

## James Avery Sauls

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Northwestern University  
Department of Physics & Astronomy  
2145 Sheridan Road  
Evanston, Illinois 60208, USA

phone: +1 847 491-8624  
webpage: eolus.phys.northwestern.edu  
email: sauls@northwestern.edu

### 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  
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:

Quantum Processes in Mesoscopic Systems, Nonequilibrium Statistical Mechanics,  
Topological Phases of Condensed Matter, Superconductivity & Correlated Fermions

### Undergraduate, Graduate & Post-Doctoral Training & Mentoring:

Supervised 11 Undergraduate research projects or Theses  
Supervised 12 PhDs in Theoretical Condensed Matter Physics  
Supervised 12 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. *On the Nambu's Fermion-Boson Relations for Superfluid  $^3\text{He}$* , Phys. Rev. B (2017) [arXiv:1611.07273]  
J. A. Sauls & Takeshi Mizushima
2. *Half-Quantum Vortices in Superfluid Helium* Physics, 9, 148, (2016), J. A. Sauls
3. *Electron Bubbles & Weyl Fermions in Superfluid  $^3\text{He-A}$*  Phys. Rev. B 94, 064511 (2016), Oleksii Shevtsov and J. A. Sauls
4. *Chiral Phases of Superfluid  $^3\text{He}$  in an Anisotropic Medium*, Phys. Rev. B, 88, 214503 (2013), J. A. Sauls
5. *Surface states, Edge Currents, and the Angular Momentum of Chiral p-wave Superfluids*,  
Phys. Rev. B 84, 214509, (2011), J. A. Sauls.

## Research Program - Current

My research program is funded by project proposal NSF-DMR-1508730, “Nonequilibrium States of Topological Quantum Fluids and Unconventional Superconductors”, which outlines theoretical research into newly discovered and newly predicted quantum phases of matter, particularly topological superfluids, and unconventional superconductors, including heavy electron materials exhibiting coexistent ferromagnetism and superconductivity. 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. Non-equilibrium transport equations, quantum statistical field theory and computational methods will be developed for *inhomogeneous* quantum states confined on edges, surfaces and domain walls of topological superfluids and superconductors. 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 supports projects in quantum field theory and topological quantum computation. Pending proposal NSF-PHY-1734332 will support fundamental studies to determine the origin of, and systematic properties, of the radio frequency surface resistance of N-doped Nb superconducting cavities. This is the first proposal submitted to support research in the new Center for Applied Physics and Superconducting Technology (CAPST). More detail can be found at this link [[CMT research](#)].

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

- ▶ 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  $^3\text{He-A}$  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  $^3\text{He}$*  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  $^3\text{He}$  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  $^3\text{He}$*  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  $^3\text{He}$*  Advanced Nanoscience & Nanotechnology 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  $^3\text{He}$*  Conference on “Topological Protection & Non-Equilibrium States in Correlated Electron Systems” University of St. Andrews, Scotland, March 20, 2014.
- ▶ Invited Keynote Talk: *Liquid  $^3\text{He}$  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  $^3\text{He-A}$*   
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  $^3\text{He-A}$*   
International Conference on Topological Quantum Phenomena  
Nagoya, Japan, May 17-20, 2012.
- ▶ Invited Talk: *Spectroscopic Signatures of Surface and Edge States of Superfluid  $^3\text{He}$  in Confined Geometries*  
International Workshop “MicroKelvin 2012”  
Smolenice, Slovakia, March 19 - 23, 2012.
- ▶ Invited Talk: *Superfluid  $^3\text{He}$  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*  
*13<sup>th</sup> 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

## Research Teaching & Supervision of Students

- *Current Ph.D. Candidates*: I supervise four Ph.D. students in theoretical condensed matter physics.
- *Current M.Sc. Candidates*: I supervise one M.Sc. student in theoretical condensed matter physics.
- *Former Ph.D. Students*: Eleven Ph.D. students have completed their thesis under my supervision.
- *Post-Doctoral Fellows*: I have supervised twelve post-doctoral fellows supported by my research grants.

