

Bo Sun

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Education & Career

2013 - present Department of Physics, Oregon State University

Assistant Professor

2011 – 2013, Princeton University.

Postdoc Associate, Advisor: Howard Stone, Department of Aerospace & Mechanical Engineering

Robert Austin, Department of Physics

2009 - 2010, Department of Physics, New York University.

Ph.D. Thesis: Non-conservative Optical Forces and Brownian Vortexes

Thesis advisor: David G. Grier

2006 - 2009, Department of Physics, New York University.

M.A. Thesis: Theory of Holographic Optical Tweezers

2003 – 2006, Institute of Theoretical Physics, Chinese Academy of Science.

Research Area: String Theory

1999 – 2003, Department of Physics, Tsinghua University, Beijing, China

B.S. Thesis: Curved Space-time Quantum Field Theory and Black Hole Thermodynamics

Honors:

2010 Chinese Government Award for Self-Financing Students Abroad

2007 -- 2010 Kessler Fellowship, New York University

2006 – 2007 MacCracken Fellowship, New York University

2005 Liu Yong Ling Scholarship, Chinese Academy of Science

2004 ITP Excellence Performance Scholarship, Chinese Academy of Science

2003 Ye Qi Sun Scholarship, Tsinghua University

2003 Excellence in Undergraduate Study, Tsinghua University

2000 Yang Zhen Bang Scholarship, Tsinghua University

1999-2002 University Fellowship, Tsinghua University

Professional Activity:

- Associate Editor, Open Journal of Biophysics
- Referee, Optical Express, Applied Optics, Optics Letters
- Referee, International Symposium on Optical Engineering and Photonic Technology: OEPT 2009

Publication:

- The network characteristics of collective chemosensing, B. Sun, G. Duclos and H. A. Stone, *Phys. Rev. Lett*, 110, 158103 (2013)
- Minimization of thermodynamic costs in cancer cell invasion, L. Liu*, G. Duclos*, B. Sun*, J. Lee, A. Wu, Y. Kam, E. D. Sontag, H. A. Stone, J. C. Sturm, R. A. Gatenby and R. H. Austin, *Proceedings of the National Academy of Science* 110(5), 1686-1691 (2013).
- Spatial-temporal dynamics of collective chemosensing, B. Sun, J. Lembong, V. Normand, M. Rogers and H. A. Stone, *Proceedings of the National Academy of Sciences* 109 (20) , 7759-7764 (2012) .
 - ※ Highlighted from the cover of PNAS.
 - ※ Also commented in the same issue of PNAS.
- Simultaneous imaging of multiple focal planes for three-dimensional microscopy using ultra-high-speed adaptive optics, M. Duocastella, B. Sun, C.B. Arnold, *Journal of Biomedical Optics*, 17, 050505 (2012)
- Probing the invasiveness of prostate cancer cells in a 3D microfabricated landscape, L. Liu, B. Sun, J. Pedersen, Koh-Meng, R. H. Getzenberg, H. A. Stone, and R. H. Austin, *Proceedings of the National Academy of Sciences* 108 (17) , 6853-6856 (2011).
 - ※ Highlighted from the cover of PNAS.
- A minimal model for Brownian vortexes, B. Sun, D. G. Grier and A. Y. Grosberg, *Physical Review E* **82**, 021123 (2010)
- Flow visualization and flow cytometry with holographic video microscopy, F. C. Cheong, B. Sun, R. Dreyfus, Amato-Grill, K. Xiao, L. Dixon and D. G. Grier, *Optics Express* 17, 13071-13079 (2009).
 - ※ Selected for inaugural issue of the OSA's Spotlight on Optics.
 - ※ Reprinted in *Virtual Journal of Biomedical Optics*.
- Brownian Vortexes, B. Sun, J. Lin, E. Darby, A. Y. Grosberg and D. G. Grier, *Physical Review E*, 80, 010401(R) (2009),

- ※ Highlighted in Nature News & Views, *Nature* 461, 1226 (2009).
- ※ Reprinted in *Virtual Journal of Biological Physics Research*
- ※ Selected for Kaleidoscope image by *Physical Review E*

- Comment: The effect of Mie resonances on trapping in optical tweezers, B. Sun and D. G. Grier, *Optics Express* 17, 2657-2660 (2009)
 - ※ Reprinted in *Virtual Journal of Biomedical Optics*.

