

DOUGLAS NATELSON

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RESEARCH INTERESTS

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

PROFESSIONAL EXPERIENCE

- 7/06-present **Associate Professor**, Department of Physics and Astronomy, Rice University; member, Rice Quantum Institute; courtesy appointment, Dept. of Electrical and Computer Engineering. Research efforts include: transport in nanoscale systems; metallic point contact devices; organic semiconductors and single-molecule electronics; and nanoscale magnetic properties
- 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 R.L. Willett. Developed novel fabrication method for nanoscale metallic wires over 1 μm in length with sub-10 nm widths. Studied low temperature transport behavior of normal metals in size regime (linewidths $<\sim 5$ nm) not accessible by conventional means. Examined dephasing, conductance fluctuations, and defect motion over broad temperature and magnetic field ranges.
- 9/93-8/98 **Research Assistant**, Stanford University, with Prof. D. D. Osheroff. Developed a new technique to study nonequilibrium acoustic response of amorphous materials at cryogenic temperatures. Investigated evidence of collective behavior of tunneling systems by dielectric and acoustic measurements. Extended range of thermal conductivity investigations through novel experimental techniques.

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*

TECHNICAL EXPERTISE

Measurement: Single-molecule transistor measurements; Coulomb blockade device measurements; bridge techniques for $1/f$ noise measurements; low level, high precision ac capacitance measurements; 4-terminal bridges for low current transport measurements; bridge measurement of ac magnetic susceptibility; thermal transport measurements at low temperatures using resistive, dielectric, and ^3He melting curve thermometry; sound velocity measurements at low temperatures using mechanical resonators; cw and pulsed NMR for low temperature thermometry.

Fabrication: extensive electron beam lithography; exotic e-beam lithography; e-beam and thermal evaporation for metal deposition; wet and dry semiconductor processing; PDMS molding; extensive machining experience.

Characterization: extensive scanning electron microscopy experience, both thermal and field emission sources; room temperature AFM and STM.

Cryogenics: extensive experience with Oxford 400 (toploading) and Kelvinox dilution refrigerators, ^3He refrigerators, and a variety of other cryostats; design and fabrication of nuclear demagnetization refrigeration stage, ^3He experimental cell, and Ag sinter heat exchangers; operation and maintenance of helium liquifier and He leak detector; use and construction of various persistent-mode superconducting magnets; low temperature design skills.

General: computer data acquisition and instrument interfacing; C, C++, FORTRAN, and BASIC programming; Unix, Windows, and Macintosh system administration; vacuum techniques including mechanical, diffusion, turbo-molecular, and ion pumps.

TEACHING EXPERIENCE

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

- Nanostructures and Nanotechnology I, II (PHYS533/534, 2002-8).
- Statistical and Thermal Physics (PHYS425, Fall, 2001, 2006-8).
- Introduction to Nanoscale Science and Technology” (PHYS600, Fall, 2000).

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

Tutor: Tau Beta Pi, Princeton University (1992-3)

- Conducted problem and discussion session for first-year engineering students enrolled in introductory physics courses.

Teaching Assistant: Department of Civil Engineering, Princeton University (1990-1)

- Conducted computer lab session for introductory C programming course.

ACADEMIC SERVICE

- 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

- 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

- “Ask a Scientist” at Children’s Museum of Houston (2008)
- 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 (2007-8)
- BBC interview (11/9/06) regarding Fe₃O₄ 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, 2006 APS March Meeting
- Organizer of APS DMP invited symposium (2005 March APS Meeting)
- Chaired three sessions at 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.
- 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)

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”)

INVITED PRESENTATIONS

- 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

- 3/08 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”
- 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 C₆₀ 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 PRESENTATIONS

- 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 Fe₃O₄ 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)
- 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. Trionfi 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 C₆₀ 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

In press:

- 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* (in press), (invited) Special Issue: Conductivity of single molecules and supramolecular architectures.

In print:

- 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., Cizek, 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., Cizek, 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., Cizek, J.W., Keane, Z.K., and Tour, J.M., "[Single-molecule transistors: electron transfer in the solid state](#)", *Chem. Phys.* **324**, 267-275 (2006).
- Cizek, 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).
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