

# Oleg G. Shpyrko

Curriculum Vitae

[as of December 11, 2009]

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## RESEARCH INTERESTS

**Experimental condensed matter.** X-ray synchrotron scattering and imaging. Strongly Correlated Systems, novel High-Temperature Superconducting materials, Metal-Insulator Transition, Charge and Spin Density Wave systems, magnetic nanostructures. Surface and interfacial properties of liquids, soft and biological materials. Dynamics and structure of materials in nanoscale confinement. Imaging and dynamics of electronic and magnetic domains. Light scattering and microscopy studies of capillary phenomena, self-assembly and soft matter systems.

## PROFESSIONAL EXPERIENCE

**ASSISTANT PROFESSOR**, University of California San Diego 2007 – present  
Department of Physics

**CNM Distinguished Postdoctoral Fellow**, Argonne National Laboratory 2005 – 2007  
Center for Nanoscale Materials. Advisor: Prof. Eric D. Isaacs

**Postdoctoral Fellow**, Harvard University 2004 – 2005  
Division of Engineering and Applied Sciences. Advisor: Prof. Peter S. Pershan

**Ph.D. in PHYSICS**, Harvard University June, 2004  
Department of Physics. PhD Advisor: Prof. Peter S. Pershan  
Ph.D. Thesis committee: David Weitz, Frans Spaepen

## HONORS AND AWARDS

**NSF CAREER FACULTY AWARD** 2010

**HELLMAN FACULTY FELLOW** 2009

**UC SAN DIEGO FACULTY CAREER DEVELOPMENT AWARD** 2009

**ROSALIND FRANKLIN YOUNG INVESTIGATOR AWARD** 2008

**DISTINGUISHED POSTDOCTORAL FELLOW**, Argonne National Lab 2005 – 2007

**R.E. MARSHAK FELLOWSHIP**, University of Rochester 1995 – 1996

**EXCIMER FELLOWSHIP**, Moscow Institute of Physics and Technology, Russia 1994 – 1995

**LEBEDEV PHYSICS INSTITUTE (FIAN) FELLOWSHIP**, Moscow, Russia 1994 – 1995

**SOROS INTERNATIONAL FOUNDATION FELLOWSHIP**, Moscow, Russia 1993 – 1994

**SILVER MEDAL, XXIV INTERNATIONAL PHYSICS OLYMPIAD**, USA 1993

## PROFESSIONAL SERVICE

**Professional Referee.** Nature Materials, Physical Review Letters, Physical Review B, Europhysics Letters, Journal of Physical Chemistry, Journal of Chemical Physics, Journal of Applied Physics, Journal of Alloys and Compounds 2003-present

<b>Member, Beam Advisory Team, NSLS-II, Brookhaven National Laboratory</b>	2008 – present
<b>Chair, Physics Colloquium Committee</b>	Fall 2009
<b>Lecturer, 2<sup>nd</sup> School and Workshop on X-ray Micro and Nanprobes</b> (XMNP2009), Palinuro, Italy	2009
<b>Member, Advanced Photon Source Proposal Review Panel, Argonne Nat'l Lab</b>	2008 – present
<b>Organizer, Focus Topic, APS March Meeting, Portland, Oregon</b>	2009-2010
<b>Chair, Condensed Matter Seminar Committee, Physics Dept., UC San Diego</b>	Winter 2009
<b>Open House Organizing Committee, Physics Dept., UC San Diego</b>	2007 – 2008
<b>Senior Lecturer, 2007 School for Liquid Surface X-ray Scattering, Argonne, IL</b>	2007
<b>Journal Club Organizer, Center for Nanoscale Materials, Argonne National Lab</b>	2006 – 2007
<b>Divisional Representative, Argonne Laboratory-Wide Postdoctoral Committee</b>	2007
<b>Steering Committee Member, Postdoc survival skills workshop, ANL</b>	2007
<b>Biophysics Consultant, Argose Inc. Waltham, MA</b>	2003 – 2004
<b>Organizer, Boston Area Undergraduate Physics Competition</b>	1999 – 2005
<b>Scientific User, National Synchrotron Light Source, Brookhaven National Lab</b>	1998 – present
<b>Scientific User, Advanced Photon Source, Argonne National Lab</b>	2000 – present
<b>Member, American Physical Society, Materials Research Society</b>	1998 – present

