Justin Schwartz
Harold and Inge Marcus Dean of Engineering
Pennsylvania State University

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College of Engineering
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Education

Ph.D., Nuclear Engineering, Massachusetts Institute of Technology, January 1990
Thesis title: "Design and stability of a high field toroidal field coil using advanced materials"
Advisors: D.R. Cohn, J.E.C. Williams, and J.P. Freidberg

B.S., Nuclear Engineering, University of Illinois at Urbana, May 1985
Highest Honors and Bronze Tablet

Professional Experience

Pennsylvania State University

- 08/17 – present: Harold and Inge Marcus Dean of Engineering
- 08/17 – present: Professor, Department of Engineering Science & Mechanics
- 08/17 – present: Professor, Department of Materials Science & Engineering (courtesy appointment)

North Carolina State University

- 08/09 – 08/17: Department Head and Kobe Steel Distinguished Professor, Department of Materials Science & Engineering
- 09/11 – 08/17: Affiliated Professor, Department of Physics
- 09/11 – 08/17: Affiliated Professor, Department of Nuclear Engineering
- 06/12 – 12/13: Interim Director, Analytical Instrumentation Facility, College of Engineering

Florida State University

- 04/05 – 08/09: Jack E. Crow Professor of Engineering
- 08/01 – 12/02: Senior Research Advisor to the Vice President for Research
- 08/99 – 04/05: Professor of Mechanical Engineering
- 12/93 – 08/09: Affiliated faculty in Physics and Electrical and Computer Engineering
- 12/93 – 08/99: Associate Professor of Mechanical Engineering
- 12/93 – 08/09: Leader, HTS Magnets and Materials Conductor Development Group, NHMFL

University of Illinois at Urbana

- 8/92 – 12/93: Assistant Professor of Mechanical and Industrial Engineering
- 2/90 – 12/93: Assistant Professor of Nuclear Engineering

National Research Institute for Metals, Superconducting Materials Research Group, Japan

- 2/90 – 8/90: Visiting Scientist under Dr. H. Maeda

Entrepreneurial Experience

Lupine Materials & Technology, Founder and CEO, 2015 – present
Eagle Power Technologies, Co-Founder and CTO, 2015 – present

ACADEMIC LEADERSHIP ACCOMPLISHMENTS

Pennsylvania State University

- ***Leading Penn State College of Engineering***
  - 13 academic departments
  - Over 520 faculty and 400 staff
  - Over 12,000 students, primarily at University Park and across 21 campuses
  - Over $250M in annual expenditures, a 29% increase over four years
  - Over $400M endowment, a 69% increase over four years
  - Over 110,000 living alumni
- ***Organizational impact***
  - Grew College tenure-line faculty by 30% over four years, including an 80% increase in female faculty, 100% increase in LatinX faculty, and an 80% increase in African-American faculty
  - Grew College endowment by 70% (over $50M/year in new gifts), including one of the largest gifts in the College's history ($15.5M) to establish the Clark Scholars Program
  - Grew College research expenditures and awards by over 50% over three years
  - Led development and implementation of College Strategic Plan, building on four cornerstone themes: *Excellence, Equity, Sustainability, and Social Mobility.*
  - Led creation of five-year College budgeting process aligned with new Penn State financial system, aligning financial decision making with the College Strategic Plan
  - Led development and implementation of College Facilities Master Plan, leading to two new buildings currently construction on West Campus providing 395,000 square feet of new academic, research and student support space, transforming the College's footprint on campus. The $313M projects are on-mission, on-time and under budget. A major building renovation and three additional buildings are anticipated in the master plan.
  - Leading transformation of the College Promotion and Tenure Criteria using an open-source process engaging all College tenure-line faculty. The new criteria focus on faculty impact and motivate faculty to focus on their impact and to aim for the highest levels of achievement.
  - Led College rebranding and transformation of marketing & communications, focusing our attention on engineering's role in impacting the world through university-wide multidisciplinary research and education
  - Led successful ABET accreditation with 19 programs and no shortcomings or weaknesses
  - Leading tenure-line faculty co-hiring initiatives, including co-hires with the Applied Research Laboratory, School of International Affairs, Penn State Law, and between various departments in College of Engineering. These initiatives establish the College of Engineering as a campus-wide leader while reducing barriers to inter-college faculty collaborations.
  - Launched 125th Anniversary celebration
- ***Engineering Equity Action***
  - Leading the development of a College-wide Equity Action Plan, a holistic effort targeting significant and sustainable changes in College culture and demographics through cultural transformations and operational modalities, including alignment with new College promotion and tenure criteria and creating a broad definition of inclusion that goes beyond traditional minoritized groups in engineering
  - Created and successfully recruited new Associate Dean for Equity and Inclusion position, as a tenured role, elevating the importance of E&I to the highest level within the College
  - Diversified college leadership with first African-American Associate Dean, first LatinX Department Head, first LatinX Assistant Dean, first LGBTQ+ Department Head

  - Defined quantitative goal to achieve gender equity in undergraduate population in seven years and under-represented minority demographics matching the Commonwealth of Pennsylvania
  - Transformed college leadership and faculty hiring processes and protocols
    - 70% increase in female tenure-line faculty, 90% increase in LatinX/Hispanic tenure-line faculty, and 17% increase in tenure-line African-American faculty in 4 years
  - Led Penn State into the Partnership for Faculty Diversity program, creating a pipeline of post-doctoral researchers from minoritized groups and mentoring them to tenure-line faculty careers
  - Launched equity-centric faculty search process, resulting in expanded diversity in our faculty applicant pool and the recruitment of an African-American computer scientist
  - Targeted corporate and alumni fund raising in support of equity
  - Created *Impact Scholars* program, transforming our scholarship awarding protocols, significantly improving female and under-represented minority yield
  - Created Allies program to engage entire college population as equity partners
- ***Clark Scholars Program***
  - Secured $25M endowment ($15M gift from the A. James and Alice B. Clark Foundation and $10M from Penn State) to support 40 full-time undergraduate students
  - Clark Scholars are a visible, cohesive cohort who have shown a drive to succeed academically and a willingness to seize opportunities in their lives and their schooling.
- ***Interdisciplinary-initiatives***
  - Created first-in-the-world *Law, Policy and Engineering Initiative*, bringing together faculty from the College of Engineering, Penn State Law, and Penn State School of International Affairs
    - Developing integrative academic degree programs for undergraduate, graduate and professional students, including Master's of Engineering in Engineering, Law and Policy, and multiple Integrated Undergraduate-Graduate degree programs with the School of International Affairs
    - Establish research and scholarly collaborations across engineering disciplines
    - LPE Symposia on: Election Security (2018), Biodevices (2019), Autonomous Vehicles on Land and in the Air (COVID-delayed to 2021)
  - Leading partnership with the United Nations Economic Commission for Europe to renew and expand the *Global Building Network*
  - Expanded the Center for Neuroengineering in partnership with the Huck Institutes for Life Science
  - Expanded relationships with College of Medicine, College of Health and Human Development, and Eberly College of Science through multiple, strategic faculty co-hires
  - Collaborated in development and launch of Penn State's Consortium to Combat Substance Abuse (led by Penn State's Social Science Research Institute)
  - Launched Project Drawdown-Penn State Partnership
    - Partnered with Penn State's Institutes for Energy and the Environment to build relationship with Project Drawdown, establishing Penn State as Drawdown's primary academic partner
    - Member of Project Drawdown "Braintrust"
    - Created Drawdown Research Experiences for Undergraduates Program
    - Co-Chair of the 1st International Conference on Drawdown — Research to Action: The Science of Drawdown
  - Launched College of Engineering Sustainability Council as part of the Penn State Sustainability Institute campus-wide initiative
- ***College undergraduate success initiatives and transformations***
  - Transitioned entrance-to-major from four semesters to two semesters

  - Launched "Exposure to Major" Initiative, including video content to inform students and parents of high school and early-career undergraduate students about the impact of engineering disciplines
  - Launched *Engineering Connect* program to scale-up small bridge programs with an aim to serve over 1000 incoming undergraduates per year, throughout their first year
  - Initiated *Return to Intern* internships program to serve international undergraduate students
  - Launched transformation of 1st/2nd year engineering curriculum
    - engage all engineering students in hands-on engineering design
    - expose all engineering students to the breadth of the engineering discipline
    - infuse equity, diversity and inclusion into undergraduate curricula
- ***College research growth initiatives and transformations***
  - Launched seed grant programs to
    - re-engage mid-career faculty with low research output
    - encourage highly successful faculty to expand their research into higher-risk, higher-payoff areas
    - encourage faculty to pursue large interdisciplinary research centers such as the NSF ERC and STC programs
    - increase collaborations with the College of Medicine
    - increase interdisciplinary research
    - advance commercialization of faculty IP towards commercialization
  - Established processes to quantify seed grant return-on-investment
  - Restructured and expanded College's Corporate and Industry Engagement
    - Concierge relationship-building to support research, philanthropy and career services
    - Expanded College Industry and Professional Advisory Committees via matrix structure to continue department-centric committees while also engaging in college-wide initiatives
  - Seeded new interdisciplinary research centers/consortia (italics are launched, other's in-progress)
    - *Consortium on Integrated Energy Systems*
    - *Center for Radar Engineering, Science, and Technology*
    - *Center for Gas Turbine Research, Education, and Outreach*
    - *Center for Structural Oncology*
    - *Center for Biodevices*
    - *Center for Artificial Intelligence Foundations and Engineered Systems*
    - *Center for Engineering Mental Health*
    - Center for Advanced Catalysis
    - Center for Climate Solutions and Sustainability Assessment
    - Center for Internet of Integrated Intelligent Biosensors
    - Center for Digital and Advanced Manufacturing Processes and Systems
    - Center for Plasma Science and Engineering
    - Center for Autonomous Construction
- ***College commitment to defense research, development, and education***
  - Created and successfully hired College of Engineering Defense Liaison
  - Reinvigorated College relationship with the Applied Research Laboratory
    - Growing collaborative research
    - Streamlining Affiliate status and graduate standing in CoE for ARL faculty
    - Launched new tenure-line faculty co-hire program and recruited inaugural faculty member
    - Developing *Defense Scholars* program for CoE faculty
  - Expanding relationship with Navy Submarine Force
    - Direct partnership with commander of Pacific Submarine Fleet (Rear Admiral)

        - Co-led (w/RADM) Navy Science and Technology Forum bringing together keymembers of the Navy submarine force R&D leadership, ONR program managers, and Penn State faculty
    - Establishing partnership with AFIT to enable graduate school opportunities for active officers
- ***University service***
    - Global Academic Leadership Council
    - Chair, Council of Academic Dean (2020-22)
    - Penn State Strategic Budget Task Force
    - Executive Committee, Institutes for Energy and the Environment
    - Executive Committee, Huck Institutes for Life Science
    - Executive Committee, Institute for Computational and Data Sciences
    - Chair, Senior Vice President for Research Search Committee
    - Academic Leadership Forum Planning Committee
    - Corporate Relations Committee
    - Conflict of Interest Committee
    - Information Technology Executive Advisory Council (fka CIO Advisory Council)

North Carolina State University

- Lead NCSU MSE department of 28 FTE tenure/tenure-track faculty, 35 technical and non-technical staff, and ~300 students
- Grew NCSU MSE faculty by 47%, including significant diversification
    - Fourteen tenured/tenure-track faculty additions (74% success rate)
    - Eleven successful retentions of faculty with outside offers (100% success rate)
    - Increased under represented group faculty from 10% to 30%
    - Six Assistant Professors combined to win eight NSF CAREER and DoD YIP awards
- Grew graduate program by 95% while increasing student quality and percentage of domestic students
- Grew undergraduate program by 200%, while increasing female population to >30%
- Improved graduate program ranking from 31 to 15
- Improved undergraduate program ranking from >25 to 16
- Grew departmental endowment by >100%
- Grew research awards and expenditures over 100% over four years
- Co-leading inter-college Cluster Hire in Carbon Electronics; will bring at least five additional faculty to NCSU in MSE, Physics, and other departments
- Established (and raised endowment for) Distinguished Lecture Series; hosted speakers including John Cahn and Mildred Dresselhaus
- Launched new M.S. Nano Engineering program
- Successfully led ABET review, receiving full accreditation
- Expanded undergraduate program to include a biomaterials concentration; nanomaterials concentration currently under development
- Revamped undergraduate laboratories into a departmental “showpiece”
- Recruited new corporate partners for Senior Design and summer high school camps
- Led the Analytical Instrumentation Facility(AIF), a shared user facility with 10 FTE staff, through an organizational transition
- Expanded NCSU AIF capabilities with over $6M in new equipment acquired with federal, state and university funds

