COMMITTEE ON NATURAL RESOURCES
114th Congress Disclosure Form
As required by and provided for in House Rule XI, clause 2(g)(5)

"The Helium Stewardship Act and the Path Forward"

July 8, 2015

For Individuals:

Name: Professor William P. Halperin
Address: Department of Physics, Northwestern University, Evanston IL 60208
Email Address: [redacted]
Phone Number:

* * * * *

For Witnesses Representing Organizations:

Name:
Name of Organization(s) You are Representing at the Hearing:
Business Address:
Business Email Address:
Business Phone Number:

* * * * *

For Nongovernment Witnesses ONLY:

1. Please attach/include current curriculum vitae or resume.

2. Please list any federal grants or contracts (including subgrants or subcontracts) related to the subject matter of the hearing that were received in the current year and previous two calendar years by you or the organization(s) you represent at this hearing, including the source and amount of each grant or contract.

National Science Foundation; Division of Materials Research;
DMR-1103625; $825,000; 8/1/2011-7/31/2016.
Department of Energy, Basic Energy Science, Division of Materials Sciences and Engineering,
DE-FG02-05ER46248; $495,000; 7/1/2014-6/30/2017; $490,000; 7/1/11-6/31/14.
Department of Energy, Basic Energy Science, Division of Materials Sciences and Engineering,
DE-FG02-10ER46783; $48,000; 9/1/13-8/31/14; $144,715; 9/1/10-8/31/13.

3. Please list any contracts or payments originating with a foreign government related to the subject matter of the hearing that were received in the current year and previous two calendar years by you or the organization(s) you represent at this hearing, including the amount and country of origin of each contract or payment.

None

WILLIAM P. HALPERIN

PERSONAL DATA:

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EDUCATIONAL BACKGROUND:

Undergraduate: Bachelor of Science, B.Sc.,1967; Queen's University, Kingston, Ontario

Graduate: Master of Science, M.Sc., 1968; University of Toronto, Toronto, Ontario
Doctor of Philosophy, Ph.D.,1975; Cornell University, Ithaca, NY

ACADEMIC OR PROFESSIONAL HONOURS AND APPOINTMENTS:

Prince of Wales Prize, Queen's University (1967)
National Research Council Fellowship (1967-68)
Alfred P. Sloan Fellow (1977-81)
Yamada Science Foundation Fellow (1984)
Grant Selection Committee for Condensed Matter Physics, NSERC of Canada (1992-95)
Chair, Grant Selection Committee for Condensed Matter Physics, NSERC of Canada (1994-95).
Fellow, American Physical Society (1995)
Chair, External Review Committee, Physics Department Purdue University (1995)
Chair, Review of Canadian Academic Physics, 1996-98
Chair, External Review Committee, Physics Department Simon Fraser University (1998)
Editor, Progress in Low Temperature Physics, Elsevier (1995-)
Member, International Proposal Review Committee, Canadian Neutron Scattering Facility (1998)
Member, Users Committee, National High Magnetic Field Laboratory(1998-01)
Member, OCGS External Review Committee, Graduate Program Dept. of Physics, Univ. of Guelph and Univ. of Waterloo, Nov. 30-Dec 2, 1998
Chair, Users Committee, National High Magnetic Field Laboratory(2000)
Wender-Lewis Professor of Teaching and Research (2000-2001)
John Evans Professor of Physics (2001-)
Member, External Review Committee CNRS, CRTBT, Grenoble, France, Sept. 19-21, 2001
Chair, External Review Committee, Dept. of Physics, Univ. of Alberta, June 24-26, 2002

