



Curriculum Vitae

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EDUCATION:

- **Postdoc** Department of **Electrical Engineering** and Department of **Physics**, University of **North Carolina**, 1988-1991. Fields: Theory of Semiconductor Quantum Wells and Superlattices, Molecular Beam Epitaxy.
- **PhD Physics**, Case Western Reserve University (CWRU), **Ohio**, 1988. Field: Theoretical Electromagnetic Fields in Dielectric Materials at High Frequencies. Thesis: "High Frequency Electromagnetic Fields In Magnetic Resonance Imaging".
- **Licenciado en Física**, Universidad Simón Bolívar, **Venezuela**, 1985. Field: Theoretical Particle Physics. Thesis: "Uncertainty of Supersymmetric Coherent States of Light".
- **Bachiller en Ciencias Básicas de Ingeniería**, Universidad de la República, **Uruguay**, 1982. Worked ad honorem on X-Ray Crystallography.

PROFESSIONAL EXPERIENCE:

2000-Today, Professor, Yeshiva University, Department of Physics, New York
Current Research Areas: Image Reconstruction with Scanning Probe Microscopes, Atomistic Modeling of Materials, Electromagnetic Scattering Image Reconstruction, Transmission of Electromagnetic Fields through Disordered Systems.
Professional Activities: Reviewer for NSF, Physical Review, Measurement, Langmuir, DOD, American Journal of Physics. Co-organizer of International conference on Complex Systems, Argentina, 2006. Co-organizer of Symposium on Nano-characterization for the Materials Research Society Fall meeting 2002. Reviewer for Physical Review, American Journal of Physics, Applied Journal of Physics, Measurement and Sensors and Actuators. Member of American

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 # DDAAD19-02-1-0445, For Support Of "Symposium G: Spatially Resolved Characterization Of Local Phenomena In Materials And Nanostructures", \$5,000, 2002

RESEARCH CORPORATION, Effect Of Interface Defects On Electronic Transport Through Quantum Multi-Layered Systems, 2002-2007, \$40,000

DOE. Grant # DE-FG03-97ER76068, "Study of Supercapacitors for Electrical Vehicle Applications", Amount \$382,326. 2000-2001.

NSF. Grant # DMR-9872689, "Collaborative between UPR and Materials Center at UPENN". Amount \$1,358,579. 1999-2001.

"For contribution to research in Puerto Rico" Office of the President, 1999

NASA. Grant # NAG8-1003, "Scanning Tunneling Spectroscopy and Solid Energetics". Amount \$117,714. 1993-1998.

NIH. Grant # CA60041-01, "Image Distortion in High Frequency MRI". Amount \$109,417. 1993-1997.

AWARDS

2018 Materials Today Embracing Challenge Award

<https://www.materialstoday.com/amorphous/news/fredy-zypman-2018-embracing-challenge-award/>

“Best Papers, Journal of Physics” For “Evidence Of Self Organized Criticality In Dry Sliding Friction”, Institute of Physics, March **2004**

“For contribution to research in Puerto Rico” Office of the President, 1996

“For contribution to research in Puerto Rico” Office of the President, 1994

"For Contributions to NASA Research" NASA 1997

"For Excellence in NASA Research" NASA 1997

"For Contributions to NASA Research" NASA 1996

"For Excellence in NASA Research" NASA 1996

"For Contributions to NASA Research" NASA 1995

"For Excellence in NASA Research" NASA 1995

"For Excellence in NASA Research" NASA 1994

"For Contributions to NASA Research" NASA 1994

Courses Taught

General Physics I & II

Introductory Physics I & II

Physics for nonscientists: Saint Petersburg

Physics for nonscientists: Kepler and Brahe in Prague

Advanced Physics Laboratory

Physics of Waves

Electromagnetism I & II

Modern Physics

Thermodynamics and Statistical Physics

Research Projects

Quantum Mechanics I & II

Solid State Physics

General Physics

Introduction to Materials Science

Classical Mechanics I & II

Topics in Nanophysics

Quantum Heterostructures

Mathematical Physics

Scanning Probe Microscopy

Honors Courses at Yeshiva University

Quantum Mechanics – Spring 2001, Fall 2008

Intermediate Physics Laboratory – Fall 2001-2002, Spring 2007, Spring 2008, Spring 2009, Spring 2010, Spring 2011, Spring 2012, Spring 2013

Intermediate Classical Mechanics – Fall 2002, Fall 2009, Fall 2012

General Physics – Fall 2006, Fall 2008, Spring 2009
Mathematical Physics, Spring 2012, Fall 2013
Advanced Classical Mechanics, Fall 2012, Fall 2014

Students in Research Projects from 2000 (in addition trained more than 20 students at the University of Puerto Rico during the 1990s).

