STEVEN MARK ANLAGE
Quantum Materials Center
Physics Department
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EDUCATION

Ph.D., Applied Physics June, 1988
California Institute of Technology (Caltech), Pasadena
Thesis Title: Icosahedral Order in Metastable Metallic Alloys
Advisor: Professor William L. Johnson

M.S., Applied Physics June, 1984
Caltech, Pasadena

B.S., Physics (Magna Cum Laude) May, 1982
Rensselaer Polytechnic Institute (RPI), Troy, NY
Thesis Title: Theory of Electron Mobility in Semiconductors
Advisor: Professor Stephen J. Nettel
Minor: Philosophy of Science and Logic

RESEARCH AND TEACHING EXPERIENCE

Interim Director July, 2007 to June, 2009
Center for Nanophysics and Advanced Materials
Physics Department, University of Maryland

Full Professor July, 2002 to present
Center for Superconductivity Research
Physics Department, University of Maryland

Associate Professor July, 1997 to June, 2002
Center for Superconductivity Research
Physics Department, University of Maryland

Assistant Professor Oct 1990 to June, 1997
Center for Superconductivity Research
Physics Department, University of Maryland

Postdoctoral Research Associate Nov 1987 to Sept 1990
Geballe-Beasley-Kapitulnik Superconductivity Group
Applied Physics, Stanford University (Mac Beasley, supervisor)

Graduate Research Fellow Oct 1983 to Nov 1987
Disordered Metals Group, Applied Physics, Caltech (W. L. Johnson, supervisor)

Collaborating Scientist, Los Alamos National Laboratory (LANL), NM
Center for Materials Science, May and Oct 1986
Semiconductor Exploratory Research and Development Group (E-11), Aug. 1985

Teaching Assistant 1982-3, 1987
Applied Physics, Caltech

Summer Research Intern 1980, 81, 82
General Telephone and Electronics Laboratories (GTEL), Waltham, MA

OTHER APPOINTMENTS

Visiting Fellow May – June, 2019
Institute of Advanced Studies
Loughborough University
Loughborough, UK

Visiting Professor Oct 2011 to March 2012
Center for Functional Nanostructures
Karlsruhe Institute of Technology
Karlsruhe, Germany

Affiliate Professor 2005 to present
Electrical and Computer Engineering Department
University of Maryland

Affiliate Professor 2017 to present
Materials Science and Engineering Department
University of Maryland

AWARDS AND FELLOWSHIPS

Outstanding Advising/Mentor Award, Physics Department, University of Maryland (2019)
Vannevar Bush Faculty Fellowship Finalist (2019)
2016 Invention of the Year Award, University of Maryland (2017)
University of Maryland Distinguished Scholar-Teacher (2016)
Alan Berman Research Publication Award at the US Naval Research Laboratory, Washington, DC (2015)
Outstanding Mentor, College of Computer, Mathematical and Physical Science, University of Maryland (2008)
2007 Invention of the Year Finalist, University of Maryland (2008)
National Security Science and Engineering Faculty Fellowship Finalist (2008)
NSF New Young Investigator Award, Maryland (1992-1998)
NATO Advanced Study Institute Fellowship, Stanford (1989)
Hewlett Packard Research Instrumentation Grant, Stanford (1989)

IBM Graduate Research Fellowship, Caltech (1986-87)
Eastman Kodak Graduate Research Fellowship, Caltech (1983-86)
G. H. Carragan Prize for outstanding scholarship in Physics, RPI (1982)
ΣΠΣ Physics Honor Society (1982)
NSF Undergraduate Research Grant, RPI (1980)

SYNERGISTIC ACTIVITIES

1. My group has produced a number of excellent scientists and engineers who have joined the defense workforce. As an example, I have support from ONR, DARPA and AFOSR to perform basic research on wave chaos in the context of Counter-Directed Energy Weapons (CDEW). We discovered that the problem of coupling of electromagnetic waves to circuits and devices inside complex enclosures (e.g. ship compartments, aircraft electronics bays, etc.) could be understood in a very general and powerful way by utilizing the ideas of quantum chaos and random matrix theory. I hired a foreign ECE graduate student to work on this project. The student, Sameer Hemmady, performed detailed experiments to test, and extend, the theory, which we now call the Random Coupling Model (RCM). Sameer was extremely successful, graduating with a Ph.D. degree in 2006, publishing 9 influential papers, giving an excellent summary talk about the RCM at our AFOSR/MURI final review in 2005, and developed a very useful web site explaining our RCM (http://anlage.umd.edu/RCM), which is still intensively used. Sameer also helped to nucleate a collaboration with the US Naval Research Laboratory, which has resulted in numerous joint publications and two NRL Alan Burman Research Publication Awards. Sameer is now a senior partner at Verus Research in Albuquerque, and an adjunct faculty member in the ECE department at the University of New Mexico. He is now a US citizen and works extensively with AFRL/Kirtland and other DoD customers. Sameer and I are co-PIs on an AFOSR/AFRL Center of Excellence grant (http://ece-research.unm.edu/AFOSR-COE/index.html), an STTR phase-II grant, and collaborate on experimental studies of electromagnetic coupling to complex networks. Sameer is an excellent example of how my group has developed the next generation of scientists and engineers for the defense workforce.
2. Led a 12-undergraduate student 4-year Gemstone group (2013-2016) to develop a new long-range wireless power transfer technology using time-reversed electromagnetics techniques developed in my lab with DOD support. Among other accomplishments, we delivered wireless energy to a moving target inside a complex enclosure, and developed a novel method to direct energy selectively to several different targets in different locations simultaneously. Two students gave invited talks at the 2016 IEEE Wireless Power Transfer Conference in Portugal and won the Best Paper Award for the conference! We also won the University of Maryland Invention of the Year Award in 2017.
3. Consultant to Nazarbayev University, a new university located in Astana, Kazakhstan. I have interviewed all of the Physics faculty candidates in the past 4 years, and act as an external expert on hiring in the sciences for the university. I visited the university in 2015, 2016 and 2017, and presented four talks, met with students, and have established research collaborations with faculty there. The department now has 12 excellent full-time faculty members from the assistant to the full-professor rank, and is embarking on an ambitious research effort that I believe will make it the pride of central Asia. Related to this, I assisted Prof. Alexey V. Ustinov (Physikalisches Institut, Karlsruhe Institute of Technology, Germany) in creating a new research group at the National University of Science and Technology MISiS, Moscow, Russia. The group was started from scratch using funding from a Russian 'Mega-Grant' and the research theme is superconducting and quantum metamaterials, and is patterned after my lab at the University of Maryland.

4. Mentored 33 undergraduate research students, 10 Masters students (to thesis), 28 Ph.D. students, and 14 post-doctoral researchers in 25 years at the University of Maryland. Selected "outstanding Mentor" in the College in 2008. Selected as a University of Maryland Distinguished Scholar-Teacher in 2016-17. Selected for the Outstanding Advising/Mentor Award, Physics Department, University of Maryland in 2019.

5. Organized and gave lectures at Short Courses on Superconducting Electronics at the 2000, 2010, 2012 and 2014 Applied Superconductivity Conferences. Attended by 30-50 students each time. Organizing committee for the High Frequency Properties of High Temperature Superconductors Workshop. Co-organized a Workshop entitled "Quantum Correlated Matter and Chaos" at the Max Planck Institute for the Physics of Complex Systems in Dresden, Germany in June 2015. Co-organized a Conference on Quantum Metamaterials in Spetses Greece in June 2015 and 2016. Co-organized the High Frequency Scanning Probe Microscopy Workshop at NIST/Boulder in December, 2019.

PATENTS

US Patent #5,900,618, "Near-Field Scanning Microwave Microscope Having a Transmission Line With An Open End," issued May 4, 1999.

US Patent # 6,366,096, "Apparatus and Method for Measuring of Absolute Values of Penetration Depth and Surface Resistance of Metals and Superconductors," issued 2 April, 2002.