Regional Editor for North America, New Journal of Physics, Inst. of Phys. 2002-2011
Member, External Advisory Committee, National High Magnetic Field Laboratory (2004-)
Chair, External Advisory Committee for the National High Magnetic Field Laboratory (2004-)
Editorial Board, Journal of Low Temperature Physics, Springer, 2004
Member, External Review Committee, Department of Physics, Univ. of Toronto, 2004
Fellow, The Institute of Physics, 2004-
Visiting Professor, Joseph Fourier University, Grenoble, France (2004)
Member, OCGS Ext. Rev. Com., Dept. of Physics, Univ. of Toronto, Oct. 26-7, 2006.
Member at large, Executive Committee Division of Condensed Matter Physics, American Physical Society, 2008-2011
E. LeRoy Hall Award, distingished teaching in the WCAS, 2007-2008.
Chair, 17th Int. Symp. on Quantum Fluids and Solids, Northwestern Univ., 8, 5-11, 2009.
Chair and member, Steering Committee on Quantum Fluids and Solids, 2009-10
Science Advisory Board, Academy of Science of Finland for the Center of Excellence, Low Temp. and Quantum Devices, Aalto University. 2009-
International Advisory Committee, High Magnetic Field Laboratory, Chinese Academy of Sciences, Hefei 2009-
Member, Inter. Advis. Com.18th Int. Symp. Quantum Fluids and Solids, Grenoble, 8/1-7, 2010
Invited testimony before the Subcommittee on Investigations and Oversight, House Committee on Science and Technology, April 22, 2010.
Chair, Fellowship Committee, DCMP, American Physical Society, 2011.
Member, International Advisory Com., 19th International Symposium on Quantum Fluids and Solids, Lancaster (2012).
Member, International Advisory Com., 26th Low Temp. Physics Conference, Beijing (2011).
Chair, Fellowship committee for the Division of Condensed matter Physics of the American Physical Society (2011).
Member Steering committee for Quantum Fluids and Solids 2012
Member, International Advisory Com., China High Magnetic Field Lab, Hefei (2009-)
Member, International Advisory Com., 20th International Symposium on Quantum Fluids and Solids, Matsue, Japan (2012).
Member, Science Advisory Board (with Andrew Cleland), Finish Academy of Sciences, Center of Excellence Aalto University (2012-2018)
Member, International Advisory Com., 27th Low Temp. Physics Conference, Buenos Aires (2014).
Vice-Chair, Division of Condensed Matter Physics of the American Physical Society, elected to the chair line, chair elect, chair, and post chair (2014-18).
Secretary and representative for the USA on the C5 Commission of the International Union of Pure and Applied Physics (2014-2017); chair elect (-2020)

POST PH.D. EMPLOYMENT HISTORY:
Postdoctoral Fellow, Cornell University (1975)
Visiting Research Associate, Argonne National Laboratory (1975)

Resident Associate, Argonne National Laboratory (1979-85)
Assistant Professor, Northwestern University (1975-81)
Visiting Professor, H.C. Ørsted Institute, Copenhagen, Denmark (8/15/77-9/2/77)
Visiting Scientist, IFF-Kernforschunsanlage, Jülich,West Germany (3/19/81-10/2/81)
Associate Professor, Northwestern University (1981-86)
Chercheur Associé, Centre National de Recherche Scientifique, Grenoble (3/15/84-9/15/84)
Professor, Northwestern University (1986-present)
Chair, Department of Physics and Astronomy (1990-1995)
Director, Integrated Science Program, Northwestern University (1998-2003)

EXTERNAL PHD EXAMINER:
J.M. Kyynarainen, Helsinki University of Technology, Helsinki, Finland, October 5,1990.
Olivier Buu, Universite de Grenoble, Grenoble France, December 16,1998.
Daren Sawkey, Queen's University, Kingston Ontario, December 19, 2001.
Marc-Henri Julien, Université Josef Fourier, 2010.

RESEARCH INTERESTS:
Quantum Liquids and Solids (superfluid ^{3}He, normal liquid ^{3}He , solid ^{3}He)
Superconductivity (ultralow temperature superconductors, high temperature ceramic superconductors, heavy fermion superconductivity, UPt_3)
Quantum Size Effects in Metallic Particles (magnetic susceptibility and NMR)
Nuclear Magnetic Resonance in Solids, Nuclear Magnetic Resonance in Very High Field
Electrical and Magnetic Properties of Quasi One-dimensional Molecular Crystals Porous Materials (glasses, sandstones, ceramics, aerogels and cement pastes)

