

JAMES OWEN RANTSCHLER

Physics Department
Xavier University
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PROFESSIONAL EXPERIENCE

2016-present Texas A&M University at Galveston
Department of Marine Sciences
Instructional Assistant Professor of Physics

2010-2016 Xavier University of Louisiana
Department of Physics and Engineering
Assistant Professor

- Taught approximately 12 contact hours of physics courses per semester (a full list appears later in this document):
 - Ten (10) different lecture courses: 4 physics courses, 2 engineering courses, 3 physics courses cross-listed with engineering, and 1 physics course cross-listed with computer science (26 total sections from 2010-2016)
 - Four (4) different laboratory courses: 2 introductory physics courses, 2 advanced laboratory courses (26 sections, 2010-2015)
 - One (1) seminar course (7 sections, 2010-2015)
- Committee memberships
 - Division of Mathematical and Physical Sciences hiring committee member, 2013-present.
 - Member of all search committees in those years: Conrad Hilton Chair in Computer Science, Physics (head), Chemistry (x2)
 - University Core Curriculum Assessment Committee, 2014-present
- Assessment Coordinator for Physics Department, Spring 2012 to present
 - Developed new assessment criteria implemented in the 2013-2014 academic year.
 - Developed rubrics for new assessment criteria to standardize application.
 - Used previous standards to assess departmental progress and identify issues in current pedagogy.
- Advanced Laboratory Coordinator, Fall 2010 to present
 - Developed new laboratories in fractal dimensions, Lenz' law, LabVIEW programming, among others.
 - Maintained equipment for Advanced Physics Laboratory and Advanced Electronics Laboratory

- Summer Research
 - Built FMR Spectrometer at University of Houston in Prof. Dmitri Litvinov's laboratory, summer 2011
 - Evaporated and measured FMR samples at New York University in Prof. Andrew Kent's Lab, supervising one Xavier student as part of the PREM program, summer 2012
 - Worked with Prof. Litvinov and students on spintronics-related projects, summer 2013
- Student Research
 - Oversaw student research with seven (7) students including multilayer deposition, magnetometer construction, and micromagnetic modelling.
 - Set up electrochemical system for the deposition of magnetic nanowires, nanowire arrays, and Hall crosses.
- Curriculum Development
 - Lead the development of a Materials Science and Engineering track in physics for students in the Partnerships for Research and Education in Materials (PREM) program.
 - Developed of new concentrations for the physics department to attract and retain students in the physics department, including Applied Physics, Computational Physics, Physics Education, and Business Physics.
- Course Development
 - Developed Introduction to Materials Science and Nanotechnology courses in support of Materials Science curriculum at Xavier (for the Materials Science track in the physics department and the ACS certified chemistry degree).
 - Designed, developed and taught nanotechnology course.
 - Developing a materials characterization laboratory for the same program.
 - Designed, developed, and taught Video Game Physics course (mechanical simulations in Python) as a non-calculus based approach to introductory physics topics for both majors and non-majors.
 - Modified Physics Seminar to align with the goals of the quality enhancement program (QEP) by emphasizing journal reading on a specified topic.
- Created the extracurricular Physics and Engineering Book Club to expand students' appreciation of physics topics and engineering careers.

2008-2010 Western Digital Corporation, Fremont, CA
 Magnetic Head Operations, Device Physics Group
 Senior Principal Engineer

- Write Head Failure Analysis and Characterization
 - Detected writer failure from magnetic and electrical tests that created over write and other crosstalk in magnetic hard drives using magnetic force microscopy, spin stand testing, and induction testing.
 - Developed magnetic force microscope tests of active magnetic write heads and shields.
 - Detected magnetic shielding errors and suggested solutions to design engineers.

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- Developed programs and procedures with TCL and ImageJ to physically characterize the size and shape of magnetic writers after processing.
- Evaluated and acquired automated Kerr microscope domain imaging systems and developed domain tests using them.
- Read Head Characterization and Lifetime Test Development
 - Detected read head failures using electrical and heat cycle testing.
 - Developed and programmed electrical characterization tests of magnetic read heads.
 - Developed and programmed high temperature tests of magnetic read heads.

