RESUME of BARRY FRIEDMAN

EDUCATION

[1985] Ph.D., Physics, *UNIVERSITY of ILLINOIS*, Urbana, Illinois, thesis advisor: Y. Oono.
[1978] B.A., Physics, *RICE UNIVERSITY*, Houston, Texas.

EMPLOYMENT

[1/2006-6/2006] Sabbatical, Department of Physics, Rice University, Houston, Texas, Host: P. Nordlander.
[9/2002-present] Professor of Physics, Sam Houston State University, Huntsville, Texas.
[9/96-9/2002] *Associate Professor of Physics*, Sam Houston State University, Huntsville, Texas.
[9/98-9/99] *Visiting Scientist*, Electrotechnical Laboratory, Tsukuba, Japan, Host: S. Abe.
[9/89-9/96] *Assistant Professor of Physics*, Sam Houston State University, Huntsville, Texas.
[1/90-9/90] *Japan Society for the Promotion of Science Fellow*, Institute for Solid State Physics of the University of Tokyo, Tokyo, Japan, Host: M. Kohmoto.
[1/88-9/89] *Postdoctoral Research Associate*, Physics Department, University of Houston, Houston, Texas, supervisor: W. P. Su.
[10/87-11/87] *Visiting Scientist*, Theoretical Condensed Matter, Cavendish Laboratory, Cambridge University, Cambridge England.
[10/85-10/87] *Bantrell Postdoctoral Fellow*, Chemical Physics Department, Weizmann Institute, Rehovot, Israel, supervisor: I. Procaccia.

CURRENT RESEARCH INTERESTS

Theoretical Solid State Physics: Quantum Hall systems, Application of the Density Matrix Renormalization Group to strongly correlated electrons, Near Field Scanning Microwave Microscopy, High Temperature Superconductivity

FUNDING HISTORY

[2007-2010] “RUI: Density Matrix Renormalization Group Studies of Quantum Hall Systems” National Science Foundation, $126000.

[2006-2008] “A Computational Study of Strongly Correlated Electron States in High Landau Levels” Texas Advanced Research Program (ATP) $70000.

[2003-2006] “New Approaches to Ground State and Transport Properties of Strongly Correlated Two dimensional Electron Systems” National Science Foundation, co-PI, (PI is Professor D. Sheng, California State University, Northridge) $96000.
[2003-2004] “Computational Study of the Quantum Hall Stripe Phases Using the Density Matrix Renormalization Group, Enhancement Grant for Research (EGR), Sam Houston State University $10732.
[2001-2003] ITP (Institute for Theoretical Physics, Santa Barbara) Scholar (three round trips to the ITP, plus local expenses)
[2002] "Inelastic X-ray Scattering Studies of Organic Aggregates", Research Council of Sam Houston State University, $5000.
[2001] "Electron Correlation and Non-Adiabatic Effects in Low Dimensional Materials", Research Council of Sam Houston State University, $5000.
[1998-1999] "Nonadiabatic Processes and Electron Correlation in Low Dimensional Systems", National Science Foundation, (Long-term Visit for Individual Research Projects to Japan)
$109,000.
[1998-1999] "Novel Consequences of Topological Zero Modes in Unconventional High-T_c Superconductors", Texas Advanced Research Program, co-PI, (PI is Professor C. R. Hu, Texas A & M) $36,000.
[1998] "Computational and Theoretical Studies of High Temperature Superconductors", Research Council of Sam Houston State University, $5000.
[1995-1997] "Theory of Photo Induced Charge Transfer in Conducting Polymer C_{60} Composites", Research Corporation $21,000, matching Sam Houston State University, $3000.
[1995] "Theoretical Study of Optical Properties of Fullerenes", Research Council of Sam Houston State University, $7500.
[1994] "Optical Properties of Fullerenes", Research Council of Sam Houston State University, $7500.
[1993] "A Theoretical and Computational Study of Optical Properties of Fullerenes", Research Council of Sam Houston State University, $7500.
[1992] "A Computational and Theoretical Study of Strongly Correlated Electron Systems", Research Council of Sam Houston State University, $7500.

RECENT PUBLICATIONS

110**.** Lee, H. Arakelyan, S., Friedman, B., and Lee, K. “Hybrid Resonance Memory Metamaterial with Full-Wave Operation”, Advanced Functional Materials, July 2018, Vol. 28, Issue 28 Article number: 1800760.

