Dr. Xiaodong Qi
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Education

2012–2018 **University of New Mexico** **Albuquerque, NM, USA**
PhD at the *Center for Quantum Information and Control (CQuIC)* in Theoretical Physics.
Dissertation: Dispersive quantum interface with atoms and nanophotonic waveguides. Advisor: Prof. Ivan H. Deutsch, DOI: 10.5281/zenodo.1216258
GPA: **3.9**.

2010 – 2012 **Queen's University** **Kingston, ON, Canada**
M.Sc. on *Quantum dots, nanophotonics, cavity-QED and computational physics* in Condensed Matter Physics.
Thesis: The effects of multi-exciton interactions on optical cavity emission. Advisor: Prof. Marc Dignam
Overall GPA: **3.9**.

2007 – 2010 **Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences** **Changchun, Jilin, China**
M.S. on *semiconductor nanophotonics* in Condensed Matter Physics Theory.
Thesis: Study on high-power coherent semiconductor laser arrays. Advisor: Prof. Lijun Wang
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. on *photoelectronics theory* in Applied Physics.
Thesis: A theoretical analysis of optical-to-THz conversion efficiency via optical rectification.
Advisor: Prof. Dehua Li
Overall GPA: **86.0**/100, Major GPA: **88.7**/100, Rank: 2/63.

Research Interests

Quantum Simulations, Quantum Optics, Quantum Computing, Quantum Measurement, Quantum Control, Quantum Software, and Nanophotonics.

Publications

2018 **Xiaodong Qi**, Yuan-Yu Jau, and Ivan H. Deutsch. Enhanced cooperativity for quantum-nondemolition-measurement--induced spin squeezing of atoms coupled to a nanophotonic waveguide, *Phys. Rev. A* 97, 033829 (2018)

2016 **Xiaodong Qi**, Ben Q. Baragiola, Poul S. Jessen, and Ivan H. Deutsch. Dispersive response of atoms trapped near the surface of an optical nanofiber with applications to quantum nondemolition measurement and spin squeezing, *Phys. Rev. A* 93, 023817 (2016)

2011 Guangyu Liu, Yongqiang Ning, **Xiaodong Qi**, etc. 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, etc. 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**, etc. 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 (光整流法产生 THz 辐射转化率的理论分析). *Science in China series E*, 39(4), 2009, 745-750.

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.

Other Selected Publications

2016 **Xiaodong Qi.** Put everything on a quantum circuit--part I (quantum dynamics revisited), A tutorial to mentored students for Google Summer of Code projects by JuliaQuantum,

https://purl.org/qxd/en/2016/07/23/put-everything-on-a-quantum-circuit-part-i.html

2014 **Xiaodong Qi**, etc.. Linear Optical Quantum Computing, Wikipedia article, https://en.wikipedia.org/wiki/Linear_Optical_Quantum_Computing

2011 **Xiaodong Qi**. Modeling and deciphering on two spin-polariton entanglement experiments on NV centers of diamond. arXiv:1111.5532 [physics.gen-ph].

Conferences

2018 **Xiaodong Qi**, Jongmin Lee, Yuan-Yu Jau, and Ivan H. Deutsch. Enhanced cooperativity of quantum measurement for spin squeezing of atoms coupled to a nanophotonic waveguide. *20th Annual SQuInT Workshop 2018*, Santa Fe, NM, USA.

2017 **Xiaodong Qi**, David Melchior, Poul S. Jessen, Jongmin Lee, Yuan-Yu Jau, and Ivan H. Deutsch. Generation of atomic spin squeezed states in nanophotonic waveguides using QND measurement. *48th Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics*, 62(8), 2017, Sacramento, California, USA.

2017 **Xiaodong Qi**, Jongmin Lee, Yuan-Yu Jau, and Ivan H. Deutsch. Spin squeezing on nanophotonic waveguides. *19th Annual SQuInT Workshop 2017*, Baton Rouge, Louisiana, USA.

2016 **Xiaodong Qi**, Ben Q. Baragiola, Poul S. Jessen, Ivan H. Deutsch and Yuan-Yu Jau. Dispersive response theory for waveguide-trapped atoms: quantum nondemolition measurement and spin squeezing. Gordon Research Conference -- Quantum Entanglement, New States of Matter, and Correlated Dynamics, Easton, MA, US.

