James Avery Sauls

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Education:

Colorado School of Mines, Golden, Colorado Physics, B.S. 1975
State University of New York, Stony Brook, New York Physics, Ph.D. 1980
Princeton University, Princeton, New Jersey Physics, Post Doc 1980-82

Appointments:

Professor of Physics, Northwestern University, 1991 — present
Co-Director, Center for Applied Physics and Superconductivity - 2017– present
Co-Director, Graduate Program in Applied Physics - 2015– present
Executive Committee of DCMP of the American Physical Society - 2011-2014
Distinguished Lecturer, University of St. Andrews & University of Edinburgh - 2014
Erasmus Mundus Lecturer on Nanoscience, Chalmers University (Sweden) - 2009
Visiting Professor, Joseph Fourier University (Grenoble), 2003
Visiting Director of Research, CNRS (Grenoble), 2003
Group Leader - Theory, NSF-STC for Superconductivity, 1991-2001
Visiting Professor, NORDITA & University of Copenhagen, 1992 - 1993
Associate Professor of Physics, Northwestern University, 1987 - 1991
Assistant Professor of Physics, Princeton University, 1983 - 1987
Visiting Fellow, NORDITA/Helsinki University of Technology, 1983 – 1984
Instructor of Physics, Princeton University, 1982 - 1983
Post-doctoral Fellow, Princeton University, 1980 - 1982
Visiting Scientist, Nordic Institute for Theoretical Physics (NORDITA, Copenhagen), 1980

Professional Societies and Awards:

Fritz London Memorial Prize in Low Temperature Physics, 2017
John Bardeen Prize for Theoretical Research on Superconductivity, 2012
Max-Planck Research Prize in Theoretical Physics, 1994
Fellow of the American Physical Society, 1998
Member of the Alexander von Humboldt Society
Member of the Aspen Center for Physics

Research Interests:

Theory of Topological Phases of Condensed Matter, Topological Superfluids & Superductors,
Nonequilibrium Superconductivity, Quantum Processes in Mesoscopic Systems,
Theory of Dense Matter & Neutron Stars

Undergraduate, Graduate & Post-Doctoral Training & Mentoring:

Supervised 12 Undergraduate research projects or Theses
Supervised 12 PhDs in Theoretical Condensed Matter Physics
Supervised 15 Post-Doctoral Fellows in Theoretical Condensed Matter Physics
Graduate Lectures on *Quantum Mechanics, Statistical Mechanics, Field Theory*
Director of Graduate Studies, Department of Physics and Astronomy, 2009-2012

Selected Recent Publications:

1. *Andreev Bound States and Their Signatures*, [Phil. Trans. Roy. Soc. A 376, 20180140 (2018)], J. A. Sauls
2. *Spontaneous Helical Order of ^{3}He Confined in Nano-Scale Channels*, [arXiv:1802.08719], J. J. Wiman & J. A. Sauls
3. *Bosonic Surface States & Acoustic Spectroscopy of Confined ^{3}He-B*, [arXiv:1801.02277] T. Mizushima & J. A. Sauls
4. *On Nambu's Fermion-Boson Relations for Superfluid ^{3}He*, [Phys. Rev. B 95, 094515 (2017)] J. A. Sauls & T. Mizushima
5. *Half-Quantum Vortices in Superfluid Helium* Physics, 9, 148, (2016), J. A. Sauls
6. *Electron Bubbles & Weyl Fermions in Superfluid ^{3}He-A* Phys. Rev. B 94, 064511 (2016), Oleksii Shevtsov & J. A. Sauls

Research Program - Current

My research project NSF-DMR-1508730, "Nonequilibrium Sates of Topological Quantum Fluids and Unconventional Superconductors", outlines theoretical research into newly discovered and newly predicted quantum phases of matter, particularly topological superfluids, and unconventional superconductors. This research program is focused on investigations of topological condensed matter *out of equilibrium*, with the goal of predicting and interpreting experimental observations on, and signatures of, topological quantum phases of matter under non-equilibrium conditions. Funding for high-risk research on problems at the forefront of quantum theory of matter and fields provided by the Office of Research Innovation grant supported projects in quantum field theory and topological quantum computation. The project NSF-PHY-1734332 was funded to support a joint theoretical/experimental program to develop a fundamental understanding of the origin of, and systematic properties, of the radio frequency surface resistance of N-doped Nb supercoducting cavities. This project proposal is part of the program of the newly established Center for Applied Physics and Superconducting Technology (CAPST).

