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Xiaodong Xu

EDUCATION BACKGROUND

2002-2008 **PhD in Physics, University of Michigan, Ann Arbor**
Advisor: Duncan Steel, Ph.D., Departments of Physics， Applied Physics, Electrical Engineering and Computer Science.

1997-2002 **B.S. in Applied Physics Department, University of Science and Technology of China,**
Advisor: Jiangfeng Du, Ph.D., Department of Applied Physics

EXPERIENCE

2010 August- **Assistant Professor** of Department of Physics, Department of Material Science and Engineering, and Department of Electrical Engineering at **University of Washington,** Seattle.

2009- 2010 **Postdoctoral Research Associate**, ***Center for Nanoscale Systems***, **Cornell University**
Advisor: Prof. Paul McEuen, Department of Physics
Investigated carbon-based nanomaterials for optoelectronics, plasmonics and nano-electronics.

2002 - 2008 **Research Assistant**, ***Nonlinear*** Optics ***Spectroscopy Lab,*** **Department of Physics, The University of Michigan**
Advisor: Prof. Duncan Steel
Investigated quantum optoelectronic properties of semiconductor quantum dots by coherent nonlinear optical spectroscopy

2002-2003 **Graduate Student Instructor, *General Physics lab*, Department of Physics, The University of Michigan**
Instructed labs, held office hours for 40 students and graded homework and exams.

2000-2002 **Undergraduate Research Assistant**, **Department of Applied Physics, University of Science and Technology of China**
Advisor: Prof. Jiangfeng Du
Performed theoretical studies on quantum information and quantum computation science.

Selected AWARDS

DoE Early Career Award, 2012
NSF Early Career Award, 2012
DARPA Young Faculty Award, 2011
Kent M. Terwilliger Memorial Thesis Prize, University of Michigan 2009
Rackham Predoctoral Fellowship, University of Michigan 2008
Physics Department Fellowship, University of Michigan 2002~2003
Best Undergraduate Thesis Award, University of Science and Technology of China 2002

SYNERGISTIC ACTIVITIES

Journal Review: Nature Nanotechnology; Nature Photonics; Nature Communication; Nature Materials; Physical Review Letters; Physical Review B; Physics Review A; ACS Nano; Nano Letters; Journal of the Optical Society of America B; Nanoscale;
Grant Review: NSF; Hongkong Research Grant Council; DoE

IMPORTANT WORK

1. Jason S. Ross*, Sanfeng Wu*, Hongyi Yu, Nirmal J. Ghimire, Aaron M. Jones, Grant Aivazian, Jiaqiang Yan, David G. Mandrus, Di Xiao, Wang Yao, **X. Xu**, "Electrical Control of Neutral and Charged Excitons in a Monolayer Semiconductor", ***Nature Communication***, in press, preprint http://arxiv.org/abs/1211.0072

2. S. Wu, J. Ross, G. Aivazian, A. Jones, Z. Fei, G. Liu, W. Zhu, D. Xiao, W. Yao, D. Cobden, **X. Xu**, "Electrical Tuning of Valley Magnetic Moment Through Symmetry Control in Bilayer MoS_2", ***Nature Physics***, in press, preprint http://arxiv.org/abs/1208.6069
3. T. Ksirga, D. Sun, J. Park, J. Coy, Z. Fei, **X. Xu**, D. Cobden, " Photoresponse of a Strongly Correlated Material Determined by Scanning Photocurrent Microscopy " , ***Nature Nanotechnology*** 7, 723 (2012).
4. D. Sun, G. Aivazian, A. M. Jones, J. Ross, W. Yao, D. Cobden, **X. Xu**, "Ultrafast Hot-Carrier Dominated Photocurrent in Graphene", ***Nature Nanotechnology*** 7, 114(2012).
5. **X. Xu**[*], W. Yao[*], B. Sun[*], D. G. Steel, A. S. Bracker, D. Gammon, L.J. Sham, "Optically Controlled Locking of the Nuclear Field via Dark State Spectroscopy", ***Nature*** 459, 1105 (2009). This work is highlighted by more than ten websites, including **eurekalert.org** and **physorg.com**.
6. **X. Xu**, B. Sun, P. Berman, D.G. Steel, A.S. Bracker, D. Gammon, L.J. Sham, "Coherent Population Trapping of an Electron Spin in a Single Negatively Charged Quantum Dot", ***Nature Physics* 4,** 692 (2008). This work has been highlighted by ***Nature Physics* 4,** 678 (2008), U. Michigan News front page and more than ten websites.
7. **X. Xu**, B. Sun, P. Berman, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham et al., "Coherent Optical Spectroscopy of a Strongly Driven Quantum Dot", ***Science* 319**, 929 (2007). This work has been highlighted by ***Nature Photonics* 1**, 506 (2007), U. Michigan physics department annual research review, and cited by research highlights of ***Nature Nanotechnology* 2**, 521 (2007).