1. Wai-Ting Lam (2017-today)
2. Li Li (2016-today)
3. David Friedenberg (2017-today)
4. Yehuda Tager (2019 today)
5. Joseph Rubin (2018-2019)
6. Yisroel Schatz (2018-2019)
7. Elan Rotenberg (2017-2019)
8. Yishai Ehrenberg (2017-2018)
9. Daniel Lazarev (2015-2017)
10. Matthew Feinstein (2014-2016)
11. Paul Creeger (2013-2014). Thesis. Friction at the Nanoscale
12. Chaim Metzger (2014-2015). Thesis. Adsorption sites on polarized molecular rings.
13. Josh Blumenkopf (2012-2013). Thesis. Effect of dielectric constant on charge nanosensors.
14. Yoni Mehlman (2011-2014). Thesis. Force reconstruction in fast imaging AFM.
15. Motti Segall (2008-2012). Worked under my supervision in the Fall 2009 on "entropy and fractality in dry friction". From summer 08 through Spring 12 he worked on "configurational free energy of free standing atomic chains".
16. Motti Kornbluth (2009-2012). Worked under my supervision in the Fall 2009 on "entropy and fractality in dry friction". Also in Summer 2009 he worked on "traveling salesman paths for extended cities". Thesis 2011-2012 on coherent states of light.
17. Roman Sandler (2009). Worked under my supervision in the Fall 2009 on "entropy and fractality in dry friction".
18. Keith Jarmusik (2008-2012). Finished MS BME at Case Western Reserve University. I was his advisor on "electrostatic tip-sample interaction in scanning probe microscopy in electrolytes".
19. Jesuan Betancourt (2007-2009). PhD thesis supervisor. We worked on various theoretical aspects of growth of nanorods and nanoforests in a Transmission Electron Microscope vacuum chamber.
20. Ari Lapin (2006-2007). Linear electrical impedance network. Nearest level statistics, $P(s)$. This probability density evolves from a sum of gaussians at small disorder, to a linear combination of Poisson and gaussian orthogonal ensemble for large values of the disorder.
21. David Sversky (2007-2008). Degradation of coherent states in parabolically graded nanowires due to confinement.
22. Motti Segal (2006-2007). Loci of the complex roots of $\exp(z)$. They all lie on a curve at infinity. We conjecture that curve is an ellipse through numerical experimentation.

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-voltage information.

Service to the University.

Chairman Physics (2005-2007 and 2009-today)
 Member Executive Committee Natural Sciences (2013-today)
 Cluster Head Physical Sciences (2006-2007)
 Member College Curriculum Committee (2006-2007)
 Member Governance Committee (2007-2008)
 Member Academic Standards Committee (2004-2007)
 Participated in committee that reported on faculty needs for the Middle State evaluation (2000-2001)
 Member YC Science Policy Meetings (Fall 2001-2006)
 Member Lab meetings (Fall 2001, Fall 2002)
 Member Dean Search (2005-2006)

Description of Research Projects

The unifying goal of my research is to understand experimental results. That is, making meaningful models of various physical systems. To that end, we develop theory and algorithms and analyze measured data.

Electromagnetic Imaging We study theoretically and numerically the penetration of Electromagnetic fields in dielectrics. In particular, we gauge the importance of heating and image distortion for high frequency Magnetic Resonance Imaging. Lately, we are developing scattering models to reconstruct tumor morphological properties.

Scanning Probe Microscopies SPM encompasses various kinds of microscopes: STM (scanning tunneling microscope), SFM (scanning force microscope), SMM (scanning magnetic microscope) and so on. We concentrate on the processing of measured data to obtain reliable microscopic information. In particular, we have done so with STM and SFM. On the former, we study the effects of STM-tip-sample proximity on

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 finding is that single-mode, hookian-like analysis is not enough to reconstruct the full features of the desired curves.

Total Energy of Atomic Clusters The energy of a collection of atoms could, in principle be calculated from an N-body Schrödinger Equation. However, although much advanced has been made in that direction computers are not yet potent enough to solve the N-Body quantum problem when N is realistically large. Under those circumstances, one needs to use semiempirical methods such as Equivalent Crystal Theory or Embedded Atom Method. What we are doing is combining first principles calculations with semiempirical ones. We set a small problem that we solve directly using Schrödinger Equation. We solve a similar (small) problem with the semiempirical potentials. Then we adjust the parameters of the second to the former. And from there we go on (with more confidence) to solve large N situations. Concretely, our group is now focusing its attention on Ruthenium Dioxide, a prime candidate for next generation electrical vehicle batteries. We are studying surface reconstruction and chemically active sites.