US Patent # 6,376,836, "Disentangling Sample Topography and Physical Properties in Scanning Near-Field Microwave Microscopy," issued 23 April, 2002.

US Patent #6,809,533, "Quantitative imaging of dielectric permittivity and tunability," issued October 26, 2004.

US Patent # 8,624,605, "Apparatus and method to distinguish nominally identical objects through wave fingerprints," issued 6 January 2014.

US Patent # 9,424,665, "System and method for signals transmission in complex scattering environments using interaction of the waves with a nonlinear object," issued 23 August, 2016.

US Patent # 11,101,915, "System and method for wireless power transfer using time reversed electromagnetic wave propagation," issued 24 August, 2021.

US Patent # 11,764,832, "Systems, Methods, and Media for Wireless Power Transfer," issued 19 September, 2023.

PATENT APPLICATIONS

Provisional US Patent Application, "Quantitative Imaging of Dielectric Permittivity and Tunability," September 10, 1999.

US Patent Application, "Disentangling Sample Topography and Physical Properties in Scanning Near-Field Microwave Microscopy," December 29, 1999.

International Patent Application, "Quantitative Imaging of Dielectric Permittivity and Tunability," April 5, 2000.

US Patent Application, "Apparatus and Method for Measuring of Absolute Values of Penetration Depth and Surface Resistance of Metals and Superconductors," August 4, 2000.

Provisional US Patent Application, "Magnetic Permeability Imaging with a Scanning Near-Field Microwave Microscope," August 16, 2000.

Provisional US Patent Application, "Imaging of Domains in Ferroelectric Crystals," October 5, 2000.

Provisional US Patent Application, "High Resolution Scanning Near-Field Microwave Microscopy," February 15, 2001.

Application for a provisional patent (60/463593) on 4/17/2003 for our disclosure, "Tunable Metamaterials".

Provisional Patent Application 60/471,696, entitled "Height Modulated Imaging in Near Field Microscopy," submitted 19 May, 2003 to the US Patent and Trademark Office.

Invention disclosure to the Office of Technology Commercialization, PS-2006-06, "Method to Generate Chaotic Electrical Signals at GHz Frequencies."

Invention disclosure to the Office of Technology Commercialization, PS-2007-006, "Wave Fingerprint of Complicated Enclosures."

Provisional Patent Application 60/885,265, entitled "Wave Fingerprint of Complicated Enclosures," submitted 8 February, 2007 to the US Patent and Trademark Office.

Provisional Patent Application 60/968,659, entitled "Chaotic Time-Reversal Sensor", submitted 29 August, 2007 to the US Patent and Trademark Office

Patent Application entitled "Apparatus and Method to Distinguish Nominally Identical Objects Through Wave Fingerprints," submitted to the US Patent and Trademark Office on Feb. 15, 2008.

Provisional Patent Application submitted to USPTO on 2 October, 2008, entitled "Exponential Amplification Chaotic Time Reversal Sensor (EACTRS)" by Steven Anlage, Thomas Antonsen and Biniyam Taddese, 61/102,065.

Invention Disclosure entitled "Sensing Small Changes in a Wave Chaotic Scattering System," submitted to OTC on 28 June, 2010.

Invention Disclosure entitled "Communications by Means of Nonlinear Time-Reversal," submitted to OTC on 22 December, 2011.

US Patent application submitted 7 Jan., 2014, titled "System and method for signals transmission in complex scattering environments using interaction of the waves with a nonlinear object."

Provisional Application Filed: April 25, 2016, "Method of Delivering Power to a Moving Target Wirelessly via Electromagnetic Time Reversal" (PS-2016-011). US Patent Application No.: 62/327,346.

Provisional Application Filed: April 25, 2016, "Selective Collapse of Nonlinear Time Reversed Electromagnetic Waves" (PS-2016-012). Application No.: 62/327,349.

US patent application filed: August, 2019, 2019/0140766, System and Method for Wireless Power Transfer Using Time Reversed Electromagnetic Wave Propagation.

US patent application filed: December, 2021, System and Method for High-Efficiency, Long-Range Wireless Power Transfer

U.S. Patent Appl. No. 17/550915, Title: Systems, Methods, and Media for Wireless Power Transfer. Claims allowed by the USPTO in November, 2022.

PROFESSIONAL AFFILIATIONS

American Physical Society
Materials Research Society
Institute of Electrical and Electronics Engineers

EDITING AND EDITORIAL BOARDS

Associate Editor for *IEEE Transactions on Applied Superconductivity* (2017 – present)
Advisory Editor for *Reviews in Physics* (2015 – present)
Editorial Board Member IEEE Transactions on Quantum Engineering, (January 2020 - Present)

PROFESSIONAL ACTIVITIES

Member of the American Physical Society Committee on Scientific Publications, 2021-2024

Chair of IEEE MTT-18 Technical Coordinating Committee "Microwave Superconductivity and Cryogenics," 2017-2018

Referee for *Science*, *Nature* journals, *Physical Review Letters*, *Physical Review B*, *Applied Physics Letters*, *Journal of Applied Physics*, *IEEE Transactions on Applied Superconductivity*, *Review of Scientific Instruments*, *Physica C*, *European Journal of Physics*

Referee for Proposals from NSF, DOD, DOE, CRDF, US-Israel Binational Science Foundation, Canadian Foundation for Innovation, Swiss National Science Foundation, Hong Kong Research Grants Council, EPSRC, EU, and other foreign funding agencies

Member of the International Organizing Committees of the High Temperature Superconductors in High Frequency Fields Symposium, Quantum Metamaterials Conferences, etc.

APS March Meeting Abstract sorting 1993, 1997, 2001-2008, 2011-2012, 2015-2016

Team Leader for Superconductivity (Category 5) abstract sorting for the 2004 March Meeting of the American Physical Society

Organized a session on Materials Challenges for Applications of HTSC, 1996 Spring Materials Research Society Meeting

Co-chair of the Electronics Program Committee for the 2000 Applied Superconductivity Conference.

Organized and ran a Short Course entitled "Superconducting Electronics" at the 2000 Applied Superconductivity Conference.

Delivered a Short Course on Superconducting Electronics at the 2010, 2012 and 2014 Applied Superconductivity Conferences.

Member of the Electronics Program Committee for the 2002 Applied Superconductivity Conference.

Session chair for APS March Meetings, Materials Research Society Meetings, Applied Superconductivity Conferences, etc.

SELECTED INVITED TALKS SINCE 2010

Invited Talks (2), Global Electromagnetics Conference 2022, Abu Dhabi, UAE, 14, 16 November 2022.

Invited Talk, 16th International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials 2022), Siena, Italy, 14 September, 2022.

Invited Talk, Materials and Mechanisms of Superconductivity (M2S-HTSC), Vancouver, BC, Canada, 19 July, 2022.

Invited Talk, Quantum Materials Workshop, College Park, MD, 24 June, 2022.

Invited talks (2), URSI Atlantic Radio Science Meeting, AT-AP-RASC 2022, Spain, 2 June, 2022.

Colloquium, VA Tech ECE Colloquium, Virginia Tech, 9 February, 2022.

Invited talk, ALPHA Mini Workshop on Tunable Plasmonic Haloscopes, University of Stockholm, Sweden, 2 February, 2022.

Colloquium, Quantalks Colloquium, organized by the Quantum Center for Diamond and Emerging Materials, India Institute of Technology Madras, Chennai, India (Zoom), 11 June, 2021. Online recording: https://youtu.be/G6k0QB8rx08

Invited talk, 10th Workshop on Quantum Chaos and Localisation Phenomena, Warsaw, Poland 27 May 2021.