External Research Collaborations - Current

I have collaborations with theoretical and experimental groups in the US, UK, Japan and Finland.

- **Royal Holloway University of London: Disovery and Identification of Majorana Excitations in Topological Superfluids** - Collaboration with Professors John Saunders and Matthias Eschrig of Royal Holloway University of London to discover and investigate Majorana modes confined to the 2D surface of superfluid ^{3}He-B, and to detect and analyze NMR of new phases of superfluid ^{3}He in 2D predicted by my research group. Support for this collaboration is provided in part by my NSF grant and a newly funded Engineering and Physical Sciences Research Council (EPSRC) grant to RHUL on which I am an external co-investigator.

- **Osaka University: Quantum Transport of Weyl and Majorana Excitations in Topological Superfluids** - Collaboration with Professor Takeshi Mizushima's theory group at Osaka University. The goal of this research collaboration is to develop the theory for the non-equilibrium response of Majorana quasiparticles, their coupling to the Bosonic spectrum, and their signatures in ultra-sound spectroscopy for the topological phases of ^{3}He under confinement.

- **Fermi National Accelerator Laboratory: Theory of Electromagnetic Response of Superconducting Niobium** - Collaboration with the SRF group led by Drs. Anna Grasselino and Alex Romanenko at FNAL's Accelerator Division. My group is developing theoretical and computational methods to predict and analyze the nonlinear a.c. current response of superconducting Niobium RF cavities. This is fundamental research aimed at improving the performance of superconducting RF cavities for particle acceleration.

Invited Talks at International Conferences and Institutions for 2010 - Date:

- Colloquium: *The Left Hand of the Electron*, Department of Physics, Royal Holloway University of London, Egham, UK, January 17, 2018
- Linnaeus Colloquium: *Signatures of Broken Time-reversal and Mirror Symmetries in Unconventional Superconductors*, Department of Microtechnology and Nanoscience, Chalmers University, Gothenburg, Sweden, January 18, 2018
- Plenary Talk: *Signatures of Broken Time-reversal and Mirror Symmetries in Unconventional Superconductors*, Frontiers of Condensed Matter Physics 2018, Bristol, UK, January 11-12 2018
- Invited Talk: *Nonequilibrium Superconductvity in Inhomogeneous Materials*, TTC Workshop on RF Superconductivity: Pushing Cavity Performance Limits, Fermi National Accelerator Laboratory, November 15, 2017
- Plenary Talk: *Superfluid Phases of Liquid ^{3}He in Random Media & Confined Space*, 2017 Fritz London Memorial Prize in Low Temperature Physics, Lecture at London Prize Session of 28th International Conference on Low Temperature Physics, Gothenburg, Sweden, August 15, 2017.
- Invited Talk: *Signatures of Weyl-Majorana Fermions in Superfluid ^{3}He*, 28th International Conference on Low Temperature Physics, Gothenburg, Sweden, August 11, 2017.
- Keynote Talk: *Spontaneous Symmetry Breaking & Topology of the Superfluid Phases of ^{3}He* International Conference on Ultra-Low Temperature Physics, Heidleberg, Germany, August 18, 2017
- Invited Talk: *The Left Hand of the Electron in a Chiral Superfluid Vacuum*, Fifth Conference on *Nuclei and Mesoscopic Physics*, National Superconducting Cyclotron Laboratory, Michigan State University, March 6, 2017.

