DOUGLAS NATELSON

Department of Physics and Astronomy
Rice University, MS: 61
6100 Main St.
Houston, TX 77005
(713) 348-3214
natelson@rice.edu
http://natelson.web.rice.edu
http://nanoscale.blogspot.com

RESEARCH INTERESTS

Nanoscale and disordered materials; coherence and correlations in systems of reduced dimensionality; quantum and molecular electronics; plasmonics; nanoscale optoelectronics; novel device fabrication methods.

PROFESSIONAL EXPERIENCE

7/16-present **Chair**, Department of Physics and Astronomy, Rice University

7/10-present **Professor**, Department of Physics and Astronomy, Rice University; member, Rice Quantum Institute; courtesy appointment, Dept. of Electrical and Computer Engineering. Since 1/14, also courtesy appointment, Dept. of Materials Science and Nanoscale Engineering.

7/06-7/10 **Associate Professor**, Department of Physics and Astronomy, Rice University; member, Rice Quantum Institute; courtesy appointment, Dept. of Electrical and Computer Engineering.

8/00-7/06 **Assistant Professor**, Department of Physics and Astronomy, Rice University; member, Rice Quantum Institute; courtesy appointment (9/01) Dept. of Electrical and Computer Engineering.

10/98-8/00 **Postdoctoral Member, Technical Staff**, Bell Laboratories, with Dr. R.L. Willett.

9/93-8/98 **Research Assistant**, Stanford University, with Prof. D. D. Osheroff.

EDUCATION

9/93-8/98 **Stanford University**, Stanford, CA - Ph.D. in Physics, "Collective behavior of tunneling systems in amorphous solids", advisor: Prof. D.D. Osheroff

9/89-6/93 **Princeton University**, Princeton, NJ - BSE in Mechanical and Aerospace Engineering, Program in Engineering Physics, *summa cum laude*

TEACHING EXPERIENCE

Professor: Department of Physics and Astronomy, Rice University (current)

- *Nanostructures and Nanotechnology I (PHYS 533, Fall 2002-5, 2020)* – This course gives an overview of condensed matter physics, emphasizing where standard bulk solid state physics assumptions fail at the nanoscale. Following this overview, two topics are presented in depth: nanoelectronics (device physics, current practices, new technologies and opportunities) and nanoscale magnetism (basic magnetic physics, practices in data storage, and frontier topics at the nanoscale). Typical enrollment of approximately 20 students.

- *Nanostructures and Nanotechnology II (PHYS 534, Spring 2003-4, 2006-9, 2011-15)* – This course is the continuation of PHYS 533, and includes in-depth examination of four topics, each with an introductory presentation of the relevant physics. The topics are: photonics (including lasers, photonic band gap systems, and plasmonics), micro/nanomachines (including friction, quantum forces, and fundamental limits on mechanical devices at the nanoscale), micro/nanofluidics (including nanoscale failures of hydrodynamic and continuum approximations, lab-on-a-chip applications), and integrated nanosensing.

- *Statistical and Thermal Physics (PHYS425, Fall, 2001, 2006-8, 2016-19)* – This is a senior-level undergraduate course that covers a variety of topics in thermodynamics and statistical mechanics, including: thermodynamic derivatives and cycles; microcanonical, canonical, and grand canonical ensembles; kinetic theory; equipartition; classical and quantum harmonic oscillators; Einstein and Debye specific heat; blackbody radiation; Bose-Einstein condensation; Fermi gases; phase transitions; and the Ising model.

- *Methods of Experimental Physics I (PHYS 537, Fall, 2009)* – This graduate level course is part of a two-course sequence intended to expose first-year graduate students to various experimental techniques. This semester focuses on mechanical design, basic statistics, analog and digital electronics, and vacuum systems.

- *Honors Mechanics (PHYS 111, Fall 2010-15)* – This is the honors track of freshman mechanics, with an emphasis on mathematical sophistication beyond the usual calculus-based physics track. This course is intended for potential physics majors as well as engineers, and covers Newtonian kinematics and dynamics, conservation of linear momentum, energy, and angular momentum, orbital mechanics, and special relativity.

- *Introduction to Nanoscale Science and Technology (PHYS600, Fall, 2000)* – This was a special topics course that gave an overview of nanoscale physics, with an emphasis on mesoscopic physics.

Teaching Assistant: Department of Physics, Stanford University (1993-4)
- Advanced Undergraduate Lab (low temperature physics)
- Introductory Electricity and Magnetism for Physicists
- Light and Heat for Premedical Students

ACADEMIC SERVICE

2020-21 **Member**, Shared Equipment Authority; SCI advisory committee; Science, Technology, & Society committee; The Welch Institute faculty advisory committee, thesis committees
Chair, Department of Physics and Astronomy
Associate, Wiess College

2019-20	**Member**, Shared Equipment Authority; Sloan Professional Masters oversight committee; SCI advisory committee; Science, Technology, & Society committee; thesis committees **Chair**, Department of Physics and Astronomy **Associate**, Wiess College
2018-19	**Member**, Shared Equipment Authority; cleanroom subcommittee; Sloan Professional Masters oversight committee; SCI advisory committee; Science, Technology, & Society committee; thesis committees **Chair**, Department of Physics and Astronomy **Associate**, Wiess College
2017-18	**Member**, Applied Physics graduate committee, Shared Equipment Authority, cleanroom subcommittee, Sloan Professional Masters oversight committee, SCI advisory committee, thesis committees **Chair**, Department of Physics and Astronomy **Associate**, Wiess College
2016-17	**Member**, Applied Physics graduate committee, Shared Equipment Authority, Sloan Professional Masters oversight committee, SCI advisory committee, thesis committees **Chair**, Department of Physics and Astronomy **Associate**, Wiess College
2015-16	**Member**, Applied Physics graduate committee, Sloan Professional Masters oversight committee, SCI advisory committee, thesis committees **Chair**, Shared Equipment Authority, P&A Graduate Program Committee **Associate**, Wiess College
2014-15	**Member**, ad hoc BRC committee, Applied Physics graduate committee, Sloan Professional Masters oversight committee, RQI + SI advisory committees, thesis committees **Chair**, Shared Equipment Authority, P&A Graduate Program Committee **Associate**, Wiess College
2013-14	**Member**, Research Advisory Group (*ex officio*), Applied Physics graduate committee, Sloan Professional Masters oversight committee, RQI Steering committee, dept. long-range strategic planning committee, thesis committees **Chair**, University Committee on Research, Shared Equipment Authority **Associate**, Wiess College
2012-13	**Member**, Research Advisory Group (*ex officio*), Applied Physics graduate committee, Sloan Professional Masters oversight committee, RQI Steering committee, dept. graduate committee, thesis committees **Chair**, University Committee on Research, Shared Equipment Authority, dept. faculty search committee. **Associate**, Wiess College
2011-12	**Member**, Research Advisory Group (*ex officio*), Applied Physics graduate program, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis committees **Chair**, University Committee on Research, Shared Equipment Authority, dept. faculty search committee (co-chair).

Associate, Wiess College

2010-11 **Member**, Research Advisory Group (*ex officio*), Shared Equipment Authority, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis committees
Chair, University Committee on Research, Applied Physics graduate program; co-director of Keck Program in Quantum Materials
Associate, Wiess College

2009-10 **Member**, University Council, Research Advisory Group, Shared Equipment Authority, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis committees
Chair, Applied Physics graduate program; co-director of Keck Program in Quantum Materials
Associate, Wiess College

2008-9 **Member**, University Council, Research Advisory Group, Shared Equipment Authority, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis committees (Chi Zhang (MS), Juan Duque (PhD), Rajiv Giridharagopal (PhD candidacy), Victoria Astley (MS))
Chair, Applied Physics graduate program; co-director of Keck Program in Quantum Materials
Associate, Wiess College

2007-8 **Member**, University Council, Research Advisory Group, Shared Equipment Authority, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis committees (Manuel Mendes, Kristjan Stone, Andrew Osgood, Anna Paulson (MS), Harold White, Zhongqing Ji)
Chair, Applied Physics graduate program; co-director of Keck Program in Quantum Materials
Associate, Wiess College

2006-7 **Member**, University Council, Shared Equipment Authority, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis committees (Seiji Yamamoto, Raj Giridharagopal, Sasa Zaric, Felicia Tam, Josh Falkner, Anton Naumov), Search committee for Dean of Graduate and Postdoctoral Studies
Chair, Applied Physics graduate program, departmental search committee for experimental condensed matter physics faculty position; co-director of Keck Program in Quantum Materials
Associate, Wiess College

2005-6 **Member**, Shared Equipment Authority, Sloan Professional Masters oversight committee, RQI Steering committee, dept. curriculum committee, thesis proposal committee (Juan Duque, Chemical Engineering), thesis committee (Nolan Harris), University Council
Chair, Applied Physics graduate program
Associate, Wiess College

2004-5	**Member**, Shared Equipment Authority, Sloan Professional Masters oversight committee; University Parking Committee, CM theory search committee, Masters thesis committee (Andrew Osgood, ECE) **Chair**, Applied Physics Graduate recruiting committee (Rice Quant. Inst.), Gulf Coast Undergraduate Research Symposium (Rice Quant. Inst.). **Associate**, Wiess College.
2003-4	**Member**, Shared Equipment Authority, Sloan Professional Masters oversight committee; University Parking Committee, CM experiment search committee, Masters thesis committee (Joy Sarkar, Physics and Astronomy), PhD committee (Joe Jackson, Physics and Astronomy) **Chair**, Applied Physics Graduate recruiting committee (Rice Quant. Inst.), Gulf Coast Undergraduate Research Symposium (Rice Quant. Inst.). **Associate**, Wiess College.
2002-3	**Member**, Shared Equipment Authority, Sloan Professional Masters oversight committee; University Parking Committee, AMO theory search committee **Chair**, Applied Physics Graduate recruiting committee (Rice Quant. Inst.), Gulf Coast Undergraduate Research Symposium (Rice Quant. Inst.). **Associate**, Wiess College.
2001-2	**Member**, Graduate admissions committee, condensed matter theory search committee (Rice Dept. of Physics and Astro.), Shared Equipment Authority, Sloan Professional Masters oversight committee, Masters thesis committee (Jigang Wang, ECE) **Chair**, Applied Physics Graduate recruiting committee (Rice Quant. Inst.), Gulf Coast Undergraduate Research Symposium (Rice Quant. Inst.). **Associate**, Wiess College.
2000-1	**Member**, Graduate curriculum committee (Rice Dept. of Physics and Astro.), Applied Physics Program admissions committee (Rice Quantum Inst.).
1994-8	**Member**, Graduate Studies Committee, Stanford Dept. of Physics.
1994-7	**Member**, Qualifying Examination Committee, Stanford Dept. of Physics.
1996-7	**Student Representative**, Stanford Faculty Senate of the Academic Council.
1995-7	**Representative**, Stanford student government. •Conceived and conducted university-wide survey of graduate student life. •Administered student-run teaching award. •Began drive for university-wide review of teaching assistant training.

