

## Curriculum Vita: James Vesenka

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### Education & Research Experience

Post-graduate Researcher, Iowa State University, 8/92-6/95 P.I.: Prof. Eric Henderson  
Post-graduate Researcher, University of Oregon, 10/90-6/92. P.I.: Prof. Carlos Bustamante  
Post-graduate Researcher, University of California, 10/89-9/90. P.I.: Prof. Yin Yeh  
Ph.D., Physics, University of California, Davis, September 1989.  
M.Sc., Physics, University of California, Davis, March 1986.  
B.A., Physics/Chemistry, Clark University, Worcester, Massachusetts, May 1982.

### Teaching Experience

Associate Professor, Chem/Phys Department, University of New England (8/03 – present)  
Assistant Professor, Chem/Phys Department, University of New England (8/99 – 7/03)  
Assistant Professor, Physics Department, California State University Fresno, (8/95-6/99)  
Adjunct Assistant Professor, Physics Department, Iowa State University, (8/94-12/94)  
Instructor, Zoology and Genetics Department, Iowa State University, (9/92-6/95)

### Honors and Grants

UNE – CAS Minigrant (11/03) and UNE Faculty Development Award (\$4,000 - 1/04)  
MMSTEC/MMSA (12/04) Modeling Workshop Grant (\$15,000 - 8/03)  
UNE – CAS Minigrant (11/02) and UNE Faculty Development Award (\$3500 - 1/03)  
UNE – CAS Minigrant (11/01) and UNE Faculty Development Award (\$3400 - 1/02)  
NSF Major Research Instrumentation Award DMR 0116398 (\$156,000 - 9/01)  
Nomination to Debra J Summers Teaching Award (4/01)  
UNE – CAS Minigrant (11/00) and UNE Faculty Development Award (\$3500 - 1/01)  
Nomination to Debra J Summers Teaching Award (4/00)  
Maine Mathematics and Science Alliance Summer Academy Grant (\$42,000 - 4/00)  
NSF Course, Curriculum and Laboratory Improvement Award DUE 9952668 (\$140,000 - 3/00)  
UNE – CAS Minigrant (11/99) and UNE Faculty Development Award (\$3500 - 1/00)  
Togus-VA Equipment Salvage (\$12,000 - 10/99)  
CSU-Fresno Claude Laval Research Award (\$5000 - 1/99)  
CSU-Natural Science Performance Awards (\$2000 - 2/96, 2/97, 2/98, 11/98)  
CSU-Fresno Indirect Cost Return Award: Networked Microscopy support (\$2000 - 5/96 & 5/98)  
CSU-Fresno Convocation Award: Recognition for teaching and research (8/97)  
IBM-Almaden Equipment Donations (\$80,000 - 6/97)  
CSU Award for Research & Creative Activity: (\$3000 - 5/96 & 5/97)  
NSF Instructional Laboratory Improvement Grant: Networked SPM (\$120,000 - 5/97)  
CSU Fresno Instructional Technology Award: Real-time SPM to large audiences (\$5000 - 11/97)  
Research Corporation Award: SPM investigations of quadruplex DNA (\$49,000 - 5/96)  
Outstanding Graduate Student Teaching Award, UC Davis (5/89).  
Graduate Phi Beta Kappa and Magna Cum Laude, Clark University (6/82).

## Professional Affiliations

American Association of Physics Teachers – American Physical Society,  
Project Kaleidoscope