- Condensed Matter Seminar: *The Left Hand of the Electron in Superfluid ^{3}He*, Department of Physics, University of Illinois, Urbana-Champaign, February 24, 2017.
- Chair, Invited Symposium: *Novel Transport Properties of Electrons and Ions Near the Surface of the Helium Liquids*, March Meeting of the American Physical Society, New Orleans, March 16, 2017
- Chair, Session: *Exotic Condensates and Helium*, March Meeting of the American Physical Society, New Orleans, March 16, 2017
- Organizer: Aspen Center for Physics *Working Group* on *Neutron Star Superfluidity, Cooling and Pulsar Timing Anomalies*, August 27 - September 17, 2017
- Invited Talk, *Keio Topological Science Project*, TMS Intensive-Interactive Meeting, Keio University
  Spontaneous Symmetry Breaking & Topological Order in Superfluid Helium, Nov. 17-18, 2016.
- Invited Talk, Anomalous Hall Effect in Chiral Superfluids, Nagoya University, November 16, 2016.
- Invited Talk, Anomalous Hall Effect in Chiral Superfluids, Osaka University, November 7, 2016.
- Invited Talk, Anomalous Hall Effect in Chiral Superfluids, Kyoto University, November 4, 2016.
- Invited Talk: Anomalous Hall Effect of Electrons in Superfluid ^{3}He-A
  Pairing Phenomena from Neutron Stars to Cold Atoms Physics at the Falls,
  SUNY Buffalo, New York, March 23-25, 2016.
- Distinguished Lecturer: *From Spontaneous Symmetry Breaking to Topological Order*
  Institute for Materials Science, Los Alamos National Laboratory, November 24, 2015.
- Invited Plenary Lecture: *From Spontaneous Symmetry Breaking to Topological Order*
  International Conference on Quantum Fluids & Solids, Niagara Falls, New York, August 9-16 2015.
- Invited Speaker: *Broken Symmetry & Topological Order* "Grand Challenges for Theory impacting Experiment", National Science Foundation Workshop: "Grand Challenges in Quantum Fluids & Solid", Buffalo, NY, August 6-9, 2015.
- Invited Talk: *Signatures of Majorana and Weyl Fermions in confined phases of superfluid ^{3}He*
  Symposium on Novel Phenomena in Helium in Reduced Dimensions and Confinement,
  American Physical Society Meeting, San Antonio, Texas, March 6-11 2014.
- Plenary Talk: *Edge Currents in Chiral Superfluids with Strong Anisotropy and Confinement*
  International Conference on Topological Quantum Phenomena 2014 (TQP2014)
  Centennial Hall of Kyoto University, Kyoto, Japan, December 16-20, 2014.
- Invited Talk: *Topological Edge and Surface States of Superfluid ^{3}He and Chiral Superconductors*
  Conference: *Strong Correlations & Unconventional Superconductivity: Towards a Conceptual Framework*
  Kavli Institute for Theoretical Physics, UC Santa Barbara, CA, September 22-26, 2014.
- Invited Talk: *Topological edge and surface states of superfluid ^{3}He*
  The Royal Society meeting on "Emergence of new exotic states at interfaces with superconductors"
  Chicheley Hall, Kavli Royal Society International Centre, Buckinghamshire, UK, March 27-28, 2014.
- Invited Talk: *Topological Edge and Surface States of Superfluid ^{3}He*
  Advanced Nanoscience & Nanotechnolgy Summer School & Symposium on *Topological States of Matter*,
  Chalmers University, Gothenburg, Sweden, June 9-13, 2014.
- Invited Talk: *Topological edge and surface states of superfluid ^{3}He*
  Conference on "Topological Protection & Non-Equilibrium States in Correlated Electron Systems"
  University of St. Andrews, Scotland, March 20, 2014.
- Invited Keynote Talk: *Liquid ^{3}He in Random Media*
  International Symposium on Quantum Fluids and Solids - *QFS 2013*
  Matsue, Japan, August 1-6, 2013
- Invited Talk: *Chiral Superfluid Order in an Anisotropic Glass*
  Statistical Physics of Disordered Systems: *A Celebration in Honor of Dan Stein's 60th Birthday*
  The Courant Institute, New York, NY August 22-23, 2013
- Invited Talk: *Symmetry Breaking Fields & Multi-Component Unconventional Superconductivity*
  John Bardeen Prize Award Session,
  International Conference on Materials and Mechanisms of Superconductivity - *M2S 2012*
  Washington D.C., July 29 – August 3, 2012
- Invited Talk: *Surface States, Edge Currents & the Chiral Ground State of Confined Superfluid ^{3}He-A*
  International Symposium on Quantum Fluids & Solids: *QFS2010*
  Lancaster, UK, August 15-21, 2012
- Invited Talk: *Vortices & Vortex Phases in Chiral P-wave Superconductors*
  International Conference on Materials and Mechanisms of Superconductivity - *M2S 2012*
  Washington D.C., July 29 – August 3, 2012