COMPLETE PUBLICATIONS

1. S. Wu, C. Huang., G. Aivazian, J. Ross, D. Cobden, **X. Xu**, " Vapor-Solid Growth of High Quality MoS2 Monolayers With Near-Unity Valley Polarization", submitted (2012).
2. Jason S. Ross*, Sanfeng Wu*, Hongyi Yu, Nirmal J. Ghimire, Aaron M. Jones, Grant Aivazian, Jiaqiang Yan, David G. Mandrus, Di Xiao, Wang Yao, **X. Xu**, "Electrical Control of Neutral and Charged Excitons in a Monolayer Semiconductor", ***Nature Communication***, in press, preprint http://arxiv.org/abs/1211.0072
3. S. Wu, J. Ross, G. Aivazian, A. Jones, Z. Fei, G. Liu, W. Zhu, D. Xiao, W. Yao, D. Cobden, **X. Xu**, "Electrical Tuning of Valley Magnetic Moment Through Symmetry Control in Bilayer MoS_2", ***Nature Physics***, in press, preprint http://arxiv.org/abs/1208.6069
4. T. Ksirga, D. Sun, J. Park, J. Coy, Z. Fei, **X. Xu**, D. Cobden, " Photoresponse of a Strongly Correlated Material Determined by Scanning Photocurrent Microscopy " , ***Nature Nanotechnology*** 7, 723(2012).
5. D. Xiao, G. Liu, W. Feng, **X. Xu**, W. Yao, "Coupled Spin and Valley Physics in Monolayers of MoS2 and Other Group-VI Dichalcogenides", http://arxiv.org/abs/1112.3144, ***Phys. Rev. Lett.*** in press (2012).
6. S. Wu, L. Mao, W. Yao, A. M. Jones, C. Zhang, **X. Xu**, "Tunable Quantum-Enhanced Second-Order Optical Nonlinearity From Bilayer Graphene", ***Nano Letters***, dx.doi.org/10.1021/nl300084j (2012).
7. D. Sun, G. Aivazian, A. M. Jones, J. Ross, W. Yao, D. Cobden, **X. Xu**, "Ultrafast Hot-Carrier Dominated Photocurrent in Graphene", ***Nature Nanotechnology*** 7, 114(2012).
8. A. Soudi, G. Aivazian, S.-F. Shi, **X. Xu**, Y. Gu, "Probing transconductance spatial variations in graphene nanoribbon field-effect transistors using scanning gate microscopy", ***APL*** 100, 033115 (2012).
9. B. Sun, W. Yao, **X. Xu**, A. S. Bracker, D. Gammon, L. J. Sham, and D. Steel, "Persistent optical nuclear spin narrowing in a singly charged InAs quantum dot", invited review, ***J. Opt. Soc. Am. B*** 29, A119(2012).
10. S. Shi, **X. Xu**, D. Ralph, P. L. McEuen, "Plasmon Resonance in Individual Nanogap Electrodes Studied Using Graphene Nanoconstrictions as Photodetectors", ***Nano Letters*** 11, 1814 (2011).
11. E. D. Kim, K. Truex, Y. Wu, A. Amo, **X. Xu**, D. G. Steel, A. S. Bracker, D. Gammon and L. J. Sham, "Picosecond optical spectroscopy of a single negatively charged self-assembled InAs quantum dot", ***APL*** 97, 113110 (2010).
12. E. D. Kim, K. Truex, **X. Xu,** B. Sun, D. G. Steel, A. S. Bracker, D. Gammon and L. J. Sham, "Fast spin rotations and optically controlled geometric phases in a quantum dot", ***Phys. Rev. Lett.*** 104, 167401

(2010).