## Student Talks:

- D. Bagg, K. Eccleston, M. Luhrs & J. Vesenka, UNE Arts and Sciences Symposium (2003).  
N. Demers, B. Rioux, M. Fletcher & J. Vesenka, UNE Arts and Sciences Symposium (2002).  
T. Armstrong & J. Vesenka, UNE Arts and Sciences Symposium (2001).  
N. Demers & J. Vesenka, UNE Arts and Sciences Symposium (2000).  
C. Vellandi,... & J. Vesenka, "Inexpensive Tapping SPM", *Scanning* **19**:3, 246 (1997).  
J. Root,... & J. Vesenka, "LCSTM of G-wires", *Scanning* **19**:3, 243-244 (1997).  
I. Kumar, C. West, & J. Vesenka, "Orientation of G-wires", *Scanning* **19**:3, 234-235 (1997).  
D. Detweiler, S. Laslovich, & J. Vesenka, "General microscopy" *Scanning* **19**:3, 205 (1996).  
C. West, I. Kumar, & J. Vesenka, *Scanning* **19**:3, journal cover (1997).  
J. Stafford & J. Vesenka, "An SPM Internet Site" *Scanning* **18**:3, 252-253 (1996).  
C. Wilson & J. Vesenka, "Atomic Force Microscopy of Olivine" *Scanning* **18**:3, 254 (1996).

## Selected List of Recent Professional Presentations: (> 60 lifetime presentations)

- J. Vesenka, "Auto-orientation of G-wire DNA", DNA Based Molecular Electronics, Jena, Germany May 13-15, 2004.
- D. Andrews, J. Arvizu, & J. Vesenka, "The Implication of Modeling Training on Physics Teacher Development in California's Central Valley." TPPI conference, Washington D.C. (03/04).
- J. Vesenka "Gain Disparity between Newtonian and Non-Newtonian Thinkers", New England APS/AAPT, Bates, Lewiston, ME (10/03).
- J. Vesenka , K. Eccleston\*, M. Luhrs\*, "Orientation of G-wire DNA", New England APS/AAPT, Bridgewater State College, Bridgewater, MA (10/02).
- J. Vesenka, "Remote Scanning Probe Microscopy Operation", New England APS/AAPT, Bridgewater State College, Bridgewater, MA (10/02).
- J. Vesenka , K. Eccleston\*, M. Luhrs\*, E. Henderson, & T. Marsh, "Construction and Examination of G-wire DNA", DNA Based Molecular Construction, Jena Germany, May 23-25, 2002.
- J. Vesenka, "DNA Nanowires." Toward a Sustainable World: Physics and Technology Assessment. A Celebration of the Research and Teaching of Christoph Hohenemser, Worcester MA, April 20, 2001.
- J. Vesenka, B. Rioux\*, M. Fletcher\*, "Orientation of Quadruplex DNA (G-wires) and purported G-wire crystals on Mica." NES APS Announcer **Fall 2001**, 14 (2001).
- J. Vesenka, "Physics Teacher Enhancement & Summer Student Education through Modeling Instruction", NES APPT Announcer **Fall 2001**, 2 (2001).
- J. Vesenka, B. Rioux\*, M. Fletcher\*, "Orientation of Quadruplex DNA (G-wires) and purported G-wire crystals on Mica." Augustusburg Conference of Advanced Science, Molecular Nanotechnology 2001, Augustusburg Germany, September 6-7, 2001.
- J. Vesenka, "Adaptation and Implementation of Modeling Techniques in a General Physics Course: On the Cheap", AAPT Announcer **29**, 82 (2000).
- J. Vesenka, "Remote Microscopy operation at CSU Fresno", *Scanning*. **21** 53-54 (1999).
- J. Vesenka, "Potential Applications of Scanning Probe Microscopy in Gene Therapy", *Scanning* '98, Baltimore, MD (4/98).
- J. Vesenka, T.C. Marsh, J. Root, W. Han, S.M. Lindsay, E. Henderson, "Electronic Properties of 'G-wire' DNA investigated by Low Current Scanning Tunneling Microscopy," 44<sup>th</sup> American Vacuum Society meeting, San Jose, CA (11/97).
- J. Vesenka, "Scanning Probe Microscopy in Education" Digital Instruments Users Conference, Santa Barbara, CA (8/97).

J. Vesenka, C. West, D. Detweiler, S. Laslovich, F. Schreiber, "A General Microscopy Course", Scanning '97, Monterey, CA (4/97).

J. Vesenka, "Linking Large Audiences to Campus Microscopes", Center for Enhancement of Teaching and Learning, 1<sup>st</sup> Annual Teaching Technology Conference, Fresno, CA (1/97).