Defects in Solids We used a Tight Binding approach to obtain the Peierls potential for dislocations in transition metals and vacancy formation energies. Lately, we have used an STM framework to relate experimental data with geometrical and chemical properties of impurities.

ARTICLES

1. F.R. Zypman, **Mathematical expression for the capacitance of coplanar strips**, Journal of Electrostatics **101** (2019) 103371
2. Y. Eisenberg, F.R. Zypman, **Ring of Charge Probed With Atomic Force Microscopy Dielectric Tip**, Journal of Electrostatics **97C** (2019) 95-100
3. F.R. Zypman, **Nanoparticle Charge in Fluid from Atomic Force Microscopy Forces within the Nonlinear Poisson-Boltzmann Equation**, Journal of Applied Mathematics and Physics **6** (2018) 1315-1323
4. F.R. Zypman, **The Tlönian Cone**, Borges Languaje and Reality, pages 103-111, Literatures of the Americas, Palgrave-Macmillan (2018)
5. D. Lazarev, F.R. Zypman, **Charge and size of a ring in an electrolyte with atomic force microscopy**, Journal of Electrostatics **87** (2017) 243-255
6. S.J. Eppell, M. Feinstein, L. Li, B. White, F.R. Zypman, **Signal distortion in atomic force microscopy photodetector**, Review of Scientific Instruments **88** (2017) 103703
7. S. Eppell, L. Li, F. Zypman, **Unexplored territory in the AFM force curve contains nanomechanics information**, AIP Advances **7** (2017) 105208
8. W.T. Lam, F.R. Zypman, **Interaction Energy between an Atomic Force Microscope Tip and a Charged Particle in Electrolyte** Journal of Applied Mathematics and Physics **4** (2016) 1989-1997

9. S. Eppell, Y. Liu and F. Zypman, **Accuracy of AFM force distance curves via direct solution of the Euler-Bernoulli equation**, AIP Advances **6** (2016) 035322
10. D. Lazarev, F.R.Zypman, **Determination of charge and size of rings by atomic force microscopy**, Journal of Electrostatics **83** (2016) 69-72
11. Fredy R. Zypman, **Supersymmetric Displaced Number States**, Symmetry **7**, 1017-1027 (2015)
12. P.B. Abel, S.J. Eppell, A.M. Walker, F.R. Zypman, **Viscosity of liquids from the transfer function of microcantilevers**, Measurement **61** (2015) 67-74
13. J. Mehlman and F.R. Zypman, Scanning Probe Microscope Force Reconstruction Algorithm via Time-Domain Analysis of Cantilever Bending Motion, J. Adv. Microsc. Res. **9**, 268-274 (2014)
14. Paul Creeger, Fredy Zypman, **Entropy Content During Nanometric Stick-Slip Motion**, Entropy **16**, 3062-3073 (2014)
15. F.R. Zypman, S.J. Eppell, **Electrostatic Force Curves in Finite-Size-Ion Electrolytes**, Langmuir, **29**, 11908–11914 (2013)
16. Motti Kornbluth and Fredy Zypman, **Uncertainties of coherent states for a generalized supersymmetric annihilation operator**, J. Math. Phys. **54**, 012101 (2013)
17. Fredy R. Zypman, **Electrostatic Clocks**, American Journal of Physics, **80**, 36 (2012)
18. G. Barach, H. Fort, Y. Mehlman and F. Zypman, **Information in the Traveling Salesman Problem**, Applied Mathematics, **3** (8) 926-930, doi: 10.4236/am.2012.38138 (2012)
19. K.E. Jarmusik, S.J. Eppell, D.J. Lacks, F.R. Zypman, **Obtaining charge distributions on geometrically generic nanostructures using scanning force microscopy**, Langmuir **27**, 1803 (2011)
20. F.R. Zypman, **Parametric ergodicity to measure roughness from a single sample**, Physica A: Statistical Mechanics and its Applications, **390** (6), 1124, (2011)
21. F.R. Zypman, **Intrinsic dissipation in atomic force microscopy cantilevers**, Ultramicroscopy, **111** (8) 1014–1017 (2011)
22. F.R. Zypman, **Handbook of Functions Errata**, viXra.org > Mathematical Physics > viXra:1006.0052, 21 June (2010)
23. H. Fort, M. Kornbluth, F. Zypman, **Traveling salesman problem for finite-size cities**, Mathematical Structures in Computer Science **20**, 1067-1078 (2010)
24. F.R. Zypman, **Promotion of Scanning Tunneling Spectroscopy current on nanotubes by bending**, J. Adv. Microsc. Res. **5**, 196-199 (2010)
25. P. Fleurquin, H. Fort, M. Kornbluth, R. Sandler, M. Segall, F.R. Zypman **Negentropy Generation and Fractality in the Dry Friction of Polished Surfaces**, Entropy **12** 480-489 (2010)
26. F.R. Zypman, **Internal damping for noncontact atomic force microscopy cantilevers**, J. Vac. Sci. Technol. B **28**, C4E24 (2010)
27. F.R. Zypman, **Transitional Wigner surmises from the spacing distribution of 4×4 matrices**, J. Phys. A: Math. Theor. **43**, 225203 (2010)