Florida State University

- Led Cluster Hire Initiative in Materials Processing, Growth and Characterization, a multidisciplinary initiative that added four new faculty members specializing in materials research; two of the four

hired are female. New faculty hired with appointments in Physics, Chemical Engineering, Mechanical Engineering and Industrial Engineering
- Led initiative with NHMFL educators and high school teachers to develop and implement a secondary school curriculum in superconductivity

AWARDS AND HONORS

- Academic Ally Award, Impact.Engineered, ASME, 2021
- John Bardeen Award, TMS Functional Materials Division, 2018
- Commencement Speaker, Penn State University Graduate College, May, 2018
- Douglas D. Osherhoff Distinguished Lecturer, Universidad Autonoma Cuidad Juarez, Instituto De Ingenieria Y Tecnologia, Mexico, November, 2017
- Plenary Speaker, IEEE International Conference on Applied Superconductivity and Electromagnetic Devices, Shanghai, China, 2015
- Fellow, ASM International, "For the advancement of high temperature superconductors and their applications as well as supporting the fledgling superconducting materials technology industrial base, and for advancing diversity in materials science and engineering," 2015
- Fellow, American Association for the Advancement of Science (AAAS), "For distinguished contributions to the field of applied superconductivity, particularly for the advancement of high magnetic fields and for the integration of experiment and computation," 2015
- IEEE Council on Superconductivity Award for Significant and Sustained Contributions to Applied Superconductivity, 2014 (highest award from the IEEE Council)
- 2013 Van Duzer Prize, for best paper in the *IEEE Transactions on Applied Superconductivity*, IEEE Council on Applied Superconductivity (awarded in 2014)
- 2012 Van Duzer Prize, for best paper in the *IEEE Transactions on Applied Superconductivity*, IEEE Council on Applied Superconductivity (awarded in 2014)
- NCSU Alumni Association Outstanding Research Award for 2012-13 (awarded in 2014)
- Papers selected as a *Superconductor Science & Technology* Highlight six times from 2013-2016
- Plenary Speaker, IEEE International Conference on Applied Superconductivity and Electromagnetic Devices, Beijing, China, 2013
- North Carolina State University Diversity Award, 2011
- Plenary Speaker, 20th International Conference on Magnet Technology (IEEE Conference), 2007
- Special Award for Exceptional Service, FAMU - FSU College of Engineering, 2007
- Engineering Research Award, FAMU - FSU College of Engineering, 2005
- Fellow, IEEE, "for contributions to high temperature superconductors and magnet systems," 2004; one of youngest Fellows in IEEE history
- Engineering Research Award, FAMU - FSU College of Engineering, 2001
- Plenary Speaker, Korean Superconductivity Society, KSS2000, South Korea, 2000
- Roger W. Boom Award, Cryogenic Society of America, 1998
- Developing Scholar Award, Florida State University, 1996
- Nuclear Engineering Students Award for Undergraduate Teaching, 1991
- NSF/Science and Technology Agency of Japan Fellowship, 1990
- Magnetic Fusion Energy Technology Fellowship, U.S. Department of Energy, 1985-1990

PROFESSIONAL SERVICE ACTIVITIES - EXTERNAL

- Society for Hispanic Professional Engineers Academic Partnership Council, 2022 - present
- Invited panelist, United Nations Economic Commission for Europe Cyber Monday Virtual Panel on High Performance Buildings, April 2021
- Invited panelist, MIT Forum for Equity: Equity in Engineering Education, February 2021

- Co-leading Big10+ Deans effort to infuse equity and inclusion in engineering curricula via collaboration with ABET and ASEE, 2020-present
- Member, National Academy Defense Science Deans' Roundtable Linking Academic Engineering Research and Defense Basic Science, 2019-present
- ASEE International Committee, 2019 - present
- Advisor, Project Drawdown, 2018 - 2020
- Department reviewer, Dept. of Materials Science and Engineering, University of Virginia, 2021
- Department reviewer, Dept. of Materials Science and Engineering, University of Central Florida, 2019
- Department reviewer, Dept. of Materials Science and Engineering, University of Florida, 2016-2017
- Invited Speaker and Panelist, TMS Diversity Summit, 2016
- Advisory Board, *Superconductor Science & Technology*, 2015-2018
- Scientific Program Committee, International Conference on Magnet Technology, Korea, 2015
- Invited Panelist, Symposium on "The Future of Materials Science and Engineering: An Industry Perspective," Georgia Tech, May 2013
- Board of Visitors, Army Research Office, Materials Science Division, May 2013; Chair, May 2015
- Chair, Graduate Program Review, Dept. of Materials Science and Engineering, Virginia Tech, 2013
- Chair, Workshop on Ethnic Diversity in Materials Science & Engineering, December, 2012
- CERN, Academic Training Instructor on Applied Superconductivity, June, 2012
- Advisory Board member, Department of Materials Science and Engineering, Virginia Tech, 2012-2016
- University Materials Council
  - Executive Committee, Elected At-large member, 2011-2013
  - Vice-Chair, 2013-2014
  - Chair, 2014-2015
  - Gender Equity Committee, 2010 – 2017
- IEEE
  - Council on Superconductivity, Fellows Committee, Vice-Chair, 2013-2014; Chair, 2015-2018
  - Editor-In-Chief, *IEEE Transactions on Applied Superconductivity*, 2005 – 2012
  - International Steering Committee, 2015 ASEMD
  - Associate Editor, IEEE Technology News, 2010 – 2012
  - Council on Applied Superconductivity, Fellow Review Committee, 2011 – 2013
  - Representative of the Council on Superconductivity to the Board of Trustees of the Federation of Materials Societies, 2007 – 2011
  - Editor for Magnets and Magnet Applications, *IEEE Transactions on Applied Superconductivity*, 1998 – 2005
  - Member of the Council on Applied Superconductivity Executive Committee, 1998 – *present*
  - Chair, Van Duzer Prize Selection Committee, 2006 – 2012
  - Technical Committee on Electronic Publishing, 2000–2002
  - Distinguished Lecturer Committee (Chair), 2001–2002
- Applied Superconductivity Conference, Incorporated (a 501(c)(3))
  - Chairman of the Board and Conference Chairman, 2002–2004
  - Board of Directors Executive Committee, 1999–2004
  - Board of Directors, 1996 - 2008
- Materials Research Society
  - MRS Medal Selection Committee, 2014 – 2018
  - Broadening Participation Subcommittee, 2015– 2018
  - Co-Chair, Acta Materialia Gold Medal Forum: Frontiers in Thin-Film Epitaxy and Nanostructured Materials, 2011 Spring Meeting

  - Editor, Journal of Materials Research, Focus Issue: Frontiers in Thin-Film Epitaxy and Nanostructured Materials, 2013
- MS&T 2011, co-Chair, Acta Materialia Gold Medal Symposium, Columbus, Ohio, USA, October 16-20, 2011
- ASM Honorary Membership Committee, 2009 – 2011
- International Advisory Board, 6th International Conference "Science and Engineering of Novel Superconductors" of the 5th Forum on New Materials
- Review Panel Member, Naval Research Laboratory, Advanced Functional Oxides, 2007
- European Conference on Applied Superconductivity
  - International Advisory Board, 2012 - 2013
  - Board of Directors, 2002 - 2008
- Review Panel Member, Director's Review of the Fermilab High Field Superconducting Magnet Program, 2006
- U.S.-Japan Workshop on High-T_c Superconductors
  - Chair, U.S. Delegation, 1996-1999; Workshop Chair, 1997; Proceedings Editor, 1997
- International Advisor to the 2007 International Conference on Magneto Science
- Manuscript reviewer for *Nature Communications, Journal of Applied Physics*, *Applied Physics Letters, Journal of Materials Research, Superconductor Science and Technology, Journal of Physics and Chemistry of Solids, Physica C, Advanced Materials, IEEE Transactions on Vehicular Technology, Journal of Physics D: Applied Physics, IEEE Transactions on Applied Superconductivity, IEEE Transactions on Magnetics, Cryogenics*
- Proposal reviewer for the National Science Foundation, U.S. Department of Energy, ARPA-E

LEADERSHIP TRAINING

- "Understanding and Managing Behavioral Differences," Tracom Group Social Style training program, 2015
- Strategic Leadership Training Program, NCSU, 2012-13

PROFESSIONAL SERVICE ACTIVITIES – NCSU AND FSU

- Women and Minority Engineering Programs National Advisory Board, NCSU College of Engineering, 2017
- Eastman Chemical Center of Excellence Research Steering Team, 2012 - 2017
- Reactor Safety and Audit Committee, 2012-2017
- Council on the Status of Women, 2011-14
- Biomedical Engineering Graduate Program Review Committee, 2011
- Vice Chancellor's Task Force on Shared Facilities for Materials Research, 2010-12
- Physical Environment Committee, 2010-12
- Led FSU Cluster Hire Initiative in Materials Processing, Growth and Characterization, 2006- 2009
- FSU GAP Committee, 2005-2009
- NHMFL Fellowship Committee, 2004–2005
- Panel Member, Council on Research and Creativity Grant Writing Workshop, 2004
- Mechanical Engineering Faculty Search Committee, 2002-2003; Co-chair 2003–2004
- Co-Chair, Magnet Science & Technology Steering Committee, 2003
- Magnet Science & Technology Director Search Committee, 2003
- Co-Chair, Committee on Expanding Corporate Research Support, 2002–2003
- Liaison on research to the Mechanical Engineering Advisory Committee, 2002–2004
- Chair, Center for Advanced Power Systems Research Committee, 2002–2004
- Center for Advanced Power Systems Budget Committee, 2002–2003

- FSU Promotion & Tenure Committee, 2002–2003; 2003–2004
- College of Engineering Promotion & Tenure Committee, 2002–2003; 2003–2004 (chair)
- Senior Research Advisor to the Vice President for Research, 2001-02
- Council on Research and Creativity, 1997–2000; 2001–2002
- Biomedical Activities Committee, 2001–2003
- Committee on Future Research Directions, 2001–2002
- FSU representative on the Southeast University Research Association, Council on Materials Science and Engineering, 1994–1997

RESEARCH INTERESTS AND ACCOMPLISHMENTS

Primary research focus is on the underlying science that drive performance and system integration of superconducting magnets, optical fiber distributed sensors, magnetic and multiferroic materials. Interests include the prevention of functional failure, systems optimization, manufacturing, processing, packaging and integration. Research is cross-disciplinary, integrating physics and chemistry of novel materials with mechanical, electrical, magnetic, thermal, and systems issues, bridging the underlying nanoscopic phenomena to macroscopic behaviors.