HONORS

- APS Fellow (Division of Condensed Matter Physics), 2012.
- AAAS Fellow (Physics), 2012.
- Member, Defense Sciences Study Group (2010-2011)
- Discovery Magazine's "Top 20 Scientists under 40", 2008.
- NSF CAREER award (2004-2009)
- Sloan Research Fellowship (2004-2006)
- David and Lucille Packard Fellowship (2003-2008)

- Outstanding Faculty Associate, Wiess College, 2001-2002.
- Hertz Fellowship (1993-8)
- National Science Foundation Fellowship (1993) (declined)
- Goldwater Scholarship (1991)
- Phi Beta Kappa, Sigma Xi, Tau Beta Pi

PROFESSIONAL ACTIVITIES

- Defense Sciences Study Group alumni board (12/18-present)
- Advisory board, IOP journal *Nanotechnology* (10/17-10/19)
- Speaker, "Taste of Science Houston" (4/18)
- Member at Large; member, Fellowship Committee, APS Division of Condensed Matter Physics (3/16-3/19)
- Organizer, workshop on "Interacting Quantum Systems Out of Equilibrium", Rice University, May, 2016
- Science Movie Nights with Rice's Baker Institute for Public Policy (10/15, 12/15)
- Blogger (nanoscale.blogspot.com) about nanoscale and condensed matter physics (2005-present)
- Speaker, NerdNite Houston 2014 (https://www.youtube.com/watch?v=J6Lr0xxZzBU)
- Speaker, 9th Story podcast (http://www.9thstory.com/303/)
- Co-organizer, ARO-sponsored workshop at Rice on "Heavy Fermion Materials and Quantum Phase Transitions", December, 2013
- Co-organizer, ARO-sponsored workshop at Rice on "Surface Plasmons, Metamaterials, and Catalysis", October, 2013
- "Ask a Scientist"/NanoDays at Children's Museum of Houston (2008-2012)
- Organizer of APS DMP invited symposium (2008 March APS Meeting)
- Science fair judging, Pershing Middle School (2008)
- Program book committee, 2007 International Strongly Correlated Electronic Systems (SCES) conference
- Co-director, W.M. Keck Program in Quantum Materials (2007-10)
- BBC interview (11/9/06) regarding Fe_3O_4 nanoparticle water purification
- Participated in Quarknet summer outreach panel discussion on science funding (2006)
- Participated in Nano Education for Students and Teachers summer program (2006)
- Course director for Lockheed Martin week-long nanotechnology short course (2005, 2006, 2007)
- Session chair, 2005-12 APS March Meetings
- Organizer of APS DMP invited symposium (2005 March APS Meeting)
- Reviewer for: PRL, PRB, JACS, APL, JAP, PNAS, J. Phys. Chem, Nature, Nature Nanotechnology, Nature Materials, JEM, Physica E, IEEE, Nano Lett., ACS Nano
- Frontiers of Science Symposium (US/UK) participant (2004)
- Program Committee Member, LT-24 (2004-5)
- Lab tours for Science Academy of South Texas, Milby Science Summer Institute (2004, 2006)
- Discussion leader at 2003 Gordon Research Conference on condensed matter physics.
- Participated in ASM panel discussion on nanotechnology and materials (4/03)
- Judge for Houston 2003 Science and Engineering Fair
- Reviewer for Civilian Research and Development Foundation
- Reviewer for NSF SBIR, NSF EPDT, NSF DMR, DOE BES, ARO.
- APS, MRS, AAAS
- Chaired session at Texas Section APS meeting (October, 2000)

DOCTORAL STUDENTS

- Dr. Lam H. Yu (PhD 2005, "Transport in Single Molecule Transistors")
- Dr. Behrang H. Hamadani (PhD 2006, "Electronic Charge Injection and Transport in Organic Field-Effect Transistors")
- Dr. Aaron Trionfi (PhD 2006, "Electronic Phase Coherence in Mesoscopic Normal Metal Wires")
- Dr. Sungbae Lee (PhD 2007, "Electron Transport in Ferromagnetic Nanostructures")
- Dr. Zachary Keane (PhD 2009, "Transport Phenomena in Molecular-Scale Devices")
- Dr. Alexandra Fursina (PhD 2010, "Investigation of Electrically Driven Transition in Magnetite, Fe_3O_4, Nanostructures")
- Dr. Daniel Ward (PhD 2010, "Electrical and Optical Characterization of Molecular Nanojunctions")
- Dr. Jeffrey H. Worne (PhD 2012, "Charge Transport and Transfer at the Nanoscale Between Metals and Novel Conjugated Materials")
- Dr. Jun Yao (PhD 2012, co-advised with Prof. James Tour, "Resistive Switching and Memory Effects in Silicon Oxide Based Nanostructures")
- Dr. Patrick J. Wheeler (PhD 2014, "Quantum Shot Noise Characteristics in Atomic Scale
- Junctions at Liquid Nitrogen and Room Temperatures Using Novel Measurement Technique")
- Dr. Heng Ji (PhD 2015, "Hydrogen doping and the metal-insulator phase transition in vanadium dioxide")
- Dr. Kenneth Evans (PhD 2015, "Photoresponse of bowtie nanojunctions")
- Dr. Ruoyu Chen (PhD 2016, "RF shot noise measurements in Au atomic-scale junctions")
- Dr. Yajing Li (PhD 2016, "Surface-enhanced vibrational spectroscopy and electrical characterization on nanojunctions")
- Dr. Will Hardy (PhD 2017, "Nanoscale electronic transport studies of novel strongly correlated materials")
- Dr. Loah A. Stevens (PhD 2019, "Noise processes in atomic-scale junctions and two-dimensional topological insulators")
- Dr. Charlotte I. Evans (PhD 2019, "Bicrystals and Bowties: Photothermoelectric and plasmonic effects of gold nanoscale structures")
- Dr. Panpan Zhou (PhD 2019, "Shot Noise Measurements in Strongly Correlated Materials")
- Dr. Xifan Wang (PhD 2020, "Photothermoelectric Effects in Gold Nanostructures")
- Current: Mahdiyeh Abbasi, Xuanhan Zhao, Liyang Chen, Yunxuan Zhu, Dale Lowder, Renjie Luo

POSTDOCTORAL RESEARCHERS

- Dr. Gavin Scott (2007-2010), now at Alcatel-Lucent Bell Laboratories.
- Dr. Jiang Wei (2010-2012), now tenured faculty in physics at Tulane University.
- Dr. Joseph Herzog (2011-2013), now tenure-track faculty in engineering at University of Indianapolis
- Dr. Pavlo Zolotavin (2013-2017), now at Lam Industries
- Dr. Longji Cui (2018-2020), now tenure-track faculty in mechanical engineering at the University of Colorado

INVITED PRESENTATIONS

4/20 *Colloquium*, Carnegie Mellon University

3/20 *Chez Pierre seminar*, Massachusetts Institute of Technology

10/19 *Invited talk*, joint Rice-Mainz workshop, "Noise reveals unusual pairs in cuprate superconductors"

9/19 *Invited presentation*, DOE Experimental Condensed Matter Physics PI meeting, "Nanostructures studies of correlated quantum materials"

8/19 *Invited talk*, ACS meeting, San Diego, CA, "Plasmons and hot electrons: Open-circuit photovoltages and bias-driven light emission"

2/19 *Colloquium*, University of Texas Rio Grande Valley, "Noise reveals unusual pairs in superconductors"

10/18 *Condensed matter seminar*, Northwestern University, "Nanostructures and strongly correlated materials"

4/18 *Colloquium*, University of Houston, Department of Physics, "Heating, thermoelectricity, and hot electrons at the nanoscale"

4/18 *Invited seminar*, Harvard Center for Integrated Quantum Materials, "Nanostructures and strongly correlated materials"

1/18 *Invited talk*, SPIE meeting/Photonics West, "Photovoltages and hot electrons in plasmonic nanogaps"

9/17 *Invited presentation*, DOE Experimental Condensed Matter Physics PI meeting, "Nanostructures studies of strongly correlated materials"

7/17 *Invited talk*, International meeting, Quantum Transport in Nanoscale Molecular Systems, Telluride, CO, "Photothermoelectricity and hot electron photocurrents in nanoscale junctions"

1/17 *Colloquium*, Ohio University, "Heating and thermoelectricity at the nanoscale"

12/16 *Seminar*, Ginzton Seminar Series, Stanford University, "Heating and photothermoelectricity in nanoscale junctions"

6/16 *Invited talk*, Harvard/MIT Center for Integrated Quantum Materials, Frontiers in Quantum Materials and Devices 2016 workshop at RIKEN, Tokyo, "Nanoscale devices to examine correlated materials"

5/16 *Invited talk*, Rice Center for Quantum Materials, Interacting Quantum Systems Out of Equilibrium workshop, "Nanostructures biased out of equilibrium: Heating and other effects"

4/16 *Plenary talk*, Pittsburgh Quantum Institute, PQI 2016 – Quantum Challenges, "Heating and vibrations at the molecular scale"

2/16 *Seminar*, Department of Chemistry, University of Pennsylvania, "Plasmonic junctions: Vibrational tuning and heating at the nanoscale"

2/16 *Colloquium*, Department of Physics, Oklahoma State University, "How does heating work at the nanoscale?"

1/16 *Seminar*, Department of Physics, National Chiao-Tung University, Taiwan, "How does heating work at the nanoscale?"

11/15 *Invited presentation*, Spring Wood High School STEM symposium, "Physics – what it is, and why you should care"

11/15 *Invited presentation*, Smalley-Curl Institute Graphene Day, "2d Materials: Opportunities for Electronics, Magnetism, and Optics"

6/15 *Invited talk*, the Batsheva de Rothschild Seminar on Molecular Electronics 2015, "Tuning vibrational energies in single-molecule junctions"

4/15 *Colloquium*, Department of Physics, University of Kentucky, Lexington, KY, "How does heating work at the nanoscale?"

4/15 *Colloquium*, Department of Physics, Tulane University, New Orleans, LA, "Nanostructures and strongly correlated materials"

3/15 *Invited talk*, American Chemical Society national meeting, Denver, CO, "Nanogap plasmonic structures for Raman studies of single molecules and heating"

2/15 *Colloquium*, Department of Physics, Louisiana State University, Baton Rouge, LA, "Heating in atomic- and molecular-scale junctions"

12/14 *Condensed matter seminar*, Department of Physics, Columbia University, "How does heating work at the nanoscale?"

10/14 *Invited talk*, Rice University NorTex US-Norway conference, "Vanadium dioxide: A switchable permeable membrane for hydrogen"

9/14 *Invited talk*, University of Konstanz, international workshop on "Controlled Charge and Heat Transport at the Molecular Scale", "Raman, noise, and resistance measurements to assess heating at the nanoscale"

7/14 *Poster*, Gordon Research Conference on Strongly Correlated Materials, Mt. Holyoke, "Hydrogen-stabilized metallic states in VO2: structure and transport"

5/14 *Invited talk*, University of Buffalo *Physics at the Falls* workshop on oxides, "Vanadium dioxide and hydrogen: Doping and the metal-insulator transition"

4/14 *Colloquium*, Department of Physics, SUNY Binghamton, "How does heating work at the nanoscale?"

1/14 *Invited talk*, NerdNite Houston, "Presenting science to the public: 'It's late; we're all tired; why should any of us care about anything you're saying?'"