## Professional Activities

- I served on the Executive Committee of the Division 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:

- ▶ Program Committee for “International Conference on Low Temperature Physics”, Gothenburg, Sweden, to be held August, 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 for Fellows of the 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. *On Nambu's Fermion-Boson Relations for Superfluid  $^3\text{He}$* , arXiv:, 1611.07273, pp. 1–20, (2016), J. A. Sauls and T. Mizushima.
2. *Half-Quantum Vortices in Superfluid Helium*, Physics, 9, 148, (2016), J. A. Sauls.
3. *Electron Bubbles in Superfluid  $^3\text{He-A}$  - Exploring the Quasiparticle-Ion Interaction*, Journal Low Temperature Physics, Online First, pp. 1–14, (2016), O. Shevtsov and J. A. Sauls.
4. *Electron Bubbles and Weyl Fermions in Chiral Superfluid  $^3\text{He-A}$* , Physical Review B, 94, 064511, (2016), O. Shevtsov and J. A. Sauls.
5. *Strong-Coupling and the Stripe Phase of Superfluid  $^3\text{He}$* , Journal Low Temperature Physics, 184, pp. 1054–1070, (2016), J. J. Wiman and J. A. Sauls.
6. *Superfluid phases of  $^3\text{He}$  in nanoscale channels*, Physical Review B, 92, 144515, (2015), J. J. Wiman and J. A. Sauls.
7. *Anisotropy and Strong-Coupling Effects on the Collective Mode Spectrum of Chiral Superconductors: Application to  $\text{Sr}_2\text{RuO}_4$* , Frontiers in Physics, 3, 36, (2015), J. A. Sauls, H. Wu, and S. B. Chung.
8. *Majorana excitations, spin and mass currents on the surface of topological superfluid  $^3\text{He-B}$* , Physical Review B, 88, 184506, (2013), H. Wu and J. A. Sauls.
9. *Superfluid phases of  $^3\text{He}$  in a periodic confined geometry*, Journal Low Temperature Physics, 175, pp. 17–30, (2014), J. J. Wiman and J. A. Sauls.
10. *Chiral phases of superfluid  $^3\text{He}$  in an anisotropic medium*, Physical Review B, 88, 214503, (2013), J. A. Sauls.
11. *New Chiral Phases of Superfluid  $^3\text{He}$  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.
12. *Surface states, Edge Currents, and the Angular Momentum of Chiral P-wave Superfluids*, Physical Review B, 84, 214509, (2011), J. A. Sauls.
13. *Vortex States of Chiral P-Wave Superconductors*, J. Phys. (IOP), 400, 022031, (2012), M. Ichioka, K. Machida, and J. A. Sauls.
14. *Thermodynamic Potential for Superfluid  $^3\text{He}$  in Silica Aerogel*, Journal Low Temperature Physics, 162, pp. 233–242, (2011), S. Ali, L. Zhang, and J. A. Sauls.
15. *Theory of Heat Transport of Normal Liquid  $^3\text{He}$  in Aerogel*, New Journal of Physics, 12, 083056, (2010), J. A. Sauls and P. Sharma.
16. *Charge Dynamics of Vortex Cores in Layered Chiral Triplet Superconductors*, New Journal of Physics, 11, 075009, (2009), M. Eschrig and J. A. Sauls.
17. *Vortices in Chiral, Spin-Triplet Superconductors and Superfluids*, New Journal of Physics, 11, 075008, (2009), J. A. Sauls and M. Eschrig.
18. *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.
19. *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.
20. *Anomalous Attenuation of Transverse Sound in  $^3\text{He}$* , Physical Review Letters, 101, 085301, (2008), J. P. Davis, J. Pollanen, H. Choi, J. A. Sauls, W. P. Halperin, and A. B. Vorontsov.
21. *Discovery of an Excited Pair State in Superfluid  $^3\text{He-B}$* , Nature Physics, 4, pp. 571–575, (2008), J. Davis, J. Pollanen, H. Choi, J. Sauls, and W. Halperin.
22. *Dynamics of Spin Transport in Voltage-biased Josephson Junctions*, Physical Review Letters, 98, 206601, (2007), E. Zhao and J. A. Sauls.
23. *Crystalline Order in Superfluid  $^3\text{He}$  Films*, Physical Review Letters, 98, 045301, (2007), A. B. Vorontsov and J. A. Sauls.
24. *Nonequilibrium Spin-transfer Torque in SFNFS Junctions*, AIP Conference Proceedings, 850, pp. 893–894, (2006), E. Zhao and J. A. Sauls.