Some specific research accomplishments include:

- Established world record for highest magnetic field generated by a superconducting magnet
- First to use magnetic fields to texture oxides during thermal processing
- Recognized world leader in understanding quench behavior in high temperature superconductors
  - First to quantify slow normal zone propagation in HTS conductors and quench-induced failure
  - First to develop experimentally validated, multiscale, quench model that links microstructural behaviors to macroscopic behavior and conditions
  - First to identify thermally-conducting electrical insulator as key to enhanced quench protection; worked closely with small business to effectively develop such an insulator
  - First to identify and develop Rayleigh-scattering interrogated optical fibers (RIOF) as sensors for quench detection. RIOF is now recognized as the best option for protecting HTS magnets.
- Coupled mechano-thermo-electro-magneto failure issues that limit performance & lifetime
  - Developed real-time imaging of crack initiation and propagation, and its relationship to quench propagation, via magneto-optical imaging
  - First to identify axial compression failure mode in $Bi_2Sr_2Ca_2Cu_3O_z$ superconducting tapes
  - First to explain microstructural causes of quench-induced failure in HTS conductors
- Tailoring defects and structure to enhance functional properties
  - First to incorporate carbon nanotubes and oxide nanoparticles into a ceramic matrix
  - First to irradiate doped $Bi_2Sr_2CaCu_2O_x$ and $HgBa_2CuO_x$ superconductors for controlled defects and enhanced magnetic flux pinning
- Advanced oxide thin film heterostructures
  - First to use chemical solution deposition to achieve $NiFe_2O_4$ films with random orientation, uniaxial texture and epitaxy, with properties as good or better than vacuum-deposited films

COLLABORATIONS AND CONSULTING

- Luna Innovations, 2018 – present
- American Superconductor Corporation, 1995 – 2009; 2014 – 2020
- Advanced Conductor Inc., 2018 – 2020
- Northrop-Grumman, 2013 – 2017
- Tai Yang Research Corporation/Energy2Power Corporation, 2011 – 2017
- CREE, 2010 – 2016
- Grid Logic, Inc., 2010 – 2016

- *n*Gimat, 2008 – 2016
- General Electric Corporation, 2009 – 2015
- Muons, Inc., 2007 – 2015
- SuperPower, 2004 – 2015
- Supercon, Inc., 2003 – 2015
- Solid Material Solutions, 2014 – 2015
- Sonic Blue, 2014 – 2015
- Boeing Corporation, 2009 – 2010
- Nove Technologies, Inc., 2006 – 2010
- Oxford Superconducting Technology, 1996 – 2009
- Superconducting Systems, Inc., 2000 – 2001
- Maine Research and Technology, 2000 – 2001
- Frederic R. Harris, Inc., 1999 – 2000
- Nordic Superconductor Technologies, 1998 – 2001
- EURUS Technologies, 1997 – 2000
- Southwire Company, 1997 – 1998
- MAGLEV 2000 of Florida Corporation, 1996 – 2001
- UNIQUEST, University of Queensland (Australia), 1995 – 1998
- Intermagnetics General Corporation, 1995 – 1998
- BICC Cables (UK), 1993 – 1994
- National Research Institute for Metals (Japan), 1992 – 1994
- National Institute for Standards and Technology, 1992 – 1998
- General Motors Corporation, ElectroMotive Division, 1992
- Argonne National Laboratory, 1990 – 1998

RESEARCH AND SCHOLARLY PRODUCTS

Patent activities

Issued

1. J. Schwartz, T. Asano, H. Sekine, D.R. Dietderich, K. Inoue and H. Maeda, "Wire-in-tube process for bismuth system superconductors," Patent Agency of Japan #2272159, 1990
2. J. Schwartz, Ch. Wolters, and K.M. Amm, "Process for preparing mercury-barium-calcium-copper-oxide-based superconductor materials," U.S. Patent Office, patent #5,858,926, issued January 12, 1999
3. J. Schwartz, C.C. Koch, Y. Zhang and X.T. Liu, "Formation of bismuth strontium calcium copper oxide superconductors," U.S. patent 9,773,962 B2, September 26, 2017.
4. W.K. Chan, Y. Wang, H. Song, and Justin Schwartz, "Hypersonic aircraft having homopolar motor with graded resistance," U.S. patent 10,507,913, December 17, 2019; "Aéronef hypersonique à moteur homopolaire à résistance progressive," international patent WO2017218801A1 published December 21, 2017.
5. T. Kittel and J. Schwartz, "Ferrite thick films and the chemical solution based methods of preparation thereof," U.S. patent 10,577,253, March 3, 2020.
6. F. Scurti and J. Schwartz, "Self-monitoring superconducting cables having integrated optical fibers," U.S. patent 10,593,444, March 17, 2020.
7. J. Schwartz, F. Scurti, S. Rogers and W.K. Chan, "Self-monitoring superconducting tape via integrated optical fibers," U.S. patent 10,892,397, January 12, 2021.

Pending

1. F. Scurti and J. Schwartz, "Enhanced optical fibers for low temperature sensing," U.S. patent application filed January 6, 2017.
2. Y. Wang, W.K. Chan, H. Song and J. Schwartz, "Mechanisms improving performance of superconducting magnets," provisional U.S. patent application filed June 15, 2016, Application No.: 62/350,485

Book Chapters

1. J. Schwartz and H.W. Weijers, *Electrical Measurements on Superconductors by Transport* in Methods in Materials Research, Ed. by E. N. Kaufmann *et al.* (John Wiley & Sons, New York, 2000) pp. 5b.5.1 - 5b.5.20
2. J. Schwartz and P.V.P.S.S. Sastry, *Emerging Materials: Hg Superconductors*, Handbook of Superconducting Materials, Volume I, Part C, Chapter C4. Ed. By D.A. Cardwell and D.S. Ginley (Institute of Physics Publishing, Bristol, UK, 2003) pp. 1029-1048.
3. H.W. Weijers, P. Noyes and J. Schwartz, *Electrical Measurements on Superconductors by Transport* in Characterization of Materials Research, Ed. by E. N. Kaufmann *et al.* (John Wiley & Sons, New York, 2012) Revised Edition, pp. 616-636.
4. R. Jha, G. S. Dulikravich, M.J. Colaco, M. Fan, J. Schwartz, and C. Koch, "Magnetic Alloys Design Using Multi-Objective Optimization", Advanced Structured Materials series (eds.: Oechsner, A., da Silva, L.M., Altenbach, H.), Springer, Germany http://www.springer.com/series/8611.

Educational Materials/Curricula

1. G.C. LaFrazza, J. Schwartz, S. Pamidi, U.P. Trociewitz, L. Ford and M. Johnson, *Project Superconductivity* (2004); Italian (2004) and German translations (2005)

   A high school curriculum package comprised of a thirteen-activity teacher guidebook and a package of manipulatives with which to conduct the activities. The first English version was completed in October 2004 and was translated into Italian and German in 2005.

Commentaries and Viewpoints

1. J. Schwartz, "Viewpoint: Are no-insulation magnets a paradigm shift for high-field DC superconducting magnets?" *Superconductor Science & Technology* **29** 050501 (2 pp) doi 10.1088/0953-2048/29/5/050501 (2016)
2. T. Richard and J. Schwartz, "Universities must lead on climate solutions", triblive.com (2019)

Peer-Reviewed Journal Publications

1988 – 1990

1. D.R. Cohn, J. Schwartz, L. Bromberg and J.E.C. Williams, "Tokamak Reactor Concepts Using High Temperature, High Field Superconductors," *Journal of Fusion Energy* **7**(6), 91-94 (1988)
2. J. Schwartz, L. Bromberg, D.R. Cohn and J.E.C. Williams, "Performance Limits of High Field Tokamak Reactors," *Nuclear Fusion* **29**(6), 983-988 (1989)
3. J. Schwartz, J.E.C. Williams, L. Bromberg and D.R. Cohn, "A Commercial Tokamak Reactor Using Super High Field Superconducting Magnets," *Fusion Technology* **15**(2), 957-964 (1989)
4. L. Bromberg, R.C. Myer, D.R. Cohn, J. Schwartz and J.E.C. Williams, "Prospects for a High Field ITER Device," *Journal of Fusion Energy* **9**(4), 507-511 (1990)

1991 – 1995

5. J. Schwartz, J.P. Freidberg and J.E.C. Williams, "Dynamic Stability of Edge-Cooled Superconducting Tapes," *Cryogenics* **31**(l), 21-32 (1991)

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36. I.B. Rutel, C. McIntosh, A. Caruso, D.C. van der Laan, M. Davidson, and J. Schwartz, "Magneto optical imaging of cracking in high temperature superconducting thin films and tapes under tensile strain," in Magneto Optical Imaging, NATO Science Series, II. Mathematics, Physics and Chemistry – Vol. 142, 133-140, T.H. Johansen and D.V. Shantsev, eds. (2004)

37. O.E. Castillo, P.V.P.S.S. Sastry, B. Trociewitz, U. P. Trociewitz, and J. Schwartz, "Microstructural and superconducting properties of V-doped MgB_2 bulk and wires," *Advances in Cryogenic Engineering Materials* **50B**, International Cryogenic Materials Conference, 546-553 (2004)
38. H. Maeda, U.P. Trociewitz, P.V.P.S.S. Sastry, J. Schwartz, M. Toshima, and M. Sato, "Phase formation and critical current density of Ag-sheathed Bi2223 tapes with insulating Sr-V-O barriers," *Advances in Cryogenic Engineering Materials* **50B**, International Cryogenic Materials Conference, 612-619 (2004)
39. A.L. Mbaruku, I. Rutel, U.P. Trociewitz, H.W. Weijers, and J. Schwartz, "Electro-Mechanical Behavior of YBCO Coated Conductor in Tension," *Advances in Cryogenic Engineering Materials* **50B**, International Cryogenic Materials Conference, 700-705 (2004)
40. F. Trillaud, A. Caruso, J. Barrow, B. Trociewitz, U.P. Trociewitz, H.W. Weijers, and J. Schwartz, "Normal Zone Generation and Propagation in $YBa_2Cu_3O_{7-\delta}$ Coated Conductors Initialized by Localized, Pulsed Disturbances," *Advances in Cryogenic Engineering Materials* **50B**, International Cryogenic Materials Conference, 852-859 (2004)
41. P.V.P.S.S. Sastry, U.P. Trociewitz, H. Maeda and J. Schwartz, "Enhancement of Texture and Critical Current Density in $Bi_2Sr_2Ca_1Cu_2O_8$ Superconducting Tapes Through Magnetic Field Processing," *Materials Processing in Magnetic Fields*, Proceedings of the International Workshop on Materials Analysis and Processing in Magnetic Fields, Tallahassee, FL (17-19 March 2004). Ed. H. Wada and H.J. Schneider-Muntau, World Scientific, 80-90 (2005)
42. D.N. Nguyen, P.V.P.S.S. Sastry, G.M. Zhang, D.C. Knoll and J. Schwartz, "Relationship between critical current density and self-field losses of Ag-sheathed $(Bi,Pb)_2Sr_2Ca_2Cu_3O_x$ tapes," *Advances in Cryogenic Engineering Materials* **52**, International Cryogenic Materials Conference, 696 (2006)
43. D.N. Nguyen, P.V.P.S.S. Sastry and J. Schwartz, "Waveform of loss voltage in Ag-sheathed Bi2223 superconducting tape carrying ac transport current," *Advances in Cryogenic Engineering Materials* **52**, International Cryogenic Materials Conference, 869 (2006)
44. J. Schwartz, "High temperature superconductors for accelerator magnets," Proceedings of the Workshop on Accelerator Magnet Design Optimization, pp. 56-60, (2006)
45. A. Oliver, A.L. Mbaruku and J. Schwartz, "Mechanical Properties of Carbon Nanotube Reinforced Polycarbonate at Cryogenic Temperature," *Mater. Res. Soc. Symp. Proc.* **1018**, 1018-EE10-24, (2007)
46. J. Schwartz, R.P. Johnson, S.A. Kahn and M. Kuchnir, "Multi-Purpose Fiber Optic Sensors for HTS Magnets," Proceedings of the 11th European Particle Accelerator Conference, Genoa, Italy (2008)
47. S.A. Kahn, R.P. Johnson, M. Kuchnir and J. Schwartz, "High Field Superconductor for Muon Cooling," Proceedings of the 11th European Particle Accelerator Conference, Genoa, Italy (2008)
48. D. Larbalestier, E. Hellstrom, J. Jiang, F. Kametani, M. LoSchiavo, D. Myers, J. Schwartz, T. Shen and U. Trociewitz, "The Bi-2212 Conductor and Magnet Program at the National High Magnetic Field Laboratory," Workshop on Accelerator Magnet Superconductors, Design and Optimization, CERN, Geneva, Switzerland (2008)
49. M. Turenne, R.P. Johnson, F. Hunte and J. Schwartz, "Multi-Purpose Fiber Optic Sensors for High Temperature Superconductor Magnets," Proceedings of the 2009 Particle Accelerator Conference, Vancouver, Canada (2009)
50. F. Hunte, H. Song, J. Schwartz, R.P. Johnson and M. Turenne, "Fiber Bragg Optical Sensors for YBCO Applications," Proceedings of the 2009 Particle Accelerator Conference, Vancouver, Canada (2009)
51. M. Turenne, R.P. Johnson, F. Hunte, J. Schwartz and H. Song, "Multi-Purpose Fiber Optic Sensors for High Temperature Superconducting Magnets," 2009 Symposium on Fusion Engineering, San Diego (2009)