2005-2008 University of Houston, TX
 Center for Nanomagnetic Systems and Department of Electrical and
 Computer Engineering
 Research Assistant Professor (half-time, 2007)
 Postdoctoral Associate, 2005-6

- Research on three funded projects:
 - Designed, synthesized, and optimized magnetic multilayer (Co/Pd) stacks using magnetron sputtering for experiments in magnetic switching of perpendicularly oriented bits in large arrays.
 - Synthesized and patterned magnetic trilayers for magnetic biosensor applications.
 - Deposited and characterized giant magnetoresistance in films and devices.
 - Tested magnetic multilayers and arrays with various magnetometers and microscopes.
- Oversaw and maintained major equipment.
 - Created LabVIEW interfacing programs for electrical and magnetic characterization equipment.
 - Devised calibration procedures for magnetometers.
 - Wrote SOPs for existing instrumentation to improve and streamline results.
- Graduate and Undergraduate Student Research Planning and Supervision
 - Provided training for deposition and magnetometry systems.
 - Developed deposition and measurement plans with students.
- Organized collaborative research with UC-Riverside and NIST.
- Taught a graduate course (Fall 2007) on Ferromagnetic Materials and Devices

2006-2008 Sentorix, Inc., Pearland, TX
 Senior Development Engineer (half-time)

- Nanomagnetic Biosensor Array Development and Commercialization
 - Lead engineer and PI on STTR for technology transfer from materials research at the University of Houston.
 - Developed magnetic biosensor materials by electrochemical deposition, increasing size and uniformity of materials and increasing throughput of the process.

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2003-2005 National Institute of Standards and Technology, Gaithersburg, MD
Materials Science and Engineering Laboratory
Metallurgy Division, Magnetic Materials Group
National Research Council Postdoctoral Associate
Dr. Robert McMichael, Advisor

- Performed experimental research on soft magnetic materials, investigating the effects of doping and interfaces on the damping of the magnetization, providing data needed for optimization of magnetic nanostructures in data storage operations, whether switched magnetically or spintronically.

Summer 2000 Seagate Technology, Bloomington, MN
Summer Intern
Dr. Vladyslav A. Vas'ko, Advisor

- Designed, constructed and programmed a 6 GHz VNA frequency-domain ferromagnetic resonance system (high-frequency permeameter).
- High-Moment Thin Film Deposition and Characterization using Magnetron Sputtering and Stress Measurements and Magnetometry Measurements (BH Looper, MOKEM)

1996-1997 TeleMedia Applications, Inc., Denver, CO
(Providing on-line coursework for the Engineering School at UC-Denver)
LAN Administrator and Content Designer

- Oversaw network and data, created HTML templates, and assisted in content conversion. Maintained database for on-line engineering courses.

PROFESSIONAL PREPARATION

2005-6 Postdoctoral Associate, University of Houston, TX
Prof. Dmitri Litvinov, Advisor

2003-5 National Research Council Postdoctoral Fellow, National Institute of Standards and Technology, Gaithersburg, MD
Robert D. Michael, Advisor

2003 Ph.D. Physics, University of Alabama, Tuscaloosa, AL
Prof. Chester Alexander, Jr. (retired), Advisor.

Dissertation Title: *Microstructure and Damping in Soft Magnetic Thin Films.*

2000 Summer Internship, Seagate Technology, Bloomington, MN

1997 B.S. Computational Physics and Pure Mathematics, Metropolitan State College of Denver, CO

1992 A.S. Science, Arapahoe Community College, Littleton, CO

ADDITIONAL ACADEMIC TRAINING

2014 Quality Matters “Applying the QM Rubric workshop” for on-line teaching.
2011 Conference on Case Study Teaching in Science
2011 AAPT New Faculty Workshop

COURSES TAUGHT

ECE 6307 – Fundamentals of Ferromagnetic Materials and Devices (University of Houston)

ENGR 1000 – Introduction to Engineering (5 sections)

ENGR 1100 – Introduction to Engineering Design (4 sections)

ENGR 2630/PHYS 2630 – Analytical Methods for Physics and Engineering (2 sections, 1 on-line)

ENGR 3010/PHYS 3010 – Electricity and Magnetism I (4 sections)

ENGR 3040/PHYS 3040 – Thermodynamics (2 sections)

PHYS 2111 – Physics II for Scientists and Engineers (2 sections)

PHYS 2550 – Materials Physics

PHYS 3011 – Electricity and Magnetism II (4 sections)

PHYS 3050 – Modern Physics (2 sections)

PHYS 3560 – Nanotechnology (formerly taught as a special topics course, PHYS 4530)