13. **X. Xu**, Nathaniel M. Gabor, Jonathan S. Alden, Arend van der Zande, and Paul L. McEuen, "Photo-Thermoelectric Effect at a Graphene Interface Junction", ***Nano Letters*** 10, 562 (2010).
14. **X. Xu,** B. Sun, P. R. Berman, Dan Gammon, L. J. Sham, D. G. Steel, "A Single Quantum Dot Driven by a Strong Optical Field", invited paper for a special issue of ***Solid State Communications*** on Fundamental Phenomena and Applications of Quantum Dots, 149, 1479(2009).
15. **X. Xu**, W. Yao, B. Sun, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham, "Optically Controlled Locking of the Nuclear Field via Dark State Spectroscopy", ***Nature*** 459, 1105 (2009).
16. P. R. Berman, **X. Xu**, "Four Wave Mixing in a Lambda System", ***Phys. Rev. A.*** 78, 053407 (2008).
17. **X. Xu**, B. Sun, P. R. Berman, D. G. Steel, A.S. Bracker, D. Gammon, L. J. Sham, "Coherent Population Trapping of an Electron Spin in a Single Negatively Charged Quantum Dot", ***Nature Physics* 4,** 692 (2008).
18. **X. Xu**, B. Sun, E. D. Kim, K. Smirl, P. R. Berman, D. G. Steel, A.S. Bracker, D. Gammon, L. J. Sham, "a Single Charged Quantum Dot in a Strong Optical Field: Absorption, Gain and the AC Stark Effect", ***Phys. Rev. Lett***. 101, 227401 (2008).
19. J. Cheng, W. Yao, **X. Xu**, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham, "Stimulated Raman Spin-Coherence and Spin-Flip Induced Hole Burning in Charged GaAs Quantum Dots", ***Phys. Rev. B***. 77, 115315 (2008).
20. **X. Xu**, B. Sun, P. Berman, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham, "Coherent Optical Spectroscopy of a Strongly Driven Quantum Dot", ***Science* 319**, 929 (2007).
21. **X. Xu**, Y. Wu, B. Sun, Q. Huang, J. Cheng, D.G. Steel, A.S. Bracker, D. Gammon, C. Emary, L. J. Sham, "Fast Spin State Initialization of a Singly-Charged InAs-GaAs Quantum Dot by optical cooling", ***Phys. Rev. Lett.* 99**, 097401 (2007).
22. Y. Wu, E. D. Kim, **X. Xu,** J. Cheng, D. G. Steel, A. S. Bracker, D. Gammon, S. E. Economou , L. J. Sham, "Selective Optical Control of Electron Spin Coherence in Singly Charged GaAs-$Al_{0.3}Ga_{0.7}As$ Quantum Dots", ***Phys. Rev. Lett.* 99**, 097402 (2007).
23. C. Emary, **X. Xu**, S. Saikin, D. G. Steel, L. J. Sham, "Fast Initialization of the Spin State of an Electron in a Quantum Dot in the Voigt Configuration", ***Phys. Rev. Lett.* 98**, 047401 (2007).
24. J. Cheng, Y. Wu, **X. Xu**, D. Sun, D. G. Steel, A. S. Bracker, D. Gammon, W. Yao, L.J. Sham, "Spin Relaxation in Charged Quantum Dots Measured by Coherent Optical Phase Modulation Spectroscopy", ***Solid State Communications* 140**, 381 (2006).
25. M. V. G. Dutt, J. Cheng, Y. Wu, **X. Xu**, D.G. Steel, A. S. Bracker, D. Gammon, S. E. Economou, R. B. Liu, L. J. Sham, "Ultrafast Optical Control of Electron Spin Coherence in Charged GaAs Quantum Dots", ***Phys. Rev. B* 74**, 125306 (2006).
26. X. Li, Y. Wu, **X. Xu**, D. Gammon, D. G. Steel "Transient Nonlinear Optical Spectroscopy Studies Involving Biexciton Coherence in Single Quantum Dots", ***Phy. Rev. B* 73**, 153304 (2006).
27. M. V. G. Dutt, J. Cheng, B. Li, **X. Xu**, X. Li, P. R. Berman, D. G. Steel, A. S. Bracker, D. Gammon, S.E. Economou, R. B. Liu, L. J. Sham, "Stimulated and Spontaneous Optical Generation of Electron Spin Coherence in Charged GaAs Quantum Dots", ***Phys. Rev. Lett.* 94**, 227403 (2005).
28. J. Du, H. Li, **X. Xu**, X. Zhou, R. Han, "Phase-Transition-Like Behavior of Quantum Games", ***Journal of Physics A-Mathematical and General* 36**, 6551 (2003).
29. J. Du, H. Li, **X. Xu**, M. Shi, J. Wu, X. Zhou, R. Han, "Experimental Implementation of the Quantum Random-Walk Algorithm", ***Phys. Rev. A* 67**, 042316 (2003).
30. J. Du, **X. Xu**, H. Li, X. Zhou, R. Han, "Playing Prisoner's Dilemma with Quantum Rules", ***Fluctuation and Noise Letters* 2**, R189 (2002).
31. J. Du, H. Li, **X. Xu**, X. Zhou, R. Han, "Entanglement Enhanced Multiplayer Quantum Games", ***Phys. Lett.***

