. E. Schmidt, N. Keim, S. R. Nagel and W. W. Zhang, Proc. Euromech 493 on Interface

dynamics, stability & fragmentation, E. Villiermaux (ed.) Grenoble, France (2007)

•“Liquid Interfaces in Viscous Straining Flows: Numerical Studies of the Selective Withdrawal Transition”

M. Kleine Berkenbusch, I. Cohen & W. W. Zhang, Proc. IUTAM Symp. Interactions for Dispersed Systems in Newtonian and Viscoelastic Fluid, Guanajuato MX G. H. Homsy & R. Zenit (ed.) (2006).

•“A Long-Wavelength Model of Viscous Entrainment”

W. W. Zhang, Proc. XXI International Congress of Theoretical and Applied Mechanics (IUTAM) Warsaw Poland (2004)

•“Similarity Solutions for Capillary Pinch-off in Viscous Fluids.”

J. R. Lister & W. W. Zhang, Proc. IUTAM Symp. Nonlinear wave behaviour in multiphase flow, Notre Dame 1999 H. C. Chang (ed.), Kluwer (2000)

## **Service**

•Member of APS-Division of Fluid Dynamics Prize Committee 2009-2011

•Member-at-large, APS-GSNP

Topical Group on Statistical & Nonlinear Physics 2009-2012

•Physics Department advisor (Luce Fellowship for women in science) 2009–present

•Co-Organizer of Workshop on “Geometrical singularities and singular geometries” with L. Mahadevan (main organizer), Ed Spiegel & Tom Witten

Institute for Mathematics and Its Applications, University of Minnesota, MN

(<http://www.ima.umn.edu/200-2008/SP7.14-25.08>) July 2008

•Co-Organizer of the Computations in Science seminar at the University of Chicago.

([http://mrsec.uchicago.edu/Comp in Sci/schedule.html](http://mrsec.uchicago.edu/Comp%20in%20Sci/schedule.html)) 2003 – present

•Organizer of the Jets, Shocks & Splashes Focus Session (DFD & GSNP)

APS March Meeting March 2006

•Acrivos Dissertation Award Committee,

Division of Fluid Dynamics, APS 2006-2008

•Co-Organizer of Workshop on “Focusing Stresses in a Soft Interface”

with Thomas A. Witten, Ka Yee Lee, & Sidney R. Nagel, Chicago IL

(<http://panza.uchicago.edu/focusing05/>) November 2005

•Member of the University of Chicago Physics Department Research Experiences for Undergraduates (REU) 2003-2006

•Referee for Analytical Chemistry, American Journal of Physics, Journal of Fluid Mechanics, Langmuir, Nature, Nature Physics, Physics of Fluids, Physica D, Physical Review Letters, Physical Review E, and SIAM J. Applied Mathematics.

## **Selected Invited Talks**

•Condensed Matter Physics Seminar, UIUC October 2009

•Complex & Biophysics Seminar, University of Michigan at Ann Arbor September 2009

•Thin-films flow meeting, Euromech 493, Edinburgh July 2009

•Physics Department Colloquia, University of Chicago April 2009

•Invited Colloquia, APS March meeting March 2009

•Courant Applied Math Lab Seminar March 2009

•Cornell LASSP (Laboratory of Atomic & Solid State Physics) seminar February 2009