PHYS 4530 – Special Topics: Video Game Physics (3 sections)

PHY 103 – College Physics I Laboratory (5 sections) (University of Alabama)

PHY 105 – College Physics II Laboratory (University of Alabama)

PHY 203 – University Physics I Laboratory (University of Alabama)

PHY 205 – Integrated Engineering Physics I Laboratory (University of Alabama)

PHYS 2020L – General Physics I Laboratory (11 sections)

PHYS 2020L – General Physics II Laboratory (10 sections)

PHYS 3310L – Advanced Physics Laboratory (5 sections)

PHYS 3320L – Advanced Electronics Laboratory (5 sections)

PHYS 3510S – Physics Seminar (7 sections)

GRANTS AWARDED

External:

NSF, STTR Phase I: Development of High Moment Corrosion Resistant Materials for Data Storage and Biomedical Applications, PI. Co-PIs: Dmitri Litvinov and Stanko Brankovic. Period: 1/1/2007-12/31/2007. Award: \$149,896.00

Internal:

Center for Undergraduate Research Award, Xavier University of Louisiana: Construction of a Four Point Probe System for Resistivity and Magnetoresistance Measurements, PI. Period 2/10/2012-5/1/2012. Award: \$10,000.00

Center for Undergraduate Research Award, Xavier University of Louisiana: Static and Dynamic Magnetometry of Electrodeposited Permalloy/Copper Interfaces, PI. Period 1/19/2011-5/1/2011. Award: \$7,964.00

AWARDS

2011-12 Mellon FaCTS Scholar
2009 Elevated to Senior Member, IEEE
2003-2005 National Research Council Postdoctoral Fellowship
1997-1998 President's Fellowship, University of Alabama
1996 Honorable Mention, SIAM Mathematical Contest in Modeling, with Frank McDonough and Colin O'Donnell.
1991, 1997 Colorado Merit Scholarship

MILITARY SERVICE

1988-1994 Selected Marine Corps Reserve

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Senior Member, Institute of Electrical and Electronic Engineers, 2004-present

Senior Member, 2009-present

Magnetics Society, 2004-present

Electron Devices Society, 2007-present

Member, American Physical Society, 2004-present

Division of Condensed Matter Physics, 2004-present

Division of Materials Physics, 2004-present

Member, American Association of Physics Teachers, 2008-present

Member, American Association for the Advancement of Science, 2008-present

Member, Advanced Laboratory Physics Association, 2014-present

PROFESSIONAL SERVICE

IEEE Admissions & Advancement Senior Member Review Panel, February 7th, 2015, New Orleans, LA.

IEEE Admissions & Advancement Senior Member Review Panel, January 8th, 2011, New Orleans, LA.

IEEE Magnetics Society, Houston Chapter Chair, 2007-2008

IEEE Houston Section, AP/MTT/ED/MAG Multigroup Chapter Vice-Chair, 2008

Workshop Co-Organizer, with Dmitri Litvinov, of 2008 IEEE *Workshop on Next Generation Recording Technologies*, March 19th, 2008, Houston, TX.

MRS "Research/Researchers" Volunteer Columnist, 2009-2012

Peer Reviewer:

- Journal of Applied Physics, 2003-present
- IEEE Transactions on Magnetics, 2004-present
- Journal of Magnetism and Magnetic Materials 2005
- IEEE Transactions on Nanotechnology, 2006-2010
- Thin Solid Films 2006-present
- IEEE Transactions on Aerospace and Electronic Systems, 2007
- Materials Chemistry and Physics, 2009-present

PEER-REVIEWED PUBLICATIONS (24):