12/13 *Invited talk*, ARO workshop on Heavy Fermion Materials and Quantum Phase Transitions, Rice University, "Nanoscale junctions to examine Kondo systems out of equilibrium"

10/13 *Condensed matter seminar*, Department of Physics, Texas A&M University, "Heating at the nanoscale: Vibrational and electronic processes"

09/13 *Presentation*, DOE Basic Energy Sciences experimental condensed matter physics PI meeting, "Nanostructure studies of strongly correlated materials"

09/13 *Poster*, 25th Anniversary Packard Fellows Meeting, Denver, CO, "Heating and electronic interactions approaching the atomic scale"

07/13 *Invited talk*, International meeting, Quantum Transport in Nanoscale Molecular Systems, Telluride, CO, "Electron heating (and voltage tuning of molecular properties) in nanoscale junctions"

04/13 *Invited talk*, International meeting, Building Blocks for Carbon-Based Electronics: From Molecules to Nanotubes, University of Regensburg, Germany, "Molecular-scale Raman as a tool: Bias-driven shifts of C_{60} vibrational states"

02/13 *Seminar*, Department of Chemistry, UCSD, San Diego, CA, "Molecular scale junctions out of equilibrium: Raman measurements"

02/13 *Colloquium*, Department of Physics, Pomona College, Claremont, CA, "Heating at the nanoscale"

01/13 *Colloquium*, Department of Physics, University of Alberta, Edmonton, "Molecular scale junctions out of equilibrium: Raman and noise measurements"

11/12 *Invited talk*, TransAtlantic Science Week, Houston, TX, "Nanoscale plasmonic junctions for sensing and optoelectronic applications"

07/12 *Invited talk*, International meeting, Molecular Electronics in Jerusalem, Hebrew University, Jerusalem, Israel, "Molecular scale junctions out of equilibrium: Raman and noise measurements"

05/12 *Invited talk*, International CECAM workshop on Quantum Transport in Molecular Nanostructures, Trinity College, Dublin, Ireland, "Molecular scale junctions out of equilibrium: Noise and Raman spectroscopy"

02/12 *Colloquium*, Department of Physics, University of Illinois at Urbana Champaign, "Nanoscale junctions: optical effects, heating, and taking the temperature on the nanometer scale"

12/11 *Seminar*, Lockheed Martin Advanced Technology Center, Palo Alto, CA, "Plasmonics: Optical antennas, chemical sensing, and photodetection"

10/11 *Final presentation*, Defense Sciences Study Group, Institute for Defense Analyses, Washington, DC, "Asymmetric space warfare"

08/11 *Keynote lecture*, SPIE Nanoscience and Engineering Conference, San Diego, CA, "Plasmonics: Metallic Nanostructures and Their Optical Properties IX" session

08/11 *Plenary talk*, Rice Quantum Institute Summer Research Colloquium, "Taking the temperature of single molecules via surface-enhanced Raman spectroscopy"

05/11 *Invited talk/Summer school*, Developments and Prospects in Quantum Impurity Physics Advanced School and Workshop, Max Planck Institute for Complex Systems, Dresden

04/11 *Seminar*, Department of Physics, Purdue University, "Nanoscale Junctions: Optical Effects, Heating and Taking the Temperature at the Nanometer Scale"

11/10 *Seminar*, Texas Center for Superconductivity, University of Houston, "Nanostructures to examine strongly correlated materials: magnetite"

10/10 *Invited talk*, 65th Birthday Symposium in Honor of D. D. Osheroff, Stanford University, "Nanoscale physics and what I learned at Stanford"

09/10 *Lecture*, School of Continuing Studies, Rice University, "Nanoscale electronics and quantum effects"

05/10 *Seminar*, Department of Chemistry, Northwestern University, "Atomic and molecular scale devices: beyond dc electronic transport"

02/10 *Seminar*, Center for Complex Quantum Systems, University of Texas, "Beyond dc transport in atomic and molecular scale junctions"

01/10 *Invited talk*, International Conference on Molecular Electronics, Emmetten, Switzerland, "Beyond dc transport: electronic and optical measurements on single-molecule junctions"

12/09 *Colloquium*, University of Maryland Center for Nanophysics and Advanced Materials, "Atomic- and molecular-scale devices: Beyond DC electronic transport"

11/09 *Condensed matter seminar*, Michigan State University Dept. of Physics and Astronomy, "Atomic- and molecular-scale devices: Beyond DC electronic transport"

10/09 *Invited talk*, 2009 Hangzhou Workshop on Quantum Matter, Zhejiang University, China, "Correlations in single-molecule transistors and other nanoscale junctions"

09/09 *Colloquium*, Rice University Dept. of Physics, "Atomic- and molecular-scale devices: Beyond DC electronic transport"

09/09 *Invited talk*, International CECAM workshop on Quantum Transport at the Molecular Scale, Bremen, Germany, "Simultaneous measurements of Raman response and electronic conduction in single molecules"

05/09 *Invited talk*, National Nanotechnology Initiative Nanotechnology Enabled Sensing Workshop 2009, Arlington, VA, "Simultaneous electronic transport and Raman spectroscopy in single-molecule devices"

04/09 *Invited talk*, Carleton College, "Nanostructures for fun and (intellectual) profit"

03/09 *Invited talk*, American Physical Society March Meeting, Pittsburgh, "Simultaneous electronic transport and Raman spectroscopy in single-molecule devices"

03/09 *Invited colloquium*, Center for Nanoscale Materials, Argonne National Lab, "Nanostructures to examine transport, dissipation, and correlations"

12/08 *NSEC seminar*, Columbia University, "Single-molecule transistors: Tools for physics and physical chemistry"

10/08 *ECE colloquium*, Princeton University, "Single-molecule transistors: Tools for physics and physical chemistry"

09/08 *Invited colloquium*, University of Arizona, "Single-molecule transistors: Tools for physics and physical chemistry"

09/08 *Research presentation*, David and Lucille Packard Foundation annual fellows meeting, "Electronic and optical measurements of single molecules"

08/08 *Invited talk*, International Symposium on Organic Transistors and Functional Interfaces, Tsukuba, Japan, "Interfacial charge transfer and contact effects in nanoscale poly(3-hexylthiophene) transistors"

07/08 *Invited talk*, Young Engineering Scientists Symposium, French embassy, Washington, DC, "Nanometer scale devices as tools for examining physics and physical chemistry"

06/08 *Short invited talk,* ESPMI-08, Princeton, NJ, "Simultaneous measurements of single-molecule Raman and conduction response"

04/08 *Invited colloquium,* University of Houston IEEE Magnetics Society/Center for Nanomagnetic Systems, "Nanoscale electronic probes of magnetic materials"

04/08 *Physics colloquium*, Texas A&M University, "Single-molecule junctions: electronic and optical properties"

04/08 *Panel discussion,* Rice VISEN center Workshop on Probabilistic and Resilient Architectures for Nanoscale Computing, "Emerging Application Opportunities and Technology Challenges"

03/08 *Invited talk,* TX-UK Collaborative, Rice University, "Nanostructures for single-molecule chemical sensing"

02/08 *Seminar*, Lockheed Martin Corporation, Orlando, FL, "LANCER: Plasmonic IR detectors"

12/07 *Seminar,* NIST, "Nanostructures: new tools for physics, physical chemistry, and materials science"

11/07 *Materials science colloquium*, Carnegie Mellon University, "Nanostructures: new tools for physics, physical chemistry, and materials science"

10/07 *Invited talk,* Electrochemical Society national meeting, Washington, DC, "Contact effects in polymer field-effect transistors"

09/07 *Physics colloquium*, University of Houston, "Single-molecule transistors: new tools for physics and physical chemistry"

09/07 *Poster,* David and Lucille Packard Foundation annual fellows meeting, "Electrically-driven phase transition in magnetite nanostructures"

08/07 *Invited talk*, Workshop on Quantum Coherence in Nanoscale Devices, Max Planck Institute, Dresden, "Anomalous gate dependence of Kondo conduction in single-molecule transistors"

07/07 *Invited talk*, ACS/MRS Workshop on Organic Electronics, Seattle, WA, "Contact effects in polymer field-effect transistors"

05/07 *Contributed talk,* 2007 International Conference on Strongly Correlated Electronic Systems, Houston, "Anomalous gate dependence of Kondo conduction in single-molecule transistors"

04/07 *Poster + short talk*, NSF Grantees conference, Reno, NV, "NER: Atomic-scale magnetoresistive sensors"

04/07 *Invited talk*, AVS Symposium on Nanoscale Electronics, Carnegie Mellon University, "Single-molecule transistors: new tools for physics and physical chemistry"

01/07 *Condensed matter seminar*, University of Washington, "Single-molecule transistors: new tools for physics and physical chemistry"

01/07 *Invited talk*, American Association of Physics Teachers national meeting, Seattle, "Nanoelectronics"

11/06 *Invited talk*, Canadian Institute for Advanced Research Nanoelectronics conference, Banff, Canada, "Single-molecule transistors: tools for physics and physical chemistry"

10/06 *Condensed matter seminar*, Texas A&M University, "Time-dependent conductance fluctuations: new results"

09/06 *Poster*, David and Lucille Packard Foundation annual fellows meeting, "Electronic conduction and coherence in nanostructures with molecules"

08/06 *Research presentation*, Air Force Office of Sponsored Research Nanotechnology Workshop, Carnegie Mellon University, "SPRING and nanoscience research at Rice University"

08/06 *Invited talk*, SPIE annual meeting, San Diego, "Contact effects in polymer field-effect transistors"

05/06 *Research presentation*, Lockheed Martin Corporation, Washington, DC, "Nanotechnology at Rice University"

04/06 *Condensed matter seminar*, Oak Ridge National Laboratory, "Surprises in the Kondo physics of single-molecule transistors"

04/06 *Physics colloquium*, West Virginia University, "Single-molecule transistors: new tools for physics and physical chemistry"

03/06 *Chemistry seminar*, University of Houston, "Transport in molecular devices"

03/06 *Invited talk*, American Chemical Society meeting, Atlanta, "Single-molecule transistors: new tools for physical chemistry and physics"

01/06 *Colloquium*, James Madison University, "Single-molecule transistors: new tools for physics and physical chemistry"

01/06 *Condensed matter seminar*, Virginia Tech, "Surprises in the Kondo physics of single-molecule transistors"

12/05 *Invited talk*, XII Latin American Congress of Surface Science and its Applications, Angra dos Reis, Brazil, "Single-molecule transistors: new tools for physics and chemistry"

10/05 *Condensed matter seminar*, University of Wisconsin, "Surprises in the Kondo physics of single-molecule transistors"

10/05 *Physics Colloquium*, University of Utah, "Surprises in the Kondo physics of single-molecule transistors"

09/05 *Electrical and Computer Engineering seminar*, Texas A&M, "Injection in polymer field-effect transistors"

9/05 *Invited talk*, Bat Sheva Seminar on Electron Transport in Molecular Junctions (international workshop), Weizmann Institute, Israel

3/05 *Invited talk*, American Physical Society March Meeting, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

2/05 *Condensed matter seminar*, MIT, "Kondo physics and inelastic processes in single-molecule transistors"

2/05 *Physics Colloquium*, Rice University, "Single-molecule transistors: new tools for physics and chemistry"

2/05 *Physics Colloquium*, Sam Houston State University, "Quantum effects in nanoscale electronics"

1/05 *Invited talk*, 4th Annual Nanotechnology Venture Forum, Rice University, "Rice Nanofabrication Facility and Nanoscience Research at Rice University"

1/05 *Condensed matter seminar*, Northwestern University, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

1/05 *Condensed matter seminar*, University of Chicago, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

12/04 *Condensed matter seminar*, University of Maryland, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

11/04 *Solid state colloquium*, Harvard University, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

10/04 *Condensed matter seminar*, University of Pennsylvania, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

10/04 *Condensed matter seminar*, Penn State University, "Single-molecule transistors: transport, Kondo physics, and inelastic processes"

9/04 *Research presentation*, David and Lucille Packard Foundation annual fellows meeting, "Single-molecule transistors: Understanding electronic conduction at the nanometer scale"

8/04 *Research presentation*, Air Force Office of Sponsored Research Nanotechnology Workshop, "SPRING and nanoscience research at Rice University"

6/04 *Poster*, US/UK Frontiers of Science Symposium, Cambridge, UK, "Single-molecule transistors: Understanding electronic conduction at the nanometer scale"

6/04 *Condensed matter seminar*, Georgia Institute of Technology, "Electronic coherence in normal and ferromagnetic metals"

1/04 *DOE Workshop presentation*, Long Island, NY, "Field-effect devices: semiconducting polymers and single-molecule transistors".