52. W.T. Nachtrab, T. Wong, X. Liu and J. Schwartz, "Effect of Insulation Materials on J_e of AgMg Sheathed Bi2212 Wire," International Cryogenic Materials Conference, Tucson (2009)
53. W.K. Chan, P. Masson, C. Luongo and J. Schwartz, "The 3D mixed-dimensional quench model of a high aspect ratio high temperature superconducting coated conductor tape," Proceedings of the COMSOL Conference, Boston (2010)
54. J. Schwartz, F. Hunte, W.K. Chan, X.F. Gou, X.T. Liu, M. Phillips, Q.V. Le, G. Naderi, M. Turenne, L. Ye, "Status of HTS magnets and the conductors they depend upon," Proceedings of the HE-LHC'10 (2010)
55. G. Flanagan, R.P. Johnston, L. Wenzel, D. Schmidt, Q. Ruan, C. Wimmer, W. K. Chan, and J. Schwartz, "Evaluation and implementation of high performance real-time signal processing for Rayleigh scattering based quench detection for high field superconducting magnets," Proceedings of the International Particle Accelerator Conference (2012)
56. J. Schwartz, "Quench in high temperature superconductor magnets," Proceedings of WAMSDO: Workshop on accelerator magnet superconductors, design and optimization, CERN, Geneva, Switzerland, 21-29 DOI 10.5170/CERN–2013–006 (2013)
57. R. Jha, G.S. Dulikravich, M. Fan, J. Schwartz, C. Koch, I.N. Egorov, C. Poloni, "A combined computational-experimental approach to design of high-intensity permanent magnetic alloys, Proceedings of the VIII Congresso Nacional de Engenharia Mecanica "CONEM2014", Sao Luis, Brazil (2014)
58. R. Jha, G.S. Dulikravich, M.J. Colaco, I.N. Egorov. C. Poloni, N. Chakraborti, M Fan, J. Schwartz, and C.C. Koch, "Multi-Objective Design and Optimization of Hard Magnetic Alloys Free of Rare Earths", MS&T15-Materials Science and Technology 2015 Conference, Columbus, Ohio, October 4-8, 2015
59. R. Jha, G.S. Dulikravich, M.J. Colaco, M. Fan, J. Schwartz, and C.C. Koch, "Magnetic Alloys Design Using Multi-Objective Optimization", ACEX2015-9th International Conference on Advanced Computational Engineering and Experimenting, Munich, Germany, June 29 – July 2, 2015
60. R. Jha, G.S. Dulikravich, N. Chakraborti, M. Fan, J. Schwartz, C.C. Koch, M.J. Colaco, C. Poloni, I.N. Egorov, "Algorithms for Design Optimization of Hard Magnetic Alloys Using Experimental Data", ICMM4-International Conference on Material Modeling, Berkeley, CA, May 27-29, 2015
61. F. Scurti and J. Schwartz, "Optical fiber distributed sensing for high temperature superconductor magnets", Proceedings SPIE 10323, 25th International Conference on Optical Fiber Sensors, 103238Q (April 23, 2017); doi:10.1117/12.22659472017
62. G. Rasic, B. Vlahovic, and J. Schwartz, "Reducing losses in magnetic thin films through nanoscale surface patterning," Proceedings of the IV Advanced Ceramics Conference, pp. 39-56 doi 10.2991/978-94-6239-213-7_4 (2017)
63. S. D. Rountree, O.J. Ohanian, A. Boulanger, D. Kominsky, M. Davis, M. Wang, K. Chen, A. Leong, J. Zhang, F. Scurti, J. Schwartz, T.E. Blue and J. Jones, "Multi-parameter fiber optic sensing for harsh nuclear environments," SPIE Defense + Commercial Sensing Conference, SPIE Proceedings, Volume 11739, Fiber Optic Sensors and Applications XVII; 117390H doi 10.1117/12.2587897 (2021)

RESEARCH AND SCHOLARLY PRESENTATIONS

Plenary and Keynote Addresses

1. *"High Field HTS Insert Coils: Status and Key Technical Issues,"* Annual Meeting of the Korean Superconductivity Society, KSS2000, Yongpyong, South Korea, August, 2000
2. "*The How & Why of High Field Superconducting Solenoids*," 20th International Conference on Magnet Technology, Philadelphia, PA, August 30, 2007

3. "*Progress Towards Superconducting Magnets Using High Temperature Superconductors: An Integrated Approach*," IEEE Conference on Applied Superconductivity and Electromagnetic Devices, Beijing, PRC, October 26, 2013
4. "Advances in $Bi_2Sr_2CaCu_2O_x$ Superconducting Wires and Related Technologies for High Field Superconducting Magnets," IEEE Conference on Applied Superconductivity and Electromagnetic Devices, Shanghai, PRC, November 23, 2015
5. "Inspiring Change, Impacting Tomorrow: Arming the next generation to save our species," Research to Action: the Science of Drawdown, State College, PA, September 16, 2019
6. "High-Performance Built Environments to Cultivate Humane Communities," United Nations Economic Commission for Europe, 30th Session of the Committee on Sustainable Energy, Concrete Actions to Attain Energy for Sustainable Development, September 22, 2021.

Invited Lectures — Conferences and Workshops

1. *"Effects of Lithium on the Formation Temperature and Superconducting Properties of 2212 BSCCO,"* Critical Current Density and Bulk Processing of High-T_c Superconductors Workshop, Argonne National Laboratory (April 1992)
2. *"Enhanced Superconducting Behaviour in Polycrystalline 2212 BSCCO by Lithium Substitution and n+Li Reactions,"* 1992 Applied Superconductivity Conference, Chicago (August 1992)
3. *"High-T_c Magnets From Powder-in-Tube Tapes,"* 3rd World Congress on Superconductivity, Munich, Germany (September 1992)
4. *"PIT Processing: Hot-Rolling and High Strength Sheaths,"* 4th International Conference of the World Congress on Superconductivity, Orlando (June 1994)
5. *"BSCCO Conductors for High Field NMR Applications,"* NYSIS Seventh Conference on Superconductivity and Applications, Buffalo (September 1994)
6. *"Flux Pinning and Magnetic Anisotropy in Neutron Irradiated Hg-Ba-Ca-Cu-O,"* 1994 Applied Superconductivity Conference, Boston (October 1994)
7. *"Bi-Sr-Ca-Cu-O Conductor Processing for High Field Insert Magnets,"* 1995 TMS Annual Meeting, Las Vegas (February 1995)
8. *"High Temperature Superconductivity and High Magnetic Fields: Research at the National High Magnetic Field Laboratory,"* 7th U. S.-Japan Workshop on High-T_c Superconductivity, Tsukuba, Japan (October 1995)
9. *"Conductor Research and Development for High Field Nuclear Magnetic Resonance Insert Coils,"* 1995 MRS Fall Meeting, Boston (November 1995)
10. *"High Temperature Superconductors for Magnetic Suspension Applications,"* 3rd International Symposium on Magnetic Suspension Technology, Tallahassee (December 1995)
11. *"$Bi_2Sr_2CaCu_2O_x$ Conductor Preparation for Insert Coils in 20 T Magnets,"* 1996 TMS Annual Meeting, Anaheim (February 1996)
12. *"High Temperature Superconductors for Near-Term and Long-Term High Field Magnets,"* International Workshop on High Magnetic Fields, Tallahassee (March 1996)
13. *"Improvements in $Bi_2Sr_2CaCu_2O_x$ by Dopants,"* 1997 TMS Annual Meeting, Orlando (February 1997)
14. *"Synthesis Studies of (Hg,X)$Ba_2Ca_2Cu_3O_x$ Superconductors,"* International Workshop on Tl and Hg Based Superconducting Materials, Cambridge, United Kingdom (May 1997)
15. *"Improved Flux Pinning in $Bi_2Sr_2CaCu_2O_x$ Powders and Powder-in-Tube Tapes Via BaO_2 and MgO Additions,"* 1997 International Workshop on Superconductivity, Hawaii (June 1997)

16. *"Conductor Development Activities at the NHMFL,"* 8th U.S.-Japan Workshop on High-T_c Superconductivity, Tallahassee (December 1997)
17. *"High Field HTS Coil Development at the NHMFL,"* The HTS/LTS for HEP Workshop, Napa (March 1998)
18. *"Progress in HTS Systems,"* Workshop on Power Distribution and Management for Electric Ship Applications, Tallahassee (May 1999)
19. *"HTS: Its Potential for Future Magnet Technology,"* Magnet Technology 16, Sawgrass (October 1999)
20. *"Progress in High Field BSCCO Insert Coils,"* 9th U.S.-Japan Workshop on High-T_c Superconductivity, Yamanashi, Japan (October 1999)
21. *"Strain effects in 3-ply BSCCO conductors: abr compression,"* Office of Naval Research Program Review (May 2000).
22. *"Progress in the Development of a 5 T Bi-2212 High Field Insert Magnet,"* Cryogenic Engineering Conference/International Cryogenic Materials Conference, Madison (July 2001)
23. *"Stability and Quench Protection of YBCO Wires and Coils,"* U.S. Department of Energy, Energy Efficiency and Renewable Energy, Superconductivity Program for Electrical Power Systems, 2002 Annual Peer Review, Washington, D.C. (July 2002)
24. *"Magneto-Optical Imaging of Strain-Induced Cracks in BSCCO and YBCO Conductors,"* 2002 Applied Superconductivity Conference, Houston (August 2002)
25. *"HTS Materials R&D in the Center for Advanced Power Systems: Strain Effects and AC losses in Bi-Sr-Ca-Cu-O and MgB_2 Superconductors,"* CAPS Workshop, Tallahassee (August 2002)
26. *"Stability and Quench Propagation of HTS Conductors,"* 2002 CHATS Workshop, Karlsruhe, Germany (September 2002)
27. *"Normal Zone Creation and Propagation in YBCO Coated Conductors*," U.S. Department of Energy Coated Conductor Workshop, St. Petersburg, FL (January 2003)
28. *"Magneto-Optical Imaging with Strain,"* Air Force Office of Scientific Research Coated Conductor Program Review, St. Petersburg, FL (January 2003)
29. *"10 Things I Hate about Coated Conductors,"* MURI Coated Conductor Workshop, Madison, WI (June 2003)
30. *"Stability and Quench Protection of YBCO Wires and Coils*" U.S. Department of Energy, Efficiency and Renewable Energy, Superconductivity Program for Electrical Power Systems, 2003 Annual Peer Review, Washington, D.C. (July 2003)
31. *"Magneto-Optical Imaging of High Temperature Superconductors Under Tensile Strain*" NATO Advanced Research Workshop on Magneto Optical Imaging, Oystese, Norway (August 2003)
32. *"Bi-2212 High Field Insert Coils,"* 2003 Low Temperature Superconductor Workshop, Monterey, CA (November 2003)
33. *"Magnetic Field Processing and Growth,"* National High Magnetic Field Laboratory Retreat, Tallahassee, FL (January 2004)
34. *"Effects of Magnetic Field Processing on the Microstructure and Properties of $Bi_2Sr_2CaCu_2O_8$ Superconducting Tapes,"* International Workshop on Materials Analysis & Processing in Magnetic Fields, Tallahassee, FL (March 2004)
35. *"Superconductivity,"* Project Superconductivity Teacher-Scientist Workshop, Jacksonville, FL (October 2004)
36. *"Quench Protection & Stabilization: How Conductors Respond to Disturbances,"* U.S. Department of Energy Wire Workshop, St. Petersburg, FL (January 2005)

37. "*Quench Behavior in Coated Conductors*," AFOSR Coated Conductor Program Review, Orlando, FL (January 2005)
38. "*Experimental Studies of Normal Zone Behavior in Coated Conductors*," Quench Protection Workshop, Orlando, FL (January 2005)
39. *"High Field HTS Magnets: Past, Present and Future … on the Road to 30 T,"* 30 T High Resolution Magnet for NMR Spectroscopy and Imaging Workshop, Tallahassee, FL (July 2005)
40. *"High Temperature Superconductors for Accelerators,"* Workshop on Accelerator Magnet Design and Optimization, Geneva, Switzerland (April 2006)
41. "*Quenching and Fatigue in As-Synthesized and Damaged YBCO Coated Conductors or Understanding Failure is the Path to Success!*" Stanford-Wisconsin Workshop on Coated Conductors, Palo Alto, CA (April 2006)
42. "*Engineering Issues for YBCO Coated Conductors: Electromechanical and Quench Behavior*," International Conferences on Modern Materials & Technologies, Acireale, Sicily, Italy (June 2006)
43. "*Relationships Between Conductor Damage, Quenching & Electromechanical Behavior in YBCO Coated Conductors (and Bi2212 too)*," 2006 Applied Superconductivity Conference, Seattle (August 2006)
44. "*Superconductivity,"* Project Superconductivity Teacher-Scientist Workshop, Seattle, WA (September 2006)
45. "*Quench Propagation Behavior & Other Failure Issues in Bi2212*," Bi2212 Workshop/LTSW, Tallahassee, FL (November 2006)
46. "*Next Generation Superconductors for Accelerator Magnets*," 2007 Particle Accelerator Conference, Albuquerque, NM (June 2007)
47. "*The How and Why of High Field Superconducting Solenoids*," 20th International Conference on Magnet Technology (plenary), Philadelphia, PA (August 2007)
48. "*Issues for High Field Superconducting Magnets using High Temperature Superconductors*," 2007 European Conference on Applied Superconductivity, Brussels, Belgium (September 2007)
49. *"$Bi_2Sr_2CaCu_2O_x$ Coils: Past and Present (and Future*!)," Pioneering High Magnetic Fields Symposium, Tallahassee, FL (March 2008)
50. *"The Next Generation of High Field Magnets at the National High Magnetic Field Laboratory & Magnetic Field Processing of $Bi_2Sr_2CaCu_2O_x$,"* 3rd International Workshop on Materials Analysis and Processing in Magnetic Fields, Tokyo, Japan (May 2008)
51. *"Status of HTS Magnets, and the conductors they depend upon*," EuCARD - HE-LHC'10 AccNet mini-workshop on a "High-Energy LHC", Malta (October 2010
52. *"The Role of the Nanoscale in the Success of Large-Scale High Temperature Superconductors,"* International Symposium on Advances in Nanostructured Materials and Applications, Materials Science & Technology, Columbus (October 2011)
53. "*HTS for High Field HEP Magnets: Are we half-way there yet?"* Low Temperature High Field Superconductor Workshop, Providence, Rhode Island (November 2011)
54. "*Quench in HTS Magnets"* Workshop on Accelerator Magnet, Superconductor Design and Optimization, CERN, Geneva, Switzerland (January 2013)
55. "*Quench Protection Modeling*" Naval Applied Superconductivity Program Review, Philadelphia, PA (June 2013)
56. "*High Field Magnets using High Temperature Superconductors: Progress and Challenges*," 2013 European Conference on Applied Superconductivity, Genova, Italy (September 2013)