Invited talk, Lawrence Workshop on Tunable Plasmonic Haloscopes, Arizona State University, 6 May, 2021.
Colloquium, Quantum Engineering seminar, University of Glasgow, UK, 26 March, 2021.
Invited talk, Virtual International Workshop on Nb_3Sn SRF Science, Technology, and Applications, 10 November, 2020.
Invited talk, Center for Bright Beams Seminar, Cornell University, 29 April, 2020.
Invited talk, Annual Directed Energy Science & Technology Symposium, West Point Military Academy, NY, 10 March, 2020.
Invited talk, Tesla Technology Collaboration Meeting, CERN, Geneva, Switzerland, 5 February, 2020.
Invited talk, 13th International Congress on Artificial Materials for Novel Wave Phenomena, Rome Italy, 18 September, 2019.
Invited Talk, International Superconducting Electronics Conference, Riverside, CA USA, 1 August, 2019.
Invited Talk, Symposium in Honor of the 60th Birthday of Giorgos P. Tsironis, The 12th CHAOS 2019 International Conference, Chania, Crete, Greece, 21 June, 2019.
Invited Talk, 2019 IEEE International Microwave Symposium, Workshop WSA "Microwave Materials: Enabling the Future of Wireless Communication," Boston, MA, 2 June, 2019.
Invited Talk, 9th Workshop on Quantum Chaos and Localisation Phenomena, Warsaw, Poland, 26 May, 2019.
Invited Talk, Landau Seminar, Physics Department, Loughborough University, Loughborough, UK, 23 May, 2019.
Physics Colloquium, Temple University, Philadelphia, PA, USA, 14 January, 2019.
Invited Talk, The 49th Winter Colloquium on the Physics of Quantum Electronics, Snowbird, UT, USA, 8 January, 2019.
Physics Colloquium, Wesleyan University, Middletown, CT, USA, 29 November, 2018.
Invited Talk, Applied Superconductivity Conference, Seattle, WA, USA, 29 October, 2018.
Invited Talk, Laboratory for Physical Sciences Seminar, College Park, MD, USA, 24 October, 2018.
Invited Talk, Workshop on Thin Films and New Ideas for SRF, INFN, Legnaro, Italy, 10 October, 2018.
Colloquium at SUNY Polytechnic Institute, Albany, NY, USA, 28 September, 2018.
Invited Talk, Northrup-Grumman Advanced Technology Laboratory, Linthicum, MD, USA, 20 September, 2018.
Invited Talk, American Electromagnetics Conference 2018, Santa Barbara, CA, USA, 29 August, 2018.
Invited Talk, 2018 IEEE International Symposium on Electromagnetic Compatibility, Signal and Power Integrity, Long Beach, CA, USA, 30 July, 2018.
Invited Talk, IEEE Photonics Society Summer Topical Meeting on Non-Hermitian and Topological Photonics, Waikoloa, Hawaii, USA, 10 July, 2018.
Invited Talk, Conference on Nonlinear Localization in Lattices, Spetses, Greece, 20 June, 2018.
Invited Talk, Conference on High Temperature Superconductors in High Frequency Fields, Yamagata, Japan, 6 June, 2018.
Invited Talk, NASA Goddard Spaceflight Center Engineering Colloquium, Greenbelt, MD USA, 16 April, 2018.

Invited Talk, Workshop on Topological Dynamics, Quantum and Classical, Keck Center for Topological Materials, Newark, NJ, USA, 7 November, 2017.
Invited talk, Workshop on Photonic Topological Insulators, Banff International Research Station, Banff, Canada, 13 September, 2017.
Invited talk, Exploring the Energetic Universe 2017, Nazarbayev University, Astana, Kazakhstan, 12 August, 2017.
Invited talk, International Metamaterials Conference 2017, Incheon, Korea, 27 July, 2017.
Invited talk, Innovations in Wave Modelling 2017, Nottingham Trent University, Nottingham, UK, 13 July, 2017.
Physik der Kondensierten Materie Seminar, Physikalisches Institut, Karlsruhe Institute of Technology, Germany, 23 May, 2017.
Invited Talk, 8th International Workshop on Quantum Chaos and Localisation Phenomena, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, 21 May, 2017.
Invited talk, Fundamentals of Quantum Materials Workshop, Greenbelt, MD, USA, 15 January, 2017.
Invited talk. Physics of Quantum Electronics, Snowbird, Utah, 13 January, 2017.
University of Maryland Distinguished Scholar Teacher Lecture, Physics Department, University of Maryland, 29 November, 2016.
Physics Colloquium, Missouri University of Science and Technology, Rolla, MO, 27 October, 2016.
Invited talk, Metamaterials 2016, Chania, Greece, 20 September, 2016. Talk given by collaborator George Tsironis.
Invited talk, Dynamics Days Central Asia, Astana, Kazakhstan, 2 September, 2016.
Invited talk, EUROEM 2016, Imperial College, London, UK, 11 July, 2016.
Invited talk, Quantum Metamaterials & Quantum Technology Conference, Spetses, Greece, 22 June, 2016.
Invited talks (2), International Conference on High Temperature Superconductors in High Frequency Fields, Tiburon, CA, 19, 20 May, 2016.
Invited talk, E-COST IC1407 (ACCREDIT) Meeting, "Advanced wave modelling and measurement techniques for stochastic fields," University of Nottingham, UK, 5 April, 2016.
Physics Colloquium, CUNY / Queens College, New York, NY, 28 March, 2016.
Invited talk, Directed Energy Symposium, Albuquerque, NM, 8 March, 2016.
Invited talk, Applied Dynamics Seminar, IREAP, University of Maryland, 3 March, 2016.
Invited talk, Physics of Quantum Electronics, Snowbird, Utah, 4 January, 2016.
Invited talk, SPIE Optics + Photonics 2015 Conference, San Diego, CA, 9 August, 2015.
Condensed Matter Seminar, Physics Department, Seoul National University, Seoul, South Korea, 7 August, 2015.
Invited talks (2), 1st Asia Electromagnetics Conference, Jeju, South Korea, 3 August, 2015.
Invited talk, Workshop on Quantum Metamaterials, Spetses, Greece, 3 June, 2015.
Invited talk, 7th Workshop on Quantum Chaos and Localisation Phenomena, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, 30 May, 2015.
Invited talk, URSI AT-RASC Meeting, Gran Canaria, Spain, 21 May, 2015.
Invited talk, Physics Department Seminar, Nazarbayev University, Astana, Kazakhstan, 8 May, 2015.
Physics Colloquium, Nazarbayev University, Astana, Kazakhstan, 6 May, 2015.

Invited talk, Department of Energy / MSE Physical Behavior of Materials PI's Meeting, Gaithersburg, MD, 31 March, 2015.
Invited talk, The 5th International Conference on Nanophotonics and Metamaterials, Seefeld, Austria, 7 January, 2015.
Invited talk, The 9th International Symposium on Intrinsic Josephson Effects and THz Plasma Oscillations in High-Tc Superconductors, Kyoto, Japan, 1 December, 2014.
Physics Colloquium, University of Crete, Heraklion, Crete, Greece, 16 October, 2014
Invited talks (2), Crete Center for Quantum Complexity and Nanotechnology Seminar, Physics Department, University of Crete, Heraklion, Greece, 14 October, 2014.
Invited talk, Echoes in Complex Systems, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany, 22 September, 2014.
Invited talk, Electromagnetics Seminar Series, University of Waterloo, Waterloo Canada, 17 September, 2014
Invited talk, The Eighth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Copenhagen, Denmark, 28 August, 2014.
Invited talk, International Conference on Electromagnetics in Advanced Applications, Aruba, 7 August, 2014.
Invited talks (3), International Workshop on High Temperature Superconductors in High Frequency Fields, Fréjus, France, 10 June, 2014.
Invited talk, NanoCore Research Institute, Physics Department, National University of Singapore, Singapore, 23 May, 2014
Invited talk at the 5th International Conference on Metamaterials, Photonic Crystals and Plasmonics, Nanyang Technological University, Singapore, 21 May, 2014
Invited talk, Electromagnetic Effects Research Laboratory, EEE Department, Nanyang Technological University, Singapore, 20 May, 2014
Invited talk, Laboratory for Physical Sciences Seminar, College Park, MD, 23 April, 2014.
Invited talk, UK EPSRC Metamaterials Retreat, Chamonix, France, 20 March, 2014.
Invited talk, NASA/Goddard Space Flight Center Scientific Colloquium, Greenbelt, MD, 10 January, 2014.
Invited talk, 2014 Physics of Quantum Electronics Conference, Snowbird, Utah, 8 January, 2014.
Invited talk, 2013 Fall Materials Research Society Meeting, Boston, MA, 2 December, 2013.
Invited talk, Zepler Institute International Lecture, Optoelectronics Research Centre, University of Southampton, UK, 25 November, 2013.
Invited talk, Theoretical Physics Colloquium, Institute for Theoretical Physics, Technical University of Dresden, Germany, 21 November, 2013
Invited talk, 7th International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Bordeaux, France, 17 September, 2013.
Invited talk, SPIE Optics and Photonics Conference, San Diego, CA, 28 August, 2013.
Invited talk, SPIE Optics and Photonics Conference, San Diego, CA, 27 August, 2013.
Invited talk, 6th Workshop on Quantum Chaos and Localisation Phenomena, Warsaw, Poland, 25 May, 2013.
Invited talk, High Energy Physics Seminar, University of Maryland, 27 March, 2013.
Invited talk, International Conference, Max Planck Institute for the Physics of Complex Systems, Dresden, Germany, 22 October, 2012.
Invited talk at Innovations in Wave Modeling, University of Nottingham, United Kingdom, 4 September, 2012.