1/04 *Condensed matter seminar*, Texas A&M University, "Field-effect devices: semiconducting polymers and single-molecule transistors".

11/03 *Condensed matter seminar*, Rice University, "Molecular-scale conduction: few-atom junctions and single-molecule transistors".

11/03 *Condensed matter seminar*, Columbia University (joint with Princeton and Rutgers), "Coherence in solids: Kondo physics in single-molecule transistors, and coherence measurements in metal nanostructures".

11/03 *Condensed matter seminar*, Bell Laboratories, "Molecular-scale conduction: few-atom junctions and single-molecule transistors".

9/03 *Condensed matter seminar*, Laboratory for Physical Sciences, Univ. of Maryland, "Molecular-scale conduction: few-atom junctions and single-molecule transistors".

9/03 *Condensed matter seminar*, NIST Gaithersburg, "Molecular-scale conduction: few-atom junctions and single-molecule transistors".

9/03 *Condensed matter seminar*, Naval Research Lab, "Molecular-scale conduction: few-atom junctions and single-molecule transistors".

8/03 *Invited talk* at 1st annual meeting of Texas Strategic Partnership for Research in Nanotechnology (SPRING), "Transport in nanostructures: physics and potential applications".

4/03 *Panel discussion* at Houston chapter meeting of ASM, on "Nanotechnology in materials science"

2/03 *Condensed matter seminar* at Stanford University Department of Physics, "Nonmetallicity in electrochemically fabricated atomic scale metal junctions"

11/02 *Invited talk* at International Workshop on Electron Interference and Decoherence in Nanostructures, Dresden, "Geometry-dependent dephasing in narrow metal wires".

10/02 *Invited talk*, Texas Nanotechnology Colloquium series sponsored by Applied Nanotechnology, "Molecular electronics: a view from the trenches".

9/02 *Physics department seminar* at Trinity University Department of Physics, "Quantum coherence and nanoscale wires: using small tools to answer big questions".

11/01 *Condensed matter seminar* at University of Texas Department of Physics, "Quantum coherence in sub-10 nm metal wires".

10/01 *Condensed matter seminar* at University of Florida Department of Physics, "Quantum coherence in sub-10 nm metal wires".

3/01 *APS March Meeting*, "Geometry-dependent dephasing in narrow metal wires", in symposium on "Dephasing and Dynamical Effects in Metals at Low Temperatures".

11/00 *MRS symposium* on Nonlithographic and Lithographic Methods for Nanofabrication-From Ultralarge-Scale Integration to Photonics to Molecular Electronics, "Quantum coherence in sub-10 nm metal wires".

4/00 *Divisional Seminar* at Bell Laboratories, Lucent Technologies, "Transport in molecular scale metal wires".

3/00 *Colloquium* at Rensselaer Polytechnic Institute Department of Physics, Applied Physics, and Astronomy, "Localization in molecular-scale metal wires".

Condensed matter seminar at Stanford University Laboratory for Advanced Materials, "Localization in molecular-scale metal wires".

Condensed matter seminar at California Institute of Technology Department of Applied Physics, "Localization in molecular-scale metal wires".

Colloquium at Amherst College Department of Physics, "Mesoscopic physics: using tiny tools to answer big questions".

2/00 *Colloquium* at University of Cincinnati Department of Physics, "Localization in molecular-scale metal wires".

Colloquium at Rice University Department of Physics and Astronomy, "Localization in molecular-scale metal wires".

1/00 *Condensed matter seminar* at University of Illinois at Urbana-Champaign Department of Physics, "Localization in molecular-scale metal wires".

10/99 *Condensed matter seminar* at Johns Hopkins University Department of Physics and Astronomy, "Fabrication and measurement of extremely narrow wires."

3/98 *APS March Meeting*, "Temperature dependent TLS collective behavior in glasses", in symposium on "Glasses: collective behavior and vibrational dynamics".

2/98 *Condensed Matter Seminar*, Bell Laboratories, Lucent Technologies, "Temperature dependent TLS collective behavior in glasses".

Condensed Matter Seminar, Princeton University Department of Physics, "Temperature dependent TLS collective behavior in glasses".

CONTRIBUTED PRESENTATIONS

3/14 *APS March Meeting*, Denver, "*In situ* Diffraction studies of H_xVO_2 and D_xVO_2"

3/11 *APS March Meeting*, Dallas, "Magnetic field dependence of the nonequilibrium metal-insulator transition in magnetite nanostructures"

3/08 *APS March Meeting,* New Orleans, "Electrically-driven phase transition in magnetite nanostructures"

3/07 *APS March Meeting*, Denver, "Strong magnetic scattering from TiO_x adhesion layers"

6/06 *Contributed talk*, TMS 2006 Electronic Materials Conference, "Surface chemistry modifications to contact resistances in organic field-effect transistors"

3/06 *APS March Meeting*, Baltimore, "Kondo resonances and anomalous gate dependence of electronic conduction in single-molecule transistors"

8/05 *Contributed talk*, 24th International Low Temperature Physics Conference (LT24), Orlando, FL.

7/04 *International Conference on the Physics of Semiconductors (ICPS)*, poster, "Contact resistances in high quality polymer field-effect transistors"
ICPS, poster, "Single-molecule transistors: Understanding electronic conduction at the nanometer scale"

4/04 *MRS Spring Meeting*, "Temperature-dependent contact resistances in high quality polymer field-effect transistors"
MRS Spring Meeting, "The Kondo effect in C_{60} single-molecule transistors"

4/03 *MRS Spring Meeting*, "Nonmetallicity in electrochemically fabricated atomic scale metal junctions"
MRS Spring Meeting, "Transport mechanisms in poly(3-hexylthiophene) transistors"

3/03 *APS March Meeting*, "Nonmetallicity in highly disordered Au point contacts at low temperatures"

2/03 *Nanotech 2003*, "Zero bias anomalies in electrochemically fabricated atomic-scale metal junctions"

3/02 *APS March Meeting*, "Transport in poly(3-hexylthiophene) transistors at high carrier densities: a progress report".

10/00 *APS Texas Section Meeting*, "Quantum coherence in sub-10 nm wires".

3/00 *APS March Meeting*, "Localization in molecular-scale metal wires".

11/99 *MRS Fall Meeting*, "Fabrication and measurement of molecular-scale wires".

3/99 *APS Centennial Meeting*, "Fabrication of nanoscale metallic wires", "Conduction of nanoscale metallic wires".

3/97 *APS March Meeting*, "Nonequilibrium acoustic response of glasses at ultra-low temperatures".

3/96 *APS March Meeting*, "Dielectric response of two-level systems to strain at low temperatures".

STUDENT/POSTDOC PRESENTATIONS

3/19 *APS March Meeting*, "Resistance fluctuation of V_2O_3 films near the metal-insulator transition" (Liyang Chen presenting)

3/19 *APS March Meeting*, "Nonequilibrium noise measurements using hBN tunnel barriers" (Xuanhan Zhao presenting)

3/19 *APS March Meeting*, "Pair tunneling in $La_{2-x}Sr_xCuO_4$ junctions above T_c" (Panpan Zhou presenting)

3/19 *APS March Meeting*, "Current Noise in InAs/GaInSb Corbino structures" (Loah Stevens presenting)

3/19 *APS March Meeting*, "Nanostructured gold thermocouple for photodetection" (Mahdiyeh Abbasi presenting)

3/19 *APS March Meeting*, "Photothermoelectric detection of gold oxide non-thermal decomposition and related studies" (Xifan Wang presenting)

3/19 *APS March Meeting*, "Photothermoelectric effects at and near individual grain boundaries in gold" (Charlotte Evans presenting)

3/19 *APS March Meeting*, "Probing energy transport in atomic and nanoscale junctions" (Dr. Longji Cui presenting)

3/18 *APS March Meeting*, "Detecting Photothermoelectric Voltages from Surface Plasmon Polariton Excitation in Gold Nanoscale Devices" (Charlotte I. Evans presenting)

3/18 *APS March Meeting*, "Shot noise in $La_{2-x}Sr_xCuO_4$ tunnel junctions" (Panpan Zhou presenting)

3/18 *APS March Meeting*, "Current Noise in InAs/GaInSb Quantum Well Interfaces" (Loah Stevens presenting)

3/18 *APS March Meeting*, "Altered Photothermoelectric Effects in Au nanowires via Surface Modification" (Xifan Wang presenting)

3/17 *APS March Meeting*, "Current noise in the edge states of InAs/GaSb quantum well interfaces" (Loah Stevens presenting)

3/17 *APS March Meeting*, "Shot noise detection in hBN-based tunnel junctions" (Panpan Zhou presenting)

3/17 *APS March Meeting*, "Remote heating in Au bowtie constrictions by propagating plasmons" (Charlotte Evans presenting)

3/17 *APS March Meeting*, "Nanogap-enhanced Raman spectroscopy of monolayer MoS_2" (Xifan Wang presenting)

3/17 *APS March Meeting*, "Transport studies and potential fluctuations in mesoscopic-scale $SmTiO_3/SrTiO_3/SmTiO_3$ quantum wells" (Will Hardy presenting)

3/16 *APS March Meeting*, "Shot noise measurement in a strongly correlated material" (Panpan Zhou presenting)

3/16 *APS March Meeting*, "Propagating plasmon excitation of molecular junctions for spectroscopy" (Charlotte Evans presenting)

3/16 *APS March Meeting*, "Optically induced changes to the tunneling properties of molecular junctions" (Pavlo Zolotavin presenting)

3/16 *APS March Meeting*, "Surface Enhance Infrared Absorption in nanogap structures" (Yajing Li presenting)

3/16 *APS March Meeting*, "Bias-dependent enhancement of the Fano factor in atomic-scale Au junctions" (Loah Stevens presenting)

3/16 *APS March Meeting*, “Thickness- and magnetic-field-driven suppression of antiferromagnetism in V5S8 single crystals” (Will Hardy presenting)

7/15 *Telluride Workshop on Quantum Transport in Nanoscale Molecular Systems*, “Voltage tuning of vibrational mode energies and optically induced changes to the tunneling properties of molecular junctions” (Pavlo Zolotavin presenting)

3/15 *APS March Meeting*, “Dissipation and heating in C_{60} molecular junctions” (Pavlo Zolotavin presenting)

3/15 *APS March Meeting*, “Nanostructure investigations of nonlinear differential conductance in $NdNiO_3$ thin films” (Will Hardy presenting)

3/15 *APS March Meeting*, “SERS detection of vibrational Stark effect using PCBM-based molecular junctions” (Yajing Li presenting)

3/15 *APS March Meeting*, “Variable temperature shot noise measurements in mechanically controlled gold break junctions” (Ruoyu Chen presenting)

