

Mr. Xiaodong Qi
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Education

- 2012–present **University of New Mexico** **Albuquerque, NM, USA**
PhD candidate for *Quantum Optics, quantum information, quantum measurement and control* in Physics.
GPA: **3.9**.
- 2010 – 2012 **Queen's University** **Kingston, ON, Canada**
M.Sc. for *Quantum Optics, nanophotonics, cavity-QED and computational physics* in Condensed Matter Physics.
Overall GPA: **3.9**.
- 2007 – 2010 **Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences**
Changchun, Jilin, China
M.S. for *semiconductor nanophotonics* in Condensed Matter Physics.
Overall GPA: **92.1/100**, Major GPA: **93.3/100**, Rank: 1% in Graduate School of Chinese Academy of Sciences.
- 2003 – 2007 **Shandong University of Science and Technology** **Qingdao, Shandong, China**
B.S. for *photoelectronics* in Applied Physics.
Overall GPA: **86.0/100**, Major GPA: **88.7/100**, Rank: 2/63.

Research

Interests

Quantum Optics, Quantum Information, Quantum Metrology, Quantum Control and Nanophotonics.

Publications

- 2015 **Xiaodong Qi**, Ben Q. Baragiola, Ivan H. Deutsch, *et al.* Dispersive response of atoms trapped near the surface of an optical nanofiber with applications to QND measurement and spin squeezing. (submitted to Physics Review A)
- 2011 Guangyu Liu, Yongqiang Ning, **Xiaodong Qi**, *et al.* The study of whispering-gallery-mode in photonic crystal microcavity. *Journal of Optoelectronics-Laser*. 2011, 7(2), 105-108.
- 2010 **Xiaodong Qi**, Shujuan Ye, Nan Zhang, *et al.* Surface-emitting distributed-feedback semiconductor lasers and grating-coupled laser diodes (面发射分布反馈半导体激光器及光栅耦合半导体激光器), *Chinese Journal of Optics and Applied Optics*, 2010, 3(5), 415-431. (in Chinese)
- 2010 Shujuan Ye, Li Qin, **Xiaodong Qi**, *et al.* Emission characteristics of second-order distributed feedback semiconductor Lasers (二阶光栅分布反馈半导体激光器的出光特性). *Chinese Journal of Lasers*, 2010, 37(9): 2371-2375.
- 2009 Dehua Li, **Xiaodong Qi** and Shenggang Liu. A theoretical analysis of optical-to-THz conversion efficiency via optical rectification. *Science in China series E*, 39(4), 2009, 745-750. (in Chinese)
- 2008 Dehua Li, **Xiaodong Qi** and Shenggang Liu. A theoretical analysis of optical-to-THz conversion efficiency via optical rectification. *Science in China series E*, 51(12), 2008, 2080-2088.

Thesis and

Essays

- 2012 **Xiaodong Qi**. The effects of multi-exciton interactions on optical cavity emission. MSc thesis.
- 2011 **Xiaodong Qi**. Modeling and deciphering on two spin-polariton entanglement experiments in NV center of diamond. [arXiv:1111.5532](https://arxiv.org/abs/1111.5532) [physics.gen-ph].

Conferences

- 2015 **Xiaodong Qi**, Ben Q. Baragiola, Poul S. Jessen, Ivan H. Deutsch. Dispersive Interactions for Strong Atom-Photon Coupling in a Guided Nanophotonic Fiber Geometry. *46th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, 60(7), 2015, Columbus OH USA (6/8/2015-6/12/2015, oral presentation).
- 2015 **Xiaodong Qi**, Ben Q. Baragiola, Poul S. Jessen, Ivan H. Deutsch. Dispersive mode response due to nanofiber-trapped atoms. *17th Annual SQuInT Workshop*, Berkeley CA USA (2/19/2015-2/21/2015, poster presentation).
- 2014 **Xiaodong Qi**, Ben Q. Baragiola, Ivan H. Deutsch. Dispersive response: Phase shift and polarization transformation of guided nanofiber modes due to trapped atoms in the evanescent field. *Gordon Research Conference on Quantum Science*, Easton MA USA (7/27/2014-8/1/2014, poster presentation).
- 2014 **Xiaodong Qi**, Ben Q. Baragiola, Ivan H. Deutsch. Dispersive response: Phase shift and polarization transformation

of guided nanofiber modes due to trapped atoms in the evanescent field. *Gordon Research Seminar on Quantum Science*, Easton MA USA (7/26/2014-7/27/2014, poster presentation).

- 2009 Dehua Li, **Xiaodong Qi** and Shenggang Liu. A theoretical analysis of optical-to-THz conversion efficiency via optical rectification. *IONS China 2009*. (poster presentation).
- 2008 Dehua Li, **Xiaodong Qi**, Zhou Wei, Jin Tao and Shenggang Liu. Optical-to-THz conversion efficiency analysis and comparison of ZnTe, DAST, LiNbO₃ crystals, *Proc. SPIE*, Vol. 7277, 727715. (Photonics and Optoelectronics Meetings (PEOM) 2008: Terahertz Science and Technology).