PROFESSIONAL AFFILIATIONS:
Life Member, American Physical Society (APS)
Life Member, Division of Condensed Matter Physics (DCMP) of the APS
Fellow, American Physical Society
Member, Ampere Society
Fellow, Institute of Physics (UK)

CONSULTANTSHIPS:
Chicopee Research, Division of Johnson and Johnson, Dayton, NJ (1986)
Standard Oil Engineered Materials Corp. Niagara Falls, NY (1987)
Hong Kong University of Science and Technology, Hong Kong (1995)
Ontario Council on Graduate Studies (1998)
Federal Trade Commission, Chicago (2004-05)
Federal Trade Commission, Washington DC (2008-11)
Department of Energy, Basic Energy Sciences, 2009-2010

BUSINESS INTERESTS:
Sole-proprietor, YOTEM, 920 Maple Ave., Evanston, IL 60202
(optical products and cryogenic cable and tubing)

BOOKS EDITED:

"Helium Three", co-edited with L.P. Pitaevskii, Inst. for Physical Problems, Moscow USSR. for the series *Modern Problems in Condensed Matter Physics*, North Holland, Amsterdam, (1990)

"Progress in Low Temperature Physics", book series, Elsevier, Amsterdam, vol.14, 15, 16

BOOK CHAPTERS WRITTEN:

Molecular Diffusion in Porous Materials, with J.C. Tarczon, A.H. Thompson, and W.A. Ellingson in *Transport and Relaxation in Random Materials*, edited by J. Klafter, R.J. Rubin, and M.F. Shlesinger, World Scientific, Singapore p72 (1986).

Magnetic Resonance Relaxation Analysis of Porous Media, with John C. Tarczon, S. Bhattacharja, and F. D'Orazio in *Molecular Dynamics in Restricted Geometries* edited by J. Klafter and J.M. Drake, John Wiley and Son, New York., ch 11, page 311 (1989).

Order Parameter Collective Modes, with E., Varoquaux in Helium Three, edited by W.P. Halperin and L.P. Pitaevskii for the series *Modern Problems in Condensed Matter Physics*, North Holland, Amsterdam, ch. 7, pp 353-522 (1990).

APPEARANCES:

Testified in congress on the crisis of availability of helium-three: Hearing of the House Committee on Science and Technology, Subcommittee on Investigation and Oversight, "Caught by Surprise: Causes and Consequences of the Helium-3 Supply Crisis." http://sciencedems.house.gov/publications/hearings_markups_details.aspx?NewsID=2798

Appearance on Jon Stewart's "The Daily Show" an interview on availability of helium, Oct. 4, 2010. http://vodpod.com/watch/4587003-gas-hole-helium-crisis

PUBLICATIONS:

1. Further Observations of the γ-Cygni Radio Source, L.A. Higgs, and W.P. Halperin, Mon. Not. R. Astr. Soc. **209**, 141 (1968).
2. Static Nuclear Magnetization Thermometry in the Milli-Kelvin Region, R.A. Buhrman, W.P. Halperin, S.W. Swenterley, J.D. Reppy, R.C. Richardson, And W.W. Webb, Proc. 12th Int. Conf. on Low Temp. Phys. **831**, (1970).
3. Properties of ^{3}He on the Melting Curve, W.P. Halperin, R.A. Buhrman, W.W. Webb, and R.C. Richardson, Proc. of the 13th Int. Conf. on Low Temp. Phys. **2**, 139 (1972).
4. Thermodynamic Fluctuations in "Zero Dimensional Superconductor". R.A. Buhrman, W.P. Halperin, and W.W. Webb, Proc. of the 13th Int. Conf. on Low Temp. Phys. **3**, 682 (1972).
5. Fluctuation Diamagnetism in "Zero Dimensional" Superconductor, R.A. Buhrman, and W.P. Halperin, Phys. Rev. Lett. **30**, 692 (1973).
6. First Order Character of the B-Transition in Liquid ^{3}He, W.P. Halperin, R.A.Buhrman, D.M. Lee, and R.C. Richardson, Phys. Lett. **45A**, 233 (1973).
7. The Elimination of Supercooling in Superconductors by the Proximity Effect, New Bounds on T_c for Mg, Ag, and Au, R.A. Buhrman, and W.P. Halperin, J. Low Temp. Phys. **16**, 409 (1974).
8. Observation of Nuclear Magnetic Order in Solid ^{3}He, W.P. Halperin, C.N. Archie, F.B. Rasmussen, R.A. Buhrman, and R.C. Richardson, Phys. Rev. Lett. **32**, 927 (1974).
9. A Thermodynamic Temperature Scale Derived from Measurements of ^{3}He Latent heat, W.P. Halperin, C.N. Archie, F.B. Rasmussen, and R.C. Richardson, Proc. of the Euro. Phys. Soc. Topical Conf. on Liquid and Solid Helium, Haifa Israel, (John Wiley and Sons, New York) August, (1974).
10. A Thermodynamic Temperature Scale Derived from Measurements of ^{3}He Latent Heat, W.P. Halperin, C.N. Archie, F.B. Rasmussen, and R.C. Richardson, Phys. Rev. Lett. **34**, 718 (1975).
11. Specific Heat of the ^{3}He Superfluid in Several Magnetic Fields, C.N. Archie, W.P. Halperin, F.B. Rasmussen, C.M. Gould, T.A. Alvesalo, and R.C. Richardson, Proc. of the 14th Int. Conf. on Low Temp. Phys. **1**, 96 (1975).
12. Specific Heat and Entropy of Solid ^{3}He Below 23 mK, F.B. Rasmussen, W.P. Halperin, C.N. Archie, and R.C. Richardson, Proc. of the 14th Int. Conf. on Low Temp. Phys. **1**, 513 (1975).
13. Specific Heat of Normal and Superfluid ^{3}He on the Melting Curve, W.P. Halperin, C.N. Archie, F.B. Rasmussen, T.A. Alvesalo, and R.C. Richardson, Phys. Rev. **B13**, 2124 (1976).
14. ^{3}He Melting Pressure Temperature Scale, W.P. Halperin, F.B. Rasmussen, C.N. Archie, and R.C. Richardson, Proc. of the 6th Int. Cryogenic Eng. Conf. IPC. Science and Technology Press, p. 194, 1976.
15. Refrigeration by Adiabatic Demagnetization of Nuclear Spins, S.Y. Shen, J.B. Ketterson, and W.P. Halperin, J. Low Temp. Phys., **31**, 193 (1978).