3/15 *APS March Meeting*, “Low temperature high bias enhanced noise in atomic-scale Au junctions” (Loah Stevens presenting)

3/15 *APS March Meeting*, “Low temperature electric transport properties of hydrogen-doped VO_2” (Heng Ji presenting)

1/15 *Tsinghua University*, seminar, “Voltage tuning of vibrations of C60 molecular junctions” (Yajing Li presenting)

3/14 *APS March Meeting*, “Kondo effect in ferromagnetic atomic scale junctions” (Pavlo Zolotavin presenting)

3/14 *APS March Meeting*, “Atomic hydrogen doping in single-crystal vanadium dioxide” (Heng Ji presenting)

3/14 *APS March Meeting*, “Layered magnetic dichalcogenide in the nanoscale thickness regime” (Will Hardy presenting)

3/14 *APS March Meeting*, “Electrostatic gating and single-molecule Raman spectroscopy” (Yajing Li presenting)

3/14 *APS March Meeting*, “Variation of the shot noise within an ensemble of atomic-scale metal junctions” (Ruoyu Chen presenting)

3/14 *APS March Meeting*, “Germanium-Based Plasmonic Nanojunctions” (Kenneth Evans presenting)

3/13 *APS March Meeting*, “High bias shot noise measurement and electronic heating in STM style gold junctions at room temperature” (Ruoyu Chen presenting)

3/13 *APS March Meeting*, “Photoconductance measurements of patterned nanocrystal films on gold nanojunctions” (Kenneth Evans presenting)

3/13 *APS March Meeting*, "Surface-enhanced Raman detection of a vibrational Stark effect in C_{60}-containing molecular junctions" (Yajing Li presenting)

3/13 *APS March Meeting*, "Surface enhanced Raman spectroscopy in nanojunctions with anomalous polarization dependence" (Joseph Herzog presenting)

3/13 *APS March Meeting*, "Modulation of single-crystal vanadium dioxide film by hydrogen" (Heng Ji presenting)

3/13 *APS March Meeting*, "Investigation of nonlinear differential conductance in $NdNiO_3$ thin films" (Will Hardy presenting)

3/12 *APS March Meeting*, "Study of Raman Stark effect in self-aligned nanojunctions" (Joseph Herzog presenting)

3/12 *APS March Meeting*, "Electrostatic gating and single-molecule Raman spectroscopy" (Yajing Li presenting)

3/12 *APS March Meeting*, "Gigahertz probing of poly(3-hexylthiophene) with a kilohertz detection scheme" (Jeff Worne presenting)

3/12 *APS March Meeting*, "Bias-dependent noise measurements in individual electromigrated nanoscale junctions" (Patrick Wheeler presenting)

3/12 *APS March Meeting*, "Shot noise measurements as a function of bias in STM-style gold junctions" (Ruoyu Chen presenting)

3/12 *APS March Meeting*, "Nanocrystal-based optoelectronic devices" (Kenneth Evans presenting)

3/12 *APS March Meeting*, "Hydrogen stabilization of metallic VO_2 in single-crystal nanobeams" (Jiang Wei presenting)

3/12 *APS March Meeting*, "Gating effect on VO_2 nanowire by ionic liquid" (Heng Ji presenting)

3/11 *APS March Meeting*, "Exploring Transport Effects in Nanoscale Graphene Devices" (Jeffrey Worne presenting)

3/11 *APS March Meeting*, "Nanocrystal optoelectronic devices by plasmon-based optical trapping" (Kenneth Evans presenting)

3/11 *APS March Meeting*, "Fast pulsed measurements of the electric-field-driven metal-insulator transition in magnetite" (Spencer Morris presenting)

3/11 *APS March Meeting*, "Vibrational heating in molecular junctions" (Daniel Ward presenting)

3/11 *APS March Meeting*, "Shot Noise Measurements in Individual Electromigrated Nanoscale Junctions" (Patrick Wheeler presenting)

3/11 *APS March Meeting*, "Bias dependent shot noise measurement in STM style Au junction at room temperature" (Ruoyu Chen presenting)

3/11 *APS March Meeting*, "Gatability of vanadium dioxide single crystal nanobeams and hydrogen doping" (Heng Ji presenting)

3/10 *APS March Meeting*, "Electric field driven transition in magnetite" (Sungbae Lee, presenting, on behalf of A. A. Fursina)

3/10 *APS March Meeting*, "Measurement of electrical field enhancement in plasmonic nanogaps via optical rectification" (D. R. Ward presenting)

3/10 *APS March Meeting*, "Anomalous Transport and Possible Phase Transition in Palladium Nanojunction" (G. D. Scott presenting)

3/10 *APS March Meeting*, "Unifying high- and low-temperature transport in organic semiconductors in large electric fields" (J. H. Worne presenting)

3/10 *APS March Meeting*, "Excess voltage-dependent noise in atomic-scale Au contacts" (P. J. Wheeler presenting)

3/09 *APS March Meeting*, "Kondo effect in the electronic transport of magnetic atomic-size contacts" (M. Reyes Calvo presenting)

3/09 *APS March Meeting*, "Universal Scaling of Nonequilibrium Transport in the Kondo Regime of Single Molecule Devices" (Dr. G. D. Scott presenting)

3/09 *APS March Meeting*, "Universal Scaling of Zero-Bias Conductance Peaks in Single-Molecule Transistors Incorporating Tetra[2,3-thienylene]" (Z. K. Keane presenting)

3/09 *APS March Meeting*, "High frequency measurements of shot noise suppression in atomic-scale metal contacts" (P. J. Wheeler presenting)

3/09 *APS March Meeting*, "Single molecule surface-enhanced Raman spectroscopy in nanogap structures" (D. R. Ward presenting)

3/09 *APS March Meeting*, "Investigation of Electrically Driven Phase Transition in Magnetite Thin Films" (A. Fursina presenting)

3/09 *APS March Meeting*, "Interfacial Charge Transfer in Nanoscale Polymer Transistors" (J. H. Worne presenting)

3/08 *APS March Meeting*, "Sub-100 nm contact effects in poly(3-hexylthiophene) transistors" (J. H. Worne presenting)

3/08 *APS March Meeting*, "Fabrication of high aspect ratio nanogaps" (A. Fursina presenting)

3/08 *APS March Meeting*, "Molecular conductance of oligophenylene-vinylene in metallic break junctions" (P. J. Wheeler presenting)

3/08 *APS March Meeting,* "Simultaneous measurements of single-molecule electrical conduction and Raman response" (D. R. Ward presenting)

3/07 *APS March Meeting*, "Electronic transport in Fe_3O_4 nanoparticles" (S. Lee presenting)

3/07 *APS March Meeting*, "Shot noise in single-molecule transistors" (Z. K. Keane presenting)

3/07 *APS March Meeting*, "Time-dependent universal conductance fluctuations in Au nanowires: implications" (A. Trionfi presenting)

3/07 *APS March Meeting*, "Electromigrated nanoscale gaps for surface-enhanced Raman spectroscopy" (D. R. Ward presenting)

3/07 *APS March Meeting*, "Electronic transport of low concentrations of P3HT molecules across nanogap source-drain electrodes" (J. H. Worne presenting)

8/06 *6th Rencontres du Vietnam, Nanophysics: from fundamentals to applications*, Hanoi, "Three-terminal devices to examine single-molecule conductance switching" (Z.K. Keane presenting)

6/06 *TMS 2006 Electronic Materials Conference*, "Single-molecule transistors to characterize bistability in molecular conduction" (Z.K. Keane presenting)

3/06 *APS March Meeting*, "Modifying mesoscopic 1/*f* noise via surface chemistry" (A. Trionfi presenting)

3/06 *APS March Meeting*, "Quantum coherence and time dependent conductance fluctuations in dilute magnetic semiconductors" (S. Lee presenting)

3/06 *APS March Meeting*, "Magnetoresistance of atomic-scale electromigrated nickel nanocontacts" (Z. K. Keane presenting)

3/06 *APS March Meeting*, "Charge injection and band alignment in organic field effect transistors" (B. H. Hamadani presenting)

6/05 *2005 Electronic Materials Conference*, "The Kondo effect and inelastic electron tunneling spectroscopy in transition metal based single-molecule transistors" (L.H. Yu presenting)

6/05 *2005 Electronic Materials Conference*, "Nonlinear charge injection in organic field-effect transistors" (B.H. Hamadani presenting)

3/05 *APS March Meeting*, "Magnetoresistance measurements in nanoconstricted nickel wires" (Z.K. Keane presenting, with L.H. Yu)

3/05 *APS March Meeting*, "Time-dependent universal conductance fluctuations in AuPd, Ag, and Au wires" (A. Tronfi presenting, with S. Lee)

3/05 *APS March Meeting*, "Quantum coherence and local/nonlocal resistance measurements in permalloy wires" (S. Lee presenting, with A. Trionfi)

3/05 *APS March Meeting*, "The Kondo effect in transition metal ion based single-molecule transistors" (L.H. Yu presenting, with Z.K. Keane, J.W. Ciszek, L. Cheng, M.P. Stewart, and J.M. Tour)

3/05 *APS March Meeting*, "Nonlinear charge injection in organic thin-film field effect transistors" (B.H. Hamadani presenting)

3/05 *ACS Meeting*, "Charge injection in organic field-effect transistors" (B.H. Hamadani presenting)

3/04 *APS March Meeting*, "Realization of the Bose-Fermi Kondo Model in a magnetic quantum dot" (S. Kirchner presenting, with L. Zhu, Q. Si)

3/04 *APS March Meeting*, "The Kondo effect in C_{60} single-molecule transistors" (L.H. Yu presenting)

3/04 *APS March Meeting*, "Electron coherence length comparison in mesoscopic AuPd wires" (A. Trionfi presenting, with S. Lee)

3/04 *APS March Meeting*, "Quantum coherence and time dependent conductance fluctuations in ferromagnetic nanowires" (S. Lee presenting, with A. Trionfi)

3/04 *APS March Meeting*, "Temperature dependent contact resistances in organic field effect transistors" (B.H. Hamadani presenting)

3/03 *APS March Meeting*, "Transport measurements on few-molecule devices" (L.H. Yu presenting, with D. Price, J.W. Ciszek, and J.M. Tour)

3/03 *APS March Meeting*, "Electrical decoherence lengths in quasi-1D AuPd nanowires" (A. Trionfi presenting, K.W. West, L.N. Pfeiffer)

3/03 *APS March Meeting*, "Electric transport in magnetic nanowires" (S. Lee presenting, with K.W. West, L.N. Pfeiffer)

3/03 *APS March Meeting*, "Gated nonlinear transport in organic polymer field-effect transistors" (B.H. Hamadani presenting)

3/02 *APS March Meeting*, "Transport in gold nanojunctions" (L.H. Yu presenting)

PUBLICATIONS (http://natelson.web.rice.edu/publications.html)

In preparation:

Submitted:

In revision:

- Mahdiyeh Abbasi, Charlotte I. Evans, and Douglas Natelson, "Single metal photodetectors using plasmonically-active asymmetric gold nanostructures", submitted.
- Yunxuan Zhu, Longji Cui, and Douglas Natelson, "Hot-carrier enhanced light emission: The origin of above-threshold photons from electrically driven plasmonic tunnel junctions", submitted.
- Longji Cui, Yunxuan Zhu, Peter Nordlander, Massimiliano Di Ventra, and Douglas Natelson, "Thousand-fold enhancement in plasmonic light emission via synergistic hot-carrier generation and interaction", in revision.