- Invited Talk: *Surface States & Edge Currents in Superfluid ^{3}He-A*
  International Conference on Topological Quantum Phenomena
  Nagoya, Japan, May 17-20, 2012.
- Invited Talk: *Spectroscopic Signatures of Surface and Edge States of Superfluid ^{3}He in Confined Geometries*
  International Workshop "MicroKelvin 2012"
  Smolenice, Slovakia, March 19 - 23, 2012.
- Invited Talk: *Superfluid ^{3}He in Confined Geometries - Broken Symmetry, Excitations and Possible New Phases*
  Advanced Working Group on P-wave States of Matter
  Royal Holloway University of London, Egham, UK, March 16-17, 2012.
- Invited Talk: *Vortices and Vortex Phases of Chiral, Spin-triplet Superfluids and Superconductors*
  13th International Conference on "Vortex Matter in Superconductors"
  Chicago, Illinois, July 31-August 5, 2011
- Invited Talk: *Excitations and Structure of Topological Defects in Exotic Superfluids*
  International Conference on "Frontiers in Condensed Matter Physics"
  Stockholm, Sweden, January 3-8, 2011
- Invited Talk: *Quantum Processes in Superconducting-Magnetic Josephson Junctions*
  International Symposium on Quantum Fluids & Solids: *QFS2010*
  Grenoble, France, August 2-7, 2010

Teaching and Graduate Education - J. A. Sauls

I have taught physics at all levels at Northwestern University, Princeton University, Helsinki University of Technology and State University of New York at Stony Brook. I have an established record and reputation for commitment to quality education, teaching and graduate training. My approach to teaching and education is to focus on physical phenomena and experimental observation as the basis for formulating scientific questions and developing physical reasoning. My specialty, and a focus of my courses and training, is to combine mathematical analysis and physical reasoning to solve problems and understand natural phenomena. Problem solving is an essential aspect of all my courses. At the undergraduate level I have taught a Freshman course on physical concepts of space and time covering the history of technical innovation in the measurement of time, and the conceptual changes that came about as a result Einstein's theory of relativity. I have served as instructor for introductory physics for science and engineering majors, and have taught advanced undergraduate courses in modern physics and statistical mechanics at Princeton, Stony Brook, Helsinki and Northwestern.

My graduate teaching covers many areas of theoretical physics, including lectures on theoretical mechanics, mathematical physics, quantum mechanics, statistical physics, solid state physics and quantum field theory and special topics in astrophysics. I developed a one-year graduate course in condensed matter physics during the three consecutive years that I taught solid-state and condensed matter physics at Princeton University, and have re-fined these lectures at Northwestern. This course covers basic concepts of solid-state physics (e.g. elementary excitations, transport properties, electrons and phonons, x-ray and neutron scattering), but also incorporates topics on the theory of phase transitions, symmetry, symmetry breaking and topology in condensed matter. Some of this material I have elaborated on in advanced courses. I have also taught advanced graduate courses on quantum field theory and statistical physics for graduate students preparing for research in theoretical condensed matter physics. This course covers topics on the theory of strong interaction effects in metals, magnetism, and disorder in metals and superconductivity. I often teach one of the *core* graduate courses for students entering the Ph.D. program, usually *Quantum Mechanics, Classical Mechanics or Mathematical Methods.* In terms of service to the department's teaching mission this is where I have contributed most since the material in these courses is essential for all students planning to pursue a Ph. D. in physics and astrophysics. In 2017 I developed and taught a new graduate course targeted at 1st year graduate students in Physics, Applied Physics and Materials Science: *Phys 421 - Introduction to Superconductivity*, offered in Fall, 2017. I teach from a traditional lecture format using the blackboard and engage discussion throughout the lecture. Problem solving outside the classroom followed by discussion is an important part of my courses.