Invited talk, Institute for Solid State Physics, Chernogolovka, Russia, 21 August, 2012.
Invited talk, Moscow University of Science and Technology, Moscow, Russia, 17 August, 2012.
Invited lecture at the Summer School Propagation D'ondes En Milieux Complexes, at the Institut d'Etudes Scientifiques de Cargèse, in Corsica France, 14 August, 2012.
Invited lecture at the Summer School Propagation D'ondes En Milieux Complexes, at the Institut d'Etudes Scientifiques de Cargèse, in Corsica France, 13 August, 2012.
Invited talk, 7th Superconducting Radio Frequency Materials Workshop, Thomas Jefferson National Accelerator Facility, Newport News, VA, 17 July, 2012.
Invited talk, Tenth International Symposium on Photonic and Electromagnetic Crystal Structures, Santa Fe, NM, 8 June, 2012.
Invited talk, SPIE Europe, Brussels, Belgium, 18 April, 2012.
Invited talk, Fifth International Workshop on Electromagnetic Metamaterials, Albuquerque, NM, 26 March, 2012.
Invited talks (2), Fifth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Barcelona, Spain, 11 October, 2011.
Invited talk, Seventh International Conference on Vortex Matter in Nanostructured Superconductors, Rhodes, Greece, 15 September, 2011.
Invited talk, 5th Workshop on Quantum Chaos and Localisation Phenomena, Institute of Physics, Polish Academy of Sciences, Warsaw, Poland, 21 May, 2011.
Physics Colloquium, University of Florida, 7 April, 2011.
Physics Colloquium, Georgetown University, Washington, DC, 19 October, 2010.
Electromagnetics Seminar, University of Waterloo, Ontario, Canada, 23 September, 2010.
Invited talk, Fourth International Congress on Advanced Electromagnetic Materials in Microwaves and Optics, Karlsruhe, Germany, 14 September, 2010.
Invited presentation to the JASON summer study on 'Optical Metamaterials,' La Jolla, CA, 28 June, 2010.
Plenary Talk, Experimental Chaos and Complexity Conference, Lille, France, 1 June, 2010.
Invited Talk, 40th Colloquium on the Physics of Quantum Electronics, Snowbird, Utah, 4 January, 2010.

GRADUATED STUDENTS

Alp Findikoglu, Ph.D. 1994 (T. Venkatesan principal advisor), Staff, Los Alamos National Lab
Jian Mao, Ph.D. 1995, Member of the Technical Staff, PRC, Inc. McLean, VA
Michael S. Pambianchi, Ph.D. 1995; MBA, 2000, Harvard Business School, now at Dow-Corning
Paul So, Ph.D. 1995 (E. Ott principal advisor), Professor of Physics, George Mason University
James C. Booth, Ph.D., 1996, Staff Member, NIST, Boulder, CO
Alberto Pique, Ph.D. Materials Science 1996 (R. Ramesh principal advisor), NRL, Wash., DC
Lucia Mercaldo, Ph.D. Physics, 1998 (Salerno), Staff, Solar Energy Institute, Naples Italy
David E. Steinhauer, Ph.D. Physics, 2000, Scientist, Tripath Medical Imaging, Seattle
Ashfaq Thanawalla, Ph.D. Physics, 2000 (jointly advised with F. Wellstood)
Claudio Cardoso, Ph.D. Physics, 2001 (University of Campinas, Brazil) Post-Doc in Campinas
Doug Strachan, Ph.D. Physics, 2002 (jointly advised with C. Lobb) Post-Doc Univ. of Penn.
Sheng-Chiang Lee, Ph.D. Physics, 2004. Professor of Physics, Mercer University
Atif Imtiaz, Ph.D. Physics, 2005. NRC Post-Doc, NIST/Boulder
Sameer Hemmady, Ph.D. 2006 (ECE). SAIC
Dragos Mircea, Ph.D. 2007 (ECE). Hitachi Global Storage.
Michael Ricci, Ph.D. Physics 2007, Systems Engineering Group, Inc.

Hua Xu, Ph.D. Physics, 2007, NIST Gaithersburg
James Hart (jointly advised with Ott, Antonsen), Ph.D. Physics, 2009, MIT Lincoln Labs
Enrique Cobas (joint with Fuhrer), Ph.D. Materials Science, 2010, Naval Research Laboratory
Biniyam T. Taddese, Ph.D. Electrical and Computer Engineering, 2012, Intel
Jen-Hao Yeh, Ph.D. Electrical and Computer Engineering, 2013, Laboratory for Physical Sciences
Tamin Tai, Ph.D. Electrical and Computer Engineering, 2013, Oak Ridge National Laboratory
Melissa Trepanier, Ph.D. Physics, 2015, US Government
Daimeng Zhang, Ph.D. Electrical and Computer Engineering, 2016, VT iDirect, Virginia
Kuang Qin (co-advised Ph.D. at U. Houston, 2017)
Xu Jiang (co-advised Ph.D. at NIH, 2017)
Qin Liu (co-advised Ph.D. at NIH, 2018, post-doc Stanford Univ.)
Min Zhou, Ph.D. Electrical Engineering, 2019, Quantcast, San Francisco
Seokjin Bae, Ph.D. Physics, 2020, Postdoc at Univ. of Illinois Urbana-Champaign
Bakhrom Oripov, Ph.D. Physics, 2020, Postdoc at NIST/Boulder
Tim Kohler (co-advisor) Ph.D. ECE, 2021, staff member Northrop-Grumman ATL
Ben Frazier, Ph.D. ECE, 2021, Chief Scientist, National Reconnaissance Office
Shukai Ma, Ph.D. Physics, 2022, Broadcom
Cougar Garcia, Ph.D. Materials Science, 2022, Northrop-Grumman
Lei Chen, Ph.D. ECE, 2022, Mathworks
Bo Xiao, Ph.D. Electrical Engineering, 2023, Google

Marc Sheffler, M.S. Physics, 1998, Post-Doc at the University of Stuttgart
Wensheng Hu, M.S. ECE, 1999, Engineer, Hughes Network Systems
J. David Kokales, M.S. Physics, 1999, Member of the Technical Staff, Illinois Superconductor
C. P. (Gus) Vlahacos, M.S. Physics, 1999 (co-advised with F. Wellstood), NSA, LPS
Hans Georg Breunig, M. S. Physics, 2000, Post-Doc, University of Marburg, Germany
Senta Karotke, Diplom. in Physics, 2001, Grad. Student, University of Basle, Switzerland
Jesse Bridgewater, M.S. Physics, 2002. Graduate student at UCLA
Renato Mariz de Moraes, M.S.E.E. 2002 (ECE). Graduate student at UC Santa Cruz
Sameer Hemmady, M.S.E.E. 2004 (ECE). Univ. of New Mexico and Techflow Scientific, Albuquerque
Nathan Orloff, M.S. Physics, 2007, Member of the Technical Staff, NIST Boulder
Ziyuan Fu, M.S. ENEE, 2017, Shanghai Institute of Satellite Engineering