In print:

- Liyang Chen, Panpan Zhou, Yoav Kalcheim, Ivan K. Schuller, and Douglas Natelson, "Percolation and nanosecond fluctuators in V_2O_3 films within the metal-insulator transition", *APL Materials* **8**, 101103 (2020).

- Charlotte I. Evans, Rui Yang, Lucia T. Gan, Mahdiyeh Abbasi, Xifan Wang, Rachel Traylor, Jonathan A. Fan, and Douglas Natelson, "Thermoelectric response from grain boundaries and lattice distortions in crystalline gold devices", *Proc. Nat. Acad. Sci. US* **117**, 23350-23355 (2020).

- Panpan Zhou, Liyang Chen, Ilya Sochnikov, Tsz Chun Wu, Matthew S. Foster, Anthony T. Bollinger, Xi He, Ivan Božović, and Douglas Natelson, "Tunneling spectroscopy of c-axis epitaxial cuprate junctions", *Phys. Rev. B* **101**, 224512 (2020)

- Longji Cui, Yunxuan Zhu, Mahdiyeh Abbasi, Arash Ahmadivand, Burak Gerislioglu, Peter Nordlander, and Douglas Natelson, "Electrically driven hot-carrier generation and above-threshold light emission in plasmonic tunnel junctions", *Nano Lett.* **20**, 6067-6075 (2020) .

- Xuanhan Zhao, Panpan Zhou, Liyang Chen, Kenji Watanabe, Takashi Taniguchi, and Douglas Natelson, "Tunneling noise and defects in exfoliated hexagonal boron nitride", *AIP Adv.*, **9**, 105218 (2019).

- Panpan Zhou, Liyang Chen, Yue Liu, Ilya Sochnikov, Anthony T. Bollinger, Myung-Geun Han, Yimei Zhu, Xi He, Ivan Božović, and Douglas Natelson, "Electron pairing in the pseudogap state revealed by shot noise in copper-oxide junctions", *Nature* **572**, 493-496 (2019).

- Loah A. Stevens, Tingxin Li, Rui-Rui Du, and Douglas Natelson, "Noise processes in InAs/Ga(In)Sb Corbino structures", *Appl. Phys. Lett.* **115**, 052107 (2019).

- Jiangtan Yuan, Andrew Balk, Hua Guo, Qiyi Fang, Sahil Patel, Xuanhan Zhao, Tanguy Terlier, Douglas Natelson, Scott A. Crooker, and Jun Lou, "Room temperature magnetic order in air-stable ultra-thin iron oxide", *Nano Lett.* **19**, 3777-3781 (2019).

- Charlotte I. Evans and Douglas Natelson, "Remote excitation of hot electrons via propagating surface plasmons", *J. Phys. Chem. C* **123**, 10057-10064 (2019).

- Douglas Natelson, "Commentary: Condensed matter's image problem", *Physics Today* online (2018).

- Xifan Wang, Charlotte I. Evans, and Douglas Natelson, "Photothermoelectric detection of gold oxide non-thermal decomposition", *Nano Lett.* **18**, 6557-6562 (2018).

- Douglas Natelson, Charlotte I. Evans, and Pavlo Zolotavin, "Photovoltages and hot electrons in plasmonic nanogaps", Proceedings Volume 10540, Quantum Sensing and Nano Electronics and Photonics XV; 105400S (2018)

- Shi Chen, Zhaowu Wang, Lele Fan, Yuliang Chen, Hui Ren, Heng Ji, Douglas Natelson, Yingying Huang, Jun Jiang, and Chongwen Zou, "Sequential insulator-metal-insulator phase transitions of VO_2 triggered by hydrogen doping", *Phys. Rev. B* **96**, 125130 (2017).

- Charlotte I. Evans, Pavlo Zolotavin, Alessandro Alabastri, Jian Yang, Peter Nordlander, and Douglas Natelson, "Quantifying remote heating from propagating surface plasmon polaritons", *Nano Lett.* **17**, 5646-5652 (2017).

- Pavlo Zolotavin, Charlotte I. Evans, and Douglas Natelson, "Substantial local variation of Seebeck coefficient in gold nanowires", *Nanoscale* **9**, 9160-9166 (2017).

- Pavlo Zolotavin, Charlotte I. Evans, and Douglas Natelson, "Photothermoelectric effects and large photovoltages in plasmonic Au nanowires with nanogaps", *J. Phys. Chem. Lett.* **8**, 1739-1744 (2017).

- Panpan Zhou, Will J. Hardy, Kenji Watanabe, Takashi Taniguchi, Douglas Natelson, "Shot noise detection in hBN-based tunnel junctions", *Appl. Phys. Lett.*, **110**, 133106 (2017).

- Will J. Hardy, Brandon Isaac, Patrick Marshall, Evgeny Mikheev, Panpan Zhou, Susanne Stemmer, and Douglas Natelson, "Potential fluctuations at low temperatures in mesoscopic-scale $SmTiO_3/SrTiO_3/SmTiO_3$ quantum well structures", *ACS Nano* **11**, 3760-3766 (2017).

- W. J. Hardy, Heng Ji, Panpan Zhou, H. Paik, D. Schlom, and D. Natelson, "Mesoscopic quantum effects in a bad metal, hydrogenated vanadium dioxide", *J. Phys. Condens. Matt.* **29**, 185601 (2017).

- Yajing Li, Mathieu Simeral, and Douglas Natelson, "Surface Enhanced Infrared Absorption of self-aligned nanogap structures", *J. Phys. Chem. C*, **120**, 22558-22564 (2016).

- Loah A. Stevens, Pavlo Zolotavin, Ruoyu Chen, and D. Natelson, "Current noise enhancement: channel mixing and possible nonequilibrium phonon backaction in atomic-scale Au junctions", *J. Phys. Condens. Matt.* **28**, 495303 (2016).

- Pavlo Zolotavin, Alessandro Alabastri, Peter Nordlander, and Douglas Natelson, "Plasmonic heating in Au nanowires at low temperatures: The role of thermal boundary resistance", *ACS Nano*, **10**, 6972-6979 (2016).

- Will J Hardy, Jiangtan Yuan, Hua Guo, Panpan Zhou, Jun Lou, and Douglas Natelson, "Thickness-Dependent and Magnetic-Field-Driven Suppression of Antiferromagnetic Order in Thin V_5S_8 Single Crystals",*ACS Nano* **10**, 5941-5946 (2016).

- Yajing Li, Pavlo Zolotavin, Peter Doak, Leeor Kronik, Jeffrey B. Neaton, and Douglas Natelson, "Interplay of bias-driven charging and the vibrational Stark effect in molecular junctions", *Nano Lett.* **16**, 1104-1109 (2016).

- R. Chen and D. Natelson, "Evolution of shot noise in suspended lithographic gold break junctions with bias and temperature", *Nanotechnology* **27**, 245201 (2016).

- D. Natelson, "Viewpoint: Precise layering of organic semiconductors", *Physics* **9**, 1 (2016).

- Jiangtan Yuan, Jingjie Wu, Will J. Hardy, Philip Loya, Minhan Lou, Yingchao Yang, Sina Najmaei, Menglei Jiang, Kunttal Keyshar, Heng Ji, Weilu Gao, Jiming Bao, Junichiro Kono, Douglas Natelson, Pulickel M. Ajayan, and Jun Lou, "Facile synthesis of single crystal vanadium disulfide nanosheets by chemical vapor deposition for efficient hydrogen evolution reaction", Adv. Mater. **27**, 5605-5609 (2015).

- Douglas Natelson, *Nanostructures and Nanotechnology* (Cambridge University Press, 2015). ISBN: 9780521877008.

- Kenneth M. Evans, Pavlo Zolotavin, and Douglas Natelson, "Plasmon-assisted photoresponse in Ge-coated bowtie junctions", ACS Photonics **2**, 1192-1198 (2015).

- J. Hu, X. Liu, C.L. Yue, J.Y. Liu, H.W. Zhu, J. B. He, J. Wei, Z.Q. Mao, L.Yu. Antipina, Z.I. Popov, P.B. Sorokin, T.J. Liu, P.W. Adams, S. Radmanesh, L. Spinu, Heng Ji, and D. Natelson, "Enhanced Electron Coherence in Atomically Thin Nb_3SiTe_6", Nature Phys. **11**, 471-476 (2015).

- W. J. Hardy, C.-W. Chen, A. Marcinkova, J. Sinova, D. Natelson, and E. Morosan, "Very large magnetoresistance in $Fe_{0.28}TaS_2$ single crystals", Phys. Rev. B **91**, 054426 (2015).

- B. Huber-Rodriguez, Siu Yi Kwang, W. J. Hardy, H. Ji, C.-W. Chen, E. Morosan, and D. Natelson, "Thermal Barkhausen effect at the metal-insulator transition in vanadium dioxide", Appl. Phys. Lett. **105**, 131902 (2014)

- J. Lin, H. Ji, M. W. Swift, W. J. Hardy, Z. Peng, X. Fan, A. H. Nevidomskyy, J. M. Tour, and D. Natelson, "Hydrogen diffusion and stabilization in single-crystal VO_2 micron/nanobeams by direct atomic hydrogenation", Nano Lett. **14**, 5445-5451 (2014).

- W. J. Hardy, H. Ji, E. Mikheev, S. Stemmer, and D. Natelson, "Nanostructure investigations of nonlinear differential conductance in $NdNiO_3$thin films", Phys. Rev. B **90**, 205117 (2014).

- J. Lin, A.-R. O. Raji, K. W. Nan, Z. W. Peng, Z.Yan, E. L. G. Samuel, D. Natelson, and J. M. Tour, "Iron oxide nanoparticle and graphene nanoribbon composite as an anode material for high-performance Li-ion batteries", Adv. Funct. Mater. **24**, 2044-2048 (2014).

- R. Chen, M. Matt, F. Pauly, P. Nielaba, J. C. Cuevas, and D. Natelson, "Shot noise variation within ensembles of gold atomic break junctions at room temperature", J. Phys.: Condens. Matt. **26**, 474204 (2014). Special issue on break junctions.

- D. Natelson, "Big lessons about small things", Nature Nano. **9**, 488 (2014).

- Y. Filinchuk, N. A. Tumanov, V. Ban, H. Ji, J. Wei, M. W. Swift, A. H. Nevidomskyy, and D. Natelson,"*In situ* diffraction study of catalytic hydrogenation of VO_2: Stable phases and origins of metallicity", J. Amer. Chem. Soc. **136**, 8100-8109 (2014).

- R. Chen, P. J. Wheeler, M. Di Ventra, and D. Natelson, "Enhanced noise at high bias in atomic-scale Au break junctions", Sci. Rep. **4**, 4221 (2014).

- Y. Li, P. Doak, J. B. Neaton, L. Kronik, and D. Natelson, "Voltage tuning of vibrational mode energies in single-molecule junctions", Proc. Nat. Acad. Sci. US **111**, 1282-1287 (2014).

- J. B. Herzog, M. W. Knight, and D. Natelson, "Thermoplasmonics: Plasmonic heating in single nanowires", Nano Lett. 14, 499-503 (2014).

- R. S. Arvidson, C. Fischer, D. S. Sawyer, G. D. Scott, D. Natelson, and A. Luttge, "Lateral resolution enhancement of vertical scanning interferometry by sub-pixel sampling", Microsc. Microanal. **20**, 90-98 (2014).