16. Melting Properties of ^{3}He: Specific Heat, Entropy, Latent heat, and Temperature, W.P. Halperin, F.B. Rasmussen, C.N. Archie, and R.C. Richardson, J. Low Temp. Phys. **31**, 617 (1978).
17. Fiberglass Insert to Liquid Helium Dewar, S.Y. Shen, W.P. Halperin, and J.B. Ketterson, Rev. Sci Instr. **49**, 542 (1978).
18. Very Low Temperature Search for Superconductivity in Pd, Pt, and Rh, R.A. Webb, J.B. Ketterson, W.P. Halperin, J.J. Vuillemin, and N.B. Sandesara, J. Low Temp. Phys. **32**, 659 (1978).
19. Carbon Powder Magnetization Thermometry for Very Low Temperatures, C.M. Bastuscheck, R.A. Buhrman, B.K. Sarma, D.B. Mast, J.B. Ketterson, and W.P. Halperin, Jour. de Phys. C6-1164 (1978).
20. On the Use of CMN Thermometry in Specific heat Measurements Below 10 mK, W.P. Halperin, Jour. de Phys. **40**, L-373 (1979).
21. Observation of Conduction Electron Density Oscillations at the Surface of Platinum Particles, I. Yu, A.A.V. Gibson, E.R. Hunt, and W.P. Halperin, Phys. Rev. lett. **44**, 348 (1980).
22. Spin Glass Behavior of CoGa Compounds, M.W. Meisel, W.P. Halperin, Y. Ochai, and J.O. Brittain, J. Phys. F: Metals Phys. **10**, L105 (1980).
23. Measurements of High Frequency Sound Propagation in ^{3}He-B, D.B. Mast, B.K. Sarma, J.R. Owers-Bradley, I.D. Calder, J.B. Ketterson, and W.P. Halperin, Phys. Rev. Lett. **45**, 266 (1980).
24. Group Velocity Spectroscopy of Collective Modes in ^{3}He-B, I.D. Calder, D.B. Mast, B.K. Sarma, J.R. Owers-Bradley, J.B. Ketterson, and W.P. Halperin, Phys. Rev. Lett. **45**, 1866 (1980).
25. NMR Study of a Smectic A-Smectic B Transition, J.R. Owers-Bradley, I.D. Calder, J.B. Ketterson, and W.P. Halperin, Molecular Crystals and Liquid Crystals **76**, 175 (1981).
26. NMR Study of Pure and Doped β-LiAl, K. Kishio, J.R. Owers-Bradley, W.P. Halperin, and J.O. Brittain, Solid State Ionics, **42**, 1031 (1981).
27. Simple Wide Temperature Range AC Susceptometer, J.R. Owers-Bradley, Wen-Sheng Zhou, and W.P. Halperin, Rev. of Sci Instr. **52**, 1106 (1981).
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29. The Micro-Electronic Structure of Platinum Particles Investigated by NMR, I. Yu, and W.P. Halperin, J. Low Temp. Phys. **45**, 189 (1981).
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31. Investigation of Platinum Particles by Nuclear Magnetic Resonance, I. Yu, and W.P. Halperin, J. Chimie Physique, **78**, 901 (1981).
32. Interplanar Magnetic Coupling in Cu/Ni Composition Modulated Alloys, Wen-Sheng Zhou, H.K. Wong, J.R. Owers-Bradley, and W.P. Halperin, Physica **108B**, 953 (1981).
33. Magnetic Phase Diagram of Slow Cooled β-Phase CoGa Alloys, M.W. Meisel, Wen-Sheng Zhou, J.R. Owers-Bradley, W.P. Halperin, Y. Ochai, and J.O. Brittain, Physica **107B**, 249 (1981).

34. NMR Study of Platinum Microcrystals and Application to Thermometry, I. Yu, and W.P. Halperin, Physica **107B**, 329 (1981).
35. Measurements of the Acoustic Impedance of Superfluid ^{3}He-B, D.B. Mast, J.R. Owers-Bradley, W.P. Halperin, I.D. Calder, B.K. Sarma, and J.B. Ketterson, Physica **107B**, 953 (1981).
36. Magnetic Properties of CoGa Alloys and the Transition from Spin Glass to Ferromagnetism, M.W. Meisel, Wen-Sheng Zhou, J.R. Owers-Bradley, Y. Ochai, J.O. Brittain, and W.P. Halperin, J. Phys. F: Metals Phys. **12**, 317 (1982).
37. Acoustic Order Parameter Mode Spectroscopy in Superfluid ^{3}He-B, W.P. Halperin, Physica **109&110B**, 1596 (1982).
38. Resolution of New Structure in the Collective Mode Spectrum of Superfluid ^{3}He-B, B.S. Shivaram, M.W. Meisel, B.K. Sarma, D.B. Mast, W.P. Halperin and J.B. Ketterson, Phys. Rev. lett. **49**, 1646 (1982).
39. Observation of a New Resonance in the Collective Mode Spectrum of ^{3}He-A, M.W. Meisel, B.S. Shivaram, B.K. Sarma, J.B. Ketterson, and W.P. Halperin, Phys. Rev. Lett. **50**, 361 (1983).
40. Non-Linear Zeeman Shifts in the Collective Mode Spectrum of ^{3}He-B, B.S. Shivaram, M.W. Meisel, Bimal K. Sarma, W.P. Halperin and J.B. Ketterson, Phys. Rev. Lett. **50**, 1070 (1983).
41. Equilibrium Magnetic Behavior in CoGa Spin Glass, Wen-Sheng Zhou, M.W. Meisel, J.R. Owers-Bradley, W.P. Halperin, Y. Ochai, and J.O. Brittain, Phys. Rev. **27B**, 3119 (1983).
42. Magnetic Field Study of the Squashing Collective Mode in ^{3}He-B, M.W. Meisel, B.S. Shivaram, Bimal K. Sarma, D.B. Mast, J.B. Ketterson, and W.P. Halperin, Phys. Rev. **27B**, 6982 (1983).
43. Study of Proton Diffusion in NH_4^+-H_3O^+ β"-Alumina Using a Pulsed-Field Gradient NMR Method, Y.-T. Tsai, S. Smoot, D.H. Whitmore, J.C. Tarczon, and W.P. Halperin, Solid State Ionics, **9/10**, 1033 (1983).
44. Study of Protonic Diffusion in Hydrogen Uranyl Phosphate Using a Pulsed-Field Gradient NMR Method, Y.-T. Tsai, W.P. Halperin, and D.H. Whitmore, J. of Solid State Chemistry, **50**, 263 (1983).
45. Ortho-Para Conversion of Hydrogen in Copper as Origin of Time Dependent Heat Leaks, M. Schwark, F. Pobell, W.P. Halperin, Ch. Buchal, J. Hanssen, M. Kubota, R.M. Mueller, J. Low Temp. Phys. **53**, 685 (1983).
46. Zero Sound Measurements Near the Pair-Breaking Edge in Low Pressure ^{3}He-B, M.W. Meisel, B.S. Shivaram, B.K. Sarma, J.B. Ketterson, and W.P. Halperin, Phys.Lett. **98A**, 437 (1983).
47. Acoustic Impedance Investigations of the Collective Modes of ^{3}He, J.B. Ketterson, B.S. Shivaram, M.W. Meisel, B.K. Sarma, and W.P. Halperin, IEEE Ultrasonics Symposium, p. 1074 (1983).
48. Probing Collective Modes of Superfluid ^{3}He with Zero Sound, J.B. Ketterson, B.S. Shivaram, M.W. Meisel, B.K. Sarma, and W.P. Halperin, AIP Conf. Proc. **103**, 288 (1983).