I have given *advanced lectures* at international schools and institutions. Highlights include lectures on the *theory of unconventional superconductivity* at the Boulder Summer School of Condensed Matter and Materials Physics

(University of Colorado, 2000), lectures on *non-equilibrium symmetry breaking phase transitions in superfluid ^3He* at the Les Houches Winter School of Theoretical Physics (France, 1999), and lectures on *superconductivity and magnetism down to the nano-scale* for the Erasmus Mundus Lecture Series on nano-science and nano-technology in modern society. These lectures were delivered via live video to University of Delft and University of Leiden in the Netherlands, Dresden University in Germany and University of Leuven in Belgium, live from Chalmers University in Göteborg, Sweden in 2009. Recently I lectured on *Unconventional and Topological Superconductors* at the 2013 Theory Winter School hosted by the National High Field Magnetic Laboratory, on *Unconventional and Topological Superfluids and Superconductors* at the Advanced Nanoscience and Nanotechnolgy Summer School and Symposium on "Topological States of Matter", Chalmers University, Gothenburg, Sweden, June 9-13, 2014. In 2014 I was invited to University of Edinburgh and University of St. Andrews as Distinguished lecturer and visitor of the Scottish Physics Society where I delivered 5 lectures on the theory of Unconventional Superconductivity and Topological Superconductors.

Lecture Courses Taught at Northwestern University

Phys 110 Freshman Seminar:
Physical Concepts of Space and Time
Spring 1993

Phys 135 Introductory Physics for Science Majors:
Waves and Modern Physics
Summer, 1991, 1995, 2000, 2008
Spring 1994

Phys 411 Core Graduate Course:
Mathematical Physics
Fall 1991
Winter 1992

Phys 412 Core Graduate Course:
Quantum Mechanics I
Fall 2001, 2004, 2006, 2009, 2011

Phys 412 Core Graduate Course:
Quantum Mechanics II
Winter 1997, 1998, 2007, 2009, 2010, 2012, 2016

Phys 412 Core Graduate Course:
Quantum Mechanics III
Spring 1991, 1993, 1996, 1997, 1998, 1999, 2000, 2006, 2007, 2009, 2011, 2015, 2016

Phys 416 Advanced Graduate Course:
Statistical Mechanics
Spring, 2000

Phys 421 Physics Graduate Elective:
Introduction to Superconductivity
Fall 2017

Phys 422 Advanced Graduate Course:
Solid State Physics I
Fall 2013

Phys 422 Advanced Graduate Course:
Solid State Physics II
Winter 1988

Phys 422 Advanced Graduate Course:
Solid State Physics III
Spring 1988, 2004

Phys 432 Advanced Graduate Course:
Many-Body Theory I
Spring 1989, 1990, 1991
Winter 1994, 1995, 1996, 2001, 2011
Fall 2007, 2012, 2015

Phys 432 Advanced Graduate Course:
Many-Body Theory II
Spring 1994, 1995, 2011, 2008, 2013, 2015

Phys 434 Advanced Graduate Course:
Quantum Fluids, Solids and Gases
Winter 2004.

Phys 436 Advanced Graduate Course:
Mesoscopic Solid-State Physics
Fall 2005.

Astr 450 Advanced Topics in Astrophysics:
Physics of Neutron Stars
Fall, 1988

Phys 450 Symmetry in Physics I:
Winter, 2017

Phys 450 Symmetry in Physics II:
Spring, 2017

Phys 460 Advanced Topics in Statistical Physics:
The Physics of Superfluid ^3He
Winter, 1990

Phys 460 Advanced Topics in Statistical Physics:
Superfluidity in Bose and Fermi Systems
Winter, 1999

Phys 460 Advanced Topics in Statistical Physics:
Bose-Einstein Condensation in Atomic Gases
Fall, 2004

Lecture Courses Taught at Other Institutions:

