

Sean Sun

Work Address

Department of Mechanical Engineering
105 Latrobe Hall
3400 North Charles St.
Baltimore, MD 21218
410-516-4003
ssun@jhu.edu

Home Address

222 East Saratoga Street
Apt. 410
Baltimore, MD 21202

Education

- 1998, Ph.D. in theoretical chemistry from The University of California, Berkeley. Thesis adviser: Professor William H. Miller.
- 1994, B.S. chemistry and B.S. physics with honors from The Pennsylvania State University.

Professional Experience

- 2005-present. Assistant professor, Department of Chemical and Biomolecular Engineering, Johns Hopkins University.
- 2003-present. Assistant professor, Department of Mechanical Engineering, Johns Hopkins University.
- 2003-present. Assistant professor, Whitaker Biomedical Engineering Institute, Johns Hopkins University.
- 2001-2002. Post-doctoral researcher, Department of Molecular and Cellular Biology, UC Berkeley. Advisor: George Oster.
- 1999-2001 Post-doctoral researcher, Department of Chemistry, UC Berkeley. Advisor: David Chandler.
- 1994-1998. Ph.D. student, Department of Chemistry, UC Berkeley. Advisor: Bill Miller.

Awards

- 2006-2011. NSF CAREER Award.
- 1994. Honorable mention, National Science Foundation Graduate Research Fellowship.
- 1991-1994. Eberly College of Science Scholar at the Pennsylvania State University.
- 1990-1994. University Scholar at the Pennsylvania State University.

Presentations

- Department of Chemistry Colloquium, Johns Hopkins. 9/2005. (Invited)
- SIAM National Meeting, New Orleans. 7/2005. (Invited)
- Statistical Mechanics Meeting, Rutgers University. 5/2005. (Contributed)
- AMOLF Institute, Amsterdam, Netherlands. 5/2005. (2 Invited presentations)
- University van Amsterdam, Amsterdam, Netherlands, 5/2005. (Invited)
- University of North Carolina, Chapel Hill. 1/2005. (Invited)
- Single Molecule Biophysics Conference, Aspen, Colorado. 1/2005. (Contributed)
- Los Alamos Laboratory. 11/2004. (Invited)
- Department of Chemistry, University of Wisconsin, Madison. 9/2004. (Invited)

- Gordon Research Conference on Mathematical Biology, 6/2004, (Invited)
- Department of Mechanical Engineering, JHU, 4/2004. (Invited)
- Department of Biomedical Engineering, JHU, 3/2004. (Invited)
- Department of physics, University of Connecticut, 2/2004. (Invited)
- IPST, University of Maryland, 10/2003. (Invited)
- FOM Institute for Atomic and Molecular Physics, Amsterdam, 7/2003. (Invited)
- New Orleans, 2003. ACS National Meeting. (Contributed)
- Department of Mechanical Engineering, Johns Hopkins University, 2002. (Invited)
- Department of Chemistry, Harvard University, 2002. (Invited)
- Department of Chemistry, New York University, 2001. (Invited)
- Department of Chemistry, University of Notre Dame, 2001. (Invited)
- Department of Chemistry, University of Illinois Urbana-Champaign, 1998. (Invited)

Professional Activity

- NSF NIRT Panelist, 2/2005.
- Session Chair, ACS National Meeting, 10/2003.
- Journal reviewer for Biophysical Journal, Journal of Theoretical Biology, Journal of Physical Chemistry, Journal of Chemical Physics, Physical Review Letters, PNAS, Royal Society Insight Journal.

Teaching Experience

- **Fall 2005** Continuum Mechanics. Graduate Level, Mechanical Engineering.
- **Spring 2005** Biomechanics of the Cell and Organisms. Advanced Undergraduate Level. Mechanical Engineering.
- **Fall 2004** Foundations of Computational Biology and Bioinformatics I: Subcellular Phenomena and Statistical Mechanics. Graduate Level. Department of Biomedical Engineering
- **Fall 2003** Statistical Mechanics with Biological Applications. Graduate Level. Department of Mechanical Engineering.

Publication List: In Chronological Order

1. X. Sun and W. H. Miller, "Mixed Semiclassical-classical approaches to the Dynamics of Complex Molecular Systems", *J. Chem. Phys.* **106**, 916 (1997).
2. X. Sun and W.H. Miller, "Semiclassical Initial Value Representation for Electronically Nonadiabatic Molecular Dynamics", *J. Chem. Phys.* **106**, 6346 (1997).
3. X. Sun and W.H. Miller, "Semiclassical Initial Value Representation for Rotational Degrees of Freedom: the Tunneling dynamics of HCl Dimer", *J. Chem. Phys.* **108**, 8870 (1998).
4. H. Wang, X. Sun and W.H. Miller, "Semiclassical Approximations for the Calculation of Thermal Rate Constants", *J. Chem. Phys.* **108**, 9726 (1998).
5. X. Sun, H. Wang and W.H. Miller, "On the Semiclassical Description of Quantum Coherence in Thermal Rate Constants", *J. Chem. Phys.* **109**, 4190 (1998).
6. X. Sun, H. Wang and W.H. Miller, "Semiclassical Theory of Electronically Nonadiabatic Dynamics: Results of a Linearized Approximation to the Initial Value Representation", *J. Chem. Phys.* **109**, 7064 (1998).