Patrick Hemmer, B.S. Physics, 2018, graduate student in Physics, Univ. of Maryland Baltimore County
Yuewen Tan, B.S. Physics, 2016. Graduate student in Physics, Washington University in St. Louis
John Abrahams, B.S. Physics, 2012
Elliott Bradshaw, B.S. Physics, 2007
Vassili Demergis, B.S. Physics, 2006, Graduate student, University of Texas, Austin
Marc Pollak, B.S. Physics, 2004, Graduate Student, University of Maryland
Nathan Orloff, B.S. Physics, 2004, Graduate Student, University of Maryland
Jonah Kanner, B.S. Physics, 2003, Graduate student, University of Maryland
Greg Ruchti, B.S. Physics, 2003, Graduate Student, Johns Hopkins University
Paul Petersan, B.S. Physics, 1998, Graduate Student, Physics Department, University of Texas
Sudeep Dutta, B.S. Physics, 1998, Graduate Student, Physics Department, UMD

Ali Gokirmak, B.S. Physics, 1998, Graduate Student, EE Department, Cornell University
Tony DeMarco, B. S. Physics, 1995, Graduate Student, EE Department, University of Maryland
Abi Davis, B. S. Physics, 1993, Engineer, Superconductor Technology Inc, Santa Barbara, CA

National Science Foundation Research Experiences for Undergraduate Students

Roger Bock, summer , 1996
Sudeep Dutta, University of Maryland, summer, 1997
Nadia Fomin, Georgetown University, summer, 1998
Eric Wang, UC Berkeley, summer, 2001
Thomas Hartman, Princeton, Summer, 2002

FORMER POSTDOCTORAL RESEARCHERS

Lie Chen, Institute of Physics, Chinese Academy of Sciences, Beijing
Johan Feenstra, Member of the Technical Staff, Philips Research Laboratories, Eindhoven, The Netherlands
Dong-Ho Wu, Staff Scientist, Naval Research Laboratory, Washington, DC
Andrew Schwartz, Manager, EPSCAN Program, Neocera, Inc., Beltsville, MD
Vladimir V. Talanov, Member of the Technical Staff, Neocera, Inc., Beltsville, MD
Lucia V. Mercaldo, Staff Scientist, Solar Energy Research Institute, Naples, Italy
Alexander Tselev, Post-Doctoral Researcher, Georgetown University
Atif Imtiaz, NRC Post-Doc NIST/Boulder
Laura Adams, post-doc, Harvard University
David Tobias (post-doc, joint with Fuhrer), APS Congressional Fellow
Cihan Kurter, IBM Research
Matthew Frazier, Virginia
Behnood Ghamsari, Post-Doc, University of Ottawa
Tamin Tai, TDK Corp.

CURRENT GRADUATE STUDENTS AND POST-DOCS

Jingnan Cai
Arthur Carlton-Jones
Jared Erb
Isabella Giovannelli
Yilin Li
Nadav Shaibe
Chung-Yang Wang

STUDENT'S AWARDS

Lei Chen, Wylie Dissertation Fellowship, 2022
Shukai Ma, Wylie Dissertation Fellowship, 2021
Min Zhou, Best Student Paper Award, AMEREM 2018
Daimeng Zhang is chosen for the Engineering School Future Faculty Program, Jan., 2014
Jen-Hao Yeh is chosen for the Engineering School Future Faculty Program, Jan., 2011
Biniyam Taddese won first place in the Focusing Research on Entrepreneurial Empowerment Poster Session on 5 December, 2008, sponsored by Black Graduate Student Association and Black Engineers Society. This became a news item on the ECE web site: http://www.ece.umd.edu/news/news_story.php?id=3581

Sameer Hemmady won the 2006 Group on Statistical and Nonlinear Physics Best Student Speaker Award at the 2006 American Physical Society March Meeting.

Two of my undergraduate research students (Nathan Orloff and Marc Pollak) won the Monroe Martin Prize at graduation in May, 2004.

My undergraduate research student, Paul Petersan, won the J. Robert Dorfman Prize for Outstanding Undergraduate Research in CMPS for 1998.

My undergraduate research student, Ali Gokirmak, won the Robert Ma Scholarship for Foreign Students in 1997

Tony DeMarco won a Senior Summer Scholarship for work in my lab (1995)

COURSES TAUGHT

Spring 1992
- Physics 161, General Physics: Mechanics and Particle Dynamics, 150 students
- Physics 838C, Superconductivity Seminar, ~20 students

Fall, 1992
- Physics 262, General Physics: Vibrations, Waves, Heat, Electricity and Magnetism, 150 students
- Physics 838C, Superconductivity Seminar, ~20 students

Spring 1993
- Physics 161, General Physics: Mechanics and Particle Dynamics, 150 students
- Physics 838C, Superconductivity Seminar, ~20 students

Fall, 1993
- Physics 262, General Physics: Vibrations, Waves, Heat, Electricity and Magnetism, 150 students
- Physics 838C, Superconductivity Seminar, ~20 students

Spring 1994
- Physics 161, General Physics: Mechanics and Particle Dynamics, 86 student
- Physics 838C, Superconductivity Seminar, ~20 students

Fall 1994
- Physics 262, General Physics: Vibrations, Waves, Heat, Electricity and Magnetism, 125 students
- Physics 838C, Superconductivity Seminar, ~20 students

Spring 1995
- Physics 422, Quantum Physics II, 20 students
- Physics 838C, Superconductivity Seminar, ~20 students

Fall 1995
- Physics 421, Quantum Physics I, 20 students
- Physics 838C, Superconductivity Seminar, ~20 students

Spring 1996
- Physics 422, Quantum Physics II, 15 students
- Physics 499A, Individual Problems with Lab, 1 student
- Physics 798, Special Problems in Advanced Physics, 1 student
- Physics 838C, Superconductivity Seminar, ~25 students
- Physics 899, Doctoral Dissertation Research, 1 student

Fall 1996
- Physics 421, Quantum Physics I, 15 students
- Physics 798, Special Problems in Advanced Physics, 1 student
- Physics 838C, Superconductivity Seminar, ~25 students
- Physics 899, Doctoral Dissertation Research, 1 student

Spring 1997

Sabbatical
Physics 899, Ph.D. thesis research, 1 student

Fall 1997
Sabbatical
Physics 499A, Individual Problems with Lab, 1 student
Physics 899, Ph.D. thesis research, 1 student

Spring 1998
Physics 121, Fundamentals of Physics I, 84 students
Physics 499A, Individual Problems with Lab, 1 student
Physics 799, Masters Thesis Research, 1 student
Physics 838C, Superconductivity Seminar, ~25 students
Physics 899, Ph.D. thesis research, 1 student

Fall 1998
Buyout from Teaching
Physics 799, Masters Thesis Research, 3 students
Physics 838C, Superconductivity Seminar, ~25 students
Physics 899, Ph.D. thesis research, 1 student

Spring 1999
Physics 121, Fundamentals of Physics I, 76 students
Physics 799, Masters Thesis Research, 1 student
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Fall 1999
Physics 122, Fundamentals of Physics II, 57 students
Physics 799, Masters Thesis Research, 2 students
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Spring 2000
Physics 121, Fundamentals of Physics I, 77 students
Physics 799, Masters Thesis Research, 1 student
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Fall 2000
Physics 122, Fundamentals of Physics II, 81 students
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Spring 2001
Physics 798S, Introduction to Superconductivity, 11 students
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Fall 2001
Physics 402, Quantum Physics II, 11 students
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Spring 2002
Physics 411, Intermediate Electricity and Magnetism, ~ 35 students
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Fall 2002
Physics 375, Optics Laboratory, 11 students
Physics 389, Undergraduate Research, 1 student
Physics 499A, Individual Problem with Laboratory, 1 student