***A* 302**, 229 (2002).

32. J. Du, H. Li, **X. Xu**, X. Zhou, R. Han, "Multi-Player and Multi-Choice Quantum Game", ***Chinese Physics Letters* 19**, 1221 (2002).
33. J. Du, H. Li, **X. Xu**, M. Shi, J. Wu, X. Zhou, R. Han, "Experimental Realization of Quantum Games on a Quantum Computer", ***Phys. Rev, Lett.* 88**, 137902 (2002).
34. J. Du, **X. Xu**, H. Li, X. Zhou, R. Han, "Entanglement Playing a Dominating Role in Quantum Games", ***Phys. Lett. A* 289**, 9 (2002).

INVITED TALK and CONFERENCE PRESENTATIONS

1. **X. Xu**, "Optical Generation and Electrical Control of Valley Excitons and Spins in Atomically Thin Semiconductors", ***Energy Materials Nanotechnology***, Huston, TX 2013.
2. **X. Xu**, "Optical Generation and Electrical Control of Valley Magnetic Moment Via Symmetry Control", ***Hong Kong Forum of Physics 2012: Frontiers of Quantum Science and Technology***, HongKong, China 2012.
3. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", Physics Department, ***University of British Columbia,*** Vancouver, Canada 2012
4. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", Physics Department, ***Massachusetts Institute of Technology***, Boston, MA 2012.
5. **X. Xu**, "Optical Generation and Electrical Control of Excitons and Valleys in Atomically Thin Semiconductors", ***DoE X-Ray Science Program Meeting***, Gaithersburg, MD 2012
6. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", Electrical and Computer Engineering, ***University of Minnesota***, Twin City, MN 2012
7. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", Chemistry Department, ***University of Washington***, Seattle, WA 2012.
8. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", Physics Department, ***Carnegie Mellon University***, Pittsburg, PA 2012.
9. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", Physics Department, ***Virginia Tech***, Blacksburg ,VA 2012.
10. **X. Xu**, "Optical Probing Novel 2D Electronic Systems", ***University of Texas***, Dallas, Texas 2012.
11. **X. Xu**, "Ultrafast Graphene Optoelectronic Assisted by Hot-Carrier Transport", ***CMOS Emerging Technology Conference***, Vancouver, Canada 2012.
12. **X. Xu**, "Hot-Carrier Dynamics in Dirac Quantum Materials", ***Kavli Institute of Theoretical Physics***, University of California at Santa Barbara, CA 2012.
13. T. S. Ksirga, D. Sun, J. Park, J. Coy, **X. Xu**, D. Cobden, " Photocurrent in Vanadium Dioxide", ***APS March Meeting***, Boston, MA 2012.
14. J. Park, T. S. Ksirga, J. Coy, **X. Xu**, D. Cobden, " Strain control of the metal-insulator transition in vanadium dioxide nanobeams ", ***APS March Meeting***, Boston, MA 2012.
15. G. Aivazian, D. Sun, , A. M. Jones, J. Ross, W. Yao, D. Cobden, **X. Xu**, " New Aspects of Photocurrent Generation at Graphene pn Junctions Revealed by Ultrafast Optical Measurements ", ***APS March Meeting***, Boston, MA 2012.
16. S. Wu, L. Mao, W. Yao, A. M. Jones, C. Zhang, **X. Xu**, " Tunable Quantum-Enhanced Second-Order Optical Nonlinearity From Bilayer Graphene ", ***APS March Meeting***, Boston, MA 2012.
17. D. Xiao, G. Liu, W. Feng, **X. Xu**, W. Yao, "Novel valley and spin physics in monolayer MoS_2", ***APS March Meeting***, Boston, MA 2012.
18. A. Jones, J. Park, J. Coy, D. Cobden, **X. Xu**, " Ultrafast Spectroscopy and Optically-Induced Phase Transitions of Single Crystal VO2", ***APS March Meeting***, Boston, MA 2012.

