

## Curriculum Vitae

Fredy Zypman  
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Department of Physics  
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### EDUCATION:

Postdoc Department of Electrical Engineering and Department of Physics,  
University of North Carolina, 1988-1991. Fields: Theory of Semiconductor

Association of Physics Teachers. Advisor of Engineering and Physics students in research projects.

2007-2008. Senior Research Scientist, Columbia University, New York

2002-Today, Industrial Consultant, Exxon Mobile Research Corporation, in various aspect of mechanical vibrations and sensors.

1991-2000, Assistant-Associate-Full Professor, University of Puerto Rico, Department of Physics.

1988-1991, Post Doctoral Associate, Department of Electrical Engineering and Department of Physics, University of North Carolina.

1992,1988, Industrial Consultant, Picker International and Technicom (Miles).  
"Study of Viability of Resistive Magnet for Magnetic Resonance Imaging",  
"Improvement of blood analysis medical instrumentation by light scattering"

## GRANTS

NSF, Instrument Development: Charge Sensing In Fluids With Nanometer Precision, \$412,000, 2017-2020

Faculty Research Fellowship, NASA, 2013

NIST for student research support, 2013, \$5,600

Cottrell Scholar Award, 2002-2008

ANII Grant#PR\_VCT\_2008\_30, "Research and seminars on Scanning Probe Microscopy", \$4,000

Panamerican School Initiative, NSF, 2006-2007, \$100,000

NIH. Grant # CA77796-01, "MRI Electromagnetic Fields In Human Tissue", 2000-2003, \$109,650

Faculty Research Fellowship, NASA, 2002

ARO. Grant # DDAAD19-02-1-



General Physics - Fall 2006, Fall 2008, Spring 2009  
Mathematical Physics, Spring 2012, Fall 2013

23. Ben Kandel (2007-2008). Viability of measuring capacitance and dielectric constants via Electrostatic Force Microscopy.
24. Ami Blickstein (2004-2006). Honors Thesis. Relationship between current, charge storage, and time delay in Quantum Well transport.
25. Louis Nemzer (2003-2004). Honors Thesis. Electronics transport through disordered systems. One paper published. One presentation.
26. Eli Lansey (2004-2007). Elasticity by Atomic Force Microscopy nanoindentation.
27. Ouri Cohen (2001-2003). We are developing computer code to simulate the evolution of tumors in humans and to characterize their properties via electromagnetic fields.
28. David Jaffe (Summer 2001). Quantum Transmission through quasiperiodic systems.
29. Jeremy Stein (2001-2003). He wrote his honors thesis on the relationship between electronic energy levels in atomic chains and scanning tunneling microscopy current-vs-

sample Density of States. We found that some features of the I-V curve and some of the  $dI/dV$  curve can be transferred to the local and global density of states respectively. However, this is not true at all voltages or energies. On SFM, we are looking at the effects of high frequency vibrations of the cantilever on the accurate reconstruction of force-distance curves. The main .00000912Tf1 0 0 1 214.force



28. J. Betancourt, F. Zypman, F. Solá, O. Resto, L. Fonseca,



46. D. Yablon, A. Schilowitz, F. Zypman, Frequency Response Of Microcantilevers In Viscous Fluids, Mat Res Soc 838, O10.17 (2005)
47. F. Zypman, Hamiltonian For Superlattice Nanowires, Phys. Virtual Journal of Nanoscale Science & Technology 11, 17 (2005)
48. L. Nemzer, F. Zypman, STM Characterization Of Oxide/Silicon Interfaces, Mat. Res. Soc. 786, 78 (2004)
49. M. Adler, J. Ferrante, A. Schilowitz, D. Yablon, F. Zypman, Self-Organized Criticality In Nanotribology, Mat Res Soc 782, 111 (2004)
50. F. Zypman, , J. Ferrante, Generalization Of Equivalent Crystal Theory To Include Angular Dependence, NASA TM 212979 (2004)
51. F. Zypman, Fast Atomic Force Microscopy, Encyclopedia of Nanoscience and Nanotechnology 3, 307 (2004)
52. C. Guerra, F. Zypman, Macroscopic Model of Scanning Force Microscopy, Patent 6799464, October (2004)
53. F Zypman, J Ferrante, M Jansen, K Scanlon, P Abel, Evidence Of Self-Organized Criticality In Dry Sliding Friction, J. Phys. Cond. Matt. Lett. 15, 191 (2003)
54. F Zypman, C Guerra, Characterization of Heterogeneity in Concrete and Cement by Mechanical Spectroscopy, Cement And Concrete Research 33, 241 (2003)
55. J Piqueras, F Zypman, D Bonnel, A Shreve, Spatially Resolved Characterization of Local Phenomena in Materials and Nano Structures. M. Res. Soc., Warrendale, Pennsylvania (2003)
56. J. Stein, F.R. Zypman, Spectroscopy Of Atomic Chains With Tunneling Microscopy, Ultramicroscopy 97, 7 (2003)
57. J. Stein, F.R. Zypman, Tunneling Spectroscopy Of Short Atomic Chains, M. Re