2016 **Xiaodong Qi**, Ben Q. Baragiola, Poul S. Jessen, Ivan H. Deutsch and Yuan-Yu Jau. Dispersive response theory for waveguide-trapped atoms: quantum nondemolition measurement and spin squeezing. Gordon Research Seminar – Quantum Simulation, Entanglement and Dynamics of Condensed Matter Systems and Field Theories, Easton, MA, US.

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.

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.

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.

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.

2014 **Xiaodong Qi**, Ben Q. Baragiola, Poul S. Jessen, Ivan H. Deutsch. Dispersive mode response due to nanofiber-trapped atoms. *16th Annual SQuInT Workshop*, Santa Fe, NM, USA.

2009 Dehua Li, **Xiaodong Qi** and Shenggang Liu. A theoretical analysis of optical-to-THz conversion efficiency via optical rectification. *IONS China 2009*, Changchun, Jilin, China.

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), Wuhan, China.

Invited Talks and Department Presentations

2018 *Seminar talk at the Hefei National Laboratory of Physical Sciences at the Microscale, Division of Quantum Physics and Quantum Information, Hefei, China*. Visit the National Labs, the Key Lab of Quantum Information, and USTC from June 26 to 27.

2018 *Seminar talk at the Wuhan Institute of Physics and Mathematics, Wuhan, China*. Visit WIPM from June 23 to 25.

2018 *Colloquium talk at the Institute of Laser Spectroscopy, Shanxi University, Taiyuan, China.* Visit Shanxi University from June 18 to 22.

2018 *Seminar talk at the Department of Physics, Tsinghua University, Beijing, China.*

2018 *Institute Seminar of the Academy of Mathematics and Systems Science*, AMSS, Chinese Academy of

Sciences, Beijing, China. “Dispersive quantum interface and control of atoms and nanophotonic waveguides”. Visit AMSS from June 12 to 17.

2018 *Dissertation defense talk*, Albuquerque, NM, USA. “Dispersive quantum interface with atoms and nanophotonic waveguides”.

2016 *CQuIC seminar*, Albuquerque, NM, USA. “Spin squeezing on optical nanofiber and waveguide platforms”.

2015 *Institute of Physics Seminar*, IPhy, Chinese Academy of Sciences, Beijing, China. “Dispersive strong atom-photon coupling in a nanofiber geometry with applications to QND measurement and spin squeezing”.

2015 *Institute Seminar of Hefei National Lab of Microscale Matter Physics*, USTC, Hefei, Anhui, China. “Dispersive strong atom-photon coupling in a nanofiber geometry with applications to QND measurement and spin squeezing”.

2015 *Julia Meetup public lecture @ USTC*, Hefei, Anhui, China. “JuliaQuantum and software ecosystem in the perspective of quantum information science”.

2015 *Institute Seminar of the Key Laboratory of Quantum Information*, USTC, Hefei, Anhui, China. “Dispersive strong atom-photon coupling in a nanofiber geometry with applications to QND measurement and spin squeezing”.

2015 *Institute Seminar of the Academy of Mathematics and Systems Science*, AMSS, Chinese Academy of Sciences, Beijing, China. “Quantum correlations generated by QND measurement on an ensemble of atoms in a nanofiber geometry”.

2015 *CQuIC Seminar*, Albuquerque, NM, USA. “Dispersive strong atom-photon coupling in a nanofiber geometry with applications to QND measurement and spin squeezing”.

2015 *Julia Meetup*, Berkeley, CA, USA. “JuliaQuantum and opening remarks for the Julia meetup”.

2014 *PhD candidate exam presentation*, Albuquerque, NM, USA. “Nanofiber quantum interface with trapped atoms”.

2013 *CQuIC seminar*, Albuquerque, NM, USA. “Theoretical study of collective emissions using Green’s function method”.

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.

Certificate of Accomplishment

2014 **Machine Learning**, Grade Achieved: 100.0%, Online Course Statement of Accomplishment signed by Prof. Andrew Ng, Computer Science Department, Stanford University.

Research Projects

2017-prese **A theoretical study on superrandiance, subradiance and PT-symmetry of an ensemble of atoms trapped near a nanofiber/waveguide**

CQuIC, University of New Mexico, Albuquerque, NM, USA

In collaboration with Prof. Perry Rice from the Miami University

We study the collective effect due to photon scattering among atoms trapped nearby an optical nanofiber/waveguide as an optical lattice. I am on charge of the detailed analytical and numerical studies. I have confirmed the collective scattering of photons among atoms can be ignored in the dispersive regime which we have been using in our previous studies. One direction is to study the PT-symmetry of the atom-waveguide interface by controlling the asymmetric branching of super- and subradiance effects across the exceptional point. This study could lead to applications including high-efficient quantum memories with atom-nanophotonic interfaces, and shadow insights on fundamental theory of quantum phase transition and state transmissions. Work in progress.