- Wang, G., Lauchner, A. C., Lin, J., Natelson, D., Palem, K. V., and Tour, J. M., "High-performance and low-power rewritable SiO_x 1 kbit one diode-one resistor crossbar memory array", Adv. Mater. **25**, 4789-4793 (2013).

- Natelson, D., "Condensed matter physics: A solid triple point", Nature **500**, 408-409 (2013).

- Lin, J., Peng, Z. W., Xiang, C. S., Ruan, G. D., Yan, Z., Natelson, D., and Tour, J. M., "Graphene nanoribbon and nanostructured SnO_2 composite anodes for lithium ion batteries", ACS Nano **7**, 6001-6006 (2013).

- Wheeler, P. J., Chen, R., and Natelson, D., "Noise in electromigrated nanojunctions", Phys. Rev. B **87**, 155411 (2013).

- Herzog, J. B., Knight, M. W., Li, Y., Evans, K., Halas, N. J., and Natelson, D., "Dark plasmons in hot spot generation and polarization in interelectrode nanoscale junctions", Nano Lett. **13** , 1359-1364 (2013).

- Natelson, D., Li, Y., and Herzog, J. B., "Nanogap structures: combining enhanced Raman spectroscopy and electronic transport", Physical Chemistry Chemical Physics **15**, 5262-5275 (2013).

- Lin, J., Zhang, C., Yan, Z., Zhu, Y., Peng, Z., Hauge, R. H., Natelson, D. and Tour, J. M., "3-Dimensional graphene carbon nanotube carpet-based microsupercapacitors with high electrochemical performance", Nano Lett. **13**, 72-78 (2013).

- Yao, J., Lin, J., Dai, Y., Ruan, G., Yan, Z., Li, L., Zhong, L., Natelson, D., and Tour, J. M., "Highly transparent nonvolatile resistive memory devices from silicon oxide and graphene", Nature Comms. **3**, 1101 (2012).

- Morosan, E., Natelson, D., Nevidomskyy, A. H., and Si, Q. M., "Strongly correlated materials", Adv. Mater. **24**, 4896-4923 (2012).

- Halas, N. J., Lal, S., Link, S., Chung, W.-S., Natelson, D., Hafner, J. H., and Nordlander, P., "A plethora of plasmonics from the Laboratory for Nanophotonics at Rice University", Adv. Mater. **24**, 4842-4877 (2012).

- Chen, R., Wheeler, P. J., and Natelson, D., "Excess noise in STM-style break junctions at room temperature", Phys. Rev. B **85**, 235455 (2012).

- Ji, H., Wei, J., and Natelson, D., "Modulation of the electrical properties of VO_2 nanobeams using an ionic liquid as a gating medium", Nano Lett. **12**, 2988-2992 (2012).

- Wei, J., Ji, H., Guo, W., Nevidomskyy, A., and Natelson, D., "Hydrogen stabilization of metallic VO_2 in single-crystal nanobeams", Nature Nano. **7**, 357-362 (2012).

- Worne, J. H., Gullapili, H., Galande, C., Ajayan, P. M., and Natelson, D., "Local Charge Transfer Doping in Suspended Graphene Nanojunctions", Appl. Phys. Lett. **100**, 023306 (2012)

- Fursina, A. A., Sofin, R. G. S., Shvets, I. V., and Natelson, D., "Statistical distribution of the electric field driven switching of the Verwey state in Fe_3O_4", New J. Phys. **14**, 013019 (2012).

- Yao, J., Zhong, L., Natelson, D., and Tour, J. M., "In Situ Probing of the Conducting Filament in a Silicon Oxide Resistive Switch", Nature Scientific Reports **2**, 242 (2012).

- Natelson, D. and Di Ventra, M., "Ion motion and electrochemistry in nanostructures", MRS Bulletin **36**, 914-920 (2011).

- Wei, J. and Natelson, D., "Nanostructure studies of strongly correlated materials", Nanoscale **3**, 3509-3521 (2011).

- Garcia-Martin, A., Ward, D. R., Natelson, D., and Cuevas, J. C., "Field enhancement in subnanometer metallic gaps", Phys. Rev. B **83**, 193404 (2011).

- Yao, J., Zhong, L., Natelson, D., and Tour, J. M., "Intrinsic resistive switching and memory effects in silicon oxide", Appl. Phys. A **102**, 835-839 (2011).

- Yao, J., Zhong, L., Natelson, D., and Tour, J. M., "Silicon oxide is a non-innocent surface for molecular electronics and nanoelectronics studies", J. Am. Chem. Soc. **133**, 941-948 (2011).

- Fursina, A. A., Sofin, R. G. S., Shvets, I. V., and Natelson, D., "Interfacial transport properties between a strongly correlated transition metal oxide and a metal: Contact resistance in Fe_3O_4/M (M=Cu, Au, Pt) nanostructures", Phys. Rev. B. **82**, 245112 (2010).

- Ward, D. R., Corley, D. A., Tour, J. M., and Natelson, D., "Vibrational and electronic heating in nanoscale junctions", Nature Nano. **6**, 33-38 (2011).

- Ward, D. R., Hueser, F., Pauly, F., Cuevas, J. C., and Natelson, D., "Optical rectification and field enhancement in a plasmonic nanogap", Nature Nano. **5**, 732-736 (2010).

- Yao, J., Sun, Z., Zhong, L., Natelson, D., and Tour, J. M., "Resistive switches and memories from silicon oxide", Nano Lett. **10**, 4105-4110 (2010).

- Natelson, D., "Carrier characteristics", Nature Mater. **9**, 703-704 (2010).

- Scott, G. D., Palacios, J. J., and Natelson, D., "Anomalous transport and possible phase transition in palladium nanojunctions", ACS Nano **4**, 2831-2837 (2010).

- Wheeler, P. J., Russom, J. R., Evans, K., King, N., and Natelson, D., "Shot noise suppression at room temperature in atomic-scale Au junctions", Nano Lett. **10**, 1287-1292 (2010).

- Scott, G. D. and Natelson, D., "Kondo resonances in molecular devices", ACS Nano **4**, 3560-3579 (2010).

- Worne, J. H., Anthony, J. E., and Natelson, D., "Transport in organic semiconductors in large electric fields: From thermal activation to field emission", Appl. Phys. Lett. **96**, 053308 (2010).

- Fursina, A. A., Sofin, R. G. S., Shvets, I. V., and Natelson, D., "Interplay of bulk and interface effects in the electric field driven transition in magnetite", Phys. Rev. B **81**, 045123 (2010).

- Sinitskii, A., Fursina, A. A., Kosynkin, D., Higginbotham, A., Natelson, D., and Tour, J. M. "Electronic transport in monolayer graphene nanoribbons produced by chemical unzipping of carbon nanotubes", Appl. Phys. Lett. **95**, 253108 (2009).

- Yao, J., Zhong, L., Jin, Z., Natelson, D., and Tour, J. M., "A two-terminal nonvolatile memory based on single-walled carbon nanotubes", ACS Nano **3**, 4122-4126 (2009).

- Yao, J., Zhong, L., Zhang, Z., He, T., Jin, Z., Wheeler, P. J., Natelson, D., and Tour, J.M., "Resistive switching in nanogap systems on SiO_2 substrates", Small **5**, 2910-2915 (2009).

- Natelson, D., "Correlated electron systems: better than average", News & Views, Nature Nanotechnology **4**, 406-407 (2009).

- Natelson, D., "The ultimate transistor", Physics World **22**, 27-31 (2009).

- Fursina, A. A., Sofin, R. G. S., Shvets, I. V., and Natelson, D., "The origin of hysteresis in resistive switching in magnetite is Joule heating", Phys. Rev. B **79**, 245131 (2009).

- Reyes Calvo, M., Fernández-Rossier, J., Palacios, J. J. , Jacob, D. , Natelson, D., and Untiedt, C. "The Kondo effect in ferromagnetic atomic contacts", Nature **458**, 1150-1153 (2009).

- Scott, G. D., Keane, Z.K., Ciszek, J. W., Tour, J. M., and Natelson, D., "Universal scaling of nonequilibrium transport in the Kondo regime of single molecule transistor devices", Phys. Rev. B, **79**, 165413 (2009).

- Natelson, D., "Journal Club: A physicist foresees a new era in electronics", Nature **456**, 145 (2008)

- Yao, J., Zhong, L., Natelson, D., and Tour, J.M., "Etching-dependent reproducible memoy switching in vertical SiO_2 structures", Appl. Phys. Lett. **93**, 253101 (2008).

- Ward, D. R., Halas, N. J., and Natelson, D., "Localized heating in nanoscale Pt constrictions measured using blackbody radiation emission", Appl. Phys. Lett. **93**, 213108 (2008).

- Worne, J. H., Giridharagola, R., Kelly, K. F., and Natelson, D., "Interfacial charge transfer in nanoscale poly(3-hexylthiophene) transistors", Nano Research 1, 341-350 (2008).

- Ward, D.R., Scott, G., Keane, Z.K., Halas, N.J., and Natelson, D., "Electronic and optical properties of electromigrated molecular junctions", J. Phys.: Condens. Matter **20**, 374118 (2008), (invited) Special Issue: Conductivity of single molecules and supramolecular architectures.

- Fursina, A., Lee, S., Sofin, R.G.S., Shvets, I. V., and Natelson, D., "Nanogaps with very large aspect ratios for electrical measurements", Appl. Phys. Lett. **92**, 113102 (2008).

- Ward, D.R., Halas, N.J., Ciszek, J.W., Tour, J.M., Wu. Y., Nordlander, P., and Natelson, D., "Simultaneous measurements of electronic conduction and Raman response in molecular junctions", Nano Lett. **8**, 919-924 (2008).

- Lee, S., Fursina, A., Mayo, J. T., Yavuz, C., Colvin, V. L., Shvets, I. V., and Natelson, D., "Electrically-driven phase transition in magnetite nanostructures", Nature Materials **7**, 130-133 (2008).

- Natelson, D., "Single-molecule transistors", *Handbook of Organic Electronics and Photonics*, Vol. 3, H.S. Nalwa, ed., pp. 1-49 (American Scientific Publishers, Stevenson Ranch, CA, 2007).

- Ward, D.R., Grady, N.K., Levin, C.S., Halas, N.J., Wu, Y., Nordlander, P., and Natelson, D., "Electromigrated nanoscale gaps for surface-enhanced Raman spectroscopy", Nano Lett. **7**, 1396-1400 (2007).

- Lee, S., Trionfi, A., Schallenberg, T., Munekata, H., and Natelson, D., "Quantum coherence in ferromagnetic semiconductors: time-dependent universal conductance fluctuations and magnetofingerprint", Appl. Phys. Lett. **90**, 032105 (2007).

- Trionfi, A., Lee, S., and Natelson, D., "Time-dependent universal conductance fluctuations in mesoscopic Au wires: implications", Phys. Rev. B **75**, 104202 (2007).

- Trionfi, A., Lee, S., and Natelson, D., "Strong magnetic scattering from TiO_x adhesion layers", Appl. Phys. Lett. **89**, 262104 (2006).

- Yavuz, C.T., Mayo, J.T., Wu, W.W., Prakash, A., Falkner, J.C., Yean, S., Cong, L., Shipley, H.J., Kan, A., Tomson, M., Natelson, D., and Colvin, V.L. "Low-field magnetic separation of monodisperse Fe3O4 nanocrystals", Science **314**, 964-967 (2006).

- Natelson, D., "Nanofabrication: best of both worlds" , Nature Materials **5**, 853-854 (2006).