## TEACHING

<b>PHYS 100C, Electromagnetism</b>	Spring 2009
<b>PHYS 2CL, Physics Laboratory: Electricity and Magnetism, Waves and Optics</b>	Spring 2009
<b>PHYS 2CL, Physics Laboratory: Electricity and Magnetism, Waves and Optics</b>	Winter 2009
<b>PHYS 2CL, Physics Laboratory: Electricity and Magnetism, Waves and Optics</b>	Spring 2008
<b>PHYS 2CL, Physics Laboratory: Electricity and Magnetism, Waves and Optics</b>	Winter 2008

## MENTORING

### Postdoctoral Mentoring:

Jyoti Mohanty, UCSD (2008-current)

### Research Student Advising:

- **University of California San Diego**

#### Graduate:

Ashish Tripathi (Ph.D.), Yeling Dai (Ph.D.), Sebastien Dietze (Ph.D.), Loic Jacot Descombes (M. Sc. project, ETH Zurich)

#### Undergraduate:

Sarah Garcia, Michael Folkerts, Kevin Duggento, Andrew McLeod, Samuel Stanwyck, LLuvia Rodriguez, Anashe Bandari, Magnus Heinz

- **University of Chicago**

Jonathan M. Logan (Ph.D.), Hyekyung Clarisse Kim (Ph.D.).

- **Harvard University**

Kyle J. Alvine (Ph.D. 2006)

- **Research Experience for Undergraduates**

Ernesto Abruna (B.Sc., 2007, University of Florida)

### Graduate Committee Member, UC San Diego:

Stephanie Moyermann (Physics), Keith Chan (Physics), Matthew Krems (Physics), Slaven Moro (Electrical Engineering), Mikas Remeika (Physics), Erik Shipton (Physics), Yaniv Rosen (Physics), Kevin D. Smith (M. Sc. 2008, Materials Science), Casey E. Chiang (Chemistry)

## PUBLICATIONS (h-index 14)

### In preparation/submitted:

1. “Local Structural Probes”, O. G. Shpyrko, Submitted to McGraw Hill 2010 Yearbook of Science & Technology (2009)
2. “Surface phase transition in the ternary Au-Si-Ge liquid metal alloy” S. Sellner, V. S. K. Balagurusamy, E. Yahel, S. Mechler, O. G. Shpyrko, A. Y. Grigoriev, P. S. Pershan, M. Meron and B. Lin, in preparation (2009)