25. *Phase diagram and spectroscopy of Fulde-Ferrell-Larkin-Ovchinnikov states of two-dimensional d-wave superconductors*, Physical Review B, 72, 184501, (2005), A. B. Vorontsov, J. A. Sauls, and M. J. Graf.
26. *Helium-Three in Aerogel*, arXiv: 0408593, pp. pp. 1–10, (2004), W. P. Halperin and J. A. Sauls.
27. *Specific Heat of Disordered Superfluid  $^3\text{He}$* , Physical Review Letters, 93, 145301, (2004), H. Choi, K. Yawata, T. M. Haard, J. P. Davis, G. Gervais, N. Mulders, P. Sharma, J. A. Sauls, and W. P. Halperin.
28. *Magnetization and spin diffusion of liquid  $^3\text{He}$  in aerogel*, Physical Review B, 72, 024507, (2005), J. A. Sauls, Y. M. Bunkov, E. Collin, H. Godfrin, and P. Sharma.
29. *Domain walls in superfluid  $^3\text{He-B}$* , Journal Low Temperature Physics, 138, 283, (2005), A. B. Vorontsov and J. A. Sauls.
30. *Nonequilibrium Superconductivity Near Spin-Active Interfaces*, Physical Review B, 70, 134510, (2004), E. Zhao, T. Löfwander, and J. A. Sauls.
31. *Spectrum of third sound cavity modes on superfluid  $^3\text{He}$  films*, Journal Low Temperature Physics, 134, pp. 1001–1008, (2004), A. Vorontsov and J. A. Sauls.
32. *Heat transport through Josephson point contacts*, Physical Review B, 69, 134503, (2004), E. Zhao, T. Löfwander, and J. A. Sauls.
33. *Thermodynamic Properties of Thin Films of Superfluid  $^3\text{He-A}$* , Physical Review B, 68, 064508, (2003), A. Vorontsov and J. A. Sauls.
34. *Shot Noise in Normal Metal/d-wave superconductor junctions*, Physical Review B, 68, 064508, (2003), T. Löfwander, M. Fogelström, and J. A. Sauls.
35. *Phase Modulated Thermal Conductance of Josephson Weak Links*, Physical Review Letters, 91, 077003, (2003), J. A. S. Erhai Zhao, Tomas Löfwander.
36. *Nonlinear magnetic field dependence of the conductance in d-wave NIS tunnel junctions*, Physical Review B, 70, 012503, (2004), M. Fogelström, D. Rainer, and J. A. Sauls.
37. *Impurity Effects on the  $A_1$ - $A_2$  Splitting of Superfluid  $^3\text{He}$  in Aerogel*, Physical Review B, 68, 224502, (2003), J. A. Sauls and P. Sharma.