- Ahn, C.H., Bhattacharya, A., Di Ventra, M., Eckstein, J.N., Frisbie, C.D., Gershenson, M.E., Goldman, A.M., Inoue, I.H., Mannhart, J., Millis, A.J., Morpurgo, A.F., Natelson, D., and Triscone, J.-M., "Electrostatic modification of novel materials", Rev. Mod. Phys. **78**, 1185-1212 (2006)

- Keane, Z.K., Ciszek, J.W., Tour, J.M., and Natelson, D., "Three-terminal devices to examine single molecule conductance switching", Nano Lett. **6**, 1518-1521 (2006)

- Hamadani, B.H., Ciszek, J.W., Corley, D.A., Tour, J.M., and Natelson, D. "Controlling charge injection in organic field-effect transistors using self-assembled monolayers", Nano Lett. **6**, 1303-1306 (2006).

- Natelson, D., Yu, L.H., Ciszek, J.W., Keane, Z.K., and Tour, J.M., "Single-molecule transistors: electron transfer in the solid state", Chem. Phys. **324**, 267-275 (2006).

- Ciszek, J.W., Keane, Z.K., Cheng, L., Stewart, M.P., Yu, L.H., Natelson, D., and Tour, J.M., "Neutral complexes of first row transition metals bearing unbound thiocyanates and their assembly on metallic surfaces", J. Am. Chem. Soc. **128**, 3179-3189 (2006).

- Keane, Z.K., Yu, L.H., and Natelson, D., "Magnetoresistance of atomic-scale electromigrated nickel nanocontacts", Appl. Phys. Lett. **88**, 062514 (2006).

- Yu, L.H., Keane, Z.K., Ciszek, J.W., Cheng, L., Tour, J.M., Baruah, T., Pederson, M.R., and Natelson, D., "Strong Kondo physics and anomalous gate dependence in single-molecule transistors", Phys. Rev. Lett. **95**, 256803 (2005).

- Kirchner, S., Zhu, L., Si, Q., and Natelson, D., "Quantum critical Kondo effect in a quantum dot coupled to ferromagnetic leads", Proc. Nat. Acad. Sci. US **102**, 18824-18829 (2005).

- Hamadani, B.H., Ding, H., Gao, Y., and Natelson, D., "Doping dependent charge injection and band alignment in organic field-effect transistors", Phys. Rev. B **72**, 235302 (2005).

- Hamadani, B.H. and Natelson, D., "Extracting contact effects in organic field-effect transistors" Proc. IEEE **93**, 1306-1311 (2005).

- Trionfi, A., Lee, S., and Natelson, D., "Time-dependent universal conductance fluctuations and coherence in AuPd and Ag", Phys. Rev. B **72**, 035407 (2005).

- Hamadani, B.H. and Natelson, D., "Nonlinear charge injection in organic field-effect transistors", J. Appl. Phys. **97**, 064508 (2005).

- Yu, L.H., Keane, Z.K., Ciszek, J.W., Stewart, M.P., Cheng, L., Tour, J.M., and Natelson, D., "Inelastic electron tunneling via molecular vibrations in single-molecule transistors", Phys. Rev. Lett. **93**, 266802 (2004).

- Lee, S., Trionfi, A., and Natelson, D., "Quantum coherence in a ferromagnetic metal: time-dependent conductance fluctuations", Phys. Rev. B **70**, 212407 (2004).

- Trionfi, A., Lee, S., and Natelson, D., "Electronic coherence in metals: Comparing weak localization and time-dependent conductance fluctuations", Phys. Rev. B **70**, 041304(R) (2004).

- Yu, L.H., Natelson, D., "Transport in single-molecule transistors: Kondo physics and negative differential resistance", Nanotechnology **15**, S517-S524 (2004).

- Yu, L.H., Natelson, D. "Kondo physics in C_{60} single-molecule transistors", cond-mat/0310625, NanoLetters **4**, 79-83 (2004).

- Hamadani, B., Natelson, D. "Gated nonlinear transport in polymer field effect transistors", J. Appl. Phys. **95**, 1227-1232 (2004).

- Hamadani, B., Natelson, D. "Temperature-dependent contact resistances in high quality polymer field-effect transistors", Appl. Phys. Lett. **84**, 443-445 (2004).

- Yu, L.H., Natelson, D. "Density of states and magnetoconductance of disordered Au point contacts", Phys. Rev. B **68**, 113407 (2003).

- Yu, L.H. and Natelson, D. "Zero-bias anomalies in electrochemically fabricated nanojunctions," *Appl. Phys. Lett.* **82**, 2332-2334 (2003).

- Natelson, D. "Fabrication of metal nanowires," (invited), In *Recent Research Developments in Vacuum Science and Technology 4*, J. Dabrowski, ed. Research Signpost, Kerala, India (2002).

- Willett, R.L., Hsu, J.W.P., Natelson, D., Pfeiffer, L.N., West, K.W. "Anisotropic disorder in high-mobility 2D heterostructures and its correlation to electron transport," *Phys. Rev. Lett.* **87**, 126803 (2001).

- Natelson, D., Willett, R.L., Pfeiffer, L.N., West, K.W. "Quantum coherence in sub-10 nm metal wires," (invited), Proceedings of MRS Fall 2000 Meeting, "Nonlithographic and Lithographic Methods of Nanofabrication: From Ultralarge-Scale Integration to Photonics to Molecular Electronics", Mehrari *et al*., eds. (2001).

- Natelson, D., Willett, R.L., Pfeiffer, L.N., West, K.W. "Geometry dependent dephasing in small metallic wires." *Phys. Rev. Lett.*, **86**, 1821-4 (2001).

- Natelson, D., Willett, R.L., Pfeiffer, L.N., West, K.W., "Fabrication of extremely narrow metal wires." *Appl. Phys. Lett.*, **77**, 1991-3 (2000).

- Natelson, D., Willett, R.L., Pfeiffer, L.N., West, K.W. "Molecular-scale metal wires." *Sol. State Comm.* **115**, 269 (2000).

- Rosenberg, D., Natelson, D., Osheroff, D. "Thermal conductivity in glasses below 1K: new technique and results." *J. Low Temp. Phys.* **120**, 259 (2000).

- Natelson, D., Rosenberg, D., Osheroff, D. "Evidence for growth of collective excitations in glasses at low temperatures." *Phys. Rev. Lett*. **80** (21), 4689-92 (1998).

- Burin, A., Natelson, D., Osheroff, D., and Kagan, Y. "Interactions between tunneling defects in amorphous solids." Chapter 5 of *Tunneling Systems in Amorphous and Crystalline Solids*, P. Esquinazi, editor. Springer Verlag, (1999).

- Rogge, S., Natelson, D., and Osheroff, D. "Evidence for the importance of interactions between active defects in glasses." *Phys. Rev. Lett.* **76**, no.17, 3136-9 (1997).

- Rogge, S., Natelson, D., Tigner, B., and Osheroff, D. "Nonlinear dielectric response of glasses at low temperature." *Phys. Rev. B* **55**, no.17, 11256-6 (1997).

- Rogge, S., Natelson, D., and Osheroff, D. "Nonequilibrium and hysteretic low temperature dielectric response to strain in glasses." *Journ. Low Temp. Phys.* **106**, no.5-6, 717-25 (1997).

- Rogge, S., Natelson, D., and Osheroff, D. "^{3}He immersion cell for ultralow temperature study of amorphous solids." *Rev. Sci. Inst.* **68**, no.4, 1831-4 (1997).

Conference papers:

- Natelson, D., Ward, D. R., Hauser, F., Pauly, F., Cuevas, J. C., Corley, D. A., and Tour, J. M., "Plasmons in nanoscale junctions: Optical rectification and thermometry", Proceedings of the SPIE (Optics and Photonics 2011) **8096**, 8096O (2011).

- Natelson, D., Yu, L. H., Keane, Z. K., Ciszek, J.W., and Tour, J.M. "Anomalous gate-dependence of the Kondo effect in single-molecule transistors", Physica B **403**, 1526-1528, Proceedings of the 2007 International Conference on Strongly Correlated Electronic Systems (2008).

- Natelson, D., Hamadani, B.H., Ciszek, J.W., Corley, D.A., and Tour, J.M. "Contact effects in polymer field-effect transistors", also cond-mat/0607744, Proceedings of the SPIE **6336**, 63360M (2006).

- Natelson, D., Yu, L.H., Keane, Z.K., Ciszek, J.W., Cheng, L., and Tour, J.M., "Kondo physics in single-molecule transistors", CP850, *Low Temperature Physics: 24th International Conference on Low Temperature Physics*, edited by Y. Takano, S.P. Hershfield, S.O. Hill, P.J. Hirschfeld, and A.M. Goldman, AIP Conf. Proc. 1365-1366 (2006).

- Trionfi, A., Lee, S., and Natelson, D., "Time dependent universal conductance fluctuations in AuPd, Ag, and Au wires", CP850, *Low Temperature Physics: 24th International Conference on Low Temperature Physics*, edited by Y. Takano, S.P. Hershfield, S.O. Hill, P.J. Hirschfeld, and A.M. Goldman, AIP Conf. Proc. 1411-1412 (2006).

- Hamadani, B. and Natelson, D. "Gated nonlinear transport in organic thin film transistors". Mat. Res. Soc. Symp. Proc. Vol. 771, "Organic and Polymeric Materials and Devices", P.W. Blom *et al.*, eds., L6.10.1-L6.10.6 (2003).

- Natelson, D. and Yu, L.H. "Zero bias anomalies in electrochemically fabricated atomic-scale metal junctions". *2003 Nanotechnology Conference and Trade Show*, vol. 2, M. Laudon and B. Romanowicz, ed., 64-67 (2003).

- Natelson, D., Rogge, S., and Osheroff, D. "Dielectric response of two level systems to strain fields at low temperatures." Proceedings of LT21, *Czech. J. Phys.* **46**, suppl., pt.S4 2265-6 (1996).

- Osheroff, D., Rogge. S., and Natelson, D. "Interactions between active defects in glasses at low temperatures." Proceedings of LT21, *Czech. J. Phys.* **46**, suppl., pt.S6 3295-302 (1996).

- Rogge, S., Natelson, D., and Osheroff, D. "Anomalous behavior of $\varepsilon'(\omega)$ in glasses at low temperature due to bias application" Proceedings of LT21, *Czech. J. Phys.* **46**, suppl., pt.S4 2263-4 (1996).

- Kupiszewski, T., Christianson, O.R., and Natelson, D. "Predicted thermal-hydraulic characteristics of cable-in-conduit conductor windings during steady-state operation." Proceedings of the 1995 Cryo. Eng. Conf., *Adv. in Cryo. Eng.* **41** 513-20 (1996).

- Osheroff, D., Rogge. S., and Natelson, D. "Anomalous dielectric properties of amorphous solids at low temperatures." Proceedings of Phonons 95, *Physica B* **219-220**, 243-6 (1996).

- Miles, R.B., Brown, G.L., Lempert, W.R., Yetter, R., Williams, G.J. Jr., Bogdonoff, S.M., Natelson, D., Guest, J.R. "Radiatively driven hypersonic wind tunnel." *Journ. of the AIAA* **33**, 1463-70 (1995).

- Mallick, G.T. Jr., Natelson, D., Carr, W.J. Jr., Snitchler, G., Kovachev, V. "Results of AC loss measurements on heat treated SSC cables" *IEEE Trans. Appl. Supercond.* **3**, no.1, pt.2, 744-6 (1993).