YAROSLAW BAZALIY

CURRICULUM VITAE

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Education

Stanford University, Stanford, California *9/1994 - 10/2000*
Ph.D. degree in physics. IBM Graduate Fellowship in 1997, 1998

Ohio State University, Columbus, Ohio *9/1992 - 9/1994*
Ph.D. program in physics, Graduate Fellowship 1992, 1993

Kapitza Institute for Physical Problems, Moscow, USSR *9/1988 - 9/1992*
Research Practice

Moscow Institute of Physics and Technology, Moscow, USSR *9/1982 - 7/1988*
M.S. with Honours in Solid State and Radio Physics

Research Experience

University of South Carolina, *8/2006 - present*
Department of Physics and Astronomy, Columbia, SC
Assistant Professor
on leave at:
Instituut Lorentz, Leiden University, Leiden, The Netherlands

- spin-tranfer effect in layered structres and magnetic domain walls
- physics of graphene

IBM Almaden Research Center, San Jose, CA *4/2004 - 8/2006*
Post-Doctoral Fellow

- Semiconductor spintronic applications
- Current induced motion of magnetic domain walls
- Statistics of spin-transfer switching at finite temperatures
- Spin-reorientation transition in orthoferrites
- Elastic model of cell crawling. Collaboration with Mathematical Biology Institute at the Ohio State University.

Argonne National Laboratory, Materials Science Division, Argonne, IL *11/2000 - 03/2004*
Post-Doctoral Fellow

• Quantum phase transition in $Cr_{1-x}V_x$ alloy.
• Switching phase diagram in"nanopillar" spintronic devices. Collaboration with IBM Almaden Research Center.
• Superconductor-ferromagnet proximity effect in F/S/F trilayer structures
• Spin-reorientation transition in orthoferrites

Stanford University, Department of Physics, Stanford CA *9/1994 - 11/2000*
Research Assistant

• SO(5) theory of high Tc superconductors. Advisor Prof. S. C. Zhang
• Dynamic equations for the continuous magnetization field in the presence of a spin-polarized current. Stanford - IBM Almaden Research Center collaboration, advisor B.A. Jones
• Pair-breaking phase transition in a superconductor with magnetic impurity. Stanford - IBM Almaden Research Center collaboration, advisor B. A. Jones
• Viscoelastic flow of actin gel in polymerization-driven propulsion of bacteria *L. Monocytogenes*. Collaboration with Prof. J. A. Theriot (Department of Biochemistry).
• Phase separation and domain shapes in Langmuir films with dipole-dipole interactions between the molecules. Advisor Prof. H. McConnell (Department of Chemistry).
• Administrator of the group UNIX workstation.

Ohio State University, Department of Physics, Columbus OH *9/1992 - 8/1994*
Research Assistant

• Unconventional superconductivity in UPt_3. Advisor Prof. D. L. Cox.

Ecole Normale Superiore, Paris, France *5/1993 - 7/1993*
Student Exchange Visitor

• Numerical model of the experiments on cavitation in He^4. Laboratory of Prof. S. Balibar.

Kapitza Institute for Physical Problems, Moscow, USSR *9/1988 - 8/1992*
Research Practice

• Quasiclassic description of the electron-phonon interaction in Fermi-liquid with proper account of the difference between momentum and quasi-momentum of the excitations. Advisor Prof. A. F. Andreev.
• Complex vacancies in quantum crystals and dynamics of He^3-He^4 solutions. Advisor Prof. A. F. Andreev.

Teaching Experience

Stanford University, Ohio State University *9/1992 - present*
Lecturing
• Experience in giving lectures on the graduate level electrodynamics, statistical mechanics, undergraduate level electricity and magnetism, classical mechanics.
Leading Discussions, Grading

• *Undergraduate courses*: Mechanics, Statistical Physics, Electricity and Magnetism, Optics, Quantum Mechanics.
• *Graduate courses*: Theoretical Mechanics, Quantum Mechanics, Statistical Mechanics, Electrodynamics, Group Theory in Physics, Quantum Field Theory.

Additional

• Referee for Physical Review B, Physical Review Letters, Applied Physics Letters, Journal of Magnetism and Magnetic Materials

References

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PUBLICATIONS

40. Ya. B. Bazaliy, "Generation of microwave radiation in planar spin-transfer devices", arXiv:0706.0529 (2007).

39. L. T. Tsymbal, Ya. B. Bazaliy, and V. A. Mishin, "Helicon-phonon resonance in PbSe", submitted to J. Low. Temp. Phys. (2007).

38. O. A. Tretiakov, Ya. B. Bazaliy, and O. Tchernyshyov, "Dynamics of domain walls in magnetic nanostrips", Dynamics of domain walls in magnetic nanostrips (2007).