2013-2018 **Dispersive interaction theory for atom-nanophotonic waveguide interface**

CQuIC, University of New Mexico, Albuquerque, NM, USA

Supervised by Prof. Ivan Deutsch, in collaboration with Prof. Poul Jessen's group at University of Arizona, Prof. Yuan-Yu Jau's group at Sandia National Labs and Prof. Alejandro Manjavacas from UNM

We develop theories to study the quantum interface with nanophotonic waveguides and trapped cold atoms, particularly to study the state preparation, cooling, control and measurement protocols for quantum information processing applications. I developed the main theory, coded simulation programs, participated research discussions and wrote paper manuscripts. We have derived the Heisenberg-Langevin equations of multiple-level atoms, the input-output relationship of the guided modes of waveguides, and a set of stochastic master equations of polarimetry spectroscopy measurement process to fully describe the quantum dynamics of atom-light interactions and quantum nondemolition (QND) measurement process in the dispersive regime. We use the Green's function language to describe the photon emissions from atoms and have applied our theory to optical nanofiber and square waveguide platforms. We have proposed a few protocols based on our theory to implement sensitive atom number detection, QND measurement and spin squeezing based on birefringence and Faraday effects for the clock state and stretched state of alkali atoms, which are going to be tested in the labs of Prof. Poul Jessen and Prof. Yuan-Yu Jau. We show in theory that the atom-light coupling strength is orders of magnitude higher using a nanophtonic waveguide compared to the free-space case due to the tight confinement of field. We show that one can achieve a large total OD or cooperativity by using a lot of atoms in the dispersive regime even though the decay rate coupled to the guided modes of the waveguide is not that great compared to the cavity case. We have discovered the anisotropy of the guided modes of a dielectric waveguide break the symmetry of atomic quantum transitions so that one can find the optimal choice of quantization axis to commit precise quantum measurements and spin squeezing; we have also generalized the idea of cooperativity for the waveguide interface coupled to many atoms to optimize the geometry of probes for strong atom-light coupling, and showed that one doesn't have to trap atoms at the strongest positions to realize strong spin squeezing. Our simulations suggest the spin squeezing can reach up to ~7dB for the nanofiber and ~13dB for a square waveguide with 2500 atoms trapped at realistic positions near the waveguides, and collective spin states beyond the Gaussian state limit could be attainable with other tricks applied. This study establishes the theoretical foundation to quantum measurement, control and state preparation of alkali atoms using guided light of a nanophotonic waveguide, and provides a guideline to optimize the design of nanophotonic structures to implement quantum information processing protocols in the dispersive regime. We continue to work on a QND measurement and spin squeezing protocol with two-color probes to fully cancel the tensor light shifts considering the Purcell effect and some experimental details.

2017-present **An efficient laser cooling and state preparation protocol on nanophotonic platforms**

Supervised by Prof. Ivan Deutsch, in collaboration with Prof. Poul Jessen at University of Arizona and potentially with Prof. Luis Orozco at JQI, University of Maryland and his collaborators elsewhere

We study the theory of combining both the laser cooling and universal state preparation of atoms trapped in an optical lattice near the surface of a nanophotonic waveguide—particularly using resolvable Raman sideband cooling and quantum state engineering for open quantum systems. I provided my research ideas, and conducted the theoretical study. The challenge is that the field near a nanophotonic waveguide may not be purely circularly polarized and the quantized motional levels of the trapped atoms are not equally spaced which are usually required by conventional resolvable sideband cooling technique. One thing that I think it might work to overcome this difficulty is to use the Floquet theory to design a periodical optical pumping drive using the guided waveguide modes and/or a perpendicularly propagating homogeneous external light field so that the target state in the joint Hilbert space spanned by the internal hyperfine manifold and the external motional levels of the atoms is a dark state in the optical pumping process. This direction was inspired by the private communications with Prof. Luis Orozco and his students who had observed the nonlinear mechanical oscillations of atoms trapped around an optical nanofiber, and our theory can be tested in the labs.