Patents

- 1 Shujuan Ye, Li Qin, Yongsheng Hu, Xiaodong Qi, Nan Zhang. Two-D Surface Emitting Laser Array Locked via Mutual Injection. Chinese Patent No: 201010179548.9, 2010.
- 2 Shujuan Ye, Yongsheng Hu, Li Qin, Xiaodong Qi, Nan Zhang. Semiconductor Laser using Grating for High-power Coherent Emission. Chinese Patent No: 201010242304.0, 2010.
- 3 Qi Wang, Lijun Wang, Jun Zhang, Xiaodong Qi, Yongsheng Hu, Shujuan Ye, Lijie Wang, Jingjing Shi. Phase-controlled Lidar Array system. Chinese Patent No: 200910125574.0, 2009.
- 4 Qi Wang, Lijun Wang, Yun Liu, Jingjing Shi, Yongsheng Hu, Jun Zhang, Lijie Wang, Xiaodong Qi, Shujuan Ye. Phase-controlled Lidar Array. Chinese Patent No: 200910125580.6, 2009.

Academic Experience

2013.5-present

Ensembles of atoms in the presence of nanophotonic geometries

CQuIC, Department of Physics and Astronomy, University of New Mexico, Albuquerque, NM, USA

Supervised by Dr. Ivan Deutsch

A basic theory study of collective interactions in optical nanofiber systems with trapped cold atoms. In particular, this project is to develop mathematical models and their application to physics experiments that involve laser cooled atoms near the surface of a waveguide. The study is to fully explore the atom-light interface and its applications to quantum nondemolition measurement and spin squeezed state generations for precise measurement and quantum information processing.

2012-2014 **Teaching Assistant on physics courses at the University of New Mexico**

Teaching Assistant to Dr. Ivan H. Deutsch, Dr. Huaiyu Duan, Dr. Dinesh Loomba, etc.

Assistant to undergraduate- and graduate-level courses including Quantum Mechanics, Quantum Optics, Electromagnetic Field theory and Modern Physics.

2010.6-2012.7 **Theoretical Study on light-matter interaction in microcavities**

Department of Physics, Engineering Physics and Astronomy, Queen's University, Kingston, ON, Canada

Thesis advisor: Dr. Marc Dignam

A theoretical study of many-body interactions in cavity-QED systems, based on Green's function method, master equations and FDTD method. Methods and models developed can be used to study micro-cavity or waveguide-assisted luminescence and quantum states transmission among quantum dots, defects, polaritons and other artificial atoms.

2010.9-2012 **Teaching Assistant on undergraduate physics courses at Queen's University**

Department of Physics, Engineering Physics and Astronomy, Queen's University, Kingston, ON, Canada

Teaching Assistant to Dr. Anne Topper, Dr. James Stotz, Dr. Stephen Hughes and Dr. Lawrence Widrow, etc.

Participated teaching activities on undergraduate courses including Solid State Physics, Advanced Quantum Physics, Electronic and Magnetic Mechanics and General Relativity, Physics Lab.

2009 – 2010 **Theoretical Study on coherent semiconductor lasers**

Key Lab of Excited State Process, CIOMP, Changchun, Jilin, China

Research Assistant to Dr. Lijun Wang

Studied the theory and processing arts to realize nearly diffraction limited surface-emitting (SE) DFB semiconductor lasers and coherent vertical-cavity surface-emitting laser (VCSEL) arrays. Studied a closed-loop design method, considering many-body effects, electrical nonequilibrium transport effects and recombination effects in the semiconductor devices. Assumed project group management and simulating duties in this study.

2009-2010 **Single mode optical pumping Vertical-External-Cavity Surface-Emitting semiconductor lasers**

Key Lab of Excited State Process, CIOMP, Changchun, Jilin, China

Research Assistant to Dr. Lijun Wang & Dr. Li Qin

Studied mode control and thermal management theory and technology of Optical Pumping Vertical-External Cavity Surface-Emitting Semiconductor Lasers (OP-VECSELs). Investigated both design and experimental technology of semiconductor lasers and nanodevices.