57. "*Ag-Al alloys: An Enabling Technology for $Bi_2Sr_2CaCu_2O_x$ Superconducting Wires*," IEEE International Conference on Applied Superconductivity and Electromagnetic Devices, Beijing, China (October 2013)
58. "*Understanding Degradation and Failure in $Bi_2Sr_2CaCu_2O_x$ Conductors through Experiment and Computation*," Spring Meeting of the Materials Research Society, San Francisco (April 2014)
59. "*Direct and Inverse Design Optimization of Magnetic Alloys with Minimized Use of Rare Earth Elements*," Aerospace Materials for Extreme Environments, Arlington, VA (May 2014)
60. "*Key Issues for Advancing High Field Superconducting Magnets: Quench Detection, Degradation Limits, and Ancillary Technology Development*," 2014 Kyoto Workshop on HTS Magnet Technology for High Energy Physics – The 2nd Workshop on Accelerator Magnet in HTS, Kyoto, Japan (November 2014)
61. "*Optical Fibers for Quench Detection*," 3rd Workshop on Accelerator Magnets in HTS (WAMHTS-3), Lyon, France (September 2015)
62. "*Heterogeneous Materials Systems for Reconfigurable Electronics via Templating*," 2016 AFOSR Reconfigurable Electronics Working Group, Arlington, VA (May 2016)
63. "*Rayleigh-scattering Interrogated Optical Fibers (RIOF) for HTS Quench Detection & Other Sensing Needs*," U.S. Magnet Development Program Workshop, Napa, CA (February 2017)
64. "*Rayleigh-scattering Interrogated Optical Fibers (RIOF) for Quench Detection*," The 2017 Low Temperature/High Field Superconductor Workshop LTSW/HFSW2017, Santa Fe, NM (March 2017)
65. "*Rayleigh-backscattering Interrogated Optical Fiber Sensors for Superconducting Magnets*," Naval Applied Superconductivity Program Review, Philadelphia, PA (April 2018)
66. "*A mixed-dimensional delamination structural model for general laminated composites including REBCO coated conductors*," 6th International Workshop on Numerical Modeling of High Temperature Superconductors, Caparica, Portugal (June 2018)
67. "*Advancing Gender Equity in Education for the Future Engineering Workforce,*" 2019 Spring Meeting of the Materials Research Society, Sympoisum on High Impact Practice – Increasing Ethnic and Gender Diversification in Engineering Education, Phoenix, AZ (April 2019)
68. *"125 Years of Engineering Education: The Foundation of Our Future,"* 2021 American Council of Engineering Companies of Pennsylvania, virtual delivery (May 2021)
69. *"Penn State College of Engineering: Engineering Equity Initiative,"* Engineering CAS Member Summit, virtual delivery (July 2021)

Seminars

1. *"High Field Superconducting Magnets for Fusion,"* University of Illinois at Urbana, Department of Nuclear Engineering (September 1989)
2. *"A Superconducting Tour of Japan – Applied Superconductivity Research in Japanese Government, Private and University Research,"* University of Illinois at Urbana, Department of Nuclear Engineering (October 1990)
3. *"Japanese Research in Superconducting Materials and Magnet Applications, A View from Within (and Without), "*Argonne National Laboratory, Energy Systems Division (November 1990)
4. *"Superconducting Magnetic Levitation (MAGLEV) – High Speed Transportation for the Year 2000,"* Champaign County Chamber of Commerce, Transportation Committee (December 1991)
5. *"Effects of Li Doping on $Bi_2Sr_2CaCu_2O_x$,"* National Research Institute for Metals, Tsukuba, Japan (March 1992)

6. *"Progress and Directions in High-T_c Superconducting Materials and Magnets,"* Florida State University, Department of Mechanical Engineering and the National High Magnetic Field Laboratory (December 1992)
7. *"The Superconductivity Revolution - Are We Near The Promised Land or Tales from the Front,"* Los Alamos National Laboratory, Superconductivity Technology Center (July 1993)
8. *"High-T_c Superconductivity at the National High Magnetic Field Laboratory,"* National Research Institute for Metals, Tsukuba, Japan (March 1994)
9. *"Superconductivity Research at the National High Magnetic Field Laboratory,"* American Institute of Chemical Engineers, (September 1994)
10. *"Towards a Practical High-T_c Superconducting Conductor,"* Florida State University Materials Research and Technology Center, (February 1995)
11. *"BiSrCaCuO and HgBaCaCuO Research at the National High Magnetic Field Laboratory,"* Argonne National Laboratory, Energy Technology Division (July 1995)
12. *"The Worst (Best) Talk You'll Ever Hear (Give) ... The Dos and Don'ts of a Scientific Seminar,"* National High Magnetic Field Laboratory, Florida State University (December 1995)
13. *"Applied HTS Research and Development Activities at the National High Magnetic Field Laboratory,"* National Research Institute for Metals, Tsukuba, Japan (October 1997)
14. *"High Field HTS Insert Coils: Status and Key Technical Issues,"* Korean Institute of Machinery and Materials, South Korea (August 2000)
15. *"YBCO Coated Conductor Development: Magneto-Optical and Microstructural Characterization of Coated Conductors,"* AFOSR Plasma Dynamics for Aerospace Applications, Theme Kick-Off Meeting, Wright-Patterson Air Force Base (May 2001)
16. *"CAPS HTS Programs: Strain Effects and AC losses in Bi-Sr-Ca-Cu-O Superconductors,"* CAPS Industrial Advisory Board Meeting, Tallahassee (May 2002)
17. *"MOI of YBCO, TBCCO and HBCCO w/ and w/out strain,"* AFOSR Coated Conductor Review, Madison (May 2002)
18. *"An Overview of the Center for Advanced Power Systems and its HTS Activities: Conductor R&D,"* American Superconductor Corporation (May 2002)
19. *"High Temperature Superconductors for Magnet Applications: Materials, Mechanics, and Systems,"* Department of Mechanical Engineering, FAMU-FSU College of Engineering (October 2002)
20. *"What We Did Over Our Summer Vacation, or ... How to Break World Records with High Field HTS Insert Magnets,"* Department of Electrical Engineering, FAMU-FSU College of Engineering (November 2003)
21. *"HTS R&D for Magnet Applications at Florida State University,"* Slovakian Academy of Sciences, Institute for Electrical Engineering (November 2003)
22. *"Superconductivity,"* REU & RET Colloquium, National High Magnetic Field Laboratory (June 2005)
23. *"The Best (Worst) Talk You'll Ever Give: The Dos and Don'ts of a Scientific Seminar,"* REU & RET Colloquium, National High Magnetic Field Laboratory (June 2005)
24. *"High Temperature Superconductors: How they fail, and how they might yet succeed*," Rensselaer Polytechnic Institute, Department of Mechanical, Aerospace and Nuclear Engineering (August 2005)
25. "*High Temperature Superconductors: How they fail, and how they might yet succeed*," Georgia Institute of Technology, Materials Council Seminar Series (October 2005)

26. "*High Temperature Superconductors: How they fail, and how they might yet succeed*," Arizona State University, Fulton School of Engineering (February 2006)
27. "*High Temperature Superconductors: How they fail, and how they might yet succeed*," Polytechnic University (Brooklyn), Department of Mechanical Engineering (March 2006)
28. "*What Limits the Performance & Lifetime of Superconducting Materials & Systems?*" Georgia Institute of Technology, Department of Electrical and Computer Engineering (September 2007)
29. "*21st Century Challenges and Opportunities in Nuclear Engineering*," Purdue University, School of Nuclear Engineering (February 2009)
30. "*Advanced Materials for a Sustainable Energy Future: How Advanced Oxides Are Helping to Create the 21st Century Smart Grid,*" Virginia Commonwealth University, Department of Mechanical Engineering (February 2009)
31. *"What Limits the Performance & Lifetime of Superconducting Materials & Systems?*" Tulane University, Department of Physics and Engineering Physics (March 2009)
32. *"What Limits the Performance & Lifetime of Superconducting Materials & Systems?*" University of Delaware, Department of Mechanical Engineering (March 2009)
33. *"What Limits the Performance & Lifetime of Superconducting Materials & Systems?*" North Carolina State University, Department of Materials Science and Engineering (April 2009)
34. *"What Limits the Performance & Lifetime of Superconducting Materials?*" University of Twente (Netherlands), Low Temperature Division (June 2009)
35. "*Understanding performance limiting issues of superconducting materials for high current, high magnetic field devices*," ASM International, Carolinas Central Chapter (September 2010)
36. "*Understanding performance limiting issues of superconducting materials for high current, high magnetic field devices*," MRS Local Chapter meeting, Raleigh, NC (November 2010)
37. "*Understanding performance limiting issues of superconducting materials for high current, high magnetic field devices*," Virginia Tech, Department of Materials Science and Engineering, Blacksburg, VA (November 2011)
38. "*Quench detection and protection: the final hurdles to wide-spread implementation of HTS-based magnet systems,*" University of Houston, Texas Center for Superconductivity at the University of Houston, Houston, TX (May 2013)
39. "*25+ years of high temperature superconductivity: the long road from discovery to magnet systems*," Universite Paris Sud, Centre de Spectrometrie Nucleaire et de Spectrometrie de Masse, Paris, France (June 2013)
40. "*25+ years of high temperature superconductivity: the long and winding road from discovery to magnet systems,*" Drexel University, Department of Materials Science and Engineering, Philadelphia, PA (May 2014)
41. "*25+ years of high temperature superconductivity: the long and winding road from discovery to magnet systems,*" University of Texas, Texas Materials Institute, Austin, TX (September 2015)
42. "*Redefining engineering in the modern age: a call to action,*" University of South Florida, Eminent Scholar Distinguished Lecture Series, Tampa, FL (March 2018)
43. "*Redefining engineering in the modern age: a call to action,*" *American Council of Engineering Companies of Pennsylvania,* 2018 Spring Conference, Harrisburg, PA (May 2018)
44. "*Project Drawdown at Penn State University*," Science on Tap, State College, PA (September 2019)

RESEARCH SUPERVISION

Graduate Student Supervision (Major Professor), Graduated (forty-six students (sixteen female, seven under represented minorities); nineteen M.S. & thirty three Ph.D.)