19. J. Ross, G. Aivazian, D. Sun., W. Yao, D. Cobden, X. Xu, " Hot-Carrier cooling at Graphene-Metal Contact Interface", ***APS March Meeting***, Boston, MA 2012.
20. R. Roy, L. Mao, G. Aivazian, Y. Wang, D. Cobden, C. Zhang, **X. Xu**, "Photo-Induced Chiral-Edge Current in Topological Insulator Nanoribbons", ***APS March Meeting***, Boston, MA 2012.
21. **X. Xu**, " Ultrafast Graphene Optoelectronics Assisted by Hot-Carrier Transport", ***Washington State University***, Pullman WA, 2012
22. **X. Xu**, "Optical Probing Novel Electronic Phenomena of New Nanoscale Structures", ***Oregon State University***, Oregon, 2011.
23. SF Shi, **X. Xu**, P. L. McEuen, D. C. Ralph, "Plasmon-Enhanced Photocurrent in a Graphene Nanoconstriction", ***APS March Meeting***, Dallas, TX 2011.
24. **X. Xu**, " Graphene Optoelectronics and Plasmonics ", ***Washington State University***, Pullman WA, 2010.
25. **X. Xu,** W. Yao, B. Sun, D. G Steel, A. S. Bracker, D. Gammon, L. J. Sham, "Increasing the electron spin coherence time by coherent optical control of the nuclear spin fluctuations", ***APS March Meeting***, Portland, Oregon 2010.
26. **X. Xu**, "Optically probing electron spin and charge in solid state nanostructures", Invited colloquium at ***University of Washington*** at Seattle, 2010.
27. **X. Xu**, "Optically probing electron spin and charge in solid state nanostructures", Seminar at ***University of California, Berkeley*** 2010.
28. Melina Blees, **X. Xu,** Arend van der Zande, Zhaohui Zhong, Nathan Gabor, Phi Pham, P. L. McEuen, "Graphene/Carbon Nanotube Cross-Junction Devices", ***APS March Meeting***, Portland, Oregon 2010.
29. Bo Sun, **X. Xu**, Wang Yao, Duncan Steel, A. S. Bracker, Dan Gammon, L. J. Sham, **"**Optically Controlled Locking of the Nuclear Field via Coherent Dark State Spectroscopy**", *Conference on Lasers and Electro-Optics***, Baltimore, MD, 2009.
30. Bo Sun, **X. Xu**, Paul R. Berman, Duncan G. Steel, A. S. Bracker, Dan Gammon, L. J. Sham, "Coherent Population Trapping of an Electron Spin in a Single Negatively Charged Quantum Dot", **", *Conference on Lasers and Electro-Optics***, Baltimore, MD, 2009.
31. **X. Xu**, B. Sun, P. R. Berman, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham , "Coherent Optical Spectroscopy of a Strongly Driven Quantum Dot", ***Conference on Lasers and Electro-Optics***, San Jose, Cal, 2008.
32. **X. Xu**, B. Sun, P. R. Berman, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham , "Experiments on Spin Manipulation in Quantum Dots", ***Michigan Quantum Summer School,*** Ann Arbor, MI, 2008.
33. **X. Xu**, B. Sun, P. R. Berman, D. G. Steel, A. S. Bracker, D. Gammon, L. J. Sham , "Coherent Population Trapping of an Electron Spin in a Singly-Charged Quantum Dot", ***American Physical Society March Meeting***, New Orleans, Louisiana, 2008.
34. **X. Xu**, B. Sun, P. R. Berman, D.G. Steel, A. S. Bracker, D. Gammon, L. J. Sham , "The Optical Mollow Absorption Spectrum of a Single Quantum Dot", ***Fundamental Optical Processes in Semiconductors***, Big Sky, Montana, 2007.
35. **X. Xu**, Y. Wu, J. Cheng, Q. Huang, D. G. Steel, A. S. Bracker, D. Gammon, C. Emary, L. J. Sham, "Fast Spin State Initializaiton of a Single Quantum Dot Electron", ***Conference on Lasers and Electro-Optics***, Baltimore, MD, 2007.
36. B. Sun, **X. Xu**, J. Cheng, Y. W. Wu, D. G. Steel, A. S. Bracker, D. Gammon, W. Yao, L. J. Sham, "Nonlinear Optical Probe of a Singly-Charged Stranski-Krastanow Quantum Dot", ***Conference on Lasers and Electro-Optics***, Baltimore, MD, 2007.
37. **X. Xu**, Y. Wu, J. Cheng, Q. Huang, D.G. Steel, A. S. Bracker, D. Gammon, C. Emary, L. J. Sham, "Fast Spin State Initializaiton of a Single Quantum Dot Electron" ***American Physical Society March Meeting***, Denver, CO, 2007.

38. **X. Xu**, J. Cheng, M. V. G. Dutt, Y. Wu, D. G. Steel, R. B. Liu, S. E. Economou, L. J. Sham, "Optically Stimulated and Spontaneously Generated Electron Spin Coherence in Quantum Dots", ***Conference on Lasers and Electro-Optics***, Baltimore, MD, 2005.