28. J. Betancourt, F. Zypman, F. Solá, O. Resto, L. Fonseca, **The influence of roughness on the mechanical spectroscopy of SiO₂ nanorods grown by e-beam irradiation**, Superlattices and Microstructures **45**, 458-468 (2009)
29. F.R. Zypman, J. Ferrante, **Analytical algorithm for Equivalent Crystal Theory**, Computational Materials Science, **42** (4) 659-663 (2008)
30. F.R Zypman, **Instrument-Dependent Cadherin Monolayer Interactions**, Journal of Biological Physics **33** (5) 477-483 (2008)
31. F.R Zypman, **Characterization of nanowires and molecular switches with scanning tunneling microscopy**, Ultramicroscopy **108** (10) 999-1004 (2008)
32. A.M. Schilowitz, D.G. Yablon, E. Lansey, F.R. Zypman, **Measuring hydrocarbon viscosity with oscillating microcantilevers**, Measurement **41** (10) 1169-1175 (2008)
33. F.R. Zypman, C.M. Bastuscheck, **Mapping of normal modes by perturbation**, Am. J. Phys. **76**(6) 533 (2008)
34. F.R. Zypman , **Instantaneous center of rotation and centrodes: background and new examples**, The International Journal of Mechanical Engineering Education **35** (1) 79-90 (2007)
35. E. Lansey, A. Lapin, F. Zypman, **Level statistics in disordered linear networks**, Physica A: Statistical Mechanics and its Applications **386** (2) 655-658 (2007)
36. M. Bastuscheck, F. Zypman, **Electromagnetic cavity to explore disordered systems**, Physica A: Statistical Mechanics and its Applications **386** (2) 633-639 (2007)
37. A.I. Frenkel, L. D. Menard, P. Northrup, J. A. Rodriguez, F. Zypman, D. Glasner, S.-P. Gao, H. Xu, J. C. Yang, R. G. Nuzzo **Geometry and Charge State of Mixed-Ligand Au₁₃ Nanoclusters**, AIP Conf. Proc. **882**, 749-751 (2007)
38. F.R. Zypman, **Exact expressions for colloidal plane-particle interaction forces and energies with applications to atomic force microscopy**, J. Phys. Condens. Matter. **18**, 2795 (2006)
39. F.R. Zypman, J Ferrante, **Gradient Equivalent Crystal Theory**, J Phys Condens Matter **18**, 6095 (2006)
40. J Ferrante, F.R. Zypman, **Generalization of equivalent crystal theory to include angular dependence**, Comp Mater Science **36**, 425 (2006)
41. F.R. Zypman, **Scanning Force Microscopy in the classroom**, Mat. Res. Soc. **909 E** (2006)
42. S Buldyrev, J Ferrante, F Zypman, **Dry friction avalanches: experiment and theory**, Phys Rev E **74**, 066110 (2006)
43. F Zypman, **Off-axis electric field of a ring of charge**, Am J Phys **74** 295 (2006)
44. F. Zypman, **Solvable Hamiltonian For Superlattice Nanowires**, Phys. Rev. B **71**, 165313 (2005)
45. E. Lansey, F. Zypman, **Elasticity Of Microcapsules With AFM**, Mat Res Soc **838**, O10.14 (2005)