Undergraduate Physics Majors:
Modern Physics (laboratory)
Fall & Spring Semester 1976-77
SUNY-Stony Brook

Introductory Physics for science majors:
Waves & Modern Physics (lecture & recitation)
Fall & Spring Semester 1982-83
Princeton University

Advanced Undergraduate Physics:
Nonequilibrium Statistical Mechanics
Spring Semester 1984
Helsinki University of Technology

Advanced Graduate Course:
Condensed Matter Physics
Fall/Spring Semesters: 1984-85, '85-86, '86-87
Princeton University

Recent Course and Teaching Evaluation - J. A. Sauls

Phys 421: Introduction to Superconductivity, Fall 2017. This is a new course approved by WCAS and TGS that I developed, targeted at 1st year graduate students in Physics, Applied Physics and Materials Science. I taught the course for the 1st time in Fall 2017, with support from my colleagues at Northwestern and Fermilab, who provided 4 key specialized lectures on applications of superconductivity.

CTEC review of Phys 421 - Introduction to Superconductivity	
Question	Response
1. Overall rating of the instruction	5.86
2. Overall rating of the course	5.43
3. Estimate how much you learned	5.50
4. Effectiveness in challenging you intellectually	5.43
5. Effectiveness of the instructor in stimulating interest	5.57
7. Preparation of the instructor	5.71
8. Effectivenes of the instructor in communicating ideas	5.71
10. Rate the instructor's enthusiasm in teaching the class	5.71
Average CTEC rating	5.62

Supervision of Students and Post-Doctoral Fellows - J. A. Sauls

Ph.D. students and post-doctoral fellows that I have supervised have gone onto careers in academia as well as government and industrial research laboratories. Many have substantial accomplishments in the field of condensed matter physics, and have gone on to do research in a broad range of fields of physical and biological sciences.

Current Ph.D., MsC. Candidates and Undergraduate Research Students:

- Hao Wu received his Ph.D. on June 16, 2017 with a dissertation titled *Excitations in topological superfluids and superconductors.*
- Joshua Wiman, PhD Candidate. Josh is working on statistical mechanics and phase transitions of quantum liquids under confinement. Expected PhD completion is August 30, 2018. Joshua has accepted a post-doctoral fellowship appointment in theory group of M2C at Chalmers University, Gothenburg, Sweden.
- Robert Regan, PhD Candidate. Robert is working on the theory of quantized vortices and vortex dynamics in unconventional superfluids.
- Wei-Ting Lin, Graduate Student pre-candidacy, Wei-Ting is working fluctuations and transport in disordered superfluid ^{3}He.
- Taeyoon Kim, MSc Candidate, Taeyoon's Masters project is to examine the Bosonic excitations toroidal superconductors with trapped, quantized flux.
- Jason He, Summer Research Intern from USTC, Hefei, China. Jason will enter Northwestern's PhD program in Fall 2018.

Current Post-Doctoral Fellows:

- Dr. Wave Ngampruetikorn, 2016-
  PhD, Cambridge University, Cambridge, UK
- Dr. Oleksii Shevtsov, 2016-
  PhD, Joseph Fourier University, Grenoble, France
- Dr. Mehdi Zarea, 2016-
  PhD, International School of Advanced Studies SISSA/ISAS, Trieste, Italy

Professional Activities

- I served on the Executive Committee of the Divsion of Condensed Matter Physics (DCMP) of the American Physical Society. The DCMP - the largest division of the American Physical Society - represents a broad range of sub-fields of condensed matter physics as well as interdisciplinary fields at the boundary between condensed matter physics, atomic physics, chemistry, biology and environmental sciences. The executive committee has responsibility for organizing the March meeting of the APS, selecting Fellows of the APS from DCMP and to help increase broader public awareness of significant developments in physics, publicize exciting new discoveries, and continue to educate the public on the importance of basic research for our society. I served as chair of the APS Fellows selection committee for DCMP in 2014.
- I have been a member of the Aspen Center for Physics (ACP) for over 20 years. The ACP sponsors workshops in all areas of theoretical physics and is devoted to support of research and the dissemination of physics and related science. I have organized numerous workshops for the summer program of Aspen, have served as scientific secretary and chair of admissions. I have also served as chair of the *Heinz Pagels Memorial Public Lecture Series*, a lecture series that brings distinguished scientists to engage the broader public on ideas and discoveries in physics.