### Published:

3. “Surface Structure of the Liquid Au<sub>72</sub>Ge<sub>28</sub> Eutectic Phase: X-ray Reflectivity” P. S. Pershan, S. E. Stoltz, S. Mechler, O. G. Shpyrko, V. S. K. Balagurusamy, A. Yu. Grigoriev, M. Meron and B. Lin, Phys. Rev. B 80, 125414 (2009)
4. “Surface structure of liquid Bi and Sn: An x-ray reflectivity study” P. S. Pershan, S. Stoltz, O. G. Shpyrko, Moshe Deutsch, V. S. K. Balagurusamy, M. Meron, B. Lin and R. Streitel, Phys. Rev. B 79, 115417 (2009)
5. “Infrared spectroscopy and nano-imaging of the insulator-to-metal transition in vanadium dioxide” M. M. Qazilbash, M. Brehm, G. O. Andreev, A. Frenzel, P.-C. Ho, Sun Jin Yun, Byung-Gyu Chae, Bong-Jun Kim, Hyun-Tak Kim, A. V. Balatsky, O. G. Shpyrko, M. B. Maple, F. Keilmann and D. N. Basov, Phys. Rev. B 79, 075107 (2009)
6. “Crystalline surface phases of the liquid Au-Si eutectic alloy” O. G. Shpyrko, R. Streitel, V. S. K. Balagurusamy, A. Yu. Grigoriev, M. Deutsch, B. M. Ocko, M. Meron, B. Lin and P. S. Pershan Phys. Rev. B 76, 245436 (2007)
7. “Pressure-Tuned Spin and Charge Ordering in an Itinerant Antiferromagnet” Y. Feng, R. Jaramillo, G. Srajer, J. C. Lang, Z. Islam, M. S. Somayazulu, O. G. Shpyrko, J. J. Pluth, H.-k. Mao, E. D. Isaacs, G. Aeppli, T. F. Rosenbaum Phys. Rev. Lett. 99, 137201 (2007)
8. “Direct measurement of antiferromagnetic domain fluctuations” O. G. Shpyrko, E. D. Isaacs, J. Logan, Y. Feng, R. Jaramillo, H. C. Kim, T. F. Rosenbaum, G. Aeppli, M. Sprung, S. Narayanan and A. Sandy Nature 447, 68 (2007)
9. “A Reply to the Comment by Frederic Caupin”, K. J. Alvine, O. G. Shpyrko, P. S. Pershan, K. Shin and T. P. Russell Phys. Rev. Lett. 98, 259602 (2007)
10. “Microscopic and Macroscopic Signatures of Antiferromagnetic Domain Walls” R. Jaramillo, T. F. Rosenbaum, E. D. Isaacs, O. G. Shpyrko, P. G. Evans, G. Aeppli and Z. Cai Phys. Rev. Lett. 98, 117206 (2007)
11. “X-ray Reflectivity Studies of Atomic-level Surface-segregation in a Liquid Eutectic Alloy of AuSn” V. S. K. Balagurusamy, R. Streitel, O. G. Shpyrko, P. S. Pershan, M. Meron, B. Lin Phys. Rev. B 75, 104209 (2007)
12. “Surface Freezing in Gold-Silicon liquid alloy” O. G. Shpyrko, R. Streitel, V. S. K. Balagurusamy, A. Yu. Grigoriev, M. Deutsch, B. M. Ocko, M. Meron, B. Lin and P. S. Pershan Science 313, 77 (2006)
13. “Capillary filling of anodized alumina nanopore arrays” K. J. Alvine, O. G. Shpyrko, P. S. Pershan, K. Shin and T. P. Russell