Physics 798, Special Problem in Advanced Physics, 1 student
Physics 838C, Superconductivity Seminar, ~20 students
Physics 899, Ph.D. thesis research, 2 students

Spring 2003

Physics 411, Intermediate Electricity and Magnetism, ~ 40 students
Physics 389, Undergraduate Thesis Research, 2 students
Physics 499A, Individual Problem with Laboratory, 1 student
Physics 838C, Superconductivity Seminar, ~25 students
Physics 899, Ph.D. thesis research, 2 students

Fall 2003

Physics 375, Optics Laboratory, 12 students
Physics 499A, Individual Problem with Laboratory, 2 students
Physics 838C, Superconductivity Seminar, 30 students
Physics 899, Ph.D. thesis research, 2 students

Spring 2004

Physics 499A, Special Problems in Physics, 2 students
Physics 798S, Superconductivity, 12 students + 5 audits
Physics 838C, Superconductivity Seminar, 25 students
Physics 899, Doctoral Dissertation Research, 3 students

Fall 2004

SABBATICAL
Physics 838C, Superconductivity Seminar, 26 students
Physics 899, Doctoral Dissertation Research, 1 student
ENEE 899, Doctoral Dissertation Research, 1 student

Spring 2005

SABBATICAL
Physics 899, Doctoral Dissertation Research, 2 students
ENEE 899, Doctoral Dissertation Research, 1 student

Summer 2005

Physics 899, Doctoral Dissertation Research, 1 student

Fall 2005

Physics 375, Experimental Physics III, 13 students
Physics 499A, Special Problems in Advanced Physics, 1 student
Physics 838C, Superconductivity Seminar, 3 students
Physics 798, Special Problems in Advanced Physics, 1 student
Physics 899, Doctoral Dissertation Research, 1 student
ENEE 898, Pre-Candidacy Research, 1 student

Spring 2006

Physics 407, Physics Undergraduate Research, 1 student
ENEE 699, Independent Study, 1 student
Physics 798S, Superconductivity, 14 students + 5 audits
Physics 838C, Superconductivity Seminar, 25 students
Physics 898, Pre-Candidacy Research, 1 student
Physics 899, Doctoral Dissertation Research, 1 student
ENEE 899, Doctoral Dissertation Research, 1 student

Summer 2006

ENEE 699, Independent Study, 1 student

Fall 2006

Physics 375, Experimental Physics III, 18 students
Physics 838C, Superconductivity Seminar, 53 students
Physics 899, Doctoral Dissertation Research, 1 student
ENEE 899, Doctoral Dissertation Research, 2 students

Spring 2007
Physics 402, Quantum Mechanics II, 54 students
Fall 2007
Physics 838C, Superconductivity Seminar, 30 students
Physics 899, Doctoral Dissertation Research, 1 student
Spring 2008
Physics 402, Quantum Mechanics II, 44 students
Fall 2008
Spring 2009
Physics 402, Quantum Mechanics II, 51 students
Fall 2009
Physics 375, Experimental Physics III, 16 students
Spring 2010
Physics 404, Statistical Physics, 42 students
Fall 2010
Physics 375, Experimental Physics III, 19 students
Spring 2011
Physics 404, Statistical Physics, 51 students
Fall 2011
Sabbatical
Spring 2012
Sabbatical
Fall 2012
Phys 798I, Superconductivity
Spring 2013
Phys 410, Classical Mechanics
Fall 2013
Phys 410, Classical Mechanics
GEMS 296, Team Project Seminar I
Spring 2014
Phys 275, Classical Mechanics Laboratory
GEMS 297, Team Project Seminar II
Fall 2014
Phys 410, Classical Mechanics
Spring 2015
Physics 276 Experimental Physics II: Electricity and Magnetism
Fall 2015
Phys 410, Classical Mechanics
Spring 2016
Physics 798S Superconductivity
Fall 2016
Phys 402, Quantum Mechanics II
Spring 2017
Phys 371, Modern Physics
Fall 2017
Phys 402, Quantum Mechanics II
Spring 2018
Phys 371, Modern Physics
Fall 2018
Sabbatical
Spring 2019
Phys 401, Quantum Mechanics I
Fall 2019
Phys 371, Modern Physics
Spring 2020

Phys 401, Quantum Mechanics I

Fall 2020

Phys 371, Modern Physics

Phys 420, Principles of Modern Physics

Spring 2021

Phys 401, Quantum Mechanics I

Fall 2021

Phys 402, Quantum Mechanics II

Spring 2022

Phys 798C, Superconductivity

Fall 2022

Phys 402, Quantum Mechanics II

Other Teaching:

Given review lectures on Quantum Mechanics for students preparing for the Physics GRE.

Comment on Student Ratings of Teaching:

I taught Physics 121 and 122 during the Spring and Fall semesters of 2000. My teaching evaluations for these classes have been among the best in the department in the past 5 years. For example, my numbers for questions 1 and 2 on the student course evaluation for my Fall 2000 Phys 122 are significantly higher than any other professor who taught 121 or 122 in 1999. My numbers were 3.43 and 3.63, while those of the others ranged from 2.68 to 3.22 for question 1, and 2.74 to 3.46 for question 2.

I also received **PERFECT teaching evaluations** for my graduate course Phys 798S Superconductivity during the Spring 2006 semester. There were 11 students enrolled, 6 submitted evaluations, and ALL students gave an evaluation of "A" (4.0) in ALL categories.

SERVICE

University Service for the past 10 years

Physics Qualifier Committee (2022-2023)
Physics Salary Review Committee (2023-2025)
Physics Majors Undergraduate Review Committee (2020)
Physics Graduate Curriculum Committee (2020)
Chair, Physics Graduate Qualifier Committee (2009-2011)
Executive Committee of Physics Council (2009-2011)
Interim Director, Center for Nanophysics and Advanced Materials (2007-2009)
Condensed Matter and Nano Faculty Search Committee (2006-2008, 2012-13)
Faculty Promotion Committees (2011, 2013)
CNAM Graduate Fellowship Committee (2008-2009)
Physics Council (2008-2011)
CSR Review Committee (2006)
Graduate Admissions Committee (2006, 2015- 2017, 2020-2021)
Physics Salary Advisory Committee (2006-2007, 2018-2019)
Faculty Candidate Teaching Interview Committee (2004-2007)
Committee on Appointments, Promotion and Tenure (2000-2004, 2010-2011, 2012-2014)
Priorities Committee (2001-2002, 2006)
Laboratory Committee (2002-2004, 2006-2011)
Incoming Graduate Student Advisor (2006)
Chairman of the Physics Undergraduate Honors Committee (1999-present)
Gemstone Discussant (2006)

Gemstone Advisor (2013-2016)
MRSEC Executive Committee (2002-2004)
Promotion Committee for Drew Baden (2003)
Committee to select NSF/REU students (1997-2002, 2004)
Extended Graduate Qualifier Committee (~1992-2004)
Physics Salary Advisory Committee (1999-2000)
Advised Incoming Physics Graduate Students (1995-1999, 2002)
Faculty Search Committee, (1996-1997)
Organized the Condensed Matter / Superconductivity Seminar Series (1993-1997)
Physics Internal Review Committee (1992-1993), Chair of the sub-committee on Research
Physics Council (1992-1995)
Physics Internal Review Committee (2004), Chair of the sub-committee on Infrastructure (2004)
Executive Committee of Physics Council (1992-1993)
Physics Curriculum Review Committee for the Engineering Sequence (1992)
Dean's Peer Initiative Review Committee (1994)