### Patents

E. Henderson & J. Vesenka, "Decontamination Device and Method Thereof", *U.S. Patent Serial No. 5,935,339*, United States Patent and Trademark Office (1999)

R. Miller & J. Vesenka, "Reconstructing the Shape of an Atomic Microscope Probe", *United States Patent No. 5,591,903*, United States Patent and Trademark Office (1997).

### NON GRANT Peer-reviewed Publications: "\*" = Student Participant

41. J. Vesenka, E. Henderson, & T. Marsh, "Hydration Layer Scanning Tunneling Microscopy of "G-wire" DNA" DNA-Based Molecular Construction, Intern. Workshop on DNA-based molecular construction", Jena, Germany 2002, Editor: W. Fritzsche, AIP Conference Proceedings **725**. pp. 59-64 (2004).

40. D. Andrews, M. Oliver, & J. Vesenka, "The Implication of Modeling Training on Physics Teacher Development in California's Central Valley." *J. Physics Teacher Education On-line* **1**(4), 14-24 (2003).

39. J. Vesenka, E. Henderson, & T. Marsh, "Construction and Examination of G-Wire DNA." DNA-Based Molecular Construction, Intern. Workshop on DNA-based molecular construction", Jena, Germany 2002, Editor: W. Fritzsche, AIP Conference Proceedings **640**. pp. 109-122 (2002).

38. J. Vesenka, G. Munoz, F. Judd, & R. Key, "A comparison between traditional and "modeling" approaches to undergraduate physics instruction at two universities." *J. Physics Teacher Education On-line* **1**(1), 3-7 (2002).

37. C. Wilson\* & J. Vesenka, "Atomic Force Microscopy of Olivine", in AFM/STM III. S. Cohen & M. Lightbody eds., Plenum Press, pp. 125-134 (2000).

36. J. Vesenka & E. Morales\* "Scanning Probe Microscopy in Biology with Potential Applications in Forensics.", in AFM/STM III. S. Cohen & M. Lightbody eds., Plenum Press, pp. 31-48 (2000).

35. J. Vesenka, C. Vellandi, I. Kumar\*, T. Marsh, & E. Henderson, "The diameter of duplex and quadruplex DNA measured by Scanning Probe Microscopy." *Scanning Microscopy* (1999).

34. T. Muir, E. Morales, J. Root, I. Kumar, B. Garcia, C. Vellandi, D. Jenigian, T. Marsh, E. Henderson, & J. Vesenka "The morphology of duplex and quadruplex DNA on mica." *J. Vac. Sci. Technol. A*. **16**, 1172-1177 (1998).

33. Yang, G., Vesenka, J.P., and Bustamante, C. Effects of Tip-sample Forces and Humidity on the Imaging of DNA with a Scanning Force Microscope. *Scanning* **18** (5), (1996).

32. W. Fritzsche, L. Martin, D. Dobbs, D. Jondle\*, R. Miller, J. Vesenka, E. Henderson, "Reconstruction of Ribosomal Subunits and rDNA Chromatin Imaged by Scanning Force Microscopy", *J. Vac. Sci. Technol. B* **14**, (1996).

31. J. Vesenka, T. Marsh, R. Miller, & E. Henderson, "High Resolution Atomic Force Microscopy Reconstruction of G-wire DNA." *J. of Vac. Sci. Technol. B* **14**, 1413-1417 (1996).

30. J. Vesenka, "Facile Procedure for Screening Nucleoproteins for Imagibility", H. Gaub Module Ed., Accepted to Procedures in Scanning Probe Microscopies (1996), J. Wiley & Sons, Ltd.

29. W. Fritzsche, J. Vesenka, & E. Henderson, "Scanning Force Microscopy of Chromatin", *Scanning Microscopy*, **9**, 729-739 (1995).

28. E. Henderson, L. Ambrosio, C. Mosher, D. Jondle\*, E. Stanley, P. Haydon, T. Marsh, & J. Vesenka, "Analyzing Chromosomes, Calcium Channels and G-wires by AFM", In press *1994 NATO Advanced Research Workshop: "Scanning Near Field Microscopies & Molecular Materials."*

27. J. Vesenka, C. Mosher, S. Schaus, L. Ambrosio, & E. Henderson, "Combining Optical and Atomic Force Microscopy for Life Sciences Research", *Biotechniques*, **19**, 240-253 (1995).