37. Ya. B. Bazaliy, "Effective attraction induced by repulsive interaction in a spin-transfer system", arXiv:0705.0508 (2007).

36. Ya. B. Bazaliy, D. Olaosebikan, B. A. Jones, "Planar spin-transfer device with a dynamic polarizer", arXiv:0705.0406, to be published in J. Nanoscience and Nanoelectronics (2007).

35. L. T. Tsymbal, Ya. B. Bazaliy, V. N. Derkachenko, V. I. Kamenev, G. N. Kakazei, F. J. Palomares, P. E. Wigen, "Magnetic and structural properties of spin-reorientation transitions in orthoferrites", to be published in J. Appl. Phys. (2007).

34. B. Bazaliy, Ya. Bazaliy, A. Friedman, "One-dimensional free boundary problem for actin-based propulsion of Listeria", J. Math. Anal. Appl., **328**, 84 (2007).

33. M. Hayashi, Luc Thomas, C. Rettner, Rai Moriya, Ya. B. Bazaliy, and S. S. P. Parkin, "Current Driven DomainWall Velocities Exceeding the Spin Angular Momentum Transfer Rate in Permalloy Nanowires", Phys. Rev. Lett., 2007, **98**, 037204.

32. L. T. Tsymbal, Ya. B. Bazaliy, L. N. Bezmaternykh, A. Slawska-Waniewska, S. V. Vasiliev, N. Nedelko, A. I. Linnik,1 A. N. Cherkasov, Yu. I. Nepochatykh, V. Yu. Dmitrenko, G. N. Kakazei, and P. E. Wigen,
"Orientation phase transition in Fe3BO6: Experimental determination of the order of the transition", Phys. Rev. B, 2006, **74**, 134429.

30. M. Hayashi, L. Thomas, Ya. B. Bazaliy, C. Rettner, R. Moriya, X. Jiang, and S. S. P. Parkin, "Influence of Current on Field-Driven Domain Wall Motion in Permalloy Nanowires from Time Resolved Measurements of Anisotropic Magnetoresistance", 2006, Phys. Rev. Lett., **96**, 197207

30. L. T. Tsymbal, V. I. Kamenev, D. A. Khara, Ya. B. Bazaliy, and P. E. Wigen,
"Structural properties of TmFeO3 in the spontaneous reorientation region", Low Temp. Phys., 2006, **32**, 779 (Fiz. Nizk. Temp., **32**, 1024).

29. B. V. Bazaliy, Ya. B. Bazaliy, Avner Friedman, and Bei Hu,
"Energy considerations in a model of nematode sperm crawling", 2006, Mathematical Biosciences

and Engineering, 2006, **3**, 347.

28. T. L. Hughes, B. A. Bernevig, Ya. B. Bazaliy,
"Transport Equations and Spin-Charge Propagating Mode in the Two Dimensional Hole Gas", 2006, Phys. Rev. B, **74**, 193316.

27. Ya. B. Bazaliy, B. V. Bazaliy, G. Güntherodt, and S. S. P. Parkin,
"Effect of Coulomb interaction on the spin-galvanic mode in a two dimensional electron gas with Rashba spin-orbit interaction", 2005, cond-mat/0511534.

26. Ya. B. Bazaliy, L. T. Tsymbal, G. N. Kakazei, V. I. Kamenev, and P. E. Wigen,
"Spin-reorientation in $YbFeO_3$", Phys. Rev. B, 2005, **72**, 174403.

25. L. T. Tsymbal, V. I. Kamenev, Ya. B. Bazaliy, D. A. Khara, and P. E. Wigen,
"Structural properties of $ErFeO_3$ in the spin-reorientation region", Phys. Rev. B, 2005, **72**, 052413.

24. L. T. Tsymbal, Ya. B. Bazaliy, G. N. Kakazei, and P. E. Wigen,
"General characteristics of the spin-reorientation transitions in orthoferrites", Ukrainian J. Phys., 2005, **50**(8), 883.

23. L. T. Tsymbal, Ya. B. Bazalii, G. N. Kakazei, Y. I. Nepochatykh, and P. E. Wigen,
"Natural behavior of the magnetization under spontaneous reorientation: $TmFeO_3$, $ErFeO_3$", Low Temperature Physics, 2005, **31**, 277.

22. Chun-Yeol You, Ya. B. Bazaliy, J. Y. Gu, S.-J. Oh, L. M. Litvak, and S. D. Bader,
"Magnetization-orientation dependence of the superconducting transition temperature calculated for F/S/F trilayer structures", Phys. Rev. B, 2004, **70**, 014505. Reprinted in the Virtual Journal of Applications of Superconductivity, July 15, 2004.