- Phys. Rev. Lett.* 97, 175503 (2006)
14. “Solvent Mediated Assembly of Nanoparticles Confined in Mesoporous Alumina”  
K. Alvine, D. Pontoni, O. G. Shpyrko, P. S. Pershan, D. J. Cookson, K. Shin, T. P. Russell, M. Brunnbauer, F. Stellacci and O. Gang  
*Phys. Rev. B* 73, 125412 (2006)
  15. “Surface induced atomic scale demixing in BiSn eutectic alloy”  
O. G. Shpyrko, A. Grigoriev, R. Streitel, D. Pontoni, P.S. Pershan, B.M. Ocko, M. Deutsch,  
*Phys. Rev. Lett.* 95, 106103 (2005)
  16. “Surface oxidation of liquid Sn” A. Grigoriev, O. G. Shpyrko, C. Steimer, P. S. Pershan, B. M. Ocko, M. Deutsch, B. Lin, J. Gebhardt, M. Meron and T. Graber  
*Surf. Sci.* 575, 223 (2005)
  17. “Anomalous layering at the liquid Sn surface”  
O. G. Shpyrko, A. Grigoriev, J.C. Steimer, P.S. Pershan, B.M. Ocko, M. Deutsch, B. Lin, J. Gebhardt, M. Meron and T. Graber  
*Phys. Rev. B* 70, 224206 (2004)
  18. “Surface Layering in Liquids: The Role of Surface Tension”  
O. G. Shpyrko, M. Fukuto, P.S. Pershan, I. Kuzmenko, B.M. Ocko and M. Deutsch  
*Phys. Rev. B* 69, 245423 (2004)
  19. “X-ray Study of the Liquid Potassium Surface: Structure and Capillary Wave Excitations”  
O. G. Shpyrko, P. Huber, P.S. Pershan, B.M. Ocko, H. Tostmann and M. Deutsch  
*Phys. Rev. B* 67, 115405 (2003)
  20. “Short-Range Wetting at Liquid Gallium-Bismuth Alloy Surfaces: X-ray Reflectivity Measurements and Square Gradient Theory”  
P. Huber, O. G. Shpyrko, P. S. Pershan, B. M. Ocko, E. DiMasi, M. Deutsch,  
*Phys. Rev. B* 68, 085409 (2003)
  21. “Tetra Point Wetting at the Free Surface of Liquid Ga-Bi”  
P. Huber, O. G. Shpyrko, P. S. Pershan, B. M. Ocko, E. DiMasi, and M. Deutsch,  
*Phys. Rev. Lett.* 89, 035502 (2002)
  22. “Wetting at the Free Surface of a Liquid Gallium-Bismuth Alloy Close to the Monotectic Point”  
P. Huber, O. G. Shpyrko, P. S. Pershan, E. DiMasi, B. M. Ocko, H. Tostmann and M. Deutsch  
*Colloids & Surfaces A*. 206, 515 (2002)
  23. “Pairing Interactions and Gibbs Adsorption at the Liquid Bi-In Surface” E. DiMasi, H. Tostmann,  
O. G. Shpyrko, P. Huber, B. M. Ocko, P. S. Pershan, M. Deutsch and L. E. Berman  
*Phys. Rev. Lett.* 86, 1538 (2001)
  24. “Resonant X-Ray Scattering from the Surface of a Dilute Hg-Au Alloy” E. DiMasi, H. Tostmann,  
B. M. Ocko, P. Huber, O. G. Shpyrko, P. S. Pershan, M. Deutsch and L. E. Berman  
*Mat. Sci. V* Vol. 590. Eds. Mini, Perry and Stock. MRS (2000)
  25. “Microscopic Structure of the Wetting Film at the Surface of Liquid Ga-Bi Alloys”  
H. Tostmann, E. DiMasi, O. G. Shpyrko, P. S. Pershan, B.M. Ocko and M. Deutsch  
*Phys. Rev. Lett.* 84, 4385 (2000)
  26. “Surface Induced Order in Liquid Metals and Binary Alloys”  
E. DiMasi, H. Tostmann, O. G. Shpyrko, M. Deutsch, P.S. Pershan and B. M. Ocko  
*J. Phys. Cond. Matt.* 12, 209 (2000)
  27. “Surface Structure of Liquid Metals and the Effect of Capillary Waves: X-Ray Studies on Liquid Indium”  
H. Tostmann, E. DiMasi, P. S. Pershan, B. M. Ocko, O. G. Shpyrko and M. Deutsch  
*Phys. Rev. B* 59, 783 (1999)

28. “Microscopic Surface Structure of Liquid Alkali Metals”  
H. Tostmann, E. DiMasi, P. S. Pershan, B. M. Ocko, O. G. Shpyrko and M. Deutsch  
*Phys. Rev. B* 61, 7284 (1999)
29. “Surface Phases in Binary Liquid Metal Alloys: an X-ray Study”  
H. Tostmann, E. DiMasi, O. G. Shpyrko, P. S. Pershan, B. M. Ocko and M. Deutsch  
*Ber. Bunsenges. Phys. Chem.* 102, 1136-1141 (1999)