26. L. Martin, J. Vesenka, E. Henderson, & D.D. Larson, "Dissociated chromatin structure from rDNA of *Tetrahymena thermophila*", *Biochemistry*, **34**;14, 4610-4616 (1995).
25. D. Jondle\*, L. Ambrosio, J. Vesenka, & E. Henderson, "Imaging and Manipulating Chromosomes with the Atomic Force Microscope", *Chromosome Research*, **3**; 239-244 (1995).
24. T.C. Marsh, J. Vesenka, & E. Henderson, "Atomic Force Microscopy of A New DNA Nanostructure.", *Nucleic Acids Research*, **23**;4, 696-700 (1995).
23. R. Miller, J. Vesenka, & E. Henderson, "Three dimensional reconstruction of scanning probe apex from colloidal gold specimens." *SIAM, J. Math.* **55**, 1362-1371 (1995).
22. C. Mosher, D. Jondle\*, J. Vesenka, & E. Henderson, "Microdissection and Measurement of Polytene Chromosomes Using the Atomic Force Microscope.", *Scanning Microscopy*, **8**;3, 491-497 (1994).
21. J. Vesenka, R. Miller, & E. Henderson, "Three dimensional probe reconstruction for Atomic Force Microscopy." *Rev. Sci. Instr.*, **65**; 7, 2249-2251 (1994).
20. T.C. Marsh, J. Vesenka, & E. Henderson, "Differential Height Characterization of Plasmid and G-Wire DNA as Determined by Atomic Force Microscopy." in press *Proc. MSA* (1994).
19. J. Vesenka, S. Manne, G. Yang, C. Bustamante, & E. Henderson, "Humidity effects on atomic force microscopy of gold-labeled DNA on mica." *Scanning Microscopy*, **7**, 781-788 (1993).
18. W-L Shaiu, J. Vesenka, D. Jondle, E. Henderson, & D.D. Larson, "Visualization of circular DNA molecules labeled with colloidal gold spheres using Atomic Force Microscopy." *J. Vac. Sci. Technol. A*, **11**, 820-823 (1993).
17. J. Vesenka, S. Manne, R. Giberson, T. Marsh, & E. Henderson, "Colloidal gold particles as an incompressible Atomic Force Microscopy imaging standard for assessing the compressibility of biomolecules." *Biophysical J.*, **65**, 992-997 (1993).
16. W.A. Rees, R.W. Keller, J.P. Vesenka, G. Yang, & C.J. Bustamante, "Evidence of DNA Bending in Transcription Complexes Imaged by Scanning Force Microscopy." *Science*, **260**, 1646-1649 (1993).
15. W-L Shaiu, D.D. Larson, J. Vesenka, & E. Henderson, "Atomic Force Microscopy of Oriented Linear DNA Molecules Labeled with 5 nm Gold Spheres." *Nucleic Acids Research*, **21**, 99-103 (1993).
14. J. Vesenka, T. Marsh, J. Weber, & E. Henderson, "AFM of Colloidal Gold Particles and Tobacco Mosaic Virus", **1**, *Royamount Proc.* (1993).
13. B. Samori, G. Siligardi, C. Qagliariello, A.L. Weisenhorn, J. Vesenka, & C.J. Bustamante, "Chirality of DNA supercoiling assigned by scanning force microscopy." *Proc. Natl. Acad. Sci. USA*, **90**, 3598-3601 (1993).
12. J. Vesenka, R.E. Feeney, & Y. Yeh, "Microbubble mediated surface probe and the ice-antifreeze glycoprotein solution system." *J. Crystal Growth*, **130**, 67-74 (1993).
11. L. Niu, W-L Shaiu, J. Vesenka, D.D. Larson, & E. Henderson, "Atomic force microscopy of DNA-colloidal gold and DNA-protein complexes.", *SPIE*, **1891**, 71-77 (1993).
10. J. Vesenka, H. Hansma, C. Siegerist, G. Siligardi, E. Schabtach, & C. Bustamante, "Scanning force microscopy of circular DNA and chromatin in air and propanol." *SPIE*, **1639**, 127-137 (1992).
9. M.-Q. Li, H.G. Hansma, J. Vesenka, G. Kelderman & P.K. Hansma, "Atomic Force Microscopy of Uncoated Plasmid DNA: Nanometer Resolution with only Nanogram Amounts of Sample." *J. Biomolecular Structure Dynamics*, **10**, 607-617 (1992).
8. H. Hansma, J. Vesenka, G. Kelderman, H. Morrett, R.L. Sinsheimer, V. Elings, C. Bustamante, & P.K. Hansma, "Reproducible imaging and dissection of plasmid DNA under liquid with the atomic force microscope", *Science*, **256**, 1180-1184 (1992).
7. C. Bustamante, J. Vesenka, C.L. Tang, W. Rees, M. Guthold, & R. Keller, "Circular DNA molecules imaged in air with the scanning force microscope." *Biochemistry*, **31**, 22-26 (1992).
6. R. Keller, D. Keller, D. Bear, J. Vesenka, & C. Bustamante, "Atomic force microscopy of *E. coli* RNA polymerase." *Ultramicroscopy*, **42-44**, (1992).