21. Ya. B. Bazaliy, L. T. Tsymbal, G. N. Kakazei, and P. E. Wigen,
"The role of erbium magnetization anisotropy during the magnetic reorientation transition in $ErFeO_3$", J. Appl. Phys., 2004, **95**, 6622.

20. Ya. B. Bazaliy, R. R. Ramazashvili, Q. Si, and M. R. Norman,
"Magnetotransport near a quantum critical point in a simple metal", Phys. Rev. B, 2004, **69**, 144423.

19. Ya. B. Bazaliy, L. T. Tsymbal, G. N. Kakazei, A. I. Izotov, and P. E. Wigen, "Spin-reorientation in $ErFeO_3$: zero field transitions, three-dimensional phase diagram, anisotropy of erbium magnetism", Phys. Rev. B, 2004, **69**, 104429.

18. Ya. B. Bazaliy, B. A. Jones, and Shoucheng Zhang,
"Current Induced Magnetization Switching in Small Domains of Different Anisotropies", Phys. Rev. B, 2004, **69**, 094421. Reprinted in the Virtual Journal of Nanoscale Science & Technology, April 5, 2004.

17. M. R. Norman, Qimiao Si, Ya. B. Bazaliy, and R. Ramazashvili,
"Hall effect in nested antiferromagnets near the quantum critical point", Phys. Rev. Lett., 2003, **90**, 116601.

16. J. Y. Gu, C.-Y. You, J. S. Jiang, J. Pearson, Ya. B. Bazaliy, and S. D. Bader, "Magnetization-

orientation dependence of the superconducting transition temperature in the ferromagnet-superconductor-ferromagnet system: CuNi/Nb/CuNi", Phys. Rev. Lett., 2002, **89**, 267001.

15. Ya. B. Bazaliy, B. A. Jones,
"Magnetization rotation or generation of incoherent spin waves? Suggestions for a spin-transfer effect experiment" Physica B, 2003, **329-333**, 1290.

14. Ya. B. Bazaliy, L. T. Tsymbal, A. I. Linnik, N. K. Dan'shin, A. I. Izotov, P. E. Wigen, "Peculiarities of spin reorientation in a thin YIG film" Physica B, 2003, **329-333**, 1257.

13. Ya. B. Bazaliy, B. A. Jones, Shoucheng Zhang,
"Towards metallic magnetic memory: How to interpret experimental results on magnetic switching induced by spin-polarized currents" J.Appl.Phys., 2001, **89**, 6793.

12. Ya. B. Bazaliy, B. A. Jones, Shoucheng Zhang,
"Magnetic Impurity in a Superconductor: Local Phase Transitions and Finite Size Effects" J.Appl.Phys., 2000, **87**, 5561.

11. L. P. Pryadko, S. A. Kivelson, V. J. Emery, Ya. B. Bazaliy, E. A. Demler,
"Topological Doping and the Stability of Stripe Phases" Phys. Rev. B, 1999, **60**, 7541.

10. M. Veillette, Y. B. Bazaliy, A. J. Berlinsky, C. Kallin,
"Stripe Formation by the Long-Range Interactions within SO(5) theory", Phys. Rev. Lett., 1999, **83**, 2413.

9. Ya. B. Bazaliy, L. T. Tsymbal,
"Electron-Phonon-Surface Scattering in Ga" Phys. Rev. B, 1999, **57**, 12431.

8. Ya. B. Bazaliy, B. A. Jones, and Shou-Cheng Zhang,
"Modification of the Landau-Lifshitz equation in the presence of a spin-polarized current in colossal- and giant-magnetoresistive materials" Phys. Rev. B (Rapid Communications), 1998, **57**, R3213.

7. Ya. B. Bazaliy, Eugene Demler, and Shou-Cheng Zhang,
"Search for the π-resonance in two-particle tunneling experiments of YBCO superconductors", Phys. Rev. Lett., 1997, **79**, 1921.

6. A. F. Andreev,Ya. B. Bazaliy, and P. V. Shevchenko,
"Nonlinear oscillations of a degenerate He^3-He^4 solution", ZhETF, 1996, **109**, 1645 (Soviet Physics-JETP, 885).

5. R. Heid, Ya. B. Bazaliy, V. Martisovits, and D. L. Cox,
"Time-reversal symmetry breaking in a model of staggered superconductivity in UPt_3" International Conference on Strongly Correlated Electron Systems, Goa, India, 1995. Physica B, 1996, **223-224**, 33.