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

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

Thesis advisor: Prof. Marc Dignam

A theoretical study of multiple scattering in cavity-QED systems, which was motivated to develop robust single-photon sources in presence of randomness using the strong coupling of quantum dots (QDs) and photons in a photonic crystal cavity. I derived the N-body Green's function tensor using the Dyson equations and developed a fast numerical algorithm to calculate the N-body Green's function tensor of randomly distributed quantum dots in a photonic crystal cavity using FDTD method. In the weak excitation limit, I derived the analytical solution of the N-body Green's function using Born approximation. I also derived the luminescence spectrum using the master equation method and quantum regression theorem. The luminescent spectrum was analyzed in the strong and weak interaction regimes due to the photon scattering among quantum dots in presence of a cavity. Assuming a Gaussian distribution of the resonances of quantum dots coupled to the cavity, I find the inhomogeneous spectrum broadening obeys the area law based on Monte

Carlo simulations in the mean-field limit. Methods and models developed in this project can be used to study luminescence and quantum states transmission among natural or artificial atoms in presence of optical cavities or waveguides when photon scattering is significant.

2009 – 2010 **A review and theoretical Study on noble coherent semiconductor lasers**

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

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

We 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. In details, we studied a closed-loop design method, considering many-body effects, electrical nonequilibrium transport effects and recombination effects in the semiconductor devices. Based on the mathematical property of a hyperbola that the path difference from the curve to the two foci is a constant, we proposed an electric pumped SE-DFB geometry with curved gratings for high-power and high-brightness semiconductor lasers. This geometry with a large surface area could overcome the rollover problem due to finite gain volume and heating of conventional semiconductor lasers. We used coupled mode method to study the optical properties of some solvable DFB laser geometries and investigated the state-of-art progress of the SE-DFB lasers with curved gratings and their advantages and disadvantages over other types of coherent semiconductor laser arrays. I was on charge of the overall project investigation and theoretical analysis in this project.

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 Prof. Lijun Wang & Prof. Li Qin

Studied mode control and thermal management theory and technology of Optical Pumped 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 studied the MOCVD epitaxial thin film growth technology on III-V group semiconductor materials. Provided basic semiconductor laser design and simulations to our experimental collaborators in the lab.

2006 – 2007 **Research on THz radiation sources**

THz Research Centre, SDUST, Qingdao, Shandong, China

Advised by Prof. Dehua Li

We theoretically studied the THz radiation generation in nonlinear optical materials via optical rectification effect, and proposed critical requirements for the bulk materials to be able to emit THz radiation efficiently and suggested some of the best source materials and corresponding dimensions based on the optimal efficiency simulations on known commonly used materials for relevant experiments to be implemented in the lab.

Open-source Initiatives

2014-2016 **Cofounder of JuliaQuantum –** an umbrella organization of Julia Computing for building high-performance-computing libraries for quantum science and technology using the high-level dynamic programming language Julia. Website: https://JuliaQuantum.github.io/

Some of my highlighted activities in the organization are below:

- Facilitate the sustainable growth of the organization by organizing various events, establishing connections to Julia Computing, Google, NumFOCUS and other entities for funding and opportunities to recruit members from institutions and industries and to develop packages, maintain websites, and organize discussions regarding the overall roadmap of the organization.
- Lead some of the theoretical designs of libraries so that our libraries are fundamental and useful. I have been working on the unified quantum circuit model for quantum simulations and quantum control packages with the capability to simulate quantum error correction codes, and discussing the theory of memory-efficient (for both classical and near-term quantum computers) approaches for simulating large quantum systems—including symbolic algebra, computing without actually calculating everything using symmetries and code abstractions, truncating Hilbert space using tensor network representation and other tricks. These frameworks will be released after my graduation as open-science projects.

- Organized and funded some Julia meetups including one in Berkeley and one in USTC to bring people working in quantum science and in Julia package development together, and let more quantum people be aware of JuliaQuantum's efforts.
- Provide opportunities to researchers in quantum science for them to give feedback to Julia package developers to make Julia packages friendly to relevant users. For example, in the 2015 Berkeley meetup, we introduced Julia to SQuInT workshop participants who asked the Convex.jl developers led by David Zeng from Stephen Boyd's group from Stanford to support complex numbers. After 2 years of thorough development, the Convex.jl package can fully handle complex numbers which are commonly used in quantum information.
- Help mentor students to develop JuliaQuantum libraries using the Google Summer of Code funding.
- Build alliances with developers of quantum simulation packages written in languages other than Julia for Julia users to run their programs easily from Julia interface. See QInfer.org for example.
- Encourage members to visit each other and participate JuliaCon to exchange ideas and collaborate on our projects. I have invited Dr. Nikolas Tezak from Prof. Mabuchi's group in Stanford and now working for Rigetti Computing to visit CQuIC in 2016 to deliver a seminar talk and collaborate on the theoretical design of quantum information libraries.