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. Res. Soc. **738**, 299 (2003)
58. O. Cohen, F.R. Zypman, **EM-wave characterization of tumor morphology**, Antennas and Propagation, IEEE **3** (22-27) 1083-1086 (2003)
59. Fredy R Zypman, Steven J Eppell, **Scanning force microscope to determine interaction forces with high frequency cantilever**, US Patent Number 6,452,170, September 17 (2002)
60. C. Guerra-Vela, F. Zypman, **The poor man's scanning force microscope**, European Journal of Physics **23**, 145 (2002)
61. F.R. Zypman, G.A. Cwilich, **Electromagnetic waves through disordered systems: comparison of intensity, transmission and conductance**, MRS **699**, 264 (2002)
62. B.A. Todd, S.J. Eppell and F.R. Zypman, **Squeezing out hidden force information from scanning force microscopes**, Applied Physics Letters **79**, 1888 (2001)
63. F.R. Zypman, **Density of states on a staircase**, Am J Phys **69**, 1156 (2001)
64. G.A Cwilich, F.R. Zypman, **Transmittance quantities probability distributions of waves through disordered systems**, in *Advances in Materials Theory and Modeling-Bridging over Multiple-Length and Time Scales*, ed V Bulatov et al, **677**, AA451 (2001)
65. F.R. Zypman, **STM spectroscopy of polymers**, Scanning **24**, 154 (2002)

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 scatterer's shape on heat deposition: T-Matrix approach**, Applied Computational Electromagnetics **17**, 170 (2001)
70. F.R. Zypman, C. Guerra-Vela, **The macroscopic scanning force 'microscope'**, Eur. J. Phys. **22**, 17-30 (2001)
71. B.A. Todd, S.J. Eppell, F.R. Zypman, **Improved analysis of the time domain response of scanning force microscope cantilevers**, Journal of Applied Physics **88**, 6973-7369 (2000)
72. F.R. Zypman, **New advances in scanning probe spectroscopy: Theory and applications**, Recent Res Devel. Vacuum Sci & Tech **2**, 149-163 (2000)
73. F.R. Zypman, S.J. Eppell, **Scanning force microscope with high frequency cantilever**, US Patent Number 6,145,374, November 14 (2000)
74. S.J. Eppell, B.A. Todd, F.R. Zypman, **Improved Algorithm to Extract Force-Distance Curves from Scanning Force Microscope Data**, in *Materials Issues and Modeling for Device Nanofabrication*, ed. L. Merhari, et.al., **584**, 189 (2000)
75. R.R. Canales, L.F. Fonseca, F.R. Zypman, **Effect of eccentricity on electric field profiles in ellipsoids**, Computing Research **2**, 7 (2000)
76. R.R. Canales, L.F. Fonseca, F.R. Zypman, **T-Matrix computer code applied to electromagnetic field penetration in Magnetic Resonance Imaging**, Applied Computational Electromagnetics **16**, 189 (2000)
77. R.R. Canales, L.F. Fonseca, F.R. Zypman, **Magnetic Resonance Imaging Heat Deposition in Non-uniform Ellipsoidal Objects**, Computing Research **1**, 71 (1999)
78. L. Blum, M.D. Legault, F.R. Zypman, **Surface morphology and chemically active sites on Ru-based ultracapacitors: Montecarlo simulations with Embedded Atom potentials**, Modeling and Simulation of Microsystems **2**, 75 (1999)
79. D. Rodriguez, F.R. Zypman, **Medidas dieléctricas mediante un analizador de redes escalar**, Materia, virtual peer reviewed journal <http://www.sm2000.coppe.ufrj.br/mirror/artigos/artigo10028/> (1999)
80. Fredy R Zypman, **Quantum Engineering: From Electrons to your Compact Disc**, for general audience, Morris Publishing (1999)
81. I. Ramos, F. Zypman, J. Santiago, A. McGhie, **Penn-UPR Materials Program (PUMP)**, MRS Frontiers in Education 13a9, 1, (1999)
82. F.R. Zypman, S.J. Eppell, **High Frequency Response of a Scanning Force Microscope Cantilever**, J Vac Sci Technol **B16**, 2099 (1998)

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, Condes 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, **Disordering in ⁶⁹GaAs/⁷¹GaAs Isotope Superlattice Structures**, J Appl Phys **72**, 5206 (1992)
98. F. Tan, H. You, U. Gösele W. Jäger, F. Zypman, R Tsu, S Lee, **Disordering and Characterization Studies of ⁶⁹GaAs/⁷¹GaAs 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. Amartur, J. Mitchell, M. Clampitt, C. Paschal, **Optimizing Blood Vessel Contrast in Fast Three-Dimensional MRI**, Magnetic Resonance in Medicine **14**, 202 (1990)
102. R. Tsu, F.R. Zypman, R.F. Greene, **Effects of Charge Transfer on the Microscopic Theory of Strain-Layer Epitaxy**, Mat Res Soc Proc, **148**, 373 (1989)
103. R.W. Brown, E.M. Haacke, M.A. Martens, J.L. Patrick, F.R. Zypman, **A Layer Model for RF Penetration, Heating and Screening in NMR**, J Mag Res **80**, 225 (1988)
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PRESENTATIONS