4. H. M. McConnell, Y. B. Bazaliy,
"Lipid monolayaer image dipoles", Proc. Nat. Acad. Science, 1995, **92**, 8823.

3. R. Heid, Ya. B. Bazaliy, V. Martosovits, and D. L. Cox,
"Staggered superconductivity in UPt_3: a new phenomenological approach", Phys. Rev. Lett., 1995, **74**, 2571.

2. A. F. Andreev, Ya. B. Bazaliy, and A. D. Savishchev,
"Plasticity of perfect crystals", J. Low Temp. Phys., 1992, **88**, 101.

1. A. F. Andreev, Ya. B. Bazaliy,
"Fermi-liquid dynamics in metals and the electron-phonon interaction" ZhETF, 1990, **98**, 1480 (Soviet Physics-JETP, 827).

PRESENTATIONS

Invited Talks:

- 1/07 Aspen Physics Institute, Aspen CO.
  Spins in Nanostructures: Dynamics, Spectroscopy, Manipulation and Control Principles.
- 6/06 KITP Santa Barbara.
  Spintronics workshop.
- 3/06 Northwestern University, Evanston, IL
  Midwest Workshop on Quantum Transport and Magnetics
- 8/02 Hiroshima, Japan,
  23-rd International Conference on Low Temperature Physics
- 7/02 Ecole Polytechnique Federale de Lausanne, Lausanne, Switzerland,
  Symposium Latsis "Spin injection induced magnetization reversal"
- 11/01 Argonne National Laboratory, Argonne, IL
  International Workshop on Nanoscale Superconductivity and Magnetism
- 7/01 Aspen Center For Phsyics, Aspen, CO
  "Spins in Nanostructures" workshop
- 5/01 Argonne National Laboratory, Center for Nanoscale Materials,
  Mini-Workshop on Theory and Computation of Nanomaterials Behavior
- 3/00 Invited talk at the APS March Meeting, Minneapolis, MN

Contributed Talks:

- 3/07 Capri Spring School on Transport in Nanostructures, Capri, Italy.
- 3/06 SpinApps, IBM Almaden Center, San Jose, CA.
  Spin Currents workshop.
- 3/06 APS March Meeting, Baltimore, MD
- 11/05 50-th Magnetism and Magnetic Materials Conference. San Jose, CA.
- 8/05 24th International Conference on Low Temperature Physics, Orlando, FL
- 3/05 APS March Meeting, Los Angeles, CA
- 3/04 APS March Meeting, Montreal, Canada

- 3/03 APS March Meeting, Austin, TX
- 5/02 Gordon Research Conference on Magnetic Nanostructures, Il Ciocco, Italy
- 3/02 APS March Meeting, Indianapolis, IN
- 5/01 SpinTech-1 School and Conference, Maui, HI
- 3/01 APS March Meeting, Seattle, WA
- 1/01 MMM Conference, San Antonio, TX
  Finalist of the "Best student presentation" competition.
- 10/00 American Society for Cell Biology Meeting, San Francisco, CA
- 6/00 European Conference on Magnetism and Applications EMMA-2000, Kyiv, Ukraine.
- 1/00 MMM Conference, San Jose, CA
- 3/99 APS March Meeting, Atlanta, GA
- 7/98 Physics of Manganites Workshop, Michigan State University
- 3/98 APS March Meeting, Los Angeles, CA
- 1/98 Gordon Research Conference on Magnetic Nanostructures, Ventura, CA
- 3/97 APS March Meeting, Kansas City, KA
- 6/92 USSR National Conference on Low Temperature Physics, Kazan'
- 7/90 Soviet-Bulgarian joint seminar, Pamporovo, Bulgaria
- 6/90 USSR National Conference on Low Temperature Physics, Donetsk
- 1/89 Bakuriani School on Helium and Superconductivity, Georgia, USSR

Seminars and Colloquia:

- 3/07 IBM Almaden Research Center, San Jose, CA.
  Colloquium.
- 1/07 IBM Almaden Research Center, San Jose, CA.
  Seminar.
- 11/06 Delft Technical University, Delft, The Netherlands.
  Physics Department Seminar.
- 11/06 Utrecht University, Utrecht, The Netherlands.
  Physics Department Seminar.
- 2/06 University of South Carolina, Columbia, SC
  Physics Department Colloquium
- 2/06 McGill University, Montreal, Quebec, Canada
  Physics Department Seminar
- 1/06 Institute of Magnetism, Kyiv, Ukraine
  Seminar

- 2/05 University of Notre Dame, South Bend, IN
  Physics Department Seminar
- 10/01 University of Notre Dame, South Bend, IN
  Physics Department Colloquium
- 9/01 Duke University, Durham, NC
  Physics Department Seminar