- 2008-2009 **Study on high power 850nm VCSEL arrays**
Key Lab of Excited State Process, CIOMP, Changchun, Jilin, China
Research Assistant to Dr. Lijun Wang & Dr. Yongqiang Ning
Investigated the structure of 850 nm VCSEL devices and learned the MOCVD epitaxial thin film growth technology on III-V group semiconductor materials.
- 2006 – 2007 **Research on THz radiation sources**
THz Research Centre, SDUST, Qingdao, Shandong, China
Advised by Prof. Dehua Li
A theoretical study of THz radiation, generated by optical rectification method, and deduced radiation source design requirements for relevant experiments.
- 2006 **Undergraduate Student Research Program (USRP)** **SDUST, Qingdao, Shandong, China**
Trained on using computer-aided electrical circuit design software. Designed and welded a practical electrical system.
- 2005 – 2006 **College Physics Synthesized Lab** **SDUST, Qingdao, Shandong, China**
Laboratory Assistant to Prof. Peisen Li et al
Assisted on instruction of college level experiments in physics, including optics, mechanics, thermodynamics, electronics, and atomic physics.
- Travel and Visits**
- 2015.11 Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Beijing, China (Visit for 5 days and give a seminar presentation).
- 2013.6 University of Calgary, Edmonton, Alberta, Canada (Attend the Thirteenth Annual Canadian Summer School on Quantum Information).
- Internship**
- summer 2005 **Metal working practice & electronic working practice** **SDUST & Haier Co., Qingdao, China**
Independently assembled a radio receiver. Learned basic methods of metal fabrication processes.
Visiting intern to learn the production line operation about the PDP and LCD assembly and the casting process.
- Other Activities**
- 2015.2 **Julia Quantum Meetup @ SQuInT**
Organized the meetup to bring Julia users together to work on open-source projects for quantum science. Video records available at <http://juliaquantum.github.io/news/2015/03/berkeley-meetup-videos-online/>.
- 2015 **CQuIC website building**
Volunteer of website building for CQuIC and its research groups (<http://cquic.unm.edu/>).
- 2014-2015 **Julia Quantum organization**
Co-founder of the Julia Quantum organization (<http://juliaquantum.github.io/>) as an open-source community to build computational libraries for quantum science and technology.
- 2013-2015 **ICIQ community**
Co-founder of the ICIQ organization to provide open-access forum, study groups and news feeds for the quantum information and computation community.
- 2009 **International OSA Network of Students, China, 2009** **Changchun, China**
Edited and released the conference processings as a key organizer.
- 2008 **National Doctoral Academic Forum** **CUST, Changchun, China**
Volunteered this conference as a student member of OSA, focusing on new principles & technology of optical test.

- Summer 2006 **FPD Training Camp for Innovative Qualities and Abilities** **SDUST, Qingdao, China**
Co-organized with SDU & NUS, as Chairman of Physics Association of SDUST.
- 2005 **Exhibition of World Year of Physics** **SDUST, Qingdao, China**
Co-organized the exhibition of World Year of Physics as Chairman of Physics Association of SDUST.
- Summer 2004 **Status Investigation for National Teenagers' Ideological and Moral Education** **China**
Designed the survey questionnaire, investigated in Shandong Province, and analyzed the gathered data.

Experimental Skills Semiconductor planar processing (lithographic process, etch polishing, bonding), Design of experiments.

Computer Skills Programming tools for studying physics and mathematics: Matlab (major), Python, Julia, Mathematica, Maple, R, basic C/C++, GeoGebra, Lumerical FDTD Solutions, Comsol Multiphysics, PICS3D, LASTIP, RSoft Component Design Suit, Quantum Optics Toolbox (in Python and Matlab), MIT Photonic-Bands (MPB), Harminv, MEEP for simulating photonics, Lindo/Lingo;
LaTeX/markdown for document writing; basic PHP/Jekyll/HTML programming for website building;
Linux/Windows OS, with cluster management and high performance computation experiences.

Communities

- 2013-present **American Physics Society (APS)**, as a student member.
- 2008 –present **Optical Society of America (OSA)**, as a student member, and former member of the Academic Section in CIOMP-OA Student Chapter (2008-2010).
- Since 2011 Invited member of **Benji Bear & Friends**, an amateur community for Theory of Everything.
- 2005 – 2006 **Physics Association in SDUST**, as the Chairman.

Honors and Scholarships

- 2013-present Research Assistantship at the University of New Mexico.
- 2012-2014 Scholarships for being a Teaching Assistant at the University of New Mexico.
- 2015 DAMOP student travel grant (\$500) from APS.
- 2015 GPSA Student Research Grant for Spring 2015 (\$500, to support to present the research results in the SQuInT workshop).
- 2010-2012 Carl Reinhardt Fellowship.
- 2008 Certificate of **Excellent Tri-good Student of Chinese Academy of Sciences** (top 1% in CAS), honored by Graduate School of the Chinese Academy of Sciences.
- 2008 “A Theoretical Research on Generation of THz Radiation via Optical Rectification”- **Excellent Bachelor Thesis in Shandong Province**, awarded to Top 100 students with academic thesis in Shandong Province by Academic Degrees Committee of Shandong Province and Shandong Province Office of Education.
- 2007 Certificate of **Superior Talent in Scientific & Technical Innovation Activities of SDUST**.
- 2006 **First Prize** in Shandong contest area of **China Undergraduate Mathematical Contest in Modeling**, awarded by Higher Education Department of Shandong Province Office of Education, CSIAM and Shandong Contest Area Organizing Committee of CUMCM.
- 2003 – 2007 **Presidential Scholarship** and many other scholarships in SDUST.

Personal

Badminton, table tennis and hiking.