- Earle E. Burkhardt, University of Illinois Urbana, Department of Nuclear Engineering
  - M.S. 05/93, *"*Superconducting Magnets for Small Scale Energy Storage Systems and Electrodynamic Magnetic Levitation Systems*"*
  - Ph.D. 03/98, *"*Stability of High-T_c Superconducting Conductors Using the Finite Element Method*"*
  - Currently: R&D Staff, Oak Ridge National Laboratory
- James L. Hill, University of Illinois Urbana, Department of Nuclear Engineering
  - M.S. 12/93, "Analysis of the Modified Square Toroid, A Force-Reduced Electromagnet"
  - Currently: Los Alamos National Laboratory
- Shiming Wu, University of Illinois Urbana, Department of Nuclear Engineering
  - Ph.D. 05/94, "Processing and Microstructural Characterization of Li Doped and Undoped Polycrystalline $Bi_2Sr_2CaCu_2O_x$"
  - Currently: Senior Patent Counsel, Huawei Technologies, China
- Bruce C. Amm, University of Illinois Urbana, Department of Mechanical Engineering
  - M.S. 12/93, *"*Optimization of the Force-Reduced Modified Square Toroid Magnet Design*"*

    Florida State University, Department of Mechanical Engineering
  - Ph.D. 12/96, "An Optimized Superconducting Toroidal Magnet Using a Force-Reduced Winding Scheme"
  - Currently: General Electric Global Research, Schenectady, NY
- Jiyou Guo, University of Illinois at Urbana, Department of Materials Science and Engineering
  - M.S. 5/94, "Microstructural Development and Superconducting Properties of Hot-Rolled Ag and Ag(Cu)-Sheathed $Bi_2Sr_2CaCu_2O_x$ Tapes"
  - Currently: Intel
- Elizabeth A. Scholle (Carle), University of Illinois Urbana, Department of Nuclear Engineering
  - Ph.D. 3/95, "Impact of Vibration-Induced Disturbances on Superconducting Magnets"
  - Currently: Associate Professor, Manufacturing and Mechanical Engineering Technology, Rochester Institute of Technology
- Kathleen Amm, Florida State University, Department of Physics
  - M.S. 8/96; Ph.D. 12/97, "Synthesis and Characterization of $HgBa_2Ca_{n-1}Cu_nO_x$ Superconductors on Metallic Substrates"
  - Currently: Leader, Superconducting Magnet Division, Brookhaven National Laboratory
- Sawako Nakamae, Florida State University, Department of Physics
  - M.S. 08/96; Ph.D. 12/98, "Magnetothermal Conductivity of $Bi_2Sr_2Ca_nCu_{n+1}O_x$ Bulk Superconductors"
  - Currently: Research Engineer, CEA-Saclay, France
- Wangshui Wei, Florida State University, Department of Mechanical Engineering
  - Ph.D. 03/98, "Effects of Oxide Additions to $Bi_2Sr_2CaCu_2O_x$: Phase Evolution and Flux Pinning"
  - Currently: Senior Analyst Federated Department Stores
- Li Ying, Florida State University, Department of Mechanical Engineering
  - M.S. 08/99, "Synthesis and Properties of Pb-Doped $HgBa_2Ca_2Cu_3O_x$ Superconductors"
  - Currently: Programmer/Consultant Tellabs
- Ulf Trociewitz, Aachen University of Technology, Applied Physics

  - Ph.D. 05/01, "The Impact of Chemically Active Additions on Phase Formation and Superconducting Properties of Partial Melt Processed $Bi_2Sr_2CaCu_2O_x$"
  - Currently: Associate Scholar/Scientist, National High Magnetic Field Laboratory, FSU
- Hiranmayi Palanki, Florida State University, Department of Mechanical Engineering
  - M.S. 12/02, "Critical Current Variability and Thermal Quench Studies on High Temperature Superconducting Tapes"
  - Currently: Florida Power & Light
- Daniel C. van der Laan, University of Twente, Applied Physics & Low Temperature Division
  - Ph.D. 01/04, "Flux Pinning and Connectivity in Polycrystalline High-Temperature Superconductors"
  - Currently: National Institute of Standards and Technology, Boulder; President & CEO, Advanced Conductor Technologies LLC
- Oscar Castillo, Florida State University, Department of Mechanical Engineering
  - M.S. 03/04, "Microstructural and Superconducting Properties of V-doped MgB_2 Bulk and Wires"
  - Currently: Engineer, Northrop-Grumman, California
- Jianhua Su, Florida State University, Department of Mechanical Engineering
  - Ph.D. 03/04, "Growth and Characterization of Mercurocuprate Superconductors on Silver"
  - Currently: Senior Engineering Manager, HzO
- Bin Xu, Florida State University, Department of Mechanical Engineering
  - M.S. 06/04, "Study of the Magnetic Field Dependence of the Critical Current of $Bi_2Sr_2CaCu_2O_{8+x}$ and $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10+x}$ Superconducting Tapes"
- Abdallah Mbaruku, Florida State University, Department of Mechanical Engineering
  - Ph.D. 03/06, "Electromechanical and Fatigue Properties of As-Manufactured and Quench Damaged YBCO Coated Conductor"
- Jamaa Bouhattate, Florida State University, Department of Mechanical Engineering
  - Ph.D. 06/06, "Modeling Texture Evolution in Polycrystalline Materials using Spherical Harmonics"
  - Currently: Assistant Professor, University of La Rochelle, France
- Gary Adam Merritt, Florida State University, Department of Mechanical Engineering
  - M.S. 07/06, "Proof of Principle for $Bi_2Sr_2CaCu_2O_{8+x}$ React Wind Sinter Magnet Manufacturing"
  - Currently: Engineering, Boeing Corporation, Seattle, WA
- Manuel Ramos, Florida A&M University, Department of Mechanical Engineering
  - M.S. 07/06, "Low Aspect Ratio $Bi_2Sr_2CaCu_2O_{8+x}$/AgMg Wires Processed in High Magnetic Field"
  - Currently: Research Professor, Universidad Autónoma de Ciudad Juárez
- Giulio Mulazzani, University of Bologna (Italy), Department of Electrical Engineering
  - M.S. 2006, "Studio sperimentale della stabilita termica di nastri superconduttori della "seconda generzaione"
- Doan Ngoc Nguyen, Florida State University, Department of Physics
  - Ph.D. 5/07, "Alternating current loss characteristics in $(Bi,Pb)_2Sr_2Ca_2Cu_3O_{10}$ and $YBa_2Cu_3O_{7-}$ superconducting tapes"
  - Currently: Los Alamos National Laboratory
- Anita Oliver, Florida State University, Department of Mechanical Engineering

  - M.S. 11/07, "Mechanical and electrical properties of carbon nanotube reinforced polycarbonate at liquid nitrogen temperature"

- Xiaorong Wang, Florida State University, Department of Electrical and Computer Engineering
  - Ph.D. 12/07, "Quench behavior of $YBa_2Cu_3O_{7-}$ coated conductors"
  - Currently: Research Scientist/Engineer, Lawrence Berkeley National Laboratory
- Timothy Effio, Florida State University, Department of Mechanical Engineering
  - M.S. 06/08, "Quench induced degradation in $Bi_2Sr_2CaCu_2O_{8+x}$ at 4.2 K"
  - Currently: Market Director, Fluence
- Samuel T. Adedokun, Florida A&M University, Department of Mechanical Engineering
  - Ph.D. 08/08, "Effects of magnetic field heat treatment on heavily deformed aluminum alloy 6061"
  - Currently: University of Lagos, Nigeria
- Makita R. Phillips, Florida A&M University, Department of Mechanical Engineering
  - M.S. 04/09, "Influence of turn-to-turn insulation on quench propagation in YBCO coated conductors"

    North Carolina State University, Department of Mechanical and Aerospace Engineering
  - Ph.D. 06/14, "Effect of Alternative Insulation Materials on Quench Propagation in $ReBa_2Cu_3O_{7-\delta}$ Coils"
  - Currently: Thermal Structural Analyst, The Johns Hopkins University Applied Physics Laboratory
- David Myers, Florida State University, Department of Mechanical Engineering
  - M.S. 04/09, "Characterization of $Bi_2Sr_2CaCu_2O_x$/Ag-alloy conductor samples extracted from wind and react solenoids"
- Michael LoSchiavo, Florida State University, Department of Mechanical Engineering
  - M.S. 04/09, Florida State University, "Processing Issues of $Bi_2Sr_2CaCu_2O_8$ Round Wire Involving Leakage and Alumino Silicate Insulation"
- Hubertus W. Weijers, University of Twente, Applied Physics & Low Temperature Division
  - Ph.D. 06/09, "High-temperature superconductors in high-field magnets"
  - Currently: Senior Principal Engineer, Magnet Systems, Robinson Research Institute, Wellington, New Zealand
- Tengming Shen, Florida State University, Department of Electrical and Computer Engineering
  - Ph.D. 07/10, "Processing, microstructure, and critical current density of Ag-sheathed $Bi_2Sr_2CaCu_2O_x$ multifilamentary round wire"
  - Currently: Scientist, Lawrence Berkeley National Laboratory, CA
- Honghai Song, Florida State University, Department of Electrical and Computer Engineering
  - Ph.D. 07/10, "Microscopic observations of quenching and the underlying causes of degradation in $YBa_2Cu_3O_{7-\delta}$ Coated Conductor"
  - Currently: Magnet Production Engineer at Mevion Medical Systems, Littleton, MA
- Sarah Haney, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 12/12, "Investigation of Low Temperature, Atomic-Layer-Deposited Oxides on 4H-SiC and their Effect on the SiC/SiO_2 Interface"
  - Currently: Manager of Substrate Technology Development at Avago Technologies
- Safoura Seifikar, North Carolina State University, Department of Materials Science and Engineering

  - Ph.D. 03/13, "Texture and Magnetocrystalline Anisotropy in $NiFe_2O_4$ Thin Films for Application in Magnetoelectric $NiFe_2O_4/Pb[Ti_{0.52},Zr_{0.48}]O_3$ Composites"
  - Currently: Module Engineer, Intel, Portland, OR
- Amir Kajbafvala, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 12/13, "High strength silver/alumina sheath for $Bi_2Sr_2CaCu_2O_{8+x}$ conductor"
  - Currently: Process Engineer, ASM America, Phoenix, AZ
- Quang Van Le, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 3/14, "Relationship between microstructure and mechanical properties in $Bi_2Sr_2CaCu_2O_x$ round wires using peridynamics simulation"
  - Currently: Engineer, Siemens
- Goran Rasic, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 3/14, "Nanoscale Surface Patterning and Coercivity Reduction in $NiFe_2O_4$ Thin Films"
  - Currently: Principal Research Scientist, North Carolina Central University, Department of Physics
- Golsa Naderi, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 7/14, "Understanding processing, microstructure and transport relationships of $Bi_2Sr_2CaCu_2O_x$/Ag round wires"
  - Currently: Process Engineer, Intel Corporation
- Yun Zhang, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 7/15, "Oxide and metallic precursor powders for $Bi_2Sr_2CaCu_2O_x$/Ag round wires"
  - Currently: Senior Scientist, Lonza, Inc.
- Yi-Fang Lee, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 8/15, "Fabrication and Properties of Topological and Two-dimensional Thin Film Heterostructures"
  - Currently: Engineer-PCVD Metals, Micron Technology, Inc., Boise, ID
- Liyang Ye, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 10/15, "Quench Behavior and Degradation Limit of Ag-sheathed $Bi_2Sr_2CaCu_2O_x$ Round Wires"
  - Currently: Magnet Production Engineer at Mevion Medical Systems, Littleton, MA
- Min Fan, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 6/16, "On the Formation and Evolution of Cu-Ni-rich Bridges of Alnico Alloys with Thermomagnetic Treatment and Tempering"
  - Currently: Global Product Manager, Applied Materials, San Jose, CA
- Sam Rogers, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 11/16, "Effects of Tensile Fatigue on Critical Current and n-value of $(RE)Ba_2Cu_3O_{7-x}$ Superconductors"
  - Currently: Senior Engineering, Illumina, San Diego, CA
- Weston Straka, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 03/17, "Chemical Solution Deposition Based Synthesis of High Symmetry Phase of Hafnium Dioxide Thin Films"
  - Currently: Physical Measurement Support Engineer, Shimadzu Scientific Instruments, Raleigh, NC
- Taryn Kittel, North Carolina State University, Department of Materials Science and Engineering
  - M.S. 05/17

- Youness Alvandi Tabrizi, North Carolina State University, Department of Mechanical and Aerospace Engineering
  - Ph.D. 06/18, "Electric Control of Magnetization in Biferroic Heterostructures with Patterned Interfaces: a Phase-Field Micromagnetic Study"
  - Currently: Senior Mechanical Engineer II, ASM America, Phoenix, AZ
- Federico Scurti, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 06/19, "*In-Situ* Distributed Sensing for High Temperature Superconductor Magnets based on Rayleigh-backscattering Interrogated Optical Fibers"
  - Currently: Assistant Professor of Nuclear Engineering, Penn State University
- Chris Velez, Pennsylvania State University, Department of Mechanical Engineering
  - M.S. 07/20, "Quench Detection Logic for High Temperature Superconducting Magnets Based on Distributed Optical Fiber Sensing"
- Alexandria Cruz, North Carolina State University, Department of Materials Science and Engineering
  - Ph.D. 01/21, "Investigating the interface of cobalt ferrite and hafnia"
  - Currently: Quality Test Engineering, ImagineOptix

Graduate Student Supervision (Major Professor), In-progress
- Nailah Oliver, Penn State University, Department of Engineering Science & Mechanics, Ph.D.