7. X. Sun and W.H. Miller, "Forward-Backward Initial Value Representation for Semiclassical Time Correlation Functions", *J. Chem. Phys.* **110**, 6635 (1999).
8. S. X. Sun, "Semiclassical Approximations to Real Time Quantum Mechanical effects in Correlation Functions of Complex Molecular Systems", *J. Chem. Phys.* **112**, 8241 (2000)
9. S. X. Sun, "A Weighted Density Functional Theory of the Solvophobic Effect", *Phys. Rev. E* **64**, 21512 (2001).
10. P. R. ten Wolde, S. X. Sun and D. Chandler, "Model of a Fluid at Small and Large Lengthscales and the Hydrophobic Effect", *Phys. Rev. E* **65**, 011201 (2001).
11. S. X. Sun and W.H. Miller, "Statistical Sampling of Semiclassical Distributions: Calculating Quantum Mechanical Effects Using Metropolis Monte Carlo" *J. Chem. Phys.* **117**, 5522 (2002).
12. S. X. Sun, D. Chandler, A.R. Dinner and G. F. Oster, "Elastic Energy Storage in β -sheets with application to F₁-ATPase" *Euro. Biophys. J.*, **32**, 676 (2003).
13. S. X. Sun, "Equilibrium Free Energies From Path Sampling of Non-equilibrium Trajectories" *J. Chem. Phys.*, **118**, 5769 (2003).
14. J. C. Liao, S. X. Sun, D. Chandler and G. F. Oster, "Conformational States of ATP:MG in Water" *Euro. Biophys. J.* **34**, 29 (2004).
15. S. X. Sun, H. Wang and G. F. Oster, "Asymmetry in the F₁-ATPase and Its Implications for the Rotational Cycle" *Biophys. J.*, **86**, 1373 (2004).
16. E. Atilgan and S. X. Sun, "Equilibrium Free Energy Estimates Based on Non-equilibrium Work Relations and Extended Dynamics." *J. Chem. Phys.*, **121**, 10392 (2004).
17. G. Lan and S. X. Sun, "Dynamics of Myosin-V Processivity." *Biophys. J.*, **88** 999-1008 (2005).
18. G. Lan and S. X. Sun, "Dynamics of Myosin Driven Skeletal Muscle Contraction I: Steady State Force Generation." *Biophys. J.* **88**, 4107-4117 (2005).
19. S. Choe and S. X. Sun, "The Elasticity of α -helices." *J. Chem. Phys.* **122**, 244912 (2005).
20. E. Atilgan, D. Wirtz and S. X. Sun, "Morphology of the Lamellipodium and the Organization of Actin Associated Proteins at the Leading Edge of Crawling Cells", *Biophys. J.*, **89**, 3589-3602 (2005).
21. E. Atilgan, D. Wirtz and S. X. Sun, "Mechanics and Dynamics of Actin-Driven Thin Membrane Protrusions." *Biophys. J.*, in press (2005).
22. S. X. Sun and D. Wirtz, "Mechanics of HIV-virus Entry into Host Cells." *Biophys. J. Biophys. Lett.* in press.
23. G. Lan and S. X. Sun, "Dynamics of Myosin Driven Skeletal Muscle Contraction II: Transient Behavior and Mechanical Efficiency." in review.
24. A. J. Tanskanen, J. L. Greenstein, S. X. Sun and R. L. Winslow, "Molecular Model of Calcium Induced Calcium Release in Cardiac Myocytes." in review.
25. A. Celedon, K. T. Ramesh and S. X. Sun, "Structure and Topology of Model Chromatin Fibers without Linker Histone H1." in review.
26. M. I. Chang, W. Zhou, P. Panorchan, Y. Tseng, S. X. Sun, R. F. Siliciano and D. Wirtz., "Functional Analysis of Individual Bonds Between a Single Virus Particle and Its Host Before Infection." in review.
27. C. Wolgemuth and S. X. Sun, "The Elasticity of α -helical Coiled-coils." in review.
28. E. Atilgan and S. X. Sun, "Statistical Thermodynamics of Proteins Catalyzed Vesicle Fusion and Fission." in review.
29. S. X. Sun, "Path Summation Formulation of the Master Equation." in review.

Current Support

- PI. Whitaker Biomedical Engineering Institute Leadership Award, 2003-2006. \$220,000.
- PI. National Science Foundation, “Molecular Origins of Biological Force Generation” 2005-2006. \$98,000.
- PI. National Institute of Health, “Bacterial Cell Division and the Dynamics of the Z-ring,” 2005-2010. \$1.55M.
- PI. National Science Foundation, ”Mechanics of Transcription Regulation,” 2005-2007. \$180,000.

References

- Prof. George Oster
Department of molecular cellular biology
UC Berkeley. goster@nature.berkeley.edu.
510-642-5277
- Prof. Arup K. Chakraborty
Department of chemical engineering
MIT. arupc@mit.edu.
617-253-3890
- Prof. William H. Miller
Department of chemistry
UC Berkeley. miller@cchem.berkeley.edu.
510-642-0653
- Prof. Denis Wirtz
Department of chemical engineering
Johns Hopkins Univ. wirtz@jhu.edu.
410-516-7006