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1. F. Zypman, Y. Mehlman, **A Graphic User Interface for Scanning Probe Microscope (SPM) Force Reconstruction**, in Nanoparticles at the interface between biology and the materials world, The David Lopatie Conference Centre Weizmann Institute of Science, Israel, July 5-6, **2015**
2. Fredy Zypman, Yoni Mehlman, **Scanning Probe Microscope Force Reconstruction Algorithm via Time-Domain Analysis of Cantilever Bending Motion**, Israel Vacuum Society Conference September **2014**
3. F.R. Zypman, **Viscosity of ionic liquids from transfer function of AFM cantilever**, NASA Glenn, August **2013**
4. Fredy Zypman, Steven Eppell, Israel Vacuum Society Conference, **Ion size effect in electrostatic forces from AFM**, October **2013**
5. Fredy Zypman, Israel Vacuum Society Conference, **Dissipation in Atomic Force Microscopy sensors**, June **2012**
6. Fredy Zypman, Steven Eppell, **Surface Charge of Nanoparticles in Liquids from Force-distance Curves**, Fall Meeting of the Materials Research Society, Boston, November **2012**
7. S. Eppell and F. Zypman, **Force-Distance Curves to Measure Nanoparticle Surface Charge Density in Aqueous Media**, 14th, International Scanning Probe Microscopy Conference, Toronto, Ontario, Canada, June 15 – 18, **2012**
8. M. Kornbluth, F. Zypman, **New Families of Coherent States of the Supersymmetric Oscillator**, Meeting of the American Physical Society, Boston, March **2012**

9. Fredy Zypman, Israel Vacuum Society Conference, **Particle Electrostatic Interactions in Liquids**, June 6, **2011**
10. Fredy Zypman, Giambiagi Winter School, **Spectroscopy of nanowires with scanning tunneling microscopy**, July 18 **2011**
11. F. Zypman. **Particle Electrostatic Interactions in Liquids**, June 14-16, **2011**, Case Western Reserve University, Cleveland OH
12. July 18, 2011 **Atomic force microscopy in liquids**, May 4, **2010**, University of Minnesota, Minneapolis
13. **Tunneling through quantum wires**, July 20, **2010**, Giambiagi Winter School, Universidad de Buenos Aires, Argentina
14. Invited talk, Sphere-plane forces in liquids with applications to AFM and cell interactions, July 30, **2009**, NASA Glenn Research Center, Brookpark, OH
15. Invited talk, Stick-slip in dry friction, June 26, **2009**, Departamento de Física, Facultad de Ciencias, Montevideo, Uruguay
16. Experimental Study of Dissipation Mechanisms in AFM Cantilevers, in 12th International Conference on Non-Contact Atomic Force Microscopy, Yale University, New Haven, CT, USA, August 11, **2009**
17. Determination of g with a microphone, American Association of Physics Teachers Summer Meeting, GG01, Ann Arbor, MI, July 29, **2009**
18. Phase build up in magnetic Aharonov-Bohm effect in 50 years of the Aharonov-Bohm effect, Tel Aviv University, October 12, **2009**
19. The Tlönian Cone in Borges and Us: Then and Always, Hofstra Cultural Center, Hempstead, New York, November 14, **2009**
20. Mechanical Properties Al-Ag Alloys Suspended Atomic Chains, 6th – 10th July, 2008 - Buenos Aires, Argentina, 15th International Symposium on Metastable, Amorphous and Nanostructured Materials
21. Invited Talk, Sphere-plane forces in liquids with AFM, July 3, 2008, Facultad de Ciencias, Montevideo, Uruguay
22. Platinum Nanoparticles on SWNT Nanopaper Support: Synthesis, Characterization and Application in Electrocatalysis, MRS 2008, Symposium JJ: Nanotubes, Nanowires, Nanobelts, and Nanocoils, Promise, Expectations, and Status, Boston
23. The influence of roughness on the mechanical spectroscopy of SiO₂ nanorods grown by e-beam irradiation, 9th International Workshop on Beam Injection Assessment of Microstructures in Semiconductors (BIAMS 2008), Toledo, Spain, 29 June, 2008
24. Invited talk. International Scanning Probe Microscopy. Korea, June 2007. “Comparison of density of states and scanning tunneling spectroscopy current-voltage curves in nanowires”.
25. Invited Talk. Purdue University, Birck Nanotechnology Center. November 6 2007. “Sphere-plane forces in liquids with applications to AFM and cell interactions”.
26. Invited Talk. University of Puerto Rico Graduate Center. May 22 2007. “Microscopic origin of dry friction”.
27. “Substrate-dependent Homophilic Cadherin Interactions”, Fredy Zypman. International conference on biological physics, Montevideo, Uruguay, 26-31 August 2007