38. *Comment on Magnetic field effects on neutron diffraction in the antiferromagnetic phase  $U\text{Pt}_3$* , Physical Review B, 66, 216402, (2002), J. Moreno and J. A. Sauls.
39. *Thermal Conductivity of Superfluid  $^3\text{He}$  in Aerogel*, Physica B, 329-333, pp. 313–315, (2003), P. Sharma and J. A. Sauls.
40. *Magnetic Susceptibility of the Balian-Werthamer Phase of  $^3\text{He}$  in Aerogel*, Journal Low Temperature Physics, 125, pp. 115–142, (2001), P. Sharma and J. A. Sauls.
41. *Vortex Structure and Dynamics in Layered Superconductors*, in ‘Vortices in Unconventional Superconductors and Superfluids’ (R. Huebener, N. Schopohl, and G. Volovik, eds.), vol. 132 of *Springer Series in Solid State Science*, pp. 175–203, Springer-Verlag, Dresden, 2001, M. Eschrig, D. Rainer, and J. A. Sauls.
42. *Magnetic Field Effects on Neutron Diffraction in the antiferromagnetic phase of  $U\text{Pt}_3$* , Physical Review B, 63, 024419, (2001), J. Moreno and J. A. Sauls.
43. *Fermi Liquid Superconductivity: Concepts, Equations, Applications*, in ‘High-Tc Superconductors and Related Materials: Materials Science, Fundamental Properties, and Some Future Electronic Applications - Lecture Notes for the 1998 NATO ASI on Superconductivity, Albena, Bulgaria’ (S. L. Dreschsler and T. Mishonov, eds.), vol. 86, 33 pages, Elsevier Science Publishers, Amsterdam, 2001, M. Eschrig, J. A. Sauls, H. Burkhardt, and D. Rainer.
44. *Broken Symmetry and Non-Equilibrium Superfluid  $^3\text{He}$* , in ‘Topological Defects and Non-Equilibrium Symmetry Breaking Phase Transitions - Lecture Notes for the 1999 Les Houches Winter School’ (H. Godfrin and Y. Bunkov, eds.), pp. 239–265, Elsevier Science Publishers, Amsterdam, 2000, J. A. Sauls.
45. *Discovery of the Acoustic Faraday Effect in Superfluid  $^3\text{He-B}$* , Nature, 400, pp. 431–433, (1999), Y. Lee, T. Haard, W. P. Halperin, and J. Sauls.
46. *Identification of the orbital pairing symmetry in  $U\text{Pt}_3$* , Physical Review B, 62, pp. 14393–14402, (2000), M. J. Graf, S.-K. Yip, and J. A. Sauls.
47. *Magneto-acoustic Rotation of Transverse Waves in  $^3\text{He-B}$* , Physica B, 284, pp. 267–268, (2000), J. A. Sauls, Y. Lee, T. M. Haard, and W. P. Halperin.