66. R.R. Canales, L.F. Fonseca, F.R. Zypman, Effects of EM frequency and object morphology on temperature profiles by the extended boundary condition method, Applied Computational Electromagnetics 18, 655 (2002)
67. F.R. Zypman, Quantum capacitor at a metal-liquid interface, Am J Phys 69, 601 (2001)
68. F.R. Zypman, Hidden fractals in light transmission through disordered multilayer photonic systems, in **Microphotonic - Materials, Physics and Applications**, ed. K. Wada, P. Wiltzius, T.F. Krauss, K. Asakawa, E.L. Thomas, 637, E511 (2001)
69. R.R. Canales, L.F. Fonseca, F.R. Zypman, Effects of frequency and **VFDWWHUHU·V VKDSH RQ KMDW QHSRM,AWLRQ 7** Computational Electromagnetics 17, 170 (2001)
70. F.R. Zypman, C. Guerra-Vela, The macroscopic scanning force 'microscope', Eur. J. Phys. 22, 17-30 (2001)
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83. A. Moreno-Gobbi, G. Paolini, F. Zypman, Peierls potential for dislocations in FCC metals, Computational Materials Science 11, 145 (1998)
84. F.R Zypman, S.J. Eppell, Electrostatic tip-surface interaction in scanning force microscopy: a convenient expression useful for arbitrary tip and sample geometries, J Vac Sci Technol B15, 1853 (1997)
85. F.R. Zypman, L.F. Fonseca, Electron scattering in STM, Phys Rev B55, 15012 (1997)
86. F.R. Zypman, J. Ferrante, Tight-Binding Surface Correction to the Embedded Atom Method Embedding Function, J Phys, Condensed Matter 7, 9433 (1995)
87. F.R. Zypman, MRI Electromagnetic Field Penetration in Cylindrical Objects, Comput Biol Med 26, 161 (1996).
88. F.R. Zypman, J. Ferrante, Impurity Induced Correction to EAM Embedding Function Physica A 231, 337 (1996).
89. F.R. Zypman, Crystallography, in Macmillan Encyclopedia of Physics, John S Ridgen, Editor, New York (1996).
90. F.R Zypman, L.F. Fonseca, L. Blum, Energetics of epitaxial monolayers deposited on a (111) surface of an FCC crystal: application to a Cu monolayer on Au(111), Proc Mat Res Soc. 1996
91. F.R. Zypman, L.F. Fonseca, Time-independent tunneling for a tip-sample system in Scanning Tunneling Microscopy, Phys Rev B51, 2501 (1995).
92. F.R. Zypman, L.F. Fonseca, Y. Goldstein, Theory of Tunneling Spectroscopy, Phys Rev B49, 1981 (1994)
93. F.R. Zypman, Electrostatic Potential of Impurities in Quantum Wells, IEEE J Quantum Electronics Letter 29, 2719 (1993)
94. F.R. Zypman, First Principles Electrostatic Potential of Impurities in Quantum Wells, in Condensed Matter Theories 8, 119 (1993)
95. F.R. Zypman, Symbolic Programming Helps to Teach Debye-Scherrer Diffraction, Computers in Physics 7, 22 (1993)
96. S.J. Eppell, F.R. Zypman, R. Marchant, Probing the Resolution Limits and Tip Interactions of AFM in the Study of Globular Proteins, Langmuir 9, 2281 (1993)
97. F. Tan, H. You, U. Gösele, W. Jäger, D. Boeringer, F. Zypman, R. Tsu, S. Lee, Disorder in  $^{69}\text{GaAs}/^{71}\text{GaAs}$  Isotope Superlattice Structures, J Appl Phys 72, 5206 (1992)
98. F. Tan, H. You, U. Gösele, W. Jäger, F. Zypman, R. Tsu, S. Lee, Disorder and Characterization Studies of  $^{69}\text{GaAs}/^{71}\text{GaAs}$  Isotope Superlattice Structures: The Effect of Out-diffusion of the Substrate Dopant Si, Mat Res Soc 19, 873 (1992)
99. F.R. Zypman, Moments to Remember-The Conditions for Equating Torque and Rate of Change of Angular Momentum, Am J Phys 58, 41 (1990)
100. R. Tsu, F.R. Zypman, New Insights in the Physics of Resonant Tunneling, Surface Science 228, 418 (1990)