24. D. Smith, L. Chang, **J. O. Rantschler**, V. Kaltasky, P. Ruchhoeft, and D. Litvinov, "The Effect of Size Distribution on the Switching Field Distribution of Co/Pd Multilayered Nanostructure Arrays," *IEEE Transactions on Magnetics*, **45**, 3554-7 (2009).
23. D. Litvinov, V. Parekh, C. E, D. Smith, **J. O. Rantschler**, P. Ruchhoeft, D. Weller, and S. Khizroev, "Nanoscale Bit-Patterned Media for Next Generation Data Storage Systems," *Journal of Nanoelectronics and Optoelectronics* **3**, 93 (2008).
22. C. E, **J. O. Rantschler**, S. Khizroev, and D. Litvinov, "Micromagnetics of Signal Propagation in Magnetic Cellular Logic Channels," *Journal of Applied Physics* **104**, 054311:1-5 (2008).
21. C. E, **J. O. Rantschler**, S. Khizroev, and D. Litvinov, "Micromagnetic Study of Domain Wall Dynamics in Bit-Patterned Nanodots," *Journal of Applied Physics* **103**, 113910:1-8 (2008).
20. D. Litvinov, V. Parekh, C. E, D. Smith, **J. O. Rantschler**, P. Ruchhoeft, D. Weller, and S. Khizroev, "Recording Physics, Design Considerations, and Fabrication of Nanoscale Bit-Patterned Media," *IEEE Transactions on Nanotechnology* **7**, 463-476 (2008).
19. J. George, **J. O. Rantschler**, S. -E. Bae, D. Litvinov and S. R. Brankovic, "Sulfur Incorporation into Electrodeposited CoFe Alloys – Consequences for Magnetic and Corrosion Properties," *Journal of the Electrochemical Society* **155**, d589 (2008).
18. C. E, **J.O. Rantschler**, S. Zhang, S. Khizroev, T.R. Lee, D. Litvinov, "Low Temperature Vacuum Annealing Study of (Co/Pd)_n Magnetic Multilayers," *Journal of Applied Physics* **103**, 07B510:1-3 (2008).
17. J. W. Lau, R. D. McMichael, S.-H. Chung, **J. O. Rantschler**, V. Parekh, and D. Litvinov, "Microstructural Origin of Switching Field Distribution in Patterned Co/Pd Multilayer Nanodots," *Applied Physics Letters* **92**, 012506:1-3 (2008).
16. K. Martirosyan, L. Chang, **J. O. Rantschler**, S. Khizroev, D. Luss, D. Litvinov, "Carbon Combustion Synthesis and Magnetic Properties of Cobalt Ferrite Nanoparticles," *IEEE Transactions on Magnetics* **43**, 3118-3120 (2007).
15. C. E, **J. O. Rantschler**, S. Zhang, D. Smith, V. Parekh, S. Khizroev, D. Litvinov, "Intergranular Interactions of Low Temperature Atmosphere Annealed Co/Pd Magnetic Multilayers," *Journal of Applied Physics* **101**, 09D108:1-3 (2007).

14. V. Parekh, D. Smith, C. E. **J. O. Rantschler**, S. Khizroev, D. Litvinov, "He⁺ Ion Irradiation Study of Continuous and Patterned Co/Pd Multilayers," *Journal of Applied Physics* **101**, 083904:1-4 (2007).
13. **J. O. Rantschler**, R. McMichael, D. Pulugurtha, L. Connors, P. Chen, A. Castillo, A. Shapiro, W.F. Egelhoff, Jr., B. Maranville, "Effect of 3d, 4d, and 5d Transition Metal Doping on Damping in Permalloy Thin Films," *Journal of Applied Physics* **101**, 033911:1-6 (2007).
12. **J. O. Rantschler**, B. Maranville, J. Mallett, P. Chen, R. McMichael, W.F. Egelhoff, Jr., "Damping at Normal Metal/Permalloy Interfaces," *IEEE Transactions on Magnetics* **41**, 3523-3525 (2005).
11. **J. O. Rantschler**, P. Chen, A.S. Arrott, R. McMichael, W.F. Egelhoff, Jr., B. Maranville, "Surface Anisotropy of NM/NiFe/NM Multilayers," *Journal of Applied Physics* **97**, 10J113:1-3 (2005).
10. **J. O. Rantschler**, C. Alexander, Jr., and H.-S. Jung, "Ferromagnetic Resonance in Soft Cu/FeCo," *Journal of Magnetism and Magnetic Materials* **286**, 262-266 (2005).
9. V. Vas'ko, **J. O. Rantschler**, M. Kief, "Structure, Stress, and Magnetic Properties of High Saturation Magnetization Films of FeCo," *IEEE Transactions on Magnetics* **40**(4), 2335-2337 (2004).
8. **J. O. Rantschler**, Y. Ding, S.-C. Byeon, and C. Alexander, Jr., "Microstructure and Damping in FeTiN and CoFe films," *Journal of Applied Physics* **93**, 6671-6673 (2003).
7. **J. O. Rantschler**, C. Alexander, Jr., "Ripple Field Effect on High-Frequency Measurements of FeTiN Films," *Journal of Applied Physics* **93**, 6665-6667 (2003).
6. X. Liu, **J. O. Rantschler**, C. Alexander, Jr., G. Zangari, "High-Frequency Behavior of Electrodeposited Fe-Co-Ni Alloys," *IEEE Transactions on Magnetics* **39**, 2362-2364 (2003).
5. H. Xi, **J. O. Rantschler**, S. Mao, M. Kief, R.M. White, "Interface Coupling and Magnetic Properties of Exchange-Coupled Ni₈₁Fe₁₉/Ir₂₂Mn₇₈ Bilayers," *Journal of Physics D: Applied Physics* **36**, 1464-1468 (2003).
4. C. Alexander, Jr., **J. O. Rantschler**, T.J. Silva, P. Kabos, "Frequency- and Time-Resolved Measurements of FeTaN Films with Longitudinal Bias Fields," *Journal of Applied Physics* **87**, 6633-6635 (2000).
3. S.-C. Byeon, **J. O. Rantschler**, C. Alexander, Jr., "Magnetic and Thermal Properties of IrMn/FeTaN Films," *Journal of Applied Physics* **87**, 5867-5869 (2000).