Served on numerous M.S. and Ph.D. thesis exam committees

Outside Service for the past 10 years

Convener for Superconductivity in the ALPHA tunable plasmonic haloscope collaboration (2021-2022)
Technical Editor of the IEEE Transactions on Applied Superconductivity (2017-present)
APS Committee on Scientific Publications (2021-2024)
APS Committee on Meetings (2012-2014)
Sorted abstracts for the March Meeting of the American Physical Society (1994, 2001-2008, 2011-2012)
Selected Leader for Category 5 (Superconductivity) abstract sorting for the 2004 March Meeting of the American Physical Society
Served on the Electronics Program Committee of the 2002 Applied Superconductivity Conference.
Served as co-chair of the Electronics Program Committee for the 2000 Applied Superconductivity Conference
Organized a 1-day Short Course on "Superconducting Electronics" at the 2000 Applied Superconductivity Conference. It was sold out (50 students).
Member of the Electronics Program Committee for the 2002 Applied Superconductivity Conference
Co-organized a session on "Materials Challenges for Applications of HTSC" at the Spring 1996 Materials Research Society Meeting
Technical Program Committee Member for MSMW 98, MSMW 00, MSMW 02 and MSMW 04 conferences in Kharkov, Ukraine (MSMW = Physics and Engineering of Millimeter and Submillimeter Waves)
Council for Engineering Education Post-Doc Review Committee (1992)
External reviewer for Ph.D., University of British Columbia (2002)
External reviewer for Ph.D., James Cook University, Australia (2000)
Administered Caltech Undergraduate Transfer Exam (1995)
Supervised high school student Doug Woodbury in "Physics Mentorship" project (1995)
Chaired many sessions at many conferences
Referee papers (PRL, PRB, RSI, APL, JAP, etc.)
Referee funding proposals (NSF, EPSRC, Italian CNR)

Extensive Outreach participation through the MRSEC:
Physics is Phun pre-shows

Maryland Day demonstrations
REU lectures, supervised 4 REU students
Science writing with Northwestern High School students
MRSEC "warm line" with Kettering Middle School

Publications since 2010

Submitted:

240. Lei Chen, Isabella L. Giovannelli, Nadav Shaibe, and Steven M. Anlage, "**Loss of Detailed Balance in Equilibrium due to Partial Quantum Decoherence: A Quantum Graph Analogue**," submitted to Physical Review B. arxiv:2308.14712.

239. Chung-Yang Wang, Carlota Pereira, Stewart Leith, Guillaume Rosaz, Steven M. Anlage, "**Microscopic Examination of SRF-quality Nb Films through Local Nonlinear Microwave Response**," submitted to Phys. Rev. Applied, May, 2023. arXiv:2305.07746.

In Press:

238. Cougar A. T. Garcia, Nancyjane Bailey, Chris Kirby, Joshua A. Strong, Anna Yu. Herr, Steven M. Anlage, and Vladimir V. Talanov, "**Disentangling superconductor and dielectric microwave losses in sub-micron Nb/TEOS-SiO_2 interconnects using a multi-mode microstrip resonator**," Phys. Rev. Applied, in press. arXiv:2303.10685.

237. Jared Erb, David Shrekenhamer, Timothy Sleasman, Thomas M. Antonsen, and Steven M. Anlage, "**Control of the Scattering Properties of Complex Systems By Means of Tunable Metasurfaces**," Acta Physica Polonica A, in press. arXiv:2309.00633.

Published:

236. Tamin Tai, Jingnan Cai, Steven M. Anlage, "**Anomalous Loss Reduction Below Two-Level System Saturation in Aluminum Superconducting Resonators**," Advanced Quantum Technologies, 2200145 (2023). arXiv:2109.11742

235. Shukai Ma and Steven M. Anlage, "**Experimental Realization of Anti-Unitary Wave-Chaotic Photonic Topological Insulator Graphs Showing Kramers Degeneracy and Symplectic Ensemble Statistics**," Advanced Optical Materials, 2301852 (2023). arXiv:2307.08622

234. Tornike Ghutishvili, Lei Chen, Steven M. Anlage, Thomas M. Antonsen, "**Impedance statistics of cable networks that model quantum graphs**," Phys Rev. Research 5, 033195 (2023).

233. Shukai Ma, Thomas M. Antonsen, Edward Ott, and Steven M. Anlage, "**Time Domain Generalization of the Random Coupling Model and Experimental Verification in a Complex Scattering System**," Physical Review Applied **19**, 064052 (2023). arXiv:2211.09695

232. Farasatul Adnan, Steven M. Anlage, Thomas Antonsen Jr., Edward Ott, "**Deviations from the Random Plane Wave Field Distribution in Electromagnetic Enclosures**," IEEE

Transactions on Electromagnetic Compatibility **65**(2), 454-463 (2023). DOI: 10.1109/TEMC.2023.3235824.

231. Shen Lin, Sangrui Luo, Shukai Ma, Junda Feng, Yang Shao, Zachary B. Drikas, Bisrat D. Addissie, Steven M Anlage, Thomas Antonsen, Zhen Peng, "**Predicting Statistical Wave Physics in Complex Enclosures: A Stochastic Dyadic Green's Function Approach**," IEEE Trans. Electromag. Compat. 65(2), 436-453 (2023). DOI: 10.1109/TEMC.2023.3234912.

230. Alexander J. Millar, Steven M. Anlage, Rustam Balafendiev, Pavel Belov, Karl van Bibber, Jan Conrad, Marcel Demarteau, Alexander Droster, Katherine Dunne, Andrea Gallo Rosso, Jon E. Gudmundsson, Heather Jackson, Gagandeep Kaur, Tove Klaesson, Nolan Kowitt, Matthew Lawson, Alexander Leder, Akira Miyazaki, Sid Morampudi, Hiranya V. Peiris, Henrik S. Røising, Gaganpreet Singh, Dajie Sun, Jacob H. Thomas, Frank Wilczek, Stafford Withington, Mackenzie Wooten, "**ALPHA: Searching For Dark Matter with Plasma Haloscopes**." Phys. Rev. D **107**, 055013 (2023). arXiv:2210.00017

229. Benjamin W. Frazier and Steven M. Anlage, "**The Future of Intelligent Wavefront Shaping for Smart Radio Environments**,", in G. Gradoni, M. Di Renzo, A. Diaz-Rubio, S. Tretyakov, C. Caloz, Z. Peng, A. Alù, G. Lerosey, M. Fink, V. Galdi, T. J. Cui, B. Frazier, S. M. Anlage, M. Salucci, A. Massa, Q. Cheng, J. Wang, S. Jin, D. Dardari, N. Decarli, O. Yurduseven, M. Matthaiou, M. Kenney, G. Gordon, O. Georgiou, C. L. Nguyen, E. Martini, S. Maci, H. Wakatsuchi, and S. Phang, "Roadmap on Smart Radio Environments," Reviews of Electromagnetics, Vol. 1, No. 1, 21012 (42 pages), November 7, 2022. arXiv:2103.16542.

228. Shukai Ma, Thomas M. Antonsen, Edward Ott, Steven M. Anlage, "**Eigenfunction and eigenmode-spacing statistics in chaotic photonic crystal graphs**," Phys. Rev. E 106, 054215 (2022). arXiv:2112.05306

227. A.- M. Valente-Feliciano, C. Antoine, S. Anlage, G. Ciovati, J. Delayen, F. Gerigk, A. Gurevich, T. Junginger, S. Keckert, G. Keppe, J.Knobloch, T. Kubo, O. Kugeler, D. Manos, C. Pira, T. Proslier, U.Pudasaini, C.E. Reece, R.A. Rimmer, G.J. Rosaz, T. Saeki, R. Vaglio, R.Valizadeh, H. Vennekate, W. Venturini Delsolaro, M. Vogel, P. B. Welander, M. Wenskat, "**Next-Generation Superconducting RF Technology based on Advanced Thin Film Technologies and Innovative Materials for Accelerator Enhanced Performance & Energy Reach**," Contribution to Snowmass 2021. arXiv:2204.02536

226. Shukai Ma, Thomas Antonsen, Steven Anlage, Edward Ott, "**Short-wavelength Reverberant Wave Systems for Enhanced Reservoir Computing**," Phys. Rev. Research 4, 023167 (2022). arXiv:2204.07036 DOI: 10.21203/rs.3.rs-783820/v1

225. Lei Chen and Steven M. Anlage, "**Use of Transmission and Reflection Complex Time Delays to Reveal Scattering Matrix Poles and Zeros: Example of the Ring Graph**," Phys. Rev. E **105**, 054210 (2022). arXiv:2202.13539

224. Ethan Zack, Daimeng Zhang, Melissa Trepanier, Jingnan Cai, Tamin Tai, Nikos Lazarides, Johanne Hizanidis, and Steven M. Anlage, "**Tuning of strong nonlinearity in radio-frequency**

superconducting-quantum-interference-device meta-atoms," Phys. Rev. E **105**, 044202 (2022). arXiv:2201.02671

223. Benjamin W. Frazier, Thomas M. Antonsen, Steven M. Anlage, Edward Ott, "**Deep-learning estimation of complex reverberant wave fields with a programmable metasurface**," Phys. Rev. Applied, 17, 024027 (2022). arXiv:2103.13500.