48. *Acoustic Faraday Effect in Superfluid  $^3\text{He-B}$* , Physica B, 280, pp. 106–107, (1999), Y. Lee, T. M. Haard, J. A. Sauls, and W. P. Halperin.
49. *Transport Properties of Normal Liquid  $^3\text{He}$  in Aerogel*, Physica B, 284-288, 297, (2000), P. Venkataramani and J. A. Sauls.
50. *Observation of Paramagnetic Meissner Currents - Evidence for Surface Andreev Bound States*, Physica C, 317, pp. 396–402, (1999), W. Prusseit, H. Walter, R. Semerad, H. Kinder, W. Assmann, H. Huber, B. Kabius, H. Burkhardt, D. Rainer, and J. A. Sauls.
51. *Spin-Orbit Scattering in  $d_{x^2-y^2}$  Superconductors*, Int. Journ. Mod. Phys. B, 13, pp. 3513–3516, (1999), M. Graf, A. Balatsky, and J. Sauls.
52. *Transport in the Heavy Fermion Superconductor  $\text{UPt}_3$* , Physica B, 280, pp. 176–177, (1999), M. Graf, S. K. Yip, and J. Sauls.
53. *Tunneling into disordered  $d$ -wave superconductors*, Physica B, 284-288, pp. 589–590, (2000), A. Poenicke, M. Fogelström, and J. A. Sauls.
54. *Local Time-Reversal Symmetry Breaking in  $d_{x^2-y^2}$  Superconductors*, Physical Review B, 61, pp. 3255–3258, (2000), M. Graf, A. Balatsky, and J. Sauls.
55. *Superconducting Fluctuations Effects on the Electron Spin Susceptibility in  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$* , Physical Review B, 60, pp. 7591–7594, (1999), H. N. Bachman, V. Mitrović, A. P. Reyes, W. P. Halperin, M. Eschrig, J. A. Sauls, A. Kleinhammes, P. Kuhns, and W. G. Moulton.
56. *Superconducting Fluctuations Effects on the Spin-Lattice Relaxation Rate in  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$* , Physical Review Letters, 82, pp. 2784–2788, (1999), V. Mitrović, H. N. Bachman, W. P. Halperin, M. Eschrig, J. A. Sauls, A. P. Reyes, P. Kuhns, and W. G. Moulton.
57. *Effects of Strong Magnetic Fields on the Pairing Fluctuations in High Temperature Superconductors*, Physical Review B, 59, pp. 12095–12113, (1999), M. Eschrig, D. Rainer, and J. A. Sauls.
58. *Impurity States in  $D$ -Wave Superconductors*, in ‘Quasiclassical Methods in the Theory of Superconductivity and Superfluidity’ (D. Rainer and J. A. Sauls, eds.), pp. 354, Bayreuth, Bayreuth, Germany, 1998, D.-C. Chen, D. Rainer, and J. A. Sauls.
59. *Thermal Conductivity of the Accidental Degeneracy and Enlarged Symmetry Group Models for Superconducting  $\text{UPt}_3$* , Journal Low Temperature Physics, 114, pp. 257–276, (1999), M. J. Graf, S. K. Yip, and J. A. Sauls.
60. *Electromagnetic Response of a Vortex in Layered Superconductors*, Physical Review B, 60, pp. 10447–10454, (1999), M. Eschrig, J. A. Sauls, and D. Rainer.
61. *Suppression of Superconductivity in  $\text{UPt}_3$  Single Crystals*, Physical Review B, 58, R603, (1998), J. Kycia, J. Hong, M. Graf, J. Sauls, D. Seidman, and W. Halperin.
62. *Low-Temperature Anomaly in the Penetration Depth of  $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$  Films: Evidence for Andreev Bound States at Surfaces*, Physical Review Letters, 80, 3598, (1998), H. Walter, W. Prusseit, R. Semerad, H. Kinder, W. Assmann, H. Huber, H. Burkhardt, D. Rainer, and J. A. Sauls.
63. *Sound Propagation and Transport Properties of Liquid  $^3\text{He}$  in Aerogel*, Journal Low Temperature Physics, 110, 525, (1998), D. Rainer and J. A. Sauls.
64. *Andreev Bound States, Surfaces and Subdominant Pairing in High  $T_C$  Superconductors*, J. Phys. Chem. Sol., 59, pp. 2040–2044, (1998), D. Rainer, H. Burkhardt, M. Fogelström, and J. A. Sauls.
65. *Tunneling into Current-Carrying Surface States of High Temperature Superconductors*, Physical Review Letters, 79, pp. 281–284, (1997), M. Fogelström, D. Rainer, and J. A. Sauls.
66. *Unconventional Pairing in Heavy Fermion Metals*, Czech. J. Phys., 47, 1065, (1996), J. A. Sauls and D. Rainer.
67. *Localized vs. Delocalized Scattering in Superfluid  $^3\text{He}$ -aerogel*, Czech. J. Phys., 46, 113, (1996), E. V. Thuneberg, M. Fogelström, S. K. Yip, and J. A. Sauls.
68. *Josephson Effects in Unconventional Heavy Fermion Superconductors*, Czech. J. Phys., 46, 557, (1996), S. K. Yip, Y. S. Sun, and J. A. Sauls.
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