49. A Low Temperature Calorimetric Investigation of CoGa Spin-Glass, H. Akbarzadeh, P.H. Keesom, M.W. Meisel, and W.P. Halperin, Phys. Rev. **29B**, 2622 (1984).
50. Explanation of the Excess Attenuation Near the Pair Breaking Edge in ^{3}He-B, M.W. Meisel, B.S. Shivaram, Bimal K. Sarma, J.B. Ketterson, W.P. Halperin and P. Wölfle, Proc. of the 17th Int. Conf. Low Temp. Phys. **2**, 757 (1984).
51. Interaction Effects and Collective Modes in Superfluid ^{3}He, B.S. Shivaram, M.W. Meisel, B.K. Sarma, W.P. Halperin and J.B. Ketterson, Proc. of the 17th Int. Conf. Low Temp. Phys. **2**, 759 (1984).
52. Dispersion Induced Splitting of Order Parameter Collective Modes in Superfluid ^{3}He-B, P.N. Brusov, V.N. Popov, B.S. Shivaram, M.W. Meisel, B.K. Sarma, W.P. Halperin and J.B. Ketterson, Proc. of the 17th Int. Conf. Low Temp. Phys. **2**, 779 (1984).
53. Li Self Diffusion in Pure and Doped β-LiAl Using Pulsed Field Gradient NMR, S.C.Chen, John C. Tarczon, W.P. Halperin, and J.O. Brittain, J. Phys. Chem. of Solids **46**, 895 (1985).
54. Nuclear Magnetic Resonance Study of the Electronic Structure in the Copper Niobium Superlattice, M. Yudkowsky, W.P. Halperin, and Ivan K. Schuller, Phys. Rev. **B31**, 1637 (1985).
55. Interpretation of NMR Diffusion Measurements in Uniform and Nonuniform Field Profiles, John C. Tarczon and W.P. Halperin, Phys. Rev. **B32**, 2798 (1985).
56. Atomic Transport Properties of Intermetallic Compounds β-LiAl and β-LiIn, S.C. Chen, John C. Tarczon, W.P. Halperin, and J.O. Brittain, Proc. of the sixth Risφ Int. Conf. on Materials Science, Transport Structure Relations in Fast Ion and Mixed Conductors, Sept. 9-13, (1985).
57. Magnetic Field Investigation of the Acoustic Impedance Resonance Near 2Δ(T) in ^{3}He-A, M.W. Meisel, B.S. Shivaram, B.K. Sarma, J.B. Ketterson, and W.P. Halperin, Phys. Lett. **110A**, 49 (1985).
58. Influence of Stoichiometry and the Nature of the Spinel-Block Stabilizing Elements on Proton Transport in Solid Electrolytes with the β" Alumina structure, S.W. Smoot, W.P. Halperin, and D.H. Whitmore, Solid State Ionics, **18-19**, 687 (1986).
59. Sound Propagation Experiments in a Magnetic Field in Superfluid ^{3}He-B, B.S. Shivaram, M.W. Meisel, B.K. Sarma, W.P. Halperin, and J.B. Ketterson, J. Low Temp. Phys. **63**, 57 (1986).
60. Quantum Size Effects in Metallic Powders, W.P. Halperin, Rev. Mod. Phys. **58**, 533 (1986).
61. Molecular Diffusion in Porous Materials, J.C. Tarczon, A.H. Thompson, W.A. Ellingson, and W.P. Halperin, in *Transport and Relaxation in Random Materials*, ed J. Klafter, R.J. Rubin, and M.F. Shlesinger, World Scientific, Singapore p72-85 (1986).
62. Transition of Local Moments Coupled to Itinerant Electrons in the Quasi-one Dimensional Conductor: Cu(pc)I, M.Y. Ogawa, B.M. Hoffman, S. Lee, M. Yudkowsky, and W.P. Halperin, Phys. Rev. Lett. **57**, 1177 (1986).
63. Sound Velocity in Highly Polarized ^{3}He, G. Bonfait, L. Puech, W.P. Halperin, and B. Castaing, Europhys. Lett. **3**, 489 (1987).