222. Lei Chen, Steven M. Anlage, Yan V. Fyodorov, "**Statistics of Complex Wigner Time Delays as a Counter of S-Matrix Poles: Theory and Experiment**," Phys. Rev. Lett. 127, 204101 (2021). arXiv:2106.15469.

221. Bakhrom Oripov, Dinesh Kumar, Cougar Garcia, Patrick Hemmer, Thirumalai Venkatesan, M.S. Ramachandra Rao, and Steven Anlage, "**Large Microwave Inductance of Granular Boron-Doped Diamond Superconducting Films**," Appl. Phys. Lett. **118**, 242601 (2021). arXiv:2103.14738.

220. Lei Chen, Steven M. Anlage, and Yan V. Fyodorov, "**Generalization of Wigner Time Delay to Sub-Unitary Scattering Systems**," Phys. Rev. E **103**, L050203 (2021). arXiv:2101.08335.

219. Seokjin Bae, Hyunsoo Kim, Sheng Ran, Yun Suk Eo, I-Lin Liu, Wesley Fuhrman, Johnpierre Paglione, Nicholas P Butch, Steven Anlage, "**Anomalous normal fluid response in a chiral superconductor**," Nature Communications 12:2644 (2021). arXiv:1909.09032. pdf

218. Steven M. Anlage, "**Microwave Superconductivity**," IEEE Journal of Microwaves **1**, 389-402 (2021). arXiv:2009.03839.

217. Benjamin W. Frazier, Thomas M. Antonsen, Jr., Steven M. Anlage, and Edward Ott, "**Wavefront Shaping with a Tunable Metasurface: Creating Coldspots and Coherent Perfect Absorption at Arbitrary Frequencies**," Phys. Rev. Research **2**, 043422 (2020). arXiv:2009.05538.

216. Lei Chen, Tsampikos Kottos, and Steven M. Anlage, "**Perfect Absorption in Chaotic Cavities with or without Hidden Symmetries**," Nat. Commun. **11**, 5826 (2020). arXiv:2001.00956.

215. Shukai Ma, Sendy Phang, Zachary Drikas, Bisrat Addissie, Ronald Hong, Valon Blakaj, Gabriele Gradoni, Gregor Tanner, Thomas M. Antonsen, Edward Ott, Steven M. Anlage, "**Efficient Statistical Model for Predicting Electromagnetic Wave Distribution in Coupled Enclosures**," Phys. Rev. Applied **14**, 014022 (2020). arXiv:2003.07942.

214. Shukai Ma, and Steven M. Anlage, "**Microwave Applications of Photonic Topological Insulators**," Appl Phys. Lett. **116**, 250502 (2020). arXiv:2003.08962.

213. Bakhrom Oripov and Steven M. Anlage, "**Time-dependent Ginzburg-Landau Treatment of RF Magnetic Vortices in Superconductors: Vortex-Semiloops in a Spatially Nonuniform Magnetic Field**," Phys Rev. E **101**, 033306 (2020). arXiv:1909.02714.

212. Shukai Ma, Bo Xiao, Zachary Drikas, Bisrat Addissie, Ronald Hong, Thomas M. Antonsen, Edward Ott, Steven M. Anlage, "**Wave scattering properties of multiple weakly-coupled complex systems**," Phys. Rev. E **101**, 022201 (2020). arXiv:1909.03827.

211. Seokjin Bae, Seunghun Lee, Xiaohang Zhang, Ichiro Takeuchi, Steven M. Anlage, "**Microwave Meissner screening properties of proximity-coupled topological-insulator / superconductor bilayers**," Phys. Rev. Materials **3**, 124803 (2019). arXiv:1904.06620.

210. Shukai Ma, Bo Xiao, Ron Hong, Bisrat Addissie, Zachary Drikas, Thomas Antonsen, Edward Ott, Steven M. Anlage, "**Classification and Prediction of Wave Chaotic Systems with Machine Learning Techniques**," Acta Physica Polonica A 136 (5), 757-764 (2019). arXiv:1908.04716.

209. Tristin Metz, Seokjin Bae, Sheng Ran, I-Lin Liu, Yun Suk Eo, Wesley T. Fuhrman, Daniel F. Agterberg, Steven M. Anlage, Nicholas P. Butch, Johnpierre Paglione, "**Point Node Gap Structure of Spin-Triplet Superconductor UTe_2**," Phys. Rev. B 100, 220504(R) (2019). arXiv:1908.01069.

208. Melissa Trepanier, Daimeng Zhang, Lyudmila Filippenko, Valery Koshelets, Steven M. Anlage, "**Tunable Superconducting Josephson Dielectric Metamaterial**," AIP Advances **9**, 105320 (2019). arXiv:1909.05326.

207. Shaomao Xu, Geng Zhong, Chaoji Chen, Min Zhou, Dylan J. Kline, Rohit Jiji Jacob, Hua Xie, Shuaiming He, Zhennan Huang, Jiaqi Dai, Alexandra H. Brozena, Reza Shahbazian-Yassar, Michael R. Zachariah, Steven M. Anlage, Liangbing Hu, "**Uniform, Scalable, High-Temperature Microwave Shock for Nanoparticle Synthesis through Defect Engineering**," Matter **1**, 759-769 (2019).

206. Shukai Ma, Bo Xiao, Yang Yu, Kueifu Lai, Gennady Shvets, Steven M. Anlage, "**Topologically Protected Photonic Modes in Composite Quantum Hall/Quantum Spin Hall Waveguides**," Phys. Rev. B **100**, 085118 (2019). arXiv:1903.04109.

205. Bakhrom Oripov, Thomas Bieler, Gianluigi Ciovati, Sergio Calatroni, Pashupati Dhakal, Tobias Junginger, Oleg B. Malyshev, Giovanni Terenziani, Anne-Marie Valente-Feliciano, Reza Valizadeh, Stuart Wilde, Steven M. Anlage, "**High Frequency Nonlinear Response of Superconducting Cavity-Grade Nb surfaces**," Phys. Rev. Applied **11**, 064030 (2019). arXiv:1904.07432

204. Seokjin Bae, Yuewen Tan, Alexander P Zhuravel, Lingchao Zhang, Shengwei Zeng, Yong Liu, Thomas A. Lograsso, Ruslan Prozorov, Ariando, T. Venkatesan, Steven M. Anlage, "**Dielectric Resonator Method For Determining Gap Symmetry Of Superconductors Through Anisotropic Nonlinear Meissner Effect**," Rev. Sci. Instrum. **90**, 043901 (2019). arXiv:1901.08762

203. Min Zhou, Edward Ott, Thomas M. Antonsen, Jr., Steven M. Anlage, "**Scattering Statistics in Nonlinear Wave Chaotic Systems**," Chaos 29, 033113 (2019). arXiv:1812.06789.

202. Alexander P. Zhuravel, Seokjin Bae, Alexander V. Lukashenko, Alexander S. Averkin, Alexey V. Ustinov and Steven M. Anlage, "**Imaging collective behavior in an rf-SQUID metamaterial tuned by DC and RF magnetic fields**," Appl. Phys. Lett. **114**, 082601 (2019). arXiv:1811.11261.

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