•Winter Statistical Physics Meeting (Taxco, MX) January 2009

- Invited symposia, American Geophysical Union (AGU) meeting December 2008
- Harvard Applied Mechanics Seminar December 2008
- Invited symposia, Division of Fluid Dynamics (APS) Fall Meeting November 2008
- Stony Brook University Physics Colloquim October 2008
- UCLA Mechanical Engineering / Applied Math Seminar October 2008
- IUTAM conference (Adelaide, Australia) August 2008
- IMA workshop on geometric singularities & singular geometries July 2008
- Caltech Mechanical Engineering Department May 2008
- Thayer School of Engineering at Dartmouth
- Jones Lecture on Science, Technology & Society March 2008
- Yale undergraduate women in physics conference February 2008
- Euromech 493 Colloquia on “Interface Dynamics, Stability and Fragmentation”  
Grenoble France August 2007
- Yale University, Physics Colloquim February 2007
- University of Chicago, Physics Colloquim October 2006
- University of Arizona, Applied Mathematics Colloquim September 2006
- Northwestern University September 2006  
Engineering Science & Applied Mathematics Seminar
- Public Lecture at Boulder Summer School on Physics of Soft Matter July 2006
- University of Illinois at Urbana-Champaign June 2006  
Mechanical Engineering Seminar
- Workshop in the “Microfluidic Flows in Nature and Microfluidic Technologies” series  
“Cells and Materials: At the Interface between Mathematics, Biology and Engineering”  
Institute for Pure and Applied Mathematics, UCLA, CA April 2006
- “Interactions for Dispersed Systems in Newtonian & Viscoelastic Fluids”  
Symposium IUTAM, Guana juato, Mexico March 2006
- APS March Meeting, Focus Session on “Soft Interfaces” March 2006
- Applied Mathematics Seminar, Columbia University March 2006  
Dynamics Days Conference Bethesda, MD January 2006
- University of Illinois at Urbana-Champaign September 2005  
Applied/Interdisciplinary Mathematics Seminar
- Los Alamos National Lab August 2005  
Center for Nonlinear Sciences (CNLS) colloquim
- Universit´e Bordeaux I, France July 2005  
Centre de Physique Moleculaire Optique et Hertzienne (CPMOH)
- New Jersey Institute of Technology  
Frontiers in Applied & Computational Mathematics (FACM’05) May 2005
- Banff International Research Station for Mathematical Innovation & Discovery (BIRS)  
Workshop on Analysis, Computations and Experiments on Pinch-off in Liquid Jets  
Alberta, Canada March 2005
- APS March Meeting March 2004  
Sheets, Spouts, Jets: Small-scale structures Invited Colloquia
- University of California at Santa Barbara  
Department of Mechanical & Environmental Engineering May 2004
- Harvard University, Applied Mechanics Colloquim May 2004
- Ecole Sup´erieure de Physique et de Chimie Industrielles, France May 2004

Laboratoire de Physique et Mécanique des Milieux Hétérogènes

- Universités d'Aix-Marseille I et II, France May 2004
- Institute de Recherche sur les Phénomènes Hors Equilibre (IRPHE)
- Cornell University, Theoretical & Applied Mechanics Seminar April 2004
- Georgia Institute of Technology, Center for Nonlinear Science February 2004
- Fields Institute for Research in Mathematical Sciences November 2003
- Workshop on Pattern in Physics, Toronto Canada
- Université Pierre & Marie Curie, Paris France, LMM group fluids seminar June 2003
- Université Paris VII, Paris France June 2003
- Geophysical Institute (IPGP) Physics of Natural Systems Seminar
- Johns Hopkins University Mechanical Engineering Thermo-Fluids Talk April 2003
- University of Delaware Applied Mathematics Seminar March 2003
- University of Texas at Austin Chemical Engineering Fluids Seminar March 2003
- University of Twente, Netherlands, Physics Department Colloquium February 2003
- University of Texas at Austin Nonlinear Dynamics Seminar January 2003
- Museum of Science & Industry brownbag seminar, Chicago IL October 2002
- Purdue University Chemical Engineering seminar May 2002
- Duke University Mathematics Seminar February 2002
- Northwestern University Interdisciplinary Nonlinear Science Seminar January 2002
- Courant Institute New York University, Applied Math Lab Seminar November 2001
- University of Pennsylvania Condensed Matter Seminar March 2001
- University of Twente, Netherlands, Fluid Dynamics Group Seminar February 2001
- Massachusetts Institute of Technology Physical Mathematics Seminar March 1998
- Cambridge University DAMTP Continuum Mechanics Seminar October 1996
- Massachusetts Institute of Technology Physical Mathematics Seminar May 1996

### **Selected Contributed Talks**

- APS March Meeting, Pittsburgh, PA March 2009
- Dynamics Days, San Diego, CA January 2009
- APS Division of Fluid Dynamics Annual Meeting, San Antonio, TX November 2008
- APS Division of Fluid Dynamics Annual Meeting, Salt Lake City, UT November 2007
- APS Division of Fluid Dynamics Annual Meeting, Tampa FL November 2006
- APS Division of Fluid Dynamics Annual Meeting, Chicago IL November 2005
- Frontiers in Research Lecture Series, MRSEC REU program, Chicago IL August 2005
- SIAM Conference on Applications of Dynamical Systems, Snowbird, UT May 2005
- Scaling, Self-similarity and Shocks Symposium
- APS Division of Fluid Dynamics Meeting, Seattle WA November 2004
- International Congress of Theoretical & Applied Mechanics, Poland August 2004
- APS Division of Fluid Dynamics Meeting, Meadowlands NJ November 2003
- APS Division of Fluid Dynamics Annual Meeting, Dallas TX November 2002
- SIAM Materials Meeting Mini-Symposium, Philadelphia PA July 2002
- APS Division of Fluid Dynamics Annual Meeting, San Diego, CA November 2001
- American Institute of Chemical Engineers Annual Meeting, Reno, NV November 2001
- APS Division of Fluid Dynamics Annual Meeting, Washington D.C. November 2000
- APS Division of Fluid Dynamics Annual Meeting, New Orleans, LA November 1999