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-EPSCOR 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
35. C. M. Bastuscheck and F. Zypman , Experimental Frequency Shifts of Rectangular Cavity Modes as a tool to study random media, Panamerican School Initiative in December 2006 in Mar del Plata, Argentina.
36. "Explicit Form For The Tip-Sample Interaction In Liquid For Atomic Force Microscopy", Zypman, Coll 381, American Chemical Society Annual Meeting, Washington, Dc, August 2005
37. "Atomic Force Microscopy In General Physics", Materials Research Society Fall Meeting, Nov-Dec 2005
38. E. Lansey, F. Zypman, Elasticity Of Microcapsules With AFM, Materials Research Society Fall Meeting, December 2004
39. D. Yablon, A. Schilowitz, F. Zypman, Frequency Response Of Microcantileveres In Viscous Fluids, Materials Research Society Fall Meeting, December 2004
40. "Locations Of Impurities In Nanowires From Stm", Zypman, 11th Conference On Composite/Nano Materials, Aug 8-14 2004, Hilton Head, South Carolina.
41. "Soc In Dry Friction", Zypman, Invited Talk, Cleveland State University, October 27 2004
42. "Elasticity Of Microcapsules With Atomic Force Microscopy, Materials Research Society, Fall Meeting, 11/30/04.
43. "Thermodynamics In Quantum Supersymmetry", Fredy Zypman, Monday Afternoon, April 07 2003, Loews Philadelphia Hotel
44. "Self Organization In Dry Friction", Fredy Zypman, Annual Meeting of the Society Of Materials, Boston, December, 2003
45. "Imaging Of Disorder In Nanowires", Fredy Zypman, Annual Meeting of the Society Of Materials, Boston, December, 2003
46. "Stm Electrical Characterization Of Nanostructures", Fredy Zypman, Annual Meeting Of The Society Of Materials, Boston, December, 2003

47. Glasner, D., Frenkel, A.I, Zypman, F. R., Menard, L., Nuzzo, R. G.; "X-Ray absorption spectroscopy measurements and theoretical simulations of structure and morphology of gold nanoparticles", Annual NSLS Users Meeting, Brookhaven National Laboratory, Upton NY, May 2004.
48. Frenkel, A.I, Glasner, D., Zypman, F.R., Menard, L. and Nuzzo, R.G., 3D Structure of Gold Nanoparticles, Annual Meeting of American Physical Society, Montreal, Canada, March 2004.
49. Glasner, D., Frenkel, A.I, and F.R. Zypman, Geometrical Properties of Metal Nanoparticles, 227th National Meeting of the American Chemical Society, Anaheim, CA, March 2004.
50. "Extracting impurity position in nano-wires from Scanning Tunneling Microscopy", Fredy R Zypman, Jeremy B Stein, Materials Research Society Meeting, December (2002)
51. "Toward measuring single molecule electro- dynamic fields", Steven Eppell, Brian Todd, Fredy Zypman, Materials Research Society Meeting, December (2002)
52. Los Angeles American Physical Society, 2002
53. "Effects of EM Frequency and Object Morphology on Temperature Profiles by The Extended Boundary Condition Method", Rafael R. Canales-Pastrana Luis F. Fonseca Fredy R. Zypman, Naval Postgraduate School, Monterey, California, March (2002)
54. "Scanning tunneling microscopy spectroscopy of biomolecules", Fredy R Zypman, Scanning2001, New York, March-April (2001)
55. "Tunneling microscopy of nanochains", Fredy R. Zypman, Yeshiva University, Wilf Campus, December 20th (2001)
56. "Transmittance quantities probability distributions of waves through disordered systems", Fredy R. Zypman and Gabriel Cwilich, Materials Research Society meeting (2001)
57. "Non-linear force curves with the force Macroscope", Claudio Guerra-Vela, Fredy R Zypman, Materials Research Society meeting (2001)
58. Electrostatic-based embedded atom method potentials for ruthenium oxide Marc D Legault, Daniel E Bacelo, Fredy R Zypman, Edmund B. Webb III, American Physical Society annual meeting, March 13 (2001)
59. "Numerical studies of the statistical distribution of transmittance quantities in the propagation of a wave in a disordered system", Fredy R. Zypman, Gabriel A. Cwilich, American Physical Society annual meeting, March 13 (2001)
60. "Improved range and resolution in scanning force measurements", Brian Todd, Fredy R Zypman, Steven J Eppell, American Chemical Society, paper 253, San Diego, CA, April 2 (2001)
61. "The Macroscope: A macroscopic tool for validating microscopic force relationships", Claudio Guerra-Vela and Fredy R Zypman, MRS **684**, GG681 (2001)
62. "Effects of frequency and scatterer's shape on heat deposition: T-Matrix approach", Rafael R. Canales-Pastrana, Luis F. Fonseca, Fredy R. Zypman, Naval Postgraduate School, Monterey, California, March 2001