2. S-C. Byeon, **J. O. Rantschler**, C. Alexander, Jr., W. Doyle, J. Barnard, K. Minor, "Dynamic Measurement of the Thermal Stability of the Magnetic Anisotropy in FeTaN Films," *Journal of Applied Physics* **87**, 5849-5851 (2000).

1. M. Huber, A. Corey, K. Lumpkins, F. Nafe, **J. O. Rantschler**, F. Hilton, J. Martinis, A. Steinbach, "DC SQUID Arrays with Intracoil Damping to Reduce Resonance Distortions," *Applied Superconductivity* **5**, 425-429 (1998).

MRS BULLETIN RESEARCH/RESEARCHERS COLUMNS

April 2010, "SiN Nanopores Enable Electrical Bar-Code Scanning of Tagged DNA." Review of Alon Singer, et al., *Nano Letters* **10**, 738 (2010).

December 2009, "How to Choose In-plane Ferroelectric Polarization States in Rhombohedral BiFeO₃." Review of Nina Balke, et al., *Nature Nanotechnology* (2009)

October 2009, "AlInN Films Display Negative Imaginary Conductivity at Terahertz Frequencies." Review of Ting-Ting Kang, et al., *Optics Letters* **34**, 2507 (2009).

September 2009, "Stirring Fluids in Confined Spaces with Chains of Iron Beads." Review of James Martin, et al., *Physical Review E* **80**, 016312 (2009).

July 2009, "Light-Assisted Writing of Bits on Low-Doped (Ga,Mn)As Ferromagnetic Semiconductors." Review of G. Astakhov, et al., *Physical Review Letters* **102**, 187401 (2009).

INVITED LECTURES AND SEMINARS:

“Spin Diffusion and Ferromagnetic Resonance”

1. September 2014, Physics Department and AMRI Center, University of New Orleans, LA

“Ferromagnetic Resonance at Nonmagnetic Metal-Permalloy Interfaces”

1. February 2011, Physics Department and AMRI Center, University of New Orleans, LA
2. September 2005, Nanoscience Center, University of South Carolina, Columbia

“Ferromagnetic Resonance in Soft Magnetic Materials – A Tutorial”

1. March 2011, Center for Integrated Bio-and-Nanosystems of the University of Houston, IEEE Technology Council, and The Houston Chapter of the IEEE Magnetics Society, Houston, TX
2. January 2005, Electrical Engineering Group, National Institute of Standards and Technology, Boulder, CO
3. December 2004, Magnetics Group, Colorado State University, Fort Collins

“Damping in Metallic Ferromagnets”

1. March 2009, Physics Department, San Jose State University, CA
2. March 2009, Physics Department, Lock Haven University, PA
3. February 2008, Physics Department, University of Northern Iowa, Cedar Falls

“Noise-Based Nanomagnetic Biosensors”

1. May 2008, Department of Physics and Engineering Physics, University of Tulsa, OK

“Co/Pd Nanostructures for Magnetic Recording”

1. April 2007, Magnetic Materials Group Seminar, Metallurgy Division, National Institute of Standards and Technology, Gaithersburg, MD