5. J. Vesenka, C.L. Tang, M. Guthold, D. Keller, E. Delaine, & C. Bustamante, "A substrate preparation for imaging biomolecules with the scanning force microscope." *Ultramicroscopy*, **42-44**, 1243-1249 (1992).
4. R.E. Feeney, W.H. Fink, J. Hallett, K. Harrison, D.T. Osuga, J. Vesenka, & Y. Yeh, "Investigations of the differential affinity antifreeze glycoprotein for single crystals of ice." *J. Crystal Growth*, **113**, 417-429 (1991).
3. J. Vesenka & Y. Yeh, "Defect site nucleation of microbubbles as a source of dynamic light scattering at the growing ice-water interface." *J. Crystal Growth*, **108**, 19-24 (1991).
2. D. Campbell, S. Copeland, T. Cahill, R. Eldred, C. Cahill, J. Vesenka, & T. van Curen, "The coefficient of optical absorption from particles deposited on filter: Integrating Plate, Integrating Sphere, and the Coefficient of Haze Measurements", *Air and Waste Management Association* **89**, 151-156 (1989).
1. J. Vesenka & Y. Yeh, "Dynamic light scattering at a growing crystal interface: Ice-water system." *Phys. Rev. A*, **38**, 5310-5315 (1988).

Dr. James Vesenka has two areas of research: scanning probe microscopy (SPM) application to educational nanotechnology and physics pedagogy. The former consists of biophysical characterization of four-stranded DNA for potential use in nanotechnology applications, and the exposure and training of large numbers of undergraduates in SPM techniques. Dr. Vesenka's interests in physics pedagogy emphasize effective physics educational practices primarily based on "modeling instruction" developed at Arizona State University. He has received two large grants to disseminate those practices and organized and run six modeling instruction summer workshops for middle and high school science teachers in the past three years. Three of the workshops were held at California State University Fresno in the summers of 2000-2002 reaching 140 middle and high school teachers. Three more workshops were held at the University of New England, funded by his NSF CCLI grant (DUE 9952668) to 32 participants. Web resources are maintained at <http://faculty.une.edu/cas/jvesenka/modeling>. Dr. Vesenka's research in physics pedagogy culminated recently in the publication of a four-year study involving data from California State University Fresno and the University of New England. In this study he compared the adaptation and implementation of modeling instruction at a college level involving students from both schools (J. Vesenka et al., *J. Physics Teacher Education On-line* **1**, 3 (2002)). The most important conclusion of the study supports the widely published results from high school modeling instruction, namely that modeling instructed students have substantially better and longer-lived understanding of physical concepts than their traditionally instructed counterparts.