Professional Service from 2010-Date:

- Advisory Board of the International Conference on Quantum Fluids and Solids - QFS 2018, to be held in Tokyo, Japan, July 25 - 31, 2018
- Selection Committee for the 2017 William L. McMillan Prize for outstanding researcher in Condensed Matter Physics awarded by the University of Illinois at Urbana-Champaign.
- External PhD Examiner: *Higgs bosons, half-quantum vortices, and Q-balls: an expedition in the ^{3}He universe* by Samuli Autti, Department of Applied Physics, Aalto University, Finland, May 1, 2017
- Organizer: Aspen Center for Physics *Working Group* on "Neutron Star Superfluidity, Cooling and Pulsar Timing Anomalies", August 27 - September 17, 2017
- Program Committee for "International Conference on Low Temperature Physics", Gothenburg, Sweden, August 9-16, 2017.
- Selection Committee for the Lars Onsager Prize of the American Physical Society, August, 2016
- External Examiner for the PhD Thesis: *Cosmic Condensates - Vortex, Fluxtube and Neutron Star Dynamics*, and PhD Defense of Vanessa Graber, Mathematical Sciences, University of Southampton, UK, August 8, 2016
- Selection Committee for The Lars Onsager Prize recognizing "outstanding research in theoretical statistical physics including the quantum fluids", awarded by the American Physical Society, 2015.
- Selection Committee for The William L. McMillan Award recognizing outstanding contributions by a young condensed matter physicist, awarded by University of Illinois at Urbana-Champaign, 2015.
- Faculty Appointment Committee for Assistant Professor in Theoretical Condensed Matter Physics, Nordic Institute for Theoretical and Atomic Physics (NORDITA), Stockholm, Sweden, February 2015.
- Chair, Selection Committee, Fellows, American Physical Society, Division of Condensed Matter Physics, 2014.
- Associate Editor for the open access NPG online journal *Frontiers in Physics*, 2013 - date
- Program Committee for "International Conference on Quantum Fluids and Solids", Matsue, Japan, August 1-6, 2013.
- Co-Organizer, "Workshop on Multi-Component Many-Body Systems", Summer Program of the Aspen Center for Physics, August 15-September 25 (2013).
- International Advisory Committee for QFS2012, "International Conference on Quantum Fluids and Solids", Lancaster, UK, August 15-21 (2012).
- Reviewer of "Physics and Theoretical Physics" of the Royal Institute of Technology (KTH) in Stockholm, June 11-16, 2012.
- International Advisory Committee for the "International Conference on Topological Quantum Phenomena (TQP2012)", May 17-20, 2012, Nagoya, Japan.
- Reviewer for the Laboratory Directed Research Program on "Nanoscale Superconductivity for Single Photon Detection", Los Alamos National Laboratory, October 2011.

- Elected to the Executive Committee of the Division of Condensed Matter Physics (DCMP) of the American Physical Society, 2011-2014.
- International Advisory Committee for QFS2010, “International Conference on Quantum Fluids and Solids”, held in Grenoble, France, August 1-5 (2010).