## **INVITED PRESENTATIONS (2004 - present)**

1. “Applications of X-ray Photon Correlation spectroscopy” 2<sup>nd</sup> School and Workshop on X-ray Micro and Nanoprobes (XMNP2009), Palinuro Salerno, Italy, June 2009
2. “Fundamental aspects of X-ray Photon Correlation spectroscopy” 2<sup>nd</sup> School and Workshop on X-ray Micro and Nanoprobes (XMNP2009), Palinuro Salerno, Italy, June 2009
3. “A novel methodology for an enlightened search for new superconductors.” International Workshop on the Search for New Superconductors, Kanagawa, Japan, May 2009
4. “Domain wall dynamics in antiferromagnetic Chromium”, UCLA Physics Seminar, April 2009
5. “Surface freezing in liquid binary alloys”, NSF Review of Consortium for Advanced Radiation, University of Chicago, Argonne, IL, May 2008
6. “Domain wall dynamics in antiferromagnetic Chromium”, Workshop on Nanoscale phenomena near phase transitions, Center for Nanoscale Materials, Argonne National Laboratory, Argonne, IL, May 2008
7. “Dynamics in Quantum Antiferromagnets”, Rosalind Franklin Young Investigator Award Presentation, Advanced Photon Source, Argonne National Laboratory, Argonne, IL May 2008
8. “Domain Wall Dynamics in Antiferromagnetic Chromium”, Advanced Light Source Seminar, Lawrence Berkeley National Laboratory, Berkeley, CA, April 2008
9. “Phase defects in spin-ordered materials”, NSLS-II Coherent Diffraction Imaging workshop, Brookhaven National Laboratory, Upton, NY, March 2008
10. “XPCS Study of Antiferromagnetic Domain Dynamics in Chromium”, NSLS-II XPCS workshop, Brookhaven National Laboratory, Upton, NY, January 2008
11. “XPCS Study of Antiferromagnetic Domain Dynamics in Chromium” DOE Review of Advanced Photon Source, Argonne, IL, December 2007
12. “Studies of Capillary Dynamics with X-ray Diffuse Scattering”, Liquid Surface X-ray Scattering School, Argonne National Laboratory, Argonne, IL, November 2007
13. “XPCS Studies of Antiferromagnetic Domain Wall Dynamics in Elemental Chromium” SSRL/LCLS Users Meeting and Workshops, New Opportunities in Imaging and X-ray Microscopy, Stanford University, Menlo Park, CA, October 2007
14. “XPCS Studies of Antiferromagnetic Domain Wall Fluctuations” DOE Review of Advanced Photon Source, Argonne National Lab, Argonne, IL, September 2007
15. “Domain Wall Dynamics in Quantum Antiferromagnets”, CNM Users Meeting, X-ray Nanoprobe Workshop, Argonne, IL, May 2007
16. “Dynamics in quantum magnets”, APS Users Seminar, Argonne, IL, April 2007
17. “Dynamics in quantum magnets”, Colloquium, University of Illinois at Urbana-Champaign, IL, March 2007
18. “Dynamics of domain walls in Chromium”, Physics Colloquium, Iowa State University, Ames, IA, February 2007
19. “Dynamics of domain walls in Chromium”, Condensed Matter Seminar, UC San Diego, La Jolla, CA, January 2007