64. Strongly polarized ^{3}He: Polarizability and Sound Velocity, G. Bonfait, L. Puech, W.P. Halperin, and B. Castaing, Can. J. of Phys. **65**, 1426 (1987).
65. One-dimensional Magnetism in Copper Phthalocyanine, S. Lee, M.Yudkowsky, W.P. Halperin, M.Y. Ogawa, and B.M. Hoffman, Phys. Rev. **B35**, 5003 (1987).
66. Magnetic Transitions in a Molecular Metal with Embedded Local Moments: Cu(pc)I, M.Y. Ogawa, S.M. Palmer, J. Martinsen, J.L. Stanton, B.M. Hoffman, J.A. Ibers, S. Lee, M. Yudkowsky, and W.P. Halperin, Synth. Metals **19**, 781 (1987).
67. Alterations in Magnetic Characteristics Produced by Intracellular Particles, R.T. Gordon, W.P. Halperin, D. Gordon, and A.J. Freeman, J. Biological Physics **14**, 77 (1986).
68. Energy Gap and Korringa Constant in the High Temperature Superconductor $La_{1.83}Sr_{0.17}CuO_4$ determined by NMR, M. Lee, M. Yudkowsky, W.P. Halperin, , J.Thiel, S.-J. Hwu, and K.R. Poeppelmeier, Phys. Rev. **B36**, 2378 (1987).
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71. Vacancy-Antistructure Defect Interaction Diffusion in β-LiAl and β-LiIn, J.C.Tarczon, W.P. Halperin, S.C. Chen, J.O. Brittain, Materials Sci. and Eng. **A101**, 99 (1988).
72. NMR and Quantum effects in Metal Particles, W.P. Halperin, and I. Yu, Proc. of the Mat. Res. Soc.**111**,79 (1988).
73. Magnetic Resonance Relaxation Analysis of Porous Media, W.P. Halperin, F. D'Orazio, S. Bhattacharja, and J.C. Tarczon, in *Molecular Dynamics in Restricted Geometries* edited by J. Klafter and J.M. Drake, John Wiley and Sons, New York. ch 11, page 311(1989).
74. High Resolution Phase Velocity Measurements in a Short Path Length Acoustical Cavity, P.J. Hamot, H.H. Hensley, and W.P. Halperin, J. Low Temp. Phys. **77**, 429 (1989).
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