109. Arakelyan, S.; Lee, H.; Han, D.-S.; Babajanyan, A.; Friedman, B.; Lee, K.; “Direct imaging of the SSD and USB memory drives heating by thermo-elastic optical indicator microscopy”, September 2017, Case Studies in Thermal Engineering 10(C).

108. Arakelyan, S.; Lee, H; Han, D.-S; Babajanyan, A.; Berthiau, G.; Friedman, B.; Lee, K.; “Microwave Heating Visualization for Carbon Fibers Composite Material: Development of Tunable Microstrip Structures”, FEB 2018, IEEE Transactions on Microwave Theory of Techniques” Volume 66 Issue: 2 Pages 883-888.

107. Lee, H.; Jeon, S.; Friedman, B.; and Lee, K.; “Simultaneous imaging of magnetic field and temperature distributions by magneto optical indicator microscopy”, Scientific Reports, Vol. 7, Article number: 43804, March 2, 2017.

106. Galstyan, O.; Lee, H.; Park, J.; Lee, J. H.; Babajanyan, A.; Friedman, B.; Lee, K.; “Influence of bismuth substitution on yttrium orthoferrite thin films preparation by the MOD method”, Journal of Magnetism and Magnetic Materials, Vol. 397, p 310-314, Jan. 1, 2016.

105. Arakelyan, S., Galstyan, O.; Lee, H.; Lee, J. H.; Friedman, B.; and Lee, K.; “Direct current imaging using a magneto-optical sensor”, Sensors and Actuators A-physical, Vol. 238, p 397-401 Feb 1, 2016.

104. Friedman, B.; Levine, G. C.; “Scaling of Entanglement Entropy for the Heisenberg Model on Clusters Joined by Point Contacts”, Journal of Statistical Physics, Vol 165, Issue 4, p 727-739, Nov. 2016.

103. Mikishev, A. B.; Friedman, B.; Nepomnyashchy, A.; “Generation of transverse waves in a liquid layer with insoluble surfactant subjected to temperature gradient”,
Fluid Dynamics Research, Vol. 48, Issue 6, Article Number 061403, Dec. 2016.

102. Lee, H.; Friedman, B.; and Lee, K.; Adaptive microwave impedance memory effect in a ferromagnetic insulator”, Nature Communications, Vol. 7, Article Number 13737, Dec. 14, 2016.

101. Lee, H.; Arakelyan, S.; Friedman, B.; and Lee, K.; “Temperature and microwave near field imaging by thermos-elastic optical indicator microscopy”, Scientific Reports, Vol. 6, Article Number 39696, Dec. 22, 2016.

100. Lee, Hanju; Jeon, S.; Friedman, B.; and Lee, “Simultaneous imaging of magnetic fields and temperature distributions by magneto optical indicator microscopy” Science Reports Vol. 7, Article Number: 43804, March 2, 2017.

99. Lee, Hanju, et al. “Characterization of anisotropic electrical conductivity of carbon fiber composite materials by a microwave probe pumping technique”, Journal of Composite Materials Volume 50 Issue:15 Pages 1999-2004 Published JUN 2016

98. Galstyan, Ogsen; Lee, Hanju; Babajanyaan; Arsen; et al. Magneto-optical visualization by Bi:YIG thin films prepared at low temperatures" Journal of Applied Physics Volume 117 Issue :16 Article Number 163914 Published Apr 28 2015

97. Choi, Sul A.; Kim, Kyungchul; Lee, Su Jin; et al. "Effects of thermal preparation on Copper Phthalocyanine organic light emitting diodes" Journal of Luminescence Volume:171 Pages 149-153 March 2016

96. Friedman, B.A. Levine, G. C. "Entanglement entropy of quantum Hall systems with short range disorder", International Journal of Modern Physics B Volume 29 Issue: 12 Article Number 1550065 Published May 10 2015.

95**.** Kim, Seungwan, et al. "In vitro monitoring of goat-blood glycemia with a microwave biosensor", Current Applied Physics V 14, 4 p563-569 (2014).

94. B. Caravan, B. A. Friedman, and G. C. Levine, "Scaling of Entanglement Entropy in Point-Contact, Free Fermion Systems", Phys. Rev. A 89, 5 052305 (2014).

95. O. Galstyan et al., "Effect of Pre-Crystalization on the Preparation of Thick BiXIG Films by the Metal-Organic Decomposition Method", J. of Magnetism and Magnetic Material Vol 366, p24-27 (2104).

92. V. Mkhitaryan, A. Babajanyan, K. Nerkararyan, K. Lee, B. Friedman, "The periodically graded metal-insulator-metal gap structure for plasmonic waveguides" Plasmonics, 8, 613-618 (2013).