101. E. Haacke, T. Masaryk, P. Wielopolski, F. Zypman, J. Tkach, S. Amatur, J. Mitchell, M. Clampitt, C. Paschal, Optimizing Blood Vessel Contrast in Fast Three-Dimensional MRI, *Magnetic Resonance in Medicine* 14





28. "Effect Of Tip Shape On Electrostatic Force Microscopy", Fredy Zypman, Eli Lansey, Ben Kandel (Lansey and Kandel students). Trends in Nanotechnology conference, San Sebastian, Spain, 3-7 September 2007
29. Puerto Rico annual NSF-E PSCOR meeting. May 24 2007. "Opportunities and techniques in theory of nanomaterials".
30. Fredy Zypman, Analytical form for the tip-sample interaction in liquid for Atomic Force Microscopy , APS March meeting, Baltimore Convention Center, 2006.
31. Fredy Zypman, Off-Axis Electric Field Of A Ring Of Charge, Gordon Research Conference on Physics Research And Education Electromagnetism, June 11-16, 2006, Mount Holyoke College, South Hadley, MA
32. Ari Lapin, Fredy Zypman, Delocalization In Disordered Nanostructures, Panamerican School Initiative in December 2006 in Mar del Plata, Argentina
33. Eli Lansey, Fredy Zypman , Experimental Measurements Of Dispersion Relations In A Disordered Mechanical Chain, Panamerican School Initiative in December 2006 in Mar del Plata, Argentina
34. Perry Fox, Gabriel Cwilich, Sergey Buldyrev, Fredy Zypman, Robin Hood Model of friction in one and two dimensions: critical exponents, Panamerican School Initiative in December 2006 in Mar del Plata, Argentina
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63. "A Home-Made Inch-Scale Scanning Force "Microscope", Claudio Guerra-Vela and Fredy R. Zypman, in **Materials Science and Engineering Education in the New Millenium** , Editors: B. London, E. Allen, A. Moll, D. Pope, MRS 632, HH8.2.1 (2000)
64. "Hidden Fractals in light transmission through disordered multiplayer photonic systems", Fredy R Zypman, MRS November 28<sup>th</sup>, 200
65. "Force reconstruction from SFM data", Fredy R Zypman, Yeshiva U niversity, Wilf Campus, November 15<sup>th</sup> , (2000)
66. "Force and Tunneling Spectroscopies", Fredy R Zypman, Queens College, October 10 (2000)
67. "E nhanced transferability of embedded atom method potentials of ruthenium using density functional theory", Lesser Blum, Marc Legault, Ilya Grinberg, Andrew Rappe, Fredy Zypman, Bull Am Phys Soc 45 (2000)
68. "Tumor growth and its effect on Magnetic Resonance Imaging signal" Homero Cersosimo, Jorge Colón, Elio Ramos, Fredy Zypman, Bull Am Phys Soc 45 (2000)
69. "Generalization of equivalent crystal theory (E CT) to include angular

80.

101. "Theory of STS for Semiconductors", Fredy Zypman, Luis Fonseca, Bulletin of

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5. The influence of roughness on the mechanical spectroscopy of SiO<sub>2</sub> nanorods  
grown by e-beam irradiation

By: Betancourt, Jesuan; Zypman, Fredy; Sola, Francisco; et al.

SUPERLATTICES AND MICROSTRUCTURES Volume: 45 Issue: 4-5 Pages:  
458-468 Published: APR-MAY 2009

7. Characterization of nanowires and molecular switches with scanning tunneling  
microscopy

By: Zypman, Fredy

ULTRAMICROSCOPY Volume: 108 Issue: 10 Pages: 999-1004 Published: SEP  
2008

8. Electromagnetic cavity to explore disordered systems

By: Bastuscheck, Marc; Zypman, Fredy

PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS Volume: 386  
Issue: 2 Pages: 633-639 Published: DEC 15 2007

9. Level statistics in disordered linear networks

By: Lansey, Eli; Lapin, Ari; Zypman, Fredy

PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS Volume: 386  
Issue: 2 Pages: 655-658 Published: DEC 15 2007

10. Explicit form for the tip-sample interaction in liquid for Atomic Force Microscopy

By: Zypman, FR

ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY Volume:  
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