

Curriculum Vitae: Ching-Hwa Kiang

Associate Professor

Department of Physics & Astronomy
and Department of Bioengineering

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Education

Ph.D., California Institute of Technology.

B.S., National Taiwan University.

Research Interests

Single molecule manipulation of biological molecules. Nanobiology. Mechanobiology. DNA melting and overstretching transitions. DNA-nanoparticle interactions. Physics of cancer. Nonequilibrium work theorem and its application to biological systems. Single-walled carbon nanotubes, carbon nanoribbons, and graphene.

Honors and Awards

Fellow, American Physical Society, 2010.

Researcher of the Year, *Small Times* **Best of Small Tech Award**, 2007.

Summary of Publications and Presentations

(Total citations: over 10,000)

(**H** index: 27)

Total:

53 papers, 120 invited talks, 9 conference proceedings, 19 technical presentations, 6 poster presentations, 25 student oral presentations, 22 student poster presentations, 3 patents, and 19 grants and contracts.

Professional Experience

Associate Professor, Physics & Astronomy, Rice University, 2011–present.

Associate Professor, Bioengineering, Rice University, 2011–present.

Assistant Professor, Physics & Astronomy, Rice University, 2002–2011.

Assistant Professor, Bioengineering, Rice University, 2002–2011.

Adjunct Assistant Professor, Department of Medicine, Baylor College of Medicine, 2008–2011.

Assistant Research Physicist, Physics & Astronomy, UCLA, 2000–2002.

Visiting Assistant Professor, Chemistry & Biochemistry, UCLA, 1996–2000.

Postdoctoral Associate, Physics, MIT, 1995–1996.

Visiting Scientist, IBM Almaden Research Center, 1992–1995.

Research Assistant, Institute of Atomic and Molecular Sciences, Academia Sinica, Taipei, Taiwan, ROC, 1987–1988.

Visiting Appointment

Visiting Associate, California Institute of Technology, Pasadena, CA, July–December 2011.

Summary of Research Accomplishments

Determination of activation mechanism of von Willebrand Factor (a blood protein).
Application of experimental single-molecule manipulation to biomedical systems.
Experimental reconstruction of free energy surfaces using Jarzynski's equality.
Experimental determination of phase transition in DNA-gold nanoparticle systems.
Discovery of single-walled carbon nanotubes.

Selected Publications

1. J. Li, S. S. Wijeratne, X. Qiu, and C.-H. Kiang “DNA under Force: Mechanics, Electrostatics, and Hydration,” *Frontiers in Nucleic Acid Nanotechnology*, special issue in *Nanomaterials*, **5**, 246–267 (2015).
2. E. W. Frey, J. Li, S. S. Wijeratne, and C.-H. Kiang, “Reconstructing Multiple Free Energy Pathways of DNA Stretching from Single Molecule Experiments,” *J. Phys. Chem. B*, **119** 5132–5135 (2015).
3. S. S. Wijeratne, E. Botello, H.-C. Yeh, Z. Zhou, A. Bergeron, E. W. Frey, J. M. Patel, L. Nolasco, N. Turner, J. Moake, J.-f. Dong, and C.-H. Kiang, “Mechanical Activation of a Multimeric Adhesive Protein Through Domain Conformational Change,” *Phys. Rev. Lett.*, **110** (2013) 108102.
4. W.-H. Chen, J. D. Wilson, S. S. Wijeratne, S. A. Southmayd, K.-J. Lin, and C.-H. Kiang, “Principles of Single-Molecule Manipulation and Its Application in Biological Physics,” *invited review article, International Journal of Modern Physics B*, **26** (2012) 1230006.
5. W.-S. Chen, W.-H. Chen, Z. Chen, A. A. Gooding, K.-J. Lin, and C.-H. Kiang, “Direct Observation of Multiple Pathways of Single-Stranded DNA Stretching,” *Phys. Rev. Lett.* **105** (2010) 218104 [20 citations].
6. S. S. Wijeratne, N. C. Harris, and C.-H. Kiang, “Helicity Distributions of Single-Walled Carbon Nanotubes and Its Implication on the Growth Mechanism,” *Materials* **3** (2010) 2725–2734.
7. E. Botello, N. C. Harris, J. Sargent, W.-H. Chen, K.-J. Lin, and C.-H. Kiang, “Temperature and Chemical Denaturant Dependence of Forced-Unfolding of Titin I27,” *J. Phys. Chem. B* **113** (2009) 10549–11047. Also appears on the cover page [16 citation].
8. N. C. Harris, Y. Song, and C.-H. Kiang, “Experimental Free Energy Surface Reconstruction From Single-Molecule Force Spectroscopy Using Jarzynski's Equality,” *Phys. Rev. Lett.* **99** (2007) 068101. The work is featured in *APS News* and *Science News* [107 citations].

9. N. C. Harris and C.-H. Kiang, “Disorder in DNA-Linked Gold Nanoparticle Assemblies,” *Phys. Rev. Lett.* **95** (2005) 046101 [38 citations].
10. C.-H. Kiang, M. Endo, P. M. Ajayan, G. Dresselhaus, and M. S. Dresselhaus, “Size Effects in Carbon Nanotubes,” *Phys. Rev. Lett.* **81** (1998) 1869–1872 [254 citations].
11. A. C. Dillon, K. M. Jones, T. A. Bekkedahl, C.-H. Kiang, D. S. Bethune, and M. J. Heben, “Storage of Hydrogen in Single-Wall Carbon Nanotubes,” *Nature* **386** (1997) 377–379 [3730 citations].
12. C.-H. Kiang and W. A. Goddard III, “Polyyne Ring Nucleus Growth Model for Single-Layer Carbon Nanotubes,” *Phys. Rev. Lett.* **76** (1996) 2515–2518 [140 citations].
13. C.-H. Kiang, W. A. Goddard III, R. Beyers, and D. S. Bethune, “Carbon Nanotubes with Single-Layer Walls,” *Carbon* **33** (1995) 903–914 [135 citations].
14. D. S. Bethune, C.-H. Kiang, M. S. de Vries, G. Gorman, R. Savoy, J. Vazquez, and R. Beyers, “Cobalt-Catalyzed Growth of Carbon Nanotubes with Single-Atomic-Layer Walls,” *Nature* **363** (1993) 605–607 [3847 citations].

Popular Press

Small Times

2007 Best of Small Tech, Researcher of the Year Award, Vol. 8, issue 1, p. 20, January/February 2008.

Science News

“Pulling Strings: Stretching Proteins Can Reveal How They Fold,” 14 July 2007, Vol. 172, No. 2, p. 22.

APS News

“Mapping Protein Folding,” March 2007, p. 3.