91. H. Melikyan, Y. Yoon, H. Lee, J. Carnis, A. Babajanyan, B. Friedman, K. Lee, "Visualization of photogenerated transport characteristics of a pentacene thin-film transistor at selected wavelengths", Thin Solid Films 534, 503-507 (2013).

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89. S. Kim, Y. Yoon, H. Lee, A. R. Choi, K. H. Jung, A. Babajanyan, T. Abrahamyan, H. Yoo, J. H. Lee, D. Cha, G. Berthiau, B. Friedman, K. Lee, "Application of a sensitive near-field microwave microprobe to the nondestructive characterization of microbial rhodopsin", Journal of Biophotonics, V.6 Issue 2, 163-170 (2013).

88. Y. Yoon, H. Lee, T. Kim, K. Kim, S. Choi, H. K. Yoo, B. Friedman, K. Lee, "Post-annealing effect on the interface morphology of organic light emitting diodes", Solid State Electronics, V. 79, p. 45-49 (2013).

87. H. Melikyan, E. Danielyan, S. Kim, J. Kim, A. Babajanyan, J. Lee, B. Friedman, K. Lee, “Non-invasive in vitro sensing of D-glucose in pig blood”, Medical Engineering and Physics, V. 34, Issue 3 p 299-304 (2012).

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84. A. Vardanyan, H. Haroyan, A. Babajanjan, K. Nerkararyan, K. Lee and B. Friedman, “Ring-type V-groove surface plasmon microresonator: The modal structure and Q-factor, J. Appl. Phys. 111, 053112 (2012).

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81. H. Lee, Y. Yoon, S. Kim, H. K. Yoo, H. Melikyan, E. Danielyan, A. Babajanyan, T. Ishibashi, B. Friedman and K. Lee, “Preparation of bismuth substituted yttrium iron garnet powder and thin film by the metal-organic decomposition method”, Journal of Crystal Growth Vol. 329, 1 p27.

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75**.** B. Friedman and G. Levine, "Topological entanglement entropy in the second Landau level", arXiv:0902.1524,Int. J. of Mod Phys. B, 24 (24) 4707 (2010).

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72. S. Kim, J. Kim, A. Babajanyan, K. Lee, and B. Friedman, "Noncontact characterization of glucose by a waveguide microwave probe", Current Applied Physics, 9 (4), 856 (2009).

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69. P. Chow and B. Friedman "Low-energy non resonant x-ray scattering of C_{60}", Phys. Rev. B vol. 77, 073406(2008).

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“Sodium Chloride Sensing by Using a Near-Field Microwave Microprobe”, Appl. Phys. Lett. **89**, 183504 (2006)

64. S. Yun, S. Na, A. Babayan, H. Kim, B. Friedman and K. Lee, “ Noncontact Characterization of Sheet Resistance of Indium Tin Oxide Films by Using a Near-Field Microwave Microprobe”, Thin Solid Films 515 (2006) 1354-1357.

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J. Am. Chem. Soc.; **(Communication); 2005**; *127*(27); 9666-9667.

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44. K. Lee, W. Wang, I. Iguchi, B. Friedman, T. Ishibashi and K. Sato, "Spin-Polarized Quasiparticle Tunnel Injection in a $YBa_2Cu_3O_y$/Au/Co Junction" Appl. Phys. Let. 75, 1149 (1999).

43. Y. Shimoi and B. Friedman "A Tight-Binding Model of Phenylene Molecules with Meta Connections – Implications for Phenylacetylene Dendrimers", Chem. Phys. 250, 13 (1999).

42. B. Friedman and G. Levine "Cutoff Dependence of a Configuration Interaction Approach to the Two Dimensional Hubbard Model", Phys. Rev. B 62, 16378 (2000).

41. J.-X. Zhu, B. Friedman, and C. S. Ting "Spin-polarized Quasiparticle Transport in Ferromagnet-d-wave Superconductor Junctions with a {110} Interface" Phys. Rev. B. 59, 9558 (1999).

40. J.-X. Zhu, B. Friedman, and C. S. Ting, "A Lattice Model for the Broken-Time-Reversal-Symmetry Pairing State Near a Surface of d-Wave Superconductors" Phys. Rev. B 59, 3353 (1999).

39. J. Bruening and B. Friedman, "Photo Induced Charge Transfer in Conducting Polymer C_{60} Composites", J. Chem. Phys. 106 (23), (15 June 1997) 9634-9638.

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