20. "Coherent X-ray Imaging of Antiferromagnetic Domains in Chromium", APS Imaging Group Seminar, December 2006
21. "Spin Dynamics in SDW Antiferromagnets with X-ray Speckle", Sixth International Workshop on Nanophysics, Argonne, IL, November 2006
22. "Dynamics in Quantum Magnets", New Scientific Opportunities with VUV and Soft X-ray Free Electron Lasers, SRC Workshop, Madison, WI, October 2006
23. "Coherent Flux and New Possibilities in Quantum Dynamics", Advanced Photon Source Upgrade Planning workshop, Coherence/Imaging section, Argonne, IL, July 2006
24. "Quantum Tunneling of Spin Density Wave Domain Walls in Chromium" Quantum Nanomagnetism Workshop, CNM Users Meeting, Argonne, IL, May 2006
25. "Nanoscale Dynamics of Antiferromagnetic Domains" Center for Nanoscale Materials SAC Review, Argonne, IL, February 2006
26. "Novel Surface Phases in Binary Liquid Alloys", CARS Facilities, University of Chicago Scientific Advisory Committee Review, Argonne, IL, February 2006
27. "Review of X-ray Reflectivity and Diffuse Scattering Studies of Liquid Surfaces" Liquid and Soft-Matter Interest Group Seminar, Argonne, IL, October 2005
28. "Quantum Phase Transitions in Antiferromagnetic Chromium" Advanced Photon Source Users Seminar, Argonne, IL, September 2005
29. "Spin, Charge and Strain Waves in Antiferromagnetic Chromium" CNM Nanoscience Seminar, Argonne National Lab, Argonne, IL, July 2005
30. "Behavior of Liquids and Nanoparticles in Nanoconfinement" SR-Nano'05, 2nd US-Japan Workshop on Synchrotron Radiation and Nanoscience, San Diego, CA, April 2005
31. "X-ray Studies of Liquid Surfaces and Nanoconfined Liquids" Advanced Photon Source User Science Seminar, Argonne IL, December 2004
32. "Liquid-Vapor Interface Structures in monatomic and binary metallic liquids" James Franck Institute seminar, University of Chicago, IL, November 2004
33. "Surface Layering in Simple Liquids: Elemental Metals, Binary Alloys and Dielectrics" Center for Nanoscale Materials Seminar, Argonne National Laboratory, November 2004

### **CONTRIBUTED PRESENTATIONS (2004 - present)**

1. "Collective Dynamics and Slow Relaxation of Charge/Spin Density Wave in Chromium", American Physical Society March Meeting, New Orleans, LA, March 2008
2. "XPCS Study of Antiferromagnetic Domain Wall Dynamics", Coherence-2007, International Workshop on Phase Retrieval and Coherent Scattering, Monterey, CA, July 2007
3. "Dynamics of Spin Density Wave Domains in Chromium", The International Conference on Strongly Correlated Electron Systems, Houston, TX, May 2007
4. "Domain Wall Dynamics in Quantum Antiferromagnets", CNM Users Meeting, Argonne, IL, May 2007
5. "Direct Measurement of Antiferromagnetic Domain Wall Fluctuations", American Physical Society March Meeting, Denver, March 2007
6. "Nanoscale dynamics of magnetic domain walls with x-ray speckle", Fifth International Conference on Synchrotron Radiation in Materials Science, Chicago, IL, August 2006
7. "Quantum vs. Thermal Annealing of Magnetic Domain Walls in Elemental Chromium", American Physical Society March Meeting, Baltimore, MD, March 2006
8. "Surface Freezing in AuSi liquid alloy", Focusing Stress in a Soft Interface, MRSEC Workshop, University of Chicago, Chicago, IL, November 2005

9. "In-situ study of structure and dynamics of nanoconfined materials" Workshop on In-Situ Characterization of Surface and Interface Structures and Processes, Argonne, IL, Sept. 2005
10. "Capillary filling and Self-Assembly of Au nanoparticles within AAO Nanopore arrays" Center for Nanoscale Materials Users Meeting, Argonne, IL, May 2005
11. "Atomic-scale surface demixing in a eutectic liquid BiSn alloy" Advanced Photon Source Users Meeting, Argonne, IL, May 2005
12. "Surface Freezing and Surface Segregation in Binary Liquids", 6<sup>th</sup> Annual Greater Boston Area Statistical Mechanics Meeting, Brandeis University, MA, October 2004
13. "Surface Freezing in Binary Liquid Gold-Silicon Alloy" APS March Meeting, Los Angeles, CA, March 2005
14. "Surface Layering in Alkali Metals: X-ray Studies of Liquid Potassium" CMC-CAT, Argonne National Laboratory, IL, August 2004
15. "Atomic Layering Structure at the Surface of Liquid Sn" Advanced Photon Source Annual User Meeting, Argonne, IL, May 2004
16. "Surface Structure Study of Liquid Eutectic Alloys: AuSi and AuGe" 2004 NSLS Users Meeting Poster Presentation (Top Prize winner), NSLS Users Meeting, Brookhaven, NY, May 2004