- Theory of holographic optical trapping, B. Sun, Y. Roichman and D. G. Grier, *Optics Express* 16, 15765-15776 (2008)
 - ※ Reprinted in *Virtual Journal of Biomedical Optics*.

- Influence of non-conservative optical forces on the dynamics of optically trapped colloidal spheres: The fountain of probability, Y. Roichman, B. Sun, A. Stolarski and D. G. Grier, *Physical Review Letters*, 101, 0128301(2008)
 - ※ Reprinted in *Virtual Journal of Biological Physics Research*

- Optical forces arising from phase gradients, Y. Roichman, B. Sun, Y. Roichman, J. Amato-Grill and D. G. Grier, *Physical Review Letters*, 100, 013602 (2008)
 - ※ Reviewed in Nature Physics Research Highlights, *Nature Physics* 4, 87 (2008)
 - ※ Reprinted in *Virtual Journal of Biological Physics Research*

- Note on DBI Dynamics of Dbrane Near NS5-Branes. Bin Chen, Bo Sun *Phys. Rev. D*, 72, 046005 (2005).

- Dbrane Near NS5-Branes: With Electromagnetic Field. Bin Chen, Miao Li, Bo Sun, *JHEP*, 0412, 057 (2004).

Books:

Non-conservative Optical Force and Brownian Vortexes, Bo Sun and David Grier, VDM Verlag Dr. Müller (September 12, 2011)

Conference Proceedings:

- Flow Visualization and Flow Cytometry with Holographic Video Microscopy, F. C. Cheong, B. Sun, R. Dreyfus, Amato-Grill, K. Xiao, L. Dixon and D. G. Grier, *SPIE Proceedings*, 7619 (2010)

- Non-conservative Forces in Optical Tweezers and Brownian Vortexes, B. Sun, A. Y. Grosberg and D. G. Grier, *SPIE Proceedings*, 7613 (2010)

- Optical Forces arising From Phase Gradients D. G. Grier, B. Sun, F. C. Cheong, Y. Roichman, S. H. Lee, Y. Roichman, J. Amato-Grill *SPIE Proceedings*, 7227 (2009)

Presentations & Seminars:

- Oregon State University (2013), “Driving the self-organization of cellular system: The Physics of mechano-chemical signaling”
- Willamette University (2013), “On the self-organization in collective chemosensing”
- Institute of Physics, Chinese Academy of Sciences (2013), “On the self-organization in collective chemosensing”
- Beijing Computational Science Research Center (2013), “On the self-organization in collective chemosensing”
- Annual Meeting for Physical Sciences and Oncology Centers 2011, “Evolutionary Game Theory of a 3-D Cancer Model”
- SPIE Photonic West 2010, “Non-conservative Forces in Optical Tweezers and Brownian Vortexes”
- Frontiers of Optics (2009), “Brownian Vortexes Induced by Optical Tweezers”
- March Meeting of American Physical Society (2009), “Complex Stochastic Behavior Induced by Optical Tweezers.”
- Conference on Advances in Microfluidics and Nanofluidics 2009, *invited talk*, “Complex Stochastic Behavior Induced by Optical Tweezers.”
- March Meeting of American Physical Society (2008), “Non-conservative Optical Forces: The Fountain of Probability.”
- Frontiers of Optics (2008), “Vectorial Theory of Holographic Optical Trapping.”

Patents:

- System for applying optical forces from phase gradients, United States Patent 8174742

Professional Affiliations:

- American Physical Society, from 2008

Major Research Areas:

- Collective Chemosensing by Mammalian Cells
- Force Generation During Wound Healing and Cancer Invasion
- Social Behavior and Self-organization of Multicellular Systems
- Optical Manipulations Using Holographic Optical Tweezers
- Non-equilibrium Stochastic Dynamics