Undergraduate Student Thesis Supervision
- Amanda Kelly, Pennsylvania State University, Department of Engineering Science & Mechanics and the Schreyer Honors College
  - B.S. 12/19, "Investigating the Effectiveness of Optical Fiber Sensors as a Failure Detection Method for Superconducting Coils"

Graduate Student Committees (not Major Professor)
- Farhad Booshaghi, Ph.D. Mechanical Engineering, FSU, 1997
- Daryl J. Hartley, Ph.D. Physics, FSU, 1998
- John Panek, Ph.D. Mechanical Engineering, FSU, 1998
- Zhongyu Chen, Ph.D. Mechanical Engineering, FSU, 2000
- Jason Trembley, M.S. Mechanical Engineering, FSU, 2003
- Yeon Suk Choi, Ph.D. Mechanical Engineering, FSU, 2004
- Xu Wang, Ph.D. Electrical Engineering, FSU, 2004
- Gilberto Alexandre Castello Branco, Ph.D. Mechanical Engineering, FSU, 2005
- Frederic Trillaud, Ph.D., CEA/SACLAY France, 2005
- Antoine Jerome Raoul Berret Jr., M.S. Mechanical Engineering, FSU, 2005
- Gail Jefferson, Ph.D. Mechanical Engineering, FAMU, 2005
- Rasheemah Burrell, Ph.D. Mechanical Engineering, FAMU, 2005
- Mohit Mathur, M.S. Mechanical Engineering, FSU, 2006
- Jingping Chen, Ph.D. Mechanical Engineering, FSU, 2006
- Kai Huang, Ph.D. Mechanical Engineering, FSU, 2007
- Lewei Qian, Ph.D. Mechanical Engineering, FSU, 2007
- Ting Xu, Ph.D. Mechanical Engineering, FSU, 2007
- Steven T. Downey, Ph.D. Mechanical Engineering, FSU, 2008
- Sladana Lazic, M.S. Mechanical Engineering, FSU, 2008
- Haomin Lin, Ph.D. Mathematics, FSU, 2008
- Shalini Gupta, Ph.D. Electrical & Computer Engineering, Georgia Tech, 2009

- Aaron Johnston-Peck, Ph.D. Materials Science and Engineering, NCSU, 2011
- Elizabeth Paisley, Ph.D. Materials Science and Engineering, NCSU, 2012
- Zach Lampert, Ph.D. Materials Science and Engineering, NCSU, 2012
- Ryan D. Hodges, Ph.D. Electrical Engineering, NCSU, 2014
- Peiman Shahbeigi Roodposhti, Ph.D. Materials Science and Engineering, NCSU, 2015
- John A. Medford, M.S. Materials Science and Engineering, NCSU, 2015
- Raj Kumar, Ph.D. Materials Science and Engineering, NCSU, 2015

Long-term Visitors Hosted

- Professor Kristian Fossheim, Trondheim University, Norway
- Professor Shimone Reich, Weizmann Institute, Israel
- Professor Yutaka Yamada, Tokai University, Japan
- Dr. Jaimoo Yoo, Korean Institute of Metallurgy and Mining, South Korea
- Professor Nasser Hamdan, King Fahad University, Saudia Arabia
- Professor Hiroshi Maeda, Kitami Institute, Japan
- Sylvain Boutemy, Toulouse University, France
- Beatrice Boutemy, Toulouse University, France
- Arno Godeke, University of Twente, Netherlands
- Hans van Eck, University of Twente, Netherlands
- Frederic Trillaud, CEA/SACLAY, France
- Dr. Pavol Usak, Institute of Electrical Engineering, Slovak Academy of Sciences, Slovakia
- Dr. Philippe Vanderbemden, Department of Electrical Engineering and Computer Science, Université de Liège, Belgium
- Dr. Andreas Heinrich, University of Augsburg, Department of Physics, Germany
- Dr. Marco Breschi, University of Bologna, Department of Electrical Engineering, Italy
- Giulio Mulazzani, University of Bologna, Department of Electrical Engineering, Italy
- Morgan Poitevin, Univ. of La Rochelle, Department of Materials Science and Engineering, France
- Antoine Guillou, Univ. of La Rochelle, Department of Materials Science and Engineering, France
- Dr. Xiaofan Gou, Hohai University, China
- Davide Cruciani, University of Bologna, Department of Electrical Engineering, Italy
- Shivendra Kumar, Indian Institute of Technology Kanpur
- Federico Scurti, University of Bologna, Department of Electrical Engineering, Italy
- Dr. Jun Zhou, Lanzhou University, College of Civil Engineering and Mechanics, China
- Yawei Wang, Shanghai Jiao Tong University, China
- Peifeng Gao, Lanzhou University, College of Civil Engineering and Mechanics, China
- Shijian Yin, Dilian University of Technology, School of Materials Science and Engineering, China
- Professor Kyu Jeong Song, Jeonbuk National University, Physics Department, Korea
- Professor Wentao Wang, Southwest Jiaotong University, China

Post-doctoral Research Fellows Supervised

- Joerg Kessler, 01/94 – 04/96
- Yang Ren Sun, 03/94 – 07/96
- Christian Wolters, 03/94 – 09/96
- Bruce C. Amm, 12/96 – 11/97
- P.V.P.S.S. Sastry, 08/96 –10/99
- Qingyu Hu, 09/97 – 08/99
- Jo Moore, 03/98 – 07/98

- Ulf Trociewitz, 01/01 – 01/04
- Isaac Rutel, 08/02 – 05/04
- Guomin Zhang, 11/03 – 04/06
- Abdallah Mbaruku, 03/06 – 02/08
- Xiaotao Liu, 04/06 – 04/12
- Wan-Kan Chan, 05/08 – 8/17 (promoted to Research Assistant Professor)
- Frank Hunte, 01/09 – 12/09
- Gang Yang, 06/09 – 08/10
- Sasha Ishmael, 10/11 – 10/15
- Golsa Naderi, 08/14 – 10/16
- Menghui Li, 02/15 – 02/16
- Weston Straka, 03/17 – 10/17
- Patrick Lomenzo, 10/17 – 9/18
- Federico Scurti, 08/19 – present

Research Staff Supervised

FSU: Verlyn Fischer, Materials Engineer; Victor Miller, Electrical Engineer; Hubertus Weijers, Magnet Engineer; Youri Viouchkov, Mechanical Engineer; Sastry Pamidi, Assistant Scholar/Scientist; Bianca Trociewitz, Measurement Technician; David Knoll, Engineer; Ulf P. Trociewitz, Assistant Scholar/Scientist

NCSU: Tom Rawdanowicz, Research Assistant Professor; C. Lew Reynolds, Teaching Assistant Professor; Keith Dawes, Teaching Professor; Frank Hunte, Research Assistant Professor; Maria Fiedler, Teaching Assistant Professor; Wan Kan Chan, Research Associate; Dieter Griffis, Research Professor; Dale Batchelor, Director of Operations; Roberto Garcia, Laboratory Manager; Yi Liu, Laboratory Manager; Charles Mooney, Laboratory Manager; Fred Stevie, Laboratory Manager; James Tweedie, Research Scholar; Chuanzhen Zhou, Research Scholar

Undergraduate Research Assistants Supervised

- Over 100 since 1990; over 50% from underrepresented groups
- Students in Mechanical Engineering, Nuclear Engineering, Physics, Mathematics, Electrical Engineering, Materials Science and Engineering, Chemistry, Chemical Engineering
    - Students from University of Illinois, Florida State University, Florida A&M University, Georgia Institute of Technology, Harvard University, Carnegie Mellon University, Northwestern University, Mary Baldwin College, Morgan State University, Smith College, University of Florida, University of Texas El Paso, Dartmouth University, Boston College, University of Wisconsin, University of Massachusetts, Amherst, University of Oregon, North Carolina State University, Missouri University of Science and Technology, Hastings College, Lenoir-Rhyne University, Pennsylvania State University

RESEARCH FUNDING

Received (past)

University of Illinois

Preliminary Investigation of Small Scale (10 MWh) Superconducting Magnetic Energy Storage (SMES) for Electrical Peak Demand Limiting, U.S. Army Construction Engineering Research Lab, 1991, $16,500

Effects of Lithium Doping and Neutron Irradiation Induced Defects in $Bi_2Sr_2CaCu_2O_x$ Superconductors, Science and Technology Center for Superconductivity/National Science Foundation, 1991-95, $226,262

Comparison of Force-Reduced Superconducting Magnet Geometries to Conventional Design, State of Illinois Department of Energy and Natural Resources, 1991-93, $85,000

EDS MAGLEV SCM Studies: SCM Stability Under Pulsed Disturbances and SCM-Ground Coil Interactions, General Motors Corporation/Bechtel/U.S. Department of Transportation National Maglev Initiative, 1991-92, $40,489

Hot-Rolling of $Bi_2Sr_2CaCu_2O_x$ Superconductors, Argonne National Laboratory/U.S. Department of Energy, 1992-95, $101,331

Florida State University

Stability of High Temperature Superconducting Conductors, Naval Research Laboratory/ARPA, 1993-96, $150,000

Exploratory Investigations of $HgBa_2CuO_{4+\delta}$ Synthesis by Emulating Partial – Melt Processing, National Science Foundation, 1993-94, $50,000

Novel Optimization of Toroids for SMES, Argonne National Laboratory/U.S. Department of Energy, 1994-95, $17,800

Improved Superconducting Properties in BSCCO-2212 Multifilament Conductors Processed by Hot Rolling and Hot Drawing, IGC Advanced Superconductor/National Science Foundation, Small Business Innovation Research Program, 1995, $17,000

Microstructure and Superconducting Properties of Bulk Hg-Ba-Ca-Cu-O On Metallic Surfaces, National Science Foundation, 1996-99, $596,699

Hot-rolling of Bismuth Based Superconductors, Argonne National Laboratory/U.S. Department of Energy, 1996-98, $41,470

Acquisition of a Scanning Transmission Electron Microscope, National Science Foundation (group proposal; senior co-PI), 1996-99, $301,871

Control of Carbon-Induced Dimensional Instabilities in $Ag/Bi_2Sr_2CaCu_2O_x$ Conductors, Naval Research Laboratory/DARPA, 1996-97, $50,000

A Diffusion Based Process for Metal-Clad $(Hg,X)Ba_2Ca_2Cu_3O_{8+x}$ Superconducting Wires, NHMFL In-House Research Program/National Science Foundation, 1997-00, $140,435

Strain Effects in Bi-Sr-Ca-Cu-O: Underlying Limits to Transport Current and Conductor Performance, Office of Naval Research, 1999-00, $119,840

Studies of HTS Conductors, Maglev 2000 of Florida Corporation, 1996-01, $197,464

Acquisition of a Variable-Temperature Scanning Probe Microscope System for Materials Research and Education, National Science Foundation (senior co-PI), 2000-01, $125,000

A Large-Bore, High-Field Liquid Neon Facility for High Temperature Superconductor Materials and Component Testing, Center for Advanced Power Systems/Office of Naval Research, 2000-01, $83,023

Collaborative to Integrate Material Science and Engineering Research and Education Between Florida A&M University and Carnegie Mellon University, National Science Foundation (group proposal; co-PI), 1999-02, $1,535,000

Risk Mitigation for HTS Motors: Intermediate Temperature (27 K) Strain Effects in Reinforced Bi-Sr-Ca-Cu-O Superconductors, Office of Naval Research, 2000-03, $100,000

Superconducting Materials R&D for Power Applications: AC losses and Electromechanical Behavior, Center for Advanced Power Systems/Office of Naval Research, 2002-03, $460,279

Collaboration in Basic Science and Engineering Project Development and Initiation Grant between Florida State University and Institute of Electrical Engineering, Slovak Academy of Sciences, Slovakia, National Research Council, 2003, $7,800

Thermo-Magnetic Continuous Processing of Bi-2212 Cable for HEP, Subcontract from Supercon, Inc., via a Phase I SBIR, U.S. Department of Energy, 2003-04, $20,000

Magneto-Optical Imaging and Microstructural Characterization of YBCO Coated Conductors Under Tensile Stress and Strain, Air Force Office of Scientific Research, 2001-04, $245,000

Project Superconductivity, A Teacher-Scientist Workshop, Office of Naval Research, 2004-05, $9,800

Project Superconductivity, A Teacher-Scientist Workshop, Institute of Electrical and Electronics Engineers, 2004, $25,000

Project Superconductivity, A Teacher-Scientist Workshop, U.S. Department of Energy, 2004, $4,050

Project Superconductivity, A Teacher-Scientist Workshop, Applied Superconductivity Conference, Inc., 2004, $20,000

Stability and Quench Protection of YBCO Wires and Coils, Lockheed-Martin (Oak Ridge National Laboratory)/DoE, 2000-04, $272,046

Distributed Energy and Electric Reliability (DEER)– High Temperature Superconductivity, State Outreach Center, U.S. Department of Energy, 2003-04, $145,600

Engineering Issues for YBCO Coated Conductor Applications, Air Force Office of Scientific Research, 2004-2005, $101,289

Coil Simulator for AC Conductors, AFOSR, STTR program, subcontract from American Superconductor Corporation, Phase I, 2004-2005, $45,000

High Field Magnets for MRI, National Institutes for Health, SBIR program, subcontract from Supercon, Inc., fast-track submission, Phase I: 2004, $15,000.