Publications - J. A. Sauls

1. *Andreev Bound States and Their Signatures*, Phil. Trans. Roy. Soc. A, 20180140, pp. 1–23, (2018), J. A. Sauls.
2. *Edge States and Broken Symmetry Phases in Laterally Confined ^{3}He Films*, Physical Review B, submitted, pp. 1–16, (2018), H. Wu and J. A. Sauls.
3. *The New Phases of Superfluid ^{3}He Confined in Aerogels*, Physics Today, to be published, pp. 1–7, (2018), W. P. Halperin, J. Parpia, and J. A. Sauls.
4. *Spontaneous Helical Order of Superfluid ^{3}He Confined in Nano-Scale Channels*, Physical Review Letters, submitted, pp. 1–5, (2018), J. J. Wiman and J. A. Sauls.
5. *Bosonic Surface States and Acoustic Spectroscopy of Confined Superfluid ^{3}He-B*, Physical Review Letters, submitted, pp. 1–5, (2018), T. Mizushima and J. A. Sauls.
6. *On Nambu's Fermion-Boson Relations for Superfluid ^{3}He*, Physical Review B, 95, 094515, (2017), J. A. Sauls and T. Mizushima.
7. *Half-Quantum Vortices in Superfluid Helium*, Physics, 9, 148, (2016), J. A. Sauls.
8. *Electron Bubbles in Superfluid ^{3}He-A - Exploring the Quasiparticle-Ion Interaction*, Journal Low Temperature Physics, 187, pp. 340–353, (2016), O. Shevtsov and J. A. Sauls.
9. *Electron Bubbles and Weyl Fermions in Chiral Superfluid ^{3}He-A*, Physical Review B, 94, 064511, (2016), O. Shevtsov and J. A. Sauls.
10. *Strong-Coupling and the Stripe Phase of Superfluid ^{3}He*, Journal Low Temperature Physics, 184, pp. 1054–1070, (2016), J. J. Wiman and J. A. Sauls.
11. *Superfluid phases of ^{3}He in nanoscale channels*, Physical Review B, 92, 144515, (2015), J. J. Wiman and J. A. Sauls.
12. *Anisotropy and Strong-Coupling Effects on the Collective Mode Spectrum of Chiral Superconductors: Application to Sr_2RuO_4*, Frontiers in Physics, 3, 36, (2015), J. A. Sauls, H. Wu, and S. B. Chung.
13. *Majorana excitations, spin and mass currents on the surface of topological superfluid ^{3}He-B*, Physical Review B, 88, 184506, (2013), H. Wu and J. A. Sauls.
14. *Superfluid phases of ^{3}He in a periodic confined geometry*, Journal Low Temperature Physics, 175, pp. 17–30, (2014), J. J. Wiman and J. A. Sauls.
15. *Chiral phases of superfluid ^{3}He in an anisotropic medium*, Physical Review B, 88, 214503, (2013), J. A. Sauls.
16. *New Chiral Phases of Superfluid ^{3}He Stabilized by Anisotropic Silica Aerogel*, Nature Physics, 8, pp. 317–320, (2012), J. Pollanen, J. I. A. Li, C. A. Collett, W. J. Gannon, W. P. Halperin, and J. A. Sauls.
17. *Surface states, Edge Currents, and the Angular Momentum of Chiral P-wave Superfluids*, Physical Review B, 84, 214509, (2011), J. A. Sauls.
18. *Vortex States of Chiral P-Wave Superconductors*, J. Phys. (IOP), 400, 022031, (2012), M. Ichioka, K. Machida, and J. A. Sauls.
19. *Thermodynamic Potential for Superfluid ^{3}He in Silica Aerogel*, Journal Low Temperature Physics, 162, pp. 233–242, (2011), S. Ali, L. Zhang, and J. A. Sauls.
20. *Theory of Heat Transport of Normal Liquid ^{3}He in Aerogel*, New Journal of Physics, 12, 083056, (2010), J. A. Sauls and P. Sharma.
21. *Charge Dynamics of Vortex Cores in Layered Chiral Triplet Superconductors*, New Journal of Physics, 11, 075009, (2009), M. Eschrig and J. A. Sauls.
22. *Vortices in Chiral, Spin-Triplet Superconductors and Superfluids*, New Journal of Physics, 11, 075008, (2009), J. A. Sauls and M. Eschrig.
23. *Proceedings of the 2009 International Conference on Quantum Fluids and Solids*, Journal Low Temperature Physics, 158, pp. 1–2, (2010), F. Rasmussen, J. A. Sauls, H. Kojima, and W. P. Halperin.
24. *Theory of Nonequilibrium Spin Transport and Spin Transfer Torque in Superconducting-Ferromagnetic Nanostructures*, Physical Review B, 78, 174511, (2008), E. Zhao and J. A. Sauls.
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