2015-present **Cofounder of CQuIC's open-source organization and co-organized scientific programming workshops and trainings for CQuIC members.** See https://cquic.github.io

Summer Studies and Internships

2018 Summer study on **Quantum Tensor Network Methods**, with main instructor Dr. Rafael Alexander, CQuIC, Albuquerque, NM, USA

2017 Summer study on **Quantum Chaos, Randomness, Scrambling and Scientific Computing Basics**, co-organized with Prof. Ivan Deutsch and a few other students, CQuIC, Albuquerque, NM, USA. https://purl.org/qxd/en/2017/05/20/2017-summer-study.html

2016 Summer study on **Advanced Topics in Quantum Optics II**, led by Prof. Ivan Deutsch and self-guided, CQuIC, Albuquerque, NM, USA. https://purl.org/qxd/en/2016/05/26/2016-summer-study-on-quantum-optics-II.html

2015 Summer study on **Computational Complexity**, led by Prof. Ivan Deutsch, CQuIC, Albuquerque, NM, USA.

2014 Summer study on **Convex Optimization**, led by Prof. Ivan Deutsch, CQuIC, Albuquerque, NM, USA.

2013 The **Thirteenth Annual Canadian Summer School on Quantum Information**, University of Calgary, Edmonton, Alberta, Canada.

2007, 2012 Lab training **on semiconductor planar processing** (lithographic process, etch polishing, bonding) in CIOMP, and then learned the theory of **Design of Experiments** in the Department of Mathematics and Statistics at Queen's University.

2006 **Undergraduate Student Research Program (USRP) on electric circuit board design and welding** at SDUST, Qingdao, Shandong, China.

2005 **Metal working practice & electronic working practice** at 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.

Institutional Service

2014-2018 IT assistant to CQuIC, particularly on managing high-performance computing resources and scientific programming trainings.

2015 CQuIC website building (http://cquic.unm.edu/).

2005,06,10,11,12,13 Teaching assistant to physics classes and labs. The classes I have been involved in include quantum optics, quantum physics, electromagnetic dynamics, modern physics, mathematical method, general physics labs and so on in graduate and undergraduate levels.

2009 Student organizer of the OSA conference of International Network of Students, China, 2009 in Changchun.

2008 Volunteer of the National Doctoral Academic Forum hosted in CUST, Changchun, China.

2006 Co-organizer of the FPD Training Camp for Innovative Qualities and Abilities hosted in SDUST, Qingdao, China, as the President of the Physics Association of SDUST.

2005 Co-organized the Exhibition of World Year of Physics hosted in SDUST, Qingdao, China, as the President of Physics Association of SDUST.

2004 Volunteer of the research project on Status Investigation for National Teenagers' Ideological and Moral Education in China.

Computer Skills

Professional on scientific programming with a full skill suit on high-performance parallel computing with PBS/Torque and MPI tools, version control collaboration skills and script automation skills;
Master multiple programming languages and tools for studying physics and mathematics: Matlab, Julia, Python, Mathematica, Maple, R, 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;
Master on LaTeX/markdown/Jupyter notebook for document writing and basic PHP/Jekyll/HTML programming for website building;
Familiar with sufficient multimedia tools on Linux and Windows.

Communities

2013-present **American Physics Society (APS)**, as a student member.
2013-present Cofounder of **JuliaQuantum** open-source quantum software organization and a few others including **ICIQ** and **CQuIC@Github, a** member of **JuliaCN** open-source organization**.**
2008 –2017 **Optical Society of America (OSA)**, as a student member, and former member of the Academic Section in CIOMP-OSA 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 President.

Honors and Scholarships

2013-2018 Research Assistantship at the University of New Mexico.
2016 S-CAP award for research traveling granted at the University of New Mexico.
2015 DAMOP student travel grant from APS.
2015 GPSA Student Research Grant for Spring 2015 to support to present research results in the SQuInT workshop.
2012-2014 Teaching Assistantship at the University of New Mexico.
2010-2012 Carl Reinhardt Fellowship at Queen's University.
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 numerous other scholarships won in SDUST.

References

Professor Ivan Deutsch
Research Supervisor and Mentor at the University of New Mexico
Regents' Professor at the Center for Quantum Information and Control (CQuIC)
University of New Mexico
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Professor Carlton Caves
Distinguished Professor, Director of the Center for Quantum Information and Control (CQuIC)
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Professor Poul Jessen
Main experimental collaborator on the nanofiber projects
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