Quench Behavior of YBCO Coated Conductors with Localized Defects, AFOSR MURI via subcontract from U. Wisconsin, 2004-2006, $95,827

AC Losses in High Temperature Superconductors for Power Applications, U.S. Department of Energy through the Center for Advanced Power Systems (group proposal, co-PI), 2005-2007, $547,000

Coil Simulator for AC Conductors, AFOSR, STTR program, subcontract from American Superconductor Corporation, Phase II, 2005-2007, $153,954

React-wind-sinter technology for $Bi_2Sr_2CaCu_2O_x$ magnets, U.S. Department of Energy, STTR program, subcontract from Supercon, Inc., Phase I: 2007-2008, $59,908

High Field Stability Exploration of Second Generation HTS, U.S. Department of Energy, STTR program, subcontract from American Superconductor Corporation, Phase I: 2007-2008, $35,050

Multi-purpose Fiber Optic Sensors for HTS Magnets, U.S. Department of Energy, STTR program, subcontract from Muons, Inc., Phase I: 2008-2009, $30,000

Insulation Materials and Methods for Bi2212 Magnets, U.S. Department of Energy, STTR program, subcontract from Supercon, Phase I: 2008-2009, $59,238

Partnership for Research and Education in Materials Science between FAMU and CMU, National Science Foundation (group proposal, co-PI), 2004-09, $3,748,555

Enhanced Thermal Performance of Nuclear Fuels, Institute for Energy Systems, Economics and Sustainability, 2009, $15,000

Influence of thermal properties of insulation material in HTS coils on quench propagation, Advanced Magnet Lab, Inc., 2009, $10,000

High Field Magnets for MRI, National Institutes for Health, SBIR program, subcontract from Supercon, Inc., Phase II: 2005-2009, $740,242 (FSU)

Three-Dimensional Quench Simulation & Protection in HTS Devices, U.S. Air Force Research Laboratory through the Universal Technology Corporation, 2008-2010, $504,494 (FAMU)

North Carolina State University

High Field YBCO Magnet Technology for Muon Cooling, U.S. Department of Energy, SBIR/STTR program, subcontract from Muons, Inc., Phase I, 2009-2010, $30,000

Enhanced magnetoelectric behavior in piezoelectric/magnetostrictive thin film composites via magnetic field-assisted processing, A Small Grant for Exploratory Research, National Science Foundation, Materials Processing and Manufacturing Program, w/Nazanin Bassiri-Gharb, Georgia Tech, 2009 – 2010, $99,183

High Strength Silver Sheath for Bi2212/Ag Conductor, U.S. Department of Energy, SBIR program, subcontract from Supercon, Phase I: 2010-2011, $25,000

Thin Robust Electrical Insulator for High Field HTS Magnets, U.S. Department of Energy, STTR program, subcontract from nGimat, Phase I: 2010-2011, $40,000

High Field Magnets for MRI, National Institutes for Health, SBIR program, subcontract from Supercon, Inc., Phase II: 2005-2009, $54,864

React-wind-sinter technology for $Bi_2Sr_2CaCu_2O_x$ magnets, U.S. Department of Energy, STTR program, subcontract from Supercon, Inc., Phase II: 2008-2011, $372,595

Proposal to fund an inter laboratory collaboration for the development of magnets with fields >22 T using HTS conductor; Very High Field Superconducting Magnet Collaboration, Department of Energy Office of High Energy Physics, 2009-2011, $4,000,000 (shared amongst six institutions); NCSU subcontract: $232,419

Fiber Optic Quench Detection Via Optimized Rayleigh Scattering in High-field YBCO Accelerator Magnets, U.S. Department of Energy, STTR program, subcontract from Muons Inc., Phase I: 2011-2012, $34,061

Magnetic field-assisted processing of piezoelectric/magnetostrictive thin film composites to enhance properties, National Science Foundation, Materials Processing and Manufacturing Program, w/Nazanin Bassiri-Gharb, Georgia Tech, 2009-2012, $361,129

Insulation Materials and Methods for Bi2212 Magnets, U.S. Department of Energy, STTR program, subcontract from Supercon, Phase II: 2009-2012, $350,000

Multi-purpose Fiber Optic Sensors for HTS Magnets, U.S. Department of Energy, SBIR program, subcontract from Muons, Inc., Phase II: 2009-2012, $255,474

Three-Dimensional Quench Simulation & Protection in HTS Devices, U.S. Air Force Research Laboratory through the Universal Technology Corporation, 2010-2012, $262,499

Characterization of Superconducting Composites for Fault Current Limiters, Grid Logic, 2011-2012, $160,000

Electrical Energy Storage System by SMES Method for Ultra-High Power and Energy Density, Air Force Office of Scientific Research, STTR program, subcontract from Tai Yang Research Company, Phase I: 2012-2013, $30,254

Thin Robust Electrical Insulator for High Field HTS Magnets, U.S. Department of Energy, STTR program, subcontract from nGimat, Phase II: 2011-2013, $243,785

High Strength Silver Sheath for Bi2212/Ag Conductor, U.S. Department of Energy, SBIR program, subcontract from Supercon, Phase II: 2011-2013, $199,992

Quench Degradation Mechanism of Metal-Ceramic Superconductor Composite Conductor and Quench Detection of Ceramic Superconductors and Magnets, Fermi National Accelerator Laboratory, 2013, $8,278

Evaluation of MgB_2 Conductor and Coil Stability at 4.2 K, National Institutes for Health, subcontract from General Electric, 2009-2014, $237,042

Fiber Optic Quench Detection Via Optimized Rayleigh Scattering in High-field YBCO Accelerator Magnets, U.S. Department of Energy, STTR program, subcontract from Muons Inc., Phase II: 2012-2014, $370,169

X-ray Diffraction Study of Bi2212 Superconducting Powder, Solid Material Solutions, 2014, $2,212

Direct and Inverse Design Optimization of Magnetic Alloys, Air Force Office of Scientific Research, subcontract from Florida International University, w/C.C. Koch, 2012-2015, $255,349

Scalable Production of High-Quality Bi2212 Nanopowders, U.S. Department of Energy, SBIR program (Fast Track), subcontract from nGimat, 2013-2015, $28,318 in Phase I, $250,000 in Phase II

Development of $20/(kA-m) Low AC Loss High Temperature Superconducting Composite Conductors, ARPA-E, subcontract from Grid Logic, 2013-2015, $328,075

Stability, Quench Propagation and Conductor Degradation of $Bi_2Sr_2CaCu_2O_x$ Round Wires for High Field Magnet Applications, Fermi National Accelerator Laboratory, 2014-15, $112,048

Collaborative study of Bi2212 wires, Fermi National Accelerator Laboratory, 2014-2015, $8,290

Production of Nanostructured Core/Shell Powders for Exchange- Spring Magnet Applications, ARPA-E, subcontract from Grid Logic, 2015-2016, $35,000

YBCO Coated Conductor with an Integrated Optical Fiber Sensors, U.S. Department of Energy, Phase I STTR program, subcontract from American Superconductor Corporation, 2015-2016, $64,089

Electrical Energy Storage System by SMES Method for Ultra-High Power and Energy Density, Air Force Office of Scientific Research, STTR program, subcontract from Tai Yang Research Company (renamed Energy2Power, Inc.), Phase II: 2013-2016, $265,000

Optical Fiber Quench Detection Studies for US4 Superconducting Magnets, U.S. Navy, collaborative with American Superconductor Corporation, 2015-2016, $141,050

Tape-cast NiFe ferrites for miniaturized phased array antennas, National Reconnaissance Office, subcontract from Northrop-Grumman Corporation Aerospace Systems, 2016, $75,000

Novel, Low Cost, High Field Conductor for Superconducting Magnetic Energy Storage, ARPA-E, subcontract from Tai Yang Research Company (renamed Energy2Power, Inc.), 2013-2017, $567,600

Superconducting Joints Between $(RE)Ba_2Cu_3O_{7-x}$ Coated Conductors via Electric Field Assisted Processing, U.S. Department of Energy, Office of Science, Office of High Energy Physics, 2014-2017, $300,000

Optical fiber integration into $Bi_2Sr_2CaCu_2O_x$/Ag/AgX and $(RE)Ba_2Cu_3O_x$ superconducting coils, U.S. Department of Energy, Office of High Energy Physics, Phase I STTR subcontract from Lupine Materials and Technology, 2016-2017, $75,000

Field Assisted Sintering and Bonding of Heterogeneous Oxide Interfaces for Thermal Barrier Coatings, Lucideon, 2017-2018, $109,349

Real-Time Distributed Quench Detection in High Temperature Superconductor Magnets, Department of Energy, Office of Fusion Energy, Phase I STTR subcontract from Luna Innovations, 2018-2019, $60,000

Controlling microstructures and interfaces in co-fired dissimilar oxide thin films via electric field processing, National Science Foundation, 2016-2019, $346,153

Smart CORC Magnet Cables Containing Optical Fibers for Quench Detection, Department of Energy, Office of Fusion Energy, Phase I SBIR/STTR subcontract from Advanced Conductor Technologies, 2018-2019, $45,000

Optical Fiber Optic Quench Detection Via Rayleigh-Interrogated Optical Fibers in AC Magnets, U.S. NSWC, 2018-2019, $50,000

Rayleigh Interrogated Optical Fiber (RIOF) Quench Monitoring and Control System for DC and AC Operated High Temperature Superconducting Magnets, Department of Defense (Navy), Phase I STTR Lupine Materials & Technology/Penn State University, 2019-2020, $240,000

Optical fiber integration into $Bi_2Sr_2CaCu_2O_x$/Ag/AgX and $(RE)Ba_2Cu_3O_x$ superconducting coils, U.S. Department of Energy, Office of High Energy Physics, Phase II STTR Lupine Materials and Technology and NCSU, 2017-2019, $1,000,000

Serial Cryogenic Pressure and Temperature Sensors, Department of Energy, Phase I SBIR subcontract from Luna Innovations, 2019-2020, $35,000

Irradiation Sensitivity of RIOF for Real-Time Magnet Monitoring, Department of Energy, Phase I SBIR, Lupine Materials & Technology, 2020-2021, $199,900

Other Funding

Workshop on Ethnic Diversity in Materials Science and Engineering, U.S. Department of Energy, 2012-2013, $50,600

Workshop on Ethnic Diversity in Materials Science and Engineering, National Science Foundation, 2012-2013, $49,999

Support for Schwartz research, Sonic Blue, $40,000 (gift funds)

Support for Schwartz research, Northrop-Grumman, $90,000 (gift funds)

Support for Schwartz research, Eagle Power Technologies, $15,000 (gift funds)

Research Funding (current)

Pennsylvania State University

Real-Time Distributed Quench Detection in High Temperature Superconductor Magnets, Department of Energy, Office of Fusion Energy, Phase II STTR subcontract from Luna Innovations, 2019-2021, $300,000

*Serial Cryogenic Pressure and Temperature Sensors***,** Department of Energy, Phase II SBIR subcontract from Luna Innovations, 2020-2022, $230,000

Irradiation Sensitivity of RIOF for Real-Time Magnet Monitoring, Department of Energy, Phase II SBIR, Lupine Materials & Technology, 2021-2023, $1,098,186