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 28th, 200
65. "Force reconstruction from SFM data", Fredy R Zypman, Yeshiva University, Wilf Campus, November 15th , (2000)
66. "Force and Tunneling Spectroscopies", Fredy R Zypman, Queens College, October 10 (2000)
67. "Enhanced 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 (ECT) to include angular dependence". John Ferrante , Fredy R. Zypman, Proc Mat Rec Soc (1999)
70. "Increased transferability of embedded atom method potentials using density functional theory". Lesser Blum, Ilya Grinberg, Marc D Legault, Andrew Rappe, Fredy R Zypman, Proc Mat Rec Soc (1999)
71. "Vacancy and divacancy contribution to the diffusion coefficient of transition metals". Fredy R. Zypman , Dimaries Nieves, Oscar Loera, Proc Mat Rec Soc (1999)
72. "Extracting surface force-separation information from high-frequency scanning force microscopy with minimal hardware changes". Steven J. Eppell, Fredy R. Zypman, Proc Mat Rec Soc (1999)
73. "Compartmentalization and Frequency Effects in Magnetic Resonance Imaging", Elio Ramos, Fredy R Zypman, Biomedical Imaging Symposium, organized by the NIH office of extramural research, on June 25–26, Natcher Conference Center, National Institutes of Health, Bethesda, MD (1999)
74. "MRI Electromagnetic Field Intensities And Local Power Deposition In Spherically Layered Configurations", Rafael Canales, Fredy Zypman, Luis F. Fonseca, Bull Am Phys Soc 44 (1999)
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76. "Vacancy Formation in FCC Transition Metals, Dimaries Nieves", Fredy R Zypman, Bull Am Phys Soc 44 (1999)
77. "Meter-Scale Model of a Scanning Force Microscopy Cantilever Operating at High Frequencies", Juan C Merced, Fredy R Zypman, Bull Am Phys Soc 44 (1999)
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81. "Cantilever Motion in Non-Contact Scanning Force Microscopy", Fredy R Zypman, Juan C Merced, Idalia Ramos, Carlos Negreira, Ramon Caraballo, Materials Research Society Fall Meeting, page 570 (1997)
82. "Theoretical Value for Peierls Dislocation Potential", Fredy R Zypman, Ariel Moreno, Gustavo Paolini, Materials Research Society Fall Meeting, page 393 (1997)
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85. "Tunneling Spectroscopy", Fredy R Zypman, course on Scanning Probe Microscopies, Universidad de Buenos Aires, Buenos Aires, 5-8 May (1997).
86. "Physical Properties of Nanostructures with Atomic Force Microscopy", Fredy R Zypman and Steven J Eppell, Fourth International Conference on Nanometer Scale Science & Technology, Beijing, September 8-10, (1996).
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89. "Identifying Charge Domains on Proteins Using Scanning Probe Microscopies", Steven J Eppell, Fredy R Zypman, Bull Am Phys Soc 41, 324 (1996).
90. "Surface and Impurity Correction of Embedding Atom Method Embedding Function" UPR-Río Piedras, Sept 21(1995).
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104. "Calibration of Electrostatic Charge Force in Contact Mode AFM", SJ Eppell, RE Marchant, FR Zypman Bulletin of the American Physical Society **38**, 543 (1993).
105. "Inelastic Scattering by Phonons in a Quantum Well With Impurities", FR Zypman, R Tsu, Bulletin of the American Physical Society **36**, 938 (1991).
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107. "Damping Via Relaxation Time in Quantum Wells" FR Zypman, Vera B Campos, Raphael Tsu, Bulletin of the American Physical Society **34**, 876 (1989).
108. "RF penetration at high frequencies in the human body", FR Zypman, EM Haacke, RW Brown, JL Patrick, Proc